



WCTC

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THE DESTINATION FOR THE TOP SURGICAL SCIENCE

83RD

ANNUAL MEETING

PROGRAM BOOK

83RD ANNUAL MEETING OF AAST AND
CLINICAL CONGRESS OF ACUTE CARE SURGERY
AND 7TH WORLD TRAUMA CONGRESS

SEPTEMBER 11-14, 2024

HISTORICAL BACKGROUND OF AAST



The American Association for the Surgery of Trauma started with conversations at the meetings of the Western Surgical Association and Southern Surgical Association in December 1937. The 14 founders, who were present at one or both of these meetings, subsequently invited another 68 surgeons to a Founding Members meeting in San Francisco on June 14, 1938. The first meeting of the AAST was held in Hot Springs, Virginia, in May, 1939, and Dr. Kellogg Speed's first Presidential Address was published in *The American Journal of Surgery* 47:261-264, 1940. Today, the Association holds an annual scientific meeting, owns and publishes *The Journal of Trauma and Acute Care Surgery* and *Trauma Surgery and Acute Care Open*, and has over 2,200 members from over 50 countries.

SCAN BELOW TO VIEW

2024 AAST ANNUAL MEETING DISCLOSURES



AN EXCEL VERSION CAN ALSO BE DOWNLOAD HERE:
<https://www.aast.org/annual-meeting/program>

CME FOR THE 83RD ANNUAL MEETING OF AAST & CLINICAL CONGRESS OF ACUTE CARE SURGERY AND 7TH WORLD TRAUMA CONGRESS

Please see the CME information for the AAST meeting here



<https://www.aast.org/annual-meeting/cme-information>

Schedules



83RD ANNUAL MEETING OF THE AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA AND CLINICAL CONGRESS OF ACUTE CARE SURGERY

September 11 - 14, 2024 • Las Vegas, NV

GENERAL
SCIENTIFIC
PROGRAM
SCHEDULE

MONDAY, SEPTEMBER 9, 2024

7:30 AM - 4:00 PM Emergency Surgery Course (Additional fee)
Skyview 2

TUESDAY, SEPTEMBER 10, 2024

7:30 AM - 4:00 PM Emergency Surgery Course (Additional fee)
Skyview 2

7:30 AM - 4:30 PM AAST Board of Managers Meeting
Champagne 2

7:30 AM - 6:00 PM Registration
Registration Desk

8:00 AM - 5:00 PM Military Symposium
Skyview 6

5:00 PM - 6:00 PM Military Reception
Skyview 5

9:30 AM - 1:00 PM Geriatric Committee: Falls Prevention Event
Off Site

Various Times Pre-sessions
The 2024 AAST Neurocritical Care Update and Board Review Course,
Hands-on Laparoscopic Common Bile Duct Exploration Seminar,
Integrating Advanced Practice Providers in Acute Care Surgery:
Considerations, Solutions, and Fresh Perspectives

WEDNESDAY, SEPTEMBER 11, 2024

6:30 AM - 7:30 AM Resident/Student/In-training
Fellow Breakfast
Vendome A

6:30 AM - 7:45 AM Committee Meetings I
ACS Program Directors
Communications Committee
Critical Care Committee
DEI Committee
International Committee
Military Committee
Prevention Committee

6:30 AM - 7:00 PM

Registration
Registration Desk

7:30 AM - 8:30 AM

Breakfast
Paris Foyer

11:00 AM - 7:10 PM

Exhibit Hours
Rivoli BR

8:00 AM - 8:45 AM

Welcome
Concorde Ballroom

8:45 AM - 9:45 AM

Session I: Plenary Papers 1-3

Moderator: Patrick Reilly, MD; **Recorder:** Karen Brasel, MD, MPH
Concorde Ballroom

Paper 1

8:45 AM - 9:05 AM

TRAUMA CENTERS AS HEALTH EQUITY BEACONS: MITIGATING THE EFFECTS OF SOCIAL VULNERABILITY ON INJURY MORTALITY

Presenter: Stephanie Bonne, MD

Discussant: Cherisse Berry, MD

Paper 2

9:05 AM - 9:25 AM

THE ECONOMIC IMPACT OF DECREASING STATE TRAUMA MORTALITY ON LIFETIME PERSONAL INCOME AND STATE TAX REVENUE

Presenter: Dennis Ashley, MD

Discussant: Joseph Minei, MD, MBA

Paper 3

9:25 AM - 9:45 AM

ASSOCIATION OF PRE- AND POST-INJURY MENTAL HEALTH WITH LONG TERM CLINICAL AND FINANCIAL OUTCOMES

Presenter: Patrick Johnson, MD, MPH

Discussant: David Livingston, MD

9:45 AM - 10:15 AM

**Session II: 7th World Trauma Congress
Keynote Address**

Presenter: Yasuhiro Otomo, MD, PhD; **Moderator:** Raul Coimbra, MD, PhD
Concorde Ballroom

10:15 AM - 11:55 AM

Session III: Papers 4-8

Moderator: Christine Gaarder, MD, PhD; **Recorder:** Ryan Dumas, MD
Concorde Ballroom

Paper 4

10:15 AM - 10:35 AM

IS ASPIRIN AN EFFECTIVE THROMBOPROPHYLAXIS IN HIGH-RISK PATIENTS? A COMPREHENSIVE SUBPOPULATION ANALYSIS OF THE PREVENT CLOT STUDY

Presenter: Anthony DeSantis, MD

Discussant: Rishi Kundi, MD

Paper 5

10:35 AM - 10:55 AM

JUST BECAUSE WE CAN DOESN'T MEAN WE SHOULD: ONE YEAR MORTALITY FOLLOWING TRACHEOSTOMY IN TRAUMATICALLY INJURED OLDER ADULTS

Presenter: Heather Kregel, MD, MS

Discussant: Lisa Kodadek, MD

Paper 6

10:55 AM - 11:15 AM

NOT ALL CALL IS CREATED EQUALLY: THE IMPACT OF CULTURE AND GENDER ON BURNOUT RELATED TO IN-HOUSE CALL

Presenter: Jamie Coleman, MD

Discussant: M. Margaret Knudson, MD

Paper 7

11:15 AM - 11:35 AM

NATIONAL ESTIMATES OF FINANCIAL TOXICITY BEFORE AND AFTER TRAUMATIC INJURY

Presenter: Nina Clark, MD

Discussant: Patrick Murphy, MD, MPH, MS

Paper 8

11:35 AM - 11:55 AM

INTEGRATED VASCULAR TRAINING MAY NOT PREPARE GRADUATES TO CARE FOR VASCULAR TRAUMA PATIENTS

Presenter: Rishi Kundi, MD

Discussant: Leah Tatebe, MD

11:55 AM - 12:15 PM

Break in the Exhibit Hall
Rivoli BR

12:15 PM - 1:15 PM

Session IV: Presidential Address:

Presenter: Patrick Reilly, MD; "Be All You Can Be"
Concorde Ballroom

1:00 PM - 8:00 PM

AAST Saloon
Rivoli BR

1:15 PM - 2:30 PM

Lunch Sessions I

Educational Evolution – The Integration of New Surgical Educational Platforms
Optimizing Your Output- Advanced Medical Billing and Coding
Palliative Care for the Acute Care Surgery: What you need to know
Trauma Surgeons Embracing Pediatric Challenges in Global Resource-Limited Settings
Trauma Survivors Network (TSN) – how does it really work?

1:15 PM - 2:30 PM

Lunch on own (if not attending a lunch session)

1:15 PM - 2:15 PM

Lunch: Product Theatre
Hosted by Avita Medical
(Attendance is Limited)
Rivoli BR, Product Theatre

2:30 PM - 6:10 PM

Session VA: Papers 9-19

Moderator: Ben Zarzaur, MD, MPH; **Recorder:** Deborah Stein, MD, MPH
Concorde Ballroom A/B

Paper 9

2:30 PM - 2:50 PM

PROPHYLACTIC ANTIBIOTICS IN NON-OPERATIVE FACIAL FRACTURES: AN AAST MULTICENTER TRIAL

Presenter: Joseph D. Amos, MD

Discussant: Christopher Dente, MD

Paper 10

2:50 PM - 3:10 PM

ENHANCING TRAUMA OUTCOMES IN INDIA: THE IMPACT OF GOOD SAMARITAN LAW

Presenter: Mayur Narayan, MD, MPH, MBA, MHE

Discussant: Christopher Dodgion, MD, MSPH, MBA

Paper 11

3:10 PM - 3:30 PM

OUTCOMES AMONG PATIENTS WITH ISOLATED TRAUMATIC BRAIN INJURY BEFORE & AFTER MEDICAID EXPANSION

Presenter: Michael Rallo, BS

Discussant: Amelia Maiga, MD, MPH

Paper 12

3:30 PM - 3:50 PM

THE ECONOMIC IMPACT OF LEGAL ADVOCACY FOR SURVIVORS OF FIREARM INJURY

Presenter: Tanya Zakrison, MD, MPH

Discussant: John Scott, MD, MPH

Paper 13 **3:50 PM - 4:10 PM**

ACCURACY, RELIABILITY, AND UTILITY OF THE EFASST EXAM IN THE SETTING OF PENETRATING THORACIC TRAUMA

Presenter: Miharuru Arase, MD

Discussant: Kyle Kalkwarf, MD

Paper 14 **4:10 PM - 4:30 PM**

PELVIC ANGIOEMBOLIZATION DOES NOT INCREASE PELVIC ISCHEMIC COMPLICATIONS: A MULTICENTER AAST STUDY

Presenter: Michael Artigue, MD

Discussant: Mark Seamon, MD

Paper 15 **4:30 PM - 4:50 PM**

COAGULATION STUDIES OF A NOVEL CARDIOVASCULAR SUPPORT FLUID (VBI-1) FOR USE IN HEMORRHAGIC SHOCK: AUGMENTATION OF THE BLOOD SUPPLY

Presenter: Nathan Carpenter, MD

Discussant: Mitchell Cohen, MD

Paper 16 **4:50 PM - 5:10 PM**

FAR FROM HOME: PATIENT PREFERENCES AND ACCEPTABLE RISK TOLERANCE FOR LOCAL VS REGIONAL TRAUMA CARE

Presenter: Patrick McGillen, MD, MS

Discussant: Adil Haider, MD, MPH

Paper 17 **5:10 PM - 5:30 PM**

THE INTERACTION BETWEEN GERIATRIC VULNERABILITY & SOCIAL SUPPORT: VARIATIONS IN COMMUNITY ENGAGEMENT DRIVE RECOVERY AMONG OLDER ADULT TRAUMA PATIENTS

Presenter: Cheryl Zogg, MD, PhD, MSPH, MHS

Discussant: Tasce Bongiovanni, MD, MPP, MHS

Paper 18 **5:30 PM - 5:50 PM**

COGNITIVE OUTCOMES AND NEUROSTIMULANTS AMONG THE CEREBRALLY INJURED & OBTUNDED IN THE UNITED STATES: THE CONSCIOUS STUDY

Presenter: Brett Tracy, MD

Discussant: Mayur Patel, MD, MPH

Paper 19 **5:50 PM - 6:10 PM**

INVISIBLE INJURIES: ASYMPTOMATIC SPINE FRACTURES AFTER FALLS FROM HEIGHT

Presenter: William Johnston, MD

Discussant: Brian Yorkgitis, DO

2:30 PM - 6:10 PM

Session VB: Papers 20-30

Moderator: Joseph Cuschieri, MD; **Recorder:** Susan Evans, MD

Concorde Ballroom C

Paper 20 **2:30 PM - 2:50 PM**

KETAMINE INFUSION FOR PAIN CONTROL IN SEVERELY INJURED PATIENTS: RESULTS OF A RANDOMIZED CONTROLLED TRIAL.

Presenter: Thomas Carver, MD

Discussant: John Harvin, MD, MS

Paper 21 **2:50 PM - 3:10 PM**

ANTI XA GUIDED THROMBOPROPHYLAXIS IN CRITICAL TRAUMA PATIENTS IS ASSOCIATED WITH LESS VTE, EXPERIENCE FROM A TERTIARY CARE TRAUMA CENTER

Presenter: Ahmad Kloub, MD

Discussant: Galinos Barmparas, MD

Paper 22 **3:10 PM - 3:30 PM**

IMPACT OF AMERICAN COLLEGE OF SURGEONS TRAUMA VERIFICATION ON A STATEWIDE QUALITY COLLABORATIVE

Presenter: Dennis Ashley, MD

Discussant: Eileen Bulger, MD

Paper 23 **3:30 PM - 3:50 PM**

HIGH INTENSITY TIME SENSITIVE INTERVENTIONS IN GERIATRIC TRAUMA ACTIVATIONS: A MULTICENTER STUDY

Presenter: Samir Fakhry, MD Discussant: Joseph Posluszny, MD

Paper 24 **3:50 PM - 4:10 PM**

TXA IMPACT ON PLATELET ADHESION TO THE ENDOTHELIUM AFTER SHOCK CONDITIONS: A PROTECTIVE EFFECT?

Presenter: Alison Karadjoff, DO Discussant: Matthew Kutcher, MD, MS

Paper 25 **4:10 PM - 4:30 PM**

CLINICAL MANAGEMENT OF BLUNT CEREBROVASCULAR INJURY-RESULTS FROM THE AAST PROSPECTIVE OBSERVATIONAL VASCULAR INJURY TRIAL (PROOVIT)

Presenter: Joshua Crapps, MD Discussant: Walter Biff, MD

Paper 26 **4:30 PM - 4:50 PM**

IMPACT OF STATE ADMISSION STANDARDS ON PATIENTS WITH ISOLATED RIB FRACTURES

Presenter: Maxwell Braverman, DO Discussant: Charles Butts, MD

Paper 27 **4:50 PM - 5:10 PM**

SOCIAL SUPPORT HELPS MITIGATE DISPARITIES ASSOCIATED WITH VARIATIONS IN NEIGHBORHOOD VULNERABILITY AMONG TRAUMA PATIENTS

Presenter: Saba Ilkhani, MD, MPH Discussant: Nina Glass, MD

Paper 28 **5:10 PM - 5:30 PM**

UNCOVERING THE ROLE OF PLATELET DRIVEN THROMBO-INFLAMMATION IN POST-TRAUMATIC ARDS

Presenter: Rachael Callcut, MD, MSPH Discussant: Timothy Pritts, MD, PhD

Paper 29 **5:30 PM - 5:50 PM**

DYNAMIC CHANGES IN BLEEDING SITES: EVALUATING CONTRAST EX-TRAVASATION ON COMPUTED TOMOGRAPHY AND ANGIOGRAPHY IN PELVIC FRACTURES

Presenter: Fumi Inamasu Discussant: Amy Hildreth, MD

Paper 30 **5:50 PM - 6:10 PM**

RESUSCITATION TRIGGERS AND OUTCOMES IN A BLOOD-CONSTRAINED TRAUMA ENVIRONMENT: ESTABLISHING TARGETS FOR EVIDENCE-BASED GUIDELINES

Presenter: Matthew Driban, BS Discussant: James Byrne, MD, PhD

3:00 PM - 3:05 PM

WTC Session: Keynote

Moderator: Raul Coimbra, MD, PhD
Vendome B/C

3:05 PM - 3:30 PM

WTC Session: WHO Consultation on the Global Strategy and Action Plan for Emergency, Critical and Operative Care (ECO)

Keynote Speaker: Teri Reynolds, MD, MS WHO

3:30 PM - 5:00 PM

WTC Session: Scientific Session I: Trauma Resuscitation I

Moderator: Jonathan Meizoso, MD, MSPH
Vendome B/C

5:05 PM - 6:20 PM

**WTC Session: Scientific Session II:
Trauma Education I**

Moderator: Allison Berndtson, MD
Vendome B/C

6:10 PM - 7:10 PM

Welcome Reception with Exhibitors
Rivoli BR

7:10 PM - 8:30 PM

WITS Reception
Vendome A

THURSDAY, SEPTEMBER 12, 2024

6:15 AM - 7:15 AM

DEI Networking Breakfast
Vendome A

6:15 AM - 7:15 AM

Committee Meetings II
Acute Care Surgery Committee
Education Committee
Geriatrics Committee
Healthcare Economics Committee
Patient Assessment Committee
Pediatric Committee

7:00 AM - 8:00 AM

Breakfast in Exhibit Hall
Rivoli BR

7:00 AM - 2:30 PM

Exhibits Open
Rivoli BR

7:00 AM - 2:00 PM

Registration
Registration Desk

8:00 AM - 2:00 PM

TraumaBrews: AAST Café
Meeting Foyer

Ongoing

Mother's Room
Registration Office

7:30 AM - 9:30 AM

Session VI: Papers 31-36

Moderator: Stephanie Savage, MD, MS; **Recorder:** Brittany Bankhead, MD, MS
Concorde Ballroom

Paper 31

7:30 AM - 7:50 AM

WEALTH IS HEALTH: HIGH ECONOMIC STATUS IN CAMEROON CORRELATES WITH PROTECTIVE GEAR USE IN TRAFFIC INJURIES AND IMPROVED CLINICAL OUTCOMES

Presenter: Mark Yost, MD, MPH

Discussant: Mary Schroeder, MD

Paper 32

7:50 AM - 8:10 AM

AUTOMATING EXCELLENCE: A BREAKTHROUGH IN EMERGENCY GENERAL SURGERY QUALITY BENCHMARKING

Presenter: Louis Perkins, MD

Discussant: Kevin Schuster, MD, MPH

Paper 33

8:10 AM - 8:30 AM

DEFINING AND ASSESSING EQUITY TO CARE IN AN URBAN TRAUMA CENTER

Presenter: Allan Stolarski, MD

Discussant: Andre Campbell, MD

Paper 34 **8:30 AM - 8:50 AM**
PATTERNS OF CARE FRAGMENTATION: DO EMERGENCY GENERAL SURGERY PATIENTS BENEFIT FROM INTERFACILITY TRANSFER?
Presenter: Ikemsinachi Nzenwa, MBChB, MS Discussant: Marta McCrum, MD, MPH

Paper 35 **8:50 AM - 9:10 AM**
STANDARDIZED ELECTRONIC ORDER SETS DECREASES OPIOID USE FOR EMERGENCY GENERAL SURGERY PATIENTS
Presenter: Adam Lucy, MD Discussant: Andrew Bernard, MD

Paper 36 **9:10 AM - 9:30 AM**
OPERATIVE NEUROSURGERY FOR TRAUMATIC SUBDURAL HEMATOMA: TRAUMA CENTER VARIATION IS ASSOCIATED WITH PATIENT OUTCOMES
Presenter: Vikas Vattipally, BS Discussant: Weidun Alan Guo, MD, MPH

8:00 AM - 5:00 PM

WTC Session: STN Program
Champagne 3/4

8:00 AM - 9:30 AM

**WTC Session: Scientific Session III:
Challenging Exposures in Trauma: How Do
You Get There? And Then What Do You Do?**

Moderator: Kenji Inaba, MD
Skyview V & VI 26th Floor

9:35 AM - 10:50 AM

**WTC Session: Scientific Session IV:
Management of Rib Fractures I**

Moderator: Andrew Doben, MD
Skyview V & VI 26th Floor

9:30 AM - 10:00 AM

Break in Exhibit Hall
Rivoli BR

10:00 AM - 11:00 AM

Session VII: Panel I,

“AI Valuation & Risk: A Current Toolbox for Trauma/ACS Surgeons”

Moderator: Rachael Callcut, MD, MSPH;
Panelists: Gabriel Brat, MD, MPH; Christopher Tignanelli, MD
Concorde Ballroom

10:55 AM - 12:25 PM

**WTC Session: Scientific Session V:
Geriatric Trauma Issues**

Moderator: Bellal Joseph, MD
Skyview V & VI 26th Floor

11:00 AM - 11:35 AM

Session VIII: Scholarship Presentations
Concorde Ballroom

“THE INTERACTION OF ESTRADIOL AND PLATELET BIOLOGY: A MECHANISTIC EXPLORATION OF SEX DIMORPHISMS IN COAGULATION AND IMPLICATIONS FOR TRANSFUSION MEDICINE”

Presenter: Julia Coleman, MD

“WHOLE TRANSCRIPTOME DYNAMICS IN NEUTROPHILS AFTER BLUNT TRAUMA”

Presenter: Anaar Siletz, MD

“IDENTIFYING AND ADDRESSING UNMET NEEDS OF INJURY SURVIVORS AT A SAFETY NET HOSPITAL IN SAN FRANCISCO”

Presenter: Marissa Boeck, MD, MPH

“CAN THE GUT SAVE THE BRAIN? AN INVESTIGATION OF MICROBIOME ON THE RECOVERY FROM TRAUMATIC BRAIN INJURY”

Presenter: Letitia Bible, MD

“PROGNOSTICATION OF HOST IMMUNE RESPONSE TO TRAUMA VIA CHARACTERIZATION OF THE HEMATOPOIETIC STEM CELL / MULTIPOTENT PROGENITOR CELL AXIS”

Presenter: John C. Kubasiak, MD

ASSOCIATE MEMBER MENTORING SCHOLAR

Presenter: Sarah Cottrell-Cumber, DO

11:35 AM - 12:35 PM

Session IX: Fitts Lecture

“The Academic Medical Center and the US Healthcare Economy: Altruism, Capitalism, Egoism”

Presenter: Michael Rotondo, MD

12:35 PM - 12:45 PM

Break-Head to Poster Session and collect your headphones and listening device

12:45 PM - 1:45 PM

Session X: Poster Session

Rivoli BR

Group 1: Abdominal Trauma and EGS;

Poster Professors: Ajai Malhotra, MD and Faran Bokhari, MD

Group 2: Critical Care

Poster Professors: Laura Haines, MD and Michael Cripps, MD

Group 3: Geriatrics

Poster Professors: Kaitlin Ritter, MD and Jacob Glaser, MD

Group 4: Health Disparities

Poster Professors: Matthew Martin, MD and Caitin Fitzgerald, MD

Group 5: Pediatrics and Injury Prevention

Poster Professors: Tanya Anand, MD, MPH and Patricia Ayoung-Chee, MD, MPH

Group 6: Neurological Trauma and Global Health

Poster Professors: Kazuhide Matsushima, MD and Fariha Sheikh, MD

Group 7: Organ-based Trauma

Poster Professors: Nicole Werner, MD, MS and David Blake, MD, MPH

Group 8: Preclinical/Translational

Poster Professors: Todd Costantini, MD and Gabrielle Hutton, MD, MS

Group 9: Shock/Transfusion

Poster Professors: Lucy Kornblith, MD and Angela Ingraham, MD, MS

Group 10: Trauma Systems, Epidemiology and Health Economics

Poster Professors: Gail Tominaga, MD and Lara Senekjian, MD

12:45 PM - 1:45 PM

Industry Lunch and Learn Session
CLR Medical (Not eligible for CME credits)

Versailles 3-4

1:45 PM - 3:00 PM

WTC Session: Scientific Session VIA: Pre-Hospital Interventions in Trauma Care

Moderator: Eileen Bulger, MD

Concord B/C

1:45 PM - 3:00 PM

**WTC Session: Scientific Session VIB:
Disaster and Mass Casualty Preparation I**

Moderator: Yasuhiro Otomo, MD, PhD
Concord A

1:45 PM - 3:35 PM

**WTC Session: Oral Papers IA:
Abdominal Trauma I Papers 1 - 10**

Moderator: Enrique Ginzburg, MD
Skyview 1

1:45 PM - 3:45 PM

**WTC Session: Oral Papers IB:
Shock/Transfusion/Resuscitation Papers 11 - 21**

Moderator: Julia Coleman, MD
Skyview 2

1:45 PM - 3:45 PM

**WTC Session: Oral Papers IC:
Outcomes - Guidelines Papers 22 - 33**

Moderator: Milos Buhavac, MD
Skyview 3

1:45 PM - 3:35 PM

**WTC Session: Oral Papers ID:
Extremity Trauma Papers 34 - 45**

Moderator: Mayur Narayan, MD, MPH, MBA, MHPE
Skyview 4

1:45 PM - 2:45 PM

Lunch on own

1:45 PM - 6:00 PM

Add-on Sessions

(Pick up lunch and head to session)

A Comprehensive Approach to Making the Transition to Independent Investigator
Hospital Disaster Preparedness: A Recipe for Success
The AAST 2024 Continuous Certification Course

1:45 PM - 6:00 PM

Leadership Academy (Invite Only)
Versailles 1/2

6:00 PM - 7:00 PM

Leadership Academy Reception (Invite Only)
Chablis

2:30 PM - 5:00 PM

JTACS Editorial Board Meeting (Invite Only)
Skyview 6

3:00 PM - 5:00 PM

**WTC Session: World Trauma
Congress Poster Sessions**

Rivoli

Poster Session: Station II

Moderator: Patricia Martinez Quinones, MD, PhD

Poster Session: Station I

Moderator: Paul Albin, MD

Poster Session: Station III

Moderator: Alexandra Brito, MD

3:00 PM - 5:00 PM

Satellite Symposium
Hosted by Prytime Medical
Versailles 3-4

3:05 PM - 4:50PM	WTC Session: Scientific Session VIIA: Trauma Resuscitation II Moderator: Sara Edwards, MD <i>Concord B/C</i>
3:05 PM - 4:20PM	WTC Session: Scientific Session VIIB: Trauma Education II Moderator: Mark Boyer, MD <i>Concord A</i>
3:35 PM - 4:55 PM	WTC Session: Oral Papers IIA: Critical Care Papers 46 - 53 Moderator: Rachel Appelbaum, MD <i>Skyview I 26th Floor</i>
3:45 PM - 5:15 PM	WTC Session: Oral Papers IIB: Thoracic Trauma Papers 54 - 62 Moderator: Joseph Forrester, MD, MS <i>Skyview II 26th Floor</i>
3:55 PM - 5:35 PM	WTC Session: Oral Papers IIC: Trauma Systems Papers 63 - 72 Moderator: Vanessa Ho, MD, PhD, MPH <i>Skyview III 26th Floor</i>
3:35 PM - 4:35 PM	WTC Session: Oral Papers IID: Trauma Education Paper 73 - 78 Moderator: Atsushi Nanashim, MD <i>Skyview IV 26th Floor</i>
4:55 PM - 5:55 PM	WTC Session: Scientific Session VIIIA: Management of Rib Fractures II Moderator: Babak Sarani, MD <i>Concord B/C</i>
5:00 PM - 8:00 PM	SCCPDS Board of Directors Meeting (Invite Only) <i>Champagne 2</i>
6:00 PM - 6:30 PM	Associate Member Business Meeting (AAST Associate Members Only) <i>Champagne 3/4</i>
6:30 PM - 7:30 PM	Associate Member Happy Hour (AAST Associate Members Only) <i>Versailles Foyer</i>
7:00 PM - 9:00 PM	Satellite Symposium Hosted by Humacyte <i>Vendome A</i>

FRIDAY, SEPTEMBER 13, 2024

6:15 AM - 7:15 AM

International Attendee Breakfast
Vendome A

6:15 AM - 7:15 AM

Committee Meetings III
Associate Member Council
Disaster Committee
Palliative Care Committee

6:15 AM - 7:15 AM

Board of Managers Meeting (Invite Only)
Champagne 2

7:00 AM - 8:00 AM

Breakfast in Exhibit Hall
Rivoli BR

7:00 AM - 1:30 PM

Exhibits Open
Rivoli BR

7:00 AM - 3:00 PM

Registration
Registration Desk

7:30 AM - 9:15 AM

WTC Session: Scientific Session IXA: Damage Control Surgery in Trauma

Moderator: Michael Rotondo, MD
Skyview V & VI 26th Floor

7:30 AM - 9:15 AM

WTC Session: Scientific Session IXB: Trauma Quality Assurance and Performance Improvement

Moderator: Ajai Malhotra, MD
Skyview III 26th Floor

Ongoing

Mother's Room
Registration Office

7:30 AM - 10:10 AM

Session XI: Papers 37-44

Moderator: Richard Miller, MD **Recorder:** Nicole Stassen, MD
Concorde Ballroom

Paper 37

PREDICTIVE VALUE OF PLATELET FUNCTION ASSAYS IN TRAUMATIC
BRAIN INJURY PATIENTS ON ANTIPLATELET THERAPY: INSIGHTS FROM
A RANDOMIZED CONTROLLED TRIAL

Presenter: Nijmeh Alsaadi, MD

Discussant: Scott Brakenridge, MD

7:30 AM - 7:50 AM

Paper 38

UNCOVERING THE ICEBERG: TRACKING VTE EVENTS IN TRAUMA PA-
TIENTS AFTER DISCHARGE

Presenter: Jacob Dougherty

Discussant: Sarah Moore, MD

7:50 AM - 8:10 AM

Paper 39

INFLAMMATORY CYTOKINES PRESENT ON ARRIVAL PREDICT 28-DAY
MORTALITY FOLLOWING TRAUMA

Presenter: Alyssa Bellini, MD

Discussant: Jonathan Meizoso, MD, MSPH

8:10 AM - 8:30 AM

Paper 40 **8:30 AM - 8:50 AM**
INSUFFICIENT OPIOID PRESCRIBING IS ASSOCIATED WITH RETURN TO THE EMERGENCY DEPARTMENT AFTER TRAUMATIC INJURY
Presenter: Wang Pong Chan, BS, BA Discussant: Timothy Browder, MD

Paper 41 **8:50 AM - 9:10 AM**
SILENCING METHYLATION-CONTROLLED J PROTEIN MITIGATES BURN-INDUCED MITOCHONDRIAL DYSFUNCTION IN ALPHA MOUSE LIVER-12 CELLS
Presenter: Kenneth Meza Monge, MD Discussant: Nicholas Namias, MD, MBA

Paper 42 **9:10 AM - 9:30 AM**
TRAUMATIC ENDOTHELOPATHY PHENOTYPES IN INJURED CHILDREN: A PRINCIPAL COMPONENT ANALYSIS
Presenter: Katrina Morgan, MD, MPH Discussant: Romeo Ignacio, Jr., MD

Paper 43 **9:30 AM - 9:50 AM**
ADIPOSE DERIVED STEM CELLS SECRETE PRO AND ANTI-INFLAMMATORY CYTOKINES AFTER MAJOR BURN INJURY
Presenter: Alison Smith, MD, PhD Discussant: Zsolt Balogh, MD, PhD

Paper 44 **9:50 AM - 10:10 AM**
ARE PROPHYLACTIC VENA CAVA FILTERS EVER INDICATED IN TRAUMA? A CONTEMPORARY ANALYSIS FROM THE CLOTT STUDY
Presenter: Andrew Kerwin, MD Discussant: Marissa Boeck, MD, MPH

9:00 AM - 5:00 PM AAST Pipeline Program Workshop
Skyview 4

9:20 AM - 10:50 AM **WTC Session: Scientific Session XA: Polytrauma Care**
Moderator: David Livingston, MD
Skyview V & VI 26th Floor

9:20 AM - 9:25 AM **WTC Session: Scientific Session XB: Research and Collaboration in Global Trauma**
Moderator: Catherine Juillard, MD, MPH
Skyview III 26th Floor

9:25 AM - 9:50 AM **WTC Session: Keynote: Importance of Equitable partnership in the Development of Trauma Programs and Research Capacity**
Keynote Speaker: Alain Chichom, MD
Skyview III 26th Floor

9:50 AM - 10:05 AM **WTC Session: Panel: Best Practices in Research and Publication of Work Conducted in LMICs**
Moderator: Catherine Juillard, MD, MPH
Skyview III 26th Floor

10:10 AM - 10:30 AM Break in Exhibit Hall
Rivoli BR

- 10:30 AM - 11:00 AM **Session XII: Expert Surgeon Lecture**
 “A Look Back.....on the Ever-Changing Practice of Trauma Surgery”
Presenter: Amy Goldberg, MD
Concorde Ballroom
- 10:55 AM - 12:25 PM **WTC Session: Scientific Session XIA:
 Management of Severe Pelvic Trauma**
Moderator: Todd Costantini, MD
Skyview V & VI 26th Floor
- 11:00 AM - 12:00 PM **Session XIII: Panel II**
 “Making the Case for Value of ACS—Overcoming Local Challenges”
Moderator: Kristan Staudenmayer, MD, MS;
Panelists: David Spain, MD; Jason Smith, MD, PhD;
 Andrew Beckett, MD; Stephanie Savage, MD, MS
Concorde Ballroom
- 11:25 AM - 12:40 PM **WTC Session: Scientific Session XIB:
 Trauma Guidelines**
Moderator: Ranson Chien-Hung Liao, MD
Skyview III 26th Floor
- 12:00 PM - 1:15 PM Lunch with Exhibitors (AAST Sponsored)
Rivoli BR
- 12:00 PM - 1:30 PM TSACO Editorial Meeting (Invite Only)
Champagne 2
- 12:00 PM - 1:15 PM **Lunch Sessions II**
 Case Studies on Publishing and Reviewing for JTACS
 Directorships, Leadership Roles, and Taking the Lead: Everything I Wish I Knew
 Geriatric Trauma: Models of Care
 Introducing Robotics to the Acute Care Surgery Setting - A Benefit to Patients or
 Just a Shiny New Toy?
 Leading a Successful Multi-Institutional Trial From A to Z
 Navigating the Unforeseen: Trauma System Preparedness
 The Physical, Emotional and Mental Toll of Academic Surgery: Actionable Steps to
 Protect Your Health and Rekindle Your Spark
- 1:00 PM - 1:50 PM **WTC Session: Oral Papers IIIA:
 Neurologic Trauma Papers 79 - 85**
Moderator: John Agapian, MD
Skyview I 26th Floor
- 1:00 PM - 2:40 PM **WTC Session: Oral Papers IIIB:
 Abdominal Trauma II Papers 86 - 95**
Moderator: Amanda Teichman, MD
Skyview II 26th Floor
- 1:15 PM - 4:55 PM **Session XIVA: Papers 45-55**
Moderator: Hans-Christoph Pape, MD; **Recorder:** Krista Kaups, MD, MS
Concorde B/C

- Paper 45** **1:15 PM - 1:35 PM**
 GERI-SCREEN: A MULTICENTER TRIAL OF A NOVEL SCREENING TOOL FOR DEPRESSION AND SUICIDE RISK AMONG US TRAUMA PATIENTS
 Presenter: Shelbie Kirkendoll, DO, MS Discussant: Esther Tseng, MD
- Paper 46** **1:35 PM - 1:55 PM**
 TIME TO HEMOSTASIS: A POSSIBLE MECHANISM RESPONSIBLE FOR WHOLE BLOOD SURVIVAL BENEFIT
 Presenter: Amanda Chipman, MD Discussant: Sigrid Burruss, MD
- Paper 47** **1:55 PM - 2:15 PM**
 TRAUMATIC AMPUTATION: THE EFFECT OF EARLY GUILLOTINE AMPUTATION ON SURGICAL SITE INFECTION
 Presenter: Stephen Gregg, MD Discussant: Matthew Lissauer, MD
- Paper 48** **2:15 PM - 2:35 PM**
 AMBULANCE DESERTS AND INEQUITIES IN ACCESS TO EMS CARE IN THE UNITED STATES: ARE PATIENTS WITHIN SOCIOECONOMICALLY DISADVANTAGED AREAS AT AN INCREASED RISK FOR DELAYS IN PRE-HOSPITAL CARE?
 Presenter: Cherisse Berry, MD Discussant: Lillian Kao, MD, MBA, MS
- Paper 49** **2:35 PM - 2:55 PM**
 ASSESSING CASE VOLUME VARIATION ACROSS LEVEL 1 AND 2 TRAUMA CENTERS IN THE UNITED STATES
 Presenter: Bryant W. Oliphant, MD, MBA, MS Discussant: Joshua Brown, MD
- Paper 50** **2:55 PM - 3:15 PM**
 ASSESSING TRAUMA INFORMED CARE ADOPTION: A COMPREHENSIVE SURVEY OF TRAUMA CENTER PROFESSIONALS AND INSTITUTIONAL TREND
 Presenter: June Yao, DO Discussant: Charity Evans, MD, MS
- Paper 51** **3:15 PM - 3:35 PM**
 AWAITING INSURANCE COVERAGE: MEDICAID ENROLLMENT AND POST-ACUTE CARE USE AFTER TRAUMATIC INJURY
 Presenter: Diane Haddad, MD, MPH Discussant: Sawyer Smith, MD, MBA
- Paper 52** **3:35 PM - 3:55 PM**
 DILUTION IS NOT THE SOLUTION: FACTORS AFFECTING THE DIRECT RED CELL EFFECT ON THROMBOSIS
 Presenter: Adam Price, MD Discussant: Rachel Appelbaum, MD
- Paper 53** **3:55 PM - 4:15 PM**
 DO EMERGENCY MEDICAID PROGRAMS IMPROVE POST-DISCHARGE HEALTHCARE ACCESS FOR TRAUMA PATIENTS? A STATEWIDE MIXED-METHODS STUDY
 Presenter: Lisa Marie Knowlton, MD, MPH Discussant: John Agapian, MD
- Paper 54** **4:15 PM - 4:35 PM**
 EARLY PRIMARY CARE FOLLOW-UP IMPROVES LONG-TERM FUNCTIONAL OUTCOMES AMONG INJURED OLDER ADULTS
 Presenter: Elliott Yee, MD Discussant: Jay Yelon, DO
- Paper 55** **4:35 PM - 4:55 PM**
 ELEVATED CELL-FREE HEMOGLOBIN: A NOVEL EARLY BIOMARKER FOLLOWING TRAUMATIC INJURY
 Presenter: James Ross, MD, MS Discussant: Joseph Rappold, MD

1:15 PM - 4:35 PM

Session XIVB: Papers 56-66

Moderator: Kimberly Davis, MD, MBA **Recorder:** Babak Sarani, MD
Concorde A

Paper 56 **1:15 PM - 1:35 PM**

EMERGENCY MEDICAL SERVICES LEVEL OF TRAINING AFFECTS MORTALITY IN HIGH-RISK TRAUMA PATIENTS: A COMBINED PREHOSPITAL AND IN-HOSPITAL DATABASE ANALYSIS

Presenter: Julia Harrison, MD

Discussant: Cynthia Talley, MD

Paper 57 **1:35 PM - 1:55 PM**

GENOMIC ANALYSIS TO IDENTIFY SURGICAL PATIENTS AT RISK FOR POST-OPERATIVE SEPSIS AND SURGICAL SITE INFECTIONS

Presenter: Kaleem Ahmed, MD, MSAI

Discussant: Mehreen Kisat, MD

Paper 58 **1:55 PM - 2:15 PM**

IDENTIFYING NOVEL NONCODING GENOMIC REGIONS IN SEPSIS USING RNA SEQUENCING DATA

Presenter: Sean Monaghan, MD

Discussant: Anaar Siletz, MD

Paper 59 **2:15 PM - 2:35 PM**

IMPACT OF PSYCHOSOCIAL INTERVENTION ON QUALITY OF LIFE IN PATIENTS WITH POST-TRAUMATIC LIMB AMPUTATION/S- A RANDOMIZED CONTROLLED TRIAL

Presenter: Subodh Kumar, MS

Discussant: Terri deRoon-Cassini, MD, PhD

Paper 60 **2:35 PM - 2:55 PM**

INCREASED PULMONARY MORBIDITY AND MORTALITY WITH EARLY VIDEO-ASSISTED THORACIC SURGERY FOR RETAINED HEMOTHORAX

Presenter: Denise Garofalo, MD

Discussant: Garth Utter, MD

Paper 61 **2:55 PM - 3:15 PM**

LATE VTE CHEMOPROPHYLAXIS IS ASSOCIATED WITH INCREASED RISK OF DVT, PE, AND MORTALITY IN PATIENTS WITH SPINAL INJURIES

Presenter: Morgan Gaither, MD

Discussant: Jennifer Leonard, MD, PhD

Paper 62 **3:15 PM - 3:35 PM**

POLYMERASE CHAIN REACTION FOR EARLY IDENTIFICATION OF BACTERIA CAUSING PNEUMONIA IN VENTILATED PATIENTS

Presenter: Aaron Pollock, MD

Discussant: Joseph Forrester, MD, MS

Paper 63 **WITHDRAWN**

Paper 64 **3:35 PM - 3:55 PM**

THE COSTS OF PARENTAL INJURY: IMPACTS ON CHILDREN'S HEALTH-CARE UTILIZATION AND FINANCIAL BARRIERS

Presenter: Ruchika Kamojjala

Discussant: Lillian Liao, MD, MPH

Paper 65 **3:55 PM - 4:15 PM**

TRAUMA CENTERS HAVE HEARD THE WARNING: AVOID ENDOVASCULAR TREATMENT FOR BLUNT CEREBROVASCULAR INJURIES

Presenter: Ariel Wolf, MD

Discussant: Niels Martin, MD

Paper 66 **4:15 PM - 4:35 PM**

FROM LAWS TO LOSS: EXAMINING THE TOLL OF ALCOHOL POLICY REPEALS ON YOUTHFUL DRIVER MORTALITY

Presenter: Krista Haines, DO

Discussant: Lucas Neff, MD

- 1:30 PM - 1:35 PM **WTC Session: Scientific Session XIIA:
Pediatric Keynote**
Moderator: Chris Newton, MD
Skyview V & VI 26th Floor
- 1:30 PM - 2:45 PM **WTC Session: Scientific Session XIIB:
Disaster and Mass Casualty Preparation – II**
Moderator: Jay Doucet, MD, MS
Skyview III 26th Floor
- 1:35 PM - 2:00 PM **WTC Session: Pediatric Surgical
Emergency Education and Trauma
Systems Development**
Keynote Speaker: Phyllis Kisa, MBCHB, MMED
Skyview V & VI 26th Floor
- 2:00 PM - 3:00 PM **WTC Session: Oral Papers IVA:
Systems/Pediatrics/Burns Papers 96 - 101**
Moderator: Laura Haines, MD
Skyview I 26th Floor
- 2:00 PM - 3:30 PM **WTC Session: Pediatric Trauma Topics**
Moderator: Michael Nance, MD
Skyview V & VI 26th Floor
- 2:50 PM - 4:30 PM **WTC Session: Oral Papers IVB:
Trauma Prevention Papers 102 - 111**
Moderator: Thomas Duncan, DO
Skyview II 26th Floor
- 2:50 PM - 4:50 PM **WTC Session: Scientific Session XIIB:
Global Trauma - Quickshots**
Moderator: Rochelle Dicker, MD
Skyview III 26th Floor
- 3:10 PM - 4:40 PM **WTC Session: Oral Papers V:
Quality Improvement Papers 112 - 121**
Moderator: Marcelo Ribeiro, PhD
Skyview I 26th Floor
- 3:35 PM - 5:05 PM **WTC Session: Scientific Session XIII A:
Critical Problems in Abdominal Trauma**
Moderator: Andrew Peitzman, MD
Skyview V & VI 26th Floor
- 5:00 PM - 6:30 PM AAST Business Meeting (AAST Members Only)
Concorde A
- 5:10 PM - 6:40 PM **WTC Session: Scientific Session XIVA:
TBI and Neck Trauma**
Moderator: Ranson Chien-Hung Liao, MD
Skyview V & VI 26th Floor

6:40 PM

WTC Meeting Adjourned

7:00 PM - 7:30 PM

Reception
Vendome Foyer

7:30 PM - 11:00 PM

Auction and Banquet
Vendome A/B

SATURDAY, SEPTEMBER 14, 2024

7:00 AM - 8:00 AM

New Member Breakfast
Vendome A

7:30 AM - 10:00 AM

Registration (if needed)
Registration Desk

Ongoing

Mother's Room
Registration Office

7:30 AM - 8:30 AM

Breakfast
Vendome A

8:00 AM - 9:12 AM

Session XV: Quickshot Session I 1-13

Moderator: Jamie Coleman, MD
Concorde A

Quickshot 1

8:00 AM - 8:06 AM

THE EFFECT OF PEDIATRIC WHOLE BLOOD USE AS A PROPORTION OF ADMINISTERED BLOOD PRODUCTS ON 24-HOUR MORTALITY: A DOSE EFFECT ANALYSIS

Presenter: Ethan Petersen, MD

Discussant: David Hampton, MD, MEng

Quickshot 2

8:06 AM - 8:12 AM

EXTRACELLULAR VESICLES MEDIATE CYTOTOXICITY IN POST-BLUNT CHEST TRAUMA PNEUMONIA

Presenter: Keita Nakatsutsumi, MD

Discussant: Alaina Lasinski, MD

Quickshot 3

8:12 AM - 8:18 AM

FLYING FASTER: DEFINING THE TIME-SAVINGS THRESHOLD FOR AIR VERSUS GROUND TRANSPORT SURVIVAL BENEFIT AFTER INJURY

Presenter: Sebastian Boland, MD

Discussant: David Spain, MD

Quickshot 4

WITHDRAWN

Quickshot 5

8:18 AM - 8:24 AM

OUTCOMES AND COMPLICATIONS OF ECMO SUPPORT IN ISOLATED BLUNT THORACIC TRAUMA

Presenter: Aryan Rafeezzadeh, MD

Discussant: Joshua Hazelton, DO

Quickshot 6

8:24 AM - 8:30 AM

HYPERTENSION AFTER BLUNT RENAL TRAUMA: MYTH OR REALITY?

Presenter: Omar Hejazi, MD

Discussant: Alexander Schwed, MD

Quickshot 7

8:30 AM - 8:36 AM

UTILIZATION OF CARDIOPULMONARY BYPASS IN TRAUMA PATIENTS, AAST-SPONSORED MULTICENTER STUDY

Presenter: Nikolay Bugaev, MD

Discussant: Michael Vella, MD, MBA

Quickshot 8 **8:36 AM - 8:42 AM**

PREGNANCY UNDER PRESSURE: ASSESSING VENOUS THROMBOEMBOLISM DUE TO TRAUMA-INDUCED COAGULOPATHY IN PREGNANCY

Presenter: Anna Jose, MD

Discussant: Thomas Duncan, DO

Quickshot 9 **8:42 AM - 8:48 AM**

A MULTICENTER, PROSPECTIVE STUDY OF CALCIUM DERANGEMENTS ON ARRIVAL TO THE EMERGENCY DEPARTMENT AFTER MAJOR TRAUMATIC HEMORRHAGE

Presenter: Steven Schauer, DO, MS

Discussant: William Chiu, MD

Quickshot 10 **8:48 AM - 8:54 AM**

EQUIVALENT OUTCOMES AFTER OPEN VS. ENDOVASCULAR REPAIR OF TRAUMATIC AXILLOSUBCLAVIAN ARTERIAL INJURY: A PROPENSITY SCORE MATCHED ANALYSIS

Presenter: Emily Grimsley, MD

Discussant: Demetrios Demetriades, MD, PhD

Quickshot 11 **8:54 AM - 9:00 AM**

THE IMPACT OF MOTORIST CHARACTERISTICS ON BEING UNDER TRIAGED IN MOTOR VEHICLE COLLISIONS

Presenter: Sarah Diaz, DO

Discussant: Glen Tinkoff, MD

Quickshot 12 **9:00 AM - 9:06 AM**

PENETRATING MECHANISM AND HIGH SOCIAL VULNERABILITY ASSOCIATED WITH LATE SEVERE PRESSURE-RELATED INJURY IN SPINAL CORD PATIENTS

Presenter: Sheng Xiang Huang, PhD

Discussant: Areti Tillou, MD

Quickshot 13 **9:06 AM - 9:12 AM**

IMPLEMENTATION OF A FRAILTY PATHWAY FOR GERIATRIC TRAUMA PATIENTS RESULTS IN DECREASED HOSPITAL COMPLICATIONS AND UNPLANNED INTUBATIONS

Presenter: Melissa Hornor, MD, MS

Discussant: Molly Jarman, PhD, MPH

9:12 AM - 9:40 AM

Break

9:40 AM - 10:58 AM

Session XVI: Quickshot Session II 14-26

Moderator: Ronald Stewart, MD

Concorde A

Quickshot 14 **9:40 AM - 9:46 AM**

LET THE RESIDENT TRY: EVALUATION OF CENTRAL VENOUS CATHETER PLACEMENT IN HYPOTENSIVE TRAUMA PATIENTS USING TRAUMA VIDEO REVIEW

Presenter: Ryan Dumas, MD

Discussant: Amy Kwok, MD, MPH

Quickshot 15 **9:46 AM - 9:52 AM**

METHAMPHETAMINE USE AND HOMELESSNESS ARE RISK FACTORS FOR TRAUMA RECIDIVISM AND PREMATURE MORTALITY IN SURVIVORS OF VIOLENT INJURIES

Presenter: Emma Worthington, MD

Discussant: D'Andrea Joseph, MD

Quickshot 16 **9:52 AM - 9:58 AM**

PREDICTING FUTILITY IN HEMORRHAGING TRAUMA PATIENTS UTILIZING 4-HOUR TRANSFUSION VOLUMES AND RATES

Presenter: Jan-Michael Van Gent, DO

Discussant: Anupamaa Seshadri, MD

Quickshot 17 **9:58 AM - 10:04 AM**

PREDICTORS OF HEALTHY DAYS AT HOME: BENCHMARKING LONG-TERM OUTCOMES IN GERIATRIC TRAUMA

Presenter: Manuel Castillo-Angeles, MD, MPH

Discussant: Jon Simmons, MD

Quickshot 18 **10:04 AM - 10:10 AM**

SOCIAL VULNERABILITY PROVOKES A HYPERCOAGULABLE STATE IN TRAUMA

Presenter: Lauren Gallagher, MD

Discussant: Julia Coleman, MD, MPH

Quickshot 19 **10:10 AM - 10:16 AM**

THE TPA CHALLENGE TEG (TPA-TEG) PROVIDES A COMPREHENSIVE ASSESSMENT OF FIBRINOLYSIS IN THE SEVERELY INJURED

Presenter: Elizabeth Maginot, MD

Discussant: Parker Hu, MD

Quickshot 20 **10:16 AM - 10:22 AM**

BARRIERS TO USING TELEMEDICINE TO IMPROVE SECONDARY TRIAGE IN A RURAL TRAUMA SYSTEM

Presenter: Zain Hashmi, MD

Discussant: Jasmeet Paul, MD

Quickshot 21 **10:22 AM - 10:28 AM**

2024 AAST PANCREAS INJURY GRADING UPDATE: BETTER GRADING FOR IMPROVED UNDERSTANDING OF MANAGEMENT OUTCOMES

Presenter: David Notrica, MD

Discussant: Allison McNickle, MD, MS

Quickshot 22 **10:28 AM - 10:34 AM**

GERIATRIC TRAUMA PROGRAMS: WHAT IS THE BENEFIT?

Presenter: Luke Shadiow, DO

Discussant: Nicole Goulet, MD

Quickshot 23 **10:34 AM - 10:40 AM**

IMPLEMENTATION OF A COLON MANAGEMENT GUIDELINE: INCREASING RATE OF SAFE ANASTOMOSIS IN EMERGENCY GENERAL SURGERY PATIENTS

Presenter: Elizabeth Wood, MD

Discussant: Jacinta Robenstine, MD

Quickshot 24 **10:40 AM - 10:46 AM**

RISK FACTORS FOR DVT IN PEDIATRIC TRAUMA PATIENTS: A 5 YEAR REVIEW OF THE NTDB

Presenter: Thomas Irons, MD

Discussant: Katherine T. Flynn-O'Brien, MD, MPH

Quickshot 25 **10:46 AM - 10:52 AM**

SOCIAL DETERMINANTS OF HEALTH AFFECT PHYSICAL AND MENTAL HEALTH OF INJURED ADULTS IN AMERICA

Presenter: Alexandra Hernandez, MD

Discussant: Nancy Parks, MD

Quickshot 26 **10:52 AM - 10:58 AM**

THROMBOEMBOLIC EVENTS AFTER ADMINISTRATION OF TRANEXAMIC ACID (TXA) IN PATIENTS WITH BLUNT THORACIC TRAUMA

Presenter: Brianna Harvey, MD

Discussant: Rondi Gelbard, MD

11:00 AM

Meeting Adjourned

7TH WORLD TRAUMA CONGRESS & 83RD ANNUAL MEETING OF AAST AND CLINICAL CONGRESS OF ACUTE CARE SURGERY

7THWTC
SCIENTIFIC
PROGRAM
SCHEDULE

September 11 – 14, 2024 • Las Vegas, NV

WEDNESDAY, SEPTEMBER 11, 2024

9:45 AM - 10:15 AM

AAST Session II: 7th World Trauma Congress

Keynote Address

Presenter: Yashuhiro Otomo, MD, PhD; **Moderator:** Raul Coimbra, MD, PhD
Concorde Ballroom

3:00 PM - 3:30 PM

7th WTC Opening Session: Keynote Address

WHO CONSULTATION ON THE GLOBAL STRATEGY AND ACTION PLAN

FOR EMERGENCY, CRITICAL AND OPERATIVE CARE (ECO)

Presenter: Teri Reynolds, MD, MS WHO; **Moderator:** Raul Coimbra, MD, PhD
Vendome B/C

3:30 PM - 5:00 PM

7th WTC Scientific Session I: Trauma Resuscitation I

Moderator: Jonathan Meizoso, MD, MSPH
Vendome B/C

3:30 PM - 3:45 PM

THE LETHAL DIAMOND: THE NEW CONCEPT IN TRAUMA RESUSCITATION

Presenter: Natthida Owattanapanich - TAT

3:45 PM - 4:00 PM

**CODE CRIMSON: TWO-TIER TRAUMA CALL. HAS IT MADE A CLINICAL
DIFFERENCE?**

Presenter: Li Hsee - ANZTS, ANZAST

4:00 PM - 4:15 PM

**ROLES AND RESPONSIBILITIES OF TRAUMA NURSES IN THE RESUSCITATION
OF SEVERELY INJURED PATIENTS**

Presenter: LeAnne Young - STN

REVISITING REBOA FOR TRAUMA PATIENTS

Presenter: Koji Morishita - JSACS

4:15 PM - 4:30 PM

INNOVATIONS IN TRAUMA CARE THROUGH A HYBRID EMERGENCY ROOM SYSTEM

Presenter: Mituaki Kojima - JSACS

4:30 PM - 4:45 PM

DISCUSSION

4:45 PM - 5:00 PM

BREAK

5:00 PM - 5:05 PM

5:05 PM - 6:20 PM

WTC Scientific Session II: Trauma Education I

Moderator: Allison Berndtson, MD

Vendome B/C

5:05 PM - 5:20 PM

TRAUMA TRAINING IN THE FUTURE - A GLOBAL PERSPECTIVE

Presenter: Mark Bowyer - AAST

5:20 PM - 5:35 PM

TRAINING TRAUMA SURGEONS: CHALLENGES AND INNOVATIONS

Presenter: Benedict Edward Valdez - PSST

5:35 PM - 5:50 PM

TEAM DYNAMICS IN TRAUMA RESUSCITATION: COMMUNICATION, COLLABORATION, AND RESILIENCE

Presenter: Allison Berndtson - AAST

5:50 PM - 6:05 PM

CURRENT INNOVATIONS AND FUTURE HORIZONS IN TRAUMA EDUCATION IN JAPAN

Presenter: Atsushi Tanikawa - JAST

DISCUSSION

4:45 PM - 5:00 PM

THURSDAY, SEPTEMBER 12, 2024

8:00 AM - 9:30 AM

WTC Scientific Session III: Challenging Exposures

In Trauma: How do you get there? And then what do you do?

Moderator: Kenji Inaba, MD

Skyview 5/6 26th Floor Horseshoe Casino Hotel

8:00 AM - 8:15 AM

SUBCLAVIAN ARTERY

Presenter: Juan Asensio - AAST

8:15 AM - 8:30 AM

LUNG HILUM

Presenter: Maeyane S Moeng - TSSA

RETROHEPATIC IVC

Presenter: Adenauer Goes Jr. - SBAIT

8:30 AM - 8:45 AM

ESOPHAGUS

Presenter: Jose Gustavo Parreira - SBAIT

8:45 AM - 9:00 AM

POPLITEAL ARTERY

Presenter: Joseph DuBose - AAST

9:00 AM - 9:15 AM

DISCUSSION

9:15 AM - 9:30 AM

BREAK

9:30 AM - 9:35 AM

9:35 AM - 10:50 AM

WTC Scientific Session IV: Management of Rib Fractures I

Moderator: Andrew Doben, MD

Skyview 5/6 26th Floor Horseshoe Casino Hotel

9:35 AM - 9:50 AM

SURGICAL STABILIZATION OF RIB FRACTURES: WHEN AND HOW

Presenter: Babak Sarani - AAST, EAST, CWIS

9:50 AM - 10:05 AM

MANAGEMENT OF RIB FRACTURES: THE AUSTRALIAN NEW ZEALAND PERSPECTIVE

Presenter: Li Hsee - ANZTS, ANZAST

10:05 AM - 10:20 AM

MANAGEMENT OF RIB FRACTURES: THE EUROPEAN PERSPECTIVE

Presenter: Shahin Mohseni - ESTES

10:20 AM - 10:35 AM

TIMING FOR RIB FIXATION IN POLYTRAUMA PATIENTS

Presenter: Wei Huang - CMDA

DISCUSSION

10:35 AM - 10:50 AM

BREAK

10:50 AM - 10:55 AM

10:55 AM - 12:25 PM

WTC Scientific Session V: Geriatric Trauma Issues

Moderator: Bellal Joseph, MD

Skyview 5/6 26th Floor Horseshoe Casino Hotel

10:55 AM - 11:10 AM

DOES EVERY GERIATRIC TBI PATIENT NEED A CT SCAN AND NEUROSURGERY CONSULTATION?

Presenter: Bellal Joseph - EAST, AAST

11:10 AM - 11:25 AM

THE SILVER TSUNAMI: UNDERSTANDING TRAUMA CARE IN THE ELDERLY POPULATION

Presenter: Mituaki Kojima - JSACS

NON-ACCIDENTAL GERIATRIC TRAUMA

Presenter: Savitha Bhagvan - ANZTS

11:25 AM - 11:40 AM

FUTILITY IN GERIATRIC TRAUMA: WHAT IS IT AND HOW TO DETERMINE IT?

Presenter: Ali Salim - ACSCOT, AAST

11:40 AM - 11:55 AM

END OF LIFE CARE IN TRAUMA

Presenter: Kristan Staudenmayer - ACSCOT

11:55 AM - 12:10 PM

DISCUSSION

12:10 PM - 12:25 PM

LUNCH BREAK (Lunch on your own)

12:25 PM - 1:45 PM

1:45 PM - 3:00 PM

WTC Scientific Session VIA: Pre-Hospital Interventions in Trauma Care

Moderator: Eileen Bulger, MD
Concord B/C

TRANEXAMIC ACID

Presenter: Martin Schreiber - AAST

1:45 PM - 2:00 PM

AIRWAY MANAGEMENT

Presenter: Carlos Brown - AAST

2:00 PM - 2:15 PM

PRE-HOSPITAL ADVANCED RESUSCITATIVE CARE

Presenter: Zaffer Qasim - AAST

2:15 PM - 2:30 PM

TOURNIQUET USE: WHEN AND HOW?

Presenter: Galinos Barmparas - AAST

2:30 PM - 2:45 PM

DISCUSSION

2:45 PM - 3:00 PM

BREAK

3:00 PM - 3:05 PM

1:45 PM - 3:00 PM

WTC Scientific Session VIB: Disaster and Mass Casualty Preparation I

Moderator: Yasuhiro Otomo, MD
Concord A

HOSPITAL RESPONSE IN MASS CASUALTIES

Presenter: Jay Doucet - ACSCOT

1:45 PM - 2:00 PM

2:00 PM - 2:15 PM
LESSONS LEARNED AFTER A MAJOR EARTHQUAKE IN TURKEY
Presenter: Mehmet Eryilmaz - TATES

2:15 PM - 2:30 PM
LESSONS LEARNED FROM MASS CASUALTY MEDICAL RESPONSE
FOLLOWING TERRORIST ATTACKS
Presenter: Ali Fuat Kaan GÖK - TATES

2:30 PM - 2:45 PM
SURGICAL APPROACH IN CATASTROPHIC TRAUMATIC WOUNDS IN A MASS
CASUALTY EVENT
Presenter Hakan Yigitbas - TATES

DISCUSSION 2:45 PM - 3:00 PM

BREAK 3:00 PM - 3:05 PM

3:05 PM - 4:50 PM

WTC Scientific Session VIIA: Trauma Resuscitation II

Moderator: Sara Edwards, MD
Concord B/C

3:05 PM - 3:20 PM
CIRCULATION FIRST
Presenter: Juan Duchesne - AAST

3:20 PM - 3:35 PM
USE OF ULTRASOUND TO GUIDE RESUSCITATION IN TRAUMA
Presenter: Paula Ferrada - PTS

3:35 PM - 3:50 PM
FLUID RESUSCITATION IN TRAUMA
Presenter: Jonathan Meizoso - AAST/EAST

3:50 PM - 4:05 PM
TRAUMA-INDUCED COAGULOPATHY
Presenter: Yasuhiro Otomo - JSACS

4:05 PM - 4:20 PM
REBOA: INDICATIONS, ADVANTAGES, AND COMPLICATIONS
Presenter: Megan Brenner - AAST

4:20 PM - 4:35 PM
SEVERE TBI: EARLY MANAGEMENT OF INTRACRANIAL HYPERTENSION
Presenter: Ruben Peralta - AAST

DISCUSSION 4:35 PM - 4:50 PM

BREAK 4:50 PM - 4:55 PM

3:05 PM - 4:20 PM

WTC Scientific Session VIIB: Trauma Education II

Moderator: Mark Bowyer, MD
Concord A

3:05 PM - 3:20 PM
BEYOND ATLS: GLOBAL TRAUMA EDUCATION OPPORTUNITIES FROM THE ACSCOT
Presenter: Warren Dorlac - ACSCOT

3:20 PM - 3:35 PM
SURGICAL STRATEGY AND TREATMENT FOR TRAUMA (SSTT) COURSE
Presenter: Hiroaki Watanabe - JAST

3:35 PM - 3:50 PM
Trauma Education in Taiwan - FAST
Presenter: Chi-Hsun Hsieh - FAST

3:50 PM - 4:05 PM
BUILDING TRAUMA CARE TRAINING USING VIRTUAL REALITY AND MIXED REALITY DEVICES
Presenter: Eiji Hira - JAST

DISCUSSION **4:35 PM - 4:50 PM**

BREAK **4:50 PM - 4:55 PM**

4:55 PM - 5:55 PM

WTC Scientific Session VIII A: Management of Rib Fractures II

Moderator: Babak Sarani, MD
Concord B/C

4:55 PM - 5:10 PM
SURGICAL STABILIZATION OF RIB FRACTURE GUIDELINES: WHERE ARE WE?
Presenter: Thomas White - CWIS

5:10 PM - 5:25 PM
RIB FIXATION IN THE ELDERLY: WHEN AND HOW?
Presenter: Andrew Doben - CWIS

5:25 PM - 5:40 PM
COMMON COMPLICATIONS AFTER RIB FIXATION
Presenter: Susan Kartiko - CWIS

DISCUSSION **5:40 PM - 5:55 PM**

4:25 PM - 5:55 PM

WTC Scientific Session VIII B: Trauma Systems

Moderator: Robert Winchell, MD
Concord A

4:25 PM - 4:40 PM
AN OVERVIEW OF TRAUMA SYSTEMS IN ASIA
Presenter: Rajkumar Menon - ACT

4:40 PM - 4:55 PM
REGIONALIZATION OF TRAUMA CARE IN SOUTH KOREA: PROCESS AND IMPACT
Presenter: Kyoungwon Jung - KSACS

ECONOMIC IMPACT OF TRAUMA

Presenter: Ashok Kumar Puranik - IATCC

4:55 PM - 5:10 PM

EVOLUTION OF TRAUMA CARE IN THAILAND

Presenter: Narain Chotirosniramit - ACT, TAT

5:10 PM - 5:25 PM

IMPROVING TRAUMA OUTCOMES IN AUSTRALIA AND NEW ZEALAND

Presenter: Dieter Weber- ANZTS, ANZAST

5:25 PM - 5:40 PM

DISCUSSION

5:40 PM - 5:55 PM

1:45 PM - 3:35 PM

Oral Papers IA: Abdominal Trauma I Papers 1-10

Moderator: Enrique Ginzburg, MD
Skyview 1 26th Floor Horseshoe Casino Hotel

Paper 1

1:45 PM - 1:55 PM

THE UTILITY OF MRI IN PANCREATIC INJURY PATIENTS REQUIRING SURGERY: INSIGHTS FROM A TQIP ANALYSIS

Presenter: Chih-Yuan Fu

Paper 2

1:55 PM - 2:05 PM

THERAPEUTIC HYPOTHERMIA AND HEMORRHAGIC RISK IN NON-OPERATIVE BLUNT ABDOMINAL TRAUMA PATIENTS: A TRAUMA QUALITY IMPROVEMENT PROGRAM STUDY

Presenter: Ting An Hsu

Paper 3

2:05 PM - 2:15 PM

THE HYBRID EMERGENCY ROOM SYSTEM (HERS) FACILITATES EFFECTIVE USE OF THE RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA (REBOA) FOR ABDOMINAL TRAUMA PATIENTS IN HEMORRHAGIC SHOCK

Presenter: Kaori Ito

Paper 4

2:15 PM - 2:25 PM

TRANSCATHETER ARTERIAL EMBOLIZATION FOR BLUNT SPLENIC INJURY: INCIDENCE OF PSEUDOANEURYSMS AND ADDITIONAL EMBOLIZATION

Presenter: Fuminori Yamaji

Paper 5

2:25 PM - 2:35 PM

TIMING MATTERS: EVALUATING THE IMPACT OF DELAYED PANCREATIC SURGERY ON OUTCOMES IN PANCREATIC TRAUMA PATIENTS - A TQIP DATABASE ANALYSIS

Presenter: Yu-Kuan Yang

Paper 6

2:35 PM - 2:45 PM

REDUCING THE TREATMENT LEVEL OF PATIENTS WITH MAJOR TORSO HEMORRHAGE: THE ROLE OF REBOA IN A LEVEL-I TRAUMA CENTER

Presenter: Yu Chi Kuo

Paper 7

2:45 PM - 2:55 PM

OPERATIVE NEUROSURGERY FOR TRAUMATIC SUBDURAL HEMATOMA: TRAUMA CENTER VARIATION IS ASSOCIATED WITH PATIENT OUTCOMES

Presenter: Kuo-Chien Lee

Paper 8**2:55 PM - 3:05 PM**

A PREDICTION MODEL OF MORTALITY AMONG CIRRHOTIC PATIENTS WITH BLUNT ABDOMINAL TRAUMA: A SINGLE-CENTER RETROSPECTIVE STUDY

Presenter: Mo-Han Lin**Paper 9****3:05 PM - 3:15 PM**

EXPLORING THE THERAPEUTIC ROLE OF LAPAROSCOPY IN ANTERIOR ABDOMINAL STAB WOUNDS

Presenter: Chien Wu**Paper 10****3:15 PM - 3:25 PM**

DIAGNOSIS AND TREATMENT OF TRAUMATIC ISOLATED BLUNT GRADE III PANCREATIC INJURY

Presenter: Miho Iwai**BREAK****3:25 PM - 3:35 PM**

1:45 PM - 3:45 PM

Oral Papers IB: Shock/Transfusion/Resuscitation Papers 11-21**Moderator:** Julia Coleman, MD*Skyview 2 26th Floor Horseshoe Casino Hotel***Paper 11****1:45 PM - 1:55 PM**

ANALYSIS OF THE CURRENT USAGE OF RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA (REBOA) IN PEDIATRIC TRAUMA PATIENTS: A RETROSPECTIVE OBSERVATIONAL STUDY FROM THE ACS-TQIP DATABASE

Presenter: Ling-wei Kuo**Paper 12****1:55 PM - 2:05 PM**

FIBRINOGEN EARLY IN SEVERE PAEDIATRIC TRAUMA STUDY (FEISTY JUNIOR): A RANDOMISED CLINICAL TRIAL

Presenter: Shane George**Paper 13****2:05 PM - 2:15 PM**

DOES CRYOPRECIPITATE TRANSFUSION IMPROVE THE SURVIVAL OUTCOME OF BLUNT TRAUMA?- A SINGLE TRAUMA CENTER RETROSPECTIVE STUDY IN JAPAN

Presenter: Sung Ho Kim**Paper 14****2:15 PM - 2:25 PM**

PREVALENCE OF TRAUMA-INDUCED COAGULOPATHY DIAGNOSED USING THROMBOELASTOGRAPHY IN A REGIONAL HOSPITAL IN THE PHILIPPINES

Presenter: Ma Corazon Cabanilla-Manuntag**Paper 15****2:25 PM - 2:35 PM**

ANALYZING ADVERSE EVENTS IN TRAUMA RESUSCITATION: IMPLEMENTING A DATA-DRIVEN APPROACH FOR IMPROVED PATIENT CARE AND SAFETY DATABASE ANALYSIS

Presenter: Anisa Nazir**Paper 16****2:35 PM - 2:45 PM**

THE DIAGNOSTIC ACCURACY OF FAST CT IN THE COMPUTED TOMOGRAPHY FIRST RESUSCITATION STRATEGY WITH HYBRID EMERGENCY ROOM SYSTEM FOR SEVERELY TRAUMA PATIENTS

Presenter: Satomi Senoo

Paper 17 **2:45 PM - 2:55 PM**
FIIRST-2 TRIAL: FACTORS IN THE INITIAL RESUSCITATION OF SEVERE TRAUMA. A 2020 EAST MULTICENTER TRIAL
Presenter: Luis da Luz

Paper 18 **2:55 PM - 3:05 PM**
OUTCOMES AFTER REVISED BLOOD TRANSFUSION POLICY DURING CRITICAL NATIONAL BLOOD SHORTAGE
Presenter: Makenna Marty

Paper 19 **3:05 PM - 3:15 PM**
ABO BLOOD TYPE GROUPS AND OUTCOMES OF SEVERE TRAUMA PATIENTS: SYSTEMATIC REVIEW
Presenter: Yohei Iwasai

Paper 20 **3:15 PM - 3:25 PM**
ROTEM IN COAGULATION MANAGEMENT FOR MAJOR TRAUMA PATIENTS: EVIDENCE BASED ALGORITHMIC APPROACH
Presenter: Vikas Chawla

Paper 21 **3:25 PM - 3:35 PM**
FEASIBILITY OF RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA FOR COMPUTED TOMOGRAPHY DIAGNOSIS: A REEVALUATION
Presenter: Hiroyuki Otsuka

BREAK **3:35 PM - 3:45 PM**

1:45 PM - 3:45 PM

Oral Papers IC: Outcomes - Guidelines Papers 22-33

Moderator: Milos Buhavac, MD
Skyview 3 26th Floor Horseshoe Casino Hotel

Paper 22 **1:45 PM - 1:55 PM**
IMPACT OF CD4 COUNT ON HIV POSITIVE TRAUMA PATIENTS IN URBAN U.S. CITY
Presenter: Vanessa Arientyl

Paper 23 **1:55 PM - 2:05 PM**
IMPACT OF CRASH DYNAMICS ON MORTALITY AND INJURY OUTCOMES AFTER ROAD TRAFFIC CRASHES (RTC) IN INDIA
Presenter: Divya Kewalramani

Paper 24 **2:05 PM - 2:15 PM**
INCREASED RISK OF POST-INJURY PULMONARY EMBOLISM AMONG SICKLE CELL DISEASE PATIENTS
Presenter: Ektha Parchuri

Paper 25 **2:15 PM - 2:25 PM**
IS WHOLE-BODY CT SCAN WARRANTED IN ELDERLY PATIENTS AFTER A FALL?
Presenter: Nicholas Gargiulo

Paper 26 **2:25 PM - 2:35 PM**
CHALLENGES IN SAVING PATIENTS WITH TRAUMA IN SEOUL: A RETROSPECTIVE COHORT STUDY BASED ON 2016-2020 COMMUNITY-BASED SEVERE TRAUMA SURVEY
Presenter: Hoonsung Park

Paper 27 **2:35 PM - 2:45 PM**
COMPARISON OF SURVIVAL OUTCOMES IN TRAUMA PATIENTS TREATED WITH ECMO OVER THE YEARS

Presenter: Oswald Perkins

Paper 28 **2:45 PM - 2:55 PM**
THE EXTERNAL VALIDATION OF THE REVISED LETHAL TRIAD CRITERIA FOR APPROPRIATE STRATEGIC DECISION-MAKING

Presenter: Keisuke Suzuki

Paper 29 **2:55 PM - 3:05 PM**
REFINING RISK IN RIB FRACTURES: THE COMPOUND EFFECT OF RIB FRACTURE SEVERITY AND AGE IN PREDICTING MORTALITY

Presenter: Arnav Mahajan

Paper 30 **3:05 PM - 3:15 PM**
MANAGEMENT AND OUTCOME OF VARIOUS TYPES OF NECK INJURIES AT LEVEL 1 TRAUMA CENTRE- AN AMBISPECTIVE OBSERVATIONAL STUDY

Presenter: Sandeep Tiwari

Paper 31 **3:15 PM - 3:25 PM**
PREHOSPITAL AIRWAY MANAGEMENT IN COMBAT TRAUMA: CURRENT EVIDENCE

Presenter: Vikas Chawla

Paper 32 **3:25 PM - 3:35 PM**
PREDICTORS OF OUTCOMES OF MOTORCYCLE CRASH ISOLATED HEAD INJURIES FROM A TERTIARY GOVERNMENT HOSPITAL IN THE PHILIPPINES
PRESENTER: EMMEA JUNE QUIBOD

Paper 33 **3:35 PM - 3:45 PM**
FACTORS ASSOCIATED WITH IN-HOSPITAL MORTALITY AMONG PREGNANT TRAUMA PATIENTS; A NATIONWIDE STUDY IN JAPAN

Presenter: Lisa Marie Knowlton

BREAK **3:45 PM - 3:55 PM**

1:45 PM - 3:45 PM

Oral Papers ID: Extremity Trauma Papers 34-45

Moderator: Mayur Narayan, MD, MPH, MBA, MHPE
Skyview 4 26th Floor Horseshoe Casino Hotel

Paper 34 **1:45 PM - 1:55 PM**
EXPLORING THE IMPACT OF AI ALGORITHMS ON PHYSICIAN PERFORMANCE IN PELVIC RADIOGRAPHY: A PROSPECTIVE, OBSERVER-BLINDED USER TEST STUDY

Presenter: Szu An Chen

Paper 35 **1:55 PM - 2:05 PM**
TARGETED MUSCLE REINNERVATION (TMR) AT THE TIME OF MAJOR LIMB AMPUTATION /IN PATIENTS WITH LOWER EXTREMITY TRAUMA. A RANDOMISED CONTROL TRIAL.

Presenter: Abhinav Kumar

Paper 36 **2:05 PM - 2:15 PM**
IMPACT OF PSYCHOLOGICAL INTERVENTION ON QUALITY OF LIFE IN PATIENTS WITH POST-TRAUMATIC LIMB AMPUTATION/S - A RANDOMIZED CONTROLLED TRIAL

Presenter: Kaur Milandeep

Paper 37 **WITHDRAWN**

Paper 38 **2:15 PM - 2:25 PM**
SAFETY OR SPEED? ASSESSING ALTERNATIVE VASCULAR ACCESS FOR ANGIOGRAPHY FOLLOWING RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA (REBOA) IN SEVERE PELVIC TRAUMA PATIENTS

Presenter: Yauren Chang

Paper 39 **2:25 PM - 2:35 PM**
RISK FACTORS FOR AMPUTATION OF AFFECTED LIMB IN COMPLEX EXTREMITY INJURY

Presenter: Ryosuke Omoto

Paper 40 **2:35 PM - 2:45 PM**
TENSION BAND FIXATION FOR PATELLAR FRACTURES: A STUDY OF FAILURE FACTORS

Presenter: Hiroakil Iwase

Paper 41 **2:45 PM - 2:55 PM**
DOES THE SURGEON'S EXPERIENCE INFLUENCE THE DURATION OF SURGERY IN 3D-ASSISTED PERCUTANEOUS TRANSPEDICULAR SPINAL STABILIZATION? - A RETROSPECTIVE MONOCENTRIC ANALYSIS OF 34 PATIENTS AFTER NAVI

Presenter: Orkun Özkurtul

Paper 42 **2:55 PM - 3:05 PM**
BINDING BLINDLY: PELVIC BINDERS - A FRIEND OR FOE

Presenter: Shahin Mohseni

Paper 43 **3:05 PM - 3:15 PM**
MULTIFACETED CHALLENGES IN IATROGENIC VASCULAR TRAUMA: A CASE SERIES FROM THE DEPARTMENT OF TRAUMA SURGERY, AIIMS PATNA

Presenter: Abdul Wakil Khan

Paper 44 **3:15 PM - 3:25 PM**
EXAMINING DISPARITIES IN LOWER EXTREMITY VASCULAR TRAUMA - A 12-YEAR SINGLE CENTER RETROSPECTIVE ANALYSIS

Presenter: Lubna Khan

Paper 45 **3:25 PM - 3:35 PM**
REVERSE CONTRALATERAL PROXIMAL TIBIA PLATE FIXATION AND PROVISIONAL REDUCTION PLATING IN THE TREATMENT OF HOFFA FRACTURE

Presenter: Zhaohua Liu

BREAK **3:35 PM - 3:45 PM**

3:35 PM - 4:55 PM

Oral Papers IIA: Critical Care Papers 46-53

Moderator: Rachel Appelbaum, MD
Skyview 1 26th Floor Horseshoe Casino Hotel

Paper 46**3:35 PM - 3:45 PM**

INCIDENCE OF SURGICAL SITE INFECTION IN CASUALTY DEPARTMENT AT A TERTIARY CARE HOSPITAL IN BANGLADESH: RESULTS FROM A PILOT SURGICAL SITE INFECTION SURVEILLANCE

Presenter: Mohammad Arif Hossain**Paper 47****3:45 PM - 3:55 PM**

MANAGEMENT OF ABDOMINAL, OPEN ABDOMEN, AND LOSS OF DOMAIN WITH DECELLULARIZED FISH DERMIS AND AUTOLOGOUS SUSPENDED-CELL TRANSPLANTATION

Presenter: Alfredo Cordova**Paper 48****3:55 PM - 4:05 PM**

CORRELATION OF ICU ACQUIRED WEAKNESS(ICUAW) MEASURED WITH MRC(MEDICAL RESEARCH COUNCIL) SCORE WITH DIAPHRAGMATIC EXCURSION(DE) MEASURED USING ULTRASOUND : A PROSPECTIVE OBSERVATIONAL STUDY

Presenter: Vikas Saini**Paper 49****4:05 PM - 4:15 PM**

PORPHYRINIZED CARBON QUANTUM DOTS WITH BROAD-SPECTRUM ANTIBACTERIAL ACTIVITY TREAT WOUNDS INFECTED BY DRUG-RESISTANT BACTERIA

Presenter: Mengwei Zhang**Paper 50****4:15 PM - 4:25 PM**

OPTIMIZING ECMO RESCUE IN TRAUMA BY ESTABLISHING A PHENOTYPIC APPROACH TO PATIENT SELECTION

Presenter: Larisa Shagabayeva**Paper 51****4:25 PM - 4:35 PM**

SELENIUM SUPPLEMENTATION IN CRITICAL ILL PATIENTS WITH ACUTE ABDOMEN – A PROSPECTIVE RANDOMIZED AND PLACEBO-CONTROLLED TRIAL

Presenter: Yutung Wu**Paper 52****4:35 PM - 4:45 PM**

RISK FACTORS FOR POST TRAUMATIC EPILEPSY IN PATIENTS WITH NON OPERATIVE TREATMENT : A RETROSPECTIVE OBSERVATIONAL STUDY

Presenter: Hikaru Odera**Paper 53****4:45 PM - 4:55 PM**

A RANDOMISED CONTROLLED DOUBLE-BLINDED STUDY TO COMPARE KETAMINE-DEXMEDETOMIDINE VERSUS KETAMINE-PROPOFOL COMBINATIONS FOR OPIOID FREE ANESTHESIA IN PATIENTS UNDERGOING BRACHIAL PLEXUS INJURY REPAIR

Presenter: Sameer Sethi

3:45 PM - 5:15 PM

Oral Papers IIB: Thoracic Trauma Papers 54-62**Moderator:** Joseph Forrester, MD, MSc*Skyview 2 26th Floor Horseshoe Casino Hotel***Paper 54****3:45 PM - 3:55 PM**

IS A DELAY IN SURGICAL STABILISATION OF TRAUMATIC RIB FRACTURES ASSOCIATED WITH INCREASED OPERATIVE TIMES AND WORSE OUTCOMES?

Presenter: Lachlan Allan

Paper 55 **3:55 PM - 4:05 PM**
RESUSCITATIVE MEDIAN STERNOTOMY PLUS ENDOVASCULAR AORTIC
OCCLUSION FOR PENETRATING INJURIES IN THE BOX: AN ACE UP THE
SLEEVE

Presenter: Carlos Alberto Ordonez Delgado

Paper 56 **4:05 PM - 4:15 PM**
HEART INJURY AS A PROGNOSTIC FACTOR IN BLUNT CHEST TRAUMA
PATIENTS UNDERGOING OPEN CARDIOPULMONARY RESUSCITATION
(OCPR): A TQIP STUDY

Presenter: Yauren Chang

Paper 57 **4:15 PM - 4:25 PM**
PNEUMOTHORAX DETECTION IN THE ED: HOCUS POCUS?

Presenter: Randeep Jawa

Paper 58 **4:25 PM - 4:35 PM**
BEYOND MEDIASTINAL WIDENING: INNOVATIVE SCREENING AND PREDICTION
METHODS FOR AORTIC INJURY

Presenter: Yu-Hao Wang

Paper 59 **4:35 PM - 4:45 PM**
EVOLUTION OF VIDEOTHORACOSCOPY IN THORACIC TRAUMA

Presenter: Rafael Andrade-Alegre

Paper 60 **4:45 PM - 4:55 PM**
THORACIC IRRIGATION FOR TRAUMATIC HEMOTHORAX: A SYSTEMATIC
REVIEW AND META-ANALYSIS

Presenter: Nicole Lyons

Paper 61 **4:55 PM - 5:05 PM**
MASSIVE HEMOTHORAX ASSOCIATED WITH THORACIC VERTEBRAL
FRACTURES: A RETROSPECTIVE ANALYSIS

Presenter: Keita Sato

Paper 62 **5:05 PM - 5:15 PM**
IMPACT OF THORACIC TRAUMA ON MORBIDITY AND OUTCOME: SIX YEARS'
EXPERIENCE FROM TERTIARY CARE LEVEL 1 TRAUMA CENTRE IN INDIA

Presenter: Amit Singh

3:55 PM - 5:25 PM

Oral Papers IIC: Trauma Systems Papers 63-72

Moderator: Vanessa Ho, MD, PhD, MPH

Skyview 3 26th Floor Horseshoe Casino Hotel

Paper 63 **3:55 PM - 4:05 PM**
PREVENTABLE AND POTENTIALLY PREVENTABLE DEATHS AMONG ROAD
TRAFFIC FATALITIES IN CHIBA PREFECTURE: PROBLEMS IN THE JAPANESE
HOSPITAL CARE SYSTEM REVEALED BY INVESTIGATION OVER A 12-YEAR
PERIOD

Presenter: Atsushi Hirabayashi

Paper 64 **4:05 PM - 4:15 PM**
OUTCOME OF SEVERE TRAUMA PATIENTS REQUIRED DAMAGE CONTROL
SURGERY BY THE DIFFERENCE BETWEEN 'DOCTOR-CAR' AND AMBULANCE
FROM JAPAN TRAUMA DATA BANK

Presenter: Yohei Iwasaki

Paper 65 **4:15 PM - 4:25 PM**
INSIGHTS INTO MILITARY-CIVILIAN TRAUMA SYSTEM INTEGRATION AND ITS EFFECTS ON BLOOD PRODUCT AVAILABILITY

Presenter: Joseph Aryankalayil

Paper 66 **4:25 PM - 4:35 PM**
PRESENCE OF GERIATRIC CONSULT SERVICE IS ASSOCIATED WITH DECREASED HOSPITAL-LEVEL MORTALITY FOR GERIATRIC TRAUMA PATIENTS

Presenter: Alexander Ordoobadi

Paper 67 **4:35 PM - 4:45 PM**
THE CORRELATION OF TRANSFER PATTERNS AND MORTALITY RATES AFTER ESTABLISHING A TRAUMA CENTER

Presenter: Dowan Kim

Paper 68 **4:45 PM - 4:55 PM**
VARIABILITY IN CT IMAGING PRACTICES IN GERIATRIC TRAUMA: A SECONDARY ANALYSIS OF AN EAST MULTICENTER TRIAL

Presenter: Arnav Mahajan

Paper 69 **4:55 PM - 5:05 PM**
DEVELOPING A GEOSPATIALLY INFORMED TRAUMA TRIAGE SYSTEM FOR IMPROVED PRE-HOSPITAL MANAGEMENT OF TRAUMA IN LOW- AND MIDDLE-INCOME COUNTRIES: A USER-CENTERED APPROACH

Presenter: Arnav Mahajan

Paper 70 **5:05 PM - 5:15 PM**
VALIDATION OF A REAL-TIME LOCATION SERVICE (RTLS) PRE-HOSPITAL TIME TO ARRIVAL TOOL IN THE SOUTHEAST MINNESOTA REGION USING AN ADVANCED GEOSPATIAL MAPPING MODEL FOR TRAUMA

Presenter: Sergio Navarro

Paper 71 **WITHDRAWN**

Paper 72 **5:15 PM - 5:25 PM**
THE IMPACT OF IMPLEMENTING THE JAPAN-AACN (D-CALL NET: DCN) DOCTOR DISPATCH SYSTEM

Presenter: Tomokazu Motomura

3:45 PM - 4:45 PM

Oral Papers IID: Trauma Education Papers 73-78

Moderator: Atsushi Nanashima, MD

Skyview 4 26th Floor Horseshoe Casino Hotel

Paper 73 **3:45 PM - 3:55 PM**
HUMANITY & TRAUMA ABOVE ALL - BUILDING BRIDGES THROUGH ADVANCED TRAUMA LIFE SUPPORT (ATLS) COURSES FOR PALESTINIAN & ISRAELI PHYSICIANS

Presenter: Adam Lee Goldstein

Paper 74 **3:55 PM - 4:05 PM**
MAINTAINING SURGICAL SKILLS IN AN ERA OF DECLINING TRAUMA SURGERY CASES: INSIGHTS FROM 12 YEARS OF TRAUMA SURGERY EXPERIENCE IN A SURGICAL RESIDENCY PROGRAM FACILITY

Presenter: Tadao Kubota

- Paper 75** **4:05 PM - 4:15 PM**
 A PRIMARY STUDY OF A SURGICAL TRAUMA COURSE ON ANIMAL MODELS
 IN MAINLAND CHINA
Presenter: Weiyi Shi
- Paper 76** **4:15 PM - 4:25 PM**
 APPLICABILITY OF A LOW-FIDELITY SIMULATOR TO LEARN EMERGENCY
 SURGICAL AIRWAY SKILLS IN MIDDLE-AND LOW-INCOME ENVIRONMENTS.
Presenter: Felipe Vega-Rivera
- Paper 77** **4:25 PM - 4:35 PM**
 THE POWER OF MENTORSHIP: HOW TO RECRUIT AND RETAIN VALUABLE STAFF
 TO YOUR TRAUMA TEAM
Presenter: Diane Wintz
- Paper 78** **4:35 PM - 4:45 PM**
 SURGICAL RESIDENCY TRAINING INNOVATIVE CURRICULUM IN TRAUMA
Presenter: Nancy Lopez

8:00 AM - 5:00 PM

Society of Trauma Nurses

Champagne 3/4

8:05 AM - 10:05 PM

STN Session I: Innovations in Trauma Nursing

Moderator: LeAnne Young, MSN, RN, TCRN

Champagne 3/4

- 8:10 AM - 8:35 AM**
 Pre-Hospital Whole Blood
Presenter: Kyle Gibson
- 8:35 AM - 9:00 AM**
 Utilization of Nurses in Pre-Hospital Care
Presenter: Linda Reinhart
- 9:00 AM - 9:25 AM**
 Impact of Bedside Laparotomy Simulation for ICU Nurses
Presenter: Jonathan Messing
- 9:25 AM - 9:35 AM**
Panel Q&A
Moderator: LeAnne Young, MSN, RN, TCRN
- 9:35 AM - 10:05 AM**
 Successful Transition to Rehab after SCI
Presenter: Tara Grimes - OTR/L
- BREAK** **10:05 AM - 10:15 AM**

10:15 AM - 12:10 PM

STN Session II: Global Trauma Systems

Moderator: Maria Bautista-Durand, MSN, APRN, FNP-C, CPNP

Champagne 3/4

10:15 AM - 10:30 AM

Global Trauma Quality Improvement (GTQI) Update

Presenter: Cristiane de Alencar Domingues

10:30 AM - 10:55 AM

Global Trauma Collaboration

Presenter: Helen Jowett

10:55 AM - 11:20 AM

Rural Trauma Care in the US

Presenter: Elizabeth Atkins

11:20 AM - 11:45 AM

The Role of Trauma Nurses in Trauma Systems Development in Brazil

Presenter: Cristiane de Alencar Domingues

11:45 AM - 12:00 PM

Lessons from the International ATCN Sister Sites Program

Presenter: LeAnne Young

12:00 PM - 12:10 PM

Panel Q&A

Moderator: Maria Bautista-Durand, MSN, APRN, FNP-C, CPNP

LUNCH (On your own)

12:10 PM - 1:00 PM

1:00 PM - 3:00 PM

STN Session III: Trauma Program Challenges

Moderator: Linda Reinhart, MSN, RN, CNS, CCRN, TCRN

Champagne 3/4

1:00 PM - 1:25 PM

Cyber-attacks: How to prepare your program

Presenter: Melissa Smith

1:25 PM - 1:50 PM

Ethics in Trauma Care

Presenter: Helen Jowett

1:50 PM - 2:00 PM

Panel Q&A

Moderator: Linda Reinhart, MSN, RN, CNS, CCRN, TCRN

2:00 PM - 2:25 PM

Disparities in Trauma Care - A Global Perspective

Presenter: LeAnne Young

2:25 PM - 2:55 PM

Cost of Trauma/Finance Performance Improvement

Presenter: Elizabeth Atkins

BREAK

2:55 PM - 3:05 PM

3:05 PM - 5:00 PM

STN Session IV: Interesting Trauma Cases

Moderator: Elizabeth Atkins, RN

Champagne 3/4

Adult patient - MVC with massive bleeding
Presenter: Knut Magne Kolstadbraten **3:05 PM - 3:30 PM**

Pediatric Patient - Hand Replantation
Presenter: Howard Pryor **3:30 PM - 3:50 PM**

Adult patient - MCC traumatic arrest
Presenter: Linda Reinhart **3:50 PM - 4:10 PM**

Pediatric Patient - Abusive Head Trauma
Presenter: Maria Bautista-Durand **4:10 PM - 4:30 PM**

Adult Patient - Impaled Unexploded Ordinance
Presenter: Melissa Smith **4:30 PM - 4:50 PM**

Panel Q&A
Moderator: Elizabeth Atkins, RN **4:50 PM - 4:55 PM**

Closing Remarks
Presenter: LeAnn Young **4:55 PM - 5:00 PM**

3:00 PM - 5:00 PM

WTC Poster Session: Station I
Moderator: Paul Albin, MD
Rivoli BR

Poster 1	VIRAL SEPSIS IN CRITICALLY ILL PATIENTS REQUIRING ICU CARE, AN OBSERVATIONAL STUDY FROM A TERTIARY CARE HOSPITAL.	Presenter: Ekta Gupta
Poster 2	AGGRESSIVE OXYGEN DELIVERY STRATEGIES DURING RESUSCITATION OF HEMORRHAGIC SHOCK AFFECTS KIDNEY MITOCHONDRIAL FUNCTION	Presenter: Nicolas Prat
Poster 3	UNVEILING THE HIDDEN WOUNDS: A CASE REPORT OF MOREL-LAVALLEE LESION	Presenter: Rene Ogatis
Poster 4	FORCE OF PELVIC BINDERS - A COMPARISON OF MECHANICAL PERFORMANCE OF VARIOUS PRODUCTS	Presenter: Naoki Matohara
Poster 5	SHORT-TERM TREATMENT OUTCOMES OF OPEN TIBIAL FRACTURES IN A TRAUMA CENTER	Presenter: Masahiro Miyashita
Poster 6	INTRAOPERATIVE USG IMAGING FOR CHEEKBONE (ZYGOMATIC) FRACTURE REPAIR: A RETROSPECTIVE STUDY	Presenter: Kuldeep Vishwakarma
Poster 7	MYOCARDIAL INJURY AND CALCIUM HOMEOSTASIS REGULATION IN ANIMAL MODEL OF HEMORRHAGIC SHOCK INDUCED ARRHYTHMIA	Presenter: Jingjing Ye
Poster 8	PEDIATRIC PATIENTS WITH OPEN PELVIC FRACTURE TREATED IN THE HYBRID EMERGENCY ROOM SYSTEM (HERS) BY A MULTIDISCIPLINARY TEAM: TWO CASE REPORTS.	Presenter: Tomoki Kanda

3:00 PM - 5:00 PM

WTC Poster Session: Station II

Moderator: Patricia Martinez Quinones, MD, PhD
Rivoli BR

Poster 9	HEMOSTATIC SPONGE BASED ON EASILY PREPARED CROSSLINKED GELATIN AND SODIUM ALGINATE FOR WOUND HEALING	Presenter: Jing Zhou
Poster 10	GUNSHOT AND BLAST INJURIES AND BLEEDING CONTROL TRAINING FOR MEDICAL STUDENTS AT A REGIONAL UNIVERSITY IN JAPAN	Presenter: Fumiaki Kawano
Poster 11	A CASE OF RECTUS SHEATH HEMATOMA	Presenter: Yoshitomo Ashitate
Poster 12	THE VAPE GRENADE: A CASE OF MAXILLOFACIAL INJURIES WITH C1-C2 FRACTURE SECONDARY TO ELECTRONIC CIGARETTE BLAST INJURY	Presenter: Arden Aron Asuncion
Poster 13	MODIFIED MESH-MEDIATED FASCIAL TRACTION, IN CONJUNCTION WITH ORTHOPEDIC ALUMINUM SPLINTS	Presenter: Yoshiaki Kawai
Poster 14	A CASE OF LIGATION OF THE COMMON CAROTID ARTERY AFTER PENETRATING TRAUMA WHO SURVIVED WITHOUT NEUROLOGICAL DEFICIT	Presenter: Kaori Kono

WTC Poster Session: Station III

Moderator: Alexandra Brito, MD
Rivoli BR

Poster 15	A CASE OF EARLY SURGICAL ESCHAROTOMY USING INTRAVASCULAR TEMPERATURE MANAGEMENT IS USEFUL FOR MAJOR DEEP BURN PATIENT	Presenter: Yuki Mochida
Poster 16	THE EFFECT OF VACUUM-ASSISTED CLOSURE AFTER ABDOMINAL SURGERY FOR A PATIENT WITH A VENTRICULOPERITONEAL SHUNT	Presenter: Naoki Oka
Poster 17	A CASE REPORT OF MANUAL COMPRESSION HEMOSTASIS FOR BRACHIAL ARTERY TRANSECTION WHILE BEING TRANSPORTED FROM AN ISOLATED JAPANESE ISLAND	Presenter: Shunsuke Saito
Poster 18	MULTIORGAN DYSFUNCTION FOLLOWING DELAYED TRAUMATIC HEPATIC PSEUDOANEURYSM AND BILOMA: A CASE REPORT	Presenter: Rene Ogatis
Poster 19	HOMEMADE DYNAMIC FASCIAL CLOSURE	Presenter: Taiki Yamataka
Poster 20	AGRICULTURAL FARM-RELATED HEAD INJURIES IN RURAL INDIA: A COMPREHENSIVE CASE SERIES	Presenter: Abdul Wakil Khan
Poster 21	PANCREATICOGASTROSTOMY AS RECONSTRUCTION FOR COMPLETE NECK TRANSECTION OF THE PANCREAS	Presenter: Jungchul Kim

FRIDAY, SEPTEMBER 13, 2024

7:30 AM - 9:15 AM

WTC Scientific Session IXA: Damage Control Surgery in Trauma Surgery

Moderator: Michael Rotondo, MD
Skyview 5/6 26th Floor Horseshoe Casino Hotel

ABDOMEN: WHEN AND HOW Presenter: Junsik Kwon - KSACS	7:30 AM - 7:45 AM
THORACIC: WHEN AND HOW Presenter: Thomas Scalea - AAST	7:45 AM - 8:00 AM
VASCULAR: WHEN AND HOW Presenter: Pedro Teixeira - AAST, EAST	8:00 AM - 8:15 AM
ORTHOPEDECS: WHEN AND HOW Presenter: Kamram Farooque - ISTAC	8:15 AM - 8:30 AM
DC IN POLYTRAUMA: HAS IT IMPROVED OUTCOMES? Presenter: Zsolt Balogh - ANZTS, ANZAST	8:30 AM - 8:45 AM
COMPLICATIONS OF OPEN ABDOMEN: WHAT THEY ARE AND HOW TO PREVENT THEM? Presenter: Rajashekar Mohan - IATCC	8:45 AM - 9:00 AM
DISCUSSION	9:00 AM - 9:15 AM
BREAK	9:15 AM - 9:20 AM

7:30 AM - 9:15 AM

WTC Scientific Session IXB: Trauma Quality Assurance and Performance Improvement

Moderator: Ajai Malhotra, MD
Skyview 3 26th Floor Horseshoe Casino Hotel

TRAUMA QA AND PI: CONCEPTS AND IMPLEMENTATION Presenter: Jeffrey Kerby - ACSCOT	7:30 AM - 7:45 AM
TRAUMA QUALITY FRAMEWORK FOR RESOURCE CHALLENGED ENVIRONMENTS Presenter: Amit Gupta - ACT	7:45 AM - 8:00 AM
MISSED INJURIES: STILL A NEMESIS FOR THE TRAUMA SURGEON Presenter: Marcelo A. F. Ribeiro Jr. - SBAIT/PTS	8:00 AM - 8:15 AM

8:15 AM - 8:30 AM
TRAUMA REGISTRY AND TRAUMA QI IN ASIA: OPPORTUNITIES FOR
IMPROVEMENT AND COLLABORATION
Presenter: Koji Morishita - ACT/JSACS/JAST

8:30 AM - 8:45 AM
TRAUMA QI IN LATIN AMERICA: ANY PROGRESS?
Presenter: Edgar Rodas - PTS

8:45 AM - 9:00 AM
OPTIMIZING QUALITY IN RESOURCE CONSTRAINED AREAS
Presenter: Fausto Catena - WSES

DISCUSSION 9:00 AM - 9:15 AM

BREAK 9:15 AM - 9:20 AM

9:20 AM - 10:50 AM

WTC Scientific Session XA: Polytrauma Care

Moderator: David Livingston, MD
Skyview 5/6 26th Floor Horseshoe Casino Hotel

9:20 AM - 9:35 AM
DEFINING POLYTRAUMA: CAN A UNIFORM DEFINITION BE ACHIEVED?
Presenter: Zsolt Balogh - ANZTS, ANZAST

9:35 AM - 9:50 AM
TIMING OF FRACTURE FIXATION IN POLYTRAUMA PATIENTS
Presenter: Hans-Christoph Pape - ESTES

9:50 AM - 10:05 AM
CONTEMPORARY MANAGEMENT OF EXTREMITY OPEN FRACTURES
Presenter: Phil Stahel - AAST

10:05 AM - 10:20 AM
PRIMARY AMPUTATION IN MANGLED EXTREMITY IN POLYTRAUMA PATIENTS:
WHEN AND HOW?
Presenter: Boris Zelle - OTA

10:20 AM - 10:35 AM
MULTIPLE PENETRATING INJURIES: WHICH CAVITY TO OPEN FIRST
Presenter: David Livingston - AAST

DISCUSSION 10:35 AM - 10:50 AM

BREAK 10:50 AM - 10:00 A

9:20 AM - 9:25 AM

WTC Scientific Session XB: Research and

Collaboration in Global Trauma

Moderator: Catherine Juillard, MD, MPH
Skyview 3 26th Floor Horseshoe Casino Hotel

9:25 AM - 9:50 AM

Keynote: Importance of Equitable Partnership in the Development of Trauma Programs and Research Capacity

Presenter: Alain Chichom, MD; **Moderator:** Catherine Juillard, MD, MPH
Skyview 3 26th Floor Horseshoe Casino Hotel

9:50 AM - 11:20 AM

Panel: Best Practices in Research and Publication of Work Conducted in LMICs

Trauma Research, Publication Impediments, and

How to Make It More Equitable for LMICs

Moderator: Catherine Juillard, MD, MPH
Skyview 3 26th Floor Horseshoe Casino Hotel

10:05 AM - 10:20 AM

THE ACT PERSPECTIVE

Presenter: Amit Gupta - ACT

10:20 AM - 10:35 AM

THE PTS PERSPECTIVE

Presenter: Antonio Martos - PTS

10:35 AM - 10:50 AM

THE ISTAC PERSPECTIVE

Presenter: Subodh Kumar - ISTAC

10:50 AM - 11:05 AM

THE TSSA PERSPECTIVE

Presenter: Maeyane Stephens Moeng - TSSA

11:05 AM - 11:20 AM

GUIDELINES FOR FAIR AND EQUITABLE PUBLICATIONS OF WORK CONDUCTED IN LMICs IN COLLABORATION WITH HICS

Presenter: Rochelle Dicker - AAST

BREAK

11:20 AM - 11:25 AM

10:55 AM - 12:25 PM

WTC Scientific Session XIA: Management of Severe Pelvic Trauma

Moderator: Todd Costantini, MD
Skyview 5/6 26th Floor Horseshoe Casino Hotel

10:55 AM - 11:10 AM

UPDATES IN THE MANAGEMENT OF SEVERE PELVIC INJURIES

Presenter: Joakim Jorgensem - ESTES, IATSIC

11:10 AM - 11:25 AM

TEMPORARY BONE STABILIZATION TO HELP BLEEDING CONTROL: TRICKS AND TECHNIQUES

Presenter: Hans-Christoph Pape - ESTES

11:25 AM - 11:40 AM

FIRST MOVE IN UNSTABLE PATIENTS WITH SEVERE PELVIC FRACTURES: PACK OR SQUIRT?

Presenter: Clay Cothren-Burlew - AAST

11:40 AM - 11:55 AM

REBOA FOR PELVIC FRACTURE HEMORRHAGE CONTROL

Presenter: Raul Coimbra - AAST

11:55 AM - 12:10 PM

SEVERE PELVIC INJURIES IN LOW-RESOURCE ENVIRONMENTS. HOW TO STOP THE BLEEDING AND STABILIZE THE BONE?

Presenter: Naveen Sharma - IATCC

DISCUSSION

12:10 AM - 12:25 AM

11:25 AM - 12:40 PM

WTC Scientific Session XIB: Trauma Quality Assurance and Performance Improvement

Moderator: Ranson Chien-Hung Liao, MD

Skyview 3 26th Floor Horseshoe Casino Hotel

11:25 AM - 11:40 AM

GUIDELINES IN TRAUMA - ANYTHING NEW

Presenter: Scott D'Amours - IATSIC

11:40 AM - 11:55 AM

THE PARADOX OF GUIDELINES: WHAT IS IDEAL IN ONE REGION MAY BE INAPPROPRIATE OR IMPOSSIBLE IN ANOTHER REGION

Presenter: Tina Gaarder - ESTES/IATSIC

11:55 AM - 12:10 PM

WRITING GENERALIZABLE GUIDELINES THAT ARE INCLUSIVE OF ALL RESOURCE AREAS

Presenter: Fausto Catena

12:10 PM - 12:25 PM

TOP 5 EAST PRACTICE MANAGEMENT GUIDELINES THAT SHOULD CHANGE YOUR PRACTICE

Presenter: Lisa Kodadek - EAST

DISCUSSION

12:25 PM - 12:40 PM

12:25 PM - 1:30 PM

Lunch With Exhibitors

Ravoli

1:30 PM - 3:35 PM

WTC Scientific Session XIIA: Pediatric Trauma

Skyview 5/6 26th Floor Horseshoe Casino Hotel

1:35 PM - 2:00 PM

**Pediatric Keynote: Pediatric Surgical Emergency
Education and Trauma Systems Development**

Presenter: Phyllis Kisa, MBCHB, MMED; **Moderator:** Christopher Newton, MD
Skyview 5/6 26th Floor Horseshoe Casino Hotel

2:00 PM - 3:30 PM

Pediatric Trauma Topics

Moderator: Michael Nance, MD
Skyview 5/6 26th Floor Horseshoe Casino Hotel

2:00 PM - 2:15 PM

NON-ACCIDENTAL PEDIATRIC TRAUMA: THE HIDDEN DISEASE

Presenter: Helen Jowett - ANZTS

2:15 PM - 2:30 PM

TRANSFUSION PRACTICES IN PEDIATRIC TRAUMA RESUSCITATIONS

Presenter: Robert Russell - PedTS

2:30 PM - 2:45 PM

THE BURDEN OF PEDIATRIC FIREARM INJURIES IN THE USA AND GLOBALLY

Presenter: Michael Nance - PedTS/AAST

2:45 PM - 3:00 PM

C-SPINE CLEARANCE IN PEDIATRIC TRAUMA PATIENTS: CONTROVERSIES AND ANSWERS

Presenter: Helen Jowett - ANZTS

3:00 PM - 3:15 PM

ETHICAL DILEMMAS IN PEDIATRIC TRAUMA CARE

Presenter: Rochelle Dicker - AAST

DISCUSSION

3:15 PM - 3:30 PM

BREAK

3:30 PM - 3:45 PM

1:30 PM - 2:45 PM

**WTC Scientific Session XIIB: Disaster and Mass
Casualty Preparation II**

Moderator: Jay Doucet, MD, MSc
Skyview 3 26th Floor Horseshoe Casino Hotel

1:30 PM - 1:45 PM

CHALLENGES OF DISASTER RESPONSE IN AREAS OF CONFLICT

Presenter: Aireen Patricia M. Madrid - PSST

1:45 PM - 2:00 PM

BUILDING A REPOSITORY OF RESOURCES FOR CONFLICT VULNERABLE REGIONS

Presenter: Alan Guo - AAST

2:00 PM - 2:15 PM

EDUCATION OF TRAUMA SURGEONS IN DISASTER TRAINING: WHAT DO THEY NEED TO KNOW

Presenter: Jeannette Capella - ACSCOT

2:15 PM - 2:30 PM

HEALTH CARE ORGANIZATION IN RESPONSE TO ACTS OF TERRORISM AND HUMAN CONFLICTS

Presenter: Nezhil Akkapulu - TATES

DISCUSSION

2:30 PM - 2:45 PM

BREAK

2:45 PM - 2:50 PM

3:35 AM - 5:05 PM

WTC Scientific Session XIII A: Critical Problems in Abdominal Trauma

Moderator: Andrew Peitzman, MD
Skyview 5&6 26th Floor Horseshoe Casino Hotel

3:35 PM - 3:50 PM

NON-OPERATIVE MANAGEMENT OF PENETRATING ABDOMINAL TRAUMA

Presenter: Pradeep Navsaria - TSSA

3:50 PM - 4:05 PM

USE OF LAPAROSCOPY IN ABDOMINAL TRAUMA

Presenter: Hangjoo Cho - KSACS

4:05 PM - 4:20 PM

SURGICAL MANAGEMENT OF COMPLEX LIVER TRAUMA: RIGHT TECHNIQUE FOR THE RIGHT PATIENT

Presenter: Jose Gustavo Parreira - SBAIT

4:20 PM - 4:35 PM

STABLE HIGH-GRADE SPLENIC INJURY WITH A BLUSH: EMBOLIZE OR OBSERVE

Presenter: Tina Gaarder - IATSIC, ESTES

4:35 PM - 4:50 PM

GRADE IV PANCREATIC INJURIES: DRAINAGE OR RESECTION?

Presenter: Tercio de Campos - SBAIT

DISCUSSION

4:50 PM - 5:05 PM

BREAK

5:05 PM - 5:10 PM

2:50 PM - 4:50 PM

WTC Scientific Session XIII B: Global Trauma – Quick Shots

Moderator: Rochelle Dicker, MD
Skyview 3 26th Floor Horseshoe Casino Hotel

2:50 PM - 3:05 PM

GLOBAL PERSPECTIVES ON TRAUMA CARE: LESSONS LEARNED FROM AROUND THE WORLD

Presenter: Kenneth Boffard - IATSIC/ESTES/TSSA

3:05 PM - 3:20 PM

HOW TO CREATE A CAREER IN GLOBAL SURGERY

Presenter: Mike M. Mallah - EAST

3:20 PM - 3:35 PM

TRAUMA IN REMOTE LOCATIONS: HOW TO IMPROVE EDUCATION, SURGICAL CARE, RESEARCH, AND EXPERTISE EXCHANGE

Presenter: Michel Aboutanos - PTS

3:35 PM - 3:50 PM

EFFECTIVE STRATEGIES FOR TREATING UNUSUAL TRAUMA WITH LIMITED RESOURCES

Presenter: Panu Teeratakulpisarn - TAT

3:50 PM - 4:05 PM

DIVERSITY, EQUITY, AND INCLUSION IN TRAUMA IN THE WORLD

Presenter: Kaori Ito - JSACS

4:05 PM - 4:20 PM

DEVELOPING THE PHILIPPINE NATIONAL TRAUMA SYSTEM

Presenter: Rolando Gerardo Fausto Dela Cruz

4:20 PM - 4:35 PM

AI IN TRAUMA CARE: NOW AND THE FUTURE

Presenter: Rachael Callcut - AAST

4:35 PM - 4:50 PM

DEVELOPING AN INDEX TO ASSESS SECURITY RISKS IN TRAUMA DATA

Presenter: Feifei Jin - CDMA

4:50 PM - 5:05 PM

KSACS PLANS AND ACTIVITIES TO IMPROVE TRAUMA CARE IN SOUTH KOREA

Presenter: Jae Gil Lee - KSACS

5:10 PM - 6:40 PM

WTC Scientific Session XIVA: TBI and Neck Trauma

Moderator: Ranson Chien-Hung Liao, MD

Skyview 5&6 26th Floor Horseshoe Casino Hotel

5:10 PM - 5:25 PM

MANAGEMENT OF TRAUMATIC BRAIN INJURY - HAVE WE MADE ANY PROGRESS IN THE LAST 20 YEARS?

Presenter: Phil Stahel - AAST, WSES

5:25 PM - 5:40 PM

TBI EPIDEMIOLOGY AND MANAGEMENT IN LMIC

Presenter: Warren Dorlac - ACSCOT

5:40 PM - 5:55 PM

BCVI SCREENING PROTOCOL: HOW WE DO IN AUSTRALIA AND NEW ZEALAND

Presenter: Rebecca Schroll - ANZTS, ANZAST

5:55 PM - 6:10 PM

MANAGEMENT OF BCVI: HOW WE DO IN THE US

Presenter: Walt Biffl - AAST, WSES

1:00 PM - 1:50 PM

Oral Papers IIIA: Neurologic Trauma Papers 79-85

Moderator: John Agapian, MD

Skyview 1 26th Floor Horseshoe Casino Hotel

- Paper 79** **WITHDRAWN**
- Paper 80** **WITHDRAWN**
- Paper 81** **1:00 PM - 1:10 PM**
 MODERATE TO SEVERE TRAUMATIC BRAIN INJURY OUTCOMES - A TWENTY YEAR LONGITUDINAL COHORT ANALYSIS
Presenter: Yuewei Xiao
- Paper 82** **1:10 PM - 1:20 PM**
 RETROSPECTIVE VALIDATION OF THE BRAIN INJURY GUIDELINES: MANAGEMENT OF TRAUMATIC BRAIN INJURY AT A SINGLE COMMUNITY TRAUMA ONE HOSPITAL
Presenter: Gianmarino Gianfrate
- Paper 83** **1:20 PM - 1:30 PM**
 EPIDEMIOLOGY OF TRAUMATIC ATLANTOOCIPITAL DISLOCATION: NATIONAL REGISTRY STUDY
Presenter: Kristin Salottolo
- Paper 84** **1:30 PM - 1:40 PM**
 DIFFERENTIAL IMPACT OF RACE ON TRAUMATIC INTRACEREBRAL HEMORRHAGE INCIDENCE AND OUTCOMES
Presenter: Erica Romo
- Paper 85** **1:40 PM - 1:50 PM**
 ASSESSING THE IMPACT OF THORACIC ENDOVASCULAR AORTIC REPAIR ON DELAYED NEUROLOGICAL DETERIORATION IN PATIENTS WITH BLUNT AORTIC INJURY AND TRAUMATIC BRAIN INJURY: A TQIP STUDY
Presenter: Chih-Yuan Fu

BREAK **1:50 PM - 2:00 PM**

1:00 PM - 2:40 PM

Oral Papers IIIB: Abdominal Trauma Papers II 86-95

Moderator: Amanda Teichman, MD

Skyview 2 26th Floor Horseshoe Casino Hotel

- Paper 86** **1:00 PM - 1:10 PM**
 BULL HORN INJURY- EMERGING PROBLEM OF URBAN INDIA: A CASE SERIES ANALYSIS FROM A LEVEL 1 TRAUMA CENTRE
Presenter: Anita Singh
- Paper 87** **1:10 PM - 1:20 PM**
 THE SIGNIFICANCE OF EARLY ARTERIAL-PHASIC IN MULTIDETECTOR CT FOR BLUNT SPLEEN INJURED PATIENTS: A CLINICAL OUTCOMES-ORIENTED STUDY
Presenter: Yu-Hao Wang

Paper 88 **1:20 PM - 1:30 PM**
CONCEALED PERIL: INFLUENCE OF SOLID ORGAN TRAUMA ON MESENTERIC INJURY DETECTION AND THE ROLE OF HEMODYNAMICS
Presenter: Yauren Chang

Paper 89 **1:30 PM - 1:40 PM**
PROGNOSTIC FACTORS IN THE MANAGEMENT OF BLUNT ABDOMINAL TRAUMA. OUR EXPERIENCE IN A TERTIARY TRAUMA CENTER.
Presenter: Agron Dogjani

Paper 90 **1:40 PM - 1:50 PM**
A RETROSPECTIVE ANALYSIS OF PENETRATING STAB ABDOMINAL INJURY AND MANAGEMENT: A SINGLE INSTITUTIONAL EXPERIENCE
Presenter: Narendra Kumar

Paper 91 **1:50 PM - 2:00 PM**
UNDERSTANDING HOSPITAL LENGTH OF STAY IN TRAUMA LAPAROTOMY PATIENTS: A NATIONAL TRAUMA DATABASE STUDY.
Presenter: Hayaki Uchino

Paper 92 **2:00 PM - 2:10 PM**
THE UTILITY OF SEQUENTIAL HEPATECTOMY FOR HIGH-GRADE LIVER TRAUMA: A CASE SERIES
Presenter: Hirotaka Yamamoto

Paper 93 **2:10 PM - 2:20 PM**
DEVELOPING VIRTUAL REALITY EDUCATION OF INTRAABDOMINAL HEMORRHAGIC DAMAGE CONTROL SURGERY FOR YOUNG SURGEONS AND MEDICAL STUDENTS
Presenter: Atsushi Nanashima

Paper 94 **2:20 PM - 2:30 PM**
LIVER INJURY WITH BLEEDING FROM EXTRAHEPATIC COLLATERAL VESSELS ONLY: CASE SERIES.
Presenter: Natsuki Hashiba

Paper 95 **2:30 PM - 2:40 PM**
ANGIOEMBOLIZATION IN THE MANAGEMENT OF ABDOMINOPELVIC INJURIES: A 2-YEAR CASE SERIES AND EARLY EXPERIENCE FROM A MAJOR TRAUMA CENTER IN THE PHILIPPINES
Presenter: Rene Ogatis

BREAK **2:40 PM - 2:50 PM**

2:00 PM - 3:00 PM

Oral Papers IVA: Systems/Pediatrics/Burns Papers 96-101

Moderator: Laura Haines, MD
Skyview 2 26th Floor Horseshoe Casino Hotel

Paper 96 **2:00 PM - 2:10 PM**
IN THE MIDST OF CHAOS: NAVIGATING PAEDIATRIC BURN AND CHEMICAL INJURY CARE IN ARMED CONFLICT ZONES
Presenter: Kathryn Campos

Paper 97 **2:10 PM - 2:20 PM**
URGENCY TO BUILD PREHOSPITAL SYSTEMS IN INDIA TO IMPROVE MORTALITY
Presenter: Divya Kewalramani

Paper 98 **2:20 PM - 2:30 PM**
ENHANCING CIVIL-MILITARY SYNERGY IN SURGICAL CARE: STRENGTHENING LOCAL HEALTH SYSTEMS FOR ROBUST HUMANITARIAN RESPONSE IN ARMED CONFLICT AND DISASTER SETTINGS
Presenter: Kathryn Campos

Paper 99 **2:30 PM - 2:40 PM**
CONFRONTING THE CRISIS: ADVANCING BURN INJURY TREATMENT IN AUSTERE ENVIRONMENTS AMIDST GLOBAL CHALLENGES:
Presenter: Kathryn Campos

Paper 100 **2:40 PM - 2:50 PM**
AUTOLOGOUS CELL HARVESTING DEVICE AND COPOLYMER-BASED EPIDERMAL SKIN SUBSTITUTES FOR THE MANAGEMENT OF PARTIAL-THICKNESS FACIAL BURNS
Presenter: Chih-Yuan Fu

Paper 101 **2:50 PM - 3:00 PM**
DISPARITIES IN EMERGENCY NEUROSURGICAL ACCESS FOR TRAUMATIC BRAIN INJURY CARE IN THAILAND: A GEOSPATIAL PERSPECTIVE
Presenter: Chih-Yuan Fu

BREAK **3:00 PM - 3:10 PM**

2:50 PM - 4:30 PM

Oral Papers IVB: Trauma Prevention Papers 102-111

Moderator: Thomas Duncan, DO

Skyview 2 26th Floor Horseshoe Casino Hotel

Paper 102 **2:50 PM - 3:00 PM**
APPLYING THE FIVE PILLAR APPROACH TO REDUCE MOTORCYCLE DELIVERY DRIVER [MDD] INJURIES: THE QATAR EXPERIENCE
Presenter: Rafael Consunji

Paper 103 **3:00 PM - 3:10 PM**
ACCESSIBILITY AND READABILITY OF ONLINE PATIENT EDUCATION MATERIALS ON FIREARM SAFETY: A CROSS SECTIONAL ANALYSIS OF HOSPITAL AND NATIONAL INJURY PREVENTION LITERATURE
Presenter: Nicholas Beattie

Paper 104 **3:10 PM - 3:20 PM**
CHARACTERIZING AND COMPARING BICYCLE INJURY TRENDS: STANDARD, MOUNTAIN, AND ELECTRIC BIKES IN THE UNITED STATES (2013-2022)
Presenter: Ryan Frier

Paper 105 **3:20 PM - 3:30 PM**
LOCALIZING GLOBAL ROAD SAFETY FRAMEWORKS: EFFICACY OF THE ZERO FATALITY CORRIDOR MODEL IN REDUCING ROAD CRASH MORTALITY IN INDIA
Presenter: Divya Kewalramani

Paper 106 **3:30 PM - 3:40 PM**
PEDESTRIAN SAFETY IN QATAR AFTER A DECADE OF ACTION FOR ROAD SAFETY: ANALYZING NATIONAL STATISTICS AND NATIONAL TRAUMA REGISTRY DATA
Presenter: Rafael Consunji

Paper 107 **3:40 PM - 3:50 PM**
IMPACT OF THE COVID-19 STAY AT HOME ORDER AND HOUSEHOLD INCOME
ON PENETRATING TRAUMATIC INJURY RATES.
Presenter: Chih-Yuan Fu

Paper 108 **3:50 PM - 4:00 PM**
ASSESSING THE IMPACT OF THORACIC ENDOVASCULAR AORTIC REPAIR
ON DELAYED NEUROLOGICAL DETERIORATION IN PATIENTS WITH BLUNT
AORTIC INJURY AND TRAUMATIC BRAIN INJURY: A TQIP STUDY
Presenter: Lindsey Braden

Paper 109 **4:00 PM - 4:10 PM**
CHANGING PATTERNS OF TRAUMA ADMISSIONS FOLLOWING SELF-HARM
AND SUICIDE ATTEMPTS: A FIVE-YEAR ANALYSIS IN A KOREAN REGIONAL
TRAUMA CENTER
Presenter: Byungchul Yu

Paper 110 **4:10 PM - 4:20 PM**
COULD SEVERE SANCTIONS PREVENT DRUNK-DRIVING INJURIES? A
RETROSPECTIVE NATION-WIDE COHORT STUDY FROM THE NATIONAL
HEALTH INSURANCE RESEARCH DATABASE
Presenter: Ling-wei Kuo

Paper 111 **4:20 PM - 4:30 PM**
BIBLIOMETRIC AND VISUAL ANALYSIS OF SEVERE TRAUMA LITERATURE IN
THE PAST 20 YEARS
Presenter: Rui Li

3:10 PM - 4:40 PM

Oral Papers V: Quality Improvement Papers 112-120

Moderator: Marcelo Ribeiro, PhD

Skyview 1 26th Floor Horseshoe Casino Hotel

Paper 112 **3:10 PM - 3:20 PM**
GETTING WITH THE GUIDELINES: GERIATRIC TRAUMA ACTIVATION
Presenter: Randeep Jawa

Paper 113 **WITHDRAWN**

Paper 114 **3:20 PM - 3:30 PM**
COST-EFFECTIVENESS OF WHOLE-BODY COMPUTED TOMOGRAPHY (PAN-
SCAN) FOR DIAGNOSTIC OF MULTIPLE TRAUMA PATIENTS IN PHRAPOKKLAO
CHANTHABURI HOSPITAL
Presenter: Tanapon Supapon

Paper 115 **3:30 PM - 3:40 PM**
DISLODGE MENT RATE OF PERCUTANEOUS ENDOSCOPIC GASTROSTOMY
(PEG) TUBES IN TRAUMA PATIENTS AT A LEVEL 1 TRAUMA CENTER
Presenter: William Tyler Crawley

Paper 116 **3:40 PM - 3:50 PM**
EFFECTS OF CONSECUTIVE OVERNIGHT ON-CALL SHIFTS ON TRAUMA
SURGEONS' WELL-BEING: A PSYCHOLOGICAL AND PHYSIOLOGICAL
ANALYSIS
Presenter: Sergio Navarro

Paper 117

3:50 PM - 4:00 PM

DOES THE AVAILABILITY OF NON-CROSS MATCHED BLOOD IN THE TRAUMA BAY EFFECT THE CARE OF TRAUMA PATIENTS? A RETROSPECTIVE STUDY FROM A LEVEL-II TRAUMA CENTER

Presenter: Adam Lee Goldstein

Paper 118

4:00 PM - 4:10 PM

QUALITY IMPROVEMENT IN TRAUMA TRANSFERS FROM AN EMERGENCY DEPARTMENT WITHOUT LEVEL-ONE TRAUMA CAPABILITIES

Presenter: Brian Goldberg

Paper 119

4:10 PM - 4:20 PM

AUTOMATIC DETECTION OF MULTIPLE CRANIOCEREBRAL TRAUMA BASED ON DENOISING DIFFUSION PROBABILISTIC MODEL

Presenter: Diya Sun

Paper 120

4:20 PM - 4:30 PM

ASSESSMENT OF TRAUMA QUALITY IMPROVEMENT ACTIVITIES IN ASIAN COUNTRIES

Presenter: Koji Morishita

WTC MEETING ADJOURNED FROM SKYVIEW V & VI 26th Floor

6:40 PM

AAST ABSTRACTS OF PAPERS

83RD ANNUAL MEETING OF AAST & CLINICAL CONGRESS OF ACUTE CARE SURGERY

AMA PRA Category 1 Credits™ will be awarded based upon actual hours attended. Total number of hours will be calculated from information individual physicians provide in the online CME evaluation forms.



WELCOME

Wednesday, September 11, 2024

8:00 AM - 8:45 AM

Location: Concorde Ballroom

Presiding: Patrick Reilly, MD

September 11-14, 2024



SESSION I: PLENARY PAPERS 1-3

Wednesday, September 11, 2024

8:45 AM - 9:45 AM

Location: Concorde Ballroom

Moderator: Patrick Reilly, MD

Recorder: Karen Brasel, MD, MPH

TRAUMA CENTERS AS HEALTH EQUITY BEACONS: MITIGATING THE EFFECTS OF SOCIAL VULNERABILITY

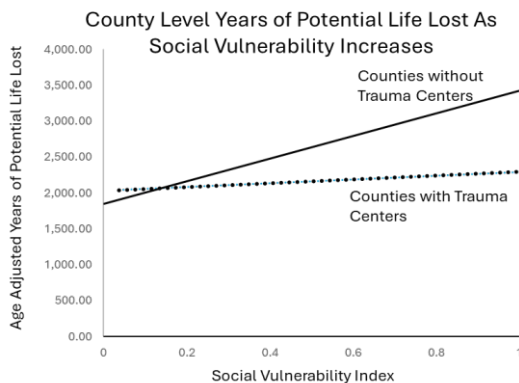
Stephanie Bonne, MD, FACS, FCCM; Kenyon Gale, BS; Robert Nugent, BS;
Melissa Blatt, MSN; Tania Zielonka CCRP; YenHong Kuo, PhD
Hackensack University Medical Center
Invited Discussant: Cherrisse Berry, MD

Introduction: Trauma Centers (TC) are key to reduction of injury mortality, but little is known about TC contribution to health equity. Social Vulnerability Index (SVI) is a county-level coefficient derived from 18 census metrics. Increasing SVI correlates to increasing injury rate, specifically from firearms. We hypothesized that the presence of a trauma center (TC) in a county would be protective against the deleterious effects of high county level SVI on injury mortality.

Methods: CDC WISQARS was queried by county from 2017-2020 for population, SVI, Age Adjusted Injury Mortality in total and by mechanism (AAIM), and Crude and Age Adjusted Years of Potential Life Lost (YPLL). A leveled listing of all US trauma centers was obtained from ACS-COT and state health departments. A novel county-level trauma center score was calculated by assigning weighted value to Level 1 and Level 2 TCs, accounting for population. Spearman's linear regression was performed relating SVI to Mortality across injury types and Regression Slope Variance was performed to identify statistical differences in slope relationships between SVI and AAIM and YPLL across injury types.

Results: 3,135 US counties were included, 335 of which have at least 1 TC. Increasing SVI predicted higher mortality for all injuries except suicide. Mortality decreased by 14/100,000 in counties with TCs. Controlling for SVI, TCs decreased mortality further to 17/100,000. TCs saved 10,000 Americans annually who would have died as a result of living in socially vulnerable areas. TCs accounted for a decrease of 478/100,000 years of life lost per county, or a total national increase of 1,673,000 years and economic contribution of \$83.6 billion. TCs were most protective for MVC (11/100,000) and Firearm Injury (5/100,000) mortality. As county trauma center score increased, there was an observed increase in protective effect.

Conclusion: There is a linear relationship between social vulnerability and injury mortality, but the presence of a trauma center flattens that line. Effects are more marked for YPLL, indicating TCs are saving the lives of younger people in high SVI areas. Trauma centers effectively decouple the relationship of social vulnerability to injury mortality, making trauma center access not only lifesaving, but a key component of health equity.



THE ECONOMIC IMPACT OF DECREASING STATE TRAUMA MORTALITY ON LIFETIME PERSONAL INCOME AND STATE TAX REVENUE

Harold E. Groce; Joe Sam Robinson, Jr., MD; Dennis W. Ashley, MD
Mercer University School of Medicine

Invited Discussant: Joseph Minei, MD, MBA

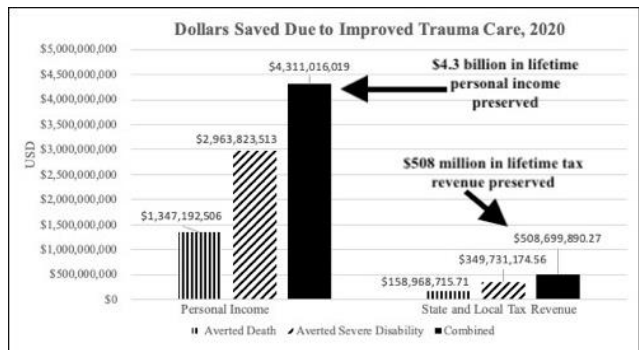
Introduction: In 2003, the state's trauma mortality rate was 16% above the national average. To combat this high mortality, a state Trauma Commission was legislatively established in 2007 to develop, maintain, and administer a trauma care network. Through system development, mortality has decreased to 6% below the national average in 2020 (1,803 lives saved in 2020). The purpose of this study is to assess the statewide economic impact of decreasing mortality and disability measured in the amount of lifetime personal income and state tax revenue preserved.

Methods: Using the CDC's WISQARS database, state/national trauma mortality rates for 2020 were compared to 2003 (pre-Commission). Years of Potential Life Lost (YPLL) for trauma victims up to 65 were calculated for the same time period. Rates of severe disability were calculated based on the average results of 6 studies (1992-2022) and used to estimate additional YPLL. The per-capita personal income for the state and average percent of personal income paid in state taxes were calculated using federal and state data. These numbers were then multiplied by state YPLL rates in order to calculate lifetime personal income and state tax revenue lost due to trauma.

Results: \$4.3 billion in lifetime personal income preserved (averted death \$1.3 billion and averted disability \$2.9 billion). \$508 million in lifetime tax revenue preserved (averted death \$158 million and averted disability \$349 million). This resulted in a return on investment of \$22.60 for every \$1 spent on the Commission in 2020.

Conclusion: Decreasing state trauma mortality and disability substantially benefitted lifetime personal income and state tax revenue. This resulted in a

positive return on investment for dollars spent on the state trauma system. State trauma system funding should be considered an investment, not a cost.



ASSOCIATION OF PRE- AND POST-INJURY MENTAL HEALTH WITH LONG TERM CLINICAL AND FINANCIAL OUTCOMES

Patrick L. Johnson, MD, MPH; Mark R. Hemmila, MD;
 Bryant W. Oliphant, MD, MBA, MS; Janessa Monahan, MSW;
 Julia Kelm, BS; Jakubus Jill, MHSA; William Curtiss, MD;
 Ben Moshier, MD; Alicia Kieninger, MD; John W. Scott, MD, MPH
 University of Michigan
 Invited Discussant: David Livingston, MD

Introduction: As increased attention is placed on optimizing long-term outcomes of trauma patients by addressing mental health, little is known regarding the interplay of both preinjury mental health conditions and post-injury mental health and the subsequent impact on long-term outcomes.

Methods: Patients from 19 Level 1-2 trauma centers took part in serial surveys 1-24m post-discharge. Pre-injury mental health diagnoses (MH dx) using trauma registry data and post-injury mental health symptoms (MH sx) from survey data. Outcomes included (i) health-related quality of life (hrQoL) from the EuroQol-5D-5L and (ii) elements of financial toxicity (FT) (e.g. medical debt, job/income loss, non-medical bills, unaffordable care). Multivariable models adjusted for patient, injury, and treatment factors to evaluate the association of MH dx and MH sx on hrQoL and FT.

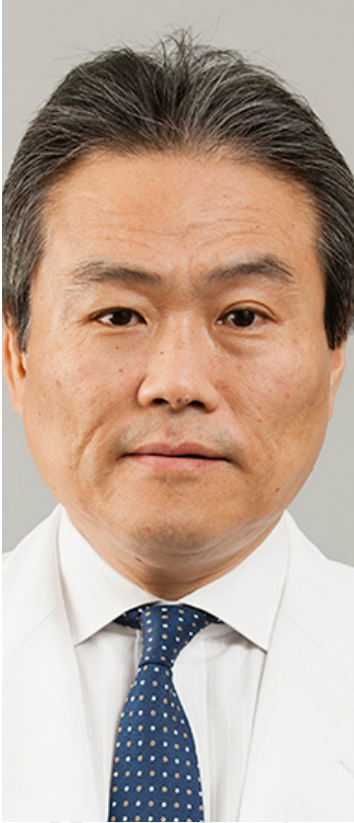
Results: 646 patients completed 833 surveys from Jul 2021-Dec 2023, at a median 6m post-injury. 47% were female, median age was 67.5y, and 89% had blunt injuries. 31% of patients had a pre-injury MH dx, 45% had self-reported MH sx post-discharge, and 44% had neither. Patients with a pre-injury MH dx had higher odds of post-injury MH sx (aOR 3.6 [2.4-5.3]); however, 56% of those with post-injury MH sx had no pre-injury MH dx. When stratified by pre- and post-injury MH dx/sx, post-injury MH sx were more strongly associated with hr-QoL than pre-injury MH dx (**Table**). Compared to patients without MH dx/sx, those with post-injury MH sx had worse FT across all domains (data not shown). Notably, patients with new post-injury MH sx (no pre-injury MH dx) had the highest rate of foregone post-injury care due to costs (26% vs 14% if no MH dx/sx, p<0.01).

Conclusions: More than 1-in-2 patients had peri-injury mental health concerns, and most patients with post-injury MH sx did not have a known pre-injury MH dx. Addressing post-injury HM sx may potentially improve long-term hrQoL of trauma survivors; however, efforts are needed to ensure patients can afford the care they need to achieve optimal health.

Table. Association Between MH and Self-Reported Health

Pre-Injury MH dx	Post-Injury MH sx	Cohort Size, N (%)	Mean Self-reported Health (Scale Range: 0-100)	Adjusted P-value
No	No	282 (44%)	77.8	Reference
Yes	No	71 (11%)	76.2	0.486
No	Yes	163 (25%)	62.6	<0.001
Yes	Yes	130 (20%)	59.5	<0.001

SESSION II: 7TH WORLD TRAUMA CONGRESS



KEYNOTE ADDRESS

Wednesday, September 11, 2024

9:45 AM - 10:15 AM

Location:
Concorde Ballroom

Presenter:
Yasuhiro Otomo, MD, PhD

Director of the National
Disaster Medical Center

Tokyo, Japan

Moderator:
Raul Coimbra, MD, PhD



SESSION III: PAPERS 4-8

Wednesday, September 11, 2024

10:15 AM - 11:55 AM

Location: Concorde Ballroom

Moderator: Christine Gaarder, MD, PhD

Recorder: Ryan Dumas, MD

IS ASPIRIN AN EFFECTIVE THROMBOPROPHYLAXIS IN HIGH-RISK PATIENTS? A COMPREHENSIVE SUBPOPULATION ANALYSIS OF THE PREVENT CLOT STUDY

Sandip P. Tarpada, MD; Nathan N. O'Hara, PhD;
Deborah M. Stein, MD, MPH; Anthony J. DeSantis, MD;
Renan Castillo, PhD; Katherine Frey, PhD;
Gerard P. Slobogean, MD; Robert V. O'Toole, MD
R. Adams Cowley Shock Trauma Center
Invited Discussant: Rishi Kundi, MD

Introduction: A recent clinical trial concluded that thromboprophylaxis with aspirin was similar in efficacy and safety to low-molecular-weight heparin in orthopaedic trauma patients. Some clinicians remain skeptical that aspirin's benefits persist in high-risk subpopulations. We have replicated the primary analysis in 11 clinically important subpopulations.

Methods: We performed a secondary analysis of a multicenter trial in which fracture patients were randomly assigned to 81mg of aspirin or 30mg of low-molecular-weight heparin, twice daily. From the 12,211-patient sample, we derived 11 subpopulations according to evidence-based thromboembolic risk factors. The primary outcome was 90-day all-cause mortality.

Secondary outcomes included non-fatal pulmonary embolism, proximal and distal deep vein thrombosis, and bleeding events. We assessed all outcomes with treatment-specific Kaplan–Meier estimators. Due to the increased risk of false positive findings with multiple comparisons, our threshold for statistical significance was a Bonferroni-corrected alpha of 0.0001.

Results: Among the 11 subpopulations, the 3 largest were isolated lower extremity fractures (n=6289), Obesity (n=4234), and ICU admission (n=1596). None of the 55 statistical comparisons reached our threshold for significance. Two of 55 statistical comparisons were less than the conventional $p < 0.05$ threshold, favoring low-molecular-weight heparin over aspirin in protecting against distal deep vein thrombosis for patients with head injuries (difference, 4.4%; 95% CI, 0.8% to 8.1; $p = 0.03$) and ICU admission (difference, 1.7%; 95% CI, 0.2% to 3.3; $p = 0.03$).

Conclusions: Across 11 clinically important subpopulations, we found no evidence of differential treatment effects of aspirin versus low-molecular-weight heparin on 90-day mortality, pulmonary embolism, proximal deep vein thrombosis, or bleeding rates. Low-molecular-weight heparin may offer better protection against clinically less important distal deep vein thrombosis in patients with head injuries or admitted to the ICU; however, this difference was not statistically significant. These findings increase the likelihood that the main findings of noninferiority of aspirin apply to high-risk subpopulations as well.

JUST BECAUSE WE CAN DOESN'T MEAN WE SHOULD: ONE YEAR MORTALITY FOLLOWING TRACHEOSTOMY IN TRAUMATICALLY INJURED OLDER ADULTS

Thaddeus J. Puzio, MD; Heather Kregel, MD, MS;

Jan-Michael Van Gent, DO; Fatimah Sunez, BS;

Michael Wandling, MD; Krislynn Mueck, MD;

Bryan A. Cotton, MD; David E. Meyer, MD, MS;

Laura J. Moore, MD; Lillian Kao, MD, MS

University of Texas Health Science Center Houston

Invited Discussant: Lisa Kodadek, MD

Introduction: Outcomes in older trauma patients undergoing tracheostomy are unclear, limiting informed decision making. We aimed to evaluate long-term outcomes following tracheostomy in older trauma patients and hypothesized that one-year survival decreases with older age.

Methods: This was a retrospective descriptive analysis of ICU patients ≥ 65 years old that underwent tracheostomy from 1/1/2015–12/31/2020. Groups were categorized by age: 65-74, 75-84, and ≥ 85 yo. The primary outcome was 1 year mortality using the National Death Index. Secondary outcomes were inpatient ventilator days, hospital length of stay (LOS), inpatient mortality, and 6-month mortality. Univariate analyses were performed. Survival by age strata was analyzed using the Kaplan-Meier method.

Results: Of 205 eligible patients, 125 (61%) were 65-74yo, 68 (33%) 75-84, and 12 (6%) ≥ 85 . Median injury severity scores (ISS) (24 vs 22 vs 21, $p=0.2$) and Charlson Comorbidity index (1 vs 2 vs 2, $p=0.99$) were similar between groups. Ventilator days (12 vs 11 vs 11, $p=0.51$) and hospital LOS (23 vs 21 vs 20 days, $p=0.49$) were similar between groups. Overall, 29 patients (14%) died prior to discharge from the hospital, 95 patients (46%) died within 6 months of tracheostomy, and 118 (58%) died within 1 year. One year mortality increased by decade of life: 51% vs 65% vs 83%. Median survival decreased by decade: 350 days for age 65-74, 164 days for age 75-84, and 58 days for those 85+.

Conclusions: In this cohort of severely injured older adults who underwent tracheostomy following trauma, 58% died within 1 year of tracheostomy, and increasing age was associated with shorter survival. While tracheostomy may facilitate transfer out of the ICU and hospital, overall survival is poor. This study offers valuable insights to patients and their families during the decision-making process. Clear goals and expectations are needed when advising these patients and their families regarding tracheostomy.

NOT ALL CALL IS CREATED EQUALLY: THE IMPACT OF CULTURE AND GENDER ON BURNOUT RELATED TO IN-HOUSE CALL

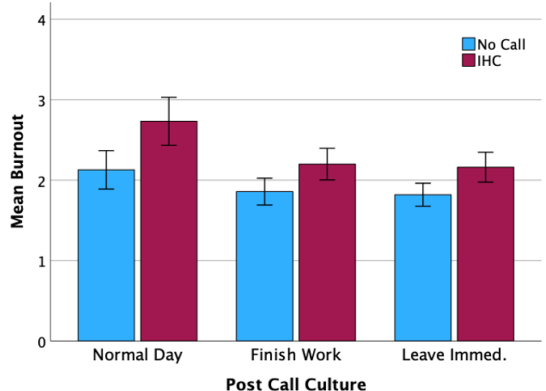
Jamie Coleman, MD; William von Hippel, PhD;
 Robinson Caitlin, MPH; Mitchell J. Cohen, MD
 University of Louisville School of Medicine
 Invited Discussant: M. Margaret Knudson, MD

Introduction: In-house call (IHC) has previously been shown to result in increased burnout in acute care surgeons (ACS). There is wide variation, however, in the implementation and culture of work surrounding IHC across trauma centers as well as within the demographics of practicing ACS. We hypothesized that local work practices and culture surrounding IHC as well as gender of ACS would impact burnout.

Methods: Continuous physiologic data were collected over six months from 224 ACS who wore a fitness wearable. ACS were sent daily surveys to record work and personal activities. The Maslach Burnout Inventory was completed by ACS at the beginning and end of the study period.

Results: 48 (21.5%) of ACS reported being expected to complete a usual workday after IHC, 94 (42.2%) were expected to finish work from IHC, and 81 (36.3%) were expected to leave immediately after IHC was over. ACS expected to complete a usual workday post-call were more likely to be burned out and IHC resulted in a greater increase in their burnout than among ACS who reported working in other work cultures (figure). Females showed higher burnout than males but no difference in the degree to which IHC led to burnout.

Conclusion: IHC results in increased burnout in all ACS, however, there were higher levels of burnout in ACS expected to work without adjustments to their work schedule post call. Although female ACS reported higher levels of burnout than male ACS, IHC increased burnout levels equally between the two genders. Taken together these findings necessitate caution about work expectations surrounding IHC and suggest a need for the deliberate creation of a post-call culture for ACS.



Error bars: 95% CI

NATIONAL ESTIMATES OF FINANCIAL TOXICITY BEFORE AND AFTER TRAUMATIC INJURY

Nina M. Clark, MD; Alexandra H. Hernandez, MD;
 Lisa M. Knowlton, MD, MPH; Barclay Stewart, MD, PhD;
 Eileen M. Bulger, MD, FACS; Douglas Zatzick, MD;
 Joseph Dieleman, PhD; John W. Scott, MD, MPH
 Harborview Medical Center
 Invited Discussant: Patrick Murphy, MD, MPH, MS

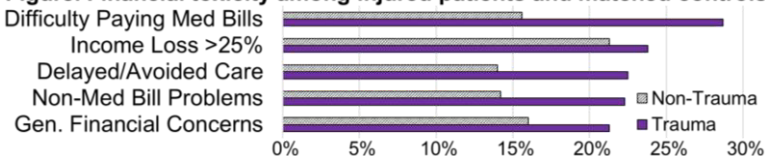
Introduction: Despite growing attention toward financial toxicity after injury, national estimates are lacking and the absence of pre-injury data limit our understanding of the association between injury and financial outcomes.

Methods: We analyzed 2011-2021 data from two nationally representative surveys: the National Health Interview Survey (NHIS) and the Medical Expenditure Panel Survey (MEPS). Injured adults who required inpatient (IP) or emergency department (ED) care were matched to uninjured controls without ED or IP encounters using 1:5 coarsened-exact matching on age, sex, income, payor, marital status, region, and survey panel. Outcomes included 5 domains of financial toxicity described by the AAST Healthcare Economics Committee (Figure). We used difference-in-difference models to estimate the temporal association between injury and self-reported health, difficulty paying medical bills, and cost-related delays in care compared to matched controls. Secondary analyses evaluated for associations between financial outcomes and self-reported fair or poor overall health.

Results: Among 22,445,434 trauma patients in NHIS and 143,887,341 in MEPS, all 5 financial toxicity domains were more common among injured adults (Figure, $p < 0.05$ for all). Injuries were temporally associated with a 22% increase in difficulty paying medical bills, 17% increase in cost-related delays in care, and 22% increase in poor self-reported health ($p < 0.05$ for all). Injured adults who reported difficulty paying medical bills were more likely to report delaying care due to costs (OR 5.2 [4.2-6.6]), and those who delayed care were more likely to report poor health (OR 2.2 [1.8-2.7]).

Conclusions: In this first-ever national estimation of financial toxicity after injury, 1 in 2 adults reported ≥ 1 domain of financial toxicity, and injury was temporally associated with worsening financial and physical health. Programs aimed at mitigating the financial impacts of injury may improve long-term health, but systems monitoring these outcomes are needed.

Figure. Financial toxicity among injured patients and matched controls



INTEGRATED VASCULAR TRAINING MAY NOT PREPARE GRADUATES TO CARE FOR VASCULAR TRAUMA PATIENTS

Rishi Kundi, MD; Navpreet Dhillon, MD;
Eric Ley, MD, FACS; Thomas M. Scalea, MD
R. Adams Cowley Shock Trauma Center
Invited Discussant: Leah Tatebe, MD

Introduction: Vascular surgery board eligibility may be secured through 5-year integrated programs (IV) as well as the traditional 2-year fellowship following general surgery residency (VF). We hypothesized that IV graduates accrue less experience in areas relevant to vascular trauma than VF graduates or general surgery graduates (GS). We assessed the first decade of IV graduates and compared it to GS and VF during the same period.

Methods: ACGME case log data was collected for IV, GS, and VF from 2013-2022. GS data was added to VF to assess total experience for VF graduates. Open vascular cases were classed as cerebrovascular, upper extremity, thoracic, abdominopelvic, infrainguinal, and infrapopliteal. Non-vascular general surgery cases were categorized as neck, thoracic, and abdominopelvic. Non-operative trauma and critical care data was recorded.

Results: There were 12,225 GS, 1224 VF, and 397 IV graduates. In 2012, IV accounted for 10% of all graduating vascular surgeons. By 2022, this proportion was 44%. Open vascular experience, regardless of body region, did not differ between IV and VF; both were significantly higher than GS ($p<0.05$). Non-vascular operative numbers did not differ between GS and VF in any category, but IV experience was significantly less than GS or VF in every category. IV logged 5% of the abdominopelvic cases that GS and VF did, 18% of the thoracic cases, and 3% of the neck cases ($p<0.05$). Critical care and nonoperative trauma experience were each higher in both GS and VF than IV ($p<0.05$). While open vascular trauma cases were not significantly different between VF and IV, integrated vascular graduates logged five vascular repairs for every vascular exposure.

Conclusion: The proportion of vascular surgeons trained through IV programs has quadrupled. IV graduates have a fraction of the experience in critical care, trauma, and non-vascular surgery than VF and GS graduates. This combined with their inexperience performing vascular trauma exposure may limit their ability to provide complete care of vascular injuries.

SESSION IV:

PRESIDENTIAL ADDRESS



“BE ALL YOU CAN BE”

Wednesday, September 11, 2024

12:15 PM - 1:15 PM

Location: Concorde Ballroom

Presenter: Patrick Reilly, MD

AAST PRESIDENT

C. William Schwab Professor
Division of Traumatology, Surgical
Critical Care and Emergency
Surgery

University of Pennsylvania School
of Medicine University of Pennsyl-
vania Medical Center

Philadelphia, PA



SESSION VA: PAPERS 9-19

Wednesday, September 11, 2024

2:30 PM - 6:10 PM

Location: Concorde Ballroom A/B

Moderator: Ben Zarzaur, MD, MPH

Recorder: Deborah Stein, MD, MPH

PROPHYLACTIC ANTIBIOTICS IN NON-OPERATIVE FACIAL FRACTURES: AN AAST MULTICENTER TRIAL

Joseph D. Amos, MD, FACS; Karen Minoza, MD;
Rosemary Kozar, MD; Andrew Doben, MD, FACS;
Tjiska Conrotto, DDS; Ernest E. Moore, MD; Claudia Alvarez, MD;
Jason Murry, MD; Tatiana CP Cardenas, MD;
Richard H. Lewis, MD, MA, MS; James Zebley, MD;
Caitlin M Blades, MS; Gail T. Tominago, MD;
Michael Charles, MD; Michael Cripps, MD
Methodist Health System
Invited Discussant: Christopher Dente, MD

Introduction: Craniofacial trauma affects approximately 3 million individuals in the United States annually. Historically, low overall data quality and inadequate sample size have limited the development of clinical practice guidelines for prophylactic antibiotic use in facial fractures. We aimed to determine the current use patterns and effects of prophylactic antibiotics in non-operative facial fractures.

Methods: A prospective analysis was conducted of adult patients with non-operative facial fractures across 19 centers from January 2022 to December 2023. Antibiotic duration was grouped as no antibiotics, ≤ 72 hours (hrs), and >72 hrs. Data were assessed with chi-square testing and a logistic regression model. Chi-squared tests evaluated the associations between antibiotic duration, infectious complications, and adverse drug events (ADEs).

Results: Among 2,311 patients, 766 (33.1%) received antibiotics (None, $n=1,545$; ≤ 72 hrs, $n=365$; >72 hrs, $n=401$). A total of 24 (1.0%) patients developed facial fracture-associated infections, 0.9% of no antibiotic group vs 1.3% with antibiotics, and eight (0.4%) patients developed ADEs. Most patients (99.0%) did not develop an infection despite the majority (66.8%) of the population receiving no antibiotics. Injuries were predominately closed fractures (87.1%), without mucosal disruption (84.1%) or foreign bodies (97.1%). Antibiotic administration correlated with higher rates of infection ($p=0.008$). Higher infection rates were maintained in the ≤ 72 hrs group following multivariable logistic regression, adjusting for confounders (OR=3.22 [95% CI: 1.56 - 8.98]; $p=0.025$).

Conclusion: Data suggest prophylactic antibiotics may be unnecessary for non-operative facial fractures. Avoiding antibiotics did not correlate with an increased risk of infection for most injury patterns. While a randomized trial is optimal to validate these data, at this time, there is no evidence to support presumptive antibiotics for closed facial fractures.

ENHANCING TRAUMA OUTCOMES IN INDIA: THE IMPACT OF THE GOOD SAMARITAN LAW ON BYSTANDER ENGAGEMENT AND TRAUMA CARE

Mayur Narayan, MD, MPH, MBA, MHPE, FACS, FCCM, FICS, FACT, FAIM, MAMSE; Divya Kewalramani, MD;

Rachel L. Choron, MD, FACS; Daniel Whitely, MD;

Amanda L. Teichman, MD, FACS; Karuna Raina, BS; Gautam Singh, BS;

Charoo Piplani, MBBS; Gregory Peck, MD; Zachary Englert, MD;

Philip S. Barie, MD, MBA, MCCM; Joseph Hanna, MD, PhD;

Sahil Mattoo, BS; Piyush Tewari, BS

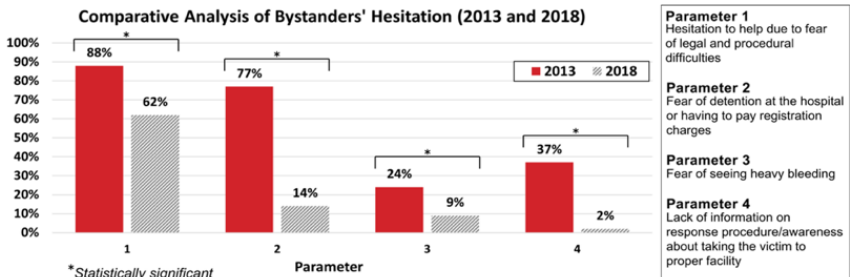
Invited Discussant: Christopher Dodgion, MD, MSPH, MBA

Introduction: India's motor vehicle collision (MVC) fatalities constitute 13% of the global MVC mortality burden. As India currently lacks a systematized prehospital trauma system, bystander engagement (BE) is crucial to the trauma "chain of survival" but limited in particular due to fear of criminal liability (Figure). The 2016 Good Samaritan Law (GSL) championed by SaveLIFE Foundation versus Union of India, provided legal protection to Good Samaritans (GS) who aid MVC victims (MVCV) at the scene. Our aim is to assess the impact of GSL on BE before and after GSL became a law.

Methods: We performed two knowledge, attitude, behavior, and practice surveys across 7 cities among 1,027 road-users before (2013) and 3,667 road-users and physicians after (2018) GSL was enacted. Barriers to BE and willingness to aid MVCV were assessed. Statistical analysis: χ^2 test; $p < 0.05$.

Results: GS surveyed were mostly male (93.1%) and young (57% aged 19-30 years). Compared with pre-GSL, willingness to assist MVCV increased post-GSL (26% vs. 88%, $p < 0.001$). Fear of liability (88% vs. 62%, $p < 0.001$) and concern about paying medical costs (77% vs 14%, $p < 0.001$) decreased. Additionally, 90% of surveyed physicians reported more trauma patients being brought by GS to hospitals.

Conclusion: GSL catalyzed cultural and behavioral shifts in India, enhancing BE by indemnifying and supporting more informed, less fearful GS. This prompted international adoption (i.e. Bangladesh) showing GSL to be a model for global trauma care reform in low- and middle-income countries.



OUTCOMES AMONG PATIENTS WITH ISOLATED TRAUMATIC BRAIN INJURY BEFORE & AFTER MEDICAID EXPANSION

Michael S. Rallo, BS; Ryan Radwanski, MD; Amanda L. Teichman, MD, FACS; Mayur Narayan, MD, MPH, MBA, MHPE, FACS; Anil Nanda, MD, MPH; Rachel L. Choron, MD, FACS

Robert Wood Johnson Medical School

Invited Discussant: Amelia Maiga, MD, MPH

Introduction: Insurance coverage is a critical determinant of access to care. Uninsured patients suffer poorer outcomes including increased risk of morbidity/mortality. To reduce uninsurance among adults, the Affordable Care Act provisioned states the option to expand Medicaid eligibility. We hypothesized patients with isolated TBI (iTBI) had more insurance coverage and better outcomes after Medicaid expansion (ME) as compared to before.

Methods: National data on trauma admissions was obtained from the ACS TQP PUF for three years preceding and following the implementation of ME in 2014. iTBI admissions were identified by an AIS-Head ≥ 2 without significant bodily injury. Only patients between the ages 18-64 years were included as that was the ME target demographic. Univariate and multivariate analyses controlling for injury severity were used to detect changes in insurance coverage (Medicaid, private/other insurance, uninsured), outcomes, and discharge disposition before and after ME.

Results: There were 267,716 and 313,664 admissions for iTBI in pre- and post-expansion years. The proportion of patients insured by Medicaid rose significantly from 13.8% to 22.6% (+8.8%, $p < 0.01$) in post-expansion years with a concomitant decrease in self-pay/uninsurance (-6.7%, $p < 0.01$) and private/other insurance (-2.1%, $p < 0.01$). While there was no significant difference in iTBI mortality pre-ME to post-ME (3.4% vs. 3.5%, $p = 0.18$), post-ME patients were more likely to receive post-injury discharge care (PIDC) at an inpatient facility or via home health service compared to pre-ME (OR=1.3, $p < 0.01$). After controlling for injury severity, post-ME patients had similar mortality to those with private/other insurance (OR=1.0, $p = 0.23$) but were less likely to receive PIDC (OR=0.9, $p < 0.01$). When comparing post-ME patients to the uninsured, Medicaid patients had less mortality (OR=0.6, $p < 0.01$) and increased rates of PIDC (OR=2.5, $p < 0.01$).

Conclusion: ME corresponded to increased Medicaid coverage and a higher rate of PIDC among adults with iTBI post-ME compared to pre-ME.

Following expansion, while ME patients were less likely to receive PIDC than privately insured patients, patients with Medicaid were 1.6-times as likely to survive and 2.5-times as likely to be discharged under medical care compared to uninsured patients.

THE ECONOMIC IMPACT OF LEGAL ADVOCACY FOR SURVIVORS OF FIREARM INJURY

Tanya L. Zakrison, MD, MPH, FRCSC, FACS;
Franklin Cosey-Gay, PhD; Elizabeth Tung, MD, MS;
Andrew J. Benjamin, MD, MS; David Hampton, MD, MEng, FACS;
Ryan Boudreau, MD; Susan Rowell, MD, MBA, FACS;
Jennifer Cone, MD, MHS, FACS; Abid Khan, MD;
Phillip Dowzicky, MD, MSHP; Timothy Plackett, DO, MPH;
Mihir Chaudhary, MD, MPH; Toba Bolaji, DO;
Selwyn Rogers, MD, MPH, FACS
University of Chicago Medicine
Invited Discussant: John Scott, MD, MPH

Introduction: Patients affected by firearm violence often have social and structural needs that adversely impact health and require legal solutions. These “health-harming legal needs (HHLNs)” are largely economic and include income, housing, employment, legal status, and personal stability. Medical-Legal Partnerships (MLPs) have addressed these HHLNs in various practice settings, but never in conjunction with a hospital-based violence intervention program (HVIP). Our objective was to measure the economic impact of implementing Recovery Legal Care, a bedside HVIP-MLP program, at an academic level I trauma center where firearm injury is the most common mechanism of injury.

Methods: After establishing a novel collaboration between our trauma center, HVIP and Legal Aid X (the largest provider of free civil legal services in X), we reviewed the type and frequency of successful legal interventions. A legal screening tool was developed to assess HHLNs among patients admitted after firearm injury. Patients that screened positive for an HHLN were referred to an attorney for bedside legal assistance. Economic impact was measured by mean monthly and lump sum increases in public benefits for HHLNs.

Results: Between 11/2022-12/2023, 244 patients were referred for intake (91% African American, 76% male, 17% unstably housed). A total of 363 HHLNs were identified (1.5 HHLNs/patient), of which 181 cases were successfully resolved (50%). A total of 280 HHLNs (77.1%) were related to public benefits. Supplemental Nutritional Assistance Program (SNAP) was the most common (n=23) and remunerative public benefit, granting a mean of \$277.09 in increased monthly benefits. Increased monthly benefits also occurred for Medicare/aid (\$3,708/mo.) and Supplemental Security/Disability Income (\$3,350/mo.). For lump sum benefits, the largest economic impact was dismissal of rental debt for one patient (\$19,652.99). Across the entire cohort, civil law attorneys were able to obtain \$17,742.44 in total monthly benefits, total lump sum benefits of \$42,795.95 and an annualized financial benefit of \$212,909.28, or \$1,047.97/trauma patient, in legally entitled yet previously denied benefits.

Conclusions: Timely legal advocacy through HVIP-MLPs may be a powerful tool to address HHLNs and structural determinants of health. These gaps in access suggest a critical role for legal advocacy among marginalized populations with historical exclusion from economic entitlements.

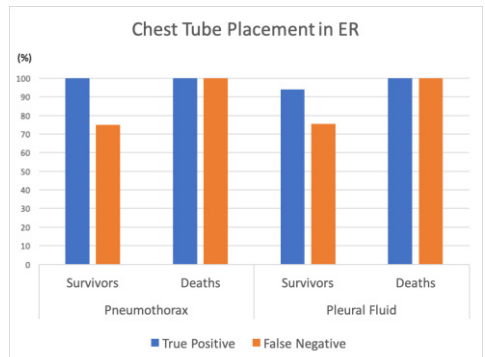
ACCURACY, RELIABILITY, AND UTILITY OF THE EFAST EXAM IN THE SETTING OF PENETRATING THORACIC TRAUMA

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Invited Discussant: Kyle Kalkwarf, MD

Introduction: The extended focused assessment with sonography in trauma (eFAST) exam adds additional thoracic views to standard FAST but has limited validation data that is primarily from blunt trauma mechanisms. We sought to analyze eFAST in a large cohort with penetrating thoracic trauma. **Methods:** All patients with thoracic GSWs over 5-years who underwent eFAST were included. Overall performance metrics and metrics for each component of eFAST were analyzed besides the impact on interventions and outcomes. Independent factors associated with mortality were assessed by binary logistic regression.

Results: 288 patients were included, (91% male, 48% ISS \geq 15, and 17% died). 39% required tube thoracostomy and 18% required urgent thoracic surgical intervention. Although specificity was high (91% to 100%) for all components, the sensitivity was less than 50% for all thoracic views, except for “no cardiac motion” (100% sens). Sensitivity for pericardial fluid was 47%, pneumothorax was 22%, hemothorax was 36%, and peritoneal fluid was 51%. Comparing survivors vs deaths, the eFAST sensitivity was higher among deaths for all components (all $p < 0.05$). The majority of patients (>70%) with a false negative (FN) eFAST for pneumothorax or hemothorax required tube thoracostomy (Figure). On multivariate analysis GCS < 9, chest/abdomen AIS \geq 3, and eFAST FN were independent predictors of mortality.

Conclusion: The eFAST exam showed highly variable performance metrics among patients with penetrating thoracic trauma, with all thoracic components demonstrating high specificity but low overall sensitivity. Urgent interventions were frequently required in patients with FN studies, and FN studies were independently associated with mortality.



PELVIC ANGIOEMBOLIZATION DOES NOT INCREASE PELVIC ISCHEMIC COMPLICATIONS: A MULTICENTER AAST STUDY

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Todd Costantini, MD; Laura Haines, MD, FACS;
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Invited Discussant: Mark Seamon, MD

Introduction: Controversy exists as to whether pelvic embolization causes ischemia related complications of the pelvis and if selective vs non-selective embolization influences the risk of these complications.

Methods: We conducted a multicenter prospective observational study of adult blunt trauma patients with pelvic fractures who underwent angiography. Patients were divided into embolized (Embo) and non-embolized (No-Embo), then further subdivided into selective (Sel) and non-selective (Non-Sel) groups. The primary outcome was ischemic complications which were defined as gluteal skin/muscle necrosis (GN), pelvic abscess (PA), wound infection, pelvic wound breakdown (WB), and osteomyelitis.

Results: Of the 460 subjects, 381 were embolized. There were no statistical differences on univariate analysis between Embo and Non-Embo in GN (2.6% v 1.3%, $p=0.7$), PA (2.1% v 0%, $p=0.36$), wound infection (3.7% v 2.5%, $p=1.0$), WB (1.0% v 0%, $p=1.0$), and osteomyelitis (0% in both cohorts). Given the low incidence of each, we created a composite outcome of ischemia related complications and performed a multivariate analysis to correct for baseline differences between the groups. There were no significant differences in the composite outcome between the Embo and Non-Embo on multivariate analysis (OR 1.03, $p=0.97$). Of those embolized, we then performed multivariate analysis of the composite outcome based on level of embolization and found no statistically significant difference between Sel and Non-Sel embolization (OR 0.86, $p=0.67$).

Conclusion: The current study is the largest to date of blunt pelvic fracture patients undergoing angiography. Our data suggests that neither the use of embolization nor the choice of embolization level independently increases ischemic complications of the pelvis.

**COAGULATION STUDIES OF A NOVEL CARDIOVASCULAR
SUPPORT FLUID (VBI-1) FOR USE IN HEMORRHAGIC SHOCK:
AUGMENTATION OF THE BLOOD SUPPLY**

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Prashanth Anamthatmakula, PhD; Alexandria Swezey, BS;

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Invited Discussant: Mitchell Cohen, MD

Introduction: According to the American College of Surgeons' manual on trauma there is no fluid other than blood that can raise blood pressure to a survivable level in patients that have lost 30% or more of their blood volume. Yet the supply of blood is continuously in varying stages of crisis. There is a need for a fluid that elevates blood pressure at least as well as blood. We have developed VBI-1, a fluid composed of phospholipid nanoparticles with a mean diameter of 17 nm that meets these requirements.

Methods: In Sprague Dawley rats of both genders, hemorrhagic shock was induced by withdrawing blood from their femoral arteries until respirations ceased. The lost blood volume was replaced by infusion of VBI-1, Ringer's Lactate (LR), or shed blood via the femoral artery. Preliminary studies showed that intra-arterial was superior to intravenous infusion. There were 6 rats in each group. Blood pressure was continuously monitored for 4 hours. In vitro ROTEM analyses of VBI-1 were conducted in triplicate. In vivo testing involved infusion of VBI-1 followed by blood extraction for ROTEM analysis.

Results: Respirations ceased at blood withdrawal levels of 33 to 44% of estimated total blood volume which was removed over 1.5 minutes. Survival rates at 4 hours post infusion were 100% with VBI-1, 83.3% with blood, and 0% with LR. Two-way ANOVA indicated significant MAP differences among fluids ($p=0.0004$). VBI-1 restored breathing and elevated MAP higher compared to shed blood and LR. The addition of VBI-1 inhibited clotting, with a 50% solution causing a significant increase in clotting time of 592 seconds compared to 49 seconds for whole blood. Adding plasma to VBI-1 in a 1:1 ratio improved clotting time to 164 seconds. In vivo testing showed similarly prolonged CT relative to in vitro experiments and all other ROTEM parameters including clot strength within normal limits.

Conclusion: VBI-1 demonstrated superior efficacy in restoring respiration and MAP elevation compared to other fluids. Like packed red blood cells without clotting factors, large volumes of VBI-1 may induce coagulopathy. Yet, this is monitorable by ROTEM and correctable with plasma. Despite the increased clotting time, no significant friability or bleeding was observed in experiments. VBI-1 presents a promising alternative to blood.

FAR FROM HOME: PATIENT PREFERENCES AND ACCEPTABLE RISK TOLERANCE FOR LOCAL VS REGIONAL TRAUMA CARE

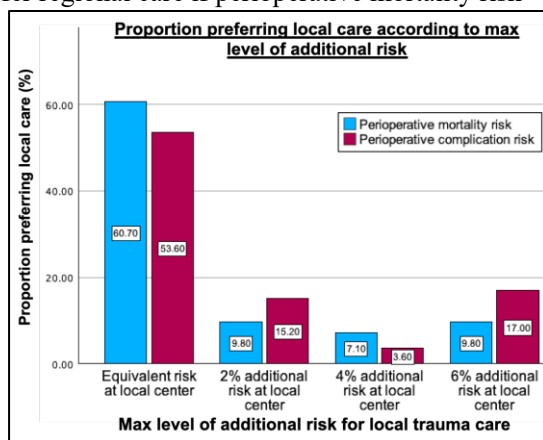
Matthew Martin, MD, McRIB; Patrick McGillen, MD, MS;
Eddie Rodriguez, BS; Shea Gallagher, MD;
Kazuhide Matsushima, MD; Kenji Inaba, MD
LAC & USC Medical Center
Invited Discussant: Adil Haider, MD, MPH

Introduction: Regionalization of trauma care is believed to improve outcomes in some populations and injuries but may conflict with patient and family preferences and risk tolerance. We sought to analyze trauma patients' preferences for care across a spectrum of relative risk profiles.

Methods: Structured surveys and risk scenario assessments of adult trauma inpatients were performed. Modified standard gamble utility assessment determined additional perioperative mortality and morbidity risk accepted for local vs regional trauma care. Logistic regression identified predictors of willingness to accept perioperative risk.

Results: 112 patient assessments were performed. If perioperative mortality and complication risks were equivalent, 88% and 89% preferred local trauma care over regional transfer. If mortality and complication risk at the local center was 2% higher vs the regional center, 28% and 36% still preferred local care ($p < 0.05$). At 6% increased mortality/complication risk, 10% and 17% still favored local care (see Figure). A larger proportion of blunt trauma patients were willing to accept at least 2% additional perioperative mortality risk for local care ($p = 0.016$). Standard gamble preferences showed high utility for regional care with lower perioperative morbidity and mortality risk (0.972 and 0.968). On average, patients accepted a 2.8% excess perioperative mortality and 3.2% excess complication risk for local trauma care. Patients with blunt injury were 4.4 times more likely to prefer regional care if perioperative mortality risk was higher at the local center (CI 1.2-15.8, $p = 0.023$).

Conclusion: Patients prefer local care versus distant transfer at equivalent morbidity and mortality risks, and a significant portion still prefer local care with up to 6% excess risk of morbidity and mortality. Patient preference and risk tolerance should be considered as a factor in these decisions.



THE INTERACTION BETWEEN GERIATRIC VULNERABILITY & SOCIAL SUPPORT: VARIATIONS IN COMMUNITY ENGAGEMENT DRIVE RECOVERY AMONG OLDER ADULT TRAUMA PATIENTS

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 Sabrina E. Sanchez, MD, MPH; John O. Hwabejire, MD, MPH;

Kimberly A. Davis, MD, MBA; Adil H. Haider, MD, MPH;

Juan Herrera-Escobar, MD, MPH; Geoffrey A. Anderson, MD, MPH; Ali Salim, MD
 Yale School of Medicine

Invited Discussant: Tasce Bongiovanni, MD, MPP, MHS

Introduction: When presenting for care, older adults frequently experience increased risk of adverse outcomes owing to factors related to age (e.g. frailty, multimorbidity): a phenomenon known as ‘geriatric vulnerability’. Emerging research among younger trauma patients suggests that differences in social support could also play an important role in predicting recovery. Little is known about how these two factors intersect to collectively influence adverse outcomes. In this study, we explored how the interaction between geriatric vulnerability and social support influences longer-term, patient-reported outcomes among older adults.

Methods: Community-dwelling older adults (aged ≥ 65 years) with major injuries (ISS ≥ 9) who presented to three level 1 trauma centers in Boston between 2017-2023 were surveyed at 6 and 12 months after injury. Bayesian latent variable models combined the influence of patient age, functional dependence, diagnosed dementia, and multimorbidity into a single metric of ‘geriatric vulnerability.’ Variations in geriatric vulnerability were then compared across differences in ‘social support’ as measured by patient/caregiver reported variations in patients’ perceived extent of community engagement evaluated on a five-point Likert scale.

Results: A total of 2,016 older adults were included. For patients with low social support, increasing geriatric vulnerability increased patients’ risk-adjusted odds of adverse outcomes (Table 1), including greater extents of health services utilization (e.g. unplanned outpatient visits OR[95%CI]: 2.31[1.51-3.56]), decreased emotional well-being (e.g. decline in mood: 2.19[1.39-3.45]), and lower participation in activities of daily living (e.g. need help going to the bathroom: 4.43[2.42-8.09]). Among patients with high social support, the effect inverted/disappeared, yielding corresponding OR (95%CI) of 0.61(0.38-0.98) a 73.6% reduction, 0.70(0.34-1.44) a 68.0% reduction, and 0.53(0.16-1.75) an 88.0% reduction, respectively. The interaction was even more pronounced among older adults living in areas with high neighborhood vulnerability (lower access to resources/care, SVI > 0.80).

Conclusions: Geriatric vulnerability increases the risk of adverse outcomes. For community-dwelling older adults, having access to strong social support is a critical modifier that portends marked improvement in outcomes. Within this population, varying levels of community engagement drove recovery, mitigating the effects of geriatric vulnerability and making otherwise higher-risk patients functionally equivalent to those who were, at baseline, less aged, less frail, and less sick.

Table 1. Risk-adjusted odds of 12-month adverse outcomes among patients with high-vs-low geriatric vulnerability

	High-vs-Low Geriatric Vulnerability					
	Low Social Support		High Social Support		Difference	
	OR	95%CI	OR	95%CI		
Health services utilization						
Unplanned outpatient visit(s), injury-related	2.31	1.51-3.56	0.61	0.38-0.98	-73.6%	
Unplanned outpatient visit(s), all cause	1.01	0.67-1.55	0.41	0.25-0.67	-59.4%	
Unplanned readmission(s), injury-related	1.21	0.62-2.35	0.78	0.33-1.87	-35.5%	
Unplanned readmission(s), all cause	1.31	0.77-2.22	0.25	0.08-0.82	-80.9%	
Need for assistance at home	4.06	2.21-7.47	3.21	1.56-6.57	-20.9%	
Trauma-Specific Quality of Life						
Emotional well-being						
Decline in appetite	2.37	1.55-3.64	0.74	0.39-1.41	-68.8%	
Decline in mood	2.19	1.39-3.45	0.70	0.34-1.44	-68.0%	
Decline in personal relationships	2.72	1.66-4.44	0.78	0.33-1.87	-71.3%	
Felt compelled to rely on others	2.45	1.58-3.80	0.40	0.17-0.95	-83.7%	
Functional engagement						
Need help bathing/showing	4.12	2.55-6.67	1.79	1.01-3.17	-56.6%	
Need help cooking/preparing meals	5.32	2.73-10.4	0.61	0.19-2.03	-88.5%	
Need help going to the bathroom	4.43	2.42-8.09	0.53	0.16-1.75	-88.9%	
Need help walking on flat surfaces	3.23	2.02-5.16	1.28	0.70-2.33	-60.4%	
Recovery/Resilience						
Decline in perceived quality of life	1.63	1.05-2.54	0.91	0.56-1.48	-44.2%	
Prolonged recovery, longer than expected	1.33	0.87-2.04	0.87	0.54-1.40	-34.6%	
Physical well-being						
Able to do leisure activities like before injury	1.99	1.31-3.03	1.82	1.10-3.01	-8.5%	
Able to exercise like before injury	2.06	1.25-3.38	1.67	1.08-2.58	-18.9%	
Have current physical limitations	2.42	1.35-4.35	2.02	1.27-3.23	-16.5%	
Have pain on a daily basis	1.17	0.77-1.77	0.86	0.52-1.41	-26.5%	

Geriatric vulnerability was derived from a Bayesian latent variable model that accounted for baseline (pre-injury) differences in patient age, functional dependence, dementia, and multimorbidity (number of comorbidities). The resultant bimodal distribution was split into ‘high’ vs ‘low’ geriatric risk.

Risk-adjusted results were taken from propensity-score weighted multilevel logistic regression models that accounted for clustering of patients within hospitals and potential confounding due to known differences in gender, presence of severe head injury, overall ISS, and mechanism of injury (blunt vs penetrating).

**COGNITIVE OUTCOMES AND NEUROSTIMULANTS AMONG THE
CEREBRALLY INJURED & OBTUNDED IN THE UNITED STATES: THE
CONSCIOUS STUDY**

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Liz Penalosa-Villalobos, MD; Tanya Egodage, MD;
Anthony Tigano, BS; Anna Liveris, MD; Joy Song, BA;
Russell Payne, MD; Jacob W. Roden-Foreman, BA;
William Brigode, MD; Johanna Stecher, MD; Michelle Kincaid, MD;
Stephanie Doris, DO; Katherine McBride, MD
The Ohio State University
Invited Discussant: Mayur Patel, MD, MPH

Introduction: Neurostimulants (NS) are used to improve cognition after a traumatic brain injury (TBI) in the post-acute care setting, yet their efficacy in the acute period is less clear. We sought to examine the effect of NS on acute cognitive dysfunction in patients with a severe TBI.

Methods: We performed a prospective, multicenter, observational cohort study of patients ≥ 18 years with a severe (GCS ≤ 8), blunt, TBI at 8 U.S. trauma centers from 2020-2023. Patients were grouped according to whether they received NS (amantadine, methylphenidate, modafinil), which was at the discretion of the intensivist. Our primary outcome was the change in cognitive disability among survivors over 28-days (or until discharge) measured by GCS and Disability Rating Scale (DRS) scores.

Results: There were 457 patients in the cohort; 29.5% (n=135) received NS. Groups were similar in age (45 y [29-63]) and sex (male: 74.6%), yet NS patients were more injured (ISS: 29 vs 26, $p=0.02$) with higher rates of diffuse axonal injury (DAI) (39.3% vs 18.3%, $p<0.0001$), neurosurgical interventions (NSI) (64.4% vs 33.2%, $p<0.0001$), and concomitant anti-psychotic (49.6% vs 35.7%, $p=0.01$) and propranolol (57% vs 7.2%, $p<.0001$) use. NS administration varied between centers ($p<.0001$). The most common NS was amantadine (97%), then methylphenidate (9.6%) and modafinil (3%). Rates of seizures (4.6%) and tachyarrhythmias (3.9%) were similar between groups. Median time to NS initiation was 8 d (5-15) and median therapy duration was 16 d (7-35). Patients who received NS in ≤ 7 d had better DRS scores compared to when started between 7-14 d and >14 d (10 vs 19 vs 21, respectively, $p=0.0002$). Among all patients who survived (n=320), NS patients had a greater improvement in GCS scores from day 7 until discharge (+3 vs +2, $p=0.004$), despite having lower final GCS (11 vs 15, $p<0.0001$) and DRS (18 vs 5, $p<.0001$) scores. Controlling for DAI, ISS, frailty, NSI, and concomitant medications, NS remained a significant predictor of GCS score improvement by 1.12 points (95% CI 0.06-2.19).

Conclusion: Neurostimulants were used more commonly in patients with worse TBI pathology. Earlier NS use was associated with better DRS scores and NS were independently associated with improved GCS scores. With similar low adverse event rates between groups, NS should be considered as an option to improve acute cognitive disability after a severe TBI.

**INVISIBLE INJURIES: ASYMPTOMATIC SPINE FRACTURES
AFTER FALLS FROM HEIGHT**

William Johnston, MD; Louis Perkins, MD;

Todd W. Costantini, MD, FACS; Allison E. Berndtson, MD, FACS;

Jay J. Doucet, MD, FACS; Jarrett Santorelli, MD, FACS;

Laura N. Haines, MD, FACS

University of California San Diego Health System

Invited Discussant: Brian Yorkgitis, DO

Introduction: Delayed identification of traumatic thoracolumbar fractures increases the risk of neurological injury. Guidelines recommend that clinical exam alone may be appropriate in non-altered patients with low energy mechanisms; however, this approach may be inadequate after falls from height. We hypothesize that many spinal fractures after falls are asymptomatic on initial exam thus increasing the risk of missed injury if imaging is not obtained.

Methods: Retrospective review of trauma patients ≥ 18 yo admitted to a level 1 Trauma Center over a 5-year period with a fall from ≥ 5 ft. Patients were included if they had thoracolumbar spine imaging and were able to participate in an exam. Chart review determined presence of midline thoracolumbar pain on initial exam. Multivariable logistic regression was used to identify predictors of asymptomatic fractures (ASXF) adjusting for demographics, toxicology, distracting injuries, fall height, fracture location, and BMI.

Results: There were 618 fall patients identified, 424 patients (68.6%) had spinal fractures, of which 17.2% were ASXF. Physical exam had a sensitivity of 82.8% and specificity 39.7% for spinal fractures. Median fall height was 15ft (IQR 11-25), which was similar for patients with and without spinal fractures. On multivariate regression for ASXF, alcohol consumption (OR 5.23, CI 1.77-15.9, $p=0.003$) and lower extremity fractures (OR 2.61 CI 1.22-5.63 $p=0.013$) were risk factors for ASXF. There was no increased risk of ASXF based on fall height, $p=0.245$ (Table). Operative repair was performed in 11.0% of ASXF patients, and 53.4% required long-term bracing.

Conclusions: Screening for spinal fractures after falls from height solely based on symptoms and physical exam is inadequate and could result in missed injuries. Thoracolumbar imaging should be considered for all patients with a fall ≥ 5 ft.



SESSION VB: PAPERS 20-30

Wednesday, September 11, 2024

2:30 PM - 6:10 PM

Location: Concorde Ballroom C

Moderator: Joseph Cuschieri, MD

Recorder: Susan Evans, MD

**KETAMINE INFUSION FOR PAIN CONTROL IN SEVERELY
INJURED PATIENTS: RESULTS OF A RANDOMIZED
CONTROLLED TRIAL**

Thomas Carver, MD; Jaclyn Gellings, MD; Rozalin Thapa, DO;
Colleen Trevino, MD; William Peppard, PharmD; Aniko Szabo, PhD;
Yushan Yang, BS; Terri deRoon-Cassini, PhD
Medical College of Wisconsin
Invited Discussant: John Harvin, MD, MS

Introduction: Opiate-based pain regimens remain the cornerstone of pain management following traumatic injury, but issues related to opioids have driven research into alternative analgesics. Adjunctive ketamine has been increasingly utilized to decrease opioid use, but little evidence exists to support its efficacy within the trauma population.

Methods: A prospective, randomized, double-blind placebo-controlled trial of severely injured (ISS ≥ 15) adult patients (age 18-64) admitted to a Level 1 trauma center was conducted. Exclusion criteria included GCS < 14 , ISS < 15 , pregnancy, and chronic opiate use. All patients were prescribed a patient-controlled analgesia in addition to being randomized to either adjustable dose ketamine (ADK) starting at 3 mcg/kg/min or an equivalent rate of 0.9% normal saline. Study drug and PCA titration were allowed as part of a treatment algorithm. The primary outcome was reduction in oral morphine equivalent (OME) utilization at 24 hours.

Results: We performed a planned interim analysis upon reaching a predetermined enrollment goal. Thirty-nine of 73 patients (53%) were randomized to the experimental arm. Both groups were similar in makeup and had a median ISS of 29 (range 18-53). Median OME in ADK and placebo groups were 99 (0-358) and 99 (20-469), respectively ($p=0.29$). This p-value exceeded the predetermined futility cutoff.

Conclusion: ADK failed to reduce 24-hour OME totals in a severely injured trauma cohort when compared to placebo. Additional studies are necessary to determine if there is any benefit for adjuvant ketamine in different trauma subpopulations.

ANTI XA GUIDED THROMBOPROPHYLAXIS IN CRITICAL TRAUMA PATIENTS IS ASSOCIATED WITH LESS VTE, EXPERIENCE FROM A TERTIARY CARE TRAUMA CENTER

Ahmad G. Kloub, MD; Abu Baker Alaieb, MD; Ahad Kanbar, MD;
Suha Abumusa, BS; Fajer Ishaq, MD; Yazan G. Hinawi, MD;
Mohammad Asem, PhD; Naushad Khan, PhD; Ayman Menyar, MD;
Hasan Al Thani, MD; Sandro Rizoli, MD
Hamad Medical Corporation
Invited Discussant: Galinos Barmparas, MD

Introduction: Venous Thromboembolism (VTE) is common and preventable in trauma. Most VTE prophylaxis (VTEp) protocols mandate standard LMWH doses, which may be inadequate for injured patients. We investigated whether calibrating LMWH doses according to anti-Xa levels is associated with reduced VTE incidence without increasing bleeding.

Methods: VTEp protocol was introduced to a single Level 1 high-volume Trauma Center (Enoxaparin 30mg twice daily), calibrated according to peak plasma Anti Xa measured after 3rd dose. The study compared severely injured adult patients admitted to the Trauma ICU 1 year before and 1 year after protocol implementation,

Outcomes were VTE (DVT, PE or both) and unexpected bleeding.

Subgroup analysis was done for traumatic brain injury (TBI)

Results: 305 patients after protocol implementation (intervention) were compared to 350 pre-protocol patients (control). Anti-Xa levels were measured in 83% of intervention patients and none of the control. 40.4% of the patients had low levels of anti-Xa, suggesting inappropriate prophylaxis and enoxaparin doses were increased. 51% had the desired anti-Xa levels while 8.6% had higher levels and LMWH doses were reduced.

VTE incidence after protocol implementation (intervention) decreased from 4% to 1.3% (OR 0.31; 95% CI 0.1-0.9, P=0.03) without increasing bleeding rate. Among TBI patients, VTE rates were lower in the intervention group without reaching statistical significance.

75% of the patients with VTE, intervention group, had low Anti Xa levels, while 20% of those with bleeding had high anti-Xa levels.

Conclusion: Among adult critically injured patients, a VTEp protocol with enoxaparin dose calibration according to anti-Xa levels, was associated with significantly lower VTE rates without increasing bleeding. About 40% of the patients receiving standard enoxaparin doses had anti-Xa levels suggestive of inadequate prophylaxis

This study suggests that the calibration of LMWH dosing may improve outcomes.

**IMPACT OF AMERICAN COLLEGE OF SURGEONS TRAUMA
VERIFICATION ON A STATEWIDE
QUALITY COLLABORATIVE**

Eli Mlaver, MD; Dennis Ashley, MD, FACS;
Elizabeth Atkins, MSN, RN, TCRN; Regina Medeiros, DNP, MHSA, RN;
Jyotirmay Sharma, MD, FACS; Gina Solomon, MHA, BSN, RN, CCRN-K,
TCRN; Samuel Todd, MD, FACS, FCCM
Georgia Trauma Commission
Invited Discussant: Eileen Bulger, MD

Introduction: American College of Surgeons (ACS) trauma center verification has demonstrated improved outcomes at individual centers, but its impact on statewide Trauma Quality Improvement Program (TQIP) Collaboratives is unknown. A statewide TQIP Collaborative, founded in 2011, noted underperformance in 6 of 8 patient cohorts identified in the TQIP Collaborative report. We hypothesized that requiring ACS verification for level I and II trauma centers would result in improved outcomes for the state collaborative.

Methods: ACS verification requirement was tied to ongoing Trauma Commission funding. Trauma centers were required to apply for an ACS consultative visit by 2017 and were given until 2023 to achieve ACS verification. The effect of this intervention was measured in the number of centers achieving verification and in the performance of the TQIP Collaborative semi-annual reports.

Results: In 2015, only 1 of 15 (7%) trauma centers were ACS verified, and 4 had undergone consultative visits. By 2023, 11 of 12 (92%) trauma centers achieved ACS verification. Following this intervention, the observed-to-expected odds ratio for all-patient morbidity and mortality improved from 1.60 to 1.17, and variation among patient-specific cohorts narrowed from 0.97-1.82 to 0.96-1.48 (Figure). Performance in all six underperforming patient-specific cohorts improved over the study period.

Conclusions: ACS verification for level I and II trauma centers improves TQIP Collaborative performance. Statewide Collaboratives should consider ACS verification as a requirement for participation.

HIGH INTENSITY TIME SENSITIVE INTERVENTIONS IN GERIATRIC TRAUMA ACTIVATIONS: A MULTICENTER STUDY

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 Justin Jacobs, MS; Kimberly Smith, MBA;
 The Geriatric Trauma Activation Criteria Study Group
 Center for Trauma and Acute Care Surgery, HCA Healthcare
 Invited Discussant: Joseph Posluszny, MD

Introduction: As increasing numbers of older adults present to trauma centers, the applicability of existing trauma activation (TA) criteria for this vulnerable population has been debated. This study sought to determine the frequency of high-intensity time-sensitive interventions (HITS) in older adult TAs to begin defining data-driven geriatric-specific TA criteria.

Methods: This multicenter, retrospective study collected data (1/17-12/19) securely from participating centers as NTDB files with TA status (full, partial, other). HITS were derived from TQIP process of care measures as critical interventions requiring trauma expertise (Table). Older adults (65+ yrs) were compared to younger adults (<65 yrs) on demographics, injury characteristics and HITS status by TA status using χ^2 .

Results: 27 Level I/II centers enrolled 165,970 patients (86.6% blunt, 20.4% full activation, median age: 53, median ISS: 9, in-hospital mortality 4.2%). There was a lower proportion of HITS in partial TAs, compared to full TAs ($p<0.001$, Table). Older adults were less likely to receive HITS compared to younger adults (Full TA: 33.0% vs 38.2%, $p<0.001$; Partial TA: 5.0% vs 5.6%, $p=0.003$). Compared to non-HITS, HITS were associated with an increased total mortality (Expired+Hospice) in both full (30.6% vs 7.7%, $p<0.001$) and partial (12.0% vs 1.5%, $p<0.001$) TAs.

Conclusions: Over 1/3 of full TAs required HITS, supporting their high-level resource allocation. However, HITS were uncommon in partial TAs, significantly more so for older adults. These data can help refine geriatric TA criteria in support of optimal resource allocation. Further research is needed to provide additional evidence for other benefits of TA.

High-Intensity Time-Sensitive (HITS) Interventions, n (%)	Total (Full+Partial+ Other) N=165,970	Full TA		Partial TA	
		<65	65+	<65	65+
Endotracheal Tube w/in 4 hrs	6,574 (4.0)	4,379 (15.9)	887 (14.1)*	640 (1.8)	237 (1.5)*
Hem Control Surgery w/in 24 hrs	3,370 (2.0)	2,690 (9.8)	308 (4.9)*	259 (0.7)	54 (0.3)*
Any Blood Product w/in 4 hrs	7,422 (4.5)	5,196 (18.9)	950 (15.1)*	635 (1.7)	269 (1.7)
Any ICP Monitor	1,642 (1.0)	1,057 (3.8)	185 (2.9)*	113 (0.3)	70 (0.4)*
Mechanical Vent w/in 24 hrs	8,176 (4.9)	5,102 (18.6)	1,154 (18.3)	809 (2.2)	328 (2.0)
Chest Tube Placement w/in 4 hrs	4,338 (2.6)	2,657 (9.7)	365 (5.8)*	658 (1.8)	207 (1.3)*
ED Thoracotomy w/in 4 hrs	245 (0.1)	209 (0.8)	25 (0.4)*	3 (0.0)	3 (0.0)
Angiography w/in 24 hrs	1,004 (0.6)	668 (2.4)	144 (2.3)	112 (0.3)	43 (0.3)
Any of the Above HITS	17,217 (10.4)	10,511 (38.2)	2,080 (33.0)*	2,046 (5.6)	804 (5.0)*

* indicates statistically significant difference between the <65 group and the 65+ group ($p<0.05$).

**TXA IMPACT ON PLATELET ADHESION TO THE
ENDOTHELIUM AFTER SHOCK CONDITIONS:
A PROTECTIVE EFFECT?**

Lawrence Diebel, MD; Alison Karadjoff, DO; David Liberati, MS
Wayne State University

Invited Discussant: Matthew Kutcher, MD, MS

Introduction: Trauma and hemorrhagic shock (T/HS) leads to microcirculatory disturbances related to endothelial injury and endothelial glycocalyx (EG) degradation. Improved outcomes following T/HS have been linked to protection of the EG layer which is a topic of increasing investigation. Early tranexamic acid (TXA) administration following T/HS improves outcomes in clinic studies. Recent translational studies have also shown that early TXA administration protects the EG following shock insults; the impact on blood-endothelial cell interactions are unknown. Platelet adherence to the vascular endothelium may contribute to microcirculatory disturbances; the effects of TXA on this phenomenon are uncertain. Microfluidic devices have been used to study the behavior of endothelial cells and platelets under flow conditions. We hypothesize that the protective effect of TXA against EG degradation would prevent shock induced platelet adhesion to the microvasculature. This was studied in a microfluidic cell culture model under a controlled microenvironment.

Methods: Human umbilical vein endothelial cell (HUVEC) monolayers were established in microfluidic devices and then subjected to control or shock conditions (hypoxia/reoxygenation + epinephrine; HR/epi). TXA was added to the perfusate at various times following HR/epi, and then diluted whole blood (2:1) with fluorescently labeled platelets was perfused in the microfluidic channels. Platelet adhesion was then determined using fluorescent microscopy. In other experiments, EG thickness was indexed using wheat germ agglutinin staining and fluorescent microscopy.

Results: See attached figure. Platelet adhesion was increased in all experimental groups vs. control. However, TXA decreased platelet adhesion in all HR/epi groups with the greatest effect noted with earlier TXA administration. Endothelial glycocalyx thickness decreased from 45-49% of the control after HR/epi ($p \leq 0.05$). With TXA, the glycocalyx thickness remained 78-86% of the control.

Conclusion: TXA administration resulted in a time dependent decrease in endothelial platelet adhesion following shock conditions. These effects were related to TXA protection of the endothelial glycocalyx layer. Our study supports early administration of TXA in severely injured patients to improve outcomes.

**CLINICAL MANAGEMENT OF BLUNT CEREBROVASCULAR
INJURY-RESULTS FROM THE AAST PROSPECTIVE
OBSERVATIONAL VASCULAR INJURY TRIAL (PROOVIT)**

Joshua L. Crapps, MD; Jason Hutzler, MD; Fiorella Mendizabal, MD;
Morgan Gaither, MD; Marc Trust, MD; Pedro G. Teixeira, MD;
Carlos V.R. Brown, MD; Joseph J. DuBose, MD
Dell Seton Medical Center at the University of Texas
Invited Discussant: Walter Biffel, MD

Introduction: Blunt cerebrovascular injury (BCVI) represents a severe type of injury with risk of debilitating stroke. Contemporary techniques have allowed for varying management strategies including medical management, open surgical repair, and endovascular therapy. We hypothesize that clinical management and injury characteristics determine subsequent stroke risk.

Methods: The AAST Vascular Trauma Registry: PROOVIT was used to identify patients with diagnosed BCVI including both internal carotid and vertebral artery injuries. Data included patient demographics, BCVI characteristics, Abbreviated Injury Scale (AIS), Injury Severity Score (ISS), and clinical management. Primary outcomes were stroke rate and mortality.

Results: From February 2013 to December 2023, 1420 patients were identified sustaining BCVI, including 45.6% internal carotid artery and 54.4% vertebral artery. Of these 65% were male, average age 43 (± 17), with a mean ISS of 24(± 14) and head AIS of 3(± 1). Therapy included medical management [97% (1377/1420)], endovascular therapy [2.9% (41/1420)] and open surgical repair [0.1% (2/1420)]. Excluding open surgical repair, the stroke rate was significantly higher with endovascular versus medical management [26.8% vs 5.7%, $p < 0.001$], however no difference was noted in overall mortality. There was also a significant increase in stroke rate amongst those with multiple vessels injured compared to those with a single injury [12.9% vs 5.6%, $p = 0.013$], as well as in injuries of carotid arteries compared to those of vertebral arteries [8.7% vs 4.4%, $p = 0.001$]. There was no significant difference in stroke rate based on patient age, gender, or admission vital signs.

Conclusion: Most patients with BCVI are treated with medical management alone. Our data suggests that endovascular therapy for BCVI conveys a significantly increased risk of stroke, bringing its role in this setting into question.

IMPACT OF STATE ADMISSION STANDARDS ON PATIENTS WITH ISOLATED RIB FRACTURES

Adam Lizak, BS; Anthony Allsbrook, DO; Rebecca Wilde-Onia, MSN, RN;
Lisa Robins, BSN, RN; Rebecca Boyer, MRN, RN; James Cipolla, MD;
Peter Thomas, DO; Roberto Castillo, DO; Maxwell Braverman, DO
St. Luke's University Hospital, Bethlehem, Pennsylvania
Invited Discussant: Charles Butts, MD

Introduction: Chest wall injury remains a significant source of admission to trauma centers. Given the prevalence across our region, a network-wide rib fracture protocol has been in effect. In Jan 2020, our state trauma standards changed to allow patients with >3 rib fractures to be admitted to level 4 centers. Our primary objective was to assess the impact of this change in standards on outcomes at our level 4 trauma centers.

Methods: Our network trauma database was queried for patients with isolated uncomplicated rib fractures between 2018–2022. Patients were stratified based on admission before or after change in admission standards. Patients evaluated at level 4 centers were compared for demographics, injury characteristics, transfer rate and outcomes. Analysis was repeated for those with ≤ 3 and > 3 rib fractures. Finally, 1:1 propensity score matching was used to create a matched group of patients with >3 rib fractures to assess outcomes based on level of admitting facility.

Results: 1070 patients with isolated rib fractures were admitted across our trauma network over the study period. Level 4 centers evaluated 360 patients with 132 (36.6%) and 228 (63.3%) in the pre- and post-standard change periods, respectively. There was significant reduction in transfers for isolated rib fractures (56% vs. 21% $p<0.01$). The number of patients with >3 rib fractures at level 4 centers increased from 13.8% to 30.6% ($p=0.01$). Patients with >3 rib fractures had the same median HLOS (3 IQR 2-5 vs. 2 IQR 1-4, $p=0.29$) and mortality (0% vs 2.3%, $p=0.22$) as those with ≤ 3 rib fractures. After 1:1 propensity matching, patients admitted to network level 1&2 trauma centers ($n=60$) versus those who were admitted to their local level 4 campus ($n=60$) had similar median age (71 IQR 60-81 vs. 73 IQR 65-85, $p=0.24$), injury characteristics, median HLOS (2.5 IQR 2-5 vs. 2 IQR 1-4, $p=0.37$) and mortality (1.7% vs. 0%, $p=0.30$).

Conclusion: Change in state admission standards allowed for a substantial reduction in transfer of patients with >3 isolated rib fractures. In a group of matched patients with >3 rib fractures, those admitted to level 4 centers had similar outcomes to those admitted to level 1 or 2 centers.

SOCIAL SUPPORT HELPS MITIGATE DISPARITIES ASSOCIATED WITH VARIATIONS IN NEIGHBORHOOD VULNERABILITY AMONG TRAUMA PATIENTS

Saba Ilkhani, MD, MPH; Cheryl K. Zogg, MD, PhD, MSPH, MHS; Dane Scantling, DO; Nathaniel Pinkes, MPH; Wardah Rafaqat, MD; Carolyn Zier, BA; Sabrina E. Sanchez, MD, MPH; John O. Hwabejire, MD, MPH; Adil H. Haider, MD, MPH; Juan Herrera-Escobar, MD, MPH; Geoffrey A. Anderson, MD, MPH; Ali Salim, MD

Brigham & Women's Hospital
 Invited Discussant: Nina Glass, MD

Introduction: Neighborhood vulnerability, measured by the CDC’s Social Vulnerability Index (SVI), has been identified as an important predictor of longer-term outcomes following injury. It has also been shown that lower social support, measured by differences in patients’ perceived social support network (SSN) strength, is associated with diminished functional and mental health recovery. Despite the importance of both factors, the interplay between SVI and SSN remains largely unexplored. Our study aimed to (1) examine the capacity for social support to improve trauma outcomes across varying SVI levels and (2) investigate the capacity for theoretical improvements in SSN to help reduce disparities associated with increased SVI.

Methods: We surveyed all adult trauma patients with moderate or severe injuries (ISS ≥9) who presented to three level 1 trauma centers in Boston between 2018-2023. Outcomes were assessed at 6-12 months after their injury. Differences in SVI were categorized by quartiles. Differences in SSN strength were evaluated on a five-point Likert scale and categorized as weak (“weak”/“nonexistent”)-vs-strong (“very strong”/“strong”) social support. Risk-adjusted linear/logistic regression models were used to examine associations between SSN strength and trauma outcomes across quartiles of SVI. Counterfactual models were then used to examine theoretical reductions in SVI’s effect by promoting improvements in SSN strength among (scenario 1) patients with the highest quartile of SVI and (2) all patients within the cohort.

Results: A total of 2,525 patients were included. For patients living in the most vulnerable neighborhoods (highest quartile of SVI, **Table 1**), having weak-vs-strong social support resulted in markedly worse outcomes (e.g. chronic disability OR[95%CI]: 2.14[1.44-3.19]). In contrast, among patients living in the least vulnerable neighborhoods (lowest quartile of SVI), risk-adjusted associations between weak-vs-strong social support and trauma outcomes were no longer significant (e.g. chronic disability OR[95%CI]: 1.13[0.50-2.55]). Counterfactual models told a similar story, suggesting that while increasing social support to “strong” levels for patients living in the highest risk areas (i.e. those with the highest quartile of SVI) reduced the overall risk of chronic disability from 31.2% within the entire population to 28.8% (a relative reduction of 7.7%), increasing social support to “strong” levels for patients living in the other three quartiles only reduced chronic disability by an additional 0.2 percentage-points to 28.6% (an 8.3% relative reduction from baseline).

Conclusion: Social support is an important mitigator of adverse outcomes among trauma patients, particularly those living in neighborhoods with greater vulnerability. The results of our study show that while weak social support significantly worsened outcomes for patients living in areas with high SVI; it had no effect among patients in areas with greater access to resources. Targeted interventions aimed at increasing social support and enhancing community engagement have the potential to help “close the gap” and increase critical access to care for at-risk patients living in our communities’ most vulnerable neighborhoods.

Table 1. Impact of SSN strength on trauma outcomes for patients living in neighborhoods with the lowest (lowest risk)-vs-highest (highest risk) quartile of SVI

Outcome	Weak vs Strong Social Support Network	
	Lowest quartile of SVI	Highest quartile of SVI
Resultant functional disability	OR ^Δ (95%CI) 1.13 (0.50-2.55)	OR ^Δ (95%CI) 2.14 (1.44-3.19)
Need help walking up stairs	0.96 (0.35-2.63)	2.01 (1.29-3.11)
Need help walking on flat surfaces	0.70 (0.20-2.42)	2.01 (1.24-3.21)
Resilient Recovery	1.45 (0.53-3.99)	2.58 (1.46-4.64)
Current physical limitation	1.18 (0.56-2.46)	1.79 (1.15-2.78)
Mean difference		
Physical health score	-2.7 (-7.60 to 2.16)	-5.21 (-7.7 to -2.65) ^{^^}

^Δ Risk adjustment for age, sex, number of comorbidities, Injury severity score

^{^^} The Physical Component Score (PCS-12) is derived from the SF-12 survey. A difference of 3 units is recognized as clinically significant.

UNCOVERING THE ROLE OF PLATELET DRIVEN THROMBO-INFLAMMATION IN POST-TRAUMATIC ARDS

Rachael A. Callcut, MD, MSPH; Anamaria J. Robles, MD;
Julia Riccardi, MD; James T. Ross, MD, MS;
Ian E. Brown, MD, PhD; Carrie Lewis, MS;
Matthew W. Mell, MD, MS; John B. Holcomb, MD
University of California, Davis
Invited Discussant: Timothy Pritts, MD, PhD

Introduction: Hemorrhagic shock has been identified as the major risk factor for the development of Acute Respiratory Distress Syndrome (ARDS). The key mechanism is hypothesized to be disordered pathophysiologic crosstalk between inflammatory and coagulation pathways. This study investigates the role of coagulation and inflammatory markers in the development of ARDS.

Methods: A secondary analysis of the biomarker profiles from patients enrolled in the Pragmatic Randomized Optimal Platelet and Plasma Ratio (PROPPR) study was performed. PROPPR was a multicenter randomized trial examining the impact of a balanced resuscitation strategy (1:1:1 vs 1:1:2 plasma:platelet:rbc) on mortality. Forty-eight coagulation and inflammatory candidate biomarkers were investigated. Those patients with complete biomarker data were included in a principal components analysis. This dimensionality-reduction machine learning method was used to identify initial biomarker phenotypes (principal components) associated with ARDS. LASSO regression was performed on the principal components to identify independent predictors of ARDS controlling for age, mechanism, injury severity score (ISS), and significant hemorrhage (≥ 5 units rbc in first 12h).

Results: 286 patients were included. The 24-hour mortality was 14%. For those that survived >24 hours, 18% developed ARDS by Berlin criteria. There was no difference in ARDS incidence by treatment group. Risk for ARDS was predictable using time zero biomarker phenotypes ($p < 0.05$). Among the 14 phenotypes identified, one remained statistically significant for predicting ARDS controlling for age, ISS, blunt injury, and hemorrhage. The phenotype ($p = 0.039$) was predominantly driven by platelet activation integrins CD41 (glycoprotein IIb), CD61 (glycoprotein IIIa), and CD42b (platelet glycoprotein Ib alpha chain).

Conclusions: This study demonstrates the predominant early predictor of ARDS is associated with platelet activated integrins which are known to induce release of immunomodulatory mediators both anti and pro-inflammatory.

DYNAMIC CHANGES IN BLEEDING SITES: EVALUATING CONTRAST EXTRAVASATION ON COMPUTED TOMOGRAPHY AND ANGIOGRAPHY IN PELVIC FRACTURES

Shokei Matsumoto, MD; Fumi Inamasu; Satomi Snoo

Saiseikai Yokohamashi Tobu Hospital

Invited Discussant: Amy Hildreth, MD

Introduction: Contrast extravasation (“blush”) on contrast-enhanced computed tomography (CT) indicates active bleeding, but diagnostic angiography (AG) following CT sometimes differs from the CT findings in patients with pelvic fractures. The relationship between blush on CT and AG remains unclear. This study aimed to evaluate the concordance between blush on CT and AG based on pelvic regions.

Methods: This was a retrospective single-center study. The study included patients (age ≥ 18 years) with pelvic fractures between 2015 and 2023, who had AG after CT. AG was performed in patients with blush on CT or unstable hemodynamics due to pelvic fracture. Pelvic bleeding regions were categorized separately left and right as anterior internal iliac arteries (IIA), and posterior IIA based on pelvic arterial anatomy. Concordance between blush on CT and AG was assessed using the k statistic.

Results: A total of 87 patients (174 unilateral pelvis) with pelvic fracture were included. Among these, 75 (86%) had blush on CT and 12 (14%) had no blush on CT. Concordance was 83% (95% CI, 0.03-0.57; $k = 0.30$) when assessed by individual patient basis (Table 1), and 51% (95% CI, 0.21-0.40; $k = 0.30$) when evaluated by anatomical regions on a unilateral half of pelvis (Table 2).

Conclusions: The location of active bleeding often differs between CT and AG, indicating that bleeding may change intermittently and at various sites over time. This suggests the importance of evaluating the entire pelvic arteries, including both sides, during AG, rather than solely relying on CT findings.

Table 1. Relationship between Blush on CT
 and AG, Based on Individual Patient Basis

	CT +	CT -	Total
AG +	67	7	74
AG -	8	5	13
Total	75	12	87

Table 2. The R

el Regions

Angiography positive	CT positive			All negative	Total
	Anterior	Posterior	Anterior & Posterior IIA		
Anterior IIA	15	6	3	4	28
Posterior IIA	5	12	2	15	34
Anterior & Posterior IIA	12	6	12	7	37
All negative	13	7	6	49	75
Total	45	31	23	75	174

RESUSCITATION TRIGGERS AND OUTCOMES IN A BLOOD-CONSTRAINED TRAUMA ENVIRONMENT: ESTABLISHING TARGETS FOR EVIDENCE-BASED GUIDELINES

Matthew Driban, BS; Fanny Dissak-Delon, MD, PhD;
Georges Etoundi-Mballa, MD, MS; Thompson Kingue, MD;
Richard Njock, MD; Daniel Nkusu, MD;
Jean-Gustave Tsiagadigui, MD; Cindy Umoh, MPH;
Rasheedat Oke, MD, MPH; Catherine Juillard, MD, MPH;
Alain Chichom-Mefire, MD; S. Ariane Christie, MD
University of California, Los Angeles
Invited Discussant: James Byrne, MD, PhD

Introduction: Balanced blood transfusion is standard of care for hemorrhagic shock, but many low-resource settings lack sufficient safe blood. Understanding current resuscitation practice in extremely blood-constrained settings is critical to optimize resource allocation. The objective of this study was to evaluate triggers and outcomes for blood-, colloid-, and crystalloid-based resuscitation strategies in a critically-injured Cameroonian cohort.

Methods: In this prospective observational cohort study, we evaluated resuscitation practice among all critically-injured patients presenting to ten trauma hospitals in Cameroon between 2022-23. Demographics, injury characteristics, and clinical trajectory were compared between cohorts receiving minimal fluid (MF), crystalloid (CRYS), colloid (COL), or blood-based (BLD) resuscitation. Multivariate logistic regression (MLR) was used to identify resuscitation triggers and test associations between resuscitation strategy and outcomes including trauma death.

Results: Of 1211 critically-injured patients, 77% (930) received CRYS, 21% (249) MF, 7% (86) COL, and 7% (87) BLD. Demographics and injury severity were similar between cohorts. While BLD was associated with hemodynamic derangements (OR 4.7, 95% CI 2.6-8.5), COL was strongly associated with traumatic brain injury (TBI) (OR 4.9, 95% CI 1.1-21.5). Overall mortality was 26% in COL, 21% in MF, 17% in CRYS, and 16% in BLD ($p=0.17$). MVR adjusted for injury severity, blood pressure, and Glasgow Coma Scale found COL to be independently associated with mortality (OR 3.5, 95% CI 1.4-8.7).

Conclusion: In blood-constrained Cameroon, TBI appears to trigger COL resuscitation and is associated with increased mortality among critically-injured patients. Educating trauma care providers to avoid COL administration in TBI patients and implementing standardized resuscitation protocols could improve trauma survival in Cameroon.



SESSION VI: PAPERS 31-36

Thursday, September 12, 2024

7:30 AM - 9:30 AM

Location: Concorde Ballroom

Moderator: Stephanie Savage, MD, MS

Recorder: Brittany Bankhead, MD, MS

WEALTH IS HEALTH: HIGH ECONOMIC STATUS IN CAMEROON CORRELATES WITH PROTECTIVE GEAR USE IN TRAFFIC INJURIES AND IMPROVED CLINICAL OUTCOMES

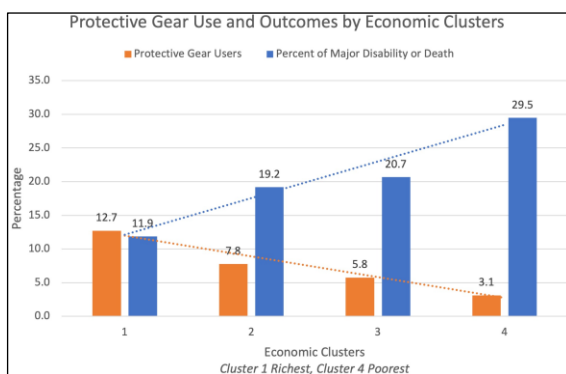
Fanny Dissak-Delon, MD, PhD; Mark T. Yost, MD, MPH;
Darwin Touko, MS; Roland Mfondoum, MS; Rasheedat Oke, MD, MPH;
S. Ariane Christie, MD; Alain Chichom-Mefire, MD;
Alan Hubbard, PhD; Catherine Juillard, MD, MPH
University of California, Los Angeles
Invited Discussant: Mary Schroeder, MD

Introduction: Sub-Saharan Africa has the highest traffic fatality rate globally. Despite laws mandating helmet and seatbelt use, data on protective gear use during road traffic injuries (RTIs) in Cameroon remains sparse.

Methods: We extracted Cameroon Trauma Registry data collected from 10 hospitals during July 2022 to December 2023. Protective gear users wore helmets in motorcycle and seatbelts/car seats in vehicle crashes. We categorized patients into four economic clusters based on ownership of durable goods using parallel distance matrix computation. We analyzed associations between continuous variables with Wilcoxon rank-sum and categorical variables with chi-squared and multivariate logistic regression. Our primary outcome was in-hospital death or major disability at discharge.

Results: In 3685 crashes, 302 (8%) patients used protective gear. The greatest percentage of protective gear users belonged the richest cluster while the poorest cluster patients comprised the smallest proportion of protective gear users (Figure; $p < 0.001$). When controlling for age, protective gear use, and injury severity, the poorest cluster patients showed the greatest odds of major disability or death (AOR 2.40; $p < 0.001$).

Conclusions: Greater economic status is associated with increased protective gear use during RTIs in Cameroon. Despite suffering the most severe outcomes, the poorest patients remain less likely to use protective gear. Enforcement of mandatory protective gear laws and economic incentives such as price subsidies for helmets and seatbelts would particularly benefit the most economically vulnerable population.



**AUTOMATING EXCELLENCE: A BREAKTHROUGH IN
EMERGENCY GENERAL SURGERY
QUALITY BENCHMARKING**

Louis Perkins, MD; Amy Liepert, MD, FACS; Jessica Masch, MD;
Brandon Harris, MD; Zongyang Mou, MD;
Todd W. Costantini, MD, FACS; Laura N. Haines, MD, FACS;
Allison E. Berndtson, MD, FACS; Laura Adams, MD, FACS;
Jay J. Doucet, MD, FACS; Jarrett Santorelli, MD, FACS
University of California, San Diego
Invited Discussant: Kevin Schuster, MD, MPH

Introduction: With the adoption of the emergency general surgery (EGS) model by institutions nationwide, designing and implementing effective quality assessment tools is imperative. Currently accepted EGS risk scores are limited by the need for manual extraction, which is time-intensive and costly. We developed an automated institutional electronic health record (EHR) linked EGS registry that calculates a Modified Emergency Surgery Score (mESS) and demonstrated its use in benchmarking outcomes.

Methods: The EHR linked automated EGS registry was used to calculate a mESS for patients undergoing emergent laparotomies from 2019-2023. Data captured included demographics, admission and discharge data, diagnoses, procedures, vitals, labs, and imaging. A mESS was calculated based off ESS variables, with estimation of subjective variables using diagnosis codes and other abstracted treatment variables. This was validated against ESS and the POTTER risk calculators by chart review using a two-way mixed effects intraclass correlation coefficient (ICC). Observed vs expected (O:E) 30-Day mortality and complication ratios were generated.

Results: The EGS registry captured 177 emergent laparotomies. There were 32 deaths within 30 days of surgery for a mortality rate of 18%. The mESS demonstrated agreement with ESS and POTTER scores.

Conclusion: Our study highlights the effective implementation of an institutional EHR-linked EGS registry equipped to generate automated quality metrics. This demonstrates potential in enhancing the standardization and assessment of EGS care while mitigating the need for extensive human resources investment.

	O:E mESS	O:E ESS (ICC)	O:E POTTER (ICC)
30-Day Mortality	1.44	1.86 (0.74)	1.30 (0.63)
30-Day Complications	0.84	0.95 (0.87)	0.88 (0.57)

DEFINING AND ASSESSING EQUITY TO CARE IN AN URBAN TRAUMA CENTER

Allan Stolarski, MD; Sophia M. Smith, MD; Michael Poulson, MD;
Daniel Holena, MD, MSCE; Sandro Galea, MD; Danby Kang, MD;
Crisanto Torres, MD; Noelle Saillant, MD; Dane Scantling, DO
Boston Medical Center

Invited Discussant: Andre Campbell, MD

Introduction: Every minute of prehospital transport time (TT) is critical to survival. Previous studies have only evaluated community proximity within an hour to a trauma center. Here we assess granular urban community-level access to trauma centers and hypothesize that TT in Boston would be longer for non-white communities as well as those with higher poverty metrics.

Methods: We utilized the 2020 Decennial Census data at the block group (BG) level (the most granular year and geography available) to approximate neighborhoods. Trauma centers were geocoded into BGs from the Census TIGER/Line Shapefiles Database. BG demographics and poverty metrics were joined to the BGs in ArcGIS Pro. BG centroids were calculated and a network analysis of traffic data was used to determine the predicted TT from each BG centroid to the nearest TC. BG characteristics were assessed with regard to TT using linear regression in Stata. Kruskal-Wallis tests were used to analyze differences for non-parametric data amongst multiple groups.

Results: A total of 581 Boston BGs with 273,188 households and 675,647 individuals were identified. Of households, 48,711 (17.8%) were receiving cash/food assistance. Further, 278 (47.8%) of BGs had a white non-Hispanic majority, 79 (13.6%) had a Black non-Hispanic majority and 29 (5.0%) had a Hispanic majority population. Household income quartiles ranged from \$32,394 to \$157,283. Relative to the highest income BGs, TT increased as income decreased for the middle quartiles (β 1.7, 95% CI 0.48 to 2.90, $p < 0.01$ and 2.6 95% CI 1.4 to 3.8, $p < 0.01$ respectively) but not in the lowest income quartile BGs. Public assistance was not associated with TT. An increased proportion of the population that was Black (β 0.10, 95% CI 0.07 to 0.11, $p < 0.01$) or Hispanic (β 0.04, 95% CI 0.01 to 0.07, $p < 0.01$) was related to increased TT; an increased proportion of the population being white non-Hispanic related to shorter TT (β -0.003, 95% CI -0.004 to -0.002, $p < 0.01$). Majority white communities had TT more than 5 minutes shorter than majority Black communities (9.2 min vs. 14.4 min; $p < 0.01$).

Conclusion: Network analysis of BGs in Boston allowed for an analysis of community temporal trauma center access. Communities with higher non-white populations have reduced access to trauma care while some available poverty metrics relate to TT and others do not.

**PATTERNS OF CARE FRAGMENTATION: DO EMERGENCY
GENERAL SURGERY PATIENTS BENEFIT FROM
INTERFACILITY TRANSFER?**

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Vahe S. Panossian, MD; Wardah Rafaqat, MD;

Emanuele Lagazzi, MD; Anne Hoekman, MD, LLM; Suzanne Arnold, BS;

John O. Hwabejire, MD, MPH; George C. Velmahos, MD, PhD;

Haytham M.A. Kaafarani, MD, MPH; Michael P. DeWane, MD

Massachusetts General Hospital

Invited Discussant: Marta McCrum, MD, MPH

Introduction: Fragmentation of Care (FOC) describes non-elective readmission to a non-index hospital and has been associated with poorer clinical outcomes, higher healthcare costs, and increased patient dissatisfaction. We hypothesized that interfacility transfer (IFT) could ameliorate the adverse effects of FOC in emergency general surgery (EGS) patients. The aim of this study was to assess the impact of IFT on patients with FOC and assess the patient-related characteristics associated with patterns of fragmentation.

Methods: We retrospectively analyzed the Nationwide Readmissions Database 2019. We included patients ≥ 18 years old with non-elective readmissions following discharge for an EGS diagnosis. We stratified the patients by patterns of fragmentation. The primary outcome was mortality. We conducted a multivariable logistic regression analysis, accounting for clustering at the hospital level.

Results: A total of 204,481 patients were eligible, of whom 77.0% were non-fragmented, 21.9% were fragmented (FOC only), 0.9% were hyper-fragmented (FOC and transferred to another non-index hospital), and 0.2% were unfragmented (FOC and transferred back to index hospital). The most common causes of readmission in all cohorts were gastrointestinal and infectious complications. After adjusting for patient characteristics, when compared to non-fragmented patients, the risks of 60- and 90-day mortality were significantly higher in the fragmented, unfragmented, and hyper-fragmented cohorts (Table 1). EGS patients experiencing both FOC and IFT (unfragmented and hyper-fragmented) had significantly increased odds of mortality. Index admission characteristics predictive of unfragmented care were initial operative management, discharge home with health services, and higher illness severity.

Conclusion: FOC in EGS patients is associated with higher mortality. Considering that IFT confers an additional mortality risk, EGS patients experiencing FOC may have a survival benefit if they are not transferred back to the index hospital.

STANDARDIZED ELECTRONIC ORDER SETS DECREASES OPIOID USE FOR EMERGENCY GENERAL SURGERY PATIENTS

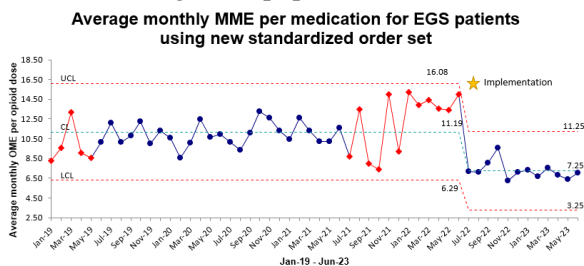
Adam Lucy, MD; Angela Sickles, MD; Laura Leal, RN;
Elise Dasinger, PharmD; Daniel T. Lammers, MD; Virginia Pierce, MD;
Lauren Tanner, MD; Sabrina D. Goddard, MD; Zain G. Hashmi, MD
University of Alabama at Birmingham
Invited Discussant: Andrew Bernard, MD

Introduction: Effective pain management while limiting opioid utilization can optimize surgical patient care. Emergency general surgery (EGS) are a vulnerable population as they are often excluded from enhanced recovery pathways. We sought to determine the effect of a protocolized opioid order set among EGS patients at a tertiary care center.

Methods: An interprofessional team imbedded new protocolized pain regimens into an electronic order set in July 2022. Oral and IV morphine milligram equivalents (MME) per opioid administration were monitored from Jan 2019-Jun 2023 for all EGS patients and compared pre and post-implementation. Primary outcome was total MME and MME per opioid dose administered. Secondary outcomes included pain score and formulation trends. Data were analyzed using Welch's t-test for continuous variables, chi-square for categorical variables, and statistical process control charts.

Results: Total monthly MME decreased from 508.9 ± 387.2 to 251.8 ± 128.4 ($p < 0.001$). Average monthly MME per dose decreased from 11.5 ± 4.1 pre-implementation to 7.2 ± 1.9 post-implementation ($p < 0.001$). This difference was sustained when stratifying data by oral (13.3 ± 3.4 vs. 7.7 ± 1.8 , $p < 0.001$) and IV (9.3 ± 3.9 vs. 5.7 ± 1.4 , $p < 0.001$) MMEs. This change resulted in fewer hydromorphone orders in favor of lower dose morphine and fewer opioid-acetaminophen combination medications. Despite fewer MMEs, average patient pain scores decreased from 6.9 ± 2.5 to 6.3 ± 2.8 ($p < 0.001$). Moreover, MME reduction was sustained with limited variation (Figure 1).

Conclusion: Implementation of a standardized EMR pain management protocol significantly decreased in-hospital opioid use for EGS patients. Opioid optimization is critical in this high-risk population where enhanced recovery strategies are not always applicable. Future research will focus on impact on LOS, opioid adverse events, and opioid utilization post discharge.



OPERATIVE NEUROSURGERY FOR TRAUMATIC SUBDURAL HEMATOMA: TRAUMA CENTER VARIATION IS ASSOCIATED WITH PATIENT OUTCOMES

Vikas N. Vattipally, BS; Kathleen Ran, BA; Debraj Mukherjee, MD, MPH;
Jose Suarez, MD; Judy Huang, MD; Chetan Bettgowda, MD, PhD; Elliott Haut, MD, PhD;
Joseph Sakran, MD, MPH, MPA; Christopher Witw, MD MS; David Gomez, MD, PhD;
Tej Azad, MD, MS; James P. Byrne, MD, PhD
The Johns Hopkins University
Invited Discussant: Weidun Alan Guo, MD, MPH

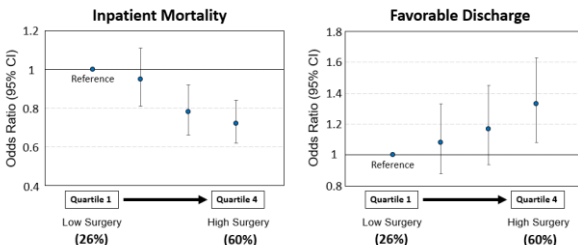
Introduction: Traumatic subdural hematoma (SDH) is a common subtype of traumatic brain injury (TBI) that often represents a neurosurgical emergency. The Brain Trauma Foundation recommends urgent surgical evacuation of SDH with midline shift (MLS) >5mm, regardless of presenting Glasgow Coma Scale (GCS) score. However, real-world practice is unknown. The objective of this study was to measure the association between trauma center (TC) tendency for operative neurosurgery (NSx) and inpatient mortality among patients with traumatic SDH.

Methods: Data for adult patients (age ≥ 18 years) presenting with severe TBI (GCS ≤ 8) and SDH with MLS >5mm were derived from TQIP (2017-2019). Patients with penetrating mechanism, non-survivable injuries (AIS=6), advance directives, or death in the ED were excluded. Hierarchical logistic regression was used to estimate each TC's unique odds of performing NSx for traumatic SDH. Risk-adjustment accounted for patient baseline and injury characteristics, including patterns of intracranial injury and neurological examination (GCS and pupillary response). TCs were then grouped into quartiles of increasing tendency for NSx. The risk-adjusted association between TC tendency for NSx and outcomes was then measured. The primary outcome was inpatient mortality. The secondary outcome was favorable discharge disposition, defined as discharge to home or rehab.

Results: 13,087 patients with traumatic SDH were treated at 454 level I/II TCs. Median age was 57 years and 70% were male. Falls were the most common mechanism (55%). Median GCS was 3 and 57% of patients exhibited abnormal pupillary exam (10%, one reactive; 47%, neither reactive). Significant variation in TC tendency for NSx was observed. Specifically, TCs with the greatest tendency for NSx (**Quartile 4**) performed surgery on 60% of patients, while TCs with the lowest tendency (**Quartile 1**) performed surgery on only 26%, despite no differences in GCS or pupillary exam. After risk-adjustment, greater hospital tendency for NSx was associated with lower inpatient mortality and higher odds of favorable discharge (**Figure**). Patients with traumatic SDH treated at TCs with highest vs. lowest tendency for NSx were 30% less likely to die (aOR, 0.7; 95%CI 0.6–0.8) and 30% more likely to achieve favorable discharge (aOR, 1.3; 95%CI 1.1–1.6). These effects were most pronounced among patients with abnormal pupillary exam.

Conclusions: Significant variation exists in TC tendency to perform NSx for traumatic SDH. This variation is associated with inpatient mortality and potential for favorable discharge disposition.

Impact of Trauma Center Tendency for Operative Neurosurgery on Patient Outcomes





SESSION VII:

PANEL I

**“AI Valuation & Risk: A Current
Toolbox for Trauma/ACS
Surgeons”**

Thursday, September 12, 2024

10:00 AM - 11:00 AM

Location: Concorde Ballroom

Panelists: Gabriel Brat, MD, MPH;

Christopher Tignanelli, MD

Moderator: Rachael Callcut, MD, MSPH





SESSION VIII: SCHOLARSHIP PRESENTATIONS

Thursday, September 12, 2024

11:00 AM - 11:35 AM

“The Interaction of Estradiol and Platelet Biology: A Mechanistic Exploration of Sex Dimorphisms in Coagulation and Implications for Transfusion Medicine”
JULIA COLEMAN, MD

“Whole Transcriptome Dynamics In Neutrophils After Blunt Trauma”
ANAAR SILETZ, MD

“Identifying and Addressing Unmet Needs of Injury Survivors at a Safety Net Hospital in San Francisco”
MARISSA BOECK, MD

“Can the Gut Save the Brain? An Investigation of Microbiome on the Recovery from Traumatic Brain Injury”
LETITA BIBLE, MD

“Prognostication of host immune response to trauma via characterization of the hematopoietic stem cell / multipotent progenitor cell axis”
JOHN C. KUBASIAK, MD

Associate Member Mentoring Scholar
SARAH COTTRELL-CUMBER, DO

SESSION IX:
FITTS LECTURE



**“THE ACADEMIC
MEDICAL CENTER AND
THE US HEALTHCARE
ECONOMY: ALTRUISM,
CAPITALISM, EGOISM”**

Thursday, September 12, 2024

11:35 AM - 12:35 PM

Location: Concorde Ballroom
Presenter: Michael Rotondo, MD

Chief Executive Officer
University of Rochester
Medical Faculty Group

Vice Dean for Clinical Affairs
University of Rochester
School of Medicine

Professor of Surgery
Department of Surgery

Senior Vice President
University of Rochester
Medical Center

Rochester, NY

49TH WILLIAM T. FITTS, JR., M.D. LECTURE



William T. Fitts, Jr., M.D.

October 6, 1915 - June 17, 1984

William T. Fitts, Jr. was born on October 6, 1915, in Jackson, Tennessee. He received his A.B. degree from Union University in Jackson in 1937 and his M.D. degree from the University of Pennsylvania in 1940. He was an intern resident, Harrison Fellow in Surgical Research, Rockefeller Foundation Fellow in Surgery and Instructor in Surgery at the University of Pennsylvania from 1940-1942 and from 1945-1947. From 1942-1945, he was a Surgical Ward Officer in the Affiliated Unit of the University of Pennsylvania, the 20th General Hospital, in the China-Burma-India Theatre of World War II. He became an Assistant Professor of Surgery in 1949, Associate Professor of Surgery in 1952, and was John Rhea Barton Professor of Surgery and Chairman, Department of Surgery, University of Pennsylvania, from 1972-1975. He spent his entire career at the University of Pennsylvania. Because of his long service to the organization, the Fitts Lecture was established by the American Association for the Surgery of Trauma in 1974 and first presented by Curtis P. Artz, M.D. at the 35th AAST Meeting in Scottsdale, Arizona.

American Association for the Surgery of Trauma:
Secretary, Vice-President, President-Elect, 1957-1964
President, 1964-1965
Editor, Journal of Trauma, 1968-1974

American College of Surgeons:
Vice-Chairman, Committee on Trauma, 1965-1966
Chairman, Pennsylvania Committee on Trauma, 1955-1967
National Safety Council Surgeon's Award for Distinguished Service to Safety, 1971

American Trauma Society:
President, 1972-1973

PAST WILLIAM T. FITTS, JR., M.D. LECTURE RECIPIENTS

2023	J. Wayne Meredith, MD	Anaheim, CA
2022	David V. Feliciano, MD	Edgewater, MD
2021	Tribute to J. David Richardson, MD	Louisville KY
2020	Postponed for COVID-19 Pandemic	
2019	Timothy C. Fabian, MD	Memphis, TN
2018	C. William Schwab, MD	Philadelphia, PA
2017	Ronald Maier, MD	Seattle, WA
2016	M. Margaret Kundson, MD	San Francisco, CA
2015	L.D. Britt, MD, MPH	Norfolk, VA
2014	Ronald G. Tompkins, MD	Boston, MA
2013	Frank R. Lewis, Jr, MD	Philadelphia, PA
2012	David B. Hoyt, MD	Chicago, IL
2011	H. Leon Patcher, MD	New York, NY
2010	Charles N. Mock, MD, PhD, MPH	Seattle, WA
2009	Frederick P. Rivara, MD, MPH	Seattle, WA
2008	Charles E. Lucas, MD	Detroit, MI
2007	Thomas M. Scalea, MD	Baltimore, MD
2006	Sten E.V. Lennquist, MD, PhD	Linkoping, Sweden
2005	Sylvia D. Campbell, MD	Tampa, FL
2004	Colonel John Holcomb, MD	Ft. Sam Houston, TX
2003	Ellen J. MacKenzie, PhD	Baltimore, MD
2002	C. James Carrico, MD	Dallas, TX
2001	Janet Reno	Washington, DC <i>(Cancelled)</i>
2000	Johannes A. Sturm, MD	Hannover, Germany
1999	Barbara Barlow, MD	New York, NY
1998	Leonard Evans, PhD	Warren, MI
1997	George F. Sheldon, MD	Chapel Hill, NC
1996	Susan P. Baker, MPH	Baltimore, MD

1995	Jonathan E. Rhoads, MD	Philadelphia, PA
1994	John R. Border, MD	Buffalo, NY
1993	John H. Davis, MD	Burlington, VT
1992	Basil A. Pruitt, Jr, MD	Ft. Sam Houston, TX
1991	Donald D. Trunkey, MD	Portland, OR
1990	Philip R. Lee, MD	San Francisco, CA
1989	Prof. Martin Allgower, MD	Switzerland
1988	Roderick A. Little, MD	Manchester, United Kingdom
1987	Paul Dudley Hart	Woods Hole, MA
1986	Sheng Chih-Yong, MD	Woods Hole, MA
1985	Donald P. Becker, MD	Los Angeles, CA
1984	F. William Blaisdell, MD	Sacramento, CA
1983	Col. Robert Scott, L/RAMC	London, England
1982	Thomas W. Langfitt, MD	Philadelphia, PA
1981	John W. Kinney, MD	New York, NY
1980	Carl T. Brighton, MD	Philadelphia, PA
1979	Mr. Peter S London	Birmingham, England
1978	Lloyd D. MacLean, MD	Montreal, Quebec, Canada
1977	G. Tom Shires, MD	New York, NY
1976	Francis D. Moore, MD	Boston, MA
1975	Curtis P. Artz, MD	Charleston, SC



SESSION XI: PAPERS 37-44

Friday, September 13, 2024

7:30 AM - 10:10 AM

Location: Concorde Ballroom

Modertor: Richard Miller, MD

Recorder: Nicole Stassen, MD

**PREDICTIVE VALUE OF PLATELET FUNCTION ASSAYS IN
TRAUMATIC BRAIN INJURY PATIENTS ON ANTIPLATELET
THERAPY: INSIGHTS FROM A RANDOMIZED
CONTROLLED TRIAL**

Nijmeh Alsaadi, MD; Reem Younes, MD; Amudan Srinivasan, MD;
Mohammadreza Zarisfi, MD; Jack Killinger, BA; Abiha Abdullah, MBBS;
Aishwarrya Arivudainambi, BA; Ronit Kar, BA; Emily Mihalko, PhD;
Patricia Loughran, PhD; Stephen Wisniewski, PhD; David Okonkwo, MD;
Susan Shea, PhD; Jason Sperry, MD, MPH; Matthew D. Neal, MD
University of Pittsburgh
Invited Discussant: Scott Brakenridge, MD

Introduction: Traumatic brain injury (TBI) patients on antiplatelet therapy face elevated mortality risks due to impaired platelet function, with significant controversy remaining regarding the reversal of antiplatelet therapy. In this study, we aimed to evaluate the relationship between objective platelet function assays (PFAs) and mortality in TBI patients on antiplatelet therapy.

Methods: TBI patients, as confirmed by CT scan, aged 18-89 years, who had a history of pre-injury antiplatelet therapy, or required platelet transfusion per standard practice, and were deemed at significant risk for urgent neurosurgical intervention were enrolled in a prospective randomized controlled trial comparing room-temperature- and cold-stored platelet transfusion. Pre- and post-transfusion blood samples were drawn, and assays including flow cytometry, thromboelastography with platelet mapping (TEG-PM), impedance aggregometry, and VerifyNow were run. Logistic regression models were used to assess the association (odds ratios (OR) and confidence intervals (CI)) of the assay results (post-transfusion, and pre-post transfusion change (delta)) with the 30-day all-cause mortality, regardless of the intervention arm.

Results: In total, 101 patients were enrolled (mean [SD] age, 73.4 [10.2] years; 46.5% female) and had a 13.86% 30-day all-cause mortality rate. There were no significant associations between pre-transfusion PFAs and mortality. However, lower post-transfusion maximal amplitude (MA) of TEG-PM with Kaolin (OR=0.906, 95% CI [0.833-0.985], p=0.021), ADP (OR=0.957, 95% CI [0.922-0.994], p=0.022), and Activator F (OR=0.859, 95% CI [0.770-0.958], p=0.006) were all associated with mortality. In comparison to the pre-transfusion values, the change in post-transfusion values of VerifyNow Aspirin (ASA) assay response units correlated with mortality (OR=0.988, 95% CI [0.979-0.998], p=0.014). There were no other significant correlations in other parameters of the tested PFAs.

Conclusion: The data show that the MA of TEG-PM values, as well as the magnitude of change in the VerifyNow ASA assay, following platelet transfusion correlated with 30-day mortality in our cohort. Our findings suggest that these PFAs may predict 30-day mortality in TBI patients on antiplatelet agents.

UNCOVERING THE ICEBERG: TRACKING VTE EVENTS IN TRAUMA PATIENTS AFTER DISCHARGE

Jacob M. Dougherty; Laura Gerhardinger, MA;

Patrick L. Johnson, MD, MPH; Scott E. Regenbogen, MD, MPH;

John W. Scott, MD, MPH; Naveen F. Sangji, MD, MPH;

Raymond A. Jean, MD, MHS; Mark R. Hemmila, MD;

Bryant W. Oliphant, MD, MBA, MS

Michigan Medicine

Invited Discussant: Sarah Moore, MD

Introduction: Although the risk of inpatient venous thromboembolism (VTE) is high after major injury, this risk does not end at hospital discharge. The lack of post-discharge surveillance limits our understanding of risk factors for post-discharge VTE and our ability to improve outcomes.

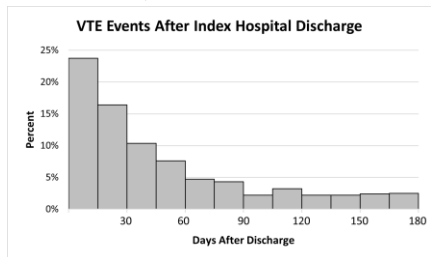
Methods: We used data from adult inpatients (≥ 18 yrs) from a statewide trauma quality improvement program from 2018-2022. Post-discharge information was obtained via longitudinal insurance claims through a described linkage

mechanism. Post-discharge VTE events (and dates of occurrence) were identified using these claims data, and multivariable logistic regression was used to identify predictors of post-discharge VTE.

Results: Of 34,421 trauma registry and claims matched patients identified, 1,487 (4.4%) had a post-discharge VTE event, compared to only 280 (0.8%) VTE events diagnosed during the index admission. A high proportion of patients had an event in the first 3 months after discharge (Figure). Multiple patient, injury, and treatment factors were associated with post-discharge VTE risk (Table).

Conclusions: The risk of a VTE event extends well beyond the index hospitalization for trauma patients. The overwhelming majority of VTE events occurred post-discharge, which highlights the need for a longitudinal patient record that captures these outcomes. Further examination of VTE prophylaxis strategies is also warranted to improve the quality of care.

Factors Associated with a VTE Event After Discharge from a Trauma Center			
Characteristic	OR	95% CI	p-value
Black race	1.68	1.35-2.1	<0.001
AIS Extremity >2	1.19	1.02-1.38	0.028
AIS Head and Neck >2	1.24	1.02-1.5	0.029
Active chemotherapy	1.8	1.25-2.59	0.002
Blood transfusion	1.23	1.03-1.46	0.022
Functionally dependent health status	1.15	1.01-1.31	0.042
Obesity	1.56	1-2.43	0.048
Discharge to other than home	1.83	1.58-2.12	<0.001



INFLAMMATORY CYTOKINES PRESENT ON ARRIVAL PREDICT 28-DAY MORTALITY FOLLOWING TRAUMA

Anamaria J. Robles, MD; Ashli Barnes, BS;
James T. Ross, MD, MS; Jessica Guzman, MD;
Alyssa R. Bellini, MD; Ian E. Brown, MD, PhD; Randi Mays, MS;
Matthew W. Mell, MD, MS; Rachael A. Callcut, MD, MSPH
University of California Davis
Invited Discussant: Jonathan Meizoso, MD, MSPH

Introduction: The complex role inflammation plays in post-trauma outcomes has many unanswered questions. It is hypothesized that differential expression of pro- and anti-inflammatory cytokines contribute to patient outcomes. One proposed mechanism is through dysregulation of normally protective inflammatory responses that become pathologic following serious injury. To further elucidate the early biomarker profiles, we characterized the baseline circulating inflammatory cytokines immediately following trauma.

Methods: A prospective cohort study was conducted from March 2021 – February 2024 at a Level I trauma center. Patients were enrolled if a time zero blood sample was obtained within 30 minutes of arrival and prior to transfusion of any blood products. All samples were obtained at the establishment of the first intravenous access in the ED. Demographics, injury characteristics, labs, and outcomes were collected prospectively. A 26-plex Luminex panel of cytokine marker was compared across injury severity (ISS) groups [minor<15, moderate 15-24, severe >24] using Kruskal Wallis and Wilcox rank sums (significance $p \leq 0.05$). Medians (+/-IQR) are reported.

Results: 401 patients were enrolled with median age 43 (IQR 30-59), 69% blunt trauma, and 37% with $ISS \geq 15$. Overall mortality was 7% with higher mortality with increasing ISS ($p < 0.05$, minor 1.2%, moderate 10.6%, severe 21.7%). Proinflammatory markers eotaxin ($p = 0.0001$), MCP1 ($p = 0.0005$), MiP1B ($p = 0.0002$), and anti-inflammatory markers PDGF-BB ($p = 0.0028$) and IL10 ($p = 0.0006$) increased across ISS groups. Time zero cytokine biomarkers Eotaxin, IL6, IL7, MCP1, IL10, PDGF-BB, and VEGF-alpha were higher in patients who died ($p < 0.05$, Table).

Conclusions: Cytokine expression differences occur very early (<30 mins) following traumatic injury.

These appear to cluster in the more severely injured and are associated with mortality differences at 28-days. These early biomarkers have implications for potential therapeutic targets for future investigation.

Biomarker	Mortality		p-value
	No	Yes	
Eotaxin	16.27 (10.15-24.35)	32.83 (17.87-36.69)	<0.0001
IL 6	12.89 (10.55-12.89)	34.34 (12.89-137.66)	0.0005
MCP 1	28.42 (12.93-57.34)	100.37 (25.78-164.24)	0.0003
Mip1B	8.06 (6.64-25.95)	15.18 (5.45-50.19)	0.2255
IL1ra	40.06 (31.22-40.06)	40.06 (40.06-512.44)	0.0447
PDGF-BB	20.38 (8.95-53.97)	60.32 (11.52-177.45)	0.0229
IL 7	2.36 (1.32-3.99)	4.38 (2.06-7.44)	0.0026
VEGF alpha	56.60 (32.90-90.14)	85.10 (50.49-220.02)	0.0088
IL10	1.66 (0.50-2.57)	3.20 (0.52-18.44)	0.0278

INSUFFICIENT OPIOID PRESCRIBING IS ASSOCIATED WITH RETURN TO THE EMERGENCY DEPARTMENT AFTER TRAUMATIC INJURY

Sophia M. Smith, MD; Emily Ha, BS; Rachel Adams, PA-C;
Wang Pong Chan, BS, BA; Kendall Jenkins, MS; Cara Michael, BA;
Noelle Saillant, MD; Jeffrey Franks, MSPH; Sabrina E. Sanchez, MD, MPH
Boston Medical Center

Invited Discussant: Timothy Browder, MD

Introduction: After traumatic injury, up to 20% of patients return to the emergency department (ED) within 30 days, most commonly for uncontrolled pain. The association between inpatient opioid needs and return ED visits has not been studied. We sought to evaluate the impact of discharge opioid prescriptions, based on inpatient opioid needs, on patients returning to the ED for pain.

Methods: We conducted a retrospective cohort study of injured patients, 2018-2021, including demographic, injury, and hospitalization data. Opioids were quantified using milligram morphine equivalents (MME). Discharge pain control (in days) was calculated by dividing MME prescribed by MME required the day before discharge. Multivariable logistic regression was used to determine the impact of discharge pain control on 30 day ED visits for pain, controlling for all covariates with a p-value <0.1 on unadjusted analysis.

Results: Of 691 patients requiring opioids within 24 hours of discharge, 499 (74%) were prescribed opioids at discharge, and 167 (24%) had an ED visit for pain. Those with an opioid prescription had a lower proportion of ED visits for pain (20%) than those without (34%) (OR 0.45, 95% CI 0.30-0.68, $p < 0.001$). The median days of pain control prescribed at discharge was 0.6 (IQR 0.0-2.2) and 1.4 (IQR 0.2-3.9) and the median MME prescribed was 45mg (IQR 0-100) and 60mg (IQR 19-113) for those with and without an ED visit for pain, respectively. Discharge with greater pain control days was associated with lower odds of an ED visit for pain (OR 0.93, 95% CI 0.88-0.98, $p = 0.01$).

Conclusion: This is the first study to evaluate whether discharge opioid prescriptions are associated with ED visits for pain after trauma. Among patients requiring opioids at the time of discharge, insufficient opioids prescribed on discharge based on requirements the day before discharge is associated with higher odds of ED visits for pain. Providers should consider a careful analysis of inpatient pain control needs throughout hospitalization to optimize pain management at discharge and potentially reduce preventable ED visits.

**SILENCING METHYLATION-CONTROLLED J PROTEIN
MITIGATES BURN-INDUCED MITOCHONDRIAL DYSFUNCTION IN
ALPHA MOUSE LIVER-12 CELLS**

Kenneth Meza Monge, MD; Andrea Qualman, BS;
Elizabeth J. Kovacs, PhD; Akshay Pratap Chauhan, MD;
Juan-Pablo Idrovo, MD

University of Colorado, Anschutz Medical Campus
Invited Discussant: Nicholas Namias, MD, MBA

Introduction: Burn injuries trigger systemic responses that severely impact the liver, leading to poor outcomes in patients. Mitochondrial dysfunction is crucial in hepatocyte damage and cell death after burns. Methylation-controlled J (MCJ) protein, an inhibitor of mitochondrial Complex I, plays a significant role in this process. Its inhibition enhances mitochondrial respiration, suggesting a potential method to reduce hepatic damage by improving energy production. This study hypothesizes that hepatocytes treated with burn mouse serum exhibit mitochondrial dysfunction, which can be alleviated by silencing MCJ, restoring **Methods:** Wild-type alpha mouse liver cells (WT AML12) and shMCJ AML12 cells were employed to simulate *in vitro* burn-induced liver damage, with MCJ silenced via short hairpin RNA (shRNA). Serum collected from mice euthanized 24 hours after burn injury was used to treat the cells for a subsequent 24-hour period. Metabolic mitochondrial respiration was evaluated using the Seahorse XF Cell Mito Stress assay and Western blot analysis of whole cell lysates.

Results: After treatment with serum from burn mice, we observed a 150% increase in MCJ expression in WT AML12 cells $p < 0.05$, compared to shMCJ AML12 cells. shMCJ AML12 cells treated with serum from burn mice showed enhanced basal, ATP-linked, and Carbonyl cyanide-*p*-trifluoromethoxy phenylhydrazone (FCCP) induced maximal respiration (75%, $p < 0.05$) and increased spare oxygen consumption rate (OCR) capacity (42%, $p < 0.05$) compared to WT AML12 cells exposed to serum from burn mice. Western blots showed an increased expression of OXPHOS complexes I, II, and III ($p < 0.005$) and a decrease in cytochrome-c leakage (85%, $p < 0.05$) in shMCJ AML12 cells compared to WT AML12 cells exposed both to serum from burn mice.

Conclusion: This *in vitro* study highlights the potential role of elevated MCJ levels in impairing mitochondrial respiration after burns. Silencing MCJ shows promise in mitigating this impairment, enhancing the electron transport chain, and potentially reducing the risk of cell death following burn injury. These findings hint at a potential therapeutic avenue for addressing burn-induced hepatocyte damage, warranting further investigation for replication *in vivo*.

TRAUMATIC ENDOTHELOPATHY PHENOTYPES IN INJURED CHILDREN: A PRINCIPAL COMPONENT ANALYSIS

Katrina M. Morgan, MD, MPH; Erin V. Feeney, MD;

Leah M. Furman, MD; Barbara A. Gaines, MD;

Christine M. Leeper, MD, MS

Children's Hospital of Pittsburgh of UPMC

Invited Discussant: Romeo Ignacio, Jr., MD

Introduction: Trauma-induced coagulopathy (TIC) is common and associated with poor outcomes in injured children. Our aim was to identify patterns of endothelial dysregulation after injury and associate these phenotypes with relevant patient factors and clinical outcomes in a pediatric trauma cohort.

Methods: Principal component analysis (PCA) was performed on data from injured children between 2018-2022. Laboratories included endothelial markers (syndecan-1, thrombomodulin, tissue factor, and VEGF), INR, platelet count, and base deficit. Variables were reduced to principal components (PC); PC scores were generated for each subject and used in logistic regression with outcomes including mortality, blood transfusion, shock (pediatric-adjusted shock index), and patient characteristics, including age, sex, injury mechanism, and traumatic brain injury.

Results: In total, 59 children had complete data for analysis. Median (IQR) age was 10 years (4-14), 31% female, 21% penetrating mechanism, and the median (IQR) injury severity score was 16 (9-21). PCA identified 2 significant PCs accounting for 67% of overall variance. PC1 included syndecan-1, thrombomodulin, VEGF, INR, and base deficit; PC1 scores were associated with mortality, blood transfusion, and shock (all $p < 0.001$). PC2 included tissue factor and platelet count; PC2 scores were associated with age ($\rho = -0.42$, $p = 0.001$), but no clinical outcome. PCs were not significantly associated with sex, injury mechanism, or traumatic brain injury.

Conclusion: PCA detected two distinct patterns of endothelial dysregulation in injured children. This may represent unique TIC phenotypes (shock/coagulopathy versus endothelial disruption/thrombosis) that would benefit from targeted treatment strategies. Further study is needed to confirm these findings and better understand pediatric TIC mechanisms.

ADIPOSE DERIVED STEM CELLS SECRETE PRO AND ANTI-INFLAMMATORY CYTOKINES AFTER MAJOR BURN INJURY

Alison Smith, MD, PhD; Jenna Dennis, BS;
Paige Deville, MD; Sophia Trinh, MD; Cara Ramos, BS;
Kaitlin Couvillion, BS; Claudia Leonardi, PhD; Asra Feroze, MD;
Tracy Dewenter, MD; Robert Siggins, PhD; Patrick McTernan, PhD;
Patricia Molina, MD, PhD; Jeffrey Carter, MD;
Herbert Phelan, MD; Jonathan Schoen, MD, MPH, FACS
Louisiana State University - New Orleans Department of Surgery
Invited Discussant: Zsolt Balogh, MD, PhD

Introduction: Adipose derived stem cells (ADSCs) are a subset of mesenchymal stem cells derived from adipose tissue which is an abundant and easily obtainable resource. ADSCs have an important role in orchestrating the immune response to injury. However, few studies have evaluated the role of paracrine factors from stem cells in burn wounds. The objective of this research is to examine the paracrine factors secreted from ADSCs in patients with major burn injury. We hypothesized that ADSCs from burn patients would have a different inflammatory profile.

Methods: Adipose tissue was collected from patients with major burn injuries (>20% total body surface area) at their index operation and non-burn adipose tissue was obtained from elective breast surgery patients. ADSCs were extracted from the adipose tissue specimens. Fluorescence activated single cell sorting (FACS) confirmed the presence of ADSCs. ADSCs were grown under standard tissue culture techniques, and the supernatant was extracted for analysis. A ten-analyte cytokine multiplex analysis was performed. Histology staining of the adipose tissue was also performed to identify for the presence of immune cells. A Student's t-test was used to analyze the groups.

Results: A total of 38 patients were included in the study with 17 major burn patients and 21 non-burn patients. FACS demonstrated ADSCs with the expression of CD 90, CD 105, and CD 73 antibodies. Levels of IFN-gamma, IL-6, IL-8, and IL-10 were all significantly higher in the burn cohort ($p < 0.05$). Histologic staining revealed a higher number of lymphocytes in the burn fat compared to the non-burn fat. Two burn samples showed macrophages while none of the non-burn fat samples did.

Conclusions: This is the first study to demonstrate that ADSCs extracted from human burn adipose tissue have both a pro and anti-inflammatory response. A balance inflammatory response is needed to help wounds progress to normal healing. Future studies are needed to investigate the potential role of paracrine factors from ADSCs to improve wound healing in major burn injuries.

ARE PROPHYLACTIC VENA CAVA FILTERS EVER INDICATED IN TRAUMA? A CONTEMPORARY ANALYSIS FROM THE CLOTT STUDY

Andrew J. Kerwin, MD; Sarah Lombardo, MD;
Elliott Haut, MD, PhD; Margaret Knudson, MD
University of Tennessee Health Science Center
Invited Discussant: Marissa Boeck, MD, MPH

Introduction: Recent national data suggest that Inferior Vena Cava Filters (IVCFs) are associated with a slightly reduced rate of pulmonary embolism, increased rates of deep vein thrombosis, other adverse events, and increased cost with no change in mortality. We reviewed the CLOTT study for the current use of prophylactic IVCFs in level 1 trauma centers.

Methods: The Consortium of Leaders in the study of post-Traumatic Thromboembolism (CLOTT) is a prospective, observational, cohort, multi-center study conducted at 17 US level 1 and 2 trauma centers between 2018 – 2020 including patients aged 18-40 to examine the prevention and management of VTE. We conducted a per center analysis of the placement rates, timing, and indications for prophylactic IVCFs.

Results: Of the 7,466 trauma patients, 93 patients (1.25%) had prophylactic IVCFs inserted. The majority sustained blunt trauma with a mean ISS of 18. Most IVCFs were placed by interventional radiologists (72.4%) followed by vascular surgeons (17.2%) and then trauma surgeons (10.3%). The mean time from injury to placement was 7.2 (SD 7.0) days; median 5 (IQR 2-10) days; range 0-32 days. There was wide variability in rates of IVCFs per centers with the lowest rate of 2/ 622 patients (0.3%) and the highest rate of 9/ 71 patients (12.7%). Reported indications for prophylactic IVCF insertion were: neurotrauma 24.7 %, repeat operations 26.9%, spinal cord injury with paralysis 7.5%, coagulopathy 17.2%, solid organ injury 8.6%, spine fracture 7.5% and other 32.3%. The mean time to initiation of VTE prophylaxis was 4.75 days; median 3 days; range 0-38 days. 62% of patients had VTE prophylaxis initiated before or on the same day as insertion of IVCF. All centers had patients who never received pharmacologic VTE prophylaxis (range 2.4% - 30.6%) but this did not correlate with increased use of prophylactic IVCF insertion as shown in the graph.

Conclusions: The CLOTT study group has generated the largest prospective study of VTE management in trauma patients and demonstrated there is little role for inserting prophylactic IVCFs in young trauma patients. Given the potential for harm, this data should inform clinical practice guidelines to avoid the wide variability in IVCF use after injury.

SESSION XII:

EXPERT SURGEON LECTURE



“A LOOK BACK....ON THE EVER-CHANGING PRACTICE OF TRAUMA SURGERY”

Friday, September 13, 2024

10:30 AM - 11:00 AM

Location: Concorde Ballroom
Presenter: Amy Goldberg, MD

Marjorie Joy Katz Dean

Lewis Katz School of Medicine at
Temple University

Philadelphia, PA



SESSION XIII: PANEL II

**“Making the Case for Value
of ACS—Overcoming Local
Challenges”**

Friday, September 13, 2024

11:00 AM - 12:00 PM

Location: Concorde Ballroom

Panelists: David Spain, MD;

Jason Smith, MD, PhD;

Andrew Beckett, MD;

Stephanie Savage, MD, MS

Moderator:

Kristan Staudenmayer, MD, MS





SESSION XIVA: PAPERS 45-55

Friday, September 13, 2024

1:15 PM - 4:55 PM

Location: Concorde Ballroom B/C

Moderator: Hans-Christoph Pape, MD

Recorder: Krista Kaups, MD, MS

GERI-SCREEN: A MULTICENTER TRIAL OF A NOVEL SCREENING TOOL FOR DEPRESSION AND SUICIDE RISK AMONG US TRAUMA PATIENTS

Shelbie Kirkendoll, DO, MS; Lavanya Sambaraju, BS;
 Alfred Croteau, MD, FACS; Tomas H. Jacome, MD, MS, FACS;
 Lisa Allee, LICSW, MSW; Brian Daley, MD, FACS;
 Thomas J. Schroepfel, MD, MS, FACS; Dorian A. Lamis, PhD, ABPP;
 Meghan Fish, MA; Gregory Davis, PhD; Hannah Bard, BS;
 Cat Nordstrom, BSN, RN, TCRN; Deborah Tuggle, RN, CEN;
 Eileen M. Bulger, MD, FACS; Brendan T. Campbell, MD, MPH, FACS
 American College of Surgeons
 Invited Discussant: Esther Tseng, MD

Introduction: Rates of depression and suicidal ideation among geriatric trauma patients admitted to the hospital are not currently known. The objective of this study was to determine the prevalence of depressive symptoms, suicidal ideation, previous suicide attempts, and lethal means access among geriatric patients admitted to US trauma centers. We hypothesized that a significant number of these patients may have unrecognized symptoms of depression and/or suicidal ideation not identified prior to hospital discharge.

Methods: These data are from a prospective multicenter cohort study of injured geriatric (≥ 55 years) patients admitted to non-ICU inpatient trauma services at five US trauma centers. Patients were approached to complete a tablet-based survey with two components, 1) validated depression and suicidal ideation screening tool (PHQ-9) and 2) household firearm ownership. Patients scoring ≥ 5 on PHQ-8 screen were considered to have depressive symptoms. On the PHQ-9, patients reporting “several days”, “more than half the days”, or “nearly every day” on question 9 were considered to have suicidal ideation.

Results: From November 2022 through December 2023, five trauma centers located in five different states administered surveys to 378 patients, who were

mostly male, Caucasian, and over 70 years old. Overall, more than one-third (37.6%) screened positive for depressive symptoms and over forty percent kept a firearm at home. Additionally, nearly one-third (28.6%) of patients experiencing suicidal ideation kept a firearm in the home.

Conclusions: We identified high rates of depressive

symptoms among geriatric patients admitted to trauma centers, and nearly one-third have access to firearms in their home. Identification of depressive symptoms and suicidal ideation among patients admitted to trauma centers may allow for mental health intervention and lethal means safety counseling prior to hospital discharge.

Variable	Total N=378 (100%)	Non- Firearm Owners n=206 (57.4%)	Firearm Owners n=153 (42.6%)	p- value
Male gender	196 (54.8)	100 (48.5)	96 (63.2)	0.006
Any depressive symptoms (PHQ-8 ≥ 5)	135 (37.6)	84 (40.8)	51 (33.3)	0.15
Suicidal ideation (PHQ question #9)	28 (7.9)	20 (9.8)	8 (5.3)	0.12

TIME TO HEMOSTASIS: A POSSIBLE MECHANISM RESPONSIBLE FOR WHOLE BLOOD SURVIVAL BENEFIT

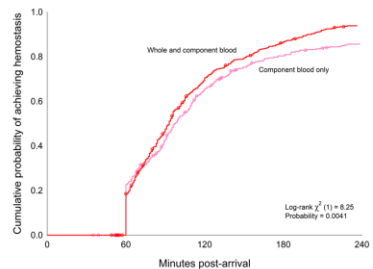
Amanda Chipman, MD; Frank Guyette, MD; Bryan A. Cotton, MD; James Luther, MA; Jeremy Cannon, MD, SM; Martin Schreiber, MD; Ernest E. Moore, MD; Nicholas Namias, MD; Joseph Minei, MD; Stephen Wisniewski, PhD; Jason Sperry, MD, MPH
University of Pittsburgh
Invited Discussant: Sigrid Burruss, MD

Introduction: Early whole blood (WB) resuscitation has been found to be associated with a survival benefit in recent observational studies. The mechanisms responsible for this benefit are not fully understood. We sought to characterize time to hemostasis and the type of trauma resuscitation (WB vs component) following severe injury.

Methods: We performed a secondary analysis of data derived from a recent prospective observational cohort study comparing early WB to component resuscitation in hemorrhagic shock patients. Inclusion criteria included risk of massive transfusion (+ABC score criteria), need for blood transfusion and hemorrhage control procedures within 60 minutes of trauma center arrival. Achievement of hemostasis was defined by receiving a single unit or less of blood (WB or red cell) transfusion in any 60-minute period in first 4 hours. Those not reaching this nadir or who died were considered not to have achieved hemostasis.

Results: Enrolled patients (n=1,051) were severely injured (median ISS 22 IQR [13,30]), with 70% requiring massive transfusion, and an overall mortality of 17% at 28 days. Over 85% of the cohort achieved hemostasis. WB patients more commonly reached hemostasis (89% vs. 81%, p<0.01) Kaplan-Meier analysis showed WB patients reached hemostasis earlier (log rank $\chi^2 = 8.2$, p<0.01, FIGURE). Logistic regression verified that WB resuscitation was independently associated with over a 2-fold greater odds of achieving hemostasis (OR 2.4 95%CI 1.6-3.5, p<0.01). As the predicated probability of mortality increased the disparity between groups achieving hemostasis similarly increased.

Conclusion: Early WB resuscitation was associated with a shorter time to hemostasis, and an independent higher rate of achieving hemostasis in patients in hemorrhagic shock. These relationships were strengthened as the estimated probability of mortality increased. Achieving early hemostasis may represent an underlying mechanism responsible for early WB survival benefit.



**TRAUMATIC AMPUTATION: THE EFFECT OF EARLY
GUILLOTINE AMPUTATION ON SURGICAL
SITE INFECTION**

Stephen E. Gregg, MD; Joseph P. Bethea, MD;

Seth L. Welborn, MD; Rachel Grant, BS; David N. Trisler, DO;

Sejul A. Chaudhary, MD; Nicole M. Garcia, MD; Mark A. Newell, MD;

William Irish, PhD; Eric A. Toschlog, MD

East Carolina University

Invited Discussant: Matthew Lissauer, MD

Introduction: Traumatic amputations are an uncommon but extremely morbid complication of blunt traumatic injury. Given the contaminated nature of these wounds, surgical site infections (SSI) are frequent in this population. The natural history of these wounds following guillotine amputation (GA) versus those that undergo an attempt at limb salvage is not well described. The purpose of this study was to assess the relationship between operative technique and timing, and SSI.

Methods: Using a single institution Level 1 trauma registry, data were obtained for all patients who underwent traumatic amputation. SSI versus non-SSI groups were compared using standard two sample T-test or Chi square test. Patients were also compared based on whether they underwent an attempt at limb salvage.

Results: One hundred patients with traumatic extremity wounds were admitted and subsequently underwent completion amputation (2013-22). The majority were male (70%) with mean age 42.7 years. The most prevalent race was white (49%) followed by black (41%). Race was not associated with outcomes. Twenty four percent of the study group were diagnosed with an SSI. Sixty five percent of the study group underwent GA with 39% within 6 hours of arrival. The SSI group had a lower rate of GA within 6 hours (20.8% vs 44.7%, $p=0.036$), higher mean number of operations (7.25 vs 4.05, $p=0.013$), and longer mean hospital LOS (30.2 vs 16.5, $p=0.007$). Patients that underwent GA at index operation had a higher mangled extremity score (8.25 vs 6.14, $p<0.001$), higher ISS (19.4 vs 14.5, $p=0.014$), higher lactate at presentation of (5.37 vs 3.18, $p=0.004$), and longer ICU LOS (8.4 vs 4.2, $p=0.021$).

Conclusion: For mangled extremity patients undergoing amputation, 24% developed an SSI. Early GA is associated with decreased rates of SSI. Futile attempts at limb salvage led to more operations, longer hospital LOS, and ultimately culminated in amputation.

AMBULANCE DESERTS AND INEQUITIES IN ACCESS TO EMS CARE IN THE UNITED STATES: ARE PATIENTS WITHIN SOCIOECONOMICALLY DISADVANTAGED AREAS AT AN INCREASED RISK FOR DELAYS IN PRE-HOSPITAL CARE?

Cherisse Berry, MD, FACS; Charles DiMaggio, PhD;
Ramesh Jakka, PhD; N. Clay Mann, PhD; Dustin Duncan, ScD;
Spiros Frangos, MD, MPH; Ashley Pfaff, MD; Natalie Esobar, MD;
Olugbenga Ogedegbe, MD, PhD; Ran Wei, PhD
New York University School of Medicine

Introduction: Delayed Emergency Medical Services (EMS) response and transport time (from injury occurrence to hospital arrival) is associated with increased mortality. Inequities in accessing EMS care for injured patients are ill-defined. We sought to evaluate the association between the area deprivation index (ADI), a measure of geographic socioeconomic disadvantage, and timely access to EMS care within the U.S.

Methods: The Homeland Infrastructure Foundation Level Data open-source database from the National Geospatial Intelligence Agency was used to evaluate the location of EMS stations across the nation using longitude and latitude coordinates. The ADI was obtained from Neighborhood Atlas at the census block group level. An ambulance desert (AD) was defined as populated census block groups with a geographic center outside of a 25-minute ambulance service area. The total population (urban and rural) located within an AD and outside an AD (non-AD) and the ADI index distribution within those areas were calculated with their statistical significance derived from Chi-square testing. Spearman correlations between the number of EMS stations available within 25-min service areas and ADI were calculated, and statistical significance was derived after accounting for spatial autocorrelation.

Results: 42,472 ground EMS stations were identified. Of the 333,036,755 people (current U.S. population), 2.6% are located within an AD. When stratified by type of population, 0.3% of people within urban populations and 8.9% of people within rural populations were located within an AD ($p < 0.01$). When compared to non-ADs, ADs were more likely to have a higher ADI ($ADI_{AD} = 53.13$; $ADI_{NAD} = 50.41$; $p < 0.01$). The number of EMS stations available per capita was negatively correlated with ADI ($r_s = -0.25$, $p < 0.01$), indicating that people living in more disadvantaged neighborhoods are likely to have fewer EMS stations available.

Conclusion: Ambulance deserts are more likely to affect rural vs. urban populations and are associated with higher ADIs. The impact of inequities in access to EMS care on outcomes deserves further study.

ASSESSING CASE VOLUME VARIATION ACROSS LEVEL 1 AND 2 TRAUMA CENTERS IN THE UNITED STATES

Patrick L. Johnson, MD, MPH; Bryant W. Oliphant, MD, MBA, MS;
 Raymond A. Jean, MD, MHS; Anne Cain-Nielsen, BS;
 Mary Hunter, MD; Naveen F. Sangji, MD, MPH; Staci Aubry, MD;
 Lena Napolitano, MD; Christopher Tignanelli, MD, MS;
 John W. Scott, MD, MPH; Mark Hemmilla, MD

University of Michigan

Invited Discussant: Joshua Brown, MD

Introduction: When trauma center distribution does not fit regional needs, the longstanding volume-outcomes relationship in trauma care is at risk. Understanding case volume variability among Level 1 and Level 2 trauma centers in the US has important implications for both optimal distribution of trauma centers and maintenance of clinical skills.

Methods: We evaluated patients ≥ 16 yo meeting ACS TQIP inclusion criteria (AIS ≥ 3 in 1+ body regions, admitted, died, or transferred out) from 2017-21.

Trauma centers were placed in quintiles based on their average annual patient volume.

Characteristics were compared between the overall mean and the highest/lowest quintiles stratified by Level of trauma center.

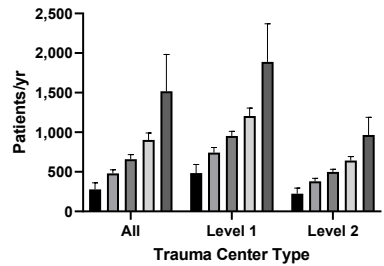
Results: There were 1,902,005 patients among 228 Level 1, and 288 Level 2 trauma centers. A 5-fold difference in patient volume was present between the highest and lowest quintile trauma centers (Figure). Substantial differences were found for volumes of types of patients treated among the highest and lowest quintile Level 1 trauma centers (Table). Similar differences

were present among the quintiles of Level 2 trauma centers.

Conclusions: One-in-five Level 1 trauma centers average < 2 hemorrhage control operations per month. These findings have important implications for trauma center distribution,

maintenance of clinical skills, training of future providers, and trauma center verification.

Mean Annual Volume by Quintile



Level 1 Trauma Centers	Quintile 1		Overall	Quintile 5	
	Mean (SD)	% Diff	Mean (SD)	Mean (SD)	% Diff
Admitted or died	487 (131)	-53%	1,040 (523)	1,835 (499)	+76%
SBP < 100 mmHg	54 (28)	-54%	118 (84)	226 (108)	+91%
ISS ≥ 25	69 (29)	-61%	178 (123)	352 (150)	+97%
OR for Hemorrhage	22 (18)	-58%	53 (49)	113 (67)	+113%
ICP Monitor	14 (9)	-50%	28 (22)	53 (28)	+89%
Operative Pelvic Fx	10 (8)	-63%	27 (24)	55 (33)	+104%

**ASSESSING TRAUMA INFORMED CARE ADOPTION: A
COMPREHENSIVE SURVEY OF TRAUMA CENTER
PROFESSIONALS AND INSTITUTIONAL TREND**

June Yao, DO; Graal Diaz, PhD; Thomas K. Duncan, DO

Ventura County Medical Center

Invited Discussant: Charity Evans, MD, MS

Introduction: Trauma-informed Care (TIC) affects every race, age, and socioeconomic group, with the goal of preventing re-traumatization. This study aimed to highlight the potential paucity of data in centers involved in the care of injured patients.

Methods: This survey was conducted by the Trauma Prevention Coalition (TPC), including 13 of its 16 member organizations. The Survey Monkey involved 22 questions distributed by e-mail to investigate the prevalence of TIC principles among 946 participants, primarily pediatric and adult trauma centers. The study examined the distribution of TIC integration into institutional core values at different trauma center levels. It also explored participants' awareness and engagement in TIC training. Bivariate regression analysis provided insights into the relationship between trauma center levels and the likelihood of incorporating TIC principles.

Results: Of the participants, 91% (n =861) were affiliated with pediatric or adult trauma centers. Adult trauma center participants reported varying levels, with Level I at 19.34% (n =167), Level II at 9.36% (n =80), Level III at 5.39% (n=46), Level IV at 3.07% (n =26), Level V at 1.16% (n =10), and non-adult trauma center at 1.16% (n =10). In pediatric trauma centers, 18.6% (n =176) were from Level I, 13.00% (n =123) from Level II, 1% (n =9) from Level III, and 67% (n =638) were from non-pediatric trauma centers. 35.52% (n =336) in trauma centers incorporated TIC into core values, while 64.48% (n =610) did not. Only 17% (n =161) reported institutional plans for training, with 57.70% (n =497) lacking or being unaware of such plans. Bivariate regression analysis highlighted decreases in log-odds ratio for adult trauma centers Level II (0.17), Level IV (0.34), and non-trauma centers (0.90), and an increase for Level III (0.026). In pediatric trauma centers, log-odds ratios decreased for Level II (0.90), Level III (1.08), and Level IV (1.36), and non-trauma centers (1.59). Compared to adult trauma centers, pediatric trauma centers have a higher proportion of TIC principles as part of their core values (39.42% vs. 71.58%, $P < 0.01$).

Conclusion: The findings depict varying TIC adoption across trauma center levels, emphasizing its prevalence in Level I trauma centers and diminishing occurrence in lower trauma level designations. It highlights the need for broad TIC training in health care.

AWAITING INSURANCE COVERAGE: MEDICAID ENROLLMENT AND POST-ACUTE CARE USE AFTER TRAUMATIC INJURY

Diane N. Haddad, MD, MPH; Justin S. Hatchimonji, MD, MBE, MSCE; Ella Eisinger, BS; Angela T. Chen, MA; Kristen M. Chreiman, MSN; Omar I. Ramadan, MD, MS; Anna U. Morgan, MD, MS; M. Kit Delgado, MD, MS; Niels D. Martin, MD; Mark J. Seamon, MD; Lisa M. Knowlton, MD, MPH; Elinore J. Kaufman, MD, MSHP
University of Pennsylvania

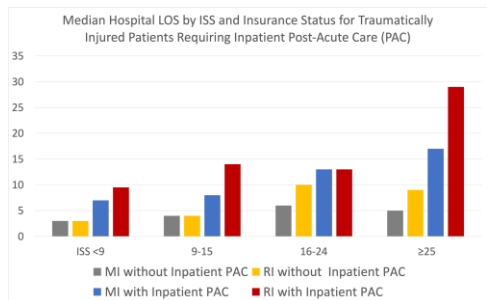
Invited Discussant: Sawyer Smith, MD, MBA

Introduction: Lack of insurance after traumatic injury is associated with decreased use of post-acute care and poor outcomes. Insurance linkage programs enroll eligible patients in Medicaid at the time of an unplanned admission. We hypothesized that Medicaid enrollment would be associated with increased use of post-acute care, but also lead to prolonged hospital length of stay (LOS) while awaiting insurance authorization.

Methods: We linked trauma registry and EMR data to identify patients ages 18-64 admitted from 2017-2021 to a Level 1 trauma center. Patients admitted without insurance and retroactively insured (RI) during hospitalization were compared to patients with established Medicaid (MI) and those remaining uninsured (UI). We measured post-acute care use including home health care, rehabilitation, and skilled nursing facilities. We tested the association between insurance status and discharge disposition and length of stay (primary outcome) using multivariable negative binomial regression. Direct costs were compared between groups.

Results: We compared 494 RI patients to 1706 MI and 148 UI patients. RI patients had longer hospitalization (median LOS [IQR] 4 days [2-9]) than other groups (MI 4 [2-8] and UI 2[1-3]), $p < 0.001$). RI patients were more likely to be discharged with home health care and to inpatient rehabilitation than UI patients ($p < 0.001$). After adjusting for injury and management characteristics, RI was associated with longer LOS compared to MI for patients discharged to inpatient facilities (Figure, $p < 0.001$). Median costs for RI patients discharged to a facility were \$10,284 higher than MI patients, ranging from \$8,582 for ISS <9 to \$51,883 for ISS ≥ 25 .

Conclusion: Enrollment in Medicaid after traumatic injury is associated with post-acute care use, but the current enrollment process may delay discharge. Streamlining insurance enrollment and permitting discharge with pending application status has the potential to reduce unnecessary hospital days, generate significant cost savings and improve patient experience.



DILUTION IS NOT THE SOLUTION: FACTORS AFFECTING THE DIRECT RED CELL EFFECT ON THROMBOSIS

Adam D. Price, MD; Ellen R. Becker, MD;

Ryan C. Chae, MD; Rebecca Schuster, MS;

Timothy A. Pritts, MD, PhD; Michael D. Goodman, MD

University of Cincinnati

Invited Discussant: Rachel Appelbaum, MD

Introduction: Red blood cell (RBC) aggregation can be initiated by calcium and tissue factor, which may independently contribute to micro- and macro-vascular thrombosis following transfusion after injury. Previous studies have also demonstrated that increased blood storage duration may contribute to thrombotic events. The aim of this study was to determine the effect of blood product components, age, and hematocrit (HCT) on the aggregability of RBCs.

Methods: Human whole blood (WB) units (n=7) were obtained following the standard 21-day storage period. WB was separated into components including RBCs, platelet-rich plasma (PRP), and platelet-poor plasma (PPP) via serial centrifugation and diluted to a standardized HCT on product day 23 and following storage to product day 46. WB and component groups were analyzed at both timepoints for RBC aggregability with calcium and tissue factor initiated electrical impedance aggregometry, reported as mean area under the curve (AUC).

Results: At both timepoints, RBCs (variable HCT) demonstrated similar aggregability to RBCs (standardized HCT) (day 23: 14.4 v. 13.6, $p=0.51$; day 46: 8.3 v. 5.3, $p=0.34$). RBCs diluted with PRP demonstrated significantly higher aggregation than RBCs diluted with PBS at both timepoints (day 23: 59.0 v. 13.6, $p<0.01$; day 46: 43.0 v. 5.3, $p=0.01$). A similar effect was observed when RBCs diluted with PPP were compared to RBCs diluted with PBS (day 23: 50.7 v. 13.6, $p<0.01$; day 46: 55.0 v. 5.3, $p<0.01$). Reconstitution with PRP and PPP demonstrated similar aggregability. Additionally, there were no differences in RBC aggregability between the day 23 and day 46 timepoints within each group.

Conclusion: This study demonstrates that the hemoconcentration of donated blood products does not affect the calcium and tissue-factor dependent aggregability of RBCs. Further, RBC aggregation is increased in the presence of plasma, not platelets – indicating a potential role for plasma in regulating the RBC aggregation effect. Finally, reconstituting the groups at a later timepoint did not impact RBC aggregation, indicating that storage duration of WB and its components may not independently affect RBC aggregability.

DO EMERGENCY MEDICAID PROGRAMS IMPROVE POST-DISCHARGE HEALTHCARE ACCESS FOR TRAUMA PATIENTS? A STATEWIDE MIXED-METHODS STUDY

Lisa M. Knowlton, MD, MPH; Katherine Arnow, MS; Zaria Cosby, MPH; Kristen Davis, MPH; Wesley Hendricks, BA; Alexander Gibson, BS; Arden M. Morris, MD, MPH; Todd Wagner, PhD

Stanford School of Medicine

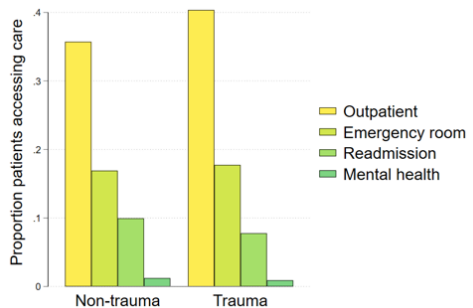
Invited Discussant: John Agapian, MD

Introduction: Hospital Presumptive Eligibility (HPE) emergency Medicaid programs available to the uninsured at hospitalization can provide long-term Medicaid coverage. We aimed to characterize post-discharge healthcare utilization among newly insured HPE trauma patients and identify patient access to care facilitators and barriers. We hypothesized utilization would be increased among HPE trauma patients, but barriers to access would remain.

Methods: We performed a convergent mixed methods study of California HPE beneficiaries using a 2016-2021 customized statewide longitudinal claims dataset from the Department of Health Care Services. We compared injured adults 18 and older to other HPE patients. Patients were tracked for two months post-discharge to evaluate healthcare utilization outcomes: outpatient specialist visits, emergency room (ER) visits, readmissions, and mental health. Thematic analysis of semi-structured interviews with HPE Medicaid patients aimed to understand facilitators and barriers to post-injury access to care (n=20).

Results: Among 206,008 HPE Medicaid patients, 35,497 (17%) had a primary diagnosis of trauma. In the two months post-discharge, 42.4% of trauma vs. 35.7% of non-trauma accessed outpatient services; 17.7% vs. 16.9% returned to ED, 7.8% vs. 9.9% were readmitted; and 0.9% vs. 1.2% accessed mental health services. In adjusted analyses, trauma HPE patients had 1.4 increased odds of accessing outpatient specialist services (p<0.01). Patients cited facilitators to accessing care: ease of HPE enrollment, in-hospital support provided for seeking future care. Barriers included: limited HPE program information recall post-discharge and not knowing how and where to seek certain care.

Conclusion: HPE Medicaid is associated with higher rates of outpatient specialist visits and fewer readmissions post-injury, suggesting improved access. Opportunities exist to improve healthcare utilization appropriateness through more robust and longitudinal education and engagement with HPE Medicaid patients that will help them navigate newfound access to services.



EARLY PRIMARY CARE FOLLOW-UP IMPROVES LONG-TERM FUNCTIONAL OUTCOMES AMONG INJURED OLDER ADULTS

Elliott K. Yee, MD; Bourke W. Tillmann, MD, PhD;

Matthew P. Guttman, MD, PhD; Stephanie A. Mason, MD, PhD;

Liisa Jaakkimainen, MD, MS; Priscila Pequeno, MS;

Avery B. Nathens, MD, PhD; Barbara Haas, MD, PhD

University of Toronto

Invited Discussant: Jay Yelon, DO

Introduction: Remaining independent in one's own home is an important functional outcome for older adults. However, the processes of care that improve such functional outcomes among injured older adults are poorly understood. We hypothesized that early primary care physician (PCP) follow-up would increase the probability of being alive and at home in the year following hospitalization for injury.

Methods: We performed a retrospective, population-based cohort study of community-dwelling older adults (age ≥ 65 years) discharged alive after an injury-related hospitalization between 2009 and 2020. Patients with no PCP were excluded. The exposure of interest was early PCP visit (within 14 days of discharge). Visits were categorized as occurring with the patient's own PCP or a different PCP. The primary outcome was time alive and at home (time to death or nursing home admission) in the year after injury. Cox proportional hazards models were used to evaluate the relationship between early PCP visit and death or nursing home admission, adjusting for patient and injury characteristics.

Results: Among 93,422 patients (64% female, mean age 80 years), 19,194 (21%) followed up with their own PCP and 5,461 (6%) with a different PCP within 14 days of discharge. In the year after injury, 16,530 (18%) patients died or were admitted to a nursing home. After risk-adjustment, early follow-up with one's own PCP was associated with a 16% reduction in the hazard of death or nursing home admission relative to no early follow-up (HR 0.84, 95%CI 0.82-0.86). Early follow-up with one's own PCP was associated with reduced hazard of death or nursing home admission for all strata of age, sex, comorbidity, and injury severity. Early follow-up with a different PCP had no impact on outcomes.

Conclusion: Injured older adults who followed up with their own PCP within 14 days of hospital discharge were more likely to remain independent in the year after injury. These findings suggest that trauma center outpatient processes of care, including ensuring early PCP follow-up, may contribute to improving long-term functional outcomes among injured older adults.

ELEVATED CELL-FREE HEMOGLOBIN: A NOVEL EARLY BIOMARKER FOLLOWING TRAUMATIC INJURY

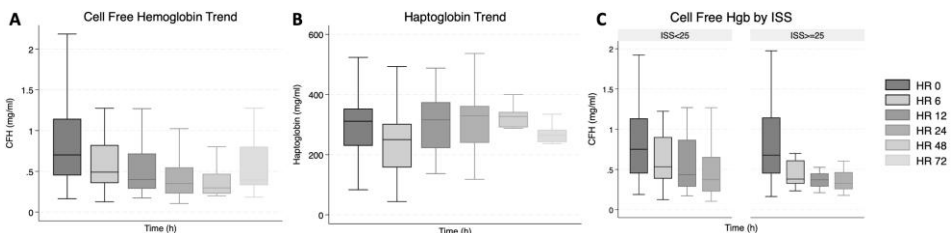
James T. Ross, MD, MS; Anamaria J. Robles, MD;
Ashli Barnes, BS; Alyssa R. Bellini, MD;
Alexandre Mansour, MD; Nicolas Nesseler, MD, PhD;
Kenneth E. Remy, MD, MHSc, MSCI; Rachael A. Callcut, MD, MSPH
University Hospital Cleveland Medical Center
Invited Discussant: Joseph Rappold, MD

Introduction: Cell-free hemoglobin (CFH) is a potent mediator of endotheliopathy and organ injury in sepsis but its role in trauma is unknown. In sepsis, injured erythrocytes release CFH and ultimately heme, which are cleared by haptoglobin and hemopexin respectively. This study investigates the presence of circulating CFH immediately after injury.

Methods: Adult traumas presenting as highest-level activations were enrolled (2021-2023) prospectively at a level-1 trauma center. Venous blood was collected at ED arrival (pre-transfusion), 6, 12, 24, 48 and 72 hours. Plasma CFH, haptoglobin and hemopexin were measured (Drabkin's and ELISA).

Results: The cohort (n=115) had a median age 48 years [31-65], 85% male, with a median ISS 21 [11-29], 11% 28-day mortality, and 61% transfused in first 24h. Median plasma CFH was elevated at 0h and was significantly lower at 12 and 24h (0.7 mg/ml [0.5-1.1] 0h vs. 0.4 mg/ml [0.3-0.7] 12h, $p=0.005$, **Fig A**). Plasma haptoglobin decreased significantly from 0 to 6h, suggesting CFH binding, returning to presentation levels by 24h (311 mg/ml [229-353] 0h vs. 250 mg/ml [158-302] 6h, $p=0.0096$, **Fig B**). There was no change in hemopexin. For $ISS \geq 25$, there was a dramatic decrease in CFH within 6h (0-6h $p=0.005$), with a trend towards lower 6h CFH in $ISS \geq 25$ compared to $ISS < 25$ ($p=0.08$, **Fig C**). The haptoglobin nadir remained at 6h in the $ISS \geq 25$ subset and recovered significantly by 24h ($p=0.03$).

Conclusions: This is the first study to our knowledge to demonstrate that endogenous hemolysis very early after injury generates excess plasma CFH, which is present at ED arrival prior to transfusion, and sufficient to deplete haptoglobin. Notably, more severely injured patients tended towards a lower CFH at 6 hours, possibly due to haptoglobin induction.





SESSION XIVB: PAPERS 56-66

Friday, September 13, 2024

1:15 PM - 4:55 PM

Location: Concorde Ballroom A

Moderator: Kimberly Davis, MD, MBA

Recorder: Babak Sarani, MD

**EMERGENCY MEDICAL SERVICES LEVEL OF TRAINING AFFECTS
MORTALITY IN HIGH-RISK TRAUMA PATIENTS: A COMBINED
PREHOSPITAL AND IN-HOSPITAL
DATABASE ANALYSIS**

Julia Harrison, MD; Akshay Bhardwaj, MS; Olivia Houck, MPH;
Lisa Rogers, MPH; Kristiana Sather, MD; Sarah Knack, MD;
Ayako Sekiya, MPH; Geetha Saarunya-Clarke, PhD;
Christopher Tignanelli, MD, MS; Mike Puskarich, MD;
Schelomo Marmor, PhD; Greg Beilman, MD
University of Minnesota
Invited Discussant: Cynthia Talley, MD

Introduction: There is conflicting evidence regarding prehospital provider level of training and outcomes in trauma. We hypothesized that basic life support (BLS) provider transport is associated with higher mortality compared to advanced life support (ALS) transport for high-risk patients.

Methods: We performed secondary analysis of a combined prehospital and in-hospital database of trauma patients utilizing ESO® electronic medical records from 2018 to 2022. We included encounters with trauma-specific International Classification of Diseases, Tenth Revision (ICD-10-CM) codes, patients aged 15-100 years, transported by ground to a level 1 or 2 trauma center. We excluded patients dead upon EMS arrival and transfers. The primary outcome was composite pre-hospital and in-hospital mortality. The exposure was EMS level of training. We included age, ICD-10 based injury severity score (ISS), blunt versus penetrating mechanism, transport time, race, gender, and year for risk adjustment given previous literature describing their status as confounding variables. We conducted a complete case multivariable logistic regression with subgroup analyses on populations we hypothesized to be high risk. Model discrimination and calibration were assessed via the C statistic and hosmer-lemeshow goodness of fit.

Results: We identified 30,738 ALS and 1,758 BLS encounters. We did not observe a significant association between EMS level of training and mortality (OR 0.93, $p = 0.63$, 95% CI 0.68-1.26, c-stat 0.85). Subgroup analyses identified a significant association between BLS transport and mortality for age > 70 years (odds ratio 1.74, $p = 0.047$, 95% CI 1.01-3.00, c-stat 0.83) and transport time > 60 minutes (odds ratio 1.87, $p = 0.04$, 95% CI 1.03-3.40, c-stat 0.85). There was no significant association between EMS level of training and mortality in subgroup analyses of ISS > 15, ISS > 25, or penetrating mechanism of injury.

Conclusion: In this national sample, we did not identify an independent association between EMS provider level of training and mortality among trauma patients for all comers, however BLS level of training was associated with increased mortality in elderly patients and those with prolonged transport times. This may have implications for policy decisions regarding EMS provider training and trauma system strategies for EMS units responding to trauma calls.

GENOMIC ANALYSIS TO IDENTIFY SURGICAL PATIENTS AT RISK FOR POST-OPERATIVE SEPSIS AND SURGICAL SITE INFECTIONS

Kaleem Sohail Ahmed, MD, MSAI; Mathias Christensen, MD;
Alexander Bonde, MD, PhD; Wei-Qi Wei, MD; Atlas Khan, MD;
Teri Manolio, MD, PhD; Jennifer Pacheco, MS;
Megan Roy-Puckelwartz, PhD; Robert McCarthy, PharmD;
Hasan Alam, MD; Martin Sillesen, MD, PhD
Northwestern University
Invited Discussant: Mehreen Kisat, MD

Introduction: Early and accurate diagnosis of sepsis and the ensuing organ dysfunction remains a challenge in the post-operative setting. Susceptibility to infections, and the subsequent immunological response, are driven to a large extent by the genetic predisposition of the patient. The purpose of this study was to identify novel genetic variants associated with post-operative sepsis (POS) and surgical site infections (SSIs).

Methods: We conducted genome-wide association studies (GWAS) for POS and SSIs in the Electronic Medical Records and Genomics (eMERGE) Network database. All patients with surgical and genomic information in eMERGE were identified. Patients with a new diagnosis of sepsis/SSIs after surgery were classified as cases and those without as controls. Analyses were performed using PLINK 2.0's logistic regression function. A p-value of $< 5 \times 10^{-8}$ was considered statistically significant.

Results: A total of 59,755 participants were included in the analysis. Genetic regions on Chromosome 9 and 14 reached statistical significance for POS ($p < 5 \times 10^{-8}$). The most significant SNPs were rs9413988 ($p = 5.59 \times 10^{-12}$) on Chromosome 9 and rs35407594 ($p = 1.43 \times 10^{-10}$) on Chromosome 14. The rs9413988 region corresponds to an intron near phosphoglucomutase 5 pseudogene (*2PGM5P2*) and Zn regulated GTPase metalloprotein activator 1F (*ZNGF1*) while rs35407594 corresponds to the olfactory receptor gene family, *hOR11*. The same variants were also associated with SSIs.

Conclusions: We have identified two genetic regions of SNPs associated with POS and SSIs. These findings provide new avenues for investigation, which may help identify and guide point of care management for at-risk patients.

IDENTIFYING NOVEL NONCODING GENOMIC REGIONS IN SEPSIS USING RNA SEQUENCING DATA

Jaewook Shin, MD; Alger M. Fredericks, PhD; Emanuele Raggi, MS; Alfred Ayala, PhD; Maya Cohen, MD; William G. Fairbrother, PhD; Mitchell M. Levy, MD; Sean F. Monaghan, MD

Rhode Island Hospital

Invited Discussant: Anaar Siletz, MD

Introduction: Despite multiple efforts to characterize sepsis pathogenesis, the etiology of dysregulated host response remains unclear. To investigate, many studies have shown novel genes associated with sepsis via DNA microarray or RNA sequencing (RNA-Seq) enriched for protein-coding genes. Given their essential roles in cellular regulation, noncoding genomic regions are also important to examine in sepsis research. We hypothesize that differential gene expression (DGE) analysis of the RNA-Seq data will yield novel, noncoding genomic regions unique to sepsis.

Methods: This is a single center, prospective study of patients with sepsis compared with critically ill patients without sepsis. Whole blood samples were drawn in PAXgene tubes at hospital day 0 then deep RNA sequencing with at least 100 million reads was performed. DGE analysis was performed with DESeq2 package in R. Statistical significance were determined as $\log_2\text{foldchange} > 2$ or < -2 and p value < 0.5 .

Results: A total of 49 critically ill patients – 6 without sepsis and 43 with sepsis – were included. Of the 27,843 differentially expressed genes and genomic regions, 300 non-coding genomic regions were statistically significant. In sepsis group, 30 were downregulated and 270 were upregulated. The categories of non-coding genomic regions consisted of: 80 pseudogenes, 205 non-coding RNAs including long non-coding RNAs (lncRNA) and small nucleolar RNA (snoRNA), and 15 to-be-experimentally confirmed (TEC) regions.

Conclusion: Deep RNA sequencing data can identify noncoding, unannotated genomic regions unique in sepsis. These novel genomic regions can be further investigated to elucidate the molecular mechanism by which dysregulated host response occurs. This will have clinical implications by facilitating the discovery of diagnostic and therapeutic targets. Future studies are necessary to identify the role of these pseudogenes and non-coding RNAs in sepsis.

IMPACT OF PSYCHOSOCIAL INTERVENTION ON QUALITY OF LIFE IN PATIENTS WITH POST-TRAUMATIC LIMB AMPUTATION/S- A RANDOMIZED CONTROLLED TRIAL

Subodh Kumar, MS, FACS, FRCS; Milandeep, MS; Rajesh Sagar, MD;

Sushma Sagar, MS, FACS, FRCS; Pratyusha Priyadarshini, MS;

Abhinav Kumar, MS; Junaid Alam, MS; Dinesh Bagaria, MS;

Narendra Choudhary, MS; Amit Gupta, MS, FACS, FRCS;

Biplab Mishra, MS; Anamika Sahu, PhD; Shivam Pandey, PhD

All India Institute of Medical Sciences New Delhi India

Invited Discussant: Terri deRoos-Cassini, MD, PhD

Introduction: Annually, an estimated 1.19 million individuals succumb to acquired trauma on a global scale, with an additional 20-50 million individuals experiencing various forms of disability. Rapid industrialization and motorization have propelled Road Traffic Injury (RTI) to become leading cause of Disability Adjusted Life Years (DALYs) and significant number of amputations. Post-traumatic amputations engender a tumultuous array of emotions for the individual affected which ranges from general anxiety disorders to depression and can even lead to self-harm. These amputations are abrupt in nature and hence impart a heightened psychological impact on patients compared to amputations stemming from other medical reasons. Hence, study was designed to evaluate the effect of brief psychosocial intervention on Quality of Life of post traumatic amputees.

Methods: This was a randomized control study. Patients >18 years of age, well oriented and coherent, with social support and with no prior history of psychological illness who underwent post traumatic extremity amputation/s were recruited. Baseline questionnaires for psychological assessment were filled as soon as possible after the surgery with informed consent. These patients were randomized (n=74), and conventional care was given to Group A (n=39) and psychosocial intervention along with conventional care was given to Group B (n=35) for 7 weeks. Patients of both the groups were asked to fill the same questionnaire after 8 weeks post first assessment.

Results: A total of 74 patients with post-traumatic amputation/s were enrolled in the study. Mean age of cohort was 32.8 years with male predominance (n=70). RTI was the most common mechanism of injury. All the 4 domains (physical health, psychological health, social relationship, environment domain), WHO total and Overall quality of life showed significant improvement in both the groups. However, there was no significant difference between the groups. Depression was significantly decreased in both the groups in 8 weeks but there was no significant difference between two groups (p=0.101). Same trend was observed with anxiety and stress. However, body image showed a significant improvement in Group B as compared to Group A (p= 0.023).

Conclusion: Our study did not show any observable positive effects of psychosocial intervention over conventional care on quality of life, depression, stress or anxiety except on body image. We hypothesize that positive results might be observed in quality of life of amputees if a larger study with longer duration of psychosocial intervention is conducted

**INCREASED PULMONARY MORBIDITY AND MORTALITY WITH
EARLY VIDEO-ASSISTED THORACIC SURGERY FOR
RETAINED HEMOTHORAX**

Denise Garofalo, MD; Michael Bronsert, PhD;

Christina M. Stuart, MD; Adam Dyas, MD;

Quintin WO Myers, PhD; Lauren T. Gallagher, MD; Ariel Wolf, MD;

Charlotte Heron, MD; Paul Rozeboom, MD; Samuel Mathai, BA;

Robert Meguid, MD, MPH; Catherine G. Velopoulos, MD, MHS

University of Colorado

Invited Discussant: Garth Utter, MD

Introduction: While most hemothoraces can be managed with tube thoracostomy alone, 5 to 30% become retained hemothoraces, with increased morbidity and prolonged hospitalization. Despite the use of video-assisted thoracic surgery (VATS), optimal timing remains debated. We sought to examine the impact of VATS timing for retained hemothorax.

Methods: Adults undergoing VATS for retained hemothorax were isolated from the Trauma Quality Improvement Program (TQIP) in 2017-2021 and categorized into early (≤ 4 days), middle (5-10 days) and late (>10 days). Patient demographics, mechanism of injury, hospital characteristics, morbidity and mortality were compared using Chi-square and Wilcoxon rank-sum tests. Multiple logistic regressions were performed to determine independent risks factors for morbidity and mortality.

Results: Of the 9784 VATS, 82% were early, 12% were middle, and 6.4% were late VATS. The late VATS group had greater injury severity score (ISS) (24 ± 13) than the early (19 ± 11) and middle groups (18 ± 10) ($p < .001$). Severe head, neck and spine injuries were the most common in the late VATS compared to the early and middle groups ($p < .001$). Mortality was highest in the early (4.5%) versus the middle (3.0%) or late VATS groups (2.9%) ($p < .001$). In addition, pulmonary morbidity was greatest in the early VATS group (57%) relative to the middle (41%) and late groups (48%, $p < .001$) with higher rates of reintervention, including more conversion to thoracotomy (4.5 vs. 3.1 vs. 3.2%, respectively, $p = .04$) and need for additional tube thoracostomy (51 vs. 24 vs. 24%, respectively, $p < .001$). Risk-adjusted mortality (odds ratio (OR) 0.80; 95% confidence interval (CI) 0.73-0.87, $p < .001$) and pulmonary morbidity (OR 0.96; 95% CI 0.93-0.99, $p = .009$) were inversely proportional to days to VATS.

Conclusions: Contrary to current literature, our study finds significantly increased morbidity and mortality in early VATS for retained hemothorax, persisting after risk adjustment. The increased pulmonary morbidity associated with early VATS group is driven by higher rates of reintervention. This supports the need for a prospective randomized, clinical trial to determine optimal timing of VATS for retained hemothorax.

LATE VTE CHEMOPROPHYLAXIS IS ASSOCIATED WITH INCREASED RISK OF DVT, PE, AND MORTALITY IN PATIENTS WITH SPINAL INJURIES

Morgan Gaither, MD; Kayla Wilson, MBA; Sarah McWilliam, BA, MSL; Joseph J. DuBose, MD; Pedro G. Teixeira, MD; Tatiana Cardenas, MD; Marc Trust, MD; Marissa Mery, MD; Jason Aydelotte, MD; Sadia Ali; Michelle Robert; Carlos V.R. Brown, MD

The University of Texas at Austin

Invited Discussant: Jennifer Leonard, MD, PhD

Introduction: For patients that sustain spinal injuries, the decision to initiate venous thromboembolism (VTE) chemoprophylaxis (CP) is weighed against bleeding risk, especially for those undergoing operative intervention. The aim of the study was to compare outcomes in patients with spinal injuries who receive early vs. late CP.

Methods: This is a retrospective study of the 2021 National Trauma Data Bank, including patients with a length of stay >48 hours who sustained spinal injuries (fracture, dislocation, ligamentous injury or spinal cord injury), according to ICD-10 codes. Data included demographics, injury severity score (ISS), timing and type of CP, and need for surgical procedure for the spine. The early (< 48 hours) and late (>= 48 hours) CP groups were compared by univariate and multivariate analysis. The primary outcomes were DVT, PE, and mortality.

Results: There were 96,515 patients, with 63,051 (65%) in the early group and 33,464 (35%) in the late group. Average time to CP was 23 hours in the early group and 96 hours in the late group ($p<0.0001$). Patients that received late CP were younger (53 vs. 56, $p<0.0001$), more often male (64% vs. 59%, $p<0.0001$), and had a higher ISS (19 vs. 14, $p<0.0001$). The most common types of CP in both groups were low molecular weight (74% vs. 75%) and unfractionated (21% vs. 21%) heparin. The late group had more spine procedures (34% vs. 13%, $p<0.0001$). The late group more often developed a DVT (3.5% vs. 1.3%, $p<0.0001$), PE (1.8% vs. 0.8%, $p<0.0001$), and had a higher mortality (5.8% vs. 2.5%, $p<0.0001$). On logistic regression, while controlling for age, gender, ISS, type of CP, and surgical procedure, late CP was independently associated with DVT (AOR: 1.9 [95% CI=1.7-2.1], $p<0.0001$) and PE (AOR: 1.4 [95% CI=1.2-1.6], $p<0.0001$). Similarly, late CP was independently associated with mortality (AOR: 1.5 [95% CI=1.3-1.6], $p<0.0001$).

Conclusion: Delayed administration of VTE CP for patients with spinal injuries is independently associated with an increased risk of DVT, PE, and mortality.

POLYMERASE CHAIN REACTION FOR EARLY IDENTIFICATION OF BACTERIA CAUSING PNEUMONIA IN VENTILATED PATIENTS

Aaron Pollock, MD; Justin Bailey, MD; Breanna Carter, PharmD;
 Hunter Parmer, MD; Mitch Thelen, PharmD; Robert Maxwell, MD;
 Alicia Stowe, MS; Jay Sizemore, MD

University of Tennessee College of Medicine Chattanooga

Invited Discussant: Joseph Forrester, MD, MS

Introduction: Ventilator associated pneumonia (VAP) occurs in 20-25% of intubated trauma patients and early effective antibiotic treatment decreases morbidity and mortality. We sought to determine the sensitivity and specificity of multiplex polymerase chain reaction amplification of bacterial DNA (Biofire® FilmArray® Pneumonia Panel [BFPP]) obtained during fiberoptic bronchoscopy in predicting the causative bacteria the day of bronchoalveolar lavage (BAL).

Methods: A practice management guideline was established calling for the collection of a BAL with quantitative culture and BFPP testing on all intubated trauma patients suspected of developing pneumonia (PNA). Demographics, hospital data, BAL culture results, and BFPP results were recorded. McNemar analysis was performed.

Results: Over a three-year study period 163 intubated trauma patients suspected of developing PNA underwent 202 BALs with quantitative culture and BFPP testing. BALs that had $\geq 10^5$ colony forming units per mL (CFU) growth were considered consistent with the diagnosis of PNA. Of the 202 BALs, 77 were considered positive and then correlated to the genomic copy number per mL (GCN) reported by BFPP testing. Using 10^6 GCN as the cutoff for a positive BFPP, we found 87% sensitivity and 97.6% specificity, with a positive predictive value (PPV) of 52.3%, and a negative predictive value (NPV) of 99.6%.

Conclusion: In patients with high clinical suspicion for PNA a BFPP cutoff value of 10^6 CFU/mL is a sensitive and specific test to initiate antibiotics targeted to the identified organism. Additionally, a negative BFPP result may limit ineffective and potentially harmful antibiotic coverage as its NPV is 99.6%.

BFPP GCN	Sensitiv ity	Specific ity	PPV	NPV
10^4	93.5 (88, 99)	94.9 (94, 95.9)	35.8 (29.2, 42.5)	99.8 (99.6, 99.9)
10^5	90.9 (84.5, 97.3)	96.2 (95.5, 96.9)	42.2 (34.7, 49.7)	99.7 (99.5, 99.9)
10^6	87 (79.5, 94.5)	97.6 (96.9, 98.2)	52.3 (43.7, 61)	99.6 (99.4, 99.9)
10^7	54.6 (43.4, 65.7)	99.2 (98.9, 99.6)	67.8 (56.1, 79.4)	98.6 (98.2, 99.1)
10^8	19.5 (10.6, 28.3)	99.7 (99.5, 99.9)	65.2 (45.8, 84.7)	97.6 (97, 98.2)

Session XIVB: Papers 56-66
Paper 63: WITHDRAWN

WITHDRAWN

THE COSTS OF PARENTAL INJURY: IMPACTS ON CHILDREN'S HEALTHCARE UTILIZATION AND FINANCIAL BARRIERS

Ruchika Kamojjala; Arnav Mahajan, MBBCh, BAO;

Penelope N. Halkiadakis, BS; Caleb Curry, MPH; Andrew H. Tran, MD;

Perna Ladha, MBBS, FACS; Megen Simpson, M.Ed, LPC;

Sarah Sweeney, MD; Vanessa P. Ho, MD, MPH, PhD

MetroHealth Medical Center

Invited Discussant: Lillian Liao, MD, MPH

Introduction: A traumatic injury can disrupt a parent's ability to offer stability in their children's lives. We hypothesize that children of injured parents (C-IP) are likely to exhibit lower healthcare utilization and encounter more financial barriers to access compared to children of non-injured parents (C-NIP).

Methods: We identified parent-child dyads from the 2020-21 National Health Interview Survey (NHIS), which surveys households on a range of health topics. Logistic regression models were calculated for each health utilization and financial barrier outcome to estimate the effect of C-IP (using C-NIP as the reference group). Models were adjusted for household income, parental education level, insurance status, and race. Adjusted odds ratios (aOR, 95% CI) are reported.

Results: We included 8393 dyads, with 296 (3.5%) having an injured parent. aOR for the effect of C-IP on health utilization and financial barriers are presented (Table). C-IP was not significantly associated with healthcare utilization for acute and preventive care but was associated with the use of mental health services and counseling. C-IP was also significantly associated with having financial barriers to healthcare access.

Conclusion: Our findings highlight a relationship between parental injuries and financial barriers to healthcare access for children, underscoring the need for improved support systems for families of injured patients.

Outcome of Interest	aOR for C-IP (95% CI)	p-value
Healthcare Utilization		
Had Urgent/emergency care or hospitalization	1.0 (0.7-1.5)	0.88
Received Flu Vaccine	1.1 (0.9-1.4)	0.26
Had Eye Exam	1.1 (0.9-1.3)	0.56
Took Prescription Medication	1.2 (1.0-1.5)	0.09
Took Medication for Mental Health	1.6 (1.1-2.2)	0.01 *
Received Counseling	1.6 (1.2-2.2)	0.002 *
Financial Barriers		
Problems paying medical bills	1.8 (1.4-2.4)	<0.001 *
Medical care delayed due to cost	2.5 (1.2-4.8)	0.008 *
Needed dental care but couldn't due to cost	1.9 (1.1-3.2)	0.013 *

**TRAUMA CENTERS HAVE HEARD THE WARNING: AVOID
ENDOVASCULAR TREATMENT FOR BLUNT
CEREBROVASCULAR INJURIES**

Ariel Wolf, MD; Michael Bronsert, PhD;

Quintin WO Myers, PhD; Charlotte Heron, MD; Whitney Jenson, MD;

Mitchell J. Cohen, MD; Michael Cripps, MD;

Catherine G. Velopulos, MD, MHS; Clay Burlew, MD

University of Colorado at Denver

Invited Discussant: Niels Martin, MD

Introduction: Blunt cerebrovascular injury (BCVI) are identified in 1-3% of all blunt trauma patients. While antithrombotic agents are the mainstay for the treatment of BCVI, interventionalists are often consulted for higher grade or difficult to access injuries. While several single institution studies have shown a trend towards decreased use of endovascular intervention (EI), it is unclear if these reports have impacted current widespread practice. The purpose of this study was to assess the national use of EI in patients diagnosed with BCVIs.

Methods: Patients with blunt injury mechanism were selected by E-code and cerebrovascular injuries were identified by ICD-10 codes in the Trauma Quality Improvement Program (TQIP) during 2017-2021. Patients undergoing EI were identified with CPT procedure codes. Bivariate analysis was performed with chi-square and Wilcoxon rank sum tests where appropriate.

Results: Of the 13,355 patients with BCVI, 13,136 (98.36%) were managed without EI while 219 (1.64%) were managed with an EI. There was no difference in age, gender, race or preexisting conditions between the two groups. Median injury severity score (ISS) was higher in the endovascular group compared to the non-endovascular group (25.0 [14.0-34.0] vs 19.0 [11.0-29.0]) ($p < .001$). In-hospital stroke rate was highest in the endovascular group (9.1%) compared to the non-endovascular group (2.1%) ($p < .001$). Mortality was highest in the endovascular group (18.7% vs 12.3%) ($p = .004$) as was overall morbidity (20.6% vs 14.2%) ($p = .007$).

Conclusion: This is the first national evaluation of EI for BCVIs. In this modern analysis, less than 2% of all BCVI patients are treated with endovascular techniques, heralding that clinicians have heard the warnings of the single center experience. Reflective of those earlier studies, patients undergoing EI have a higher stroke rate compared to those treated with antithrombotics alone.

**FROM LAWS TO LOSS: EXAMINING THE TOLL OF ALCOHOL
POLICY REPEALS ON YOUTHFUL
DRIVER MORTALITY**

Gi Jung Shin, BA; Ruidi Xu, BS; William Rice, BA;

Suresh Agarwal, MD; Krista Haines, DO

Duke University

Invited Discussant: Lucas Neff, MD

Introduction: Young drivers aged 15-20 consistently exhibit the highest rates of motor vehicle collisions (MVC) and fatalities. In 2015, Georgia repealed its "use/lose" laws, which previously penalized underage alcohol use in non-driving settings. However, the effects of abolishing these policies remain unexplored.

Methods: Mortality data for drivers and passengers aged 15-20 were extracted from the Fatality Analysis Reporting System (FARS) spanning 2012-2018. Annual population figures for the same age group in each state were sourced from the Centers for Disease Control and Prevention WONDER. Comparative analyses between Georgia and national mortality rates were performed using paired t-tests (two-sided, $\alpha = 0.05$) and generalized linear modeling with a Gamma distribution and log link for the three years preceding and following the law change. National mortality rates were calculated from states that retained their existing legislation during the same period.

Results: Prior to the policy change, young drivers and passengers in Georgia had a 5.9% lower likelihood of MVC fatalities compared to the national average from 2012-2014 ($B = -0.059$, $p < 0.001$). However, after the repeal of the use/lose laws, Georgia experienced a significant increase in MVC mortality rates among adolescents aged 15-20. During the period 2016-2018, young drivers in Georgia were 4.1% more likely to be involved in fatal MVCs compared to their counterparts in other states ($B = 0.041$, $p < 0.001$).

Conclusion: The elimination of laws penalizing underage drinking in Georgia was associated with a notable rise in young driver mortality rates, surpassing the national average. Further research is warranted to investigate the effects of policy changes on a state-specific basis, providing insights into the broader impact of legislative modifications.

PETER C. CANIZARO, M.D. AWARD



PETER C. CANIZARO, M.D.
June 30, 1935 - September 3, 1990

Peter C. Canizaro was born on June 20, 1935, in Vicksburg, Mississippi. He received his B.A. degree from the University of Texas, Austin, in 1956 and his M.D. degree from the University of Texas Southwestern Medical School, Dallas, in 1960. Following an internship at Parkland Memorial Hospital/UTSMS, he spent two years as a Captain in the Surgical Research Unit, Brooke Army Hospital, Fort Sam Houston. Following another year as a NIH Research Fellow, he completed his surgical residency at Parkland/UTSMS from 1964-1968. He remained on staff at Parkland/UTSMS from 1968-1974, and then subsequently served on the faculty at the University of Washington (1974-1976) and Cornell University Medical Center (1976-1981) where he became Professor of Surgery. Dr. Canizaro became Professor and Chairman of the Department of Surgery at the Texas Tech University Health Sciences Center in 1982 and remained there until his untimely death in 1990. Dr. Canizaro was an innovative surgical scientist who made multiple contributions to the field of trauma and resuscitation. Examples of topics covered in his published manuscripts include the following:

- | | |
|------|--|
| 1960 | Distribution changes in extracellular fluid during acute hemorrhage (with G. Tom Shires, M.D.) |
| | Use of dextran |
| 1963 | Use of hypertonic glucose |
| 1963 | Diagnostic abdominal paracentesis in trauma |
| 1969 | Fluid resuscitation of hemorrhagic shock |
| 1970 | Use of Ringer's lactate during shock |
| 1971 | Oxygen-hemoglobin dissociation curve |
| 1974 | Stroma-free hemoglobin |
| 1975 | Ultrasound detection of fluid collection |
| 1985 | Endopeptidase in human lung |
| 1986 | |

IN RECOGNITION OF DR. PETER CANIZARO'S OUTSTANDING CONTRIBUTIONS TO THE SCIENCE OF TRAUMA, THE AAST HAS PRESENTED THE CANIZARO AWARD SINCE 1993 TO THE BEST PAPER BY A NEW MEMBER IN THEIR FIRST TWO YEARS OF MEMBERSHIP.

PETER C. CANIZARO AWARD

2023	Lisa Marie Knowlton, MD, MPH, FRCSC
2022	Marta McCrum, M.D., M.P.H.
2021	Lucy Kornblith, M.D.
2020	Alexander Colonna, M.D., MSCI
2019	Vanessa Ho, M.D., M.P.H
2018	Jamie Coleman, M.D.
2017	Scott Brakenridge, M.D.
2016	Jon Simmons, M.D.
2015	Matthew Bloom, M.D.
2014	Sarah Majercik, M.D.
2013	Jason Smith, M.D.
2012	Stephanie Savage, M.D.
2011	Jay Manaker, M.D. , FACEP
2010	Oscar Guillamondegui, M.D.
2009	Andrew Bernard, M.D.
2008	Randall Friese, M.D.
2007	Kari Hansen, M.D.
2006	Saman Arbabi, M.D.
2005	Carnell Cooper, M.D.
2004	Eileen Bulger, M.D
2003	James Jeng, M.D.
2002	Karen Brasel, M.D. , M.P.H.
2001	Hans-Christoph Pape, M.D.
2000	John Owings, M.D.
1999	David Spain, M.D.
1998	Charles Mock, M.D. , M.P.H. , Ph.D.
1997	Ronald Simon, M.D.
1996	Rodney Durham, M.D.
1995	Patrick Offner, M.D.
1994	Frederick Luchette, M.D.
1993	Philip Barie, M.D. , M.B.A.

ASSOCIATE MEMBER BEST ORAL AND PAPER AWARD

2023	John Scott, MD, MPH
2022	Lisa Marie Knowlton, MD, MPH
2021	M. Victoria Purvis Miles, MD
2020	Sydney Radding, MD

QuickShots

QuickShots



SESSION XV: QUICKSHOT SESSION I 1-13

Saturday, September 14, 2024

8:00 AM - 9:18 AM

Location: Concorde Ballroom A
Moderator: Jamie Coleman, MD

Session XV: Quickshot Session I 1-13

Quickshot 1: 8:00 AM - 8:06 AM

THE EFFECT OF PEDIATRIC WHOLE BLOOD USE AS A PROPORTION OF ADMINISTERED BLOOD PRODUCTS ON 24-HOUR MORTALITY: A DOSE EFFECT ANALYSIS

Ethan Petersen, MD; Andrew Fisher, MD; Steven G. Schauer, DO, MS;
Michael D. April, MD, DPhil, MS; Matthew Borgman, MD
University of New Mexico Hospital

Invited Discussant: David Hampton, MD, MEng

Introduction: Hemorrhage is a leading cause of death in pediatric patients. The use of balanced component transfusion therapy (CT) has a demonstrated benefit, and whole blood (WB) is safe in pediatric trauma patients. However, less is known about the benefit of WB compared to CT in these patients. We examined what ratio of WB to total blood product would confer a survival benefit in pediatric trauma patients receiving transfusion.

Methods: We requested and analyzed data from patients <18 years of age in the American College of Surgeons Trauma Quality Improvement Program (TQIP) database that received any blood within the first 4-hours. We created a variable of the volume of whole blood divided by the volume of total blood products. This was used as a binary variable within a multivariable logistic regression (MVLr) model starting at 0.1 and increasing by increments of 0.1 until we determined the optimal proportion with 12-hour survival as the outcome. The MVLr was adjusted for relevant confounders.

Results: From 2020-2021 there were 6340 patients that met inclusion criteria – 764 WB recipients and 5576 component-only. WB recipients represented a lower proportion of children 1-4 (7% versus 14%), but a higher proportion of older children (66% versus 51%, $p<0.001$). Collisions were the most frequent mechanism in both groups. Median composite injury severity scores were similar between the groups (25 versus 25, $p=0.059$). WB recipients had higher proportions of serious injuries to the thorax (56% versus 49%, $p<0.001$) and abdomen (42% versus 36%, $p<0.001$). Unadjusted survival was similar at 12-hours (93% versus 93%, $p=0.692$), 24-hours (91% versus 91%, $p=0.711$) and discharge (81% versus 80%, $p=0.512$). We noted that improvement in survival at a proportion of ≥ 0.2 with an associated OR 1.69 (1.03-2.78) when adjusting for confounders. On sensitivity testing, the proportions varied from ≥ 0.2 to ≥ 0.3 .

Conclusions: We found that resuscitations with WB comprising at least 20-30% of the total transfusion volume within the first 4-hours was associated with improved survival at 12-hours. Our findings will help inform clinical practice patterns and guide future prospective studies.

EXTRACELLULAR VESICLES MEDIATE CYTOTOXICITY IN POST-BLUNT CHEST TRAUMA PNEUMONIA

Keita Nakatsutsumi, MD, PhD; Brian Eliceiri, PhD;

William Johnston, MD; Jessica Weaver, MD, PhD;

Raul Coimbra, MD, PhD, FACS; Todd W. Costantini, MD, FACS

University of California, San Diego

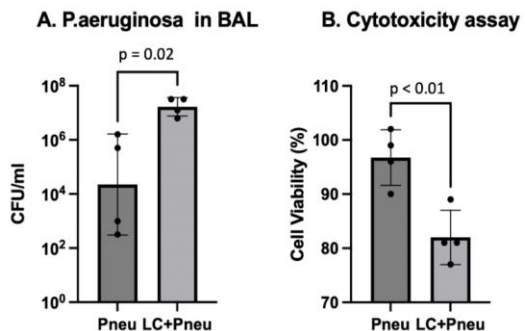
Invited Discussant: Alaina Lasinski, MD

Introduction: Blunt chest trauma complicated by pneumonia is associated with a higher risk of acute lung injury (ALI) that is mediated by activation of immune cells and injury to the lung epithelium. Small extracellular vesicles (sEVs) are important mediators of cellular crosstalk; however, their role in driving ALI after trauma is unknown. We hypothesized that chest trauma worsens ALI caused by pneumonia through sEV-mediated cytokine release and injury to the lung epithelium.

Methods: Studies in C57BL/6 mice were designed with 3 cohorts: sham, lung infection (Pneu) by intratracheal injection of 105 cfu *Pseudomonas aeruginosa*, or unilateral lung contusion using a cortical impactor followed by infection (LC+Pneu). Bronchoalveolar lavage fluid (BAL) was harvested 24 hours post-infection, and sEVs were purified by centrifugation and size exclusion chromatography. Bacterial clearance was assessed by culture of BAL fluid on agar plates. To evaluate activity, BAL sEVs from each group were co-cultured with macrophages (RAW 264.7) to assess cytokine release and lung epithelial cells (MLE 12) to assess epithelial cytotoxicity.

Results: Bacterial clearance of *P. aeruginosa* was decreased in LC+Pneu compared to Pneu alone (5×10^5 vs. 2×10^7 cfu/ml, $p=0.02$, Panel A). There was no difference in BAL sEV concentration or size between Pneu and LC+Pneu on vesicle flow cytometry. Compared to sham, BAL sEVs harvested after both Pneu and LC+Pneu increased the release of TNF α , MIP1 α , and IL1Ra from macrophages. Epithelial cytotoxicity was increased after exposure to BAL sEVs from LC+Pneu compared to Pneu alone (96% vs 82%, $p<0.01$, Panel B).

Conclusion: LC worsens ALI caused by pneumonia through sEV-mediated cytokine release and injury to the lung epithelium. Defining sEV activity may identify new therapeutic targets to prevent ALI.



FLYING FASTER: DEFINING THE TIME-SAVINGS THRESHOLD FOR AIR VERSUS GROUND TRANSPORT SURVIVAL BENEFIT AFTER INJURY

Sebatian Boland, MD; Liling Lu, MS; David Silver, MD, MPH;
Tamara Byrd, MD; Jamison Beiriger, BS; Tristan Meister;
Quentin Mcilvaine, BS; Joshua Brown, MD, MS
University of Pittsburgh
Invited Discussant: Michael Ditillo, DO

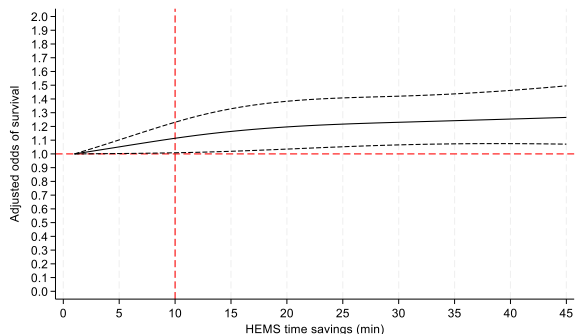
Introduction: Air medical transport (AMT) offers a survival advantage to trauma patients for several reasons, one of which may be time-savings over ground transport. Triage guidelines suggest AMT use when there are significant time-savings, but how much time needs to be saved to confer a benefit is unclear. Our objective was to define the time-savings threshold for which AMT has a survival benefit over ground transport.

Methods: Retrospective cohort of adult trauma patients transported ≤ 40 mi by ground or air in the Pennsylvania Trauma Outcomes Study 2000-2017. GIS network analysis was used to generate counterfactual transport mode times and calculate a time-savings of AMT for each patient. We used logistic regression with splines to identify a threshold of AMT time-savings associated with survival. Subgroups meeting anatomic or physiologic criteria from the National Field Triage Guidelines (NFTG) and those with a positive Air Medical Prehospital Triage (AMPT) Score were analyzed.

Results: We included 25,303 patients. No amount of time saved by air over ground transport was associated with survival among all unselected patients. For patients with either anatomic or physiologic NFTG criteria, there was a survival benefit beginning at 10min of time-saved (OR 1.11; 95%CI 1.01-1.23, Figure). For patients positive on the AMPT Score, the survival benefit began at 20min of time-saved (OR 1.19; 95%CI 1.00-1.42).

Conclusion: Among patients meeting the physiologic or anatomic NFTG criteria, a time-savings of 10 minutes for AMT over ground transport was associated with improved survival.

There is heterogeneity among this threshold of benefit among different patient groups that may be due to other benefits of AMT such as advanced capabilities. These findings can inform AMT triage guidelines.



Session XV: Quickshot Session I 1-13
Quickshot 4: WITHDRAWN

WITHDRAWN

OUTCOMES AND COMPLICATIONS OF ECMO SUPPORT IN ISOLATED BLUNT THORACIC TRAUMA

Bardiya Zangbar, MD; Aryan Rafieezadeh, MD; Kartik Prabhakaran, MD;
Anna Jose, MD; Ilya Shnaydman, MD; Matthew Bronstein, MD;
Joshua Klein, DO; Jorge Con, MD; Jordan M. Kirsch, DO
New York Medical College
Invited Discussant: Joshua Hazelton, DO

Introduction: Extracorporeal membrane oxygenation (ECMO) has emerged as a critical intervention in the management of patients with trauma-induced cardiorespiratory failure. ECMO has a pivotal role in stabilizing respiratory and hemodynamic parameters. This study aims to compare outcomes in patients with severe thoracic injuries with and without Venovenous ECMO.

Methods: We did a retrospective review of TQIP (2017- 2021) and included all patients with isolated blunt thoracic injuries with Abbreviated Injury Scale (AIS) ≥ 4 who required intubation. Transferred patients and those dead on arrival were excluded. Patients were divided into two groups of with and without Venovenous ECMO support using propensity score (PS) matching.

Results: Of 14,106 patients with severe thoracic injuries, 9.5% had ECMO support. After excluding, 815 patients were in ECMO group. PS matching resulted in two groups of 812 ECMO and 812 non-ECMO support. ECMO support group had significantly lower in-hospital mortality rates (22.3% vs. 37.3%, $p < 0.001$). However, ECMO group had significantly higher rates of complications including cardiac arrest (27.7% vs. 10.6%), pulmonary embolism (7.6% vs. 2.1%), ventilator associated pneumonia (16.7% vs. 4.2%), unplanned intubation (11.9% vs. 8.5%), unplanned ICU admission (8.4% vs. 4.9%) and unplanned return to operation room (10.1% vs. 2.6%), ($p < 0.001$, for all). Patients in ECMO group had significantly higher hospital (29.46 ± 26.37 vs. 13.59 ± 13.3 days) and ICU (22.96 ± 19.38 vs. 9.38 ± 9.05 days) length of stay (LOS) ($p < 0.001$, for both). In ECMO group, the mean time to perform ECMO was 5.54 ± 5.91 days. As a time dependent relationship, each day earlier initiation of ECMO resulted in decreased hospital and ICU LOS by 67.1% and 59.9%, respectively ($p < 0.001$ for both). Among patients without acute respiratory distress syndrome (ARDS) ($n = 435$ in each group after repeated PS matching), we observed significantly lower mortality rates in ECMO group (26.9% vs. 40%, $p < 0.001$).

Conclusion: While ECMO support in isolated blunt thoracic trauma patients is associated with higher survival rates even in non-ARDS cases, it is associated with higher incidence of complications. These findings emphasize the earlier consideration of ECMO use in severe blunt thoracic trauma.

**HYPERTENSION AFTER BLUNT RENAL TRAUMA:
MYTH OR REALITY?**

Omar Hejazi, MD; Sai Krishna Bhogadi, MD;

Muhammad Haris Khurshid, MD; Audrey L. Spencer, MD;

Tanya Anand, MD, MPH, FACS; Adam Nelson, MD, FACS;

Michael Ditillo, DO, FACS; Marc Matthews, MD, FACS;

Louis J. Magnotti, MD, MS, FACS; Bellal Joseph, MD, FACS

University of Arizona

Invited Discussant: Alexander Schwed, MD

Introduction: Hypertension as a late complication after renal trauma is debated. There is no generalized consensus on the duration of blood pressure monitoring following renal trauma. Our study aimed to determine the prevalence of new-onset hypertension after blunt renal injuries.

Methods: We performed a 4-year retrospective analysis of the Nationwide Readmissions Database 2017-2020. We included all adult (≥ 18 years) trauma patients who sustained blunt renal injuries and excluded those with penetrating injuries, a history of hypertension, and those who developed hypertensive crisis or died during the index admission. The outcome of the study was the prevalence of new-onset hypertension within 6-months of injury. Descriptive statistics and multivariable logistic regression analyses were performed to identify the independent predictors of new-onset hypertension, adjusting for patients' demographics, comorbidities, injury severity, and interventions.

Results: We identified 12,810 adult trauma patients with blunt renal injuries. The mean (SD) age was 39 (18) years, 69% were male, the median [IQR] ISS was 19 [10 – 34], and the median [IQR] abdominal AIS was 3 [2 – 4]. Nearly 91.5% of the patients were managed nonoperatively. The most common procedures performed on index admission were stenting (3.6%), followed by total nephrectomy (2.6%), nephrostomy (1.5%), and partial nephrectomy (0.8%). The rate of new-onset hypertension was 3.3% at 1 month, 4.7% at 3 months, and 5.5% at 6 months after injury. On multivariable regression analysis, increasing age, diabetes, renal artery injury, partial nephrectomy, and nephrostomy were identified as independent predictors of developing new-onset hypertension whereas total nephrectomy was not a predictor (**Table**).

Conclusion: Our findings reveal that the risk of new-onset hypertension increases with time after blunt renal injury with a prevalence of 5.5% at 6 months from injury. Follow-up blood pressure measurements may be required following renal injuries, particularly in older diabetic patients with renal artery injuries undergoing nephrostomy or partial nephrectomy.

Variable	aOR	95%CI	p
Age (every 1-yr increase)	1.04	1.03 – 1.05	<0.001
Renal artery injury	1.48	1.04 – 2.14	0.031
Diabetes Mellitus	1.09	1.05 – 1.18	0.044
Interventions			
No intervention	Ref	Ref	Ref
Total nephrectomy	1.21	0.75 – 1.96	0.441
Partial nephrectomy	7.35	4.44 – 12.18	<0.001
Stent	1.10	0.73 – 1.66	0.652
Nephrostomy	3.04	2.05 – 4.49	<0.001

aOR=adjusted odds ratio; CI=confidence interval; Ref= reference

Session XV: Quickshot Session I 1-13

Quickshot 7: 8:30 AM - 8:36 AM

UTILIZATION OF CARDIOPULMONARY BYPASS IN TRAUMA PATIENTS, AAST-SPONSORED MULTICENTER STUDY

Manish Karamachandani, MD; Nikolay Bugaev, MD; Bethany Doles, BS;

Walter Biffel, MD, FACS; Bishwajit Bhattacharya, MD;

Bryan R. Collier, DO; Zachary M. Bauman, DO;

Claudia Alvarez, MD; Michael D. Goodman, MD; David C. Evans, MD;

Shayan Rakhit, MD; Caroline Park, MD, MPH; Michael Ghio, MD;

Carlos V.R. Brown, MD; Jason Sciarretta, MD

Tufts Medical Center

Invited Discussant: Michael Vella, MD, MBA

Introduction: Cardiopulmonary bypass (CPB) is required to be immediately available in Level I trauma centers. The data regarding the use of CPB after injury is scarce. The purpose of this study was to characterize the utilization and outcomes of CPB after trauma.

Method: This is a retrospective multicenter study of adult trauma patients undergoing CPB from 2011-2021. Demographics, clinical characteristics, and outcomes were reported. Univariate analysis was performed comparing those who survived to discharge versus those who did not.

Results: There were 113 patients from 32 Level I trauma centers with mean age 39.5 ± 15.6 ; with most males (82%); and 27% had comorbid conditions. In total 63% sustained blunt trauma, 70% from motor vehicle crashes. The median (IQR) ISS was 29 (25); and 19% presented in shock. CPB was performed within 2 hours in 39%, and 18% after 24h. The most common injuries were cardiac 43%, thoracic aorta 42%, and 26% had pericardial tamponade. Per operative reports, repair of aorta (31%); emergency preservation & resuscitation (20%); and cardiac repair (15%) were the three most common reasons to use CPB. In-hospital mortality was 22%, with the median day of mortality 1 (IQR 3) days. 60% died in ICU, 36% in OR and one patient died in ED. Median (IQR) hospital length of stay (LOS) of survivors was 17.5 (21) days with 44% discharged home. When comparing survivors and non-survivors, there were no difference in demographics, mechanism of injury, admission vital signs and lab values. Non-survivors had higher median (IQR) ISS 47.5(27.5) vs 29.0 (19.0) $p=0.002$, more lung injuries 56% vs 25% $p=0.006$, and developed cardiac arrest more often 84% vs 13% $p<0.001$. The rate of mortality was 44% when CPB was used for emergency preservation & resuscitation, 24% for cardiac injuries and 14% for aorta repair.

Conclusion: Utilization of CPB for traumatic injuries is extremely rare. The true impact of CPB should be studied in comparison to patients where cardiovascular injuries are repaired without CPB controlling for patients' characteristics, severity, and types of injuries.

Session XV: Quickshot Session I 1-13

Quickshot 8: 8:36 AM - 8:42 AM

**PREGNANCY UNDER PRESSURE: ASSESSING VENOUS
THROMBOEMBOLISM DUE TO TRAUMA-INDUCED
COAGULOPATHY IN PREGNANCY**

Anna Jose, MD; Aryan Rafieezadeh, MD; Mikael Ebanks, MPH;
Kartik Prabhakaran, MD; Jordan M. Kirsch, DO; Ilya Shnaydman, MD;
Matthew Bronstein, MD; Joshua Klein, DO; Bardiya Zangbar, MD
New York Medical College

Invited Discussant: Thomas Duncan, DO

Introduction: Pregnancy induces a hypercoagulable state to protect against peripartum hemorrhage. However, trauma induced coagulopathy can lead to devastating complications. This study aims to compare venous thromboembolism in pregnant women in comparison to non-pregnant women in the setting of a traumatic injury.

Methods: A retrospective analysis using the American College of Surgeons Trauma Quality Improvement Program (ACS-TQIP) was conducted to identify traumatically injured females aged 18 to 45 years between 2020 and 2021. All patients who were transferred, dead on arrival or did not have VTE prophylaxis were excluded. Patients were then dichotomized into two groups, pregnant group (PG) and non-pregnant group (NPG). A logistic regression model was used to generate a propensity score to create inverse probability weighting (IPW) to balance baseline characteristics of cases and controls. The primary outcomes were pulmonary embolism (PE) and deep vein thrombosis (DVT). Secondary outcomes included mortality, and in-hospital complications.

Results: Out of 87,032 patients, 1428 (1.6%) were pregnant. Most common cause of injury in PG group was motor vehicle crash in PG. The mean age was 30.22 ± 7.11 . PG had higher rates of PE (OR: 1.3; 95% CI, 1.124–1.504, $p < 0.001$), DVT (OR: 1.237; 95% CI, 1.094–1.399, $p < 0.001$), unplanned intubations (OR: 1.506; 95% CI, 1.335–1.7, $p < 0.001$), return to operating room (OR: 1.366; 95% CI, 1.242–1.503, $p < 0.001$), ventilator associated pneumonia (VAP) (OR: 2.35; 95% CI, 2.068–2.671, $p < 0.001$), but a lower mortality rate (OR: 0.659; 95% CI, 0.568–0.766; $p < 0.001$).

Conclusion: Our findings suggest that this physiological hypercoagulability in PG is compounded by trauma induced coagulopathy, increasing their risk for VTE. PG also have higher odds of unplanned intubation, unplanned admission to OR and VAP. These findings emphasize the importance of having a low threshold to implement protective measures in this population.

Session XV: Quickshot Session I 1-13

Quickshot 9: 8:42 AM - 8:48 AM

**A MULTICENTER, PROSPECTIVE STUDY OF CALCIUM
DERANGEMENTS ON ARRIVAL TO THE EMERGENCY
DEPARTMENT AFTER MAJOR
TRAUMATIC HEMORRHAGE**

Steven G. Schauer, DO, MS; Susannah Nicholson, MD;

Franklin Wright, MD; Samuel Gentle, BS; Brit Long, MD;

James Aden, PhD; Michael D. April, MD, DPhil, MS;

Andrew D. Fisher, MD, MPAS; Jessica Mendez, MS; Alex Cheng, PhD;

Brian Kirkwood, DDS; Lauran Barry, CCRC; Jennifer Gurney, MD;

Vikhyat Bebarta, MD; Andrew Cap, MD, PhD

United States Army

Invited Discussant: William Chiu, MD

Introduction: Calcium derangement, more specifically hypocalcemia, occurs after trauma, and may be secondary to physiologic effects of hemorrhage or secondary to transfusion. Limited published data also suggests that hypercalcemia may be a deleterious factor. We sought to determine the incidence of abnormal calcium on arrival after major trauma.

Methods: We conducted a prospective, observational, multicenter study at three level 1 trauma centers. An initial ionized calcium (iCa) value was drawn on arrival to the trauma center prior to infusion of any blood products or crystalloid. Descriptive, inferential, and regression modeling were used to describe the outcomes.

Results: Animals resuscitated with cRBCs showed lower MAP compared to hRBCs and fRBCs post-resuscitation. Hepatic injury markers AST and ALT were elevated with cRBCs, whereas hRBCs showed similar AST levels to fRBCs. hRBCs improved sensorimotor and cognitive functions and reduced brain tissue damage up to 28 days compared to cRBCs. hRBCs attenuated blood-brain barrier (BBB) breach and brain edema compared to cRBCs. hRBCs also suppressed MMP-9 production from neutrophils, mitigating MMP-9-mediated BBB breakdown and exerting anti-inflammatory effects in microglia. Comparatively, cRBCs showed decreased superoxide dismutase (SOD) and catalase, with increased thiobarbituric acid reactive substances (T-bars) post-transfusion, indicating an oxidative imbalance. hRBCs restored SOD and catalase levels, similar to fRBCs, suggesting improved oxidative status.

Conclusion: Overall, hRBCs for three weeks provided comparable resuscitation efficacy to fRBCs in TBI with severe HS. Furthermore, hRBCs conferred long-term neuroprotection against TBI with HS, possibly through mitigating MMP-9-mediated BBB disruption and neuroinflammation. Hemanext did not participate in the experiment, data collection, analysis or interpretation.

EQUIVALENT OUTCOMES AFTER OPEN VS. ENDOVASCULAR REPAIR OF TRAUMATIC AXILLOSUBCLAVIAN ARTERIAL INJURY: A PROPENSITY SCORE MATCHED ANALYSIS

Emily A. Grimsley, MD; Melissa A. Kendall, MD; Tyler L. Zander, MD; Michelle D. Lippincott, MD; Sandra M. Farach, MD; Jose J. Diaz, MD; Paul C. Kuo, MD, MS, MBA; Rajavi S. Parikh, DO
University of South Florida

Invited Discussant: Demetrios Demetriades, MD, PhD

Introduction: Despite increased use of endovascular repair (ER) for traumatic vascular injury, large-scale study of the operative management of traumatic axillosubclavian arterial (Ax-Sub) injury has not been performed. We compare patient outcomes after open (OR) vs ER of Ax-Sub injury.

Methods: 2017-2021 TQIP database was queried for adult patients with blunt or penetrating axillary or subclavian artery injury. Patients with severe TBI, death in ED, missing necessary data, or non-operative management were excluded. Propensity score matching (PSM; 1:1) was performed, adjusting for age, sex, ISS, concomitant injuries, blunt vs. penetrating trauma, severity of Ax-Sub injury (AIS <3 vs. ≥3), comorbidities, hypotension, and tachycardia at presentation.

Results: There were 1,517 patients in the study: 1,032 OR and 485 ER cases. OR was more common for severe Ax-Sub injuries (54 vs. 22.1%), axillary injury (67 vs. 39.8%), penetrating injury (67.2 vs. 52%) concomitant upper extremity injury (22.7 vs. 8.7%), and patients with hypotension (21.9 vs. 11.8%) or tachycardia at presentation (51 vs. 43.9%). For both approaches, 6% had combined Ax-Sub injury. Unmatched, OR had higher mortality (8.3 vs. 4.1%, $p < 0.01$) despite shorter time to procedure (2.2 [1.1-4.3] vs. 4 [2.5-8.4] hours, $p < 0.02$). After PSM (485 OR vs. 485 ER), there was no difference in mortality (6.8 vs. 4.1%), length of stay (7 [5-13] vs. 7 [4-13] days), ICU admission rate (80 vs. 81.4%), delayed amputation (2.1 vs. 1.6%), fasciotomy (2.3 vs. 0.6%), or most complications. OR still occurred earlier than ER (2.8 [1.4-5.5] vs. 4 [2.5-8.4] hours, $p < 0.01$). OR had more unplanned reoperations (6 vs. 3.3%, $p = 0.047$), while ER had more unplanned intubations (1.6 vs. 4.5%, $p < 0.01$).

Conclusion: While initial operative decision for traumatic Ax-Sub injury appears to be based on hemodynamic status, location and severity of Ax-Sub injury, and presence of concomitant injury, after adjusting for these factors through PSM, there were no significant differences in major outcomes between OR and ER. This is despite increased time to ER. This implies there is no inherent advantage to OR vs. ER that should dictate surgeon decision making. Thus, continuing to determine operative approach based on patient presentation and surgeon judgement is warranted.

THE IMPACT OF MOTORIST CHARACTERISTICS ON BEING UNDER TRIAGED IN MOTOR VEHICLE COLLISIONS

Sarah Diaz, DO; Shukri Dualeh, MD;

Staci Aubry, MD; Mark R. Hemmila, MD;

Stewart Wang, MD, PhD; Raymond A. Jean, MD, MHS

University of Michigan Medical Center

Invited Discussant: Glen Tinkoff, MD

Introduction: Motor vehicle collisions are one of the most frequent mechanisms of traumatic injuries. Currently, field triage guidelines are utilized to direct emergency personnel on decisions about patient level of care needs and accelerate transfers to major trauma centers. However, even with these guidelines many patients are under triaged possibly leading to inappropriate disposition. Given this, we sought to study associations of the motorist characteristics and the risk of being under triaged.

Methods: We conducted a retrospective study using a novel linkage of publicly available UD10 police reports linked with Michigan Trauma Quality Improvement Program (MTQIP) registry. Inclusion criteria included all MVCs, with only exclusions being motor-pedestrian collisions and patients less than 6 years old. We then compared outcomes of the patients evaluated for traumatic injuries by the details of their MVC, including vehicle age, type of collision, restraint use, and airbag deployment, controlled for patient age and sex. Multivariable logistic regressions were used to identify collision characteristics and calculated triage using both ISS criteria (Cribari Matrix Method) and Need for Trauma Intervention (NFTI) criteria to assess for characteristics that could be predictive for being under triaged.

Results: There were 15,972 cases that were linked to the MTQIP trauma registry. This group contained 42.7% males with mean age 41.7 years (SD 20.1 years). Several collision features were associated with being under triaged. Certain motorist characteristics were more predicative of being under triaged including: age, sex, and race. Being 65 or older, increased the risk of being under triaged, ISS criteria (OR 1.89, 95% CI 1.57-2.29, $p=0.000$) and NFTI criteria (OR 2.51, 95% CI 2.08-3.03, $p=0.000$). Males were also associated with being under triaged: NFTI criteria (OR 1.20, 95% CI 1.04-1.39, $p=0.012$). Nonwhite race was also linked to increase risk of being under triaged: ISS Criteria (OR 0.79, 95% CI 0.67, $p=0.004$).

Conclusions: Integrating motorist characteristics within field triage guidelines, including race, sex, and age could help to decrease risk of being under triaged following MVC, leading to better determination of potential intervention needs at a major trauma center.

**PENETRATING MECHANISM AND HIGH SOCIAL
VULNERABILITY ASSOCIATED WITH LATE SEVERE
PRESSURE-RELATED INJURY IN SPINAL CORD PATIENTS**

ShengXiang Huang, BS; Melissa Canas, MD;

Ricardo Fonseca Ruiz, MD; Douglas Schuerer, MD;

Grace Niziolek, MD; Marguerite Spruce, MD; Lindsay Kranker, MD

Washington University School of Medicine

Invited Discussant: Areti Tillou, MD

Introduction: Pressure-related injuries (PRI) are a significant source of morbidity and mortality following spinal cord injury (SCI). We sought to identify risk factors in SCI patients who require operative PRI debridement.

Methods: We performed two separate retrospective analyses. First, a trauma registry retrospective evaluation was performed of all patients sustaining an SCI at our urban Level 1 Trauma Center from 2018 to 2023 (n=1,396).

Separately, we manually reviewed the charts of all soft tissue debridements within the same period (n=1,288) to identify patients with underlying SCI (n=158). Patients' home addresses were geocoded to match Social Vulnerability Index (SVI), an aggregate score that considers 16 socioeconomic factors at the census tract level. Descriptive and analytical statistics were conducted using Stata.

Results: 1,554 patients were included in data analysis. Compared to the general SCI population, SCI patients requiring operative debridement were younger (47 vs 60 y, $p < 0.0001$) and more likely to be male (84% vs 58%, $p < 0.0001$), black (50% vs 26%, $p < 0.0001$), have a penetrating mechanism (42% vs 5.5%, $p < 0.0001$), have a thoracic injury (45.6% vs 33%, $p < 0.0001$), and higher SVI ($p = 0.0035$) (see Table below). The median time from index injury to operative debridement was 8 years (IQR: 2-23). Most PRIs were Stage 4 (70%) with evidence of osteomyelitis (70%).

Conclusions: Of the PRIs requiring surgical debridement, the proportion of those with underlying penetrating SCI was eightfold higher than the overall incidence of penetrating SCI in our trauma catchment. This cohort suffered severe PRI wounds as reflected in the high incidence of Stage 4 wounds and osteomyelitis. The PRI group's higher SVI indicates an unmet need to provide additional socioeconomic support after discharge that may mitigate PRI burden. Additional research is needed to identify areas for targeted intervention.

	Index Injury (1396)	Surgical Debridement (158)	p-value
Age mean (SD)	60.0 (± 22.7)	47.3 (± 15.8)	<0.0001
Male Gender	812 (58.2%)	134 (84.4%)	<0.0001
Black Race	259 (25.7%)	79 (50.0%)	<0.0001
Penetrating Mechanism	77 (5.5%)	66 (42.0%)	<0.0001

IMPLEMENTATION OF A FRAILTY PATHWAY FOR GERIATRIC TRAUMA PATIENTS RESULTS IN DECREASED COMPLICATIONS AND UNPLANNED INTUBATIONS

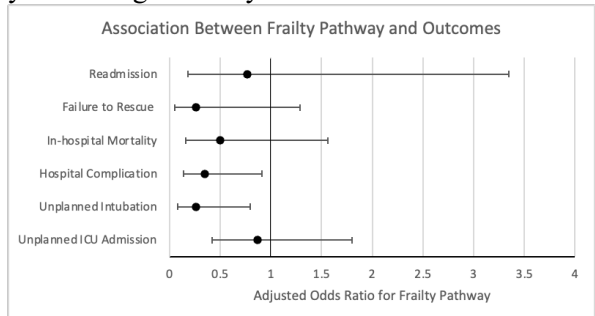
Purvi Patel, MD; Melissa Hornor, MD, MS; John Kubasiak, MD; Richard P. Gonzalez, MD; Hieu Ton-That, MD; Manuel Portalatin, MD; Kevin Galicia, MD; Casey Silver, MD; Michael Anstadt, MD
Loyola University Chicago
Invited Discussant: Molly Jarman, MD, MPH

Introduction: Frailty is a well-established marker of physiologic vulnerability and is associated with morbidity and mortality. Prompt diagnosis and interdisciplinary care pathways can mitigate its effect. We hypothesized that implementation of a frailty identification and treatment pathway would result in improved outcomes for geriatric trauma patients.

Methods: This was a retrospective cohort study of patients ≥ 65 years old, admitted to the trauma service at an academic level I trauma center between April 2021 to Dec 2023. Patients with firm indications for ICU-level care (HR >120 , SBP <90 , and GCS ≤ 10) and those with missing data on frailty were excluded. After August 2022 (initiation of our frailty pathway), patients were screened for frailty upon admission using a 5-point FRAIL scale. If positive, the pathway called for initial triage to the ICU and an interdisciplinary protocol focused on reducing geriatric complications. Patients were compared pre and post pathway implementation. Our outcomes were unplanned ICU admission, unplanned intubation, hospital complication, mortality, failure to rescue, and readmission.

Results: There were 611 geriatric patients included in the study, 271 of which received frailty pathway care. There were no significant differences between the groups in age, mechanism, co-morbidities, ISS, ED GCS, or ED vital signs. After controlling for confounding factors, we found that the frailty pathway predicted lower odds of unplanned intubation (OR 0.26, CI 0.08-0.80) and hospital complications (OR 0.35, CI 0.14-0.91).

Conclusion: Frailty pathway care is significantly associated with decreased risk for unplanned intubation and hospital complications. Identification and treatment of frailty in geriatric trauma patients may result in improved outcomes.





SESSION XVI:
QUICKSHOT SESSION II
14-26

Saturday, September 14, 2024
9:40 AM - 10:58 AM

Location: Concorde Ballroom A
Moderator: Ronald Stewart, MD

LET THE RESIDENT TRY: EVALUATION OF CENTRAL VENOUS CATHETER PLACEMENT IN HYPOTENSIVE TRAUMA PATIENTS USING TRAUMA VIDEO REVIEW

Daniel Holena, MD MSCE; Michael Vella, MD, MBA; Bahaa Succar, MD; Amelia Maiga, MD, MPH; Ryan Dumas, MD; TRVC Investigators

Medical College of Wisconsin/Froedtert

Invited Discussant: Amy Kwok, MD, MPH

Introduction: While intraosseous attempts are faster and more often successful than central venous catheter (CVC) attempts, CVC devices will continue to have a role in the resuscitation of hypotensive trauma patients. Using audiovisual recordings of trauma resuscitations, we sought to identify factors associated with successful placement of CVC devices. We hypothesized that attending surgeons would be both faster and more successful than trainees in the placement of CVC.

Methods: We analyzed data abstracted from audiovisual recordings from a multicenter study of intravascular access in injured patients with initial systolic blood pressure (SBP) <90mmHg. The primary exposure of interest was the training level of the practitioner attempting CVC access (attendings (AT) vs. trainees (TR)). The primary outcomes of interest were the success rates and duration of CVC attempts. Secondary outcomes of interest were these same outcomes stratified by site of attempt (femoral vs. subclavian). We also examined the association between success rates and patient age, gender, injury mechanism, injury severity score (ISS), and initial SBP.

Results: 242 CVC attempts occurred in 176 patients at 13 centers (median age 37 (IQR 27-52), 84% male, median ISS 26 (IQR 17-40), and with initial median SBP 59 (IQR 0-78) mmHg. Trainees performed 172/242 (68%) of CVC attempts, and the overall success did not differ between groups (AT 59% vs. TR 59%, $p=0.96$). Patient age, sex, injury mechanism, and ISS were not associated with CVC success, but success rates were higher in patients with measurable SBP (71% vs. 45%, $p<0.001$). CVC attempts were faster in the AT group than the TR group (median 123 (IQR 70-240) seconds vs. 193 (IQR 120-303) seconds, $p<0.001$). Subclavian attempts were more successful in the AT than TR group (68% vs. 47%) even after accounting for measurable SBP (OR 2.42, 95%CI 1.04-5.63).

Conclusions: Overall, CVC attempts in hypotensive patients were ~1 minute faster but not more successful when performed by attendings vs. trainees. Attendings were also more successful than trainees at subclavian CVC attempts. Our findings support allowing resident CVC attempts even in critically ill patients.

METHAMPHETAMINE USE AND HOMELESSNESS ARE RISK FACTORS FOR TRAUMA RECIDIVISM AND PREMATURE MORTALITY IN SURVIVORS OF VIOLENT INJURIES

Emma K. Worthington, MD; Roger J. Lewis, MD, PhD; Ayesha Ng, BS;

Youngju Pak, PhD; Jennifer A. Smith, MD

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Invited Discussant: D'Andrea Joseph, MD

Introduction: Methamphetamine use and homelessness have markedly increased nationally, and this trend is especially evident among trauma patients. However, no study to date has examined long-term outcomes associated specifically with methamphetamine use and homelessness in trauma survivors. The aim of this study was to measure how methamphetamine use and homelessness impact risks of recurrent injury and premature death in survivors of violent trauma.

Methods: In this retrospective single-institution study, the electronic medical records of patients who presented between 2015-2023 with violent injuries were reviewed for housing status and recurrent injury. Our County Coroner's database was queried to identify any post-discharge deaths. Cox proportional hazards regression models were used in a time-to-event analysis, with death and recurrent traumatic injury as the events of interest, to calculate hazard ratios (HR) and 95% confidence intervals (95% CI) for the risk factors of homelessness and methamphetamine use.

Results: Among the 2,468 patients who met our inclusion criteria, 1,037 (42.5%) tested negative for methamphetamine while 1,401 (57.5%) tested positive, and 1,646 (66.7%) reported having housing while 822 (33.3%) were experiencing homelessness. There were 181 (7.3%) who returned at least once to the ED with a new traumatic injury and 115 (4.7%) who died post-discharge. Meth-positive patients returned to the ED with a new traumatic injury at a rate three times higher than meth-negative patients (HR, 3.15; 95% CI 2.48-3.99), while unhoused patients returned at a rate five times that of housed patients (HR, 4.99; 95% CI 3.82-6.52). When compared to their counterparts, meth-positive patients had a two-fold higher rate of post-discharge death (HR, 1.90; 95% CI 1.44-2.51), and unhoused patients had a three-fold higher rate (HR, 3.25; 95% CI 2.40-4.41).

Conclusion: Methamphetamine use and homelessness significantly increase risk of premature death and recurrent traumatic injury in survivors of violent trauma. It is imperative that trauma care includes mandatory screening for substance use and housing insecurity. Additional study is needed to identify effective interventions to improve long-term outcomes.

PREDICTING FUTILITY IN HEMORRHAGING TRAUMA PATIENTS UTILIZING 4-HOUR TRANSFUSION VOLUMES AND RATES

Jan-Michael Van Gent, DO; Thomas W. Clements, MD;

Bedda Rosario-Rivera, PhD; Stephen Wisniewski, PhD;

Frank Guyette, MD; Jeremy Cannon, MD, SM; Martin Schreiber, MD;

Ernest E. Moore, MD; Nicholas Namias, MD, MBA; Joseph Minei, MD;

Jason Sperry, MD, MPH; Bryan A. Cotton, MD

The University of Texas Health Science Center at Houston

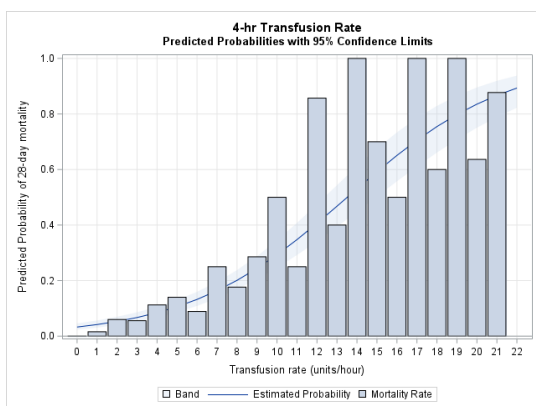
Invited Discussant: Anupamaa Seshadri, MD

Introduction: Blood shortages and increased stewardship have motivated the trauma community to evaluate futility cut-points during massive transfusion (MT). Recent single center studies have confirmed meaningful survival in ultra-MT (≥ 20 units), while others advocate for earlier futility cut-points. We sought to evaluate whether transfusion volume and intensity cut-points could predict 100% mortality in a multicenter analysis.

Methods: A prospective, multicenter, observational cohort study was performed at 7 trauma centers, enrolling patients requiring both blood transfusion and hemorrhage control procedures. Transfusion volumes and rates (units/hour) were evaluated. Primary outcome was 28-day mortality.

Results: 1047 patients met inclusion with an overall mortality rate of 17%. Median age was 35, 80% male, 62% penetrating, with an ISS of 22. At 4-hr, volumes below 110 units and transfusion intensity averaging ≥ 21 units/hr did not demonstrate futility. Total transfusion volumes >110 units were associated with 100% mortality ($n=9$). At 24-hr, survival was observed >120 units and up to sustained transfusion of 10 units/hr, with 100% mortality being observed at transfusion velocities ≥ 11 units/hr. (FIGURE).

Conclusion: In this study from seven level-1 trauma centers, survival was observed at transfusion volumes up to 110 units and at transfusion velocities of 21 units/hr during the first 4 hours of resuscitation. Data are limited on transfusion volumes above 110 units in the first 4 hours.



PREDICTORS OF HEALTHY DAYS AT HOME: BENCHMARKING LONG-TERM OUTCOMES IN GERIATRIC TRAUMA

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Invited Discussant: Jon Simmons, MD

Introduction: Quality benchmarking has recently evolved from a historical focus on short-term morbidity and mortality as the key metrics to assessing long-term outcomes. Long-term quality metrics have been shown to provide a more complete assessment of geriatric trauma care. Among these metrics, patients’ average number of healthy days at home (HDAH) reports to be a useful administrative claims-based marker of patient functional status. Our goal was to determine the predictors of HDAH among injured older adults.

Methods: Medicare inpatient claims (2014-2015) were used to identify all geriatric trauma patients. Patients’ number of HDAH was measured from the date of discharge and calculated as the total sum of patients’ time during that period less any time spent in the hospital or emergency department, step-down/rehabilitation/nursing care, home health, or after death within a 365-period after index admission. Controlling for demographic, injury severity, and hospital-level characteristics, multivariable regression analyses were performed to identify the factors associated with increased HDAH.

Results: We included 772,109 geriatric trauma patients. Mean age was 82.15 (SD 8.49), 68.3% were female, and 91.6% were white. Median HDAH was 351 (IQR 351–355) days. After adjusted analysis, predictors of 365-day HDAH are shown in the table. Age, black race, CCI, care at a Level 2/3/non-trauma center were associated with fewer HDAH.

Conclusions: This study suggests that higher level trauma centers provide more healthy days at home after index admission for injured older adults. Future studies should focus on correlating healthy days at home with more granular but less readily accessible quality of life metrics.

Variables	Adjusted Coefficient	95% CI
Age	-1.16	-1.18 – -1.14
Female sex	3.54	3.17 – 3.90
Race (ref. White)		
Black	-2.18	-3.03 – -1.33
Other	2.91	2.08 – 3.74
Injury Severity Score	0.06	0.03 – 0.09
Charlson Comorbidity Index	-5.55	-5.66 – -5.44
Teaching hospital	1.35	0.77 – 1.93
Hospital size (≥200 beds)	0.81	0.37 – 1.26
Admitting Hospital (Ref. Level 1)		
Level 2 Trauma Center	-0.85	-1.45 – -0.25
Level 3 Trauma Center	-1.86	-2.56 – -1.16
Non-Trauma Center	-1.35	-1.96 – -0.73

SOCIAL VULNERABILITY PROVOKES A HYPERCOAGULABLE STATE IN TRAUMA

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Charlotte Heron, MD; Benjamin W. Stocker, MD;
Denise Garofalo, MD; Sanchayita Mitra; Quintin WO Myers, PhD;
Ernest E. Moore, MD; Christopher C. Silliman, MD, PhD;
Jessica Cardenas, PhD; Michael Cripps, MD;
Catherine G. Velopulos, MD, MHS; Mitchell J. Cohen, MD
University of Colorado
Invited Discussant: Julia Coleman, MD, MPH

Introduction: Previous research links the complex associations between social determinants of health to worse trauma outcomes in vulnerable populations. The Centers for Disease Control and Prevention's Social Vulnerability Index (SVI) is a composite census tract level measure of 16 variables created to examine the complex interaction of demographic, social and socioeconomic factors that impact not only the community, but individuals as well. At present, SVI has been identified as increased risk of inpatient trauma mortality; however, its influence on the fundamental biologic response to injury has not been examined. We sought to examine the effect of SVI on coagulation function and proteomics after severe injury.

Methods: Patients from our Trauma Activation Protocol Database (2014-2018) were assigned SVI based on residential address and grouped into low SVI (<75 %ile) and high SVI (>75 %ile) cohorts. Multiple regression was used to adjust omics data for injury severity and base excess before proteome-wide comparisons between high SVI and low SVI. Proteomic signatures from trauma plasma were compared between groups, stratified by injury severity, shock, sex and ethnicity. TEG data was analyzed by the Wilcoxon-Mann-Whitney test for non-normally distributed continuous variables.

Results: 74 patients with High Injury/High Shock were included (44 [59%] low SVI, 30 [41%] high SVI). High SVI was associated with a hypercoagulable phenotype with a greater rate of clot propagation (angle 70.5 in low SVI vs. 73.6 in high SVI, $p=0.034$) higher clot strength (MA 57.9 in low SVI vs. 62.0 in high SVI, $p=0.036$), and diminished clot fibrinolysis (LY30 0.75 in low SVI vs. 2.5 in high SVI, $p=0.045$). Proteomics signatures demonstrated enrichment in proteins associated with hemopoiesis, coagulation and apoptotic pathways among high SVI patients compared to low SVI patients.

Conclusion: High SVI patients exhibit a hypercoagulable phenotype, affecting clot propagation, strength, and fibrinolysis and a pro thrombotic proteomic milieu. Our data highlight the role of social vulnerability on the biologic response to injury and emphasize the previously unknown complex interplay between social factors and the fundamental biologic response to trauma.

THE TPA CHALLENGE THROMBOELASTOGRAM (TPA-TEG) PROVIDES A COMPREHENSIVE ASSESSMENT OF FIBRINOLYSIS IN THE SEVERELY INJURED

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University of Nebraska Medical Center

Invited Discussant: Parker Hu, MD

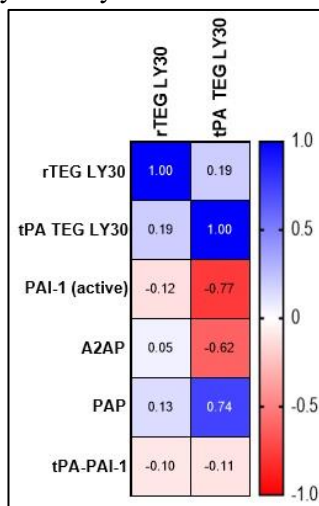
Introduction: Tissue-plasminogen activator added to thromboelastography (tPA-TEG) predicts massive transfusion (MT) and mortality better than conventional rapid TEG (rTEG), with little concordance between their lysis values (LY30). We hypothesized that the main fibrinolytic inhibitors plasminogen activator inhibitor-1 (PAI-1) and alpha-2 antiplasmin (A2AP), and markers of fibrinolytic activation (plasmin-antiplasmin (PAP) and tPA-PAI-1 complex), would correlate more strongly with tPA-TEG versus rTEG LY30 and may explain the recent findings of four distinct fibrinolytic phenotypes in trauma based on these two TEG methodologies.

Methods: Adult trauma patients (n=56) had tPA-TEG, rTEG and plasma obtained on arrival to the emergency department with IRB approval. PAI-1 activity, A2AP, PAP, and tPA-PAI-1 complex levels were measured. Data were analyzed using Spearman’s correlations and ANOVA.

Results: Median age was 34, 75% were male, and the NISS was 14. Mortality was 25%, and 23% required a MT. There was a significant negative correlation between PAI-1 activity and A2AP with tPA-TEG LY30 ($r=-0.77$, $p<0.0001$ and $r=-0.62$, $p<0.0001$). There was a significant positive correlation between PAP complex and tPA-TEG LY30 ($r=0.74$, $p<0.0001$). There was no correlation between any fibrinolytic analyte and rTEG LY30.

When stratified by phenotype, patients with hypofibrinolysis and non-pathologic fibrinolysis had higher A2AP levels ($p<0.05$), lower PAP ($p<0.05$) and tPA-PAI-1 complex ($p<0.05$) than true hyperfibrinolysis and fibrinolysis shutdown.

Conclusion: tPA-TEG LY30 more accurately reflects fibrinolysis phenotypes in trauma patients than conventional TEG methods. This provides an explanation for tPA-TEG’s superior performance over rTEG in predicting massive transfusion and mortality.



BARRIERS TO USING TELEMEDICINE TO IMPROVE SECONDARY TRIAGE IN A RURAL TRAUMA SYSTEM

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Invited Discussant: Jasmeet Paul, MD

Introduction: Level I/II trauma centers in rural regions often face high rates of secondary overtriage which leads to inefficient resource utilization.

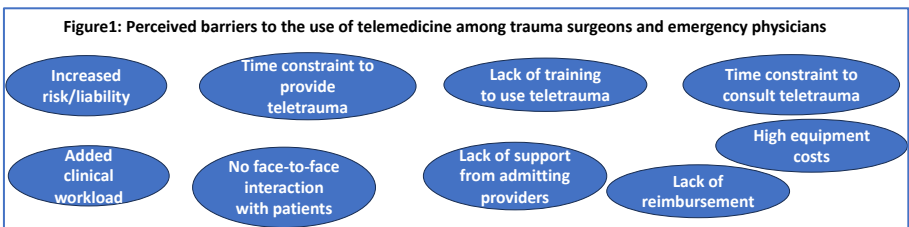
Evidence suggests telemedicine use for trauma care (teletrauma) can help decrease the rate of secondary overtriage. However, teletrauma is not being widely used and the reasons for its low utilization remain unknown. The objective of this study was to identify physician perceived barriers to using teletrauma to improve secondary triage in a rural trauma system.

Methods: We used nominal group technique (NGT), a novel qualitative research method to identify and prioritize physician perceived barriers to using teletrauma using ranked choice voting. Four NGT panels were convened; two included trauma surgeons (n=14) at level I/II trauma centers and two included emergency physicians(n=6)at level III/non-trauma centers.

Results: Overall, 98 barriers were identified and 44 (45%) barriers were prioritized through ranked choice voting. Highest voted barriers among trauma surgeons identified concerns regarding increased risk/liability, additional clinical workload amid time constraints and lack of face-to-face interaction with patients. Highest voted barriers among emergency physicians identified concerns regarding time constraints to be on a teletrauma call while actively delivering bedside trauma care, high equipment cost, lack of reimbursement, lack of training to use teletrauma and lack of support from admitting providers to admit patients locally.

Conclusion: Trauma surgeons and emergency physicians identified unique barriers to using telemedicine. While precedents from other telehealth programs exist to resolve some of these barriers, directed effort is needed to address trauma care-specific barriers to using teletrauma.

Figure1: Perceived barriers to the use of telemedicine among trauma surgeons and emergency physicians



2024 AAST PANCREAS INJURY GRADING UPDATE: BETTER GRADING FOR IMPROVED UNDERSTANDING OF MANAGEMENT OUTCOMES

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Marie Crandall, MD, MPH, FACS; Kevin M. Schuster, MD, MPH; Mark McOmber, MD; Richard Southard, MD; Chad Ball, MD

Phoenix Children's Hospital

Invited Discussant: Allison McNickle, MD, MS

Introduction: The AAST Organ Injury Scale (OIS) Committee published the original Pancreas OIS in 1990 with the authors commenting that the classification would need “continued refinement as clinical experience dictates.” After 34 years, the purpose of this revision is to improve the alignment between pancreatic injury grade, severity, as well therapeutic, diagnostic, and clinical pathways.

Methods: A working group of the AAST, including trauma and pediatric surgeons, experts in radiology, and interventional GI participated. Contemporary research was reviewed, and a standardized iterative and collegial process utilized over several months to arrive at consensus.

Results: Major changes to the grading system include moving contusions of the pancreatic head (without laceration or ductal injury) down from grade IV to grade I. All lacerations without ductal injury are grade II. Injuries to the duct remain grade III, but are further subclassified to distinguish between suspected, partial, and complete ductal transection. Grade IV injuries are now ductal injuries right of the portal vein or SMV. Grade V are destructive injuries of the head with non-viable tissue.

Conclusion: We propose a revised Pancreas OIS schema based on current literature and understanding of imaging limitations. Though validation will be necessary, increasing grades should now more closely reflect increasing injury severity. Management based on grade and subgrade will allow for improved analysis of clinical outcomes.

Grade	Subgrade	Grade Criteria	Sub Grade Criteria
I	A	Pancreatic injury without laceration/hematoma	Peripancreatic edema without visible pancreatic injury
	B		Pancreatic contusion without hematoma or laceration
II	A	Parenchymal laceration/hematoma in any location, without evidence of main duct injury	Overlying or left of the portal vein/SMV
	B		Right of the portal vein/SMV
III	A	Main duct injury overlying or to the left of the portal vein/SMV	Suspected ductal injury based on depth of injury >50%
	B		Confirmed main duct injury with ductal alignment
IV	A	Main duct injury to the right of the portal vein/SMV	Confirmed main duct injury - completely transected and/or distracted
	B		Suspected ductal injury based on depth of injury
V	A	Destructive injury of pancreas with non-viable pancreatic head (blast injury or crushed pancreatic head)	Confirmed main duct injury with ductal alignment
	B		Confirmed main duct injury - completely transected and/or distracted
	C		with intact main pancreatic duct in head
	D		with injury of main pancreatic duct

GERIATRIC TRAUMA PROGRAMS: WHAT IS THE BENEFIT?

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Invited Discussant: Nicole Goulet, MD

Introduction: Multiple studies have validated frailty index scores - including the ISAR screening tool - at predicting elderly patients at risk of adverse outcomes in both the medical and surgical setting. Early involvement of the geriatric team has been proposed to improve outcome measures. We set out to evaluate the effect of ISAR screening and automatic consultation with the geriatrics team on our trauma patient population

Methods: The trauma ISAR screening program began at our facility on 11/1/2021. During the leading nine-month period, we retrospectively reviewed our trauma database to identify 548 patients aged 65 years and older admitted to the hospital who met ISAR criteria and did not have a consultation by the geriatric team. We compared these patients to the post intervention group, consisting of 270 patients who screened ISAR positive and were evaluated by the geriatric trauma team for the trailing nine months following program initiation. Primary endpoints included hospital and ICU length of stay (LOS), 30-day readmission, mortality, and discharge disposition.

Results: For the two intervention groups, there was no difference in mortality or discharge disposition. Average hospital LOS was 6.8 days in the pre-intervention group and 9.7 days in the post-intervention group. Of those patients admitted to the ICU, the average LOS was 4.3 days in the pre-intervention group and 5.8 days in the post-intervention group. Average age and average injury severity scores were 82.9 and 8.25 for the pre-intervention group and 81.7 and 10.06 for the post-intervention group. 30-day readmission rates were 1.1% vs. 0.4% before and after intervention, respectively.

Conclusions: Our retrospective study shows a defined ISAR screening and geriatric trauma team consult program leads to increased hospital and ICU length of stay without a difference in mortality or discharge disposition. With the increased geriatric trauma patient admission rates and geriatrician utilization, further studies are needed to better define the healthcare benefit of these initiatives.

**IMPLEMENTATION OF A COLON MANAGEMENT GUIDELINE:
INCREASING RATE OF SAFE ANASTOMOSIS IN EMERGENCY
GENERAL SURGERY PATIENTS**

Elizabeth C. Wood, MD; Mary Alyce McCullough, MD;
Hope E. Werenski, MD; Nicholas Major, MD; Heather Ots, MD;
Kristina Fioretti, MD; Bonnie Laingen, MS; Thomas Sullivan, BS;
Rachel Appelbaum, MD; Nathan Mowery, MD; Shayn Martin, MD;
Matthew Painter, MD; Preston Miller, MD
Wake Forest

Invited Discussant: Jacinta Robenstine, MD

Introduction: Creation of a colostomy versus anastomosis remains a controversial topic in emergency general surgery (EGS) patients requiring emergent or urgent colon resection. In 2017, our institution standardized the indications for colostomy creation in EGS patients which included the presence of septic shock, poor tissue condition at the anastomotic site, and underlying medical conditions associated with poor wound healing. In the absence of these conditions, the guideline recommended anastomosis. The goal of this study is to examine rates of colostomy, anastomosis, and abdominal complications before (PRE) and after (POST) guideline implementation.

Methods: This is a single-institution, retrospective review of EGS patients over a 10-year period who underwent urgent or emergent colon resection by the EGS service. Demographics, comorbidities, operations, pre- and post-operative courses were recorded and analyzed before and after implementation of colectomy management guidelines.

Results: Between 1/1/2013 and 10/31/2022, 710 patients underwent segmental colon resection (283 PRE/427 POST). The PRE and POST groups were similar with respect to sex (F 48.1% vs. 51.8%, $p=0.43$), Charlson Comorbidity Index (3.7 ± 2.8 vs. 3.8 ± 2.8 , $p=0.50$), and ASA score (3.5 ± 8.6 vs. 3.4 ± 8.8 , $p=0.08$). Anastomosis was significantly more common in the POST group as compared to PRE (65.6% vs. 44.5%, $p<0.0001$). Intestinal leak, abscess, and wound dehiscence rates were similar in the PRE and POST groups (4.7 vs. 5.2, $p=0.51$, 14.1 vs. 14.7, $p=0.50$, 5.5 vs. 2.4, $p=0.10$, respectively) despite fewer colostomies.

Conclusion: Implementation of an EGS colon management guideline was associated with a significantly higher rate of anastomosis creation but no concomitant increase in leak or abdominal complication rate. This study supports the safety of anastomosis in over 60% of appropriately selected patients despite the urgent/emergent nature of their colon resections.

**RISK FACTORS FOR DVT IN PEDIATRIC TRAUMA PATIENTS:
A 5 YEAR REVIEW OF THE NTDB**

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University of Nevada, Las Vegas

Invited Discussant: Katherine T. Flynn-O'Brien, MD, MPH

Introduction: Pediatric trauma patients receive venous thromboembolism (VTE) prophylaxis less often than adult trauma patients, but they still have a relatively low rate of deep venous thrombosis (DVT) and pulmonary embolisms (PE). Prior literature suggests that patients with lower extremity orthopedic injuries, traumatic brain injuries, more severely injured patients and older children may be at risk of these complications, but these risk factors have not been examined together for a large population group.

Method: The National Trauma Data Bank (NTDB) was queried from 2017-2022 for pediatric patients, aged ≤ 17 years old, and patients with DVT, PE or both were identified from this subset. Categorical variables were analyzed with χ^2 test and continuous variables were analyzed with t-test. A logistic regression model was performed to determine risk factors for DVT and PE in pediatric trauma patients.

Results: From 2017-2022, there were 696,592 pediatric trauma patients. Of these, 786 had DVT (0.11%) and 194 had PE (0.03%), totaling 980 patients. The DVT group was older (13.63 vs 9.70 years, $p < 0.00001$) and was more likely to be male (71.63% vs 64.65%, $p < 0.00001$), have gone to the OR immediately (41.6% vs 14.63%, $p < 0.0001$), have received packed red blood cells (PRBC) ≤ 4 hours of arrival (47.71% vs 9.92%, $p < 0.0001$), have received fresh frozen plasma (FFP) ≤ 4 hours of arrival (58.14% vs. 49.55%, $p < 0.0001$), have an ISS > 15 (87.02% vs. 43.41%, $p < 0.0001$), have a penetrating injury (5.85% vs. 1.01%, $p < 0.0001$), and have a long bone fracture (1.4% vs. 0.18%, $p < 0.0001$). A logistic regression model demonstrated that age ≥ 13 years had an odds ratio (OR) of 1.788 with confidence interval (CI) 1.088-2.937 ($p = 0.022$). Other significant risk factors included PRBC ≤ 4 hours of arrival (OR: 3.915, CI: 2.070-7.414, $p < 0.0001$), ISS > 15 (OR: 13.299, CI: 5.166-34.236, $p < 0.0001$), long bone fracture (OR: 3.878, CI: 1.043-14.416, $p = 0.043$), and VTE prophylaxis administered more than 6 days after admission (OR: 23.073, CI 14.085-37.795, $p < 0.0001$).

Conclusions: VTE prophylaxis should be considered in pediatric patients who are ≥ 13 years old, received PRBC ≤ 4 hours of arrival, severe ISS, or long bone fractures; delayed VTE prophylaxis more than 6 days after arrival increases risk of DVT in patients with these risk factors.

SOCIAL DETERMINANTS OF HEALTH AFFECT THE PHYSICAL AND MENTAL HEALTH OF INJURED ADULTS IN AMERICA

Alexandra H. Hernandez, MD; Nina M. Clark, MD;

Erika Bisgaard, MD; Deepika Nehra, MD; Barclay Stewart, MD, PhD;

Eileen M. Bulger, MD, FACS; Joseph Dieleman, PhD;

Douglas Zatzick, MD; John W. Scott, MD, MPH

Harborview Medical Center

Invited Discussant: Nancy Parks, MD

Introduction: Although increased attention is being placed on social determinants of health (SDOH) and modifiable unmet social health needs (USNs) of injured people, there are currently no national estimates of SDOH prevalence and associated post-injury health outcomes.

Methods: We analyzed data from the nationally representative 2019-2021 Medical Expenditure Panel Survey. We identified all injured adults requiring emergency or inpatient care and compared them to age- and sex-matched uninjured controls. SDOH factors included financial strain, environmental stressors, discrimination, social isolation, adverse childhood experiences (ACEs) and 3 USNs (food insecurity, housing instability, and poor access to transportation). We then evaluated the association between USNs and physical health, mental health, and delaying care due to cost.

Results: Among a weighted sample of 21,799,813 injured adults and 114,880,510 uninjured controls, trauma was associated with higher prevalence of all SDOH factors (**Table**). Injured adults had a greater number of ACEs than their matched controls (3.5 vs 3.1, $p < 0.001$). Compared to injured adults without USNs, those with USNs had increased odds of poor physical health (OR: 1.46 [95%CI: 1.06-2.01]), poor mental health (OR: 1.94 [1.4-2.69]) health and delaying care due to cost (OR: 2.48 [1.65-3.76]).

Conclusions: Injured adults in the United States have a high burden of negative SDOH and USNs. Modifiable USNs are correlated with worse physical and mental health, and delays in care due to cost. These findings suggest that screening for, and developing affordable ways to address USNs might improve long-term mental and physical health among injured adults.

Table. Prevalence of SDOH Factors Among U.S. Trauma Patients

	Control (%)	Trauma (%)	aOR (95% CI)
Discrimination	31%	37%	1.34 (1.17-1.53)
Environmental Stress	24%	32%	1.51 (1.32-1.74)
Social Isolation	13%	20%	1.61 (1.36-1.92)
Financial Strain	43%	62%	2.14 (1.82-2.52)
Limited Transportation (USN)	39%	43%	1.18 (1.01-1.37)
Housing Instability (USN)	57%	63%	1.24 (1.07-1.44)
Food Insecurity (USN)	18%	31%	2.02 (1.72-2.37)

**THROMBOEMBOLIC EVENTS AFTER ADMINISTRATION OF
TRANEXAMIC ACID (TXA) IN PATIENTS WITH BLUNT
THORACIC TRAUMA**

Shannon Greenberg, MD; Rodica Muraru, MD, MPH; Tyler Carcamo, MD;

Brianna Harvey; Kaleigh Falimirski; Ethan Falimirski;

Ian E. Brown, MD, PhD; Linda Schutzman, MD

Indiana University Hospital

Invited Discussant: Rondi Gelbard, MD

Introduction: Patients with blunt thoracic trauma are twice as likely to experience a pulmonary thromboembolic event compared to other trauma patients. The reported risk of thromboembolic events in trauma patients who receive TXA has been mixed. Our study analyzed the effects of tranexamic acid administered to patients with blunt thoracic trauma on thromboembolic complications.

Methods: Multicenter retrospective, observational study conducted between 2010-2022 at 2 US level 1 trauma centers. Adult patients aged 18 and older with blunt trauma and a chest abbreviated injury scale (AIS) ≥ 3 were included. The occurrence of thromboembolic events between those who received TXA and those who had not received TXA were compared using Chi-square test. The primary outcome was thromboembolic events, which included deep venous thrombosis, pulmonary embolism, myocardial infarction, and stroke.

Results: A total of 12,453 patients were analyzed: 793 (6.4%) patients who received TXA and 11,660 (93.6%) who did not. Of the patients who received TXA, 53 (6.7%) patients had a thromboembolic event (DVT 3.8%, PE 2.3%, MI/CVA 0.6%), and 296 (2.5%) of those who did not receive TXA had a thromboembolic event (DVT 1.3%, PE 0.5%, MI/CVA 0.7%). A logistic regression on 10,240 complete cases was completed. After controlling for age, gender, race, ethnicity, systolic blood pressure (SBP), heart rate (HR), respiratory rate (RR), Revised Trauma Score (RTS), and Glasgow Coma Scale (GCS), patients who suffered blunt thoracic trauma and received Tranexamic Acid (TXA) were 2.4 times more likely to experience thromboembolic complications than those who did not receive TXA. (OR 2.4, 95% CI 1.9-4.43, $p < 0.001$, Hosmer-Lemeshow goodness of fit p -value=0.99).

Conclusions: Patients with severe, blunt thoracic trauma who receive TXA are 2.4 times more likely to have a thromboembolic complication compared to those who did not. Complications associated with the use of TXA in this patient population warrant further investigation.

POSTERS



SESSION X: POSTER SESSION

Thursday, September 12, 2024
12:45 PM - 1:45 PM

Location: Rivoli BR

Group One: (#1-10) Abdominal Trauma and EGS
Poster Professors: Ajai Malhotra, MD and Faran Bokhari, MD

Group Two: (#11-20) Critical Care
Poster Professors: Laura Haines, MD and Michael Cripps, MD

Group Three: (#21-30) Geriatrics
Poster Professors: Kaitlin Ritter, MD and Jacob Glaser, MD

Group Four: (#31-40) Health Disparities
Poster Professors: Matthew Martin, MD and Caitin Fitzgerald, MD

Group Five: (#41-49) Pediatrics and Injury Prevention
Poster Professors: Tanya Anand, MD, MPH and
Patricia Ayoung-Chee, MD, MPH

Group Six: (#50-59) Neurological Trauma and Global Health
Poster Professors: Kazuhide Matsushima, MD and Fariha Sheikh, MD

Group Seven: (#60-68) Organ-based Trauma
Poster Professors: Nicole Werner, MD and David Blake, MD, MPH

Group Eight: (#69-78) Preclinical/Translational
Poster Professors: Todd Costantini, MD and Gabrielle Hatton, MD, MS

Group Nine: (#79-88) Shock/Transfusion
Poster Professors: Lucy Kornblith, MD and Angela Ingraham, MD, MS

**Group Ten: (#89-#98) Trauma Systems, Epidemiology and
Health Economics**
Poster Professors: Gail Tominaga, MD and Lara Senekjian, MD

DON'T WAIT, OPERATE! LATE CHOLECYSTECTOMY IN PREGNANCY IS ASSOCIATED WITH PREGNANCY RELATED ADVERSE OUTCOMES

Melissa A. Kendall, MD; Tyler Zander, MD;
Emily Grimsley, MD; Johnathan Torikashvili, BS;
Jose J. Diaz, MD; Thomas Herron, MD; Paul Kuo, MD, MS, MBA
University of South Florida

Introduction: Delayed intervention for acute cholecystitis (AC) is associated with higher costs, longer length of stay (LOS), and more operative complications. Time to intervention and outcomes has not been evaluated in pregnant patients. We aim to evaluate the association between time to intervention and pregnancy related adverse outcomes (PRAO).

Methods: New York Statewide Planning and Research Cooperative System inpatient dataset was queried for adult pregnant patients presenting with AC from 2016 to 2020. Exclusion criteria included patients who received a cholecystectomy prior to admission, had a concurrent diagnosis of choledocholithiasis or gallstone pancreatitis, or were in labor on admission. Early cholecystectomy (EC) was defined as occurring within 72 hours of admission, and late cholecystectomy (LC) at ≥ 72 hours after admission. Univariable analysis was performed.

Results: 203 patients were included: 71 in their first trimester, 103 in their second, and 29 in their third. The rate of spontaneous abortions in second trimester was higher in patients who underwent LC, compared to EC (6 vs. 0%, $p < 0.05$); there was no statistically significant difference for first or third trimester patients. Regardless of trimester, length of stay (5 (5-7) vs 2 (2-3)) and total charges (\$60,249.04 (44,359.9-\$84,291.68) vs \$32,692.15 (23,176.45-\$48,094.84)) were higher in the LC group ($p < 0.001$).

Conclusion: For pregnant patients with AC, LC is associated with longer LOS and higher total charges. Pregnant patients in the second trimester who underwent LC had higher rates of spontaneous abortion, indicating EC is should be offered for second trimester patients.

DRIVING ADOPTION: PERSPECTIVES DIFFER ON LAP COMMON BILE DUCT EXPLORATION FOR ACS AND MIS SURGEONS

Maggie Bosley, MD; Elizabeth C. Wood, MD;
Juhi Saxena, BS; Gabriel Cambroner, MD; Gloria Sanin, MD;
Lucas P. Neff, MD; Ranjan Sudan, MD
Washington University in St. Louis

Introduction: Cholelithiasis (CDL) is frequently encountered in emergency general surgery and need for endoscopic clearance can extend hospital stays and drive-up costs. Laparoscopic common bile duct exploration (LCBDE) can mitigate this problem but requires greater adoption. Outreach efforts must begin by understanding practice patterns, attitudes, and barriers. Acute care surgeons' (ACS) perspectives on LCBDE are not well described and this technique has generally been viewed as an advanced minimally invasive skill. Therefore, we surveyed and compared ACS and minimally invasive (MIS) surgeons on CDL management.

Methods: A survey of CDL management preferences was developed by content experts and distributed by email to members of the Society of American Gastrointestinal and Endoscopic Surgeon (SAGES) and the American Association for the Surgery of Trauma (AAST). Results were analyzed utilizing descriptive statistics.

Results: A total of 543 US surgeons performing laparoscopic cholecystectomy completed the survey (ACS=124, MIS=175). Similar proportions of ACS and MIS surgeons preferred to manage cholelithiasis by LCBDE (27% vs 28%). A majority (86%) of both cohorts asserted that ERCP and laparoscopic cholecystectomy (LC) would be associated with increased length of stay as compared to LCBDE+LC. MIS surgeons perform cholangiogram more frequently than ACS surgeons (Figure 1). A greater percentage of ACS surgeons favored LCBDE than MIS (58% vs 49%, $p=.02$). Neither group felt that routine LCBDE would negatively affect patient referral patterns (11% vs 6%, $p=0.13$). A third of MIS surgeons felt that LCBDE was too time consuming versus 25% of ACS surgeons ($p=0.37$). When asked if LCBDE is a difficult skill to master, 56% of MIS surgeons agreed compared to only 32% of ACS surgeons ($p<0.01$).

Conclusion: LCBDE is underutilized by both ACS and MIS surgeons, but ACS surgeons are more apt to advocate for surgical management of CLD. Courses and educational content designed to teach these techniques may drive adoption in ACS and decrease healthcare costs and lengths of stay. Understanding surgeon perspectives can enhance outreach to target audiences.

PROGNOSTIC PERFORMANCE OF THE PREHOSPITAL NATIONAL EARLY WARNING SCORE (pNEWS) IN PATIENTS WITH ACUTE ABDOMEN SYNDROME

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Yokohama City University Medical Center

Introduction: The National Early Warning Score (NEWS, Fig.1) is utilized in emergency departments and rapid response teams as a prognostic indicator for acute illnesses. It has been reported that the prehospital NEWS (pNEWS), based on vital signs assessed before transportation, may be associated with in-hospital mortality. The aim of this study was to compare pNEWS and in-hospital mortality among patients undergoing emergency surgery for acute abdomen.

Methods: This retrospective observational study was conducted on patients aged 16 years or older who underwent emergency abdominal surgery at a tertiary care center from April 2020 to August 2023. The primary outcome assessed was in-hospital mortality, with the predictive performance of pNEWS evaluated using receiver operating characteristic (ROC) analysis.

Results: Fifty-two patients underwent emergency laparotomy for acute abdomen, resulting in an in-hospital mortality rate of 7.7% (4/52). Half of the patients had gastrointestinal perforation, followed by bowel obstruction. Non-survivors included cases of gastrointestinal perforation, bowel obstruction, and bowel ischemia, all of which were associated with NEWS of 7 points or higher. The area under the ROC curve for pNEWS(Fig.2) was 0.779 with a cut-off value of 7(sensitivity 1.000, specificity 0.625).

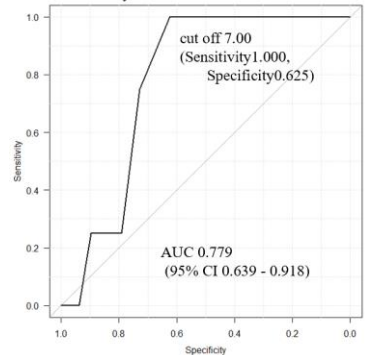
Conclusion: The pNEWS may be a useful prognostic tool for assessing acute abdomen cases before transportation.

Fig.1 National Early Warning Score (NEWS).

Physiological parameters	3	2	1	0	1	2	3
Respiratory Rate	≤ 8		9-11	12-20		21-24	≥ 25
Oxygen Saturations	≤ 91	92-93	94-95	≥ 96			
Any Supplemental Oxygen		Yes		No			
Temperature	≤ 35.0		35.1-36.0	36.1-38.0	38.1-39.0		≥ 39.1
Systolic Blood Pressure	≤ 90	91-100	101-110	111-219			≥ 220
Heart Rate	≤ 40		41-50	51-90	91-110	111--130	≥ 131
Level of Consciousness				A			V, P, or U

A: alert, V: voice, P: pain, U: unresponsive

Fig.2 Diagnostic Ability and Test Performance of NEWS to Predict Mortality.



THE SECOND VICTIM IN EMERGENCY SURGERY: THE TOLL OF HOSPITALIZATION ON INFORMAL CAREGIVERS

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Introduction: Emergency general surgery (EGS) patients are usually hospitalized unexpectedly, often with complex conditions and chronic post-discharge needs. The impact of EGS hospitalization on informal caregivers (e.g. family members) is unknown. We aimed to explore how an EGS hospitalization impacts the lives of informal caregivers and identify specific stressors of hospitalization.

Methods: We conducted 30-minute semi-structured interviews of EGS patients and their caregivers at a single academic center (April–October 2023) using purposeful sampling to include adult EGS patients hospitalized ≥ 7 days. Patients identified their primary caregiver for participation. Interviews were completed until thematic saturation was reached, coded in duplicate, and analyzed using a modified grounded theory approach. All participants also completed the 36-Item Short Form Health Survey (SF-36), a validated quality of life (QoL) questionnaire, to assess perceived QoL during hospitalization. The SF-36 scores are standardized on a 100-point scale, with the worst score being 0 (poor QoL) and the best being 100 (excellent QoL).

Results: Of 26 total participants, 17 were patients and 9 were caregivers. All caregivers were family members, with most identifying as a patient's child. Most caregivers were female (mean age 44.9y +/-15.0y). Caregivers displayed profound decrease in QoL, most significantly in the following domains: vitality, role limitations due to emotional problems, and mental health. (Figure 1) The most common caregiver stressors in qualitative analysis included emotional stress secondary to the patient's EGS condition, difficulties with travel, financial concerns, and job security. (Figure 2)

Conclusion: EGS hospitalization has a profound impact on informal caregivers, most of whom are female family members. QoL was impacted in all domains with the largest impact on energy and mental health. Future steps should include targeted interventions that address logistic concerns and offer formalized emotional support for EGS caregivers. Optimizing the mental and physical health of EGS caregivers may aide in sustained recovery of patients after EGS hospitalization.

RESTRICTING ROUTINE DAILY CBC ORDERING IS SAFE AND EFFECTIVE IN TRAUMA AND ACUTE CARE SURGERY PATIENTS

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Andrew Esposito, MD, MHS; Kevin M. Schuster, MD, MPH
Yale University

Introduction: A nationwide shortage of phlebotomy tubes caused a level I trauma center to limit ordering of complete blood counts (CBCs) and remove recurring order options. This restriction was used as a natural experiment evaluating elimination of routine CBCs on surgical outcomes.

Methods: Acute Care Surgery (ACS) Service patients were evaluated for 60 months before and 4 months after the restriction. Patient demographics, admission characteristics, and outcomes were extracted from patient charts and the NSQIP database. Pre- and post-restriction patients were compared.

Results: Analysis included 9,372 patients, 8755 pre-restriction and 617 post-restriction. For all admissions, the number of CBCs performed per admission was significantly reduced post-restriction (6.99 vs 6.1, $p=0.011$) and when normalized to length of stay (LOS), (1.26 vs 1.12, $p<.001$). There was no significant change in other labs, imaging studies performed, antibiotic days, LOS, or 30-day mortality (Table). There was a significant reduction in transfusion of packed red blood cells per admission, from 3.95 units to 2.95 units ($p=0.018$). In patients who underwent an operation, the rate of 30-day re-admission was lower post-restriction ($p=.029$).

Conclusion: Restricting the ability to order multiple CBCs reduced the number of CBCs, did not adversely affect outcomes, and may have reduced transfusions and readmissions.

	Before Restriction (n=8755)	After Restriction (n=617)	p-value
Length of Stay (days)	5.96	6.09	0.748
Age (years)	58.86	59.60	0.391
CBC count per admission	6.99	6.10	0.011
CBC per day	1.26	1.12	<0.001
BMP count per admission	6.50	6.22	0.455
Minimum Hemoglobin (g/dl)	10.72	10.68	0.748
Xray count per admission	3.51	3.52	0.955
CT count per admission	2.69	2.54	0.184
MR count per admission	0.28	0.29	0.953
US count per admission	0.55	0.56	0.793
Transfused units/admission	3.95	2.95	0.018
30 day readmissions	1.15	1.13	0.736
Ventilator days	5.62	5.29	0.763
Antibiotic days	4.49	4.93	0.773

DO ALL PENETRATING ZONE II HEMATOMAS REQUIRE SURGICAL EXPLORATION: A SECONDARY ANALYSIS OF AN AAST-SPONSORED MULTICENTER STUDY

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AAST Genito-Urinary Trauma Study Group
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Introduction: Classic teaching is to explore penetrating zone II hematomas to rule out active renal bleeding and/or ureteropelvic injury. The objective of this study was to characterize the need for surgical intervention in penetrating renal trauma. We hypothesized that a large proportion of penetrating renal injuries do not require surgical intervention for bleeding control, and therefore, routine surgical exploration is not needed.

Methods: This was a secondary analysis of a AAST sponsored prospective observational trial that enrolled patients with high-grade renal injuries (III-VI-V) at 14 trauma centers from 01/2014 to 02/2017. Adult (≥ 18 years) patients with penetrating injuries were selected and stratified according to their initial management as: 1) nonoperative (NOM), including interventional radiology (IR), 2) operative (OR) without initial CT imaging, and OR with initial CT imaging (OR-CT). The primary outcome was requirement for surgical intervention for bleeding control. Secondary outcomes included delayed surgical or IR re-intervention for bleeding control. Standard statistical tools were utilized for this descriptive study.

Results: A total of 255 patients met inclusion criteria. The median age was 28 years, 87% were male, and median ISS was 25. Overall, 14% underwent NOM, 49% required emergent OR, and the remaining 37% required OR after an initial CT (OR-CT.) Surgical intervention to control renal bleeding was required for 6% of NOM, 74% of patients requiring emergent OR, and 38% of patients with OR-CT. Overall, of those requiring intervention (n=130), 59% required a nephrectomy, and 25% required a nephrorrhaphy.

Conclusion: Nonoperative management is frequently employed for high-grade penetrating renal injuries, and even when exploratory laparotomy is required, intervention to control bleeding from the kidney is not universally required, especially when preoperative imaging is available. Further studies are required to characterize the subset of patients that would require routine exploration of zone II hematoma following penetrating trauma.

MACHINE LEARNING IDENTIFICATION OF PERSONALIZED PATIENT RISK FACTORS FOR PROLONGED LENGTH OF STAY AFTER TRAUMA LAPAROTOMY

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 Larisa Shagabayeva, MD; Matthew Fastiggi, MD; Zoe Weiss, MD;
 Brianna L. Collie, MD; Nicole Lyons, MD; Luciana Tito, MD;
 Jonathan P. Meizoso, MD, MSPH; Nicholas Namias, MD;
 Carl I. Schulman, MD; Kenneth Proctor, PhD
 Ryder Trauma Center - Jackson Memorial Hospital

Introduction: Trauma laparotomy patients often experience prolonged hospital length of stay (PLOS). Previous studies have relied on standard statistical analyses to identify contributing factors for PLOS, but machine learning (ML) algorithms can discern complex interactions and nonlinear relationships among variables, capturing unique patient trajectories. By assigning individualized relative weights to features, ML can enhance accuracy and provide a nuanced understanding of PLOS determinants. This study tests the hypothesis that ML can predict PLOS and provide personalized risk profiles for individual patients.

Methods: Patients from the American College of Surgeons Trauma Quality Improvement Project database (TQIP) who received a laparotomy within 90 minutes of arrival were included. ML models were created to predict a greater than 90th percentile length of stay (LOS). Patients with missing data for LOS were excluded. A game theoretical approach was used to estimate the relative significance of each variable towards the final prediction.

Results: Of 5,481,046 patients in TQIP from 2017 to 2021, 74,806 met inclusion criteria. Median LOS was 7 days and 90th percentile LOS was 28 days. A gradient-boosted decision tree model performed the best with area under the receiver-operator curve of 0.920. The most impactful predictor variables are displayed in Fig 1.

Conclusions: ML can identify patients at high risk of PLOS. Direct electronic medical record implementation can identify the most important factors contributing to PLOS in each individual patient and prospective implementation may allow for personalized care plans tailored to each patient's risk profile. This algorithm is designed to improve over time and can capture complex non-linear relationships that may not be apparent to humans or standard statistics.

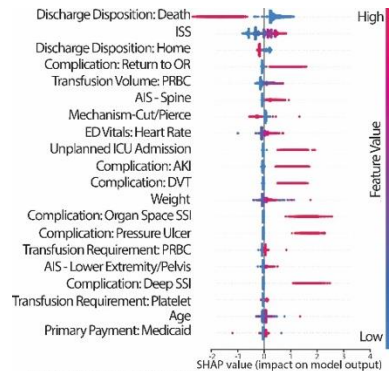


Figure 1: Shapley additive explanation (SHAP) methods to assess feature importance. Each point represents an individual case, and the grouping of points demonstrate how that variable contributes to the model's outcome prediction for each individual case.

REBOA IN SHOCKED PENETRATING ABDOMINAL TRAUMA PATIENTS: IMPACT ON OUTCOMES

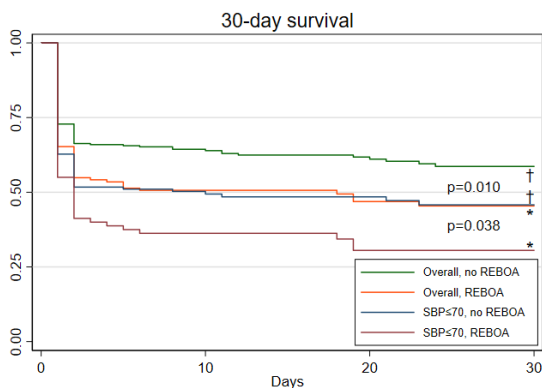
Justin Hatchimonji, MD, MBE, MSCE; Diane N. Haddad, MD, MPH;
 Lydia Maurer, MD; Phillip Dowzicky, MD, MSHP;
 Andrew Benjamin, MD; Niels D. Martin, MD; Patrick Reilly, MD;
 Jay Yelon, DO; Mark J. Seamon, MD
 University of Chicago

Introduction: The role of Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) in trauma is debated. We hypothesized that the use of REBOA for patients presenting in shock after penetrating abdominal trauma is associated with delay to laparotomy and increased mortality.

Methods: We used 2017-2021 Trauma Quality Improvement Project (TQIP) data to identify adult (≥ 16 years) penetrating abdominal trauma patients with systolic blood pressure (SBP) ≤ 90 mmHg undergoing laparotomy. REBOA was defined by ICD-10 code, with a procedure timestamp preceding or simultaneous to laparotomy incision. We propensity score matched REBOA to non-REBOA patients on demographics, mechanism, injury characteristics and severity, solid organ injury, abdominal vascular injury, SBP, heart rate, and GCS motor score. Outcomes were time to incision, transfusion requirements, complications, and in-hospital mortality. We additionally performed a survival analysis stratified by presenting SBP.

Results: There were 148 REBOA patients with complete data for matching to 286 non-REBOA patients. Among patients with REBOA timestamps preceding laparotomy incision, there was a delay to laparotomy (time to incision 40 [31, 50] vs 33 [23, 43.5] minutes, $p=0.001$). Overall, REBOA was associated with increased transfusion volume (median [IQR] pRBCs 5,125 [2,100, 9,100] vs 2,500 [1,050, 5,450] ccs in the first 4 hours, $p<0.001$), leg amputations (3.4% vs 0.4%, $p=0.010$), and mortality (53.4% vs 42.7%, $p=0.034$). The mortality relationship persisted among patients presenting with SBP ≤ 70 mmHg (Figure).

Conclusion: REBOA for patients in shock after penetrating abdominal trauma is associated with delay to operation, greater transfusion requirement, leg amputation and mortality. Our data support the need for expeditious definitive hemorrhage control in these patients.



REFINING KIDNEY ORGAN INJURY SCALING: EVIDENCE-BASED UPDATES TO THE AAST RENAL TRAUMA GRADING

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Marie Crandall, MD, MPH, FACS; Rosemary Kozar, MD;
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University of Utah

Introduction: The American Association for the Surgery of Trauma (AAST) introduced the Organ Injury Scale (OIS) for kidney injuries in 1989, primarily based on anatomic and operative findings. The OIS was updated in 2018 and added important radiologic findings. With the near-universal use of CT scans for initial trauma assessment and the widespread adoption of non-operative management for renal trauma, further refinement of the OIS is necessary.

Methods: A multidisciplinary workgroup of trauma surgeons, urologists, and radiologists reviewed the kidney OIS and developed a consensus aligned with recent literature. Priorities in the process were assigning injury grades to better predict the need for therapeutic interventions and provide objective measures to assign injury grades based on imaging, operative, and pathologic findings.

Results: Key modifications to the kidney OIS include: increasing the cutoff for laceration length from 1 cm to 2.5 cm or greater for Grade III injuries; introducing a 3.5 cm hematoma rim size cutoff for Grade III injuries; and focusing more on active bleeding (defined by presence of vascular contrast extravasation) in grade IV injuries. The term "shattered kidney" is replaced with "multi-fragmented kidney", now defined as the presence of three or more parenchymal fragments separated by blood or fluid. Urinary extravasation is also downgraded to grade III due to its high rates of spontaneous resolution and limited need for intervention.

Conclusion: We present an updated kidney OIS based on the contemporary evidence-based data and collaborative efforts of a multi-disciplinary group. The emphasis of the updated OIS is on the overall need for interventions depending on the modality used for diagnosis. These revisions align with the widespread adoption of CT imaging and the growing acceptance of non-operative management for renal trauma across all grades.

VARIATION AMONG TRAUMA CENTERS IN THE USE OF ANGIOEMBOLIZATION AND SPLENECTOMY RATE IN ISOLATED HIGH-GRADE BLUNT SPLENIC INJURIES

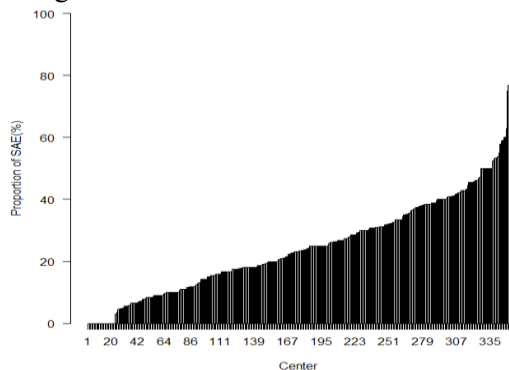
Makoto Aoki, MD, PhD; Yohei Okada, MD, PhD; Shokei Matsumoto, MD; Morihiro Katsura, MD, MPH; Kazuhide Matsushima, MD
National Defense Medical College Research Institute

Introduction: Many US trauma centers have recently adopted splenic angioembolization (SAE) as an adjunct in patients with high-grade blunt splenic injuries (BSI) undergoing non-operative management (NOM). However, it remains unclear whether the use of SAE is associated with successful NOM. We hypothesized that trauma centers with higher rates of SAE would have decreased splenectomy rates for high-grade BSI.

Methods: This is a retrospective cohort study using data from the ACS-TQIP database (2013-2021). We included patients (age ≥ 16 years) with isolated high-grade BSI (Abbreviated Injury Scale: 3-5) treated at trauma centers that admitted ≥ 10 high-grade BSI cases during the study period. Study patients were classified into three groups based on the percentage of patients undergoing SAE: 0% (no-SAE centers); 1% to 39.9% (low-SAE centers); and more than 40% (high-SAE centers). The cutoff for high SAE centers ($\geq 40\%$) represented the 90th percentile for trauma center SAE use. Hierarchical logistic regression controlling for clustering at the hospital level was performed to examine the association between trauma center SAE use and splenectomy rate.

Results: A total of 7,434 patients with isolated high-grade BSI were included (no-SAE: 375 from 23 centers, low-SAE: 5,792 from 267 centers, high-SAE: 1,267 from 60 centers). The median percentage of SAE use was 23.2% (IQR: 11.9-34.8) (**Figure**). Overall splenectomy rates were 14.4%, 9.8%, and 7.3% in the no-SAE, low-SAE, and high-SAE centers, respectively. After adjusting for hospital case mix, low-SAE and high-SAE centers were associated with decreased odds of splenectomy compared with no SAE centers (OR: 0.71, 95%CI: 0.51-0.99 and OR: 0.57, 95% CI: 0.38-0.85, respectively).

Conclusions: Our results suggest that trauma centers with higher rates of SAE use had lower splenectomy rates in patients with isolated high-grade BSI.



DISCRIMINATION OF PATHOPHYSIOLOGY IN SYSTEMIC INFLAMMATION BY CANONICAL DISCRIMINANT ANALYSIS BASED ON TRANSCRIPTOME ANALYSIS

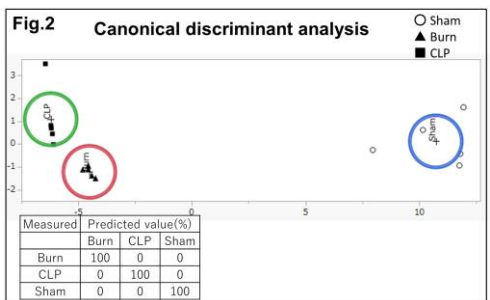
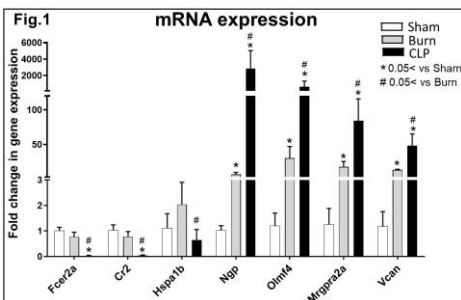
Goro Tajima, MD; Shimon Murahashi, MD; Eri Uemura, MD;
Miyuki Miura, BS; Osamu Tasaki, MD
Nagasaki University Hospital Acute & Critical Care Center

Introduction: It is difficult to diagnose the pathophysiology of systemic inflammation by a single biomarker. We aimed to develop a novel method to discriminate pathophysiology by evaluating multiple gene expressions as a pattern using transcriptome analysis.

Methods: We employed cecal ligation and puncture (CLP) using 25G needle, and 20% full thickness burn injury model for systemic inflammation models. RNA was extracted from whole blood 24 hours after injury, and RNA sequencing was performed on a next-generation sequencer (NGS) (n=3 per group). qPCR was performed on genes (Cr2, Fcer2a, Hspa1b, Ngp, Olfm4, Mrgpra2, Vcan) that showed significant changes between groups in the statistical analysis after NGS (n=6 per group). The gene expression patterns were compared by canonical discriminant analysis (CDA).

Results: Statistical analysis after NGS showed significant difference in 1746 mRNAs among the 3 groups (ANOVA p<0.05). The gene expression of Ngp, Olfm4, Mrgpra2, and Vcan was significantly upregulated in CLP and Burn compared to Sham, and Ngp and Olfm4 were significantly upregulated in CLP compared to Burn (p<0.05). Cr2, Fcer2a was significantly lower in CLP compared to Sham and Burn (p<0.05) (Fig.1). Each group showed a characteristic gene expression pattern, and CDA showed that each pathophysiology could be discriminated 100%, and, using only three parameters, it could be discriminated more than 90% for all specimens (Fig.2).

Conclusion: The results suggested the possibility of a novel method to discriminate pathophysiology based on gene expression patterns extracted by transcriptome analysis.



DO AS I SAY AND NOT AS I TEACH: SURGICAL CRITICAL CARE PROGRAM DIRECTORS AND DIPLOMATES SHAPE THE FUTURE OF SURGICAL CRITICAL CARE

Deborah M. Stein, MD, MPH; Carol Barry, PhD; Niels D. Martin, MD;
 Caroline Prendergast, PhD; Kimberly A. Davis, MD, MBA;
 Thomas K. Duncan, DO; Amy N. Hildreth, MD; Kenji Inaba, MD;
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 American Board of Surgery

Introduction: In 1987, the Trauma, Burn, Surgical Critical Care Board (TBSCCB) began providing certification in surgical critical care through a certification examination (CE) process. The blueprint for the CE has remained largely unchanged since that time. In 2020, the TBSCC began to revise the CE, and wanted to evaluate the relevance of exam content to SCC training programs and diplomates. The purpose of the study was to evaluate whether the material being tested aligns with clinical practice.

Methods: SCC program directors (PDs) and diplomates were identified, and on-line surveys administered. A draft blueprint was vetted with SCC PDs and diplomates to determine how frequently each item should be tested. Respondents were asked to rank each item by how frequently they felt it should be tested on the exam (4 = each year, 3 = every other year, 2 = every few years, 1 = never). Diplomates were also asked to identify how frequently specific topics were encountered in their practice. Results were compared with both t-tests and Mann-Whitney U test. Cohen's *d* was calculated as a measure of effect size. Given the large sample size, we used a p-value of < 0.001 and at least a moderate effect size as an indication of relevant differences.

Results: Response rates were 42% (n=70) and 30% (n=1307), respectively. 188 topics were evaluated. Program directors requested more frequent assessment than diplomates in 28 categories. Obstetrical emergencies and ICU billing and coding were the most discordant. There were 17 topics for which diplomates expressed high discordance between the importance of the topic and everyday practice (Table). The most frequently performed procedures were ultrasound for trauma, central line, arterial line and tube thoracostomy. Transthoracic echocardiography was performed more frequently than pulmonary artery catheter placement.

Conclusions: SCC practice has evolved significantly since the CE began. PDs and diplomates identified notable differences in the importance of various topics for testing indicating a discrepancy in the training vs practice paradigms. Assessments used to measure knowledge should be aligned with practice but require a balance of topics that are infrequently encountered but exquisitely life-threatening and time sensitive.

Table. Ranking of various items by diplomates "for testing" vs. "see in practice."

Topic	For testing	See in practice
ICU coding	2.18	3.33
Thoracic esophageal injury	2.74	1.74
Tracheal and bronchial injuries	2.92	1.92
Cardiac tamponade	3.28	1.96
Rectal injury	3.11	2.09
Pancreatic injury	3.21	2.13
Duodenal injury	3.13	2.12
Malignant hyperthermia	2.58	1.39
Great vessel injury	3.13	2.13
Larynx/thyroid/airway injury	2.86	1.85
Abdominal compartment syndrome	3.45	2.35
Anaphylaxis	2.92	1.9
SIADH and cerebral salt wasting	3.38	2.37
Extremity compartment syndrome	3.55	2.49
Diabetes insipidus	3.38	2.34
Surgical airways	3.59	2.58

IS PHENOBARBITAL THE DRUG OF CHOICE FOR ALCOHOL WITHDRAWAL SYNDROME PROPHYLAXIS IN TRAUMA PATIENTS?

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Introduction: The development of alcohol withdrawal syndrome (AWS) poses significant risk to the hospitalized trauma patient irrespective of injury severity. Although diazepam is a commonly used agent to prevent or treat AWS, phenobarbital is being increasingly used as an alternative. The purpose of this study was to compare both the efficacy and adverse effects of these two drugs in preventing AWS. We hypothesized that phenobarbital would be associated with a lower incidence of AWS than diazepam.

Methods: Adult trauma patients from a level 1 trauma center who received either scheduled-dose diazepam or phenobarbital for AWS prevention between 2015 and 2022 were reviewed. Primary outcome was development of AWS, defined as dose or frequency increase of the prophylactic agent, high usage of prn CIWA protocol, and/or medication regimen changes. Secondary outcomes included development of somnolence or unplanned intubation.

Results: 172 patients (89% male) with an average age of 49.6 ± 14.5 years and median injury severity score of 12 (5-17) were identified. 54 (31.4%) patients were initiated on diazepam, at a median daily dose of 20mg (15 – 20) and 118 (68.6%) patients were initiated on phenobarbital, at a median daily dose of 130 mg (130 - 195). Overall, 14 (8.1%) patients developed AWS. Comparing groups, 10 (18.5%) patients in the diazepam group developed AWS vs. 4 (3.4%) in the phenobarbital group ($P < 0.001$). Median daily dose was not different between patients who developed AWS vs those who did not for diazepam (27.5 mg vs 20 mg, $P = 0.806$) or phenobarbital (162.5 mg vs 130 mg, $P = 0.841$). Rate of somnolence was significantly higher in the diazepam group (diazepam 20.4% vs phenobarbital 8.5%, $P = 0.024$). No patient with AWS required intubation secondary to development of withdrawal.

Conclusion: Among hospitalized trauma patients, those treated with prophylactic phenobarbital were significantly less likely to develop AWS and experience somnolence vs prophylactic diazepam. Phenobarbital should be considered as a first-line agent for AWS prevention.

MRSA NASAL SWABS PREDICT NEED FOR ANTIBIOTIC COVERAGE IN A TRAUMA POPULATION

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Introduction: Methicillin Resistant Staphylococcus Aureus (MRSA) nasal swab screening in a general intensive care unit (ICU) population has a high negative predictive value (NPV) and is used to guide antibiotic stewardship. The role of MRSA nasal swabs to de-escalate broad-spectrum antibiotics in trauma populations, known to be susceptible to hospital acquired pneumonia, has not been defined. The goal of this study was to assess the utility of the MRSA nasal swab in predicting MRSA pneumonia in a trauma population, hypothesizing that MRSA swabs would have a high NPV.

Methods: A retrospective review of trauma ICU patients at a Level 1 trauma center who received an MRSA nasal swab and respiratory culture from 2020-2023 was performed. Positive and negative MRSA nasal swab groups were compared and sensitivity, specificity, positive predictive value (PPV), and NPV for MRSA culture growth and pneumonia ($\geq 10^5$ colonies) were calculated. The area under the curve (AUC) of a receiver operating characteristic was measured.

Results: A total of 163 patients were screened and cultured, of these, 22 (13.5%) had positive MRSA nasal swabs, with 15 (9.2%) having MRSA growth and 5 (3.1%) diagnosed with MRSA pneumonia. There were no significant differences in age, BMI, smoking, or COPD between the positive and negative swab groups. Sensitivity and specificity were 66.7% and 91.9% respectively with a PPV 45.5% and NPV of 96.5% for any MRSA growth (Table). AUC for MRSA culture growth was calculated to be 0.79. Nasal swabs had an NPV of 100% for MRSA pneumonia.

Conclusion: This study, which is the largest to date on this topic, found MRSA nasal swabs to have a high NPV for MRSA growth and pneumonia and can help deescalate empiric antibiotic coverage in trauma patients. Further studies are needed to investigate the incidence of MRSA and role of routine nasal swabs in these high-risk trauma patients.

	Culture positive	Culture negative	Total
Swab positive	10 (6.1%)	12 (7.4%)	22 (13.5%)
Swab negative	5 (3.1%)	136 (83.4%)	141 (86.5%)
Total	15 (9.2%)	148 (90.8%)	163 (100%)

Table: Nasal swab as a predictor of MRSA culture growth

PREDICTING READMISSIONS FOLLOWING SEPSIS: AN INTERPRETABLE MACHINE LEARNING APPROACH

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Introduction: Sepsis survivors are a leading cause of hospital readmissions. We developed an interpretable machine learning (ML) model to predict 30-day readmissions for post-operative sepsis and septic shock survivors.

Methods: NSQIP (2018-2021) was queried for post-operative sepsis or septic shock during admission. Univariate analysis compared readmitted and non-readmitted patients. Using demographics, comorbidities, pre-operative labs, surgical specialty, diagnoses present at time of surgery (PATOS), operative time, length of stay, post-operative complications, and discharge destination, AutoML, LightGBM and XGBoost models were developed with Shapley Additive Explanations (SHAP) for interpretability. Models were validated with an 80/20 train-test split.

Results: The cohort had 52,025 patients (75% sepsis and 25% septic shock); 75% had sepsis or septic shock PATOS. 6,374 (12.5%) had an unplanned readmission. Readmitted patients had more comorbidities ($p<0.05$) and higher 30-day rates of surgical site infection (SSI), pneumonia, unplanned intubation, pulmonary embolism, renal failure, cardiac arrest, DVT, MI, UTI, and reoperation ($p<0.05$). During initial admission, readmitted patients had shorter average length of stay (12.7 vs 13.3 days, $p<0.01$) and lower rates of pneumonia, unplanned intubation, stroke, and cardiac arrest ($p<0.05$) with no significant differences in other complications. LightGBM (accuracy=0.81; AUC=0.71) was chosen. The F1 maximizing threshold (0.6) resulted in a readmission rate of 29% and captured 37% of all readmissions. Mean absolute SHAP values revealed organ space SSI PATOS (0.26), days from operation to discharge (0.2), and post-operative organ space SSI (0.18) as the most influential factors in predictions.

Conclusions: Interpretable ML accurately predicts risk of readmission after survival of sepsis. SHAP identifies the contributing factors for each patient. Early identification of high-risk patients could inform decisions on discharge timing, disposition, and follow-up.

SPONTANEOUS BREATHING TRIAL PARAMETERS (NIF AND RSBI) ARE NOT PREDICTORS OF TRAUMA PATIENT REINTUBATION

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Introduction: Reintubation in trauma patients is linked to increased morbidity and mortality. While spontaneous breathing trial (SBT) factors such as negative inspiratory force (NIF) and rapid shallow breathing index (RSBI) are recognized in general intensive care unit populations, their applicability to trauma patients is less clear. This study aims to identify clinical predictors of reintubation in trauma patients, thereby offering insights for better management and prognostication.

Methods: A single center, retrospective (1/2017-12/2023) study of trauma patients ≥ 18 years-old who underwent extubation from endotracheal mechanical ventilation was performed. Exclusion criteria included self-extubation, patients with a tracheostomy or comfort measures, and death before extubation. The study compared patients unexpectedly reintubated at any point during their admission versus those who weren't, using multivariable logistic regression to identify risk factors associated with reintubation.

Results: From 424 trauma patients, 51 (12.0%) underwent reintubation. Patients reintubated were older (55 vs 39 years-old, $p=0.016$) and more often had congestive heart failure (7.9% vs 1.6%, $p=0.023$), cirrhosis (7.8% vs 1.9%, $p=0.032$), and a higher injury severity score (ISS) (27 vs 18, $p<0.001$). Reintubated patients had lower NIF (-24.0 vs -27.0, $p=0.037$) but increased ventilator days (6 vs 2, $p<0.001$) prior to extubation, whereas RSBI was similar between cohorts (32.0 vs 36.5, $p=0.076$). Multivariable logistic regression revealed that neither RSBI <50 or <100 , nor NIF <-20 were associated with reintubation, whereas increased age (OR 1.024, CI 1.004-1.044, $p=0.017$), ISS (OR 1.040, CI 1.005-1.076, $p=0.026$), and ventilator days before extubation (OR 1.132, CI 1.041-1.231 $p=0.004$) were associated with increased risk of reintubation (Table 1).

Conclusion: Over 10% of extubated trauma patients underwent reintubation. SBT parameters like RSBI and NIF were not associated with reintubation, whereas age, ISS, and ventilator days before extubation were independently associated risk factors for reintubation. This suggests patient-specific factors, beyond SBT parameters, should help guide extubation decisions.

STRESS HYPERGLYCEMIA RATIO PREDICTS MORTALITY IN TRAUMA PATIENTS

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Introduction: The relationship between hyperglycemia and poor outcomes after injury, including mortality, is well-established. This effect has been observed in patients both with and without diabetes mellitus (DM). Admission glucose (AG) alone may be inferior to more global markers of glycemic status such as the stress hyperglycemia ratio (SHR). The SHR has been demonstrated to correlate with mortality in non-trauma, critically ill populations. The purpose of our study was to investigate the relationship between SHR and outcomes in a trauma population.

Methods: Using a single institution Level 1 trauma center registry, data from all trauma admissions with HbA1c (2017-23) were obtained. The SHR was calculated as admission glucose divided by HbA1c-derived average glucose. Individual cohorts were compared using Student's T-test and Chi-Squared. SHR was studied across the cohort using a cutoff value of 1.14, identified in previous literature. Lastly, logistic regression analyses were performed to identify the odds ratio for death associated with increased SHR.

Results: 10,038 patients were studied (1,764 diabetic). The DM cohort had significantly higher AG, HbA1c, lower SHR, and higher mortality (6.9 vs 5.3%, $p=0.009$). Using an SHR cutoff of 1.14 in the entire study population, the high SHR cohort (4,337) had a longer ICU and hospital LOS, and mortality (9.1 vs 2.9%, $p<0.001$). On regression analysis, $SHR > 1.14$ was predictive of mortality (OR 3.38, CI 2.8-4.1), as was $AG > 180$ (OR 4.4, CI 3.7-5.3). In subgroup analysis, AG and SHR were strongly predictive of mortality for both DM and non-DM patients. However, SHR was more sensitive than AG in the non-DM cohort. In quartile analysis, a significant increase was seen in the OR for death within the 4th quartile, at an SHR of 1.33 (OR 5.7, CI 4.3-7.6).

Conclusions: Similar to AG, SHR is strongly predictive of mortality in both DM and non-DM trauma patients. SHR is a more sensitive predictor of mortality than AG in the non-DM patient and is more sensitive in the non-DM patient versus the DM cohort. Utilization of SHR appears to identify a cohort of patients at risk for death at a lower threshold than conventional measures such as AG.

THE ASSOCIATION OF WHOLE BLOOD VERSUS COMPONENTS WITH EARLY LABORATORY VALUE CHANGES

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Introduction: Many studies compare whole blood (WB) to component only (CO) transfusions with respect to overall outcomes in trauma patients. These studies are plagued by shortcomings including small volume transfusions, whole blood groups with minimal volumes of WB delivered and CO groups with low ratios of plasma to platelets to red blood cells. We aimed to compare early laboratory value changes in trauma patients receiving massive transfusions with either large volumes of WB or CO.

Methods: Retrospective review from a single level-1 academic trauma center performed from 2016-2021. We included patients >15 years old who received a massive transfusion with a minimum of 3 units in the 1st hour of either WB or red blood cells. Low titer group O leukoreduced whole blood (LTOWB) was utilized. Our primary outcome measures were early laboratory value changes including hematologic, organ specific, perfusion and coagulation from baseline to 8-12 hours. Appropriate tests for categorical, normally and abnormally distributed data were performed. Significance was set at $p < 0.05$.

Results: The WB group received a median of 5 units of WB and 0 units of other components and CO received a median of 6 units of red blood cells, 5 units of plasma and 1 unit of apheresis platelets. The median time to the 2nd blood draw was 9.4 hours after admission. There was a larger change in baseline to early platelet counts in the CO group (114 vs 80 x 10³/uL, $p < 0.048$). and lesser change in LY30 (0 vs 0.7%, $p = .037$). There were no significant changes in baseline to early values for lactate (0.3 vs 0.8 mmol/L, $p > 0.9$), potassium (-0.4 vs -0.2 mmol/L, $p = 0.9$), creatinine (0.13 vs 0.12 mg/dL, $p = 0.4$), aPTT (1.2 vs 0.1 sec, $p > 0.9$), INR (-0.05 vs -0.05, $p > 0.9$), fibrinogen (-1 vs -25 mg/dL, $p = 0.7$), hemoglobin (1.4 vs 0.95 g/dL, $p = 0.2$), pH (-0.12 vs -0.11, $p = 0.2$), or base excess (-2.3 vs -2.45 mmol/L, $p = 0.7$)

Conclusion: CO resuscitation with high ratios results in a greater increase in platelet count and no change in LY30 compared to resuscitation with leukoreduced LTOWB. Overall differences in laboratory values between the 2 resuscitation techniques are minimal.

ENHANCING TRAUMA PATIENT SAFETY: A RELATIONSHIP- FOCUSED FEEDBACK WORKSHOP IN THE INTENSIVE CARE UNIT

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Introduction: Communication skills amongst health care workers are essential to provide safe patient care. It can be uniquely challenging to provide considered, well-timed, respectful peer feedback in high-pressure settings such as a Surgical Trauma Intensive Care Unit (STICU). Formally training trauma nurse team members in providing relationship-focused feedback has the potential for improving patient safety.

Methods: In a large Level I trauma center, STICU RN quality committee and communication experts developed a simulation-based workshop for bedside nurses with practice scenarios drawn from STICU RN experiences. Workshop content was derived from nursing/medical education literature. The SPIKES protocol, most used for “breaking bad news” in medical education, was adapted as a framework for difficult peer-feedback discussions. Pre/post surveys captured previous training, attitudes, and confidence performing target skills. Observers, small group facilitators, and nurse-actors rated learners on simulation performances.

Results: STICU RNs (N=54) participated in half-day workshops. In pretests, 93% agreed they had recently avoided giving feedback due to being uncomfortable; only 19% had received previous training in and felt empowered giving/receiving peer feedback. “Years in profession,” “leadership role,” and “trauma certification” were not statistically significantly related to simulation performance. RNs <30 years scored significantly higher in simulation skills than older RNs. Importantly, RNs stating they “feel empowered to provide feedback” performed statistically significantly better in simulation. After training, median STICU RN confidence increased ($p<.001$) regarding 1) ability to offer useful feedback, 2) using a framework to guide feedback, 3) ability to listen and problem solve with peers struggling with clinical skills. Most (79%) follow up surveys indicated that STICU RNs felt empowered to and had recently offered feedback when observing an opportunity.

Conclusion: A simulation-based feedback workshop designed for and implemented by trauma RNs and communication specialists can improve RN confidence, willingness, and skill engaging in important feedback discussions with peers, and lead to increased patient safety.

GROWING TRENDS OF PREHOSPITAL KETAMINE USE IN SEVERELY INJURED PATIENTS

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Introduction: Our local EMS guidelines prioritize the use of ketamine for acute pain management in patients with hypotension and respiratory failure. We hypothesize that prehospital ketamine for pain has increased and is a safe option for prehospital pain control. The specific aim of this study was to compare patients who received prehospital ketamine vs. fentanyl for pain.

Methods: This was a retrospective study (2014-2022) of adult trauma patients transported by EMS to our trauma center at the highest level of activation. We compared patients who received only fentanyl vs. only ketamine for prehospital pain. The ketamine and fentanyl groups were compared by univariate and multivariate analysis.

Results: 878 patients were included, 27% received ketamine and 73% received fentanyl. Ketamine use increased significantly from 2014-2022, $p < 0.001$. Ketamine patients were younger (39 vs. 42, $p = 0.0008$), but there was no difference in white/non-Hispanic ethnicity (53% vs. 55%, $p = 0.58$), male gender (74% vs. 70%, $p = 0.31$), or blunt mechanism (69% vs. 63%, $p = 0.15$). Ketamine patients had a higher prehospital heart rate (103 vs. 99, $p = 0.02$) and a lower systolic blood pressure (119 vs. 128, $p = 0.0002$) and lower GCS (12 vs. 15, $p < 0.0001$). These physiologic derangements persisted in the ED. Ketamine patients had a higher ISS (18 vs. 14, $p < 0.0001$) and more often required an emergent hemorrhage control procedure (22% vs. 15%, $p = 0.02$). Ketamine patients had a higher ED mortality (3% vs. 0.2%, $p = 0.003$), and double the hospital mortality (6% vs. 3%, $p = 0.06$). Ketamine patients spent more days in the hospital, ICU, and on the ventilator (all $p < 0.05$). On logistic regression, prehospital GCS (AOR: 0.79 [0.73-0.87], $p < 0.0001$) and blood pressure (AOR: 0.99 [0.98-0.99], $p = 0.008$) were independently associated with receiving ketamine. While ketamine patients had worse outcomes, ketamine was not independently associated with mortality (AOR: 0.32 [0.09-1.2], $p = 0.09$).

Conclusion: Ketamine use for prehospital pain control is increasing. Ketamine is being given to more severely injured patients with more physiologic derangement. Though patients who receive ketamine have worse outcomes, ketamine is not independently associated with mortality.

We anticipate that due to its mechanism of action leading to pain control without further respiratory suppression, ketamine will continue to be used more commonly for acute pain in trauma patients in the pre-hospital setting.

A FRAGILE BODY AND AN INJURED BRAIN: THE EFFECT OF FRAILTY ON OUTCOMES IN OLDER ADULTS WITH TRAUMATIC BRAIN INJURY

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Introduction: The aim of this study is to assess the effect of frailty on admission and 3-month post-discharge outcomes in older adults (OAs) with isolated traumatic brain injury (TBI).

Methods: This is a secondary analysis of the prospective observational AAST frailty multi-institutional trial conducted across 17 trauma centers (2019-2022). OAs (≥ 65 years) with isolated TBI (head AIS³2 and other-body region AIS ≤ 2) were included. Frailty was measured using the TSFI. Outcomes included in-hospital mortality and major complications, unfavorable discharge disposition (hospice/SNF), and 3-month post-discharge readmissions. Multivariable regression analyses were performed to identify the independent effect of frailty on outcomes.

Results: Of the 249 patients identified, 132 (53%) were non-frail and 117 (47%) were frail. Mean age was 78 ± 9 , 56% were male, 69% presented after a fall, median head AIS was 3 [2-3], and 66% presented with a mild (GCS ≥ 13) TBI. Frail patients experienced an increased in-hospital mortality (OR 2.8, $p=0.04$) and major complications (OR 3.4, $p<0.001$), unfavorable discharge disposition (OR 2.1, $p=0.02$), readmission (OR 2.3, $p=0.047$) and post readmission major complications (OR 9.8 $p=0.004$). Similar trends were seen on subgroup analysis stratified by TBI severity. (**Table**)

Conclusion: Frailty in OAs with TBI significantly impacts outcomes, emphasizing the need for early screening of OAs with TBI to facilitate goals of care discussions and treatment plans in this vulnerable population.

Table - Independent Effect of Frailty on the Outcomes Stratified By Head Injury Severity (n=249)

Outcome Measures	Mild TBI			Moderate TBI			Severe TBI		
	aOR	95% CI	p-value	aOR	95% CI	P-value	aOR	95% CI	P-value
Index Admission									
Mortality	4.84	1.47-15.94	0.010	1.42	0.53-3.30	0.409	1.65	0.12-3.45	0.619
Major Complications	4.03	1.62-10.01	0.003	8.00	1.93-18.62	0.048	1.69	0.15-3.13	0.635
Discharge to Home	0.44	0.22-0.88	0.021	0.74	0.18-0.83	0.016	0.27	0.03-0.96	0.042
Unfavorable Disch. Disp.	2.72	1.09-6.82	0.032	1.87	1.35-4.05	0.037	2.80	1.71-11.09	0.033
3-months Post-discharge									
Readmissions	2.64	1.50-4.56	0.046	.*	-	-	-	-	-
Major Complications	5.42	2.75-17.13	0.027	2.01	1.03-3.45	0.011	-	-	-

aOR=adjusted odds ratio; CI=confidence interval; Unfavorable Disch. Disp.=discharge disposition to skilled nurse facility or Rehabilitation center or hospice
* = Multivariable regression analysis was not performed due to the small number of cases in these outcomes.

AGE MATTERS: ADMISSION ENDOTHELIAL DIFFERENCES ARE ASSOCIATED WITH WORSE OUTCOMES IN OLDER ADULT PATIENTS AN ANALYSIS OF THE TXA IN TBI PREHOSPITAL CLINICAL TRIAL

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Introduction: Injured older adults represent 25% of trauma admissions, with increased morbidity and mortality compared to younger adults. Factors contributing to their poor outcomes are not fully characterized. Endothelial dysfunction has been associated with poor outcomes in trauma patients. We aimed to characterize post-traumatic endothelial changes in older versus younger adult trauma patients and compare outcomes.

Methods: We performed a secondary analysis of the “Prehospital Tranexamic Acid (TXA) for TBI” trial. We studied patients with admission endothelial biomarkers: ICAM1, angiotensin-1, thrombomodulin, VCAM1, angiotensin-2, syndecan-1, thrombospondin. To avoid using an arbitrary age cut off, we divided patients into age quartiles and defined the upper quartile as the oldest age quartile (OA) and compared it to the three youngest quartiles (YA). In-hospital, discharge, and mortality outcomes were compared. Significance was set at $p < 0.05$.

Results: 436 patients met our criteria. Mean OA age was 66 years (54-88 years, $n=327$), similar to the ACS older patient guidelines of >55 years. YA mean age was 30 years (15-54 years, $n=107$). No difference was observed between the OA and YA in rates of penetrating trauma (3.4% vs 1.8%, $p=0.626$), head AIS score (mean 3 vs 3, $p=0.582$), or ISS (mean 19 vs 21, $p=0.265$). TXA dosing was not different between cohorts ($p=0.571$). OA was associated with higher thrombomodulin (median 693.3 vs 593.4 pg/mL, $p<0.001$), VCAM1 (median 71035.6 vs 59708.3 pg/mL, $p<0.001$) and angiotensin-2 (164.9 vs 134.7 pg/mL, $p=0.007$). No differences in Syndecan-1 was observed (median 291.1 vs 247.7 pg/mL, $p=0.267$). OA patients had fewer hospital free days (median 8 vs 18, $p<0.0001$), ICU free days (median 20 vs 24, $p=0.002$), and ventilator free days (median 24 vs 26, $p=0.005$), lower Glasgow Outcome Scale Extended scores at discharge (mean 3.5 vs 4.2, $p<0.001$), lower Glasgow Outcome Scale Extended scores at discharge (mean 3.5 vs 4.2, $p<0.001$), and higher 28-day mortality (20.5% vs 9.8%, $p=0.011$).

Conclusion: Despite similar injury patterns, OA patients presented with higher admission endothelial plasma biomarkers and had worse outcomes. This warrants further investigation into the association between endothelial dysfunction post-traumatic outcomes.

FALL-RELATED REINJURY: IDENTIFYING INJURY PATTERNS ASSOCIATED WITH GERIATRIC FALL RECIDIVISM

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Introduction: Falls represent a major source of morbidity and mortality for geriatric patients. This is especially true for patients who suffer repeated falls, as they often experience more severe injuries and greater disability. This study sought to identify injury patterns most associated with repeat fall admission using a nationally representative database.

Methods: Using the 2019 National Readmissions Database, patients ≥ 65 years admitted with fall-related injuries were identified. Patients that died during the index fall admission, out-of-state residents, and those with less than 90 days of follow-up were excluded. Patients were classified by their injury pattern into the following mutually exclusive cohorts: traumatic brain injury, spine fracture, thoracic fracture, pelvic fracture, upper extremity fracture, lower extremity fracture, femoral neck fracture, superficial injuries, or multi-region injuries. Mortality risk for the index admission was assessed using the Trauma Mortality Prediction Model for ICD-10. Using survey-weighted estimates, descriptive statistics and logistic regression were used to compare outcomes by injury type, with a primary outcome of repeat fall-related admission within 90 days.

Results: A total of 236,903 patients met criteria, correlating to a survey-weighted population of 410,107 individuals. The most common injury patterns were femoral neck fractures (38%), multi-region injuries (15%), and traumatic brain injury (12%). Overall, 3% of patients were readmitted within 90 days for repeat fall-related injuries. In addition, 19% were readmitted within 90 days for any non-elective cause, and 2% died within 90 days of discharge. After adjusting for patient age, gender, number of comorbidities, mortality risk, non-home discharge after fall, and occurrence of a major operative procedure, traumatic brain injury was significantly associated with greater risk of repeat fall-related readmission than all other patient injury cohorts, including 72% greater odds than patients with femoral neck fractures (OR 1.72, 95% CI 1.54-1.92, $p < 0.001$).

Conclusions: Geriatric patients with traumatic brain injury after fall are at increased risk of readmission for fall-related injuries within 90 days. Increased screening and preventative interventions within this population are warranted to target patients at greatest risk and reduce rates of potentially preventable reinjury.

FRATILITY ASSESSMENT FOR PREDICTING ADVERSE OUTCOMES IN HIP FRACTURE PATIENTS: A COMPARATIVE ANALYSIS USING THE UNITED STATES NATIONAL INPATIENT SAMPLE

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Introduction: With the annual number of hip fractures increasing globally, it is important to be able to determine which patients suffer from a disproportionate risk of further deterioration. The aim of the current investigation was to compare the ability of several frailty scores to predict morbidity and mortality in hip fracture patients.

Methods: All adult patients (18 years or older) who suffered a hip fracture due to a fall and underwent surgical fixation were extracted from the 2019 National Inpatient Sample (NIS) Database. A combination of logistic regression and bootstrapping was used to compare the predictive ability of several frailty scores for adverse outcomes. These scores included the Orthopedic Frailty Score (OFS), the Nottingham Hip Fracture Score (NHFS), the 11-factor (11-mFI) and 5-factor (5-mFI) modified frailty index, as well as the Johns Hopkins Frailty Indicator.

Results: 227,850 patients were extracted from the NIS. In the prediction of both in-hospital mortality and FTR, the OFS surpassed all other frailty measures, approaching an acceptable predictive ability for mortality [AUC (95% CI): 0.69 (0.67-0.72)] and achieving an acceptable predictive ability for FTR [AUC (95% CI): 0.70 (0.67-0.72)]. All scores struggled to predict complications; however, the NHFS demonstrated the highest predictive ability [AUC (95% CI): 0.62 (0.62-0.63)]. On the other hand, the 11-mFI demonstrated the highest predictive ability for cardiovascular complications [AUC (95% CI): 0.66 (0.64-0.67)] and the NHFS achieved the highest predictive ability for delirium [AUC (95% CI): 0.69 (0.68-0.70)]. No score succeeded in effectively predicting venous thromboembolism or infections.

Conclusion: The OFS surpassed all other frailty scores when predicting mortality and failure-to-rescue, while the NHFS and 11-mFI demonstrated the best ability to predict delirium and cardiovascular complications, respectively.

GETTING WITH THE GUIDELINES: GERIATRIC TRAUMA ACTIVATION

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Introduction: The ACS Committee on Trauma recently revised geriatric trauma activation criteria. Accordingly at our facility, the partial or full trauma team is activated for geriatric patients with SBP <110, HR>120, fall on anticoagulant/antiplatelets, any long bone fracture, or GCS<13. We evaluated the effects of the revised criteria.

Methods: A retrospective review of the trauma registry at a level 1 trauma center for all patients age >65 years presenting to the ED who were hospitalized with blunt traumatic injury during the 11 months before (2022) and after (2023) institution of the revised trauma team activation criteria.

Results: Geriatric Trauma Team Activations

	2022	2023	P value
Partial & Full activations (n)	190	532	<0.001
Mechanism of Injury: Fall	71.6%	85.2%	0.01
Anticoagulant/antiplatelets (%)	41.1%	68.1%	<0.001
Injury Severity Score	10 (5, 17.7)	9 (4,10)	<0.001
Head/neck AIS>3 (%)	30%	22%	<0.001
Hospital LOS (days)	8 (3.2, 13.7)	5 (2,9)	<0.01
ICU admission (%)	56%	37%	<0.001
Complications (%)	21%	32%	0.003
In-hospital mortality (%)	12%	5.6%	0.003

Conclusions: Trauma team activation reduced ($p<0.001$) the time to CT vs non-activations (2022: 48 (41,61) vs 217 (145, 303) min, $p<0.001$ and 2023: 46 (38,55) vs 186 (130, 251) min, $p<0.001$). The volume of trauma activations increased by 2.5-fold (190/1136 vs 532/1286 geriatric admissions) following the revised guidelines. Post guideline implementation patients were more often on anticoagulants/antiplatelets but were less severely injured including less often severe head injury. They had less ICU admissions, shorter hospital length of stay, and lower mortality. Given the intensive resources required for trauma activation in less severely injured patients, further study is indicated for optimal activation criteria.

IDENTIFYING OLDER ADULTS AT RISK FOR FUTURE FALLS VIA PHYSICAL & OCCUPATIONAL THERAPY ASSESSMENTS

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Introduction: Unintentional falls are the leading cause of non-fatal injuries for admitted adults ≥ 65 years, and many of these encounters are for recurrent events. This project examined predictors of subsequent fall admissions based on physical and occupational therapy assessments, treatments, and recommendations during an index admission.

Methods: This retrospective matched case-control study examined patients ≥ 65 years admitted to our trauma center for a fall in 2015-2019. Cases were those with a second fall admission within one year of discharge. Controls did not admit for a second fall within one year. Patients were identified via the trauma registry and matched 1:1 on age, sex, race, ethnicity, fall height, initial Glasgow Coma Scale - motor, anatomic injury grade in each body region, insurance type, and admission year. Predictors of subsequent admissions were screened with cross-validated LASSO regression and tested in a paired Cox hazards model. Alpha was set at 0.05.

Results: 208 total patients were included. Median [Q1, Q3] age at index was 84 [77, 88] years, 69% were female. Injury Severity Scores were 9 [5, 10] at index and second admission. The model revealed increased fall hazard from requiring minimal or moderate assistance with bathing at discharge (HR = 2.27, 95% CI = 1.11 - 4.64), requiring minimal assistance walking at discharge (HR = 4.97, 95% CI = 1.05 - 23.56), using a rolling walker prior to index injury (HR = 1.70, 95% CI = 1.05 - 2.75), and physical therapy recommending discharge to a skilled nursing facility (HR = 1.92, 95% CI = 1.32 - 2.81). In contrast, there was reduced fall hazard from being referred to outpatient occupational therapy (HR = 0.42, 95% CI = 0.24 - 0.76) and having no deficit in toileting-related activities of daily living at discharge (HR = 0.60, 95% CI = 0.38 - 0.93).

Conclusion: This study of older adults suggests using a rolling walker prior to injury or needing even minimal assistance with walking, bathing, or toileting at discharge may increase the risk of serious falls within one year. Further work is needed to clarify which additional referrals or services would help mitigate the risk of future falls in this population.

RIB FRACTURE INJURY GUIDELINES FOR PATIENTS OVER AGE 65: SHOULD THESE PATIENTS ROUTINELY BE ADMITTED TO THE ICU?

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Introduction: Elderly patients with rib fractures have a high incidence of complications including pneumonia, extended intensive care unit (ICU) stay, and mortality. To date, there are small studies assessing proper admission triage of elderly patients with rib fractures. 2022 EAST guidelines state there is insufficient data to recommend ICU versus non-ICU admission for patients over age 65 with greater than three rib fractures and 2016 WEST guidelines recommend ICU admission for patients over age 65 with two rib fractures. At our institution, we routinely admit patients over age 65 with three or more rib fractures to the ICU for at least 24 hours to achieve adequate pain control and maximize pulmonary hygiene; however, this may lead to an overutilization of scarce resources. The goal of this study is to determine which factors are associated with worse outcomes to create a new admission triage algorithm for elderly patients with rib fractures.

Methods: Patients aged 65 or older with three or more rib fractures were identified between 2016 and 2023 using our institutional trauma database. Patient demographics, comorbidities, and injury characteristics were collected. The primary outcome was predictors of a composite negative outcome (mortality, pneumonia, and readmission to ICU).

Results: 495 patients were included in the analysis with 340 patients admitted to the ICU and 155 patients admitted to the floor. ICU patients were more likely to be older, frail, and have ≥ 5 rib fractures (all $p < 0.05$). Less than 1% of patients initially admitted to the floor had an unplanned ICU admission and 25% of patients who ultimately died were readmitted to the ICU from the floor. Multivariable analysis demonstrated that frailty (OR:11.82, $p < 0.001$), ≥ 5 rib fractures (OR:2.64, $p = 0.04$), chest tube placement (OR:3.31, $p = 0.04$), and regional nerve block (OR:4.66, $p = 0.001$) were all associated with worse outcomes.

Conclusions: Patients with blunt thoracic trauma who are 65 or older, frail, and have ≥ 5 rib fractures may benefit from ICU admission. Future studies will assess the safety of this new proposed admission triage algorithm.

TRAUMA ACTIVATION FOR GERIATRIC FALLS ON BLOOD THINNERS RESULTS IN OVER TRIAGE

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Introduction: Unintentional falls account for approximately 70% of all geriatric emergency department visits. Patients on blood thinners who suffer low level falls are at an increased risk for deterioration from intracranial hemorrhage (ICH). Early recognition of ICH is crucial for prevention of a life-threatening event. However, our previous assessment found that implementing a trauma triage criterion for any patient over the age of 65 who had a fall on a blood thinner resulted in significantly over-triage. Further analysis aims to show that the removal of this trauma activation criteria does not significantly impact the mortality of patients due to ICH.

Methods: A retrospective case-controlled study was conducted comparing patients over 65 on a blood thinner who fell and had an intracranial hemorrhage with a partial trauma activation (initial criteria) and without an activation (modified criteria). Patients meeting only this criterion were accrued for a period of 6 months prior to the modification (n=20), then for a full year following (n=33). Primary outcome measure was all cause in hospital mortality. Secondary outcomes included the time from initial presentation in the emergency department to receiving a head CT.

Results: There was no significant difference in mortality between the patients within the initial criteria (10% mortality) vs the modified criteria (15% mortality) (p=0.59). Time (min) from door to CT was significantly higher for the patients in the modified criteria (median 169 [6.00, 391]) vs the initial criteria (median 39.0 [21.0,88.0]) (p < 0.001).

Conclusion: Inclusion of a trauma activation criterion for patients over 65 on a blood thinner who fell results in over triage, and its removal does not increase the risk of mortality. For patients with an intracranial hemorrhage, time to receive a head CT was significantly increased with the removal of the low-level trauma team activation criteria. It is still important to implement systems in the emergency department that recognize patients at risk of mortality from ICH and ensure that they receive a CT scan promptly.

TRAUMA IN CENTENARIAN: WHAT AFFECTS IN-HOSPITAL MORTALITY AND FUNCTIONAL OUTCOMES?

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Introduction: Advances in health care and the development of various technologies have improved disease-free longevity and healthy centenarians are gradually increasing. While independent living can help to maintain quality of life in centenarians, a risk of injury is also expanding due to sustained physical functions. As literature is sparse on post-injury functions in centenarians, we aimed to elucidate clinical predictors for mortality and unfavorable functions after injury among centenarians.

Methods: A retrospective observational study was conducted using a nationwide trauma database, including patients aged ≥ 100 years who required admission due to injury at ≥ 250 institutions in 2019-2022. Patient demographics, comorbidities, mechanism and severity of injury, vital signs on hospital arrival, and pre- and in-hospital treatments were obtained and compared between survivors and non-survivors. Among survivors, patient, injury, and treatment characteristics were also compared between those with and without dependency in daily life at discharge, which was defined as Glasgow Outcome Scale ≤ 3 out of 1 to 5 scale. Independent predictors for in-hospital mortality and unfavorable function at discharge were examined using a generalizing estimating equation model to consider institutional and regional differences in management and characteristics of centenarians.

Results: Among 409 centenarians in this study, 384 (93.9%) survived to discharge. While 208 patients (50.9%) had lived independently before the injury, only 91 (22.2%) could live independently at discharge. All patients suffered from blunt injury and fall from standing was most frequent (86.6%). Injury Severity Score was 10 ± 5 and surgeries/angiographies were performed in $< 2\%$ of centenarians, except for fracture fixation in extremity/pelvis which was conducted in 225 patients (55.0%). The adjusted model revealed three independent predictors for in-hospital mortality; male sex, mechanism of injury other than fall from standing; and Glasgow Coma Scale (GCS) on arrival, whereas only injury severity in extremity/pelvis was the independent predictor for dependency in daily life after injury.

Conclusion: Male sex, non-fall-from-standing injury, and GCS on arrival were associated with in-hospital mortality. Severe injury in extremity/pelvis was related to dependent living after injury in centenarians.

TRAUMA OUTCOMES IN PATIENTS WITH A HISTORY OF CEREBROVASCULAR ACCIDENT

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Introduction: Traumatic brain injury (TBI) and cerebral vascular accident (CVA); are both leading causes of mortality and morbidity, worldwide. Outcomes in patients who have suffered TBI have been studied extensively, however, outcomes in TBI patients who have a history of CVA (HxCVA) are not well defined. Here we aimed to seek the differences in outcomes between TBI patients with and without a history of CVA (HwoCVA).

Methods: Using the TQIP, adult patients (age \geq 18) with isolated blunt TBI from 2017 to 2019 were selected. Transferred patients and those who were dead on arrival were excluded. Patients were then grouped based on CVA as a comorbidity. Morality, hospital disposition, hospital and ICU length of stay, were compared.

Results: 655,686 patients with isolated blunt TBI patients were identified. The HxCVA group (n = 23,482) were older (72.18 \pm 12.1 years vs. 54.10 \pm 21.28 years, p<0.001) and had a lower ISS (13.60 \pm 8.4 vs. 14.33 \pm 10.4, p<0.001), than HwoCVA. TGCS was higher in HxCVA patients (13.58 \pm 3.9 vs. 12.99 \pm 3.0, p< 0.001). Mortality rates were higher in HxCVA (8.39% vs 7.94%, p<0.001). Hospital disposition was also significantly different between groups (p<0.001) with HxCVA more likely to be discharged to a nursing facility (22.88% vs. 9.11%). The mean hospital length of stay was significantly higher in the HxCVA (7.10 \pm 13.35 days vs. and 6.68 \pm 10.30 days, p<0.001), in comparison to HwoCVA. However, ICU length of stay was significantly lower in HxCVA (4.46 \pm 5.22 days vs. 5.44 \pm 6.98 days, p<0.001). Having a history of CVA significantly increased odds of mortality (OR: 1.283, 95% CI: 1.208 – 1.363, p< 0.001).

Conclusion: TBI patients with a history of CVA were associated with significantly increased odds of mortality, spent more days in the hospital, and less days in the ICU in comparison to TBI patients without a history of CVA. These results suggest a significant relationship between CVA history and TBI outcomes, potentially due to increased comorbidity burden, autonomic/endocrine dysfunction, and chronic post stroke systemic inflammation.

CAN POWERPOINT SAVE LIVES? ASSESSMENT OF EQUITY AND REACH OF TRADITIONAL DISSEMINATION CHANNELS IN GERIATRIC TRAUMA EDUCATION—A MIXED-METHODS STUDY USING DIGITAL ANALYTICS

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Introduction: Creation of evidence-based clinical guidance resources does not necessarily improve patient outcomes or standardize care without deliberate education, dissemination, and implementation. We sought to better understand the effectiveness of recorded didactics in improving knowledge as well as the equity, effectiveness, and reach of various information dissemination strategies, and to elucidate providers' typical means of knowledge acquisition.

Methods: An observational mixed-methods study was conducted amongst all United States' trauma care clinicians from March to August 2023. A 20-minute didactic video on anticoagulant management in geriatric traumatic brain injury (TBI), along with pre-and post-video knowledge surveys, was created by the American Association for the Surgery of Trauma (AAST) Geriatric Committee. This was circulated via email and social media accounts affiliated with 7 professional trauma societies as well as state and regional health departments. Digital analytics were captured, and descriptive and regression analyses conducted.

Results: The didactic video was viewed 1,407 times on YouTube with a mean view time of 7 minutes. Email was the primary point of access (85%), usually via computer (75.1%), and yielded the highest mean view time (9:13 minutes) and overall watch time (152.8 hours). Computers also yielded the longest mean view time (8:10 minutes) and overall watch time (143.9 hours). A total of 311 participants responded to the survey. Most were registered nurses (RNs) from urban, non-academic institutions with 11+ years of clinical experience. Of these, 31.9% were in a rural practice and 38.6% at a Level III/IV trauma center. Only 16.1% of respondents correctly answered all pre-video knowledge question (n=48/298); this increased to 51.6% post-video (n=94/182). Surgeons and advanced practice providers (APPs) ($r=0.148$, $p<0.05$), male respondents ($r=0.131$, $p<0.05$), and clinicians at higher-level trauma centers ($r=-0.140$, $p<0.05$) answered more pre-video questions correctly. Surgeons and APPs were more likely than RNs to report primary use of literature ($r=0.134$, $p<0.05$) and point-of-care medical information ($r=0.133$, $p<0.05$). Less experienced ($r=-0.174$, $p<0.01$) and academic clinicians ($r=0.126$, $p<0.05$) were more likely to confer with colleagues. Neither trauma center designation, urban/rural location, nor race/ethnicity was associated with means of knowledge acquisition.

Conclusion: Recorded didactics are associated with improved knowledge of anticoagulation management in geriatric TBI. Trauma society-sponsored email is an effective means of information dissemination to urban, Level I/II trauma centers, but still fails to reach many rural and Level III/IV trauma centers. Further study is needed to better understand end-user needs to optimize dissemination and implementation of up-to-date clinical guidance.

DIVERSITY IN CRISIS: THE IMPACT OF RACE AND ETHNICITY ON FAILURE-TO-RESCUE AMONG GERIATRIC TRAUMA PATIENTS OVER THE YEARS

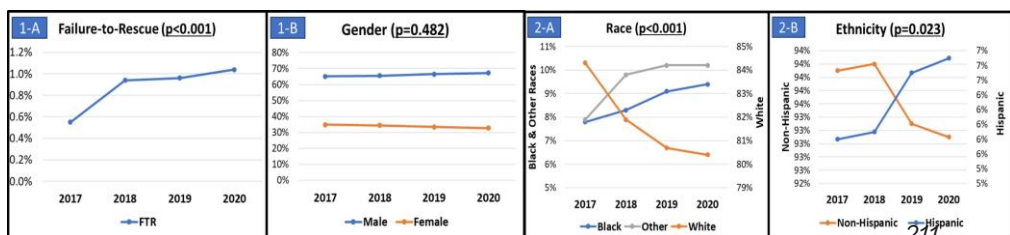
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Introduction: This study aimed to examine the trends of failure-to-rescue (FTR) (death from a major complication) incidence in geriatric trauma patients over the years and to determine whether race, ethnicity, and gender impact the FTR incidence among these patients across the United States.

Methods: In this retrospective analysis of ACS-TQIP (2017-2020), Geriatric (≥ 60 yrs) trauma patients were included. FTR was defined as death following a major complication (cardiac arrest, MI, sepsis, ARDS, unplanned intubation, acute renal failure, CVA, ventilator-associated pneumonia, or pulmonary embolism). Patients were stratified based on Race (White vs. Black vs. Others), ethnicity (Hispanic vs. non-Hispanic), and gender.

Results: 1,105,651 geriatric patients were identified, of which 30,984 (2.8%) developed major complications and 10,684 (34.5% of those with complications) had FTR. Mean age was 75, 46% were male, 86% were White, and 6% were Hispanic. Median [IQR] ISS was 9 [4-10] with no change over the years ($p=0.364$). Over the 4 years, the rate of FTR increased from 0.55% in 2017 to 1.04% in 2020 ($p<0.001$) (Fig 1A). An analysis of trends in FTR patients revealed no significant difference in the proportion of males and females over the years ($p=0.482$) (Fig 1B). However, there was a notable increase in the proportion of Black and Hispanic patients in comparison to White ($p<0.001$) and non-Hispanic patients ($p=0.023$), respectively (Fig 1C&1D). After controlling for confounding factors, odds of developing FTR increased over the years (aOR:1.08, $p<0.001$), with Black race (aOR:1.29, $p<0.001$) and Hispanic Ethnicity (aOR:1.12, $p=0.005$) identified as independent risk factors for FTR.

Conclusion: Despite the recent advancements in geriatric trauma care, the risk-adjusted odds of developing FTR have been increasing over the years, with one in every three patients developing complications not surviving to discharge. Our findings demonstrate that racial and ethnic factors significantly impact the incidence of FTR. Whether these disparities are attributable to the quality of care or patient-related factors is yet to be defined.



A GEOSPATIAL ANALYSIS OF GENTRIFICATION, GUN VIOLENCE AND DISPARITIES IN CARE FOR SHOOTING VICTIMS

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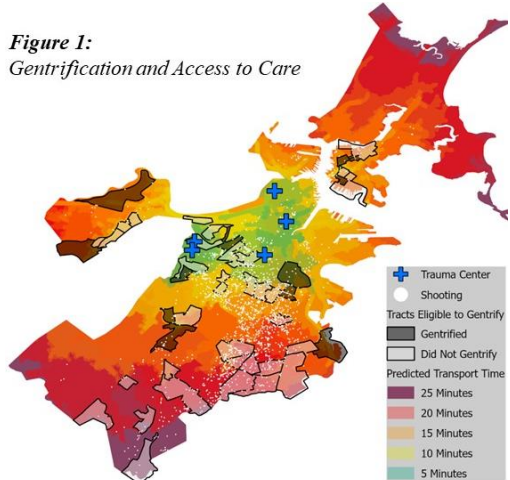
Introduction: Gentrification (GN) is associated with a displacement of shootings from gentrifying areas and 20% of American neighborhoods have undergone GN. However, the relationship between GN and access to trauma care is unknown. We evaluate the impact of GN on shooting rates, transport times to trauma centers, and survival in Boston, Massachusetts.

Methods: Using 2010-2020 census data, GN was defined by educational attainment and median home value. Shooting data were obtained from the Boston Police and geocoded into census tracts (CT) stratified by GN. Transport times were calculated using ArcGIS Pro analysis of traffic data. The primary outcome was shooting rates. Secondary outcomes were fatality rates, race of shooting victims and transport times. Poisson regression was used for shooting/fatality rates and Kruskal-Wallis tests for transport times.

Results: Of 171 CT, 57 (33%) were eligible for GN and 11 (19%) gentrified. There were 2,311 shootings, with lower shooting rates in gentrifying CT (β -0.69, 95% CI -0.93 to -0.45, $p < 0.0001$) but no differences in fatality rates or racial distribution of shootings. Median transport times were longer in non-gentrifying CT (11.71, IQR 5.82-15.51) than gentrifying (7.10, IQR 7.08-10.92) and ineligible CT (9.54, IQR 6.20-13.63, $p < 0.0001$). This data is presented in Figure 1.

Conclusion: GN was associated with lower shooting rates, resulting in more shooting victims with longer transport times in non-gentrifying areas. Understanding redistribution patterns of shootings may help to inform future violence prevention efforts and trauma system planning.

*Figure 1:
Gentrification and Access to Care*



CARE COMPLEXITY PREDICTS OUTPATIENT EMERGENCY HEALTHCARE UTILIZATION IN FIREARM INJURY SURVIVORS

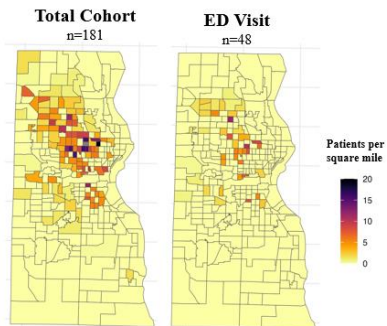
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Introduction: Firearm injury survivors (FIS) may have difficulty accessing outpatient care and are more likely to visit the emergency department (ED) after hospital discharge. Having implemented a longitudinal care team consisting of a medical social worker and a nurse navigator to improve outcomes for FIS, our objective was to review predictors of ED utilization and unplanned readmissions within 60 days of hospital discharge.

Methods: This was a prospective study where FIS were randomized 1:1 to the care team or standard of care (SOC) groups. The main outcomes were ED visits and unplanned readmissions. Patient demographics, home address, injury patterns, operative characteristics, and clinic follow-up were utilized to determine predictors of the main outcomes.

Results: There were 110 patients in the SOC and 109 in the care team groups. There were no differences in the number of patients who visited the ED (27% SOC vs 20% care team) or who were readmitted (16% SOC vs 18% care team). As there were no differences between groups, predictors were compared in aggregate. Those who were discharged with a drain (n=17) were 3x more likely to visit the ED (OR 2.86; 95% CI 1.0 – 8.0; p=0.04). Discharge with an ostomy (n=11) had a four-fold increased risk of being readmitted (OR 4.23; 95% CI 1.1 – 15.2; p=0.03). Most patients who visited the ED attended their outpatient follow-up appointment. The mean social vulnerability index of the entire cohort was 0.86 (SD=0.12) indicating high vulnerability, and patients who visited the ED came from specific, vulnerable areas (Figure 1).

Conclusion: Emergency healthcare utilization is common after firearm injury, and complex care needs are predictors. In light of high social vulnerability and geographic distribution, a comprehensive approach to care addressing social determinants of health is necessary to improve outcomes.



CRIME VICTIM COMPENSATION AFTER FIREARM INJURY - AN UNFULFILLED PROMISE?

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Introduction: The Crime Victim Compensation (CVC) program is a reparations program from the 1980s. It was established to offer significant financial support for survivors of violence and/or families to help recovery after trauma. In Illinois, CVC provides up to \$45,000 of financial assistance, however few firearm injury survivors receive this support. Barriers to CVC may exacerbate injured patients' trauma, hinder their ability to recover physically, financially, and emotionally, and may increase the risk of re-injury. The purpose of this study was to quantify and understand barriers that violently injured patients face in receiving CVC.

Methods: Mixed methods were used to conduct semi-structured interviews using qualitative methodology of federal program stakeholders, CVC advocates and facilitators (community violence interrupters & intervention specialists), survivors and family members. We further filed a Freedom of Information Act claim with the Office of the Illinois Secretary of State, to analyze claims for homicide from 2012-2023.

Results: 30 participants (stakeholders (n=9), advocates & facilitators (n=12), survivors & family members (n=9)) were interviewed. Administrative burdens, including those unique to Illinois, was the dominant theme. These burdens included the timeliness of compensation, the reimbursement vs. compensation model, necessity of "court-of-claims" processing, police department obstructionism, and adequacy of perceived reparations. These burdens eroded trust in violence prevention programs. There were 42,390 applications for CVC in Illinois over the study period. The median age of applicants was 30 years IQR [22,41]. A total of 16,803 (39.6%) applicants were women. Only 16,075 (37.9%) applicants were awarded pay, with an average of \$4,995.85 per successful applicant. In comparing claimants who self-identified as white, claims from those of all other races took longer to process ($P < 0.0001$).

Conclusions: Administrative burdens prevent access to CVC funds in Illinois, undermining its original intent as a reparations program. Less than half of applicants receive CVC. Removing these barriers is vital to making CVC more accessible to promote healing and prevent re-injury for patients and families. Elimination of these barriers is also critical to maintaining trust between patients, hospital-based injury prevention programs and state welfare institutions, which is compromised when extensive application processes yield no results.

EFFICIENCY AND EQUITY IN TRAUMA CARE COSTS: A NATIONWIDE PROPENSITY-MATCHED ANALYSIS OF SEVERELY INJURED PATIENTS IN SAFETY NET HOSPITALS

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Introduction: Safety net hospitals are key providers for marginalized populations and face distinct challenges and, consequently, may exhibit variations in length of stay, discharge disposition, and hospitalization costs. The purpose of this study was to analyze these aspects to enhance equity and efficiency in caring for severely injured trauma patients including readmissions throughout the US.

Methods: The Nationwide Readmissions Database for 2016-2020 was queried for all surviving trauma patients over 17 years of age and with an Injury Severity Score over 15. Patients admitted to safety net hospitals were identified as publicly funded, metropolitan academic, and large by bed size per region of the country. Propensity matching was performed one to one for safety net patients to non-safety net patients using predictors for age, gender, comorbidities, injury characteristics, household income, and insurance status. The primary outcome was length of stay (LOS) and the secondary outcomes were discharge disposition, and total hospitalization charges and cost including 30-day readmissions. Chi-squared was used for categorical variables and Student's t test was used for continuous variables.

Results: There were 852,397 total patients meeting inclusion criteria with 13.2% (n=112,614) admitted to safety net hospitals. After matching, the mean LOS for safety net hospitals was 9.3 ± 13.6 days and for non-safety net hospitals the mean LOS was 8.2 ± 11.3 days ($p < 0.01$). The overall most common discharge disposition was routine (home or self-care) with a rate of 50.9% (n= 80,807). The rate of transfer to rehab or skilled nursing facility (SNF) was 30.7% (n=48,705) and home healthcare (HHC) was 15.5% (n=24,686). Safety net hospitals were less likely to utilize HHC (OR 0.86 [0.83-0.88] $p < 0.01$). Safety net hospitals had lower mean total charges than non-safety net hospitals ($\$138,056 \pm \$204,651$ versus $\$142,904 \pm \$223,239$, $p < 0.01$). Safety net hospitals had a higher mean total cost than non-safety net hospitals ($\$38,664 \pm \$55,174$ versus $\$31,336 \pm \$44,845$).

Conclusions: This study represents a unique analysis of trauma hospitalization costs by including readmissions. Safety net hospitals, despite facing distinct challenges, demonstrate longer lengths of stay and underutilize home healthcare. Safety net hospitals incur lower mean total charges, however higher total cost suggests underlying complexities in resource allocation and financial dynamics. These findings emphasize the need for targeted interventions to enhance the efficiency and equity of trauma care delivery in safety net hospitals.

MENTAL HEALTH SCREENING AND CONSULTATION RATES DEMONSTRATE HIGH NEED AT TRAUMA CENTERS

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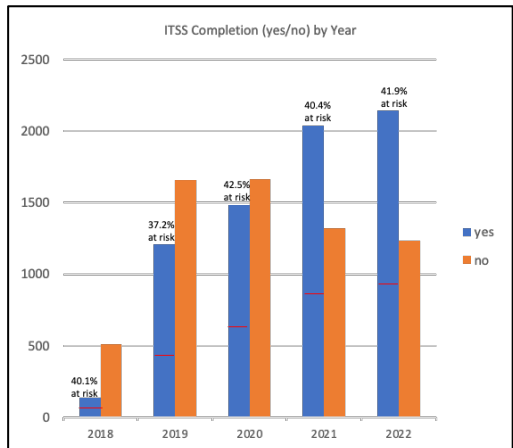
Introduction: Given risk of psychopathology post-injury, the ACS-CoT requires protocols for mental health screening and referral. We examined implementation of the multitier approach to psychological intervention after traumatic injury (MAPIT) which incorporates screening, inpatient psychological evaluation, and ongoing, as-needed intervention.

Methods: A retrospective study at a Level 1 trauma center explored the MAPIT model which includes four tiers: 1) screening for PTSD and depression using the Injured Trauma Survivor Screen (ITSS); 2) psychology consultation for positive risk; 3) inpatient psychology evaluation; 4) as needed intervention. Screening and consultation were evaluated in relation to hospital characteristics including length of stay (LOS) and injury severity (ISS).

Results: Participants ($N=6997$) included adults admitted after injury from 2018-2022. Overall, 40.8% of patients screened at risk. Screening rates increased each year (Fig 1), consults quadrupled over time (175 vs 703), and were completed on average at hospital day 4 ($SD=7.48$). ISS correlated with increased time to consult ($r=.26, p<.001$) but more follow ups ($r=.18, p<.001$) and cumulative intervention time ($r=.09, p=.002$). Those who were less likely to get a consult had lower ISS ($B=-.04, p<.001$) and shorter LOS ($B=-.06, p<.001$); yet, 36.4%-42.0% of those screened at risk still did not receive consult

$[X^2(3)=495.67, p<.001]$.

Conclusion: The MAPIT model successfully screens for risk and provides early intervention, particularly for patients with long LOS waiting to access outpatient treatment. Future work must continue to address barriers (e.g., early discharge) to ensure equitable mental health care for high-risk trauma patients and meet growing needs.



RACIAL AND ETHNIC DISPARITIES IN DISCHARGE SERVICES AMONG ELDERLY PATIENTS WITH MODERATE TO SEVERE TRAUMATIC BRAIN INJURIES IN THE UNITED STATES

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Introduction: Elderly trauma patients are at the greatest risk of requiring post-discharge services, including home health, nursing care, or inpatient rehabilitation. We sought to identify potential racial and ethnic disparities in services available to elderly traumatic brain injury (TBI) patients in the United States (US).

Methods: We analyzed the US National Trauma Data Bank (2011-2021). Medicare patients over the age of 65 with AIS of 3 or greater who survived discharge were stratified by race and ethnicity (non-Hispanic White; non-Hispanic Black; Hispanic; non-Hispanic Asian), and propensity score matched based on age, sex, Charlson Comorbidity Index, and Injury Severity Score (ISS). An ordered logistic regression was performed on the matched cohorts to estimate the odds ratio of receiving a higher level of discharge services compared to white patients. Discharge services included home, home with home health services, skilled nursing facility (SNF), and inpatient rehabilitation.

Results: We analyzed 387,274 patients. Race and ethnicity composition was 86.2% non-Hispanic White, 5.6% non-Hispanic Black, 5.0% Hispanic, and 3.2% non-Hispanic Asian. The mean age was 77.9 (SD 6.9) years, with a slight female preponderance (50.6%). The mean ISS was 16.4 (SD 7.7). After propensity matching, the cohorts were well-balanced. The odds ratio for a higher level of discharge services was lower for each minority group compared to white patients (Table 1).

Conclusions: In a propensity-matched cohort, all analyzed minority groups had lower odds of receiving a higher level of discharge services than white patients. Urgent work is needed to improve access to discharge services for racial minority groups to improve patient outcomes.

Patient Race/Ethnicity	Odds Ratio of Higher Level of Discharge Services (95% CI)
Non-Hispanic White	1.00
Non-Hispanic Black	0.94 (0.92, 0.96)
Non-Hispanic Asian	0.90 (0.87, 0.93)
Hispanic	0.77 (0.75, 0.79)

Table 1. Odds ratio for higher level of discharge services compared to white patients

RACIAL DISPARITIES IN INTUBATION WITHOUT CRITICAL INJURIES

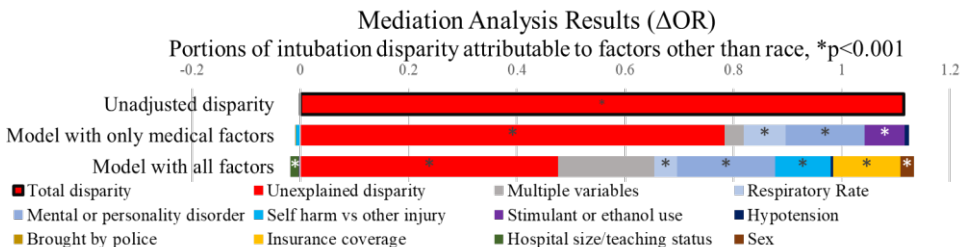
Elizabeth Dunne, MD; Natasha Pitcairn, BS; Katherine McKenzie, DO; Cleo Siderides, MD; Danielle Defoe, DO; Robert Laskowski, MD, PhD; R. Jonathan Robitsek, PhD; Randi N. Smith, MD, MPH; John Bliton, MD
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Introduction: Injuries that compromise the airway are inherently life-threatening and require intubation. However, patients are sometimes intubated for less objective reasons, such as ‘combative’ behavior. This study investigates whether there is a racial disparity in intubation among patients without typical indications in the National Trauma Data Bank.

Methods: Years 2017-2021 were queried from NTDB. Patients with Glasgow Coma Scale ≤ 8 , Abbreviated Injury Scale ≥ 4 in any region, hypoxia (SpO₂ < 88%), or ED disposition to the OR were excluded. A raw disparity in the rate of intubation within an hour of arrival was calculated and examined over time by comparing intubation in the trauma bay by racial group. Multiple mediation analysis was performed to evaluate potential contributors to these disparities.

Results: 3.4 million patients met criteria to be included. The largest disadvantage affected Black patients. In 2021, Black patients were more likely to be intubated than non-Black patients (1.27% vs. 0.64%), and this ratio has increased since 2017 (1.98:1 from 1.66:1). On multiple mediation analysis, about ¼ of the racial disparity could be alternatively associated with medical factors (such as respiratory rate), ¼ to non-medical factors (such as insurance), and ½ remained unexplained.

Conclusion: A racial disparity exists in how trauma centers manage airways. Institution-level investigations are needed to definitively determine the underlying causes of this gap. However, strategies to improve rapport in the trauma bay, such as increasing provider diversity or Trauma Informed Care, could reduce the quantity of these intubations performed.



DEMOGRAPHIC VARIATION IN TRAUMA TEAM ACTIVATION AFTER MOTOR VEHICLE CRASH PATIENTS

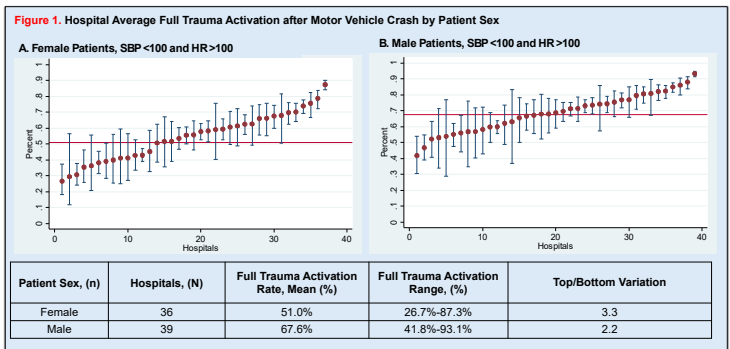
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Introduction: Patients involved in motor vehicle crashes (MVCs) are known to be at risk for under-triage, where patients at risk for severe injuries do not receive a full trauma team activation. We sought to investigate hospital-level variation in under-triage among patients who presented with a decreased systolic blood pressure (SBP) and elevated heart rate (HR).

Methods: Patients were identified from a linkage between publicly available crash data with trauma registry data from a statewide quality collaborative from 2020 to 2022. We compared mean hospital-level activation rates among patients with first emergency department vitals of SBP<100 and HR>100. Risk- and reliability-adjusted mean activation rates were calculated for each trauma center, and compared across demographic cohorts of sex, age, and race.

Results: There were a total of 14,840 patients, of whom 2,299 (15.1%) received a full trauma activation. A total of 296 (1.9%) of patients had SBP less than 100 and HR greater than 100. The overall full trauma activation rate among patients with SBP<100 and HR >100 was 60.4%. Within this subset, there were similar average variation rates for age and racial groups, however there was a significant difference in mean full trauma activation between male and female patients (male 67.8% vs female 51.0%, p-value <0.01).

Conclusion: Across level 1 and level 2 trauma centers, there was significant sex-based variation in full trauma activation, even among patients with evidence of hypotension and tachycardia on presentation. These data highlight the ongoing risk for under-triage among patient subgroups, necessitating standardization and implementation of trauma protocols.



CHALLENGES AND OPPORTUNITIES IN ADDRESSING ALCOHOL AND SUBSTANCE ABUSE AMONG PENETRATING TRAUMA PATIENTS

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Introduction: Alcohol and drug use impact a significant proportion of trauma patients at our urban, academic, level one trauma center. We recently introduced a Hospital Violence Intervention Program (HVIP) focusing on the holistic care of our penetrating trauma patients. At that time, we enhanced screening efforts for alcohol and substance abuse using provider questionnaires. We hypothesized that with these intensified efforts, we would identify more patients who may benefit from attention and resources related to alcohol and substance abuse through future HVIP initiatives.

Methods: We performed a retrospective chart review of all patients injured by gunfire or stab wounds one year prior to the initiation of the HVIP (October 2021-September 2022) and during the first year of the HVIP (October 2022-September 2023). Descriptive statistics were conducted, and the comparisons between groups (pre- vs. post-implementation) were tested with Independent-Samples Mann-Whitney U tests or Person Chi-square/Fisher's Exact tests.

Results: Overall 357 patients were included (pre-HVIP = 165, HVIP = 192). The majority of penetrating trauma cases were observed in Hispanic/Latino males. Upon increased screening, substance and/or alcohol use disorder rates were notably higher in the HVIP group compared to the pre-HVIP group (48 patients, 25% vs. 22 patients, 13.3%; p-value = 0.006). The incidence of comorbid mental health disorders was marginally lower in the HVIP group (15.1% vs. 17.6%; p-value = 0.528), although this difference was not statistically significant. The overall rate of post-discharge rehabilitation for drug and alcohol treatment was 17.1%, consisting of behavioral therapy (7.1%), outpatient detoxification (5.7%), and inpatient detoxification (5.7%), with no statistically significant variation observed between the two groups.

Conclusions: Increased surveillance of alcohol and substance use disorders among patients injured by gunfire or stab wounds revealed alarmingly high prevalence rates, yet effective intervention rates remained low. Recovery services for drug and alcohol abuse represent a crucial area of future focus for our HVIP.

COULD WE HAVE STOPPED THE BLEED? AN EXAMINATION OF 5765 HOMICIDE AUTOPSIES ACROSS 13 YEARS

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Introduction: Since 2015, the Stop the Bleed (STB) Campaign has taught bystanders to render aid in bleeding emergencies, through tourniquet application, wound packing, and compression of extremity injuries. Despite training more than 3 million Americans, little is known about potential lives saved by STB at the population-level. We performed a statewide evaluation of autopsy reports to quantify such deaths.

Methods: The Maryland Chief Medical Examiner's office investigates all homicides statewide. We analyzed autopsies for all gunshot (GS) or stab wound (SW) homicide victims from 2005-2017. We categorized homicides into isolated extremity or non-isolated extremity wound groups. We identified patients with vascular injuries amenable to STB techniques, including femoral, axillary, popliteal, brachial, and other uncategorized peripheral arterial injuries. Multivariate logistic regressions compared odds of major vascular injury between isolated vs. non-isolated extremity injuries. Analyses were stratified by injury mechanism (GS or SW).

Results: 5765 homicides were analyzed (88% male, 82% black, median age 28 years). The majority were due to GS only (84%), followed by SW only (16%). 47% of GS and 35% of SW victims had extremity injuries. For GS victims with extremity injuries, 2.4% (n=55) had isolated wounds; 5.3% (n=17) of SW victims with extremity injuries had isolated wounds. Victims with isolated vs. non-isolated extremity injuries had higher prevalence of major vascular injuries (GS: 33% vs. 5.0%, SW: 59% vs. 9.5%). GS victims with isolated extremity wounds had 10-fold greater odds of concomitant vascular injury relative to GS victims with non-isolated extremity injuries (OR = 10.1 [95%-CI: 5.8 – 17.5], P < 0.01). The difference was not significant for SW victims (OR = 3.7 [95% CI: 0.5 – 17.1], P = 0.11).

Conclusion: We found a significant burden of extremity wounds with major vascular injury amongst a large cohort of GS and SW homicide victims. GS victims who died from isolated extremity injuries were significantly more likely to have sustained major vascular injury. Isolated extremity wounds therefore provide an ideal, focused opportunity for hemorrhage control through STB techniques, which may save lives. This reinforces the utility of STB training as a potentially life-saving public health intervention.

INVOLVEMENT WITH HOSPITAL BASED VIOLENCE INTERVENTION PROGRAM IMPROVES CLINIC FOLLOW UP AFTER VIOLENT TRAUMATIC INJURY

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Introduction: Patients who have suffered a violent traumatic injury may develop medical and psychological complications after discharge, such as wound infections, poorly healing wounds, acute traumatic stress disorder (ATSD), and post-traumatic stress disorder (PTSD). These complications are most easily detected in outpatient follow up visits. However, clinic follow up after a suffered trauma is typically low. Hospital Based Violence Intervention Programs (HVIPs) assist patients who have suffered a violent traumatic injury with psychological and logistical resources. Previously it has not been studied whether HVIPs improve clinic follow up. We hypothesized that increased involvement with a HVIP leads to increased follow up in trauma, specialty, and primary care (PCP) clinics.

Methods: This was a retrospective chart review study analyzing 185 patients who had suffered a violent traumatic injury and were treated at an urban Level 1 Trauma Center, and who had at least one HVIP encounter. Patients were analyzed for amount of PCP, trauma, and specialty clinic appointments scheduled and attended. Other factors studied were sex, race, ethnicity, zip code, substance use, stable housing, employment, and incarceration. We performed univariate analyses followed by a multivariate linear regression.

Results: There was a statistically significant difference in trauma appointments attended ($p = .0063$) as well as specialty clinic appointments scheduled ($p=.0293$) and attended ($p= .0294$) based on number of HVIP encounters. Those in the medium (2-3) and high (4+) encounter groups, had higher numbers of clinic follow up. No significant difference was found with PCP appointments scheduled or attended based on HVIP encounters. The number of trauma clinic appointments attended were independent of injury type and age and there was no difference in appointments scheduled or attended based on race, housing stability, incarceration, or amount of substance use.

Conclusion: Increased involvement with HVIPs improves clinic follow up both in trauma clinics and specialty clinics. Clinic appointments are useful in detecting medical or psychological complications after a violent traumatic injury thus hopefully improving outcomes and reducing disparities.

TREAD LIGHTLY: EVALUATING GEOGRAPHIC DISTRIBUTION AND SEVERITY OF PEDESTRIAN VS. AUTO INJURIES IN A MAJOR METROPOLITAN AREA

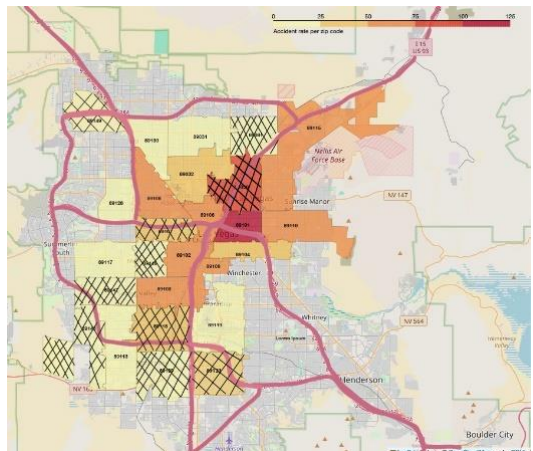
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Introduction: Pedestrian vs. automobile collisions are a prevalent cause of traumatic injury, leading to significant morbidity and mortality. The United States Department of Transportation (DOT) mandates annual Transparency Reports from state DOTs, focusing on locations with severe traffic safety needs. This study aims to identify high-risk areas for such collisions within our city and determine which high-volume injury locations are associated with severe injury.

Methods: Following IRB approval, we conducted a retrospective cohort study on adult trauma patients with the ICD-10 injury mechanism “Pedestrian vs. Auto” from January 2018 to December 2022. After obtaining injury incidence, we grouped patients according to injury ZIP code. Heat maps were then generated, with darker colors indicating higher injury incidence. We then calculated the median patient ISS and added cross-hatching to the heat map for all ZIP codes with >33% of patients with ISS greater than 15.

Results: We identified 1172 patients, of which 67.6% were male, median ISS was 9, and 30.5% of the total cohort had an ISS > 15. After heat mapping, we identified ten ZIP codes with >33% of patients with ISS>15. ZIP code 89030 exhibited both a high incidence of injuries (89 patients) and a high proportion of severe injury (33.7%, see Figure).

Conclusions: Our study is the first of its kind to examine a major metropolitan area by ZIP code to identify “hot spots” for severe pedestrian vs. automobile collisions, in a way that can be easily replicated in other cities, to help inform DOT investigations into associated factors. Incorporation of injury severity in our analysis helps to further focus safety interventions to the areas that need it most.

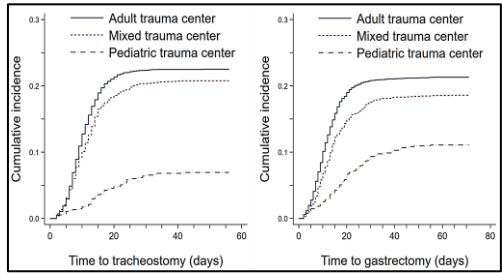


SIGNIFICANT VARIATIONS IN THE RATES AND TIMING OF TRACHEOSTOMY AND GASTROSTOMY FOR ADOLESCENTS WITH SEVERE TRAUMATIC BRAIN INJURY

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Introduction: The objective of this study is to explore variations between different trauma center types in the rates and timing of tracheostomy and gastrostomy for adolescent patients with severe traumatic brain injury (TBI).
Methods: This retrospective cohort study analyzed the ACS-TQIP database (2017-2021). We included trauma patients aged 14-18 years with severe TBI (Head AIS:3-5 & GCS:3-8). Trauma centers were classified as: adult (ATC), mixed (MTC), and pediatric trauma centers (PTC). We developed a multilevel mixed-effect Poisson regression model to assess the association between trauma center type and rates of tracheostomy and gastrostomy.

Results: Of 6,978 adolescent patients, tracheostomy and gastrostomy were performed in 22.5% and 21.3% at ATC, 20.8% and 21.3% at MTC, and 6.9% and 11.1% at PTC, respectively. The timing of tracheostomy and gastrostomy were significantly later at PTC (Figure). In the regression model adjusting for covariates, compared to ATC, the adjusted incidence rate ratios (IRR) for tracheostomy and gastrostomy were 0.38 (95 % CI: 0.28-0.52, $p < 0.001$) and 0.58 (95 % CI: 0.44-0.75, $p < 0.001$) at PTC (Table). There was no significant difference in the incidence of ventilator-associated pneumonia between ATC and PTC.



Conclusions: Our results suggest that there are significant practice variations in performing tracheostomy and gastrostomy for adolescent patients with severe TBI between ATC, MTC, and PTC. Further research is warranted to examine the impact on short- and long-term outcomes and to standardize care process for adolescent patients.

Trauma center type	IRR for Tracheostomy	IRR for Gastrostomy
ATC	Reference	Reference
MTC	0.94 (0.82-1.07)	0.87 (0.76-1.01)
PTC	0.38 (0.28-0.52)	0.58 (0.44-0.75)

SIMILAR RISK OF COMPLICATIONS AND DEATH FOR ADOLESCENTS WITH GUNSHOT WOUNDS TREATED AT PEDIATRIC ONLY HOSPITALS WHEN COMPARED TO COMBINED ADULT/PEDIATRIC CENTERS

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Introduction: Adult trauma centers including combined adult/pediatric centers (CPAC) see a higher volume of penetrating trauma. Thus, adolescents with gunshot wounds (GSWs) may have improved outcomes at CPACs vs pediatric only hospitals (POHs). This study aimed to compare differences in injury patterns, complications, and mortality for adolescents sustaining GSWs presenting to CPACs vs POHs, hypothesizing decreased associated risk of complications and mortality at CPACs.

Methods: The 2017-2021 TQIP was queried to identify adolescents (aged 12-17) who sustained GSWs. Patients transferred and those with a traumatic brain injury were excluded. CPAC included centers with both adult and pediatric ACS-verification while POHs only had pediatric ACS-verification. A multivariable logistic regression analysis was performed to identify risk factors for in-hospital complications and mortality while controlling for age, injury severity score (ISS), vitals on arrival, and need for transfusion.

Results: Of the 3,064 adolescent GSWs, 1,512 (49.3%) presented to a CPAC. CPAC patients were slightly older (median, 16 vs. 15 years old, $p<0.001$) and had a higher median ISS (9 vs. 4, $p<0.001$), as well as increased injuries to the spine (9.3% vs. 5.7%, $p<0.001$), heart (2.3% vs. 0.7%, $p<0.001$), lung (19.1% vs. 10.6%, $p<0.001$), liver (8.5% vs. 4.8%, $p<0.001$), and spleen (3.2% vs. 1.5%, $p=0.002$). CPAC adolescents also more frequently underwent emergent operations (31.9% vs. 23.5%, $p<0.001$). CPAC adolescents had higher rates of complications (5.2% vs. 3.1%, $p=0.003$) and mortality (7.7% vs. 3.1%, $p<0.001$). However, after adjusting for confounders, CPAC adolescents had similar associated risk of in-hospital complications (OR 0.81, CI 0.53-1.25, $p=0.34$) and mortality (OR 0.75, CI 0.40, 1.43, $p=0.38$).

Conclusion: Adolescent trauma patients after risk adjustment had similar outcomes at POHs compared to CPACs, confirming similar care across different types of pediatric centers.

THE ABDOMEN DOES NOT LIE, BUT THE LABS MIGHT: PREDICTORS OF INTRAABDOMINAL INJURY ON CT IMAGING AMONG PEDIATRIC BLUNT TRAUMA PATIENTS

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 Muhammad Haris Khurshid, MD; Christina Colosimo, DO, MS;
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 Louis J. Magnotti, MD, MS, FACS; Bellal Joseph, MD, FACS
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Introduction: Based on latest ACS practice guidelines, isolated abnormal laboratory tests necessitate obtaining abdominal CT for pediatric patients with blunt abdominal trauma (BAT), regardless of the abdominal examination. This study aims to identify the predictors of intra-abdominal injury (IAI) and the role of blood tests in CT imaging in pediatric BAT patients.

Methods: This is a retrospective review at a Level I adult and Level II pediatric trauma center (2018-2022). Children (<17 years) who presented with BAT and received abdominal CT imaging were included. Outcomes included the rates of intra-abdominal injuries and interventions. Multivariable regression analysis was performed to identify the predictors of IAI on CT imaging, using clinical and lab information available in the trauma bay.

Results: Of 3,707 pediatric patients over 5 years, 483 patients with BAT and abdominal CT imaging were identified. Mean age was 13, 58% were male, mean lowest SBP was 85, and median GCS was 15. Overall, 19% had abdominal pain, 6 had post-injury emesis, 26% had abdominal tenderness, and 11% had pelvic tenderness on initial evaluation. Moreover, 90% had an initial FAST examination, of which 9.5% were positive. Based on initial lab tests, 8% had abnormal serum aspartate aminotransferase (AST) (>200 U/L), 3% had abnormal hematocrit (<30%), 1.2% had abnormal UA (>5 RBC/hpf), and 0.8% had abnormal lipase. 17% had at least one IAI, of which 17% underwent operative or interventional procedures. On multivariable regression analysis, abdominal tenderness, abnormal plain x-ray, positive FAST, blood transfusion requirements, and abnormal AST were identified as independent predictors of IAI upon abdominal CT findings (Table). Among patients with IAI, only 37% had abnormal labs, all of whom had one of the predictors of IAI. Among patients with abnormal lab results (n=57), only 9 patients had none of the predictors of IAI, out of which none were found to have IAI on abdominal CT.

Conclusion: More than 80% of all abdominal CT imaging had negative results, with less than 5% receiving any intervention. Our findings highlight the significant role of clinical findings in the trauma bay, regardless of lab findings, when deciding about requesting abdominal CT imaging for pediatric trauma patients with BAT.

Table – Independent Predictors of Intraabdominal Injuries on Abdominal CT Imaging			
variables	aOR	95% CI	p-value
Abdominal Tenderness	1.78	1.21-3.12	0.021
Abnormal Plain X-ray	2.23	1.04 - 4.75	0.038
Positive FAST	17.28	5.80-51.50	<0.001
Blood Transfusion Requirements	4.30	1.15-15.94	0.030
Abnormal AST	18.42	6.96-48.75	<0.001

THE GRAY ZONE: COMPARING TEENAGE TRAUMA RESUSCITATION IN ADULT AND PEDIATRIC EMERGENCY DEPARTMENTS.

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David Jacobs, MD; A. Britton Christmas, MD; Chad Scarboro, MD;
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Introduction: Evidence shows injured children < 15 years old are most effectively treated at Pediatric Trauma Centers. There is no consensus for teen trauma patients (TTP) 15-17.99 years old. We historically treated TTP in our Adult ED (AED). To enhance our Pediatric ED (PED) readiness, we transitioned to treating TTP in our PED. Our hypothesis was that transitioning would not affect hospital length of stay (LOS) or mortality but lead to longer ED LOS given unfamiliarity with high acuity patients in PED.

Methods: This is a retrospective review of two consecutive 13-month time periods (1/21-1/22 and 2/22-2/23) comparing trauma resuscitations in TTP in AED with TTP in PED, respectively. This occurred at our combined ACS verified, Level 1 Trauma Center. Trauma specific variables were collected. Outcomes of interest were ED LOS (primary), inpatient mortality and hospital LOS (secondary). Univariate and multivariate analysis was performed. The analysis was repeated for Code 1 (highest acuity) patients.

Results: A total of 743 TTP were identified: 378 were treated in AED and 365 were treated in PED. For Code 1 activations, 77 TTP were treated in AED and 76 in PED. There was no difference in mortality between AED vs PED. There was no significant difference between groups with univariate or multivariate analysis. (Table 1)

Conclusion: Determining the best location for teen trauma resuscitation remains a challenge. This study provides evidence that TTP receive excellent, timely care in both AED and PED. Further study is needed to determine the impacts for younger pediatric patients.

	Adult ED Triage	Peds-ED Triage	p-value
All-Code Mortality	13 (3.44%)	7 (1.94%)	p=0.21
All-Code Hospital LOS (days)	4.70 (STD 13.6)	3.66 (STD 6.07)	p=0.79
All-Code ED LOS (min)	234 (IQR 124-312)	252 (IQR 136-336)	p=0.10
All-Code Injury Severity Score	11.1 (IQR 4-16)	10.0 (IQR 4-13)	p=0.17
Code 1 Mortality	13 (16.9%)	6 (8.11%)	p=0.10
Code 1 Hospital LOS (days)	6.06 (STD 8.0)	6.04 (STD 7.8)	p=0.82
Code 1 ED LOS (min)	126 (IQR 38-158)	153 (IQR 47-248)	p=0.05
Code 1 Injury Severity Score	17.3 (IQR 7-25)	13.9 (IQR 3-20)	p=0.05

VALIDATION OF A PEDIATRIC PREDICTION MODEL FOR MORTALITY IN ADULTS WITH TRAUMATIC BRAIN INJURY

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Introduction: Traumatic brain injury (TBI) is a significant cause of morbidity and mortality. While most TBI-related admissions are mild, identifying early predictors of poor outcome may assist with timely medical decisions and effective triage utilization. We sought to validate a clinical tool built in pediatric patients for predicting in-hospital death in adults with a TBI.

Methods: Data was collected from the National Trauma Data Bank between the years of 2007 to 2015. We included adults who sustained any TBI, defined as: (i) open and closed skull fractures, (ii) cerebellar, cortical, or brain stem contusions, and (iii) subarachnoid, subdural, or epidural hemorrhages. Our interest was in assessing the performance of a pediatric trauma mortality model in adults with TBI. The development cohort (years 2007 to 2015) was randomly split into a training (70%) and test set (30%). Model performance was calculated via C-statistic followed by external validation (year 2016).

Results: Mortality rate was 7.2% in the development cohort (n=351,642; median [IQR] age: 60 [41, 77]; 63% males) and 9.8% in the validation cohort (n=9,970; median [IQR] age:58 [38,74]; 66% males). The prediction model included 11 variables: age, gender, race, mechanism, transportation mode, systolic blood pressure, pulse, respiratory rate, oxygen saturation, temperature, and Glasgow coma scale (GCS). The C-statistic in the development cohort was 86.7% (95% CI 86.3, 87.1) and 89.5% (95% CI 88.7, 90.4) in the validation cohort. Our model outperformed some of the currently used and validated trauma scores.

Conclusions: We derived a clinical model that can accurately predict in-hospital death in adult TBI patients. The model was translated into a web-based application that can be quickly implemented to assist in patient triaging and resource allocation.

IMPROVING KNOWLEDGE, ATTITUDES AND BELIEFS ABOUT TRAUMA-INFORMED CARE BY IMPLEMENTATING A NOVEL NATIONAL CURRICULUM: A STUDY OF 23 US TRAUMA CENTERS

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Introduction: Trauma-informed care (TIC) is a framework acknowledging “trauma” as a complex psychological state based upon past and present experiences. Understanding this state improves patient-provider interactions, reduces bias, and improves outcomes. Few TIC educational opportunities exist for those caring for injured patients. We aim to test the effectiveness of a novel educational curriculum on TIC knowledge, attitudes and beliefs.

Methods: We conducted a multi-site pilot at 23 US trauma centers using a standardized curriculum given in-person or via a virtual platform. We measured knowledge, attitudes and beliefs using online pre and post questionnaires developed by our multidisciplinary team. Descriptive statistics were used to analyze the data.

Results: 1,255 surveys were completed with diverse participants (see table). Despite 40% having >5 years trauma work experience, TIC was a new concept for 64% of participants and 72% never had training, although concepts of social determinants of health were well understood (86.3%). There was a notable effect of the intervention on knowledge and beliefs. Participants rated the training as high-quality, informative and relevant.

Conclusion: TIC requires education and cultural shifts that have historically been difficult to reliably implement without a sanctioned national curriculum. Our study demonstrates that this relatively short, accessible, and effective educational intervention could be delivered widely to various providers and using various platforms with fidelity, with the ultimate goal of improving equitable quality care for all patients.

Percentage (N=1,255)																
27	25	24	6	5	4	2	2	1	.7	.3	3	21	42	28	2	6
Trainee	Nurse	Surgeon	Allied Health*	APP	Social Work	Administrator	Comm	Chaplain	Paramedic	Mental Health	Other	New Concept	Little familiarity	Some familiarity	Expert	Did not Answer
Occupation												TIC Exposure				

*Includes Physical, Occupational, Speech and Respiratory Therapists, Dieticians and Pharmacists

REVISITING TRAUMATIC BRAIN INJURY IN THE GOLDEN YEARS

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Introduction: Traumatic brain injury (TBI) is a significant health concern, particularly among geriatric patients. Readmission after TBI could be associated with increased worse outcomes. In this study, we aimed to investigate the rates and causes of readmission in geriatric patients that sustain TBI.

Methods: We used National Readmission Database 2015-2016 and included all geriatric patients (age \geq 65 years) that were admitted due to TBI in the index hospital. Primary outcomes of this study were rates of readmission and mortality when readmitted. Secondary outcomes were relations between index discharge disposition and hospital length of stay (LOS) and readmission and rates of recurrent TBI.

Results: Totally, 284,817 patients were identified with TBI on their first visit. Of them, 73,152 patients (25.7%) were readmitted. Rates of readmission was highest in patients that were discharged to a short-term hospital (34.5%) followed by Skilled Nursing Facility (SNF)\ Intermediate Care Facility (ICF) (30.8%) and was lowest in patients that were discharged home in the first admission (22%) ($p<0.001$). The mean age of readmitted TBI patients was 80.08 ± 7.83 years and 34,324 patients (46.9%) were male. Totally, 4,066 patients (5.6%) died on the readmission. The mean time to readmissions was 69.86 ± 74.24 days. The mean index hospital LOS was significantly longer in patients who were later readmitted (7.02 ± 9.28 vs. 6.06 ± 8.76 days, $p<0.001$). 16.7% of readmissions were due to recurrent TBI and 12.2% were due to falls. On a sub-analysis on patients with readmission less than 30 days, recurrent TBI was the reason of readmission in 24.2% of patients and 14.4% were readmitted due to falls. The odds of readmission in TBI patients increased significantly with advanced age (OR=1.008), longer index hospital LOS (OR=1.012) and primary discharge to short-term hospital (OR=1.789) and SNF\ICF (OR=1.497) ($p<0.001$ for all).

Conclusion: Readmissions, especially within less than a month, due to recurrent TBI and falls are high among geriatric population who are admitted for TBI. The readmission rate is higher in patients who are discharged to short-term hospital or SNF\ICF. Targeted interventions and comprehensive care planning are imperative to reduce readmission rates and improve outcomes for geriatric TBI patients.

CURRENT STATE OF TRAUMA CLINICAL GUIDANCE GLOBALLY: A SYSTEMATIC REVIEW

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Introduction: Investments in cost-effective healthcare system strengthening have led to the development of clinical practice guidelines (CPGs), defined as clinical decision-making aids built on scientific evidence, experiential knowledge, and patient values. This review evaluates accessibility, relevance, and quality of existing trauma CPGs globally.

Methods: A systematic review evaluated trauma-related clinical aid sources published from 2016 to 2023, searching in English across eight databases and 28 professional society websites. Using a combination of Medical Subject Headings (MeSH) terms or similar we included protocols, guidelines, position papers, reviews and consensus documents, assessing their quality using the National Guideline Clearinghouse Extent Adherence to Trust-worthy Standards (NEATS).

Results: Out of 986 records, 108 met review criteria, excluding unretrievable (13), outdated (25), non-trauma (110), and not fitting CPG definition (730). Ninety percent of trauma CPGs, featured a first author from a high-income country (HIC). When categorizing CPGs by the first author's region, 43% came from North America, 8% from South America, 35% from Europe, 13% from Asia & Pacific and 1% from Africa. Eighty-two percent of CPGs were public access with no registration required, the remaining 18% had an average cost of 45.7 USD (13.38 SD). Regarding guideline standard adherence, the mean quality score of all guidelines was 3.81 (scale 1-5), 77% disclosed the source of funding, 91% involved a multidisciplinary group and 54% explicitly mentioned inclusion of a methodologic expert. On logistic regression, the tested variables included English language, public access, first/senior author from HIC, multidisciplinary group, methodological expert, and professional society endorsement. The only factor predictive of a high (≥ 4) NEATS score was the reported presence of a methodological expert.

Conclusion: Current CPGs largely feature authors from HIC with minimal representation from low and middle-income countries (LMIC), despite LMIC bearing a higher injury burden. Promoting LMIC authorship recognizes the value of cultural perspectives and local expertise in resource allocation. Improving CPGs impact may involve expert methodological input and addressing accessibility barriers like cost, registration, and language.

PENETRATING TRAUMA RE-INJURY: WHAT IS THE PROGNOSIS OF PATIENTS WITH MULTIPLE TRAUMAS?

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Introduction: Recurrent presentations for separate traumatic injuries account for a large proportion of urban trauma activations, with rates as high as 10-44%. However, injury patterns and in-hospital surgical and critical care needs for patients experiencing penetrating trauma reinjury outside the United States have not been thoroughly evaluated. Trauma is a global public health issue with a disproportionately high burden of morbidity and mortality in immature trauma systems. This study analyzed the injury burden, need for surgical and critical care resources, and short-term outcomes in patients presenting with penetrating trauma reinjury in a single urban trauma center in Chile.

Methods: In a retrospective review of a prospectively collected hospital trauma registry, we included patients over age 15 treated from 1/2019-12/2020 for penetrating trauma, defined as stab wounds (SW), gunshot wounds (GSW), and other high-velocity projectile injuries. Reinjury was defined as any subsequent hospitalization for new penetrating injury; previous injuries' sequelae were excluded. The primary outcome was all-cause mortality, and secondary outcomes included hospital length of stay (LOS), intensive care unit (ICU) LOS, length of vasoactive drug requirement, operating room (OR) time, and need for blood transfusion within 3 hours of arrival. Chi-squared test and Student's t-test were used for group comparisons, logistic regressions for independent association of mortality with reinjury.

Results: Of 1,028 included patients, 100 (9.72%) experienced penetrating trauma reinjury, and 22 (2.1%) experienced two or more reinjuries. Most patients were male (92.96%), and 65.8% of cases were GSWs. Greater number of reinjuries was associated with greater mortality, higher proportion of GSW to SW, longer ICU and hospital LOS, longer vasoactive drug requirement, and higher 3-hour transfusion need.

Conclusion: Patients suffering penetrating trauma reinjury had poorer outcomes and required more hospital resources than those with one incident of penetrating trauma. To reduce armed violence and prevent penetrating reinjuries, successful community- and hospital-based violence prevention and intervention programs should be adapted to the Chilean context.

MODIFIED BRAIN INJURY GUIDELINES IMPROVE RESOURCE UTILIZATION IN A PUBLIC HEALTHCARE SYSTEM

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Introduction: The management of traumatic brain injury (TBI) and intracranial hemorrhage (ICH) can be resource-intensive and present considerable challenges in a public healthcare system. The modified Brain Injury Guidelines (mBIG) provide an algorithmic approach to determine which patients need additional computed tomography (CT) scans of the head, neurosurgical consultation, and hospitalization. Although mBIG has demonstrated improved resource utilization in several studies, it has not been evaluated within a publicly-funded healthcare model. We sought to determine whether implementation of mBIG at two tertiary-care trauma centres in Canada would reduce repeat imaging and unnecessary neurosurgical consultations, without adverse outcomes.

Methods: We conducted a retrospective review of all adults (≥ 18 years) presenting to two university-affiliated tertiary-care trauma centres in Edmonton with ICH or TBI, between July 1, 2022 and March 31, 2023. Patients were excluded if their initial Glasgow Coma Score (GCS) was less than 13, did not receive a CT head scan, or had focal neurological findings. mBIG score (mBIG 1, 2, or 3) was assigned based on imaging and clinical findings on arrival to hospital. Clinical characteristics, including the number of repeat CT scans, neurosurgical consultation, and neurological deterioration in hospital, were evaluated.

Results: We reviewed 911 charts, of whom 322 patients had ICH on imaging. Among this group, 29 (9%) were mBIG1; 62 (19%) were mBIG2; 231 (72%) were classified as mBIG3. Among the 91 patients with mBIG1 or mBIG2 ICH, 66 (73%) received unnecessary neurosurgical consultation, and 50 unnecessary repeat CT scans were performed. There was no neurological deterioration among mBIG1 or mBIG2 patients and repeat imaging did not change management.

Conclusions: A sizeable proportion of patients with ICH may be managed without repeat imaging or neurosurgical consultation, without suffering adverse outcomes. Modified Brain Injury Guidelines (mBIG) are a safe and resource-efficient tool for managing patients with TBI and ICH within a public healthcare system.

ANALYSIS OF NERVE REGENERATION INHIBITOR RGMA AND MICROGLIA IN THE MURINE CONTROLLED CORTICAL IMPACT MODEL

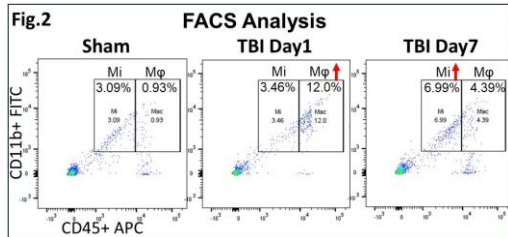
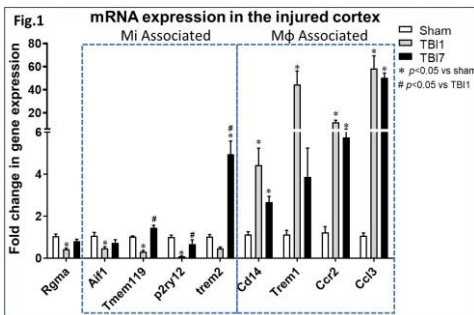
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Introduction: We have previously reported that microglia (Mi) are suspected to be involved in the expression of repulsive guidance molecule a (RGMa), a neuroregeneration inhibitor, in a murine traumatic brain injury (TBI) model. We aimed to clarify the changes over time in Mi and macrophage (M ϕ) activation, and RGMa expression in the injured brain after TBI.

Methods: We employed controlled cortical impact (CCI) model for TBI. Brains were extracted 1 and 7 days after the injury (n=6 per group), and RNA was extracted from brain contusion sites. RT-PCR was performed on RGMa and activation markers for Mi and M ϕ (Aif1, Tmem119, P2ry12, Trem2, Cd14, Trem1, Ccr2, Ccl3). Flow cytometry (FACS) was performed to evaluate changes in Mi and M ϕ at the site of TBI.

Results: In RT-PCR, RGMa showed a significant decrease at day 1 (p<0.05), but recovered at day 7, comparable to Sham. The Mi markers Aif1, Tmem119, Trem2 and P2ry12 also showed a significant decrease at day 1 (p<0.05), similar to RGMa, but recovered at day 7. (Fig.1) FACS analysis showed that both Mi (CD11b+, CD45 intermediate) and M ϕ (CD11b+, CD45 high) increased at day1 and day 7 compared to Sham. However, by day7, the percentage of Mi increased and that of M ϕ decreased (Fig.2).

Conclusion: In TBI, M ϕ was activated and the activation of RGMa and Mi was decreased on day 1, while RGMa and Mi increased on day 7, suggesting that RGMa-expressing Mi may be involved in the inhibition of nerve regeneration after TBI.



ASSOCIATION BETWEEN CT VOLUMETRY AND INTRACRANIAL PRESSURE ELEVATION IN TRAUMATIC BRAIN INJURY: A RETROSPECTIVE COHORT STUDY

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Introduction: Intracranial pressure (ICP) elevation is associated with poor outcomes in patients with traumatic brain injury (TBI), and ICP is one of the key indicators in the management of TBI patients. Although ICP elevation is sometimes estimated from CT images as a substitute for ICP sensor placement, the association between CT images and ICP elevation remains unclear. This study aimed to objectively elucidate this association through the utilization of a freely available programming code for CT assessment.

Methods: We conducted a retrospective cohort study at Rinku General Medical Center in Japan from April 2014 to August 2023, including patients of all ages with TBI and inserted ICP sensors. ICP values were compared with CT series taken at the same timing. ‘CT volumetry’ was employed to analyze CT series, visualizing and calculating intracranial volume (ICV) and three density volumes: low-density volume (LDV), middle-density volume (MDV), and high-density volume (HDV). The thresholds for the density areas were determined as averages by three blinded trauma physicians. The code was developed using Python and the OpenCV module, enabling cost-free and versatile utilization. The primary outcome was ICP value, and an ICP elevation was defined as ICP > 22mmHg for a dichotomous outcome to assess diagnostic accuracy.

Results: A total of 123 TBI patients and 267 CT series were analyzed. The percentage of LDV to ICV (LDV%) was related to ICP elevation (Odds ratio 0.55 [95% confidence interval (CI), 0.42-0.73]). The area under the receiver operating characteristic curve for LDV% predicting ICP elevation was 0.852 [95%CI,0.777-0.927]. LDV% > 5% had a negative likelihood ratio of 0.13 [95%CI, 0.00-0.49], and LDV% > 10% could completely exclude ICP elevation.

Conclusion: CT volumetry was associated with ICP elevation in TBI. LDV% was a useful indicator to exclude ICP elevation in TBI.

IMPACT OF TRAUMATIC BRAIN INJURY ON FIBRINOLYTIC DYNAMICS IN SEVERELY INJURED PATIENTS

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Introduction: In severely injured patients, dysregulated coagulation impairs stable clot formation and increases mortality. Traumatic brain injury (TBI) notably precipitates a spectrum of derangements to normal clot formation and breakdown. This study examined profiles of clot mechanics and stability, specifically in patients suffering TBI.

Methods: Plasma was isolated from 63 trauma patients upon emergency department arrival. Clotting kinetics, mechanics, and fibrinolysis rates were measured with rheological and turbidity assays. ELISAs were performed to assess tissue plasminogen activator (tPA) and D-dimer levels.

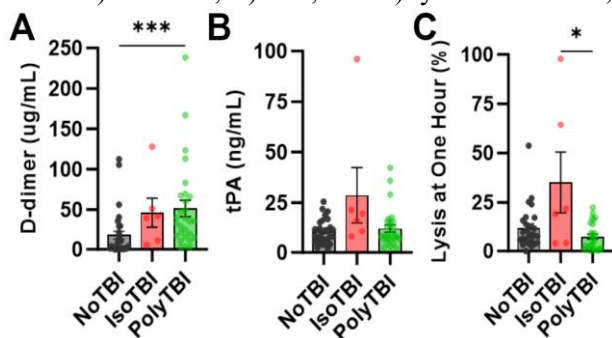
Results: Patients with TBI had higher mortality, and significantly higher D-dimer levels, indicating pre-hospital lysis, when compared to patients without TBI. This early lysis was seen across injury severity. To isolate the specific contribution of TBI, patients were divided into those with isolated TBI (IsoTBI), TBI with extracranial injuries (PolyTBI), and no head injury (NoTBI). IsoTBI and PolyTBI exhibited increases in pre-hospital lysis (A). IsoTBI exhibited increased tPA levels (B) and a significant increase in clot lysis rate one hour after clot activation compared to the other groups (C).

Conclusion: Our study demonstrates that early hyperfibrinolysis and predisposition to excess lysis were not due to injury severity or quantity of injury but were attributable to TBI. Turbidity measurement was uniquely sensitive in detecting persistent fibrinolysis in isoTBI patients. Therefore, the utilization of turbidity assays and D-dimer as complementary tools to classify clotting status can inform early treatment approaches.

Figure: Fibrinolytic markers A) D-dimer, B) tPA, and C) lysis at one hour,

in NoTBI (n=29), isoTBI (n=6) and polyTBI (n=26) patients.

Significance between groups indicated by * $p < 0.05$, *** $p < 0.001$.



OPTIMIZING THE MODIFIED BERNIE NORWOOD CRITERIA FOR EARLY PROPHYLAXIS ADMINISTRATION

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Introduction: The clinical decision to administer venous thromboembolism prophylaxis (VTE PPX) is determined by an assumption of low re-bleeding risk. There is very little research on the timing of the higher risk groups and very early administration of VTE PPX, which prohibits the facilitation of an evidence-based strategy. Findings from this study will inform clinical decisions designed to help TBI patients avoid VTE complications.

Methods: This retrospective cohort study utilized the ACS-TQIP-PUF from 2017 to 2021. The study involved a review of VTE PPX type and timing, demographics, injury categories, in-hospital complications, morbidity factors, comorbidity, neurosurgical procedures with timing, and in-hospital mortality. The study population consisted of adult (≥ 15 years) patients who received LMWH, UFH, or mechanical filter VTE PPX with no missing times and had a blunt isolated TBI based upon the mBNC. The population was split into two groups, patients with and without a comorbid history of anticoagulation or bleeding disorder (BLEED). The mBNC was applied to distinguish each group into a low-risk, moderate-risk, and high-risk of re-bleeding. The risk groups were stratified into early (≤ 24 -hour), mid (> 24 to < 72 -hour), and late (≥ 72 -hour) VTE PPX administration.

Results: A total of 99,078 patients were included in the analysis; 75,952 (76.6%) did not have a comorbid BLEED. Multivariable regression models found a protective effect against mortality (BLEED OR .36, CI = .25 to .51; vs no BLEED OR .30, CI = .23 to .39), DVT (BLEED OR .28, CI = .14 to .57; vs no BLEED OR .22, CI = .15 to .33) and PE (BLEED OR .31, CI = .09 to 1.03; vs no BLEED OR .29, CI = .16 to .55) if VTE PPX was given early in both the low and moderate-risk groups (all values $p < .01$). The high-risk group found a higher odds of mortality in the early (OR 2.11, CI = 1.06 to 4.18, $p = .03$) and mid (OR 1.39, CI = 1.10 to 1.75, $p < .01$) VTE PPX BLEED group.

Conclusion: Early VTE PPX in the low and moderate risk mBNC reports to be effective in preventing VTE and mortality, with the absence of neurosurgical procedures only in the low-risk group regardless of BLEED. Early VTE PPX in the high-risk group prevents VTE; however, associates with a higher odds of mortality.

SERUM BIOMARKERS TO PREDICT THERAPEUTIC INTENSITY AND LOSS OF CEREBRAL AUTOREGULATION IN SEVERE TBI

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Introduction: Current treatment of severe traumatic brain injury involves reducing cerebral edema and resultant intracranial hypertension. Intracranial pressure (ICP) elevations can compress brain parenchyma and decrease cerebral perfusion, altering cerebral autoregulation. Disruption of the endothelial glycocalyx increases vascular permeability and disrupts coagulation and inflammation. The goal of this study is to determine if serum biomarkers can predict loss of cerebral autoregulation and if serum biomarkers are predictive of a malignant ICP phenotype requiring higher therapeutic intensity.

Methods: 25 trauma patients with severe TBI (GCS <9) underwent continuous ICP monitoring. Serum biomarkers of acute phase reactants were obtained on admission and serially after ICP monitor placement. Modified PILOT scale quantified therapeutic intensity. Pressure Reactivity index (PRx), correlation between ICP and mean arterial pressure (MAP) was used as a metric for cerebral autoregulation

Results: Multiple regression modeling demonstrated higher initial acute phase reactants correlated with greater area under the curve (AUC) PILOT scores. Syndecan-1 release greater than 40 predicted higher PILOT AUC. Pearson's correlation analysis demonstrated a correlation between soluble thrombomodulin (sTM) levels at 48hrs and the PRx between 48-72hrs (Pcc=0.4376, p=0.06). Additionally, sTM levels within 24 hrs were correlated with PRx between 36-48hrs (0.35, p=0.10) and PRx 48-72hrs (0.3955, p=0.0938). Syndecan-1 levels 2hrs post-admission showed a correlation with PRx between 36-48hrs (r=0.55, p=0.02).

Conclusion: This suggests an association between endothelial dysfunction and both therapeutic intensity and the brain's autoregulatory capacity after acute TBI. Increased release of acute phase reactant proteins and Syndecan-1 is associated with increased PILOT scores, demonstrating a relationship between elevated serum biomarkers and higher therapeutic intensity. Elevations in sTM and Synd-1 precede a loss of cerebral autoregulation. Identification of these biomarkers can alter TBI management.

CIVILIAN PREHOSPITAL TOURNIQUETS FOR EXTREMITY TRAUMA: MORE COMMON AND GETTING BETTER ALL THE TIME

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Pedro G. Teixeira, MD; Marc Trust, MD; Tatiana CP Cardenas, MD;
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Introduction: From lessons learned in recent U.S. military conflicts, extremity tourniquets (TQ) have become standard practice in civilian prehospital care. We hypothesized that civilian EMS TQ use has increased and TQ are more often applied correctly to patients with extremity vascular injury. The specific aim of this study was to investigate the rate of civilian TQ placement and compare TQ placement in patients with and without vascular injury.

Methods: This was a retrospective study (2014-2022) of all adult trauma patients who had a prehospital extremity TQ placed and were transported to our trauma center at the highest level of activation. Data collected includes demographics, mechanism, physiology, injury severity, presence of extremity vascular injury (ICD-9 and 10 codes), and TQ year, number, and location. The primary outcome was the rate of TQ placement over time, while secondary outcome was the presence of an extremity vascular injury.

Results: There were 353 patients who had a total of 482 prehospital extremity TQ placed. The TQ patients were on average 37 years old, 82% male, 61% sustained penetrating trauma with an ISS=15, and 26% had an extremity vascular injury. There was an average of 1.4 TQ placed per patient, with 44% placed on an arm and 59% placed on a leg. TQ placement increased during the study period for both TQ placement per EMS transport (4% → 15%, $p<0.0001$) and TQ placement per vascular injury (11% → 39%, $p<0.0001$). When comparing TQ patients with and without vascular injury, there was no difference in age, gender, race/ethnicity, or ISS, but the vascular injury patients more often sustained penetrating trauma (82% vs. 54%, $p<0.0001$) and had a lower prehospital systolic blood pressure (106 vs. 116, $p=0.03$). On logistic regression, while controlling for age, gender, as well as number and location of tourniquets, only penetrating injury (AOR: 3.4 [1.7-6.8], $p=0.0004$) and prehospital hypotension (AOR: 2.9 [1.6-5.4], $p=0.0005$) were independently associated with the patient having an underlying extremity vascular injury.

Conclusions: Civilian EMS TQ use has increased over the past decade, and one in four patients with a TQ had an extremity vascular injury. There may be room to further refine indications for civilian prehospital TQ application, considering mechanism and hemodynamic condition in the decision making.

COMPUTED TOMOGRAPHY AFTER PENETRATING CARDIAC BOX INJURY IS SAFE IN STABLE PATIENTS: A REVIEW OF THE NTDB AND A TRAUMA CENTER REGISTRY

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Introduction: Surgeons may be reluctant to bring stable patients with penetrating cardiac box injuries to the CT scanner due to a perceived risk of sudden cardiopulmonary deterioration. The primary purpose of this study is to address this concern by evaluating the risk of complications during CT in these patients. A secondary purpose is to explore how CT guides management.

Methods: Penetrating cardiac box injuries were selected from one Level I Trauma Center's registry, and penetrating thoracic injuries were selected from the National Trauma Data Bank (NTDB) for years 2017-2021. Patients were included if they were stable (shock index <1) and received a CT chest as part of their trauma workup. Patients were excluded if they had critical or worse head injuries (AIS>4). Variables extracted included mechanism, vitals, abbreviated injury scale, procedures performed, and mortality.

Results: Out of 290 penetrating thoracic injuries in stable registry patients, 74 were to the box, and 42,987 NTDB patients met criteria. FAST was negative in all registry patients. There were no complications associated with going to CT in the registry. There were 93 deaths (0.2%) within 6 hours of presentation in the NTDB. After CT, in the registry and the NTDB respectively, 27.0% and 25.7% received a chest tube, 95.9% and 89.8% avoided open chest exploration, and 18.9% and 18.5% underwent abdominal exploration. Among the registry cohort, 85.0% of post-CT chest tubes were placed for findings absent on trauma bay chest X-ray.

Conclusion: In stable patients with penetrating box injuries, CT is rarely associated with complications and often seems to guide management.

Cohort and post-CT management	N	Died in	Chest tube, no thoracotomy	Abdominal exploration	Thoracic exploration
		under 6 hrs			
Registry "cardiac box" injuries	74	0	20, 27.0%	14, 18.9%	3, 4.1%
NTDB penetrating thoracic injuries	42987	93, 0.2%	10224, 23.8%	7964, 18.5%	4386, 10.2%
NTDB firearm thoracic injuries	19490	82, 0.4%	4949, 25.4%	4574, 23.5%	2291, 11.8%

GROWING PAINS: EXPANDING ON BIG CRITERIA TO INCLUDE MINOR FRACTURES

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Introduction: The Brain Injury Guidelines (BIG) were developed to reduce the use of repeat CT, ICU and neurosurgical resources in patients that were unlikely to benefit. Until this time, all trauma patients that have a TBI and an additional injury have been excluded from the BIG, regardless of injury severity. We propose that minor fractures (AIS <4) can be safely included within BIG without an increase in morbidity or mortality in patients who would otherwise meet BIG 1 or 2 stratification.

Methods: Retrospective chart review of polytrauma patients with traumatic brain injury patients from a single level-1 trauma center presenting from January 2017 to November 2022. Patients who died in or were discharged from the emergency department, stratified to BIG 3, admitted to ICU or did not have an additional injury were excluded. The remaining patients were stratified by their assigned BIG category or given one based off their imaging and GCS on presentation if they were initially excluded.

Results: 766 patients underwent chart review. 88 patients met final inclusion criteria. 31 patients were assigned BIG 1, and 57 patients were assigned BIG 2. Neurosurgery was consulted in 20 patients (22.7%, BIG 1 35% vs BIG 2 65%) with 0 interventions performed. 27 patients (30.6%) underwent repeat head CT, but progression of TBI was found only in 1 patient (3.7% overall) who underwent observation only. All patients had minor fracture injuries (AIS <4) with a median AIS of 2. 15 (17%) patients underwent surgery a median of 1 day from admission (range 0 to 22 days) with 4 (26.6%) receiving a preoperative neurosurgery consult, 7 (25.9%) of these repeat head CT. Mean time to OR after neurosurgical consultation was 1 day. We observed no in-hospital mortality, no ICU upgrades and 5.6% morbidity. 82% were discharged home, 6.7% to rehab, 4.5% to SNF and 3.3% to inpatient psychiatry.

Conclusions: Addition of minor fracture injuries to institutional BIG criteria can be safe, as demonstrated by our low morbidity, in-hospital mortality and ICU upgrade rates with high rate of home discharge. We additionally demonstrate the low utility of neurosurgical consultation and routine repeat head CT scanning in patients with minor fractures in the setting of TBI meeting BIG 1 or 2 criteria. We were unable to demonstrate a significant delay to OR for fracture fixation imposed by neurosurgical consultation or repeat head CT scanning.

INITIAL IMPLEMENTATION OF A POST-MORTEM CT PROTOCOL AT A LEVEL 1 TRAUMA CENTER

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Introduction: The national rate of autopsies has declined to <8% due to limited resources. There is accumulating evidence that post-mortem computed axial tomography (PMCT) is a valuable tool in forensic pathology, but its potential role as an alternative to conventional autopsy has not yet been fully defined. We hypothesize that PMCT will improve injury severity reporting accuracy by identifying unknown injuries and increasing ISS.

Methods: This is a retrospective study of PMCTs in trauma patients who were dead on arrival (DOA) or arrived with signs of life (SOL) and died shortly after arrival from 3/2023 to 11/2023. PMCT is a noncontrast CT performed from the skull vertex to the upper thighs with options to image the lower extremities if relevant. Patients were divided into two cohorts: (1) those with SOL who received interventions and (2) those who did not. ISS was calculated with and without PMCT.

Results: The majority of patients (79.3%) were male who presented with blunt mechanism with 27.6% from falls, 13.8% motorcycle crashes, 17.2% motor vehicle crashes, 20.7% pedestrians hit by cars, 3.4% jet ski collision and 3.4% bicyclist hit by van. The remaining 13.8% were gunshot wounds. The time from death to performing PMCT was <7hours for all patients. Of the 29 patients, 13 (44.8%) arrived with SOL and received interventions whereas 15 (55.2%) were DOA and received no hospital intervention. Of those who received interventions, the median ISS without PMCT was 11 [IQR: 3.5-23] compared to 50 [IQR: 44-58] with PMCT ($p=0.001$). For patients who did not receive interventions, the median ISS without PMCT was 2.5 [IQR:0.25-8] compared to 47.5 [IQR:35.8-54] with PMCT ($p<0.001$). PMCT identified a lethal injury in 3 patients (10.3%), updating ISS to 75 (I.e. nonsurvivable injury). Only 6 (20.7%) conventional autopsies were completed by the medical examiner at the time of this writing.

Conclusion: PMCTs can be a valuable adjunct, and even a potential alternative, to conventional autopsy in trauma patients. Postmortem CT scan adds educational value and improves the reporting of accurate information to major quality databases in a timely fashion.

PHYSIOLOGY OVER PHARMACOLOGY: EFFECT OF ANTICOAGULATION ON NONOPERATIVE MANAGEMENT OF SOLID ORGAN INJURIES

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Introduction: The risk of anticoagulation (AC) in the management of intraperitoneal solid organ injury (SOI) is not clearly defined. We hypothesize that preinjury anticoagulation will increase the failure of non-operative management (NOM) after blunt liver and/or spleen trauma.

Methods: We performed a retrospective review of adult blunt trauma patients with ≥ 1 liver or spleen injury that underwent initial non-operative management from January 2020 to August 2023. Patients were excluded if there was no initial CT, emergency department (ED) death, or planned operative management. Data collected included age, AC status, AC reversal, initial INR, Injury Severity Score (ISS), ED vitals, embolization status, operative intervention, and transfusion amounts. Using univariate and multivariate logistic regression analyses, we evaluated the relationship between pre-injury anticoagulation, excluding aspirin alone, and NOM failure.

Results: 1492 patients met inclusion criteria. There were 726 isolated splenic, 487 isolated liver, and 279 concomitant liver and spleen injuries. The patients were 64% male with a median age of 37 (IQR 25 - 58) and a median ISS of 22 (IQR 17 - 33). The NOM failure rate was 2.3% overall. 97 patients were on AC prior to injury of whom only two (2.1%) failed non-operative management. In our regression analysis, AC status did not correlate with NOM failure (aOR 0.67; $p=0.618$), but Grade IV/V injuries (aOR 6.12; $p<0.001$) and ED transfusion (aOR 1.10; $p<0.001$) did. AC patients receiving reversal received more blood in the ED (4.6u vs. 1.1u, $p<0.001$); however, they did not have a significantly different rate of failure of NOM (3.7% vs. 1.4%, $p=0.480$).

Conclusions: Pre-injury AC was not associated with NOM failure in our cohort. Our NOM success rates are higher than what has been previously reported, even in patients on pre-injury anticoagulation, suggesting that, with modern resuscitation practices, reversal of AC may not be necessary in all patients with intraperitoneal solid organ injury.

PNEUMOTHORAX DETECTION IN THE ED: HOCUS POCUS?

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Introduction: The incidence of pneumothorax (PTX) in polytrauma may be as high as 20%. Prior studies demonstrated have indicated rather variable sensitivity for both POCUS and supine CXR in PTX detection. The efficacy of both modalities in PTX detection at a major ED that serves an overwhelmingly blunt trauma population was assessed.

Methods: All full adult trauma activations admitted from 2019-2021, excluding traumatic arrests or those without POCUS exam, were included. A subset (19%) of POCUS exams were reviewed by the POCUS director.

Results:

Total patients	541
ISS	16 + 13
Pneumothorax (n, %)	76 (14%)
Chest tube for PTX (n)	52
CXR identified PTX (n)	30
CXR Sensitivity	39.4%
POCUS Sensitivity – overall	42%
POCUS Sensitivity – APP/PGY1	44%
POCUS Sensitivity – PGY 2/3	40%
POCUS Sensitivity – Fellow/Attending	45%
POCUS PPV	94%
POCUS FNR	30%

Conclusion: The incidence of PTX was 14%. A chest tube was placed in about 68%. The overall sensitivity of POCUS for PTX was 42%, with limited variation by level of training, with a false negative rate of 30%. Ultrasound image review by POCUS director indicated 97% concordance with the examining provider with regards to PTX presence/absence and location thereof. Further study of imaging process and outcomes is indicated.

SHOULD WE BE SCORING PAIN DIFFERENTLY FOR RIB FRACTURES? A COMPARISON OF TWO SCORING SYSTEMS

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Introduction: Following rib fractures uncontrolled pain leads to hypoventilation, impaired airway clearance, and in some patients, progression to respiratory failure and death. Pain assessment and control is the primary treatment for all patients with rib fractures. Pain is typically assessed at rest. A novel approach is to assess patients' pain with movement, as this may better capture pain that interferes with physical function. We hypothesized that movement pain scores (MPS) would be higher than resting pain scores (RPS) for patients admitted with rib fractures, and would correlate better with opioid administration.

Methods: A retrospective cohort of patients ≥ 18 years admitted at a Level 1 trauma center with isolated chest injury (non-chest AIS ≤ 2) were eligible. Patients unable to self-report pain scores were excluded. RPS and MPS scales range from 0-10, with 10 being most pain. RPS and MPS were compared during the first 10 days of admission.

Results: During the 3 month study period, 81 patients met inclusion criteria (median age 69 years [47-79]). The median number of rib fractures was 4 [2-6]. 423 hospital days with 1688 pain assessments were analyzed. MPS and RPS agreed only 39% of the time. When RPS and MPS differed, the average MPS was 2.3 points higher than RPS ($p < 0.01$). Days with higher average MPS had higher average opioid usage (42.7 MME vs. 21.5 MME, $p < 0.01$).

Conclusions: Pain scores with movement were higher than resting scores when measured simultaneously for patients admitted with rib fractures. Higher MPS were associated with increased opioid use. Using resting pain scores alone for rib fractures patients may underestimate pain and lead to worse pain control and outcomes for patients.

TRAUMA PNEUMONECTOMY: HAS SURVIVAL IMPROVED OVER TWO DECADES?

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Introduction: Trauma pneumonectomy, although infrequently performed, has a mortality exceeding 50% from exsanguination and acute right heart failure. The hypothesis of this study is that recent advances in mechanical cardiopulmonary support and operative management have improved survival over time.

Methods: Retrospective, single center, trauma registry study from January, 2003 to December, 2023 of all adult patients who underwent a pneumonectomy for trauma. Data collected included demographics, mechanism of injury, admission physiology, operative details, the use of veno-venous extracorporeal membrane oxygenation (VV-ECMO) and mortality, defined as early (within 24 hours of surgery) and late (> 24 hours after surgery). Outcomes were compared by decade, the first decade (2003-2010) and second decade (2011-2023), using t-tests, ANOVA, and chi-squared tests.

Results: Twenty patients met inclusion criteria, 9 in the first decade and 11 in the second decade. Fifteen (75%) sustained a penetrating injury (11 gunshot and 4 stab wounds), 2 (10%) sustained a blunt injury and 3 (15%) had incomplete data on mechanism. Comparing the decades, there were no differences in mean age (32.2 vs 25.8, $p=0.16$) or injury severity score (26.4 vs 34.3, $p=0.23$). However, those in the second decade had significantly lower mean admission pH (6.89 vs 7.14, $p=0.01$) and higher admission base deficit (19.3 vs 9.8, $p=0.003$). The use of thoracic damage control surgery significantly increased from 33% in the first decade to 100% in the second decade ($p=0.002$). VV-ECMO with lung rest ventilation increased from 22% in the first decade to 64% in the second decade ($p=0.06$). Mean time to cannulation was 1.6 days (± 2.2) with a mean VV-ECMO duration of 24.8 days (range 5 to 105 days); one patient with persistent hemodynamic instability was converted to veno-arterial ECMO. The overall mortality was 5 (55.6%) in the first decade compared to 5 (45.5%) in the second decade ($p=0.65$). Early mortality, all secondary to hemorrhagic shock and/or right heart failure, did not significantly change over the respective decades 1 (11%) vs 5 (45.5%), $p=0.09$. However, late mortality was significantly lower in the second decade compared to the first, 0% vs 50% ($p=0.04$).

Conclusion: Patients requiring a traumatic pneumonectomy are severely injured, in profound shock and physiologically compromised. Despite improved overall survival, early mortality from intractable hemorrhage and right heart failure, remains high. However, the combination of a thoracic damage control operative strategy and early initiation of VV-ECMO may contribute to the dramatic decrease in late mortality to 0% in the last decade.

SURGICAL STABILIZATION OF RIB FRACTURES – WHO GETS IT?

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Introduction: Clinical benefits of surgical stabilization of rib fractures (SSRF) for patients with severe multiple rib fractures (MRF) or flail chest (FC) have been reported in multiple studies. However, most patients with MRF or FC do not receive SSRF. Our study assessed rates and predictors of SSRF among patients with MRF or FC in the United States.

Methods: Patients with MRF or FC admitted in the inpatient setting were identified within the Premier Healthcare database. All patients had a chest Abbreviated Injury Scale (AIS) score > 1 and > 2 days inpatient stay. Patients were stratified by receiving SSRF anytime during index admission.

Variables included patient demographic, comorbid and injury-related characteristics (e.g., injury severity score (ISS), specific lung injury types) and hospital characteristics (size, location, type). Logistic regression analyses were conducted to identify hospital or patient characteristics associated with SSRF. Separate models were built for MRF vs FC patients.

Results: 225,865 patients with MRF and 9,286 with FC were included, of which 2% (4,537) and 31.5% (2,923) received SSRF, respectively. In patients with FC, the two main predictors for SSRF were presence of pneumo- or hemo- or pneumohemo-thorax present on admission and requiring drainage (OR: 5.8 (95% confidence interval (CI): 5.2-6.5), $p < 0.001$) and hospital size > 500 beds (OR: 4.5 (95%CI: 2.3-8.7), $p < 0.001$). The same two predictors were identified for patients with MRF, however in this cohort, White race (vs Black) was also associated with increased odds for SSRF (1.31 (95% CI: 1.17-1.46), $p < 0.001$). Patients with Medicaid and Medicare as payer also had lower odds of SSRF vs patients with commercial insurance (Medicaid: 0.83 (95% CI: 0.75-0.92) – Medicare: 0.85 (95% CI: 0.78-0.92), $p < 0.001$ for both).

Conclusion: SSRF is still underutilized. In patients with FC, hospital size and pneumo- or hemo- or pneumohemo-thorax present on admission predict SSRF utilization. In patients with severe multiple rib fractures, socioeconomic factors such as race and payer are also associated with SSRF utilization.

QUANTIFYING FASTER HEMOSTASIS IN NONCOMPRESSIBLE TORSO HEMORRHAGE

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Introduction: Rapid surgical hemostasis is a critical component of trauma care and is associated with improved survival. However, little is known about the time spent in the various phases of care prior to achieving definitive hemostasis. We hypothesized that time to hemostasis varies based on different management strategies and prolonged hemostasis is associated with worse outcomes.

Methods: A prospective, observational study was performed at 6 level 1 trauma centers 2017-18. Adults with hemorrhage below the diaphragm requiring intervention within 60min were included. Patients were grouped by interventions required for hemostasis: interventional radiology only (IR), laparotomy and IR (Lap+IR), laparotomy only (Lap), REBOA and Lap (REBOA+Lap), and thoracotomy and Lap (Thor+Lap). Outcomes included time spent in 4 hospital segments, time to hemostasis, death, and complications. Univariate, multivariable, and Cox regression for time to hemostasis, censored for death, were performed.

Results: Of 398 included patients, hemostasis was obtained in 86%. Patients had a median age of 34 (IQR 25-50), and ISS of 26 (17-38). Death or complications occurred in 71% of patients, with a 24% mortality rate. The median time from ED arrival to definitive hemostasis was 117 mins (Figure 1). ED time was longer in the IR group than other groups ($p < 0.001$) while procedural time was shorter in the Lap and Thor+Lap groups ($p < 0.02$). On Cox regression, the Lap group had the shortest time to hemostasis (Figure 2). Above-average hemostasis time was associated with increased odds of death or complications (OR 1.8, IQR 1.1-2.9, $p = 0.02$).

Conclusion: Time to hemostasis varied widely among severely injured patients with noncompressible torso hemorrhage requiring emergent intervention. Definitive hemostasis was obtained fastest in the Lap patients, after adjustment for death. Procedure start was nearly 60 minutes later in the IR group than others. Prolonged time to hemostasis was associated with worse outcomes. These detailed time data will allow targeted interventions to improve time to hemostasis.

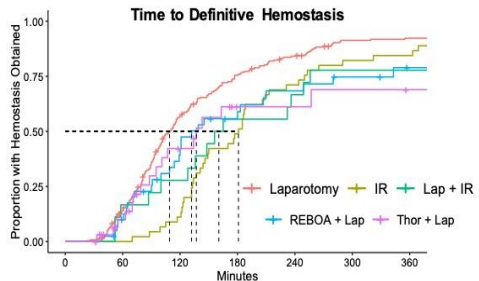
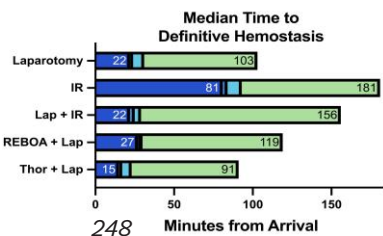


Figure 1

Figure 2

A NOVEL SILICON-BASED POLYMER- UNIVERSAL COMBAT MATRIX SUPPORTS LIVER VIABILITY OUT TO 72 HOURS IN PORCINE MODEL OF HEPATIC LACERATION

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Introduction: Hemorrhage is the leading cause of death in trauma and control of non-compressible parenchymal bleeding remains challenging. Many hemostatic agents have been evaluated to minimize blood loss and improve survival. We compared a novel silicon dioxide-based universal combat matrix (UCM) to the recently FDA-approved QuikClot® Control+® (QCC+) in a hepatic laceration porcine model.

Methods: A 6cm full thickness left liver laceration was made sharply in 12 anesthetized swine and treated with UCM (n=6) or QCC+ (n=6). As many gauze applications required for hemostasis were used, and manual pressure held until hemostasis achieved. The animal was monitored for 1 hour and recovered for a 3-day period. Animal survival and number of applications were analyzed. Labs were drawn at baseline, end of hemorrhage, end of monitoring period, and daily for 3 days. The animal was euthanized, and liver tissue collected for histology and blinded histopathological evaluation.

Results: All UCM and QCC+ animals survived the 3-day period. On average, UCM required 3.1 applications to achieve hemostasis and QCC+ 2.2 (p=0.54). There was no significant difference in liver function tests (AST p=0.29, ALT p=0.99), white blood cell count (p=0.94), platelets (p=0.89), creatinine (p=0.97), hemoglobin (p=0.99) or hematocrit (p=0.99), between groups over the 3-days. On gross liver inspection, UCM livers were well perfused without necrosis or ischemia, while QCC+ livers showed early necrosis and discoloration. Blinded histopathology scoring demonstrated QCC+ had significantly more hepatic neutrophilic inflammation (p=0.02) and panlobular necrosis (p=0.001) compared to UCM.

Conclusions: UCM demonstrated comparable hemostatic efficacy to QCC+, without evidence of significant liver or kidney injury, blood loss, leukocytosis, or electrolyte derangement. While QCC+ was used in this model against product instructions (which recommend removal within 48 hours) histology examination indicates that UCM may be left in place for extended periods of time without appreciable inflammation and necrosis. This may have implications for improved post-treatment hepatic function if using UCM as a hemostatic agent for traumatic injury. Ongoing efforts include examining this product out to 30-day survival in this model.

BARRIERS TO ADOPTION OF AN ARTIFICIAL INTELLIGENCE CLINICAL DECISION SUPPORT SYSTEM FOR TRAUMA

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Introduction: Clinical decision support systems (CDSSs) can help trauma clinicians identify high-risk patients after injury. An artificial intelligence (AI) model that predicts trauma-induced coagulopathy (TIC) has been developed, validated, and embedded within a CDSS. However, barriers to adopting or implementing the AI CDSS may impede its effect on clinician decision-making or patient outcomes. We aimed to evaluate the potential barriers and facilitators influencing adoption of an AI CDSS in trauma care.

Methods: This prospective study was approved by the UK Health Research Authority (22/HRA/2324). Participants (trauma clinicians) used a prototype AI CDSS in a simulated environment using clinical vignettes, completed a validated questionnaire and a semi-structured interview. The ‘non-adoption, abandonment, scale-up, spread and sustainability’ (NASSS) framework – developed to identify complexity in healthcare technology interventions – informed the questionnaire and interview. Thematic analysis of interview transcripts was conducted on NVivo v12, achieving theme saturation.

Results: Participants (n=22) had a median age of 39 years (IQR 31-48), 73% were male, 77% were doctors, 18% nurses and 5% paramedics, with a median of 13.5 years (IQR 6.3-19.8) experience. The main potential barriers to adoption/implementation of AI CDSS were: 1) heterogeneous TIC mechanisms and treatments; 2) duplication of input unless connected to electronic patient records; 3) limited benefit to the decision-making process without treatment thresholds; 4) uptake is dependent on clinicians’ seniority, specialism, and resistance to change; 5) organizational cost, 6) data governance and security; and 7) evidence of patient benefit for regulatory approval. The main potential facilitators were the system’s: 1) usability (accessibility, efficiency, learnability, and ease of use); 2) usefulness (for treatment decisions, real-time prediction, triage, and confidence); 3) credibility (endorsement by key individuals, demonstration of patient benefit, and reinforcement of decision-making); and 4) dissemination (enthusiastic early adopters, and ensuring clinician awareness of the tool).

Conclusion: Reducing complexity will aid the successful adoption of our AI CDSS. This work has informed the design of future feasibility and randomized studies evaluating its impact on clinicians and patient outcomes.

EXTRAVASCULAR FACTOR IX IN A RAT MODEL OF PENETRATING TRAUMA

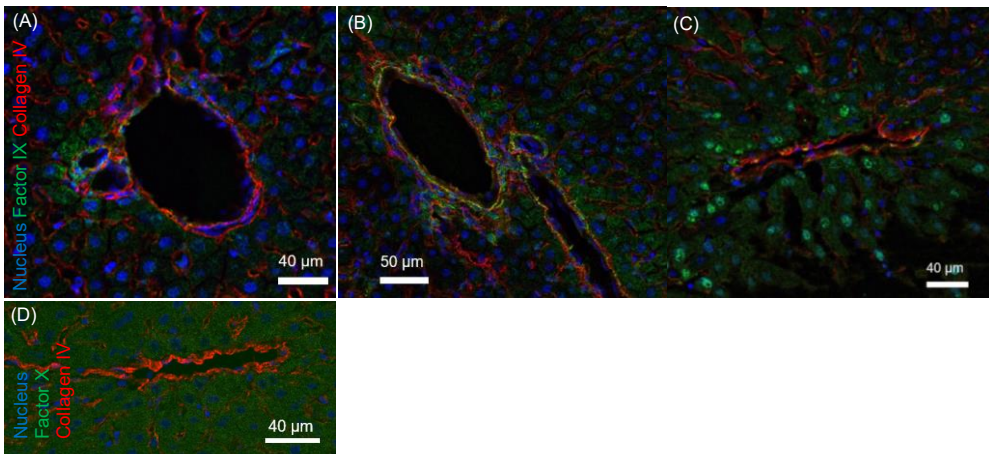
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Introduction: Through its unique binding to collagen IV in the basement membrane of blood vessels, Factor IX forms a hemostatic reservoir outside of circulation that may be a target for augmentation or anticoagulation. Factor IX and collagen IV have never been studied in trauma.

Methods: Adult rats were anesthetized and subjected to laparotomy with penetrating injury to the liver. Injured and uninjured liver lobe specimens were fixed, frozen, and sectioned for confocal microscopy. Sections were stained with antibodies against Factor IX (variable), Factor X (control), and collagen IV (basement membrane protein). Confocal microscopy was used to colocalize Factors IX or X and the basement membrane, and to compare their spatial association with penetrating injury and the vasculature.

Results: Factor IX was associated with portal triad structures and colocalized with the basement membrane as evidenced by yellow overlap in merge images of uninjured and injured livers (A, B). Interestingly, cell nuclei around areas of injury but not in uninjured regions showed dense anti-Factor IX staining (C). Factor X had a more usual disseminated staining pattern consistent with known hepatocyte synthesis (D).

Conclusion: Unlike the prototype coagulation protein Factor X, Factor IX co-localizes with collagen IV in the basement membrane of liver tissue and has unique patterns of recruitment in the regions surrounding penetrating tissue injury. This extravascular reservoir makes Factor IX an exciting target for augmentation or anticoagulation in patients with penetrating injuries.



FINALLY, A USE FOR BALLOONS: AUTOMATED ENDOVASCULAR SUPPORT ENHANCES CLOSED LOOP DRUG AND FLUID DELIVERY IN A PORCINE MODEL OF SEVERE SHOCK

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Introduction: Endovascular Perfusion Augmentation for Critical Care (EPACC) is a method of dynamic aortic balloon catheter titration for precision hemodynamic support. EPACC has a potential role in augmenting hemodynamics in tandem with conventional resuscitation strategies. We have previously described that even short periods of EPACC in conjunction with an automated fluid and drug delivery system termed, Precision Automated Critical Care Management (PACC-MAN), can reduce resuscitation requirements over the first few hours after severe ischemia-reperfusion injury (IRI). We sought to understand if an initial 180 minutes of EPACC+PACC-MAN has sustained benefits over a 24-hr period compared to PACC-MAN alone in an established IRI model.

Methods: Twelve large swine underwent 30% hemorrhage, followed by 45 minutes of complete zone 1 aortic occlusion to induce IRI and a vasoplegic state. Animals were then transfused to euvolemia and randomized to a standardized critical care (SCC) algorithm with the PACC-MAN system, or EPACC+PACC-MAN (180 min of dynamic partial aortic balloon pressure augmentation that autonomously adjusted based on the animal's physiology). Fully autonomous, closed-loop resuscitation lasted for a total of 24 hrs in both groups. Primary outcomes included duration of hypotension (HYPO) (MAP <60mmHg) and hypertension (HTN) (MAP >70mmHg), and total crystalloid/norepinephrine (NE) volumes.

Results: Duration of HYPO for SCC vs EPACC [3.75% vs 3.10 % p=0.47) and HTN for SCC vs EPACC (5.58% vs 8.90% p=0.13) was equivalent. SCC required significantly more NE during the study period (1102.0 mcg/kg vs 210.77 mcg/kg p=0.045) than EPACC. Total volume trended higher for SCC vs EPACC (308.2 ml/kg vs 198.3 ml/kg p= 0.38).

Conclusion: Supporting hemodynamics with EPACC in the initial phases of resuscitation had a sustained effect on limiting overall vasopressor requirements in this 24-hour study without compromising physiologic or metabolic endpoints. Automation of endovascular devices may play an adjunctive role in the management of severe shock states and augment autonomous resuscitation system capabilities. Such systems may play an important role in resource-constrained care environments.

MICROBIAL NETWORKS, ANTIMICROBIAL RESISTANCE AND VIRULENCE FACTORS ARE ASSOCIATED WITH DIFFERENTIAL RECOVERY FOLLOWING ABDOMINAL INJURY

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Introduction: Alterations in microbiome diversity occur after injury, although the impact on clinical outcomes is unknown. We performed a pilot study to evaluate microbial features associated with complications after abdominal trauma.

Methods: Adult patients sustaining abdominal trauma (2014-2016) were clustered into four complication groups (Table). Genomic DNA was extracted from peritoneal lavage (PTL) specimens and sequenced. Sequences were classified via Centrifuge (NCBI nt database) and functionally annotated. Associations between complications and microbiome features were assessed via Multiple Correspondence Analysis (MCA).

Results: Eighty-five samples from 54 patients were analyzed. C4 samples had significantly lower Shannon entropy scores (microbial diversity) compared to C2 (Figure). Only C2 had increasing microbial diversity across days post-injury. C4 specimens had higher abundance of *Bacteroides* and *Enterobacter* species, and enrichment of tetracycline resistance genes compared to C2. MCA revealed correspondence of high *Bacteroides* bioburden with complications such as severe sepsis.

Conclusion: The highest bacterial burden, antimicrobial resistance, and morbidity was seen in patients with multiple systemic complications after abdominal injury. Such observations could facilitate the identification of microbial metagenomic determinants predictive of patient outcomes.

Cluster	Cluster description	no. of samples	no. of patients
1	Wound & infectious complications, organ dysfunction, escalation of care	10	5
2	No complications	29	25
3	Cardiovascular complications, organ dysfunction, escalation of care	14	8
4	Multiple complications	32	16

Table 1. Cluster descriptions for the patient cohort.

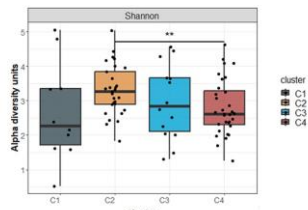


Figure 1. Shannon entropy scores across complication clusters (Wilcoxon test: **, $p \leq 0.01$).

PLASMA LIPIDOMICS IN BURN PATIENTS REVEAL ALTERATIONS IN OCTANOYL CARNITINE LEVELS

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Introduction: Severe burn patients demonstrate a pathological stress response characterized by a hypermetabolic state, which may produce alterations in the plasma lipid profile. Alterations in lipid metabolites may cause dysregulation in fatty acid oxidation (FAO) as the body attempts to meet increased energy requirements. We hypothesized that the plasma lipid metabolite profile would differ between burn patients and healthy subjects.

Methods: Plasma samples were collected from 8 patients who were admitted to an ABA-verified hospital for burn injuries and matched with 8 healthy individuals. Samples were collected using Telimmune DUO Plasma Separation Cards. Lipids were extracted with the 8:4:3 (CHCl₃:MeOH:H₂O) Folch ratio. Mass spectrometry was performed on each sample and used for quantification of each lipid species. Lipid profiles of burn and healthy subjects were analyzed pairwise using the Limma empirical Bayes t-statistics to detect differences in lipid levels between the two groups. Significantly different lipid species ($p < 0.05$) were identified and matched by mass to known lipids catalogued in the LIPID MAPS® database.

Results: Mean age was 41.8 ± 16.0 years in the burn patients and 43.8 ± 12.1 years in the healthy subjects ($p = 0.39$). The mean BMI was 26.1 ± 7.3 kg/m² in the burn patients and 27.5 ± 6.7 kg/m² in the healthy subjects ($p = 0.34$). Of the burn patients, 88% were male, and of the healthy subjects, 63% were male ($p = 0.25$). The mean percent of burned total body surface area (TBSA) was $12.7 \pm 10.0\%$ in the burn group. A total of 1008 peaks were identified by mass spectrometry in the plasma samples. Significant differences in plasma levels of 41 peaks were found between burn patients and healthy subjects. Of those peaks, 27 were identified as lipid species using the LIPID MAPS® database. Of interest, significantly decreased plasma levels of the fatty ester, O-octanoylcarnitine, were found in burn patients compared to healthy subjects ($p = 0.03$).

Conclusion: L-carnitine transports fatty acids into the mitochondria for FAO. Therefore, downregulation of octanoyl carnitine in the plasma of burn patients may provide a mechanism behind the dysregulation of FAO in severe burns. Larger studies examining the relationship between octanoyl carnitine downregulation and burn injury are warranted.

QUANTUM ELECTROCHEMICAL SPECTROSCOPY (QES) ALLOWS FOR CLASSIFICATION OF TRAUMA PATIENT PHENOTYPES

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Introduction: Trauma patients have a complex milieu of circulating proteins and metabolites that contribute to thromboinflammation and consequential outcomes. Traditional assays such as mass spectrometry require complex parallel sample preparations and lengthy runtimes. Quantum electrochemical spectroscopy (QES) is a novel technique that allows for the measurement of numerous and diverse biomolecules in 30 minutes using only 2 μ L of plasma without reagents or sample preparation. The multidimensional data produced by QES is then processed with machine learning (ML) algorithms to allow for classification of samples into phenotypic cohorts. The aim of this study was to assess the ability of QES technology to discriminate clinically relevant phenotypes after trauma.

Methods: Plasma samples were collected from injured patients meeting trauma activation criteria on day of admission during two separate study protocols at two Level 1 trauma centers. Minimal injury (MI) was injury severity score (ISS) <15 and base deficit (BD) <6. Serious injury (SI) was ISS \geq 15 and BD \geq 6. Plasma samples were run in triplicate through QES. ML algorithm was trained and verified with 70% of data; the remaining 30% was then used for blinded classifier testing. Bootstrap resampling was implemented to enhance model robustness. Area under receiver operating characteristic (AUROC) curve was used to assess performance.

Results: There were 16 MI and 15 SI patients. The ML classifier demonstrated robust discrimination between MI and SI groups with a mean AUROC of 0.83 (max 0.95, min 0.72). The algorithm also effectively distinguished between cohorts from the two independent study locations with a mean AUROC of 0.78 (max 1.0, min 0.70).

Conclusion: QES allows for accurate classification of trauma patient phenotypes utilizing small sample volumes and one-step operation. Next steps will include improving the prediction model with more patient samples and quantifying relevant biomolecules from the multidimensional data. Future directions will also include expanding the classification methodology using the quantum signatures to predict complications such as respiratory failure, venous thromboembolism, and mortality. This will allow for targeted clinical care of the trauma patient.

POTENTIAL INVOLVEMENT OF PI-3 KINASE SIGNALING IN PERITONEAL MESOTHELIAL CELLS EXPOSED TO REACTIVE ASCITES: IMPLICATIONS FOR ADHESION FORMATION

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Introduction: Previous abdominal surgery (PAS) increases risk of abdominal adhesions that may cause small bowel obstruction (SBO). Trauma and peritoneal inflammation, e.g., acute appendicitis (AA), causes formation of peritoneal reactive ascites (rA) and activates peritoneum surface mesothelial cells (MCs) to form adhesions. MCs treated with reactive ascites (rA) collected during appendectomy (appy) or adhesiolysis for SBO may form adhesion-like fibers (FIB) and glycocalyx (GCX).

Methods: This is an ongoing prospective observational IRB-approved study at four level 1 trauma centers where rA is collected prior to surgical intervention for non-perforated AA or SBO. 44 appy and 10 SBO rA patient fluids were categorized into 6 groups by history of PAS (PAS/naïve) and by formation of FIB (high/no) and GCX (high/low/no) by rA-treated MCs. 71 cytokines/chemokines and 14 soluble receptors were quantified in rA and analyzed by Dunn's tests; adjusted $P < 0.05$ was considered significant. Log₂ fold-changes were calculated for each group compared to the PAS-highFIB-highGCX group and were analyzed by Ingenuity Pathway Analysis (IPA).

Results: PAS-FIB-GCX groups showed differences in the median concentration of 33 cytokines. IPA analysis showed that the naïve-noFIB-noGCX group was predicted to mobilize neutrophils, prime for activation phagocytes and myeloid cells, and increase epithelial tissue formation. Upstream analysis predicted that LY294002, a phosphoinositide 3-kinase inhibitor, would inhibit proteins of these associated pathways.

Conclusions: rA fluids collected from patients with naïve abdomens, which do not induce FIB or GCX formation in treated MCs, show predicted activation of pathways critical to the formation of abdominal adhesions. Future testing of PI-3 kinase inhibitors on MC formation of adhesion-like fibers and GCX is warranted.

THE STUDY OF EDUCATIONAL EFFECTS: 2D VS. VR RANDOMIZED CONTROLLED TRIAL

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Introduction: Virtual reality (VR) has potential for effective learning in medical education. There are increasing reports of simulation and procedures education using VR. Compared to conventional two-dimensional (2D) videos, however, the effects of VR in medical education are not clear. This study aims to compare VR and 2D videos on distance learning of live-action Focused Assessment with Sonography for Trauma (FAST) in initial trauma care and to examine psychological learning effects such as self-efficacy and comprehension.

Methods: We conducted a randomized controlled trial using distance learning. Eligible participants for inclusion were fourth- to sixth-year medical students and first- and second-year residents in five medical schools and university hospitals. We conducted stratified randomization by institution and participants were assigned to 2D and VR groups. Participants attended approximately 30 minutes of remote lectures on initial trauma care and watched live-action FAST practices in the emergency room in 2D or VR. Primary outcomes were self-efficacy, intrinsic value and emotional engagement to assess learning effectiveness. Multiple regression analysis was used to evaluate the association between VR use and outcomes.

Results: Sixty-four participants were eligible for analysis (2D, n = 33; VR, n = 31). There were no significant differences in participant characteristics; however, the median pre-test score for measuring medical knowledge differed by two points (2D, 20.0; VR, 18.0). In multiple regression analysis to evaluate the association between VR and outcomes, all outcomes showed no significant association (B, -0.62, 0.44, 0.98; 95% CI, -5.62 to 4.38, -2.72 to 3.59, -2.12, 4.08; p-value, 0.80, 0.78, 0.53, self-efficacy, endogenous value and emotional engagement, respectively).

Conclusion: We evaluated VR use and psychological learning effects in distance learning of FAST in initial trauma care. In this study, using VR was not significantly associated with learning effectiveness.

20 YEARS OF ACUTE TRAUMATIC COAGULOPATHY

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Introduction: The term “Acute Traumatic Coagulopathy” (ATC) to describe post injury coagulation dysfunction was first published in 2003. Treatment of ATC has fundamentally changed in the last two decades with Major Hemorrhage Protocols – balanced resuscitation, pre-hospital transfusions and empiric tranexamic acid. However, the impact of contemporary trauma care on the incidence of ATC and associated outcomes has not been fully described. Our objective was to determine current rates of ATC and their relationship to ISS and clinical outcomes, for comparison with seminal data published 20 years earlier.

Methods: Retrospective study of adult patients at a Level 1 UK trauma centre (2012-21). Data was extracted from the trauma registry for all patients ISS and admission INR (excluded if no INR result; ATC INR>1.2) and compared with 2003 published data of 1088 HEMS trauma patients (57% ISS>15) admitted to the same centre (ATC = abnormal PT, aPTT or Thrombin Time). Multivariate analysis was performed to examine relationship of ATC and ISS with mortality.

Results: 19,025 patients (2012-21) were analyzed. Median age 36 years, 78% male, 26% penetrating injury, median ISS 9 (1-16) with 25% ISS>15. Overall ATC incidence was 9% and for ISS>15 ATC ranged from 11-21% (with no trend over time 2012-21) vs 33% (2003), $p<0.05$. Overall mortality was 4.8%, and for ATC was significantly lower compared to 2003: 23% vs 46%, $p<0.05$ (Figures 1A & 1B). For ISS>15, ATC was significantly associated with increased mortality x4 (2012-21) vs x3 (2003) and after adjusting for ISS in the 2012-21 cohort, ATC had OR 5.3 (4.5-6.3) for death ($p<0.05$). x

Conclusion: Contemporary trauma care has improved outcomes from ATC over the last 20 years with lower overall admission rates. Risk of death in ATC remains high despite modern empirical approaches to pre-hospital transfusion and antifibrinolytics. Further opportunities for improvement require more targeted and precision therapy for ATC.

WITHDRAWN

EARLY LIQUID PLASMA IS A SAFE ALTERNATIVE FOR BALANCED TRANSFUSION

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Introduction: Bleeding trauma patients benefit from early plasma administration with balanced transfusion ratios. Availability of plasma in the ED has been limited by the time needed to thaw fresh frozen plasma (FFP). Our institution adopted a liquid plasma (LQP) protocol to facilitate early plasma administration upon patient arrival. This study compares our pre- and post-protocol implementation transfusion outcomes.

Methods: This was a retrospective study evaluating a LQP protocol implementation one year pre- and post-implementation at a Level 1 trauma center. Patients 16 years or older who received blood in the ED were included. Patients with systolic BP <90mmHg received transfusions. Pre-LQP resuscitation protocol was transfusion of 2 units pRBCs, post-LQP protocol was 1U pRBC and 1U LQP, each could be repeated once before MTP initiation. The primary outcome was total blood products transfused in 24 hours. Secondary outcomes included death from exsanguination in 24 hours, 30-day mortality, and transfusion related complications (TRALI, ARDS, VTE). A subgroup analysis was performed for the primary outcome for patients who received massive transfusion, or >10 units in 24 hours. A negative binomial generalized linear model was used to assess the outcomes.

Results: 552 total patients were included in the study, 275 in the pre-LQP period (January 2018 to July 9th 2019) and 277 in the post-LQP period (July 11th 2019 to January 2020). There were no major differences in demographics across groups. Median ISS was 22 with primarily blunt injury (75%). There was no effect of LQP protocol on number of blood products transfused in first 24 hours in either the full ($p=0.45$) or MTP subgroup ($p=0.91$), and no differences in any secondary mortality outcomes or transfusion-related complications.

Conclusion: Early LQP had no impact on 24-hour blood product usage but is safe to use with no higher rates of mortality, VTE, TRALI or ARDS. LQP may be a more rapid, balanced transfusion alternative to FFP for centers without access to whole blood.

FLOW RATE OF 1:1:1 TRANSFUSION HAS A MODULATING AFFECT ON INFLAMMATORY RESPONSE FOLLOWING INJURY

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Introduction: Past research has shown that transfusion flow rate of PRBCs alone impacts the expression of multi-functional cytokines (IL-6, IL-8, IL-1ra, IL-10, IP 10, MIP1b, MCP-1 and RANTES) independent of injury burden. PRBC transfusion rarely happens in isolation in acute injury and FFP, platelets and cryo may also modulate the inflammatory response. The purpose of this study was to assess the flow rate of matched ratio transfusion strategies and their effect on the inflammatory response to trauma.

Methods: This study utilized severely injured patients from the PROPPR dataset. Volumes of PRBC, FFP, platelets and cryo were calculated for time increments over the first 24 hours after injury. Using linear growth models controlling for aspects of severe injury (mechanism, demographics, measures of injury and shock), key cytokines were modeled against incremental transfusion volumes /time (flow rate) of combined blood products.

Results: 538 patient were included. Expression of IL-6, IL-1ra, IP-10, MCP-1, MIP-1b, RANTES and PDGF were affected by transfusion flow rate (Table). Other cytokines were not affected.

Conclusion: The flow rate of multiple blood products, delivered in a matched fashion, modulates the immune response. This impact was particularly notable with pro-inflammatory IL 6 and chemokines. Though

transfusion patterns may not be amenable to manipulation, awareness of the impact of such transfusion strategies on inflammatory response may allow opportunities to modulate the inflammatory response and impact patient care.

Cytokine	PRBC (SE)	FFP (SE)	Platelets (SE)	Cryo (SE)
<i>Pro-Inflammatory</i>				
IL 6	1.47 (1.21, 1.79) p=0.0485	0.75 (0.67, 0.83) p=0.0073	2.42 (1.57, 3.71) p=0.0399	1.11 (0.75, 1.64) p=0.7927
<i>Anti-Inflammatory</i>				
IL 1ra	1.55 (1.29, 1.87) p=0.0160	0.91 (0.82, 1.01) p=0.3450	2.58 (1.75, 3.82) p=0.0155	0.76 (0.53, 1.10) p=0.4609
<i>Chemokines</i>				
IP 10	0.89 (0.79, 1.02) p=0.3906	0.96 (0.89, 1.03) p=0.5593	2.29 (1.72, 3.04) p=0.0037	0.94 (0.73, 1.22) p=0.8160
MIP 1b	1.03 (0.90, 1.19) p=0.8180	1.00 (0.99, 1.01) p=0.9790	0.92 (0.70, 1.25) p=0.7968	1.76 (1.32, 2.34) p=0.0473
MCP 1	1.41 (1.21, 1.65) p=0.0259	0.90 (0.82, 0.98) p=0.1993	1.43 (1.02, 2.00) p=0.2899	1.45 (1.07, 1.97) p=0.2267
RANTES	0.66 (0.57, 0.76) p=0.0037	1.18 (1.09, 1.28) p=0.0371	0.77 (0.56, 1.06) p=0.4149	0.51 (0.38, 0.67) p=0.0167
<i>Growth Factor</i>				
PDGF	0.57 (0.46, 0.71) p=0.0093	1.09 (0.97, 1.22) p=0.4718	1.54 (0.98, 2.40) p=0.3385	0.49 (0.32, 0.75) p=0.0939

IMPACT OF EARLY WHOLE BLOOD VERSUS COMPONENT BLOOD RESUSCITATION ON OUTCOMES AND RESOURCE UTILIZATION IN PATIENTS WITH TRAUMATIC SHOCK

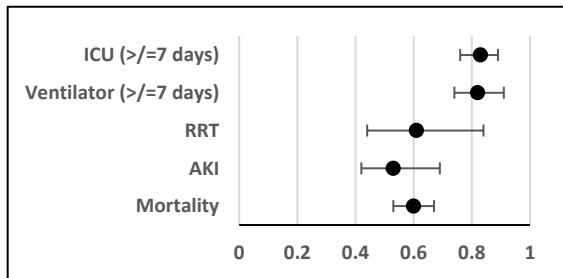
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Introduction: Recent military experience has led to a renewed interest in Whole Blood (WB) vs. Component Blood (CB) resuscitation for traumatic shock. Results of civilian studies examining mortality are mixed and there is paucity of studies evaluating morbidity and resource utilization. The current study compares in-hospital mortality, morbidity, and resource utilization for WB vs. CB resuscitation in patients with traumatic shock.

Methods: The National Trauma Data Bank (NTDB: 2020-21) was queried for adult patients receiving early (<4 hours) blood-based resuscitation. Only patients who received either WB or CB exclusively were included and compared by univariate and multivariate regression analysis. Outcomes of interest were in-hospital mortality, morbidity, and resource utilization.

Results: 89,676 patients met inclusion (WB: 6,101; CB: 83,575). WB patients had lower mortality, blood resuscitation volume, acute kidney injury (AKI), and resource utilization [need for Renal Replacement Therapy (RRT), ventilator, ICU, and hospital days – all $p < 0.05$: Table). On multivariate regression analysis, controlling for group differences, WB resuscitation was independently associated with decreased odds of mortality, AKI, RRT need, ventilator, and ICU days (Figure).

Table	WB	CB	p
Mean Age (years)	44.2	46.3	<0.05
Median ISS	17	20	<0.05
RTS	7.1	7.6	>0.05
Mortality (%)	10.7	17.8	<0.05
Blood Res. Vol. (ml)	912	2204	<0.05
AKI (%)	1.5	3.1	<0.05
RRT need (%)	1.0	1.7	<0.05
Ventilator days	6.3	6.7	<0.05
ICU days	7.4	8.0	<0.05
Hospital days	12.1	12.9	<0.05



Conclusion: Early resuscitation with WB exclusively vs CB results in lower mortality, morbidity and resource utilization in patients with traumatic shock.

MIASURVIVEMTP: MACHINE LEARNING FOR IMMEDIATE ASSESSMENT AND SURVIVAL PREDICTION AFTER MASSIVE TRANSFUSION PROTOCOL

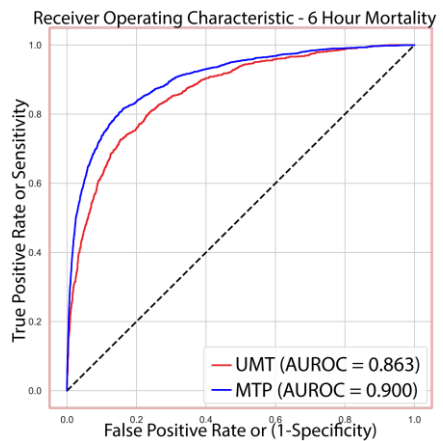
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Introduction: Trauma patients requiring massive transfusion (MTP) face high likelihood of mortality. Early identification of patient's chances of survival may help limit futile blood product administration in cases of exsanguinating hemorrhage and may assist in appropriate triaging of these patients.

Methods: Patients from the American College of Surgeons Trauma Quality Improvement Project database (TQIP) who received more than 5 units of red blood cells and/or whole blood within the first four hours of arrival were identified as MTP patients. Those receiving 10 or more units were identified as ultramassive transfusion (UMT) patients. Database variables that were not available immediately or within seconds of arrival were excluded. Machine learning (ML) models were created to predict 6-hour mortality. Models were trained and optimized using fivefold cross validation and a holdout testing set.

Results: Of 5,481,046 patients in TQIP from 2017 to 2021, 47,744 received MTP and 20,337 of these received UMT. 6-hour mortality was 21.9% in the MTP group and 29.9% in the UMT group. A gradient-boosted decision tree model performed best in both the MTP and UMT groups with area under the receiver-operator curve of 0.900 [95% CI 0.892-0.908] and 0.863 [95% CI 0.850-0.875] respectively (Figure 1), and an area under the precision recall curve of 0.76/0.75 respectively.

Conclusions: ML models reliably predict mortality in both MTP and UMT patients with data available immediately upon trauma center arrival. This is the most accurate ML MTP prediction model trained with the largest training data set described to date. This model is designed to be further improved over time as more patients are added to this national registry. Such an approach can help improve patient selection in MTP/UMT scenarios and optimize the distribution of this limited resource.



OCCULT HYPOPERFUSION IN TRAUMA PATIENTS: A SYSTEMATIC REVIEW ON AGE-SPECIFIC CLINICAL OUTCOME

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Introduction: Occult hypoperfusion (OH) is defined as normal vital signs and inadequate tissue oxygenation. OH is associated with poor outcome after trauma. However, the effect of age is unclear. The aim of this study is to determine the impact of OH on outcome in polytrauma in both middle-aged and geriatric patients.

Methods: Adult polytrauma patients (ISS >16) were extracted from our prospectively maintained trauma database. Two groups were composed and compared: a group of MIDDLE-aged people (30-59yrs) and OLDER adults (60+yrs). We further distinguished between cases of OH: Lactate > 2 mmol/l plus SBP > 90 mmHg and PR < 120 bpm, shock-cases (SBP < 90 or PR > 120) and regular cases (all other patients). We analyzed the impact of hemodynamic status on outcome in both groups (MIDDLE aged vs. OLDER adults). Outcomes included: Intensive Care Unit (ICU)-stay, length of stay (LOS), complication rates and mortality.

Results: A total of 1,782 patients were included. The group MID. Included 1,067 patients, whereas 715 individuals were selected for the OLD-group. In the MIDDLE-aged study group, ICU-stay (P=0.43), LOS (P=0.80) did not differ between shock and OH patients. As anticipated, highest mortality rates were found in the shock patients (39%). Mortality was also significantly higher in the OH-group than in normal patients (20 vs. 8%, P >0.05). In the OLD-group mortality and hospitalization times were significantly higher upon shock than in the groups. However, no differences were observed between OH-patients and normal trauma patients.

Conclusion: This study shows that occult hypoperfusion is associated with increased mortality in middleaged patients. In older patients (>60yrs), however, no difference in morbidity nor mortality was found between OH and non-OH trauma patients. These findings contradict the literature. It is tempting to hypothesize that in the case of severe polytrauma, OH is an important risk factor for impaired outcome in middle-aged patients, but not in older patients. The role of OH in different age groups should be investigated in future prospective studies of severely injured trauma patients.

THE EFFECT OF PARTIAL REBOA CATHETERS ON HEMORRHAGE-RELATED DEATH: AN ANALYSIS OF THE AAST AORTA REGISTRY

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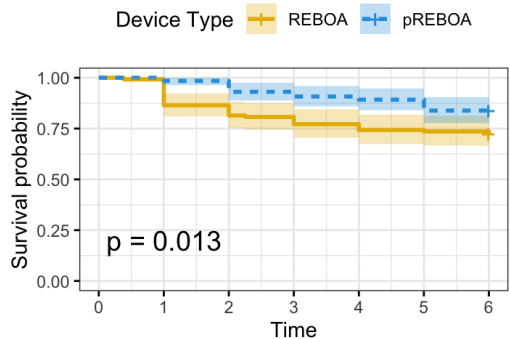
Introduction: Resuscitative endovascular balloon occlusion of the aorta (REBOA) is a resuscitative adjunct used to temporize non-compressible hemorrhage. Partial aortic occlusion is a strategy used to mitigate ischemic complications by titrating flow across the aortic balloon. Next generation partial REBOA (pREBOA) catheters are designed to accurately titrate complete or partial aortic occlusion, and have been used across North American centers of excellence. This study evaluates whether the choice of catheter is associated with hemorrhage-related mortality, defined as death within 6 hours.

Methods: The AORTA registry was queried to identify all adult trauma patients undergoing successful endovascular aortic occlusion (AO) in the emergency department or operating room from Jan 2020 to Jan 2024. Patients identified as dead-on-arrival or with a shock index <0.6 were excluded. Primary outcome was 6-hour mortality. Multi-level cox regression was used, adjusting for institution, year, shock index, ISS, mechanism, and zone of AO.

Results: 273 cases across 26 institutions were included (n=142 REBOA vs. 131 pREBOA). There were no differences in sex, age, ISS (33 IQR 22-42), AO zone (65% zone 1), or time to AO (29 mins IQR 20-50). The use of pREBOA catheters increased by year and was associated with longer durations of AO (median 45 IQR 30-78 vs. 36 mins IQR 18-60, p=0.026), partial AO accounting for a substantial proportion of AO time (median 31 mins IQR 12-65). Mortality at 6-hours was 22% (REBOA 28% vs. pREBOA catheters 16%, p=0.02).

pREBOA catheters were independently associated with a 70% decreased risk-adjusted hazards of 6-hour mortality (HR 0.30, 95%CI 0.15-0.60).

Conclusion: The use of pREBOA catheters was associated with a decreased hazards of death from hemorrhage. These findings support the ongoing prospective study of pREBOA as a resuscitative strategy for select patients with hemorrhagic shock.



HR 0.30, 95%CI 0.15-0.60. Adjusted for institution, year, shock index, ISS, mechanism, and zone of aortic occlusion

TIME MATTERS: THE EFFECT OF PREHOSPITAL TXA AND TRANSPORT TIME ON MORTALITY

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Introduction: Current data on tranexamic acid (TXA) supports early use in hemorrhagic shock, yet the ideal population for pre-hospital TXA has not been elucidated. While timing of TXA administration has been thoroughly examined, the effect of total transport time (TTT) has not been studied in those that receive pre-hospital TXA. Therefore, we sought to evaluate the effect of pre-hospital TXA in patients with a long TTT.

Methods: The trauma registry at a large, mixed-catchment, level I trauma center was queried for patients who did and did not receive pre-hospital TXA over a 3.5 year period. Demographics, TTT, transfusions, complications, and mortality were evaluated. Univariate and multinomial analyses were utilized to evaluate predictors of mortality.

Results: During the study period, 8,352 patients were included with 5,833 having a short (≤ 1 hour) and 2,519 a long (> 1 hour) TTT. Patients were primarily male (64%), with a blunt mechanism (85%), had a median TTT of 50 min, a median ISS of 9, and a mortality rate of 6%. There was no significant difference in transfusions, ISS, or mortality between patients with short or long TTTs. Multinomial logistic regressions were performed on groups with short and long TTTs with the primary outcome of mortality. Pre-hospital TXA in short TTT patients was not associated with a difference in mortality. However, pre-hospital TXA administration in those with a long TTT was associated with decreased mortality in patients receiving blood and who were severely injured (table).

Conclusion: In patients requiring transfusions and those that are severely injured with a TTT > 1 hr, the use of pre-hospital TXA is associated with improved outcomes. TXA should be considered in bleeding or severely injured patients with a longer TTT, but may not provide benefit in those with quicker access to definitive care.

Impact of TXA on Mortality in Long TTT Patients			
	aOR	95% CI	P-Value
All Patients (N=2,519)	3.429	[0.907, 12.958]	0.069
Transfused Patients (N=358)	5.46	[1.158, 25.749]	0.032
ISS > 15 (N=757)	6.553	[1.266, 33.929]	0.025

WHOLE BLOOD TRAUMA RESUSCITATION IN CHILDBEARING AGE FEMALES: PRACTICE PATTERNS AND TRENDS

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Introduction: The use of low titer group O whole blood (LTOWB) in bleeding trauma patients is increasingly common. However, some centers do not administer RhD-positive LTOWB to females <50 due to concerns about RhD-negative patients becoming D-alloimmunized. This study examined practices related to LTOWB transfusion as they pertain to age and sex using a large prospectively collected database.

Methods: This was a secondary analysis of the Shock, Whole blood, and Assessment of TBI (SWAT) trial: a prospective, multicenter observational cohort study where outcomes following transfusion to 1046 injured patients were analyzed at 7 level 1 trauma centers between 2018-2021. The proportion of patients who received LTOWB or exclusively conventional components (CT) was examined over the course of the original study and stratified by age and sex. We characterized the RhD-types of females <50 and surveyed the RhD-blood product selection practices for trauma patients at these centers.

Results: A total of 1046 patients were evaluated; 130 females <50, 77 females ≥50; 661 males <50, and 178 males ≥50. Of females <50 13/128 (10.2%) were RhD-negative. Of females <50, 34/130 (26.2%) received LTOWB including 4/33 (12.1%) who were RhD-negative. In contrast, 587/916 (64%) of all other recipients received LTOWB. RhD blood product selection practices varied considerably between institutions, e.g., only 1/7 centers stocks RhD-negative LTOWB, and 1/7 centers does not transfuse RhD-positive LTOWB to adult females <50. Multiple strategies for deciding which patients should receive RhD-positive or negative LTOWB and CT in initial resuscitation as well as the use of D-alloimmunization prophylaxis for RhD-negative females <50 after receipt of RhD-positive blood were reported. Over the study period, the percentages of females <50 who received LTOWB between 2018-2021 were 0%, 28.3%, 35.1% and 25.0%.

Conclusion: There were fewer than the expected 15% of RhD-negative females <50 in this cohort of patients. Most institutions transfused LTOWB to females <50 but these patients were less likely to receive LTOWB than other recipients. As the understanding of safety of RhD-positive products in females <50 improves, the reasons why a lower proportion of females <50 compared to other patient groups received LTOWB need to be elucidated.

THE INCREASING NATIONAL BURDEN OF POTENTIALLY PREVENTABLE DEATHS DUE TO HEMORRHAGE

Zain G. Hashmi, MD; Russell L. Griffin, PhD;
Stacy Drake, PhD, MPH, RN; McKinley Williams, BS; Sheza Hassan, MD;
Junaid Razzak, MD; John B. Holcomb, MD
University of Alabama at Birmingham

Introduction: The use of low titer group O whole blood (LTOWB) in bleeding trauma patients is increasingly common. However, some centers do not administer RhD-positive LTOWB to females <50 due to concerns about RhD-negative patients becoming D-alloimmunized. This study examined practices related to LTOWB transfusion as they pertain to age and sex using a large prospectively collected database.

Methods: This was a secondary analysis of the Shock, Whole blood, and Assessment of TBI (SWAT) trial: a prospective, multicenter observational cohort study where outcomes following transfusion to 1046 injured patients were analyzed at 7 level 1 trauma centers between 2018-2021. The proportion of patients who received LTOWB or exclusively conventional components (CT) was examined over the course of the original study and stratified by age and sex. We characterized the RhD-types of females <50 and surveyed the RhD-blood product selection practices for trauma patients at these centers.

Results: A total of 1046 patients were evaluated; 130 females <50, 77 females \geq 50; 661 males <50, and 178 males \geq 50. Of females <50 13/128 (10.2%) were RhD-negative. Of females <50, 34/130 (26.2%) received LTOWB including 4/33 (12.1%) who were RhD-negative. In contrast, 587/916 (64%) of all other recipients received LTOWB. RhD blood product selection practices varied considerably between institutions, e.g., only 1/7 centers stocks RhD-negative LTOWB, and 1/7 centers does not transfuse RhD-positive LTOWB to adult females <50. Multiple strategies for deciding which patients should receive RhD-positive or negative LTOWB and CT in initial resuscitation as well as the use of D-alloimmunization prophylaxis for RhD-negative females <50 after receipt of RhD-positive blood were reported. Over the study period, the percentages of females <50 who received LTOWB between 2018-2021 were 0%, 28.3%, 35.1% and 25.0%.

Conclusion: There were fewer than the expected 15% of RhD-negative females <50 in this cohort of patients. Most institutions transfused LTOWB to females <50 but these patients were less likely to receive LTOWB than other recipients. As the understanding of safety of RhD-positive products in females <50 improves, the reasons why a lower proportion of females <50 compared to other patient groups received LTOWB need to be elucidated.

THE UTILITY OF ADDING DELTA SHOCK INDEX TO STANDARD TRAUMA TRIAGE CRITERIA: A NTDB ANALYSIS

James Bardes, MD; Tanner Smida, MS;
Bradley Price PhD; Alison Wilson, MD
West Virginia University

Introduction: Shock index (SI) and delta shock index (Δ SI) have shown utility identifying severe injury. Despite this, trauma team activation criteria (TTAC) do not include either. Using the National Trauma Data Bank, we aim to evaluate the effect of integrating Δ SI and SI in standard TTAC.

Methods: Retrospective cohort study using the NTDB database 2017-2020. Patients with missing vital sign data were excluded. Subjects in the dataset were queried for standard TTAC and positive need for trauma intervention (NFTI) defined as appropriately classified. SI was calculated as heart rate divided by systolic blood pressure. Δ SI was calculated as the change from prehospital SI to arrival SI. The accuracy for NFTI was determined from SI and Δ SI in conjunction with standard TTAC. To optimize this approach a classification tree using a recursive partitioning algorithm was utilized to identify optimal cutoffs for SI and Δ SI in TTAC.

Results: Over 911,000 patients were available for analysis. Using standard TTAC 69.5% were classified correctly, with the addition of SI or Δ SI we found no improvement in classification accuracy. Utilizing the classification tree (Figure 1) and focusing on patients without mechanistic or anatomic TTAC (n >759,000), the NFTI accuracy is 71.7%. This approximates to approximately 23,000 additional trauma team activations with over 13,000 correctly triaged.

Conclusion: The use of both SI and Δ SI in conjunction should be considered for addition to TTAC. Individually neither value adds significant value as a TTAC. While the NTDB does have limitations in the number of vital sign values available, this study demonstrates that combining measurements of SI and Δ SI can achieve improvements in trauma triage. These findings call for additional study with more granular EMS datasets.

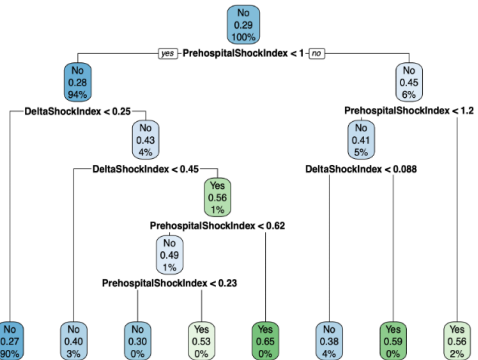


Figure 1. Classification tree
Nodes on left side of rule are in agreement

TOURNIQUET APPLICATION BY BYSTANDERS: MORE WORK TO DO

Robert Painter, MD; Andreina Giron, MD;
John Schomberg, PhD, MPH; Yigit Guner, MD;
Peter Yu, MD, MPH; Jeffry Nahmias, MD, MHPE; Sigrid Burruss, MD;
Thomas K. Duncan, DO; Kenji Inaba, MD; Laura F. Goodman, MD
Children's Hospital of Orange County

Introduction: Civilian prehospital tourniquet placement (TP) has increased over time. Studies have shown that prehospital TP may be associated with decreased hemorrhagic shock and improved survival, however tourniquets may be placed incorrectly or without clear indication. Additionally, no national study has evaluated outcomes of bystander TP. This study sought to compare outcomes of prehospital TP by emergency medical services providers (EMS) or first responders (police, fire) versus civilian bystanders, hypothesizing civilian TP would have less acuity improvement than EMS TP.

Methods: The 2017-2020 National Emergency Medical Systems Information Systems (NEMSIS) database was queried for TP for patients of all ages. Acuity was reported in the database, and improvement was defined as change from critical to emergent or lower acuity. Descriptive statistics for demographics, TP and improvement were completed. A multivariable analysis was also performed to determine associated improvement in acuity.

Results: 3,003 patients had prehospital TP, 85% of which were applied by EMS. There was a lower success rate of TP by bystanders (90% vs 97%, $p < 0.001$) compared to EMS and first responders. When combining all groups, there was a higher rate of improved acuity for TP after EMS arrival on site compared to before (65% vs 58%, $p = 0.002$). Placement of tourniquet by bystander was not associated with improvement in acuity (OR 1.1 95% CI 0.97-1.25, $p = 0.12$). However, TP by first responders was associated with improved acuity (OR 1.22 95% CI 1.01-1.44, $p = 0.02$).

Conclusion: Tourniquets are life-saving tools. First responders seemed to be trained adequately and EMS are critical for tourniquet success. While bystander TP appears to be less efficacious, bystanders are successfully using tourniquets. Trauma programs should consider outreach programs in their communities with respect to tourniquet application to save lives.

AN ALARMING TURNING POINT IN BALTIMORE HOMICIDE TRENDS: ANALYSIS OF 6500 VIOLENT DEATHS

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David Efron, MD; Joseph Sakran, MD, MPH, MPA
Johns Hopkins Hospitals

Introduction: Freddie Gray's death in Baltimore police custody on April 19th, 2015 was followed by civil unrest and a sustained, citywide surge in interpersonal violence. Anecdotally, clinicians also observed a heightened pace with which patients presented with multiple—and more often lethal—injuries. This study thus quantified the temporal association between Gray's death and indicators of Baltimore homicide incidence and violence intensity.

Methods: Autopsy data was obtained for all homicides committed from 2005-2017 in Maryland. Decedents were grouped by mechanism of injury: gunshot wound (GSW), stab wound (SW), or other. The number of distinct GSW or SW sustained was collected for each victim of penetrating trauma. The primary outcome was the overall homicide rate. The secondary outcome was the 90th percentile of total wounds sustained by GSW and SW victims, which we defined as the high violence intensity threshold (HVIT).

Difference-in-differences regressions analyzed trends in homicide rates and HVIT by fiscal quarter; comparisons were made between trends from before and after the death of Freddie Gray. We separately evaluated trends in Baltimore and the rest of MD, the latter serving as an ecological control.

Results: Autopsy reports for 6508 homicides were evaluated (Baltimore City, 42%; rest of MD, 58%). Statewide, most deaths were due to gun violence (74%). Homicides from GSW were more common in Baltimore (79% vs. 70%), while homicides due to SW were more common in the rest of MD (16% vs. 11%). Following Gray's death, firearm-related homicides composed an increased proportion of city totals (77% of pre-event vs. 86% of post-event Baltimore homicides). This event was also associated with an increase in Baltimore homicide incidence by 13.1 per 100,000 persons (95% CI: 8.9-19.6; $p < 0.001$). Accounting for trends in the rest of MD, the HVIT for GSW homicides increased from 8 to 10 after the event ($p = .02$). There was no temporal change in the HVIT for SW homicides ($p = .47$).

Conclusions: After the death of Freddy Gray, the homicide rate grew significantly in Baltimore relative to the rest of MD. This was accompanied by a significant rise in violence intensity observed among firearm homicide victims in Baltimore. These findings coincided with increased prevalence of firearm-related injuries in Baltimore's homicide victim pool, suggesting that a surge in firearm violence may have precipitated the trends observed.

BEDSIDE BRILLIANCE: USE OF BMAT SCORE TO REDUCE ACUTE PHYSICAL AND OCCUPATIONAL THERAPY REFERRALS IN TRAUMA PATIENTS

Audrey L. Spencer, MD; Hunter Alexander, BS;
Muhammad Haris Khurshid, MD; Adam Nelson, MD, FACS;
Omar Hejazi, MD; Collin Stewart, MD, FACS;
Stanley Okosun, MD, MS, FACS; Michael Ditillo, DO, FACS;
Louis J. Magnotti, MD, MS, FACS; Bellal Joseph, MD, FACS
The University of Arizona

Introduction: Banner Mobility Assessment Tool (BMAT) for nurses is a tool to identify the mobility status of patients admitted to hospitals. However, there is limited data on the role of BMAT in identifying the trauma patients who might benefit most from physical or occupational therapy (PT/OT) services. This study aims to assess the association between BMAT scores and the true need for PT/OT and outcomes in trauma patients.

Methods: We performed a retrospective review of adult (≥ 18 years) trauma patients who were admitted to our level I trauma center and were consulted for PT/OT services in 2021. We excluded patients who died during the admission. Patients were stratified based on BMAT score: 1 (maximal assistance), 2-3 (moderate assistance), and 4 (minimal assistance). The primary outcome was the rates of acceptance and deferral of acute skilled PT/OT by therapists. The secondary outcome was discharge disposition. Multivariable logistic regression analyses were performed to identify the independent association between BMAT scores and outcomes.

Results: We identified a total of 320 patients who met the inclusion criteria (BMAT 1: 70, BMAT 2-3: 225, BMAT 4: 25). The mean age was 55 years and 53% were male. The median ISS was 8. Patients in the lower BMAT score categories received higher rates of acute skilled PT/OT services (BMAT 1: 100% vs BMAT 2-3: 89% vs BMAT 4: 20%, $p < 0.001$) and were more likely to be discharged to rehabilitation or skilled nursing facilities (BMAT 1: 79% vs BMAT 2-3: 53% vs BMAT 4: 0%, $p < 0.001$). On regression analyses, increasing BMAT scores were independently associated with reduced odds of receiving acute PT/OT services (aOR = 0.19, 95%CI = 0.12 – 0.33, $p < 0.001$) and discharge to rehabilitation or skilled nursing facilities (aOR = 0.25, 95%CI = 0.15 – 0.43, $p < 0.001$). All BMAT 4 patients who received acute PT/OT services (20%) were advised home discharge with outpatient PT/OT follow-up and the rest (80%) were deferred as they were independent with activities of daily life with no acute skilled OT/PT services required.

Conclusion: BMAT accurately predicts the need for acute PT/OT consultation. With increased burden and limited availability of PT/OT services, BMAT can be used to avoid potentially unnecessary PT/OT referrals to reduce healthcare resource utilization.

CELL PHONE MEASURED POPULATION MOBILITY AND INTERACTIONS AS A PREDICTOR OF TRAUMA VOLUME AND TRAUMA CENTER NEED

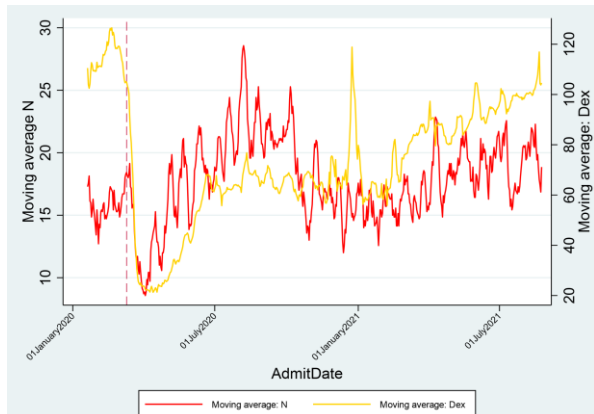
Pawan Mathew, MD; Jane Keating, MD; Manuel Moutinho, MD; Robert Becher, MD; Adrian Manung, MD; Kimberly A. Davis, MD, MBA; Elena Graetz, PhD; Eric Schneider, PhD; Kevin M. Schuster, MD, MPH
Yale School of Medicine

Introduction: Predicting the need for trauma centers is based primarily on population. Population activity measured through cell phone tracking used for commercial marketing purposes may improve the prediction accuracy. Changing activity during the COVID-19 pandemic created a natural experiment to compare trauma admissions and cellular phone mobility.

Methods: Trauma admissions (TA) from all level I trauma centers in one state, January 2020 to August 2021, were aggregated and compared to the Device Exposure Index (DEX) which provides a standardized measure of cellular device interactions per day in a given county. Both were smoothed with a 7-day moving average. Correlation coefficients were calculated, and linear regression adjusted for autocorrelation and seasonality.

Results: The DEX and TAs declined sharply after pandemic lockdowns were implemented, with DEX and TAs following similar patterns across the participating centers (Figure). TAs and the DEX were correlated, Spearman's rho=0.2 ($p < 0.05$). In regression, DEX was associated with TAs ($p=0.034$). Half of low admission days ($TA < 15$) occurred when the DEX was less than 50, whereas only a quarter of all high admission days ($TA \geq 20$) occurred when the DEX was less than 50.

Conclusion: Shifting TA patterns at the onset of the COVID-19 pandemic, correlated with DEX suggesting this may be a valuable measure for long-term trauma center planning. Daily DEX may also help predict short-term TAs.



FIVE YEAR, POST-IMPLEMENTATION ANALYSIS OF AN AIR EMS AUTO-LAUNCH SYSTEM FOR SEVERLY INJURED TRAUMA PATIENTS

Brennan Gagen, MD; Kunal Verma, BS;
Justin Regner, MD; Chad Hall, MD
Scott & White Memorial Medical Center

Introduction: Prolonged transport times and double transfers have the potential to worsen trauma mortality by delaying time to definitive hemorrhage control. The Air EMS Auto-Launch System (AALS) was developed to expedite care of severely injured trauma patients by prompting air EMS agencies to the scene of injury. This is the five-year analysis post-implementation of the AALS.

Methods: This study is a retrospective analysis at a Level I trauma center following the implantation of the AALS in 2018. Adult trauma patients from January 2015- September 2023 with ISS >15 were included. Transport origin, transport time, initial vital signs, and blood product administration data were collected. Mortalities on arrival, within 4, and 24 hours were compared before and after implementation. Preliminary analysis was completed with standard student t-test and Chi-Square test.

Results: A total of 695 patients met the inclusion criteria for the study. Following initiation of the system, there were significantly more patients that came directly from the scene compared to a referring hospital, $\chi^2 (2, N=693) = 8.7, p < 0.05$. The ISS scores of presenting patients were similar compared between before and after the implantation of the system, (27.90 ± 11.95 vs $28.42 \pm 11.30, p = 0.603$). Patients dead on arrival and 4-hour mortality remained similar through 2023. Mortality at 24-hours was significantly lower in 2023, the fifth year after AALS implementation, $\chi^2 (2, N=249) = 5.046, p < 0.05$.

Conclusion: The AALS system decreased trauma transfers, promoting the opportunity to expedite hemorrhage control and improve mortality within 5 years of implementation. These results highlight the importance of rapid, definitive management and justify the ongoing use of the AALS system for severely injured trauma patients.

GREAT DISPARITIES EXIST IN PREHOSPITAL TRANSFUSION RESOURCES

Justin Regner, MD; Chad Hall, MD
Baylor Scott and White

Introduction: Hemorrhage remains the most common preventable cause of mortality in critically injured patients. While early transfusion improves survival in military & civilian settings, few institutions have implemented Low Titer O-Whole Blood (LTOWB) into their prehospital transfusion algorithms. We planned a survey to determine the variation in prehospital transfusion resources for trauma centers in the Southwestern US.

Method: Multicenter trials committee conducted an anonymous 26-question survey of prehospital blood transfusion resources. The survey included: trauma center demographics and location, number of Helicopter Emergency Medical Service (HEMS) and Ground EMS agencies, and types of blood products available. A single survey was filled out per center in coordination with the center's trauma medical director or trauma program manager. Descriptive statistics were utilized to determine variance.

Results: 36 trauma centers across 14 US states responded to the survey. The majority were level 1 trauma centers (30/36) in urban settings (20/36). Four trauma centers were rural. All centers received critical hemorrhaging trauma patients from both HEMS and EMS. 22 centers received critical patients from ≥ 3 HEMS agencies, and 13 centers have ≥ 10 EMS agencies transporting critical patients. EMS was the predominate mode of transportation for critically injured patients. Prehospital blood availability was more likely on HEMS (25/35) than EMS (9/35) as was LTOWB (18/35 vs 5/35). HEMS (16/35) was more likely to have plasma than EMS (1/35). 10 centers did not have any prehospital blood available by HEMS or EMS. Most critical, the four rural trauma centers had only 2 of 4 HEMS carry LTOWB and no EMS vehicles carried any blood products.

Conclusion: Our survey demonstrates significant discrepancies in prehospital blood availability and concerns that Ground EMS agencies are under-resourced for life sustaining therapies. While the majority of HEMS carried blood, ground EMS was the primary mode of transport for hemorrhaging trauma patients at most centers. Most significant, rural trauma centers, with the longest transport times, had the least access to prehospital blood. Further work is needed to better understand limitations in prehospital blood supply and how to make it available for all trauma centers.

HAS NOTHING CHANGED? EVALUATING A DECADE OF EMERGENCY RESUSCITATIVE THORACOTOMY

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Wardah Rafaqat, MD; Ikemsinachi C. Nzenwa, MBChB, MS;
Matthew Simpson; May Abiad, MD; Jonathan Parks, MD;
Haytham M.A. Kaafarani, MD, MPH; George C. Velmahos, MD, PhD;
John Hwabejire, MD, MPH; Michael DeWane, MD
Massachusetts General Hospital

Introduction: The 2015 EAST guidelines have attempted to establish clear indications for Emergency Resuscitative Thoracotomy (ERT) to optimize procedural outcomes. The impact of the updated guidelines on current clinical practice and patient survival remains unknown. In this nationwide analysis, we aim to analyze changes in ERT utilization and survival patterns in trauma patients over the last decade.

Methods: The ACS-TQIP 2010-2020 was used to identify all patients ≥ 15 years old who underwent ERT within the first hour of hospital admission. ERT was defined using ICD-9 and ICD-10-PCS codes and ERT rates were calculated for every 100,000 trauma patients. Joinpoint Regression analysis was employed to identify any changes in procedure and survival rates. Patients were stratified based on the mechanism of injury - blunt vs. penetrating- and trauma center verification level to assess whether the performance of the ERT and survival rate trends varied through the years.

Results: 4,899 patients underwent ERT, with 3,464 (71%) for penetrating trauma. The average survival rate was 21.07% for penetrating trauma and 8.85% for blunt trauma. ERT was performed in level I trauma centers in 55% of cases, in level II in 14%, and in level III centers in 31% of cases. Following Joinpoint regression analysis, we noticed a significant decrease in ERT performance from 2010 to 2017, and an increase in ERT following 2017 in all trauma centers, even when stratifying the institutions based on ACS verification level. Following 2017, there has been a significant increase in ERT performance for penetrating trauma. ERT following blunt trauma has decreased from 2010 to 2020, albeit not significantly. However, no significant differences in survival were seen following the implementation of the 2015 guidelines regardless of the mechanism of injury or trauma center level.

Conclusion: Since 2017 there has been a nationwide increase in ERT performance for penetrating trauma compared to blunt trauma. However, despite nationally published guidelines intended to improve patient selection and outcomes, survival following ERT has not changed significantly in the past decade regardless of the mechanism of injury or trauma center level. These findings warrant further studies aimed at identifying if barriers exist to nationwide adherence to current clinical guidelines.

NOVEL STRATEGIES FOR RCTS FOR TRAUMA CARE: HARNESSING THE POWER OF CNTR, TQIP AND THE STEPPED WEDGE DESIGN

Melanie Fritz, MD; Eileen M. Bulger, MD, FACS; Rosemary Kozar, MD;
Avery B. Nathens, MD; Bret M. Hanlon, PhD; Lily Stalter, MS;
Bhavin Patel, MPH; Michelle A. Price, PhD; Margaret L. Schwarze, MD
University of Wisconsin

Introduction: Clinical research in the trauma population faces enrollment challenges associated with high acuity settings and difficulty obtaining surrogate consent. Passive data collection through the American College of Surgeons (ACS) Trauma Quality Improvement Program (TQIP) provides an opportunity to test the effect of minimal-risk, team-based interventions in a large cohort of seriously injured patients. The objective of this project was to design a randomized clinical trial (RCT) at high volume trauma centers, leveraging TQIP and the Coalition for National Trauma Research (CNTR), that could feasibly produce strong enrollment of trauma patients with judicious use of resources and provide a study design model that others might adopt for future research.

Methods: With support from CNTR and TQIP, we surveyed level 1 trauma centers to determine the number of eligible patients at US centers that were willing to participate. We calculated study size using estimates of eligible family and clinicians for survey completion and the TQIP variable for ICU length of stay (LOS). We identified covariates and other outcomes of interest in the ACS National Trauma Data Standard (NTDS) Data Dictionary and worked with TQIP to collect two additional patient outcomes (vital status at six months and quality assurance for ICU LOS).

Results: We designed an RCT with an estimated enrollment of 4,500 patients at eight trauma centers, funded by the NIH and approved by the IRB. The intervention, Best Case/Worst Case-ICU, is a team-based communication tool. We use a stepped wedge design to allow time for implementation at each study site and reduce confounding for temporal trends. For this study, consent is not required for intervention or patient data extraction, as the intervention and TQIP qualify as quality improvement efforts. TQIP developed an incremental data collection platform to capture additional patient outcome variables.

Conclusion: Leveraging CNTR and TQIP offers an ideal approach for overcoming the difficult barriers of enrolling trauma patients in clinical trials. This study design can be emulated for interventions implemented at the site level to generate important knowledge to advance the care of trauma patients.

WTC Abstracts

7TH WORLD TRAUMA CONGRESS



OPENING SESSION

Wednesday, September 11, 2024

3:00 PM - 6:20 PM

Location: Vendome B/C

Moderator: Raul Coimbra, MD, PhD

WORLD FOR TRAUMA CARE

WCTC

OPENING KEYNOTE:

7TH WORLD TRAUMA CONGRESS



“WHO
CONSULTATION
ON THE GLOBAL
STRATEGY AND
ACTION PLAN
FOR EMERGENCY,
CRITICAL AND
OPERATIVE CARE
(ECO)”

Wednesday, September 11, 2024
3:05 PM - 3:30 PM

Location: Vendome B/C
Speaker: Teri Reynolds,
MD, MS World Health
Organization

KEYNOTE:

7TH WORLD TRAUMA CONGRESS



"IMPORTANCE OF EQUITABLE PARTNERSHIP IN THE DEVELOPMENT OF TRAUMA PROGRAMS AND RESEARCH CAPACITY"

Friday, September 13, 2024

9:25 AM - 9:50 AM

Location:
SKYVIEW III 26th Floor
Keynote Speaker:
Alain Chichom, MD

FOR THE CARE
WCTC

KEYNOTE:

7TH WORLD TRAUMA CONGRESS



“PEDIATRIC SURGICAL EMERGENCY EDUCATION AND TRAUMA SYSTEMS DEVELOPMENT”

Friday, September 13, 2024

1:35 PM - 2:00 PM

Location:

Skyview V & VI 26th Floor

Speaker:

Phyllis Kisa, MBCHB, MMED



**ORAL PAPERS IA:
ABDOMINAL TRAUMA I
PAPERS 1 - 10**

Thursday, September 12, 2024

1:45 PM - 3:35 PM

Location: SKYVIEW I 26th Floor
Moderator: Enrique Ginzburg, MD

**THE UTILITY OF MRI IN PANCREATIC INJURY
PATIENTS REQUIRING SURGERY: INSIGHTS FROM A
TQIP ANALYSIS**

Chih-Yuan Fu, MD

Invited Moderator: Enrique Ginzburg, MD

Introduction: In addition to the CT scan, which serves as a standard diagnostic modality for pancreatic injuries, MRI could provide more information for the evaluation of pancreatic injuries. In the current study, we aimed to assess the role of MRI in pancreatic injuries requiring surgical treatment using a nationwide database.

Methods: The Trauma Quality Improvement Program (TQIP) database was queried to investigate patients with pancreatic trauma who underwent pancreatic surgeries from 2017 to 2019. Characteristics and the time from emergency department (ED) arrival to pancreatic surgery of patients with and without an MRI study before the surgery were compared. A subset analysis was performed for patients who received an MRI study before pancreatic surgery. Patients who underwent pancreatic surgery within 24 hours and those who underwent surgery over 24 hours after the MRI study were compared.

Results: A total of 1,631 patients with pancreatic injuries were included, with a mean time to pancreatic surgery of 12.4 hours. Among them, 714 patients received an MRI study before pancreatic surgery. Compared to patients without an MRI study (N=917), patients with an MRI study before surgery (N=714) had significantly higher abbreviated injury severity (AIS) of the pancreas (4.0 vs. 3.0, $p=0.001$) and a longer time to surgery from ED arrival (28.4 hours vs. 11.6 hours, $p=0.001$). Among patients with an MRI study before pancreatic surgery, over 50% (N=377, 52.8%) had surgery more than 24 hours after the MRI. The comparison between patients who underwent surgery within and over 24 hours after the MRI study showed no significant difference in pancreatic injury severity (4.0 vs. 4.0, $p=0.086$), mortality rate (14.4% vs. 15.7%, $p=0.063$), and hospital length of stay (11.5 vs. 12.6 days, $p=0.191$) between these two groups.

Conclusion: The significant role of MRI in surgical decision-making and further surgical planning for blunt pancreatic injury was not observed in the current study. However, an early MRI is suggested for prompt surgical treatment in patients requiring an MRI for the surgical plan.

**THERAPEUTIC HYPOTHERMIA AND HEMORRHAGIC
RISK IN NON-OPERATIVE BLUNT ABDOMINAL
TRAUMA PATIENTS: A TRAUMA QUALITY
IMPROVEMENT PROGRAM STUDY**

Ting An Hsu, MD

Invited Moderator: Enrique Ginzburg, MD

Introduction: The hypothermia treatment has been studied extensively for its neuroprotective effects in traumatic brain injury (TBI) patients. However, concerns have been raised regarding the potential for increased hemorrhagic complications in polytrauma patients with concomitant blunt abdominal trauma (BAT) which could be treated conservatively due to the coagulopathy associated with hypothermia.

Methods: The TQIP database was queried to study BAT patients who were managed non-operatively from 2016 to 2019. The outcomes were compared between patients who underwent the therapeutic hypothermia for concomitant TBI or not. The primary outcome was the occurrence of delayed intra-abdominal hemorrhage, defined as the need for transcatheter arterial embolization (TAE) or surgical intervention to control bleeding after 24 hours. Propensity score matching (PSM), inverse probability of treatment weighting (IPTW), and multivariate logistic regression (MLR) were employed to account for potential confounders.

Result: A total of 354,709 patients were included, with 40 patients who underwent the therapeutic hypothermia for concomitant TBI. Delayed intra-abdominal hemorrhage was observed in 1 patients (2.5%, 1/40) who underwent the therapeutic hypothermia. Both well-balanced PSM and IPTW analyses demonstrated no significant difference in the probability of intra-abdominal hemorrhage between the two groups. Furthermore, MLR analysis revealed that the therapeutic hypothermia did not increase the probability of intra-abdominal hemorrhage for non-operatively managed BAT patients.

Conclusion: In polytrauma patients with BAT and TBI, the risk of hemorrhage was not observed in patients who underwent a therapeutic hypothermia. These findings suggest that therapeutic hypothermia can be safely implemented in this patient population, provided appropriate monitoring and management of potential coagulopathy are maintained.

**THE HYBRID EMERGENCY ROOM SYSTEM (HERS)
FACILITATES EFFECTIVE USE OF THE RESUSCITATIVE
ENDOVASCULAR BALLOON OCCLUSION OF THE
AORTA (REBOA) FOR ABDOMINAL TRAUMA PATIENTS
IN HEMORRHAGIC SHOCK**

Kaori Ito, MD

Invited Moderator: Enrique Ginzburg, MD

Background: After the installation of the hybrid emergency room system (HERS) in July 2017 at our institution, the resuscitative endovascular balloon occlusion of the aorta (REBOA) can be safely implanted under fluoroscopic guidance, and a protocol has been developed that is explicit regarding its indications in April 2018. In this study, we investigated the evolution of aortic control methods for abdominal trauma patients presenting with hemorrhagic shock before and after the installation of the HERS and examined the frequency of REBOA use and its clinical outcomes.

Methods: A retrospective review of trauma patients presented with hemorrhagic shock and underwent trauma laparotomy at our institution from April 2013 to October 2023 was conducted. The method of aortic control (resuscitative thoracotomy vs REBOA) before the installation of HERS (pre-HERS era: April 2013 to June 2017) and after the installation of the HERS protocol (HERS era: April 2018 to October 2023) were reviewed. Outcomes were compared between two groups.

Results: The number of trauma surgeries was 105 in the pre-HERS era and 264 in the HERS era. Of these, 25 emergency trauma laparotomies were performed for patient with hemorrhagic shock in the pre-HERS era, and 37 in the HERS era. Compared to the pre-HERS era, the frequency of REBOA use increased (4% [1/25] vs. 27% [10/37], $p=0.02$), and the frequency of resuscitative thoracotomy decreased (28% [7/25] vs. 22% [8/37], $p=0.57$) in the HERS era. In addition, 70% [7/10] of cases of REBOA use in the HERS era were prophylactically implanted prior to laparotomy to prevent cardiac arrest due to massive hemorrhage. Mortality in patients who required aortic control tended to be lower in the HERS era than in the pre-HERS era (88% [7/8] vs 50% [9/18], $p=0.70$).

Conclusion: After the installation of HERS and the establishment of protocols defined the indications for REBOA, the frequency of early prophylactic placement of REBOA increased, the frequency of resuscitative thoracotomy decreased, and mortality of patients who required aortic control trended downward. Protocolized prophylactic use of REBOA in the HERS may improve outcomes of patients in hemorrhagic shock due to abdominal trauma.

**TRANSCATHETER ARTERIAL EMBOLIZATION FOR
BLUNT SPLENIC INJURY: INCIDENCE OF
PSEUDOANEURYSMS AND ADDITIONAL
EMBOLIZATION**

Fuminori Yamaji, MD

Invited Moderator: Enrique Ginzburg, MD

Introduction: Transcatheter arterial embolization (TAE) is an effective treatment for blunt splenic injuries with good outcomes. However, the need for follow-up and approach to subsequent pseudoaneurysms remain unclear.

Objective: This study aimed to investigate the need for follow-up after TAE for blunt splenic injuries and additional embolization of pseudoaneurysms.

Methods: The electronic medical records of patients with blunt splenic injuries who were transported to our hospital between 2018 and 2023 were retrospectively reviewed.

Results: This study included 66 patients, with a mean age of 41 years. The injury mechanisms included traffic accidents (28 cases), falls from heights (20 cases), snowboarding-related trauma (10 cases), and other causes (eight cases). According to the 2018 revised American Association for the Surgery of Trauma-Organ Injury Scale, there were 14, 10, 16, 17, and 9 grades I, II, III, IV, and V injuries, respectively. TAE/surgery was performed in 2/0 cases of grade I, 2/2 cases of grade II, 4/0 cases of grade III, 16/0 cases of grade IV, and 2/7 cases of grade V. Patients undergoing TAE and conservative treatment as nonoperative management underwent a follow-up contrast computed tomography after approximately 8 days. Pseudoaneurysms developed in two grade I cases (14%), two grade II cases (25%), seven grade III cases (43%), four grade IV cases (23%), and one grade V case (50%). Among these, 13 cases (81%) underwent additional embolization. Thereafter, no apparent reruptures were observed.

Conclusion: Follow-up of the development of pseudoaneurysms is important in cases of blunt splenic injury. Moreover, additional embolization of pseudoaneurysms may be effective in preventing re-rupture.

**THE DECISION OF DIAGNOSTIC MODALITIES IN THE
EVALUATION OF PELVIC FRACTURE PATIENTS WITH
HEMATURIA**

Yu-Kuan Yang, MD

Invited Moderator: Enrique Ginzburg, MD

Background: In evaluating patients with pelvic fractures, the possibility of associated lower urinary tract injuries (LUTIs) should be considered, especially in patients presenting with hematuria. Primary physicians face dilemmas in distinguishing between bladder and urethral injuries, as the diagnostic modality and subsequent treatments differ. This study evaluates the role of computed tomography (CT) scans, a common imaging study in the emergency department (ED), for identifying LUTIs in pelvic fracture patients with hematuria.

Methods: Pelvic fracture patients presenting with hematuria during the study period from January 2009 to December 2021 were retrospectively reviewed. We compared characteristics between patients with bladder injuries and urethral injuries. The focus was on the diagnostic tool and timing of LUTI diagnosis. A subset analysis was performed on bladder injury patients who underwent an initial CT scan in the ED, comparing those with positive and negative results.

Results: A total of 2,865 patients with pelvic fractures were studied. The proportions of bladder injury, urethral injury, and both injuries were 60 (53%), 46 (41%), and 7 (6%), respectively. Compared with patients with bladder injuries, a significantly higher proportion of urethral injury patients were male (98% vs. 63%, $p=0.001$). The proportion of bladder injuries diagnosed by CT scan was significantly higher than that of urethral injuries (60% vs. 20%, $p=0.001$). Conversely, retrograde urethrography was the dominant diagnostic tool for urethral injuries. Of the bladder injury patients who underwent a CT scan ($N=36$), only 3% were diagnosed after leaving the ED, while less than 10 patients (42%) could be diagnosed in the ED without a CT scan ($p=0.001$).

Conclusion: An early CT scan is recommended for the management of pelvic fracture patients with hematuria, particularly for female patients. For male patients, both urethrography and CT scans are necessary in the ED.

**TIMING MATTERS: EVALUATING THE IMPACT OF
DELAYED PANCREATIC SURGERY OUTCOMES IN
PANCREATIC TRAUMA PATIENTS – A TQIP DATABASE
ANALYSIS**

Yu Chi Kuo, MD

Invited Moderator: Enrique Ginzburg, MD

Introduction: The decision to undergo pancreatic surgery for pancreatic trauma remains challenging due to the necessity for multiple imaging surveys or attempts at non-surgical treatments before resorting to surgery. However, complications may arise without timely surgery for pancreatic trauma. In this study, we aim to evaluate whether delayed pancreatic surgery results in poor outcomes for patients with pancreatic trauma.

Methods: The Trauma Quality Improvement Program (TQIP) database was queried to investigate patients with pancreatic trauma who underwent pancreatic surgeries from 2021 to 2022. The time from emergency department (ED) arrival to pancreatic surgery was analyzed. Mortality, sepsis, acute kidney injury (AKI), and hospital length of stay (LOS) were compared between patients who underwent pancreatic surgery within 12 hours or after 12 hours from ED arrival. Propensity score matching (PSM) and inverse probability of treatment weighting (IPTW) were employed to account for potential confounders.

Results: A total of 854 patients with pancreatic injuries were included, with a mean time to pancreatic surgery of 12.4 hours. Among them, 240 patients underwent pancreatic surgery after 12 hours. In this group, sepsis and AKI were observed in 17 (7.1%) and 25 (10.4%) patients, respectively. Both well-balanced PSM (208 vs. 208 patients) and IPTW analyses demonstrated that patients undergoing pancreatic surgery after 12 hours from ED arrival had significantly longer hospital LOS, higher sepsis rates, and higher AKI rates than patients who underwent pancreatic surgery within 12 hours from ED arrival. Subset analysis for patients who underwent pancreatic surgery within 12 hours showed that the incidence of sepsis ($p=0.717$) and AKI ($p=0.264$) did not increase with the increment of time to surgery in hours.

Conclusion: Patients undergoing pancreatic surgery beyond 12 hours exhibited elevated risks of sepsis and AKI, along with extended hospital stays. Prompt diagnosis and surgical intervention are vital for reducing complications in patients with pancreatic injuries.

**REDUCING THE TREATMENT LEVEL OF PATIENTS
WITH MAJOR TORSO HEMORRHAGE: THE ROLE OF
REBOA IN A LEVEL-I TRAUMA CENTER**

Kuo-Chien Lee, MD

Invited Moderator: Enrique Ginzburg, MD

Introduction: Resuscitative endovascular balloon occlusion (REBOA) offers temporary hemodynamic stabilization until definitive surgical bleeding control is possible. Existing literature suggests that REBOA may effectively extend survivability in severely injured trauma patients requiring interfacility transfer to a facility with definitive hemorrhage control capabilities. However, its role in a high-level trauma center, capable of providing extensive resuscitation and immediate hemostatic procedures, needs clarification.

Methods: A retrospective review was conducted on patients with abdominal/pelvic hemorrhage-associated unstable hemodynamics, primarily sent to a level-I trauma center from 2017 to 2022. Comparisons of time to definitive hemostasis, hemostatic procedures, and outcomes were made between patients who underwent REBOA and those who did not. A subset analysis was performed for patients with pelvic fracture-related life-threatening hemorrhage, comparing patients with and without REBOA.

Results: A total of 82 patients with abdominal/pelvic hemorrhage and unstable hemodynamics were studied. Thirteen patients (15.9%) underwent REBOA prior to hemostasis interventions. There was no significant difference in the time to definitive hemostasis between patients with and without REBOA (Surgery: 73.3 vs. 89.8 minutes, $p > 0.05$; Angioembolization: 113.9 vs. 113.3 minutes, $p > 0.05$). Among patients with intra-abdominal hemorrhage ($N=47$), 60% of those with REBOA underwent angioembolization for hemostasis, while only 28.6% without REBOA underwent angioembolization, with 71.4% requiring laparotomies for hemostasis. In patients with pelvic fracture-related retroperitoneal hemorrhage, typically requiring angioembolization, the mean systolic blood pressure (SBP) increased from 47 to 100 mmHg after REBOA placement. There was no significant difference in SBP before angioembolization between patients with and without REBOA (100 vs. 107 mmHg, $p > 0.05$).

Conclusion: In a fully equipped level-I trauma center, REBOA did not prolong the time to definitive hemostasis. Lifesaving angioembolization for pelvic fracture-related retroperitoneal hemorrhage could be successfully performed in patients with REBOA. Additionally, reduced treatment for intra-abdominal hemorrhage was observed with REBOA application.

**A PREDICTION MODEL OF MORTALITY AMONG
CIRRHOTIC PATIENTS WITH BLUNT ABDOMINAL
TRAUMA: A SINGLE-CENTER RETROSPECTIVE STUDY**

Mo-Han Lin, MD

Invited Moderator: Enrique Ginzburg, MD

Purpose: Liver cirrhosis is recognized as a detrimental factor in patients with blunt abdominal trauma (BAT). This study aims to evaluate factors contributing to mortality in cirrhotic patients with BAT and develop a corresponding prediction model.

Methods: A retrospective observational study of BAT patients from May 2008 to December 2022 in a level-I trauma center was conducted. Propensity score matching (PSM) was performed at a 1:2 ratio to compare mortalities, bleeding-related complications, length of stay (LOS), and intensive care unit (ICU) LOS between patients with and without pre-existing cirrhosis. A subset analysis using multivariate logistic regression (MLR) was conducted to identify independent factors of mortality among cirrhotic patients.

Results: Out of 5,705 BAT patients, 88 (1.5%) had pre-existing cirrhosis. Well-balanced PSM revealed that patients with cirrhosis had significantly higher mortality rates (21.3% vs. 6.8%, p-value less than 0.001) and bleeding-related complication rates (31.8% vs. 19.9%, p=0.032). Among BAT patients with liver cirrhosis (N=88), MLR analysis demonstrated that the PT-INR and Creatinine levels were independent factors of mortality. A 0.1 unit increase in PT-INR raised the odds of mortality by 58.2% (odds ratio=1.582, 95% CI: 1.244–2.012, p-value less than 0.001), while a 1mg/dL rise in Creatinine level increased the odds of mortality by 90.3% (odds ratio=1.903, 95% CI: 1.082–3.347, p=0.026).

Conclusions: Cirrhotic patients exhibited a statistically significant higher mortality rate and bleeding-related complication rate than non-cirrhotic population. PT-INR and Creatinine levels are identified as predictors of mortality for cirrhotic patients with BAT.

**EXPLORING THE THERAPEUTIC ROLE OF
LAPAROSCOPY IN ANTERIOR ABDOMINAL STAB
WOUNDS**

Chien Wu, MD

Invited Moderator: Enrique Ginzburg, MD

Introduction: Traditional management of abdominal stab wounds with peritoneal violation typically involves exploratory laparotomy. However, our previous research comparing laparoscopy and laparotomy in managing anterior abdominal stab wounds (AASWs) suggested that laparoscopy is a safe and effective method, fulfilling both diagnostic and therapeutic needs.

Methods: We conducted an analysis of patients with AASWs and peritoneal violation who underwent diagnostic laparoscopy initially over the past 26 years. Logistic regression was utilized to identify factors predicting the need for further therapeutic procedures.

Results: A total of 94 patients with AASWs and peritoneal violation underwent initial diagnostic laparoscopy. Among them, 50 patients (53.2%) required therapeutic procedures. The median operation time was 117.5 minutes, and the median length of hospital stay was 6 days. Initial systemic blood pressure, heart rate, serum hemoglobin level, and presence of bowel evisceration were not significantly associated with the need for therapeutic procedures. However, a history of assault by others was found to be a negative predictive factor (odds ratio= 0.309, p-value= 0.018) for therapeutic laparoscopy. Conversion to laparotomy occurred in 4 patients, primarily due to severe injuries to hollow organs and solid organs in the bare area.

Conclusion: Laparoscopy demonstrates significant therapeutic potential in managing AASWs with peritoneal violation. However, careful consideration is required for severe organ injuries, potentially leading to conversion to laparotomy.

**DIAGNOSIS AND TREATMENT OF TRAUMATIC
ISOLATED BLUNT GRADE III PANCREATIC INJURY**

Miho Iwai, MD

Invited Moderator: Enrique Ginzburg, MD

Case: A 48-year-old man, who was getting drunk and probably falling and went to sleep. He woke up with an abdominal pain, and he came to the hospital the next day. On arrival, contrast-enhanced CT revealed that there was an increase in the concentration of surrounding fat tissue and accumulation of ascites that appeared to be bloody were observed between stomach and pancreas. However, as there was no obvious extravasation and vital signs were stable, conservative treatment was chosen as intra-abdominal bleeding was suspected. The next day, abdominal pain worsened and generalized. CT follow-up showed a tendency for ascites to increase in volume. Ascitic fluid puncture was performed and a markedly high level of ascitic fluid amylase was found. Emergency surgery was performed for generalized peritonitis and the pancreatic tail was completely ruptured. Based on the general condition and surgical findings, a pancreatic body and tail and splenectomy were performed. Postoperatively, the pancreatic fistula was mild, and the patient was discharged home on POD 20.

Discussion: Pancreatic injuries are relatively rare, accounting for 2-16% of abdominal injuries, and in Japan, blunt trauma accounts for about 90%. In particular, Grade III injuries with main pancreatic duct injury have a high mortality rate. The presence or absence of damage to the main pancreatic duct is important as an indication for surgery, and ERCP may need to be considered in some cases, but in cases where the mechanism of injury is unclear and diagnosis is difficult due to blunt pancreatic isolated trauma, measurement of ascitic fluid amylase levels may assist in simple diagnosis. Although there is still no consensus regarding the surgical method for Grade III, in this case there was severe collapse of the pancreatic tail, and it is possible to minimize pancreatic fistula by performing splenectomy at the pancreatic body and tail and ensuring drainage.

Conclusion: It is necessary to use multiple methods for early diagnosis and to consider appropriate surgical techniques for traumatic isolated blunt Grade III pancreatic injury.



**ORAL PAPERS IB:
SHOCK/TRANSFUSION/RE-
SUSCITATION PAPERS 11 - 21**

Thursday, September 12, 2024

1:45 PM - 3:45 PM

Location: SKYVIEW I 26th Floor
Moderator: Julia Coleman, MD

**ANALYSIS OF THE CURRENT USAGE OF
RESUSCITATIVE ENDOVASCULAR BALLOON
OCCLUSION OF THE AORTA (REBOA) IN PEDIATRIC
TRAUMA PATIENTS: A RETROSPECTIVE STUDY FROM
THE ACS-TQIP DATABASE**

Ling-wei Kuo, MD

Invited Moderator: Julia Coleman, MD

Background: Resuscitative endovascular balloon occlusion of the aorta (REBOA) has been an established life-saving procedure for adult trauma patients, but the evidence for its use in pediatric patients is still under question. The purpose of this study was to examine the outcome of REBOA in pediatric patients.

Methods: We retrospectively analyzed observational cohort data from the American College of Surgeons Trauma Quality Improvement Program (ACS-TQIP) from 2017 to 2019. We analyzed 183,506 trauma patients under the age of 18 years old, and 129 patients were matched by propensity score analysis. Basic demographics, injury severity and mechanism, and clinical outcomes of the patients who received REBOA and those who did not receive REBOA were compared. In the REBOA patients, a subgroup analysis was performed to evaluate the potential influence of age and body weight on the outcomes of REBOA.

Results: After the demographics and pretreatment factors were balanced for the REBOA and no-REBOA groups, the patients in the REBOA group had more PRBC transfusion requirements in the first 4 hours (3250 ml vs. 27 ml, $p=.001$), and the mortality rate was significantly higher in the REBOA group (55.8% vs. 36.0%, $p=.039$). No significant difference was detected regarding in-hospital complications. In the subgroup analysis of the patients who received REBOA, we discovered no significant difference in demographics and outcomes between the subgroups when compared by age (15 years old as cutoff) or by weight (56 kg as cutoff).

Conclusions: The use of REBOA was associated with an increased risk of mortality among the pediatric patients when the REBOA patients were compared with the non-REBOA patients, despite the patients' basic demographics and pretreatment factors being matched. Younger age and lighter body weight did not seem to influence the outcomes of REBOA regarding survival and complications.

**FIBRINOGEN EARLY IN SEVERE PAEDIATRIC TRAUMA
STUDY (FEISTY JUNIOR): A RANDOMISED CLINICAL
TRIAL**

Shane Geroge, MD

Invited Moderator: Julia Coleman, MD

Introduction: Early replacement of fibrinogen in paediatric haemorrhage has been reported to reduce 24-hour mortality. The time taken to deliver fibrinogen replacement has been studied in adults, with a median of 60mins for cryoprecipitate (cryo), and 29min for Fibrinogen concentrate (FC). There are no published studies comparing FC and cryoprecipitate in the children.

Methods: This is a prospective multi-centre, randomised study enrolling children aged 3-months to 18-years with traumatic haemorrhage. Eligible patients were allocated to receive FC or cryo in patients with a FIBTEM A5 of ≤ 10 mm. All other aspects of the current ROTEM guided treatment and damage-control approach were unchanged (Figure 1, 2). The primary outcome was time to administration of fibrinogen replacement from time of identification of hypofibrinogenaemia. Clinical secondary and feasibility outcomes were also analysed.

Results: 67 patients were included in the final analysis (Figure 3). Patients were similar at baseline in both groups (Table 1). There was no significant difference in the time to administration of FC (62min, 95% CI 33-100) or Cryo (65 mins, 95%CI 47-77). There was also no difference in red cell, plasma or platelet use at 6 and 24 hours. Thromboembolic adverse events were similar between groups. 90-day follow up data was collected for 51 participants. Analysis of response to fibrinogen replacement is ongoing.

Conclusions: The time to administer FC in children is longer than that reported in adults. The reasons for this are likely to be multifactorial and represent complex interplay between patient and system factors. Further analysis of this data set will aim to identify and explore contributing factors to this observed difference. Importantly there is no difference in blood product use and adverse events between the two products. Outcomes of this preliminary study provide support for the use of FC in regional and remote centres without access to frozen blood products.

**DOES CRYOPRECIPITATE TRANSFUSION IMPROVE
THE SURVIVAL OUTCOME OF BLUNT TRAUMA? A
SINGLE TRAUMA CENTER RETROSPECTIVE STUDY IN
JAPAN**

Sung Ho Kim, MD

Invited Moderator: Julia Coleman, MD

Introduction: Administering fibrinogen is crucial in managing traumatic coagulopathy. Cryoprecipitate, a concentrated form of frozen fibrinogen, is expected to expedite hemostasis and improve survival chances. However, there is limited evidence regarding its impact on survival rates. We hypothesized that patients with blunt trauma who received cryoprecipitate transfusion would exhibit a higher 28-day survival rate compared to those receiving conventional transfusion.

Methods: This study conducted a single-center retrospective analysis. We included all patients with blunt trauma directly brought in from the scene between April 2013 and March 2020 who underwent emergency transfusions. Patients receiving cryoprecipitate transfusions were compared to those receiving conventional transfusions. The primary outcome measure was the 28-day survival rate. Logistic regression analyses were conducted, adjusting for potential confounders with 95% confidence intervals.

Results: A total of 208 patients were included in the analysis. The median age was 60 years (IQR: 38.00-70.25), with 138 (66.3%) being male. One hundred eighteen patients received cryoprecipitate transfusions, while 90 received conventional transfusions. The median probability of survival, as measured by the Trauma Injury Severity Score (TRISS), was 0.52 (IQR: 0.19-0.89), with a tendency to be lower in the control group. However, there was no statistically significant difference in the 28-day survival rate between the two groups (74.6% vs. 71.1%, odds ratio 1.19, 95% confidence interval [0.644-2.21]). Multivariate logistic regression analysis, adjusted for TRISS and the presence of traumatic brain injury determined by an Abbreviated Injury Scale (AIS) score of 3 or more, revealed that cryoprecipitate did not improve the 28-day survival rate (odds ratio 0.688, 95% confidence interval [0.309-1.53]).

Conclusion: In this single-center retrospective study, cryoprecipitate transfusion did not demonstrate a significant improvement in the 28-day survival rate among patients with blunt trauma.

**PREVALENCE OF TRAUMA-INDUCED COAGULOPATHY
DIAGNOSED USING THROMBOELASTOGRAPHY IN A
REGIONAL HOSPITAL IN THE PHILIPPINES**

Ma Corazon Cabanilla-Manuntag, MD

Invited Moderator: Julia Coleman, MD

Background: Trauma remains to be a global threat to public health worldwide and mortalities remain significant especially in third world countries. To manage this, a lot of research is being done to further manage mortality-associated with trauma, protocols for resuscitation are being studied. An active area of research is identifying trauma-induced coagulopathy (TIC) is still an area of active research for both laboratory and clinical data. Generally, it is regarded as an abnormal process of coagulation mainly attributed to severe traumatic injuries. And while trauma remains to be a public health concern worldwide, much of what is known about TIC comes from only from mature trauma systems.

Objective: This study explored the prevalence of TIC in Filipino patients admitted in a tertiary regional hospital using deranged parameters in thromboelastography (TEG) and prothrombin time and INR for conventional coagulation assay (CCA).

Methodology: From July 2023 to January 2024, sixty six patients met the trauma admission criteria and blood samples for TEG, CCA, arterial blood gas, and complete blood count were taken simultaneously. TEG results were interpreted by the intensivist.

Result: TIC was diagnosed in a total of thirty patients (45.45%), eleven using only TEG (16.67%), fifteen patients using only CCA (22.72%), and four patients using both (6.06%). Mortality was highest when TIC was diagnosed using both assays (100%) but between TEG and CCA, correlation with mortality was higher with TEG (45% vs 13%). Average length of stay were 14.6 days, 11 days, and less than 24 hours for those diagnosed with TIC using CCA, TEG, and both, respectively.

Average initial blood transfusion requirements at the emergency department were 2 units, 2 units, and 5.5 units for patients with TIC diagnosed using CCA, TEG, and both, respectively.

Conclusion: The prevalence of TIC is higher for this population than previously reported. Patients diagnosed with TIC had poorer outcomes, especially when diagnosed using both assays. TEG and CCA should be done on severe trauma patients for guidance in both resuscitation and prognostication.

**ANALYZING ADVERSE EVENTS IN TRAUMA
RESUSCITATION: IMPLEMENTING A DATA-DRIVEN
APPROACH FOR IMPROVED PATIENT CARE AND
SAFETY**

Anisa Nazir, MD

Invited Moderator: Julia Coleman, MD

Background and Objectives: Errors in trauma care manifest during the initial resuscitation phase in the trauma bay. Identifying trauma adverse events (AEs) poses challenges due to the time-sensitive, high-stress environment, retrospective data collection, and potential underreporting by healthcare providers. The STAT (Safety Threats and Adverse Events in Trauma) taxonomy categorizes 65 trauma resuscitation AEs into nine distinct groups. The objective of this study is to characterize AEs and latent safety threats in trauma using the STAT taxonomy.

Methods: A prospective cohort observational study at St. Michael's Hospital investigated consecutive trauma team activations over four months, employing an audio-visual data capture system. The study spanned activities from 10 minutes pre-arrival to departure in the trauma bay. Participants consented to the recording and analysis of trauma resuscitation, with detailed documentation of all aspects. Three independent raters conducted the data analysis, aiming to bolster reliability by mitigating subjectivity and enhancing objectivity in the results.

Results: The preliminary analysis of the STAT taxonomy application reveals intriguing patterns in AEs and errors within the trauma bay. A total of 410 adverse events were identified among the 197 enrolled patients. This resulted in an average of approximately 2.08 adverse events per case. These events encompassed a range of factors, including procedural complications, communication errors, equipment malfunctions, and contextual challenges within the trauma bay setting. Most common AEs identified are ID bracelet ($n=43$, $CI=(0.16, 0.275)$), failure to draw bloodwork within 10 minutes of arrival ($n=41$, $CI=(0.15, 0.26)$), close loop communication ($n=22$, $CI=(0.06, 0.16)$), concurrent conversations preventing team leader communication ($n=27$, $CI=(0.89, 0.185)$), patient assessment begins before EMS handover in stable patient ($n=22$, $CI=(0.07, 0.15)$) and unclear team roles ($n=20$, $CI=(0.06, 0.14)$).

Conclusions: The initial application of the STAT taxonomy to trauma videos has provided insight into the intricacies of trauma resuscitation. These early insights have already revealed distinctive error patterns, emphasizing the role of prospective analysis in improving patient safety within trauma settings. The most common AEs pinpoint specific areas that might benefit from targeted interventions or process improvements. Further correlation with registry data is crucial to identify patterns and impacts on patient outcomes.

THE DIAGNOSTIC ACCURACY OF FAST CT IN THE COMPUTED TOMOGRAPHY FIRST RESUSCITATION STRATEGY WITH HYBRID EMERGENCY ROOM SYSTEM FOR SEVERELY TRAUMA PATIENTS

Satomi Senoo, MD

Invited Moderator: Julia Coleman, MD

Introduction: The introduction of hybrid emergency room system (HERS) with high-speed computed tomography (CT) scan has dramatically changed the management for severely injured patients in some centers in Japan. We developed CT first resuscitation (CTFR) strategy in HERS with the goal of minimizing the time to identification of critical injuries and the definitive treatment (Fig1). FAST CT is a method of CT scan that prioritizes scan time and scan the whole body (from head to pelvis) in a non-contrast enhanced CT, which differs from non-contrast enhanced conventional whole body CT scan. The purpose of this study is to evaluate the diagnostic accuracy difference between the FAST CT scan and conventional whole body CT scan in trauma patients.

Method: Over a period of two years, from January 2020 to December 2022, we divided blunt trauma cases aged over 20y.o and AIS 3 or higher, who were admitted to HERS, into two groups: the FAST CT group and the conventional CT group. Demographics, injury patterns, outcomes, radiation dose, and the diagnostic accuracy of CT examinations in both groups retrospectively.

Result: 121 patients who met the inclusion criteria were identified: 66 in the FAST CT group and 55 in the conventional CT group. There were no significant differences observed in patient's characteristics and outcomes between the two groups. The radiation dose was significantly lower in the FAST CT group [2173 (2159.2-2251.4) vs 3411.8 (2815.6-3765.7) mGy•cm: $P < 0.01$]. The sensitivity/specificity of CT scan in each group were as follows: head (100%/100% vs 100%/100%), chest (96%/98% vs 94.1%/100%), abdomen (100%/88.5% vs 80%/100%), and pelvis and spine (100%/100% vs 100%/100%) (Table1).

Conclusion:

Although the radiation dose of FAST CT scan in the CTFR strategy was significantly lower than that of the conventional CT scan, its diagnostic accuracy was the same as that of conventional whole-body CT scan. Further studies are needed to increase the number of cases.

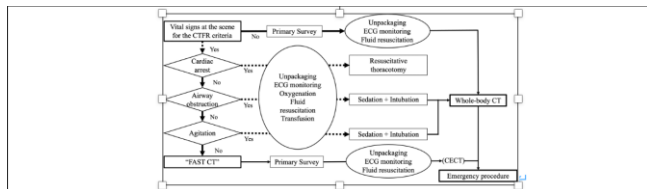


Figure1: CTFR strategy¹⁾

	FAST CT group			Conventional CT group		
	N	Sensitivity(%)	Specificity(%)	N	Sensitivity(%)	Specificity(%)
Head	9	100	100	1	100	100
Chest	66	96	98	54	94.1	100
Abdomen	66	100	88.5	55	80	100
Pelvis and spine	66	100	100	55	100	100

Table1: The sensitivity and the specificity¹⁾

**FIRST-2 TRIAL: FACTORS IN THE INITIAL RESUSCITATION
OF SEVERE TRAUMA. A 2020 EAST MULTICENTER TRIAL**

Luis da Luz, MD

Invited Moderator: Julia Coleman, MD

Background: Bleeding trauma patients with coagulopathy have a three-fold increased mortality risk, which has prompted renewed research interest in the optimal transfusion strategy for trauma-induced coagulopathy. We aimed to compare efficacy/safety of using clotting factor concentrates (CFCs) with the standard ratio-based plasma strategy.

Methods: Randomized, controlled, superiority trial, at six Level 1 Trauma Centers (April 2021-January 2023) with a pre-planned interim analysis for futility and sample size check after enrollment of 120 randomized/treated/consented patients. Inclusion: patients with massive hemorrhage protocol (MHP) activation at admission. Randomization: computer generated, stratified by center, using closed opaque envelopes for rapid allocation. Intervention: CFC (fibrinogen concentrate [FC] 4g and prothrombin complex concentrate [PCC] 2000 IU) in MHP packs 1+2. Control: 4U frozen plasma [FP] (packs 1+2). Concomitant therapy: 4U RBC (packs 1+2), and 1 adult dose platelets (pack 2, transfused as per clinician discretion). Outcomes: Primary, blood products (RBCs, FP, platelets) administered within 24 hours (powered to detect difference of 5U RBC between arms); Secondary, efficacy/safety (24-hour, 28-day mortality, thromboembolic events [TE], among others).

Results: The study was terminated following interim analysis, indicating low conditional

Table - FiiRST-2 Study (NCT04534751): Details on intervention, active control, and outcomes.

Characteristic	Plasma, No. (%) (n=71)	FC and PCC, No. (%) (n=66)	Effect estimates	
			LS mean ratio (FC+PCC/plasma, 1-sided 97.5% CI, superiority)	P value
Primary outcome				
Red cells + plasma + platelets within 24h (LS mean, 95% CI)	23.8 (19.2 - 29.4)	20.8 (16.7 - 25.9)	0.87 (0.0 to 1.19)	0.20
Median (IQR)	12.0 (8, 31)	11.0 (6, 23)		
Secondary outcome – mortality				
24-hour mortality, n (%)	12 (16.9)	5 (7.6)		0.25
28-day all-cause mortality, n (%)	15 (21.1)	9 (13.6)		0.25
Secondary outcome – thromboembolic events (TE)				
TE complications at 28 days n (%)	n (%), 95% CI 10 (14.1, 6.97-24.4)	n (%), 95% CI 14 (21.2, 12.1 - 33.0)	Risk difference 7.13 (-5.9 - 20.6)	P 0.37

Abbreviations: CI – confidence interval, FC – fibrinogen concentrate, IQR – interquartile range, LS – least mean, PCC – prothrombin complex concentrate.

power of the test statistic for the primary outcome for superiority. In the full analysis, 217 patients were randomized and 137(66 CFC/71 plasma) were treated and included in the primary analysis. Demographics/injury severity: median age (interquartile range, IQR) 38(29-55) years; 81% men; 66% blunt mechanism; median (IQR) ISS 29(19.5-43). CFC and plasma patients received full

treatment dose in first pack in 89.4% and 66.2%, respectively, before MHP termination or death. The mean 24-hour units of blood products was 20.8 and 23.8 in the CFC and FP groups, respectively (Table). TE occurred in 14(21.2%) and 10(14.1%) of patients in the CFC and FP groups, respectively. However, no differences were found when adjusted for numerically more survivors in the CFC arm (p=0.46). There were no differences in 24-hour and 28-mortality (Table).

Conclusion: The use of CFCs as part of the initial MHP in trauma patients did not demonstrate superiority in 24-hour blood product administration. Future trials should investigate different sources of CFCs and compare with plasma, evaluating their impact on important outcomes

OUTCOMES AFTER REVISED BLOOD TRANSFUSION POLICY DURING CRITICAL NATIONAL BLOOD SHORTAGE

Makenna Marty, MD

Invited Moderator: Julia Coleman, MD

Introduction: During the national blood shortage in 2021, [redacted]'s blood bank adopted a restricted transfusion policy. This prompted the following after a PRBC order: hemoglobin >6.5 g/dL prompted clinician to reconsider transfusion; and hemoglobin 5.5-6.5 g/dL was given one unit only. This study aims to evaluate hemodynamics and blood product usage of patients under the restrictive transfusion policy.

Methods: A retrospective chart review was performed for inpatients from January to March 2022 with a Hgb ≤ 7.0 g/dL. Exclusion criteria were age under 18 years, pregnancy, active bleeding, death prior to intervention, and incomplete data.

Results: 227 identified patients had a hemoglobin of ≤ 7.0 during the specified time frame. 42 were excluded. Of the 185 included, 64 (34.5%) were transfused according to policy and stratified based on degree of anemia (Table 1). 121 (65.4%) received unindicated transfusions. There were no significant differences across groups in age, sex, comorbid conditions, antiplatelets, anticoagulants, or pre-transfusion platelets or INR. Primary outcomes included hemodynamic changes (new-onset tachycardia or hypotension) and need for repeat transfusion (Table 2). Secondary outcomes included mortality and length of stay (Table 3). Results showed no difference in hemodynamics between groups (HR $p=0.798$, SBP $p=0.935$) or mortality ($p=0.661$). The most-restricted groups were more likely to need re-transfusion based on immediate next hemoglobin ($p=0.026$) and need for re-transfusion at any point during remainder of inpatient stay ($p=0.001$) and increased length of stay ($p=0.042$).

Conclusions: The number of patients who were given transfusions that were not aligned with the restrictive guidelines (34.5%) was higher than anticipated, indicating clinician judgment often guided transfusion over policy. For patients transfused according to policy, they demonstrated a significant increased need for re-transfusion and longer length of stay. Despite a second transfusion being somewhat delayed for patients with ongoing blood product needs, there was no significant difference in hemodynamic outcomes or mortality. These data suggest patients may tolerate more restrictive blood transfusions without adverse outcomes when rationing is required to preserve the critical resource of PRBCs, which could prevent overuse of blood products in patients who may not require as much as is currently given per standard of care.

ABO BLOOD TYPE GROUPS AND OUTCOMES OF SEVERE TRAUMA PATIENTS: SYSTEMATIC REVIEW

Yohei Iwasai, MD

Invited Moderator: Julia Coleman, MD

Background: Although it has been reported that ABO blood type has a profound influence on hemostasis, the correlation between blood type and outcomes of severe trauma patients are still under debate.

Objective: The purpose of this study was to provide a systematic and comprehensive review of evaluation studies on the impact of ABO blood type on the clinical outcomes in severe trauma patients.

Methods: PubMed and Cochrane library were searched for studies investigating the relationship between ABO blood type and outcomes in patients with severe trauma. In this review, meta-analysis was excluded according to the significant study heterogeneity. The study quality was assessed using CASP checklists, the certainty of evidence was evaluated using GRADE, and PRISMA guidelines were followed throughout manuscript.

Results: Of 183 potentially eligible relevant records, fourteen studies met inclusion criteria, representing 12,580 patients. Of these studies, statistically significant differences by ABO blood type were reported in 3 studies evaluating all-cause mortality, 2 evaluating exsanguination, and 3 evaluating the amount of transfusion. Included studies had substantial variability in methods and population. Although blood type O tended to be associated with higher mortalities and larger transfusion volume than other blood types, there was significant heterogeneity among studies with certainty of evidence rated as low.

Conclusions: There is insufficient evidence to definitively demonstrate an association between ABO blood type and outcomes in severe trauma patients. Further studies elucidating their mechanism underlying this association are needed to establish clinical significance.

ROTEM in coagulation management for major trauma patients: Evidence based algorithmic approach

Vikas Chawla, MD

Invited Moderator: Julia Coleman, MD

Coagulopathy is present in approximately 25-35% of trauma patients on admission to the emergency room. Therefore, major trauma patients face a serious problem that accounts for 40% of all trauma-related deaths. Early and rapid hemostatic treatment is necessary to prevent excessive bleeding and exsanguination in cases of coagulopathy.

TRALI, ascribed to empirical (or non-goal-directed) bleeding management strategy, is the most crucial cause of transfusion-associated mortality and morbidity in trauma patients. Using coagulation factor concentrates can help quickly and effectively correct coagulopathy.

Quick and reliable coagulation monitoring is necessary for goal-directed coagulation treatment of severely bleeding patients, along with a targeted therapeutic approach based on test results. Standard coagulation tests such as PT and aPTT do not offer sufficient insight into complex coagulopathy associated with high blood loss, factor consumption, and hemodilution.

Goal-directed hemostatic therapy using coagulation factor concentrates can help decrease the need for allogeneic blood transfusions, which can negatively affect patient outcomes. In recent years, rotational thromboelastometry (ROTEM), a viscoelastic method that evaluates the speed of clotting and the quality of the clot, has been effectively used to guide hemostatic therapy.

ROTEM enables an accurate and timely assessment of the clotting process and clot quality. Administering coagulation factors promptly and goal-directedly may lead to improved patient outcomes. Most of the major trauma patients show a reduced MCF in the FIBTEM test. Low FIBTEM MCF reflects reduced fibrinogen concentration or disturbed fibrin polymerization. Platelet concentrate should preferably be transfused in patients not responding sufficiently to fibrinogen concentrate/cryoprecipitate (i.e., absence of an adequate increase in EXTEM MCF after administering fibrinogen concentrate/cryoprecipitate). Patients with recent intake of coumarins and patients showing prolonged EXTEM CT (>1.5 times normal) may benefit from an additional 1000 to 1500 U PCC to augment thrombin generation.

Summary: FIBTEM MCF less than 10 mm and EXTEM CT > 1.5 times normal can guide the administration of FC and PCC, respectively. Mortality is likely to be associated with FIBTEM less than 7 mm, EXTEM-MCF less than 45 mm; significantly shorter EXTEM-CT, INTEM-CT, EXTEM-CFT, and INTEM-CFT; significantly higher EXTEM-MCF, INTEM-MCF.

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**FEASIBILITY OF RESUSCITATIVE ENDOVASCULAR
BALLOON OCCLUSION OF THE AORTA FOR
COMPUTED TOMOGRAPHY DIAGNOSIS: A
REEVALUATION**

Hiroyuki Otsuka, MD

Invited Moderator: Julia Coleman, MD

Background: Advances in medical equipment have led to changes in the management of severe trauma. The role of resuscitative endovascular balloon occlusion of the aorta (REBOA) in this context remains unclear. This study aimed to reassess the utilization of REBOA and the utility of computed tomography (CT) in the context of aortic occlusion in contemporary trauma management. While initially reported in 2021 by J Trauma Acute Care Surg, uncertainties persist and warrant further discussion.

Methods: This retrospective observational study, conducted at a single tertiary center in Japan, analyzed 77 patients who experienced severe trauma and persistent hypotension between October 2014 and March 2020.

Results: All patients required urgent hemostasis. Twenty patients underwent REBOA, 11 underwent open aortic cross-clamping, and 46 did not undergo aortic occlusion. Among patients who underwent aortic occlusion, 19 underwent pre-hemostasis CT, and 7 underwent operative exploration without pre-hemostasis CT to identify active bleeding sites. The 24-hour and 28-day survival rates in patients who underwent CT were not inferior to those in patients who did not undergo CT (24-hour survival rate, 84.2% vs. 57.1%; 28-day survival rate, 47.4% vs. 28.6%). Moreover, patients who underwent CT had less discordance between the primary hemostasis site and the main bleeding site compared with patients who did not undergo CT (5% vs. 71.4%, $p = 0.001$). In patients who underwent pre-hemostasis CT, REBOA was the most common approach to aortic occlusion. Most bleeding control sites were located in the retroperitoneal space. Many patients underwent interventional radiology for hemostasis.

Conclusion: In a limited number of patients whose cardiac arrests were imminent and in whom no active bleeding sites could be clearly identified without CT findings, REBOA for CT diagnosis may be effective. Further studies are recommended.



**ORAL PAPERS IC:
OUTCOMES - GUIDELINES
PAPERS 22 - 33**

Thursday, September 12, 2024

1:45 PM - 3:45 PM

Location: SKYVIEW I 26th Floor
Moderator: Milos Buhavac, MD

IMPACT OF CD4 COUNT ON HIV POSITIVE TRAUMA PATIENTS IN URBAN U.S. CITY

Vanessa Arienty, MD

Invited Moderator: Milos Buhavac, MD

Introduction: There is scarce literature investigating the impact of HIV on outcomes for trauma patients. Literature that exists has predominately used national databases and majority have found difference in the rates of complications. This has largely been attributed to modern day use of antiretroviral therapy (ART). We hypothesize those with lower CD4 count would have increased rates of infections and inflammatory related complications.

Methods: A retrospective cohort review of patients at a single center between 2018-2023 was performed. Trauma patients with HIV and recorded CD4 count during or within 12 months of admission were included. Demographics, medical history, CD4 count, hospital length of stay and complication records were collected for review. Patients were subsequently categorized into two groups: CD4 lower than 200 (L-CD4) or higher than 200 (H-CD4).

Results: The cohort was comprised of 368 patients. The Median (IQR) age was 43 (34-59) years, with 80% males, 81% blunt mechanism and a median ISS of 9 (5-14). The L-CD4 group included 104 (28%) patients, while the H-CD4 had 264. Between groups there was no difference in age, sex, trauma mechanism or ISS. The median CD4 count for L-CD4 was 96 vs 474 for H-CD4. L-CD4 was more likely to have a smoking and drug use history and were less likely to be on ARV at time of admission (58% vs 85%, $p = 0.001$). There was no difference in complications such as DVT, pulmonary embolism, acute respiratory distress, acute kidney injury and pneumonia. L-CD4 was associated with higher rates of sepsis, stroke and hospital length of stay. Overall there was no difference in rates of in-hospital mortality.

Conclusion: Our data suggest that HIV positive patients with traumatic injuries and CD4 counts below 200 were at higher risk of stroke and sepsis, but not for other infectious or inflammatory complications. We found that over 25% of our population presented with AIDS defining CD4 counts, with over 40% not on ARV therapy. Additional studies should investigate the influence of ARV adherence on complications and public health interventions to create avenues that increase the use of and access to ARV therapy.

	CD4 > 200 (n=264)	AIDS (n=104)	Total N=368	p value
Age	48 (32.5 - 59.5)	49.5 (38 - 58)	48 (34.5 - 59)	0.277
Gender				0.102
Male	206 (78%)	89 (85.6%)	295 (80.2%)	
Mechanims				0.211
Blunt	208 (78.8%)	90 (86.5%)	298 (81%)	
Burn	1 (0.4%)	0	1 (0.3%)	
Penetrating	55 (20.8%)	14 (13.5%)	69 (18.8%)	
CD4	471 (302 - 678)	96 (53 - 151)	339 (179 - 601)	<0.001
Homeless	68 (25.8%)	37 (35.6%)	105 (28.5%)	0.06
ARV at admission				<0.001
No	39 (14.8%)	43 (41.3%)	82 (22.3%)	
Yes	223 (84.5%)	59 (56.7%)	282 (76.6%)	
Unknown	2 (0.8%)	2 (1.9%)	4 (1.1%)	
Complications				
DVT	1 (0.4%)	0	1 (0.3%)	0.53
PE	3 (1.1%)	2 (1.9%)	5 (1.4%)	0.557
ARDS	2 (0.8%)	1 (1%)	3 (0.8%)	0.845
Pneumonia	5 (1.9%)	2 (1.9%)	7 (1.9%)	0.985
AKI	7 (2.7%)	4 (3.8%)	11 (3%)	0.545
Stroke	1 (0.4%)	3 (2.9%)	4 (1.1%)	0.037
Sepsis	1 (0.4%)	3 (2.9%)	4 (1.1%)	0.037
Outcomes				
Hospital LOS	5 (3 - 10)	7 (3 - 13)	6 (3 - 10.5)	0.019
ICU LOS	5 (3 - 10)	7 (3 - 13)	4 (2 - 9)	0.221
Ventilator days	3 (2 - 7)	7 (3 - 12.5)	4 (2 - 9)	0.084
Mortality	4 (1.5%)	4 (3.8%)	8 (2.2%)	0.167

IMPACT OF CRASH DYNAMICS ON MORTALITY AND INJURY OUTCOMES AFTER ROAD TRAFFIC CRASHES (RTC) IN INDIA

Divya Kewalramani, MD

Invited Moderator: Milos Buhavac, MD

Introduction: RTC are a leading cause of mortality worldwide. While previous studies investigated the epidemiology and risk factors associated with RTC, there is a lack of research examining relationships between vehicle collision mechanics (VCM) and the resulting patterns of occupant injuries. We hypothesize that interrelationships between VCM and occupant injuries will reveal distinct patterns to inform targeted interventions to improve vehicle safety designs and road safety protocols, ultimately reducing RTC mortality.

Methods: Forensic investigation data from 149 road crashes was analyzed (169 Light Motor Vehicles (LMVs) and 222 unique events). Crash simulations were generated using PC-Crash and cross-referenced with 39 medical injury reports. Vehicular damage was categorized by magnitude (minor, moderate, or severe) and impact location (front, rear, side, roof). Injuries were classified by nature and severity using the Abbreviated Injury Scale (AIS). Descriptive statistics and correlation analysis quantified the relationships between vehicular damage and occupant injuries.

Results: Of 149 crashes, 95 (64%) were fatal and 42 (28%) resulted in serious injuries (AIS greater than 4). Rear-end collisions were the most prevalent (51%), followed by rollover (16%) and off-road object impacts (11%). Impact force was primarily from the front (58%), followed by side planes (24%) and the rear (12%). Passenger compartment intrusion caused 54.4% of fatalities, (longitudinal intrusion=53.6%; vertical and lateral intrusions=36.4%).

Category	Details
Time Period	2019 to 2023
Data Set	149 unique cases, 169 LMV inspections, 222 events with LMV as collision partner
Crash Severity	64% fatal, 28% serious injury
Road Type	93% on expressways, 7% on national highways
Time Zone Distribution	00:00-03:00 (18%), 03:00-06:00 (19%), 06:00-09:00 (19%), 09:00-12:00 (14%), 12:00-15:00 (9%), 15:00-18:00 (8%), 18:00-21:00 (6%), 21:00-24:00 (6%), Unknown (1%)
Lighting Conditions	42% daylight, 35% dark-not-lighted, 10% dawn/dusk, 7% dark-lighted, 6% unknown
Crash Configuration	Rear-end (51%), off-road object impacts (25%), others (24%)
Driving Behavior	Sleepy/fatigued (24%), not in vehicle (7%), attentive (57%)
Vehicle Damage	Rollover (19.5%), fire (0.6%), driveline damage (22%)
Safety Systems	ABS availability (41.4%), Seatbelt availability (81.6%), Seatbelt usage (19%)
Collision Partner	Straight Truck (44%), Pickup/LCV/Minitruck (18%), Bus (23%), Object Impact (13%), Tanker/Tipper/Tractor Trailer (3%)
Most Harmful Configuration	Side/angle impact (36%), rear end (36%), head-on (21%)
Seating Position Analysis	Front row (41%), second row (28%), third row (10%), Injury linked to longitudinal intrusion (77%)
Seatbelt Usage Analysis	Not using seatbelts (56%), Unavailable (15%), Fatality increase with non-usage (65%), Fatalities where available but not used (18%)
MAIS-Body Region Analysis	Head injuries (62% overall, 68% fatal), Thorax injuries (21% overall, 21% fatal), Lower Extremity (5%), Spine (3%), Upper Extremity (3%), Unknown (5%)

Speeding over 80 km/h increased fatality rates to 46%. The safety systems analysis revealed only 41.4% of LMVs had Anti-lock Braking Systems. Only 19% of victims

utilized seatbelts overall and seatbelts were not used or available in 59% of mortalities.

Conclusion: The patterns identified in this study provide a foundation for evidence-based strategies to enhance LMV safety designs to improve mortality. These include minimizing passenger compartment intrusion, implementing rollover prevention technologies, while promoting the adoption of safety features like ABS, seatbelts, and speed management strategies.

INCREASED RISK OF POST-INJURY PULMONARY EMBOLISM AMONG SICKLE CELL DISEASE PATIENTS

Ektha Parchuri, MD

Invited Moderator: Milos Buhavac, MD

Background: Clinical implications and management of traumatic injury in individuals with sickle cell disease (SCD) and sickle cell trait (SCT) are poorly understood. While recent studies suggest an increased predisposition to post-injury vaso-occlusion, it is unknown whether SCD and SCT patients experience increased rates of adverse outcomes following injury, specifically pulmonary embolism (PE), acute renal failure syndrome (ARFS), deep venous thrombosis (DVT), and rhabdomyolysis.

Methods: Retrospective cohort of SCD, SCT, and non-sickle cell control subjects with a history of traumatic injury from 1990 to 2021 was extracted from All of Us Research Program (AoURP) data browser. Through ICD-9/10 codes, the earliest date of a traumatic injury and date of secondary outcomes within 12 months of injury was identified. Demographic, injury, and outcome data was extracted for qualifying patients. T-tests, ANOVA, and Chi-squared tests were used for descriptive statistics. Kaplan-Meier survival analysis captured incidence of outcomes over time. Cox proportional hazard models identified confounders between age at injury, gender, cohorts, and outcomes.

Results: SCD (n=335), SCT (n=684), and non-sickle cell controls (n = 102,391) were identified. Females overrepresented males (60.70% vs 36.77%). Mean age was 47 (SD 17); SCD and SCT patients were younger than controls (39 vs 37 vs 47; p =0.01). Patients with SCD – compared to SCT and controls – had significantly higher rates of ARFS (24.77% vs 13.89% vs 10.89%; p =0.01), DVT (6.57% vs 3.07% vs 1.99%; p= 0.01), PE (5.67% vs 2.33% vs 1.67%), and rhabdomyolysis (0.89% vs 0.87% vs 0.70%; p=0.01) within 12 months of their injury. Controlling for confounders, SCD patients had a significantly higher risk of ARFS (HR= 1.590, p=0.044) and PE (HR=2.901, p=0.01) than controls and significantly higher risk of PE (HR=3.215, p=0.01) than SCT patients within 12 months of injury. Older age (=65) heightened risk of DVT (p=0.045), ARFS (p=0.0193) and PE (p=0.048) across all groups.

Conclusion: Patients with SCD are at a significantly higher risk of post-injury pulmonary embolism compared with both SCT and controls. Older age intensifies this susceptibility. Future research may refine risk assessment models for tailored interventions in sickle cell patients following trauma.

IS WHOLE-BODY CT SCAN WARRANTED IN ELDERLY PATIENTS AFTER A FALL?

Nicholas Gargiulo, MD

Invited Moderator: Milos Buhavac, MD

Background: the purpose of this study was to assess the prognostic value of demographic and clinical characteristics and determine which elderly patients will benefit from ct chest and/or abdomen/pelvis (ct cap) during their trauma evaluation.

Materials and methods: we conducted a retrospective study of elderly patients ≥ 65 years that were evaluated by trauma surgery from january 2016 to december 2020. Patients with low-level fall, defined as fall from standing or sitting position that underwent ct cap as part of their initial evaluation were included. For our statistical analysis we compared patients that were diagnosed with chest and/or abdominal trauma on ct versus patients with no traumatic findings on ct. A p value 0.05 was considered significant.

Results: 244 patients met the inclusion criteria. The mean age was 79.6 years and 56.1% were male. The ct was positive in 23.8% of cases. The most common finding was rib fractures (67.2%) followed by spinal fractures (19%). Features that were associated with higher probability of positive ct results were decreased breath sounds (p: 0.02), site-specific pain/tenderness (p .0001) and absence of extremity fractures (p: 0.01). There was no association between positive ct results and gender (p: 0.88), age (p: 0.73), use of antiplatelets (p: 0.63) or anticoagulants (p: 0.7), neurologic deficit (p: 0.67) or abrasions and/or ecchymoses (p: 0.24).

Conclusion: a lower threshold for body ct is necessary to avoid missed injuries in the elderly population. More broad and prospective randomized controlled studies are necessary to develop guidelines that could guide our approach to the evaluation of elderly trauma.

CHALLENGES IN SAVING PATIENTS WITH TRAUMA IN SEOUL: A RETROSPECTIVE COHORT STUDY BASED ON 2016-2020 COMMUNITY-BASED SEVERE TRAUMA SURVEY

Hoonsung Park, MD

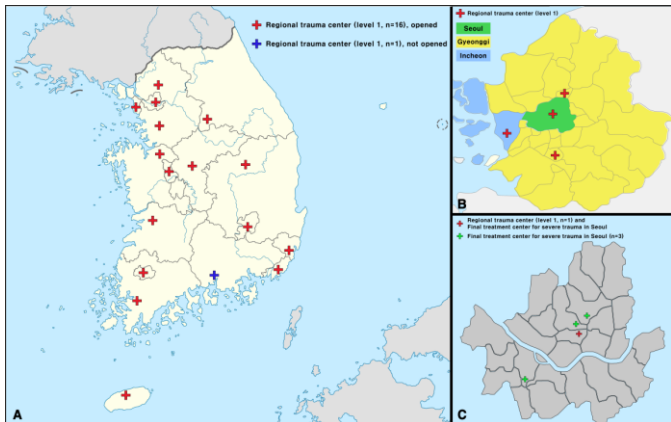
Invited Moderator: Milos Buhavac, MD

Objective: This study aimed to investigate the characteristics and mortality risk factors of patients with trauma in South Korea, focusing on Seoul, which has the highest preventable trauma death rate (PTDR) (20.4%) and Gyeonggi-Incheon, which has the lowest PTDR (13.1%).

Methods: This retrospective cohort study used data from the 2016–2020 Community-Based Severe Trauma Survey. Among the 237,616 patients, 24,448 were included in the study after applying the inclusion and exclusion criteria.

Results: All variables in patient characteristics differed significantly between Seoul and Gyeonggi-Incheon. No significant difference was observed in the time from 119 calls to the emergency room (ER) visits between the two groups (27.9 min vs. 28.7 min). The time from the ER visit to the first transfusion was significantly shorter in Gyeonggi-Incheon (232 min vs. 154 min). In Seoul, the identified risk factors included age (aOR 1.03, 95% CI, 1.03–1.04, $p=0.001$), regarding insurance type (reference = National Health Insurance), loss of NHI (aOR 2.6, 95% CI, 1.81–3.73, $p=0.001$), others (aOR 2.35, 95% CI, 1.46–3.76, $p=0.001$), ISS (aOR 1.11, 95% CI, 1.1–1.12, $p=0.001$), regarding trauma severity (reference = $ISS \leq 15$), $ISS > 15$ (aOR 2.26, 95% CI, 1.73–2.94, $p=0.001$), regarding hospital level (reference = regional trauma centers), regional emergency centers (aOR 2.62, 95% CI, 1.14–6, $p=0.023$), local emergency centers/institutes (aOR 2.33, 95% CI, 1.03–5.31, $p=0.043$), number of angioembolizations (aOR 1.4, 95% CI, 1.06–2.1, $p=0.021$). In Gyeonggi-Incheon, the identified risk factors included age (aOR 1.03, 95% CI, 1.02–1.04, $p=0.001$), Loss of NHI (aOR 1.88, 95% CI, 1.18–2.99, $p=0.008$), ISS (aOR 1.06, 95% CI, 1.04–1.08, $p=0.001$), regarding Trauma severity (reference = $ISS \leq 15$), $ISS > 15$ (aOR 5.69, 95% CI, 3.94–8.21, $p=0.001$), regarding mechanism (reference = Car Traffic Accident), falls and slippages (aOR 1.83, 95% CI, 1.27–2.63, $p=0.001$).

Conclusion: No differences were observed between the two groups in terms of patient characteristics or time required for major procedures. However, the time from the ER visit to the first blood transfusion was shorter in Gyeonggi-Incheon. The unique mortality risk factors for Seoul compared with Gyeonggi-Incheon were regional emergency centers, local emergency centers/institutes, and angioembolization.



COMPARISON OF SURVIVAL OUTCOMES IN TRAUMA PATIENTS TREATED WITH ECMO OVER THE YEARS

Oswald Perkins, MD

Invited Moderator: Milos Buhavac, MD

Background: Despite an overall increase in the use of Extracorporeal Membrane Oxygenation (ECMO), there is a paucity of data regarding how ECMO outcomes have changed in recent years. We evaluated the use of ECMO in the trauma population in a nationwide sample between 2017-2021 to determine if outcomes improved as levels of comfort and knowledge increase in this population. We utilized the most up to date national cohort of this population. We hypothesize that outcomes have improved due to increased familiarity with use of ECMO in trauma.

Methods: The 2017-2021 Trauma Quality and Improvement Program (TQIP) database was queried for patients ≥ 18 years of age treated with veno-venous (VV) and veno-arterial (VA) ECMO. The primary outcome was survival to discharge. Secondary outcomes included length of stay (LOS), intensive care unit LOS, and ventilator days.

Results: 1232 trauma patients received ECMO between 2017-2021 with 225, 253, 265, 274, 215, cases each year respectively. Most patients were male (81%) who sustained blunt injuries (73.3%). The average age was 34 [interquartile range 21-45], mean injury severity score was 28.4 [17-38], and prehospital cardiac arrest was found in 9.1% of patients. When comparing outcomes by year across the study period, there were no differences in 30-day mortality (32%, $p=0.479$) or hospital mortality (36%, $p=0.27$). There were also no statistical differences in ICU LOS (median 19 days [8-32]), total LOS (median 25d [9-41]), or total ventilator days (median 14d [6-27.5]) (p value > 0.1 for all).

Conclusion: The use and outcomes of ECMO in the trauma population have remained stable in recent years. Recent studies have suggested safety and outcome benefit in trauma which may reflect potential for increased use to broaden benefit in this population. Further research is needed to assess its safety and effectiveness as ECMO use expands to new populations.

**THE EXTERNAL VALIDATION OF THE REVISED
LETHAL TRIAD CRITERIA FOR APPROPRIATE
STRATEGIC DECISION-MAKING**

Keisuke Suzuki, MD

Invited Moderator: Milos Buhavac, MD

Background: It was pointed out that the conventional lethal triad criteria in trauma was too specific for death and was therefore inappropriate as a standard for strategic decisions. We previously proposed the revised lethal triad criteria based on the data multicenter observational study, in which positive is defined as meeting one major criterion (fibrin/fibrinogen degradation product [FDP] $>90 \mu\text{g/ml}$) or two minor criteria (base excess [BE] -3 mEq/L or temperature $36 \text{ }^\circ\text{C}$). The present study aimed to externally validate this revised lethal triad criteria for the usefulness as the indicator for damage control strategy in severe blunt trauma patients.

Methods: Trauma patients injured by blunt mechanism with an Injury Severity Score ≥ 16 and admitted to 25 institutions in Japan between April 2018 and March 2019 were included. The predictive accuracy of the conventional and revised lethal triad criteria was evaluated using the area under the receiver operating characteristic curve (AUC). Calibration plots were used to visually evaluate the agreement between predicted and observed mortality.

Results: A total of 1177 severe blunt trauma patients were evaluated, of which 125 patients (10.6%) died during hospitalization. While the conventional criteria predicted outcomes with a sensitivity of 2.8% and specificity of 99.8%, the revised criteria predicted outcomes with a sensitivity of 80.6% and specificity of 64.4%. The area under the characteristic curves for conventional criteria and revised criteria was 0.662 and 0.765, respectively.

Conclusion: The revised lethal triad criteria demonstrated reasonable sensitivity and specificity as the standard for the decision making of therapeutic strategy in severe blunt trauma patients. The criteria for decision-making in penetrating trauma should be further assessed.

REFINING RISK IN RIB FRACTURES: THE COMPOUND EFFECT OF RIB FRACTURE SEVERITY AND AGE IN PREDICTING MORTALITY

Arnav Mahajan, MD

Invited Moderator: Milos Buhavac, MD

Introduction: Older patients with multiple rib fractures are at a high risk for morbidity and mortality. Current clinical scoring systems often treat age as an independent factor without considering its relationship to other factors. This approach may lead to unwieldy rib fracture scoring systems. We examined the interplay between age and fracture severity to propose a refined understanding of this relationship to yield simpler yet effective clinical tools.

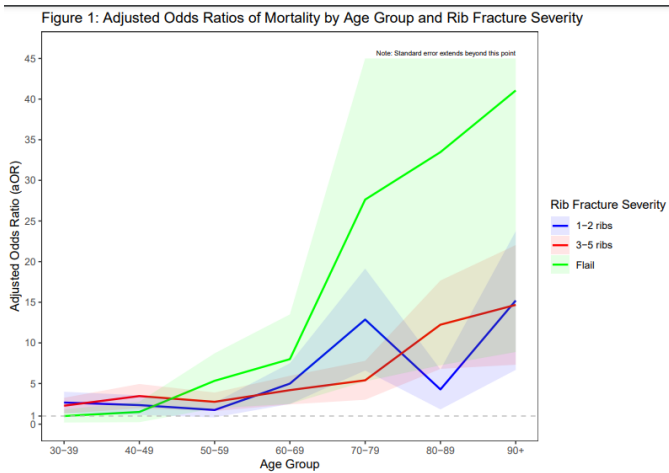
Methods: In this single-center retrospective study, we reviewed our trauma patient registry from January 2012 to December 2023. We included all adults with blunt trauma and rib fractures, categorized as 1-2 ribs fractured, 3-5 ribs fractured, or flail chest. We collected information on demographics, comorbidities and Glasgow Coma Scale score at admission. Adjusted logistic regression using an interaction variable between deciles of age and rib fracture severity was used to identify factors associated with mortality, reported as adjusted odds ratios (aOR).

Results: We utilized 4,843 patients with blunt rib fractures. Median age was 56 years (IQR: 40.5 – 70) and 63.3% had 3-5 ribs fractured. Overall mortality was 8.6%. Adjusted for other factors, age and rib fracture severity are significant predictors of mortality risk for all age deciles. Flail chest predicts significant mortality risk for ages above 50. We found a non-linear relationship of mortality between rib fracture severity and age, with significant variation in cohorts below the age of 60.

Patients aged 70-79 with 1-2 rib fractures (aOR: 12.7) exhibited higher mortality odds compared to patients in the same age group with 3-5 rib fractures (aOR: 5.4). This pattern reversed in the

80-89 age cohort, where having 3-5 rib fractures (aOR: 12.2) contributed higher mortality odds than patients in the same age group with 1-2 rib fractures (aOR: 4.3). [Figure 1].

Discussion: The interplay of age and rib fracture severity is complex, and mortality risk is non-linear across different age deciles. Despite this, age and rib fracture severity alone effectively predict patient mortality. Simplifying risk assessment tools to incorporate this relationship could significantly improve mortality risk predictions for clinical application.



MANAGEMENT AND OUTCOME OF VARIOUS TYPES OF NECK INJURIES AT LEVEL 1 TRAUMA CENTRE- AN AMBISPECTIVE OBSERVATIONAL STUDY

Sandeep Tiwari, MD

Invited Moderator: Milos Buhavac, MD

Introduction: Neck injuries are challenging for Trauma services and present as acute emergency. These injuries are due to accidents, suicides, homicides and animal injuries both as blunt and penetrating injuries. Behavioral changes in the society has given rise to increased number of suicides & homicides In North India, Manjha injuries are specific.

Methodology: The study was ambispective observational study with 390 patients admitted in department of trauma surgery after sustaining various type of neck injuries over a period of 7 years at level 1 trauma centre. Epidemiological parameter, mechanism of injuries, management and outcome were noted

RESULT: In total 390 patients, majority of patients were male 332 and female 58. Age group was (21-30), mean age was 28.68. In mechanism of injury homicidal cases 188 included 78 of firearm, 35 by sharp object, 21 of stab injury and 54 were blunt trauma. Of total 121

accidental cases, 70 had history of RTA, 18 were injured by kite thread (MANJHA injury), 9 were of blast injury, 24 cases by fall on sharp object. 54 cases with suicidal attempt, 19 cases were due to animal involvement and 8 miscellaneous causes.



Site of injury were isolated neck injuries 343, neck injury with chest injuries 22, with head injuries 12, with abdominal injuries were 13. Penetrating injuries were more common (86.1%). Management includes primary repair and closure (186), conservative (71), surgical repair with management of associated injuries (26), tracheal repair with distal tracheostomy (89), wound exploration (13), vessel ligation(5). In outcome of total 390 patients, 313 were discharged, 19 required ICU care and ventilation, 13 expired, 20 were treated for various complications, 25 were transferred to speciality department for further management.

Conclusion: Neck injuries are life threatening injuries but timely intervention can save many lives. Management of the patient depends on the presentation. Airway is foremost priority. The simple and small looking injury may be so serious that it should be considered life threatening and thorough evaluation and management should be done.

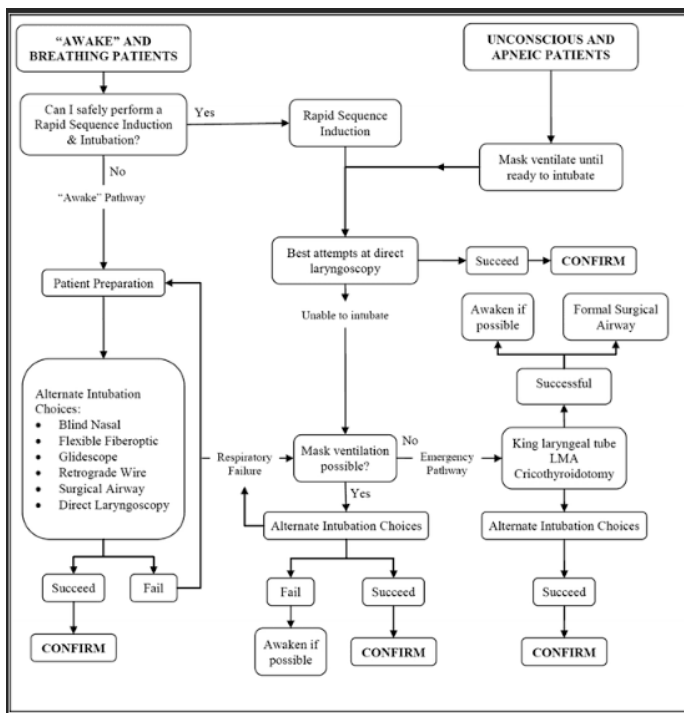
PREHOSPITAL AIRWAY MANAGEMENT IN COMBAT TRAUMA: CURRENT EVIDENCE

Vikas Chawla, MD

Invited Moderator: Milos Buhavac, MD

Introduction: Airway management is of critical importance in combat trauma patients. Airway management failures account for 8 to 15% of potentially preventable trauma deaths. Airway obstruction is the second most common cause of potentially survivable death in combat, accounting for about 1 in 10 preventable deaths. The prehospital setting represents the area of most significant difference in planning and practice between the civilian and combat trauma systems. Prehospital airway management

aims to maintain oxygenation and ventilation rather than establish a definitive airway in adults. Combat medics can perform several prehospital lifesaving interventions to manage casualty airways, including



cricothyrotomy, bag-valve-mask (BVM) ventilation, and supraglottic airway (SGA) placement.

Summary: Airway compromise remains a leading cause of death in battlefield trauma. In patients with traumatic injuries, the timing and selection of airway interventions must be balanced with the need to optimize hemodynamic resuscitation and transport the patient promptly to a designated facility for definitive care.

PREDICTORS OF OUTCOMES OF MOTORCYCLE CRASH ISOLATED HEAD INJURIES FROM A TERTIARY GOVERNMENT HOSPITAL IN THE PHILIPPINES

Emmea June Quidbod, MD

Invited Moderator: Milos Buhavac, MD

In the Philippines, there continues to be a lack of reliable public transportation options, which contributes to the increasing number of motorcycles registered. Despite legislation regarding helmet use and speed limit, motorcycle crash (MCC) remains to be the most common trauma mechanism that ends up in hospital admission. This study was designed to evaluate and compare the outcomes among helmeted and non-helmeted patients who sustained isolated MCC-related head injuries in our institution.

This was a retrospective observational cohort study of all patients admitted with isolated traumatic brain injuries (TBI) due to MCC from January 1, 2018 to December 31, 2022. There were 350 patients identified with blunt TBI during the study period, of which 98 (28.0%) patients had isolated TBI due to MCC. Patients had a median age of 31.5 years, were predominantly males (77.6%) and were non-helmeted (70.0%).

Non-helmeted patients were most likely alcohol-intoxicated (48.0% vs 10.2%, $p=0.003$), had depressed GCS score (9 vs 14, $p<0.001$), and had severe TBI (59.2% vs 5.1%, $p<0.001$) on admission. Moreover, non-helmeted patients were most likely managed surgically (66.3% vs. 21.4%, $p<0.001$), were found to have greater hospital length of stay (11.5 vs 7.0 days, $p=0.045$), with increased need for intensive care unit admission (59.2% vs 10.2%, $p<0.001$), with increased need for mechanical ventilator (57.1% vs 11.2%, $p<0.001$), had more complications (25.5% vs 3.1%, $p=0.013$), and had higher overall mortality (18.4% vs 0, $p=0.001$). Helmet use had been significantly protective against severe TBI (OR 0.030, 95% CI 0.007–0.122, $p<0.001$).

Hence, a more rigorous enforcement of existing traffic laws, as well as a more effective education campaign about the positive impact of helmet use, is imperative to reduce the rates and the debilitating outcomes of severe TBI in the country.

Logistic regression analysis for severe TBI

Parameters	p-value	OR	95% CI	
Age > 65 years	0.322	0.226	0.012	4.286
Male	0.938	0.946	0.233	3.842
Alcohol	0.320	0.486	0.117	2.012
Helmeted	<0.001	0.067	0.016	0.279

Test for collinearity was performed prior to analysis. AUROC 0.907 (95% CI 0.850-0.965). OR, odds ratio. CI, confidence interval.

FACTORS ASSOCIATED WITH IN-HOSPITAL MORTALITY AMONG PREGNANT TRAUMA PATIENTS; A NATIONWIDE STUDY IN JAPAN

Lisa Marie Knowlton, MD

Invited Moderator: Milos Buhavac, MD

Introduction: Trauma is the leading non-obstetric cause of maternal death during pregnancy, accounting for over 5% of deaths despite advancements in management. Identifying risk factors and optimizing in-hospital management are essential for improving outcomes. In this study, we assessed factors associated with mortality of pregnant trauma patients.

Methods: We conducted a retrospective analysis of the Japan Trauma Databank (JTDB), evaluating data from January 2004 to May 2019. Participants included pregnant women aged 15-49 across all gestational ages who experienced trauma with at least one injury of an Abbreviated Injury Scale (AIS) score of 3 or higher. Patient demographics, in-hospital management strategies, and outcomes, primarily in-hospital mortality and length of hospitalization were first described. Multivariable logistic regression was performed to assess independent parameters associated with in-hospital mortality: age, systolic blood pressure, injury severity score (ISS), presence of abdominal injury, decision to perform computer tomography (CT), and surgery.

Results: Of 361,706 trauma patients, a total of 165 (0.05%) pregnant trauma patients were identified. The predominant injury type was blunt (94.5%), primarily due to vehicular collisions (58.2%). Head injuries were most common (33.3%). Diagnostic interventions included CT scans (62.4%), with head CTs accounting for 87.4% of these. Angiography was utilized in 3.6% of patients, half of which were abdominal. Surgical procedures were performed in 27.9% of cases, predominantly orthopedic (69.6%). Use of FAST ultrasound was notable at

84.8%. The in-hospital mortality rate stood at 6.1%, with an average hospital stay of 7 days. In the multivariable analysis, the decision to perform CT yielded the adjusted odds ratio (AOR) of 0.066, with a 95% confidence interval

(CI) of 0.003-1.376. ISS was the only factor associated with in-hospital mortality (AOR 1.198 [95% CI 1.071-1.340]).

Conclusion: In this nationwide Japanese study, a high mortality rate was observed in the pregnant trauma population. This may be due to the difficulty in the multidisciplinary management of the fetus and the mother. In multivariable logistic regression, the decision to perform CT was associated with reduced mortality. The findings highlight the importance of conducting CT scans even in pregnant trauma patients.

Table 1 Factors Associated with In-Hospital Mortality of Pregnant Trauma Patients

Variables	Mortality % (n/N)	Adjusted OR (95% CI)	P value
Age (years)	6.1 (10/165)	1.128 (0.953-1.335)	0.16
Systolic BP			
≤ 90 mmHg	38.9 (7/18)	5.725 (0.544-60.211)	0.146
> 90 mmHg	2.1 (3/145)	Reference	
Missing	0.0 (0/2)		
ISS	6.1 (10/165)	1.198 (1.071-1.340)	0.002
Abdominal injury			
(+)	18.8 (3/16)	0.712 (0.037-13.677)	0.822
(-)	5.2 (7/135)	Reference	
Missing	0.0 (0/14)		
Performed CT scan			
(+)	6.8 (7/103)	0.066 (0.003-1.376)	0.079
(-)	3.4 (3/62)	Reference	
Performed surgery			
(+)	8.7 (4/46)	0.887 (0.051-15.467)	0.934
(-)	5.0 (6/119)	Reference	

OR, Odds Ratio; CI, Confidence Interval; BP, Blood Pressure; ISS, Injury Severity Score; CT, Computer Tomography



**ORAL PAPERS ID:
EXTREMITY TRAUMA
PAPERS 34 - 45**

Thursday, September 12, 2024

1:45 PM - 3:35 PM

Location: SKYVIEW I 26th Floor
Moderator: Mayur Narayan, MD, MPH,
MBA, MHPE

**EXPLORING THE IMPACT OF AI ALGORITHMS ON
PHYSICIAN PERFORMANCE IN PELVIC RADIOGRAPHY:
A PROSPECTIVE, OBSERVER-BLINDED USER TEST
STUDY**

Szu An Chen, MD

Invited Moderator: Mayur Narayan, MD, MPH, MBA, MHPE

Background: Hip and pelvic fractures are common emergencies globally, associated with high mortality and morbidity rates. Despite relying on plain pelvic X-rays (PXR) for diagnosis, miss rates remain high, necessitating improved methods. Artificial intelligence (AI), particularly deep learning algorithms, holds promise in enhancing diagnostic accuracy. However, the practical impact of AI on clinical practice and its interaction with physicians remain underexplored.

Methods: 26 physicians (8 radiologists, 10 emergency physicians, and 10 trauma surgeons) participated in a prospective study at Linkou Chang Gung Memorial Hospital. We developed a deep convolutional neural network (DCNN) algorithm for PXR analysis. Physicians assessed PXRs without AI assistance initially, followed by AI-supported assessments. The AI system provided varying information levels. We recorded and analyzed physicians' performance, time efficiency, and confidence levels during PXR interpretation.

Results: Physicians' performances significantly improved with AI. There was an 8.0% increase in accuracy, 11.5% in specificity, 21.3% in positive predictive values (PPV), and a 10.2% in F1-score (all p value less than 0.05). Surgeons and emergency physicians saw substantial improvements in specificity, PPV, and F-1 scores (p value less than 0.05). Reading time reduced significantly (from 22.7s to 9.6 sec/PXR, p value less than 0.001), and confidence levels improved with AI assistance.

Conclusion: AI, specifically DCNNs, enhances PXR interpretation. Tailored AI tools can bridge the gap between radiologists and non-radiologists, improving diagnostic accuracy and patient care. Integrating AI into clinical practice optimizes efficiency in diverse healthcare settings.

TARGETED MUSCLE REINNERVATION (TMR) AT THE TIME OF MAJOR LIMB AMPUTATION IN PATIENTS WITH LOWER EXTREMITY TRAUMA. A RANDOMIZED CONTROL TRIAL

Abhinav Kumar, MD

Invited Moderator: Mayur Narayan, MD, MPH, MBA, MHPE

Introduction: Post-amputation pain in amputees is a major cause of morbidity. Recent studies have highlighted the impact of pre-emptive surgical intervention of the amputated nerves for the prevention and treatment of post-amputation pain. In this study we aimed to analyze the role of Targeted muscle reinnervation (TMR) at the time of limb loss in addressing both residual limb pain and phantom limb pain.

Methodology: In this open RCT, patients with lower extremity trauma undergoing above-knee amputation were randomized into two groups ie group A with TMR (Intervention) and group B with conventional stump formation (Control) at the time of amputation using simple mixed block randomization. The primary outcome analysis for the assessment of postoperative residual limb pain (RLP) and phantom limb pain (PLP) at five-time points postoperatively viz. 48 hours, 2, 4, 8, and 12 weeks were done using the Numerical Rating Scale (NRS) for RLP and PLP, the HADS, the McGill questionnaire, and PROMIS scores.

RESULTS: The majority of the patients were males (n=37:92.5%). The mean MESS score was comparable (p=0.98). The mean NRS of RLP at the end of 12 weeks was 1.6 in the intervention arm and 3.2 in the control (p-value of 0.001). While the mean NRS of PLP at the end of 12 weeks was 0.9 in the intervention arm and 3.1 in the control (p-value of 0.001).

Conclusion: The preemptive surgical intervention of amputated nerve at the time of amputation by TMR techniques significantly reduces the postoperative residual limb pain and phantom limb pain.

Keywords: TMR; Targeted Muscle Reinnervation; Residual limb pain; Phantom limb pain; Above-knee amputation.

**IMPACT OF PSYCHOLOGICAL INTERVENTION ON
QUALITY OF LIFE IN PATIENTS WITH POST-
TRAUMATIC LIMB AMPUTATION/S – A RANDOMIZED
CONTROLLED TRIAL**

Kaur Milandeep, MD

Invited Moderator: Mayur Narayan, MD, MPH, MBA, MHPE

Introduction: Post-traumatic amputations engender a tumultuous array of emotions for the individual affected which ranges from general anxiety disorders to depression and can even lead to self harm. These amputations are abrupt in nature and hence impart a heightened psychological impact on patients compared to amputations stemming from other medical reasons. Hence, study was designed to evaluate the effect of brief psychosocial intervention on Quality of Life of post-traumatic amputees.

Material and Methods: This was a randomized control study. Patients >18 years of age, well oriented and coherent, with social support and with no prior history of psychological illness who underwent post-traumatic extremity amputation/s were recruited. Baseline questionnaires for psychological assessment were filled as soon as possible after the surgery with informed consent. These patients were randomized (n=74), and conventional care was given to Group A (n=39) and psychosocial intervention along with conventional care was given to Group B (n=35) for 7 weeks. Patients of both the groups were asked to fill the same questionnaire after 8 weeks post-first assessment.

Results: A total of 74 patients with post-traumatic amputation/s were enrolled in the study. Mean age of cohort was 32.8 years with male predominance (n=70). RTI was the most common mechanism of injury. All the 4 domains (physical health, psychological health, social relationship, environment domain), WHO total and Overall quality of life showed significant improvement in both the groups. However, there was no significant difference between the groups. Depression was significantly decreased in both the groups in 8 weeks but there was no significant difference between two groups (p=0.101). Same trend was observed with anxiety and stress. However, body image showed a significant improvement in Group B as compared to Group A (p= 0.023).

Conclusion: Our study did not show any observable positive effects of psychosocial intervention over conventional care on quality of life, depression, stress or anxiety except on body image. We hypothesize that positive results might be observed in quality of life of amputees if a larger study with longer duration of psychosocial intervention is conducted.

WITHDRAWN

SAFETY OR SPEED? ASSESSING ALTERNATIVE VASCULAR ACCESS FOR ANGIOGRAPHY FOLLOWING RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA (REBOA) IN SEVERE PELVIC TRAUMA PATIENTS

Yauren Chang, MD

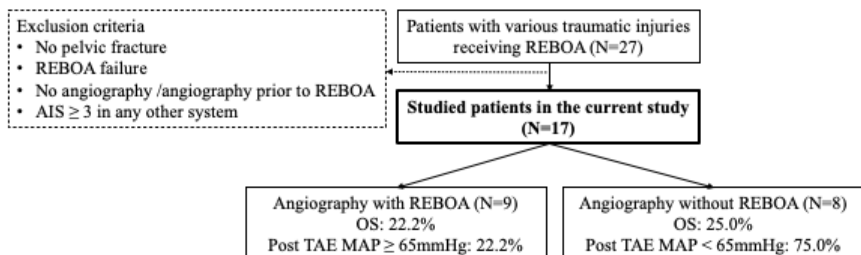
Invited Moderator: Mayur Narayan, MD, MPH, MBA, MHPE

Introduction: Resuscitative endovascular balloon occlusion of the aorta (REBOA) is a technique gaining traction for hemorrhage control in severe pelvic fractures. The success of subsequent transcatheter arterial embolization (TAE), a mainstay for managing hemorrhage, often hinges on overcoming the challenges of vascular access post-REBOA. Our study focuses on these challenges and their impact on patient outcomes in the context of severe pelvic trauma.

Methods: We performed a retrospective review of pelvic fracture cases at our institution from 2017 to 2023, selecting patients who underwent both REBOA and TAE. We excluded those with high Abbreviated Injury Scores in non-pelvic regions, or where REBOA placement was suboptimal. Data collected included demographics, injury patterns, procedure details, complications, and survival rates, with a focus on the duration of REBOA inflation and angiographic cannulation times.

Results: In our study, 17 patients met the inclusion criteria. The majority were male (76.5%) with a median age of 51. Overall survival was 23.5%. Patients were grouped into angiography with or without REBOA. Angiography without REBOA group was younger (39.0 vs. 63.0, $p=0.030$), and had higher shock index at triage (2.30 vs. 1.10, $p=0.015$). More patient whose post TAE mean arterial pressure (MAP) ≥ 65 mmHg was found in angiography without REBOA group (75.0% vs. 22.2%, $p=0.044$), though no significant difference on Overall survival (25.0% vs. 22.2%, $p=1.000$). Angiographic cannulation times, pre-angiographic MAP, and amount of pre-angiographic transfusion of Packed RBC, were similar across groups.

Conclusion: Our findings provide empirical insights into vascular access selection and suggest that angiography without REBOA in the management of severe pelvic fractures can be beneficial, particularly when pre-angiographic resuscitation is sufficient. Larger studies are required to validate these observations and assess long-term outcomes.



RISK FACTORS FOR AMPUTATION OF AFFECTED LIMB IN COMPLEX EXTREMITY INJURY

Ryosuke Omoto, MD

Invited Moderator: Mayur Narayan, MD, MPH, MBA, MHPE

Introduction: In severe open fractures of the extremities, the decision to amputate the affected limb is not an easy one. Various scoring systems have been reported for severity evaluation, but there is no consensus and no clear criteria. Therefore, in the present study, we respectively aimed to investigate the feasibility of Mangled Extremity Severity Score (MESS) in deciding amputation of the affected limb.

Method: Of 287 open extremity fracture cases admitted to our facility between 2013 to 2024, 56 cases of classified as IIIb or IIIc by Gustilo-Anderson classification were divided into two groups: amputation and preservation. The MESS was compared retrospectively, and cases with a MESS score of less than 7 points that resulted in amputation of the affected limb and cases with a MESS score of more than 7 points that resulted in preservation of the affected limb were additionally examined.

Result: In our cases, amputation group was 18, and preservation was 38 cases. The sensitivity and specificity of MESS were 83.3% (15/18) and 89.4% (34/38), respectively. MESS (Amputation vs preservation: 8 [7-9] vs 6 [5-6]; P0.001) was significantly higher in Amputation group than in preservation group. There were three cases in which the MESS was less than 7 but required amputation. None of these cases required amputation at the initial surgery. One case was amputated due to wound infection, and two cases resulted in amputation due to severe damage to the joint ligaments. On the other hand, four cases with MESS scores of 7 or higher were spared amputation. One of them was a Gustilo classification IIIc open tibiofibular fracture with complete occlusion of the popliteal artery at MESS:9, but the leg could be saved because of the revascularization.

Conclusion: At our institutions, MESS in open extremity fractures was shown to be an useful predictor of amputation of the affected limb. Patients with open fractures complicated by severe wound infection or severely contused joint ligament injuries may require amputation even with low MESS, whereas patients with good revascularization may be preserved even with high MESS.

TENSION BAND FIXATION FOR PATELLAR FRACTURES: A STUDY OF FAILURE FACTORS

Hiroakil Iwase, MD

Invited Moderator: Mayur Narayan, MD, MPH, MBA, MHPE

Background: The gold standard of treatment for patellar fractures is tension band fixation, but reoperation is often required in cases of fixation failure. To date, there have been no reports examining the factors that contribute to the failure of tension band fixation for patellar fractures.

Objective: To clarify the factors that cause the failure of tension band fixation for patellar fractures.

Study Design: Case-Subject Study

Setting: Single-center, retrospective study

Subject: Patellar fracture cases treated at our institution between January 2008 and October 2023 with fracture type AO classification C1.1, C1.2, C1.3, or C2 and fixed with one tension band. The cases were divided into two groups according to the presence or absence of tension band fixation failure and were designated as case group and subject group.

Factors: Factors affecting the failure of tension band fixation were examined retrospectively.

Primary Outcome: Age, gender, BMI, fracture type, number of days to start range-of-motion training, whether the hook at the end of the K-wire was driven into the bone, and the distance between the soft wire and the patella were investigated to determine the factors that affected the fixation failure. The distance between the softwire and the patella was measured radiographically at the point where the softwire contacted the K-wire, and the distance was the sum of the four values at the top, bottom, left, and right. The effects of these factors on fixation failure were investigated in univariate and multivariate analyses.

Results: Age and the distance between the softwire and the patella influenced Tension band fixation failure, and ROC analysis showed that a distance of 8.15 mm or more between the softwire and the patella was the cutoff value for fixation failure.

Conclusion: In tension band fixation of patellar fractures, a distance of 8.15 mm or more between the soft wire and the patella is a risk for fixation failure.

DOES THE SURGEON'S EXPERIENCE INFLUENCE THE DURATION OF SURGERY IN 3D-ASSISTED PERCUTANEOUS TRANSPEDICULAR SPINAL STABILIZATION? – A RETROSPECTIVE MONOCENTRIC ANALYSIS OF 34 PATIENTS AFTER NAVI

Orkun Ozkurtul, MD

Invited Moderator: Mayur Narayan, MD, MPH, MBA, MHPE

Introduction: The superiority of 3D-navigated dorsal instrumentation over percutaneous transpedicular screw placement has been substantiated in several studies regarding reduced radiation exposure and the safe positioning of pedicular screws. However, the duration of the operation appears to be significantly extended in routine practice due to the additional requirements for special positioning and referencing of the navigation system. The objective of our study was to determine if and how the learning curve of the surgeon can yield improvements in operation duration.

Methods: This study was designed as a retrospective monocentric cohort study and analyzes the 3D-navigated transpedicular spinal screw placements conducted at a supraregional trauma center from January 1, 2023, to December 5, 2023. Patients who were primarily operated with navigation using the Loop-x system (Brainlab) were included. The procedures conducted by three surgeons were analyzed. Demographic data, number of screws, operation duration, and the level of spinal injuries were recorded.

Results and Conclusion: In the aforementioned period, navigated transpedicular spinal screw placements were performed on 34 patients (47% male, 53% female) with an average age of 73 ± 12 years. Segmental allocation involved 10 (29%) placements at the cervical spine level, thoracic spine was addressed in 11 (32%) cases, lumbar spine in 7 (21%) cases, and the sacrum was instrumented in 6 cases (18%). The average operation time was 162 ± 87 minutes, with the mean time per screw being 28 ± 12 minutes. Surgeon A, with the most navigated procedures totaling 27 (88.2%) cases, had an average screw time of 22 ± 12 minutes (median 24 minutes, range 10-66 minutes), Surgeon B with 3 (9%) cases at 35 ± 11 minutes (median 37.5, range 23-45 minutes), and Surgeon C with 4 cases (12%) and a screw time of 38 ± 8 minutes (median 37, range 30-49 minutes). Regression analysis, due to the small number of cases, did not show a significant relationship between the frequency of operations and duration. Nonetheless, a marked reduction in operation times for screw placement was observed in the surgeon with the highest number of procedures over the period. The standardized and regular performance of the procedure thus enables faster screw placement, thereby increasing the acceptance among surgeons and operating room staff, and facilitating the implementation of navigation benefits considering the limited operating room resources.

**BINDING BLINDLY: PELVIC BINDERS – A FRIEND OR
FOE**

Shahin Mohseni, MD

Invited Moderator: Mayur Narayan, MD, MPH, MBA, MHPE

Background: Pelvic binders are used frequently in prehospital settings for early stabilization when pelvic fractures are suspected. Although a rapid and cost-effective tool, uncertainties persist regarding the safety of this intervention.

Methods: A retrospective review of adult patients with a pelvic fracture requiring trauma team activation admitted to a tertiary trauma center between 2020-2023 was conducted. The radiological studies were reviewed by four consultant orthopedic surgeons and were classified according to if the application of a pelvic binder would be potentially beneficial (i.e. stabilize fracture and/or reduce ongoing hemorrhage), make no difference, or be potentially harmful (i.e. further dislocate the fracture, risk exacerbating ongoing hemorrhage, and/or cause additional injuries) to the patient. This classification was based on the pelvic ring fracture pattern, presence of concomitant acetabular and proximal femoral fractures, as well as the consultants' clinical judgement.

Results: A total of 298 patients were included in the current investigation. Of these patients, applying a pelvic binder would have been potentially beneficial in 17% of cases (95% CI: 13%-22%, N = 50), make no difference in 28% of cases (95% CI: 23%-33%, N = 82), and be potentially harmful in 56% of cases (95% CI: 50%-61%, N = 166). Out of a total of 10 patients who were hypotensive on admission, applying a pelvic binder would have been potentially beneficial in three cases, constituting 6% of all beneficial cases.

Conclusion: The judicious application of pelvic binders, following radiological confirmation of fracture type and severity, is recommended. Routine use in the prehospital and emergency department should be discouraged.

**MULTIFACETED CHALLENGES IN IATROGENIC
VASCULAR TRAUMA: A CASE FROM THE
DEPARTMENT OF TRAUMA SURGERY, AIIMS PATNA**

Abdul Vakil Khan, MD

Invited Moderator: Mayur Narayan, MD, MPH, MBA, MHPE

Abstract: This case series highlights unique challenges encountered in the management of vascular trauma within the trauma surgery department at AIIMS Patna. Three cases involving arterial injuries with varying etiologies were successfully treated through a combination of prompt surgical intervention and meticulous postoperative care.

****Case 1:** Iatrogenic femoral artery injury during fracture management **

A 22-year-old male presented with a history of right lower limb injury from a fodder cutting machine. Initial management at a private hospital involved femur and tibia fracture fixation, but intraoperatively, torrential hemorrhage led to femoral pedicle ligation. Referred to AIIMS Patna, the patient underwent thrombectomy, distal fasciotomy, and limb salvage. Successful perfusion restoration resulted in discharge on postoperative day 15.

****Case 2:** Iatrogenic Femoral Artery Injury during Varicose Vein Surgery**

A 30-year-old male experienced iatrogenic femoral artery injury during varicose vein surgery, leading to absent pulses in the left limb. Urgent intervention at AIIMS Patna involved femoral artery thrombectomy and end-to-end anastomosis. Gradual improvement in limb perfusion in the postoperative period resulted in discharge by day 10.

****Case 3:** Iatrogenic femoral artery injury after fasciotomy for

Compartment syndrome** A 32-year-old male presented with compartment syndrome secondary to a heavy gate fall, complicated by femoral pedicle transection during fasciotomy at a private hospital. AIIMS Patna intervention included thrombectomy and end-to-end anastomosis, leading to improved limb perfusion by postoperative day 1 and discharge on day 15.

Discussion & Conclusion: These cases underscore the diverse scenarios and successful outcomes achieved through the collaborative efforts of the trauma surgery team at AIIMS Patna. The series emphasizes the importance of timely recognition, thorough surgical management, and vigilant postoperative care in achieving positive outcomes in vascular trauma cases.

EXAMINING DISPARITIES IN LOWER EXTREMITY VASCULAR TRAUMA – A 12-YEAR SINGLE CENTER RETROSPECTIVE ANALYSIS

Lubna Khan, MD

Invited Moderator: Mayur Narayan, MD, MPH, MBA, MHPE

Introduction: Lower extremity vascular trauma (LEVT) presents a significant challenge in trauma care, often resulting from both blunt and penetrating mechanisms. It is a devastating injury that can lead to limb loss, with amputation rates ranging from 4% to 21%, along with profound disability and mortality rates as high as 1.5% to 4.5%. Our study aims to define the geographic origins of vascular trauma patients in Houston, analyze their socioeconomic status, and investigate outcomes based on injury patterns in order to identify at-risk groups and develop tailored support programs.

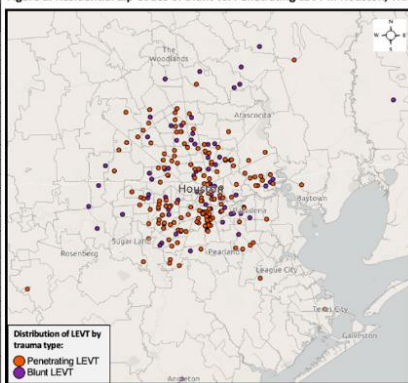
Methods: A retrospective analysis of trauma registry data was conducted to compare injury patterns, demographics including race and insurance status, and outcomes among adult patients (age >15 years) with lower extremity vascular trauma between January 2011 to December 2022. Descriptive statistics, Wilcoxon rank sum, Pearson's Chi-squared, and Fisher's exact tests were employed to assess differences and associations. Residential zip codes of patients were extracted and mapped using ArcGIS software. The USZipCode 2022 registry was used for median household income analysis. **Results:** Among the 277 patients with LEVT (Table 1), penetrating LEVT cases (68.6%, n=190) outnumbered blunt LEVT cases (31.4%, n=87). The majority of patients with LEVT were Black/African American (48%, n=132) and Hispanic/Latino (39%, n=109). Patients with blunt LEVT were significantly more likely to undergo amputation (49% in blunt, 2.6% in penetrating; p<0.001), have associated fractures (70% in blunt, 36% in penetrating; p<0.001), and be uninsured (17% in blunt, 38% in penetrating; p=0.004). The mortality rate during index hospitalization did not significantly differ between the two LEVT groups (13% in blunt vs. 19% in penetrating, p = 0.22). There were no notable variations in the regional distribution of LEVT incidents across Houston, TX (Figure 1).

Conclusion: In summary, prevalence of LEVT is notably higher among Black and Hispanic populations. Blunt LEVT cases are associated with a higher incidence of amputation and uninsured status, which can potentially hinder access to prosthetics for these patients. These findings emphasize the need for targeted interventions to address healthcare disparities and ensure equitable access to essential services for all individuals affected by LEVT.

Characteristic	Overall, N = 277 ¹	Blunt, N = 87 ¹	Penetrating, N = 190 ¹	P-value ²
Age	28 (23, 38)	31 (25, 53)	27 (22, 36)	<0.001
% Male	253 (91%)	72 (83%)	181 (95%)	<0.001
Ethnicity				<0.001
White, Asian, or Other	36 (13%)	24 (28%)	12 (6.3%)	
Black	132 (48%)	28 (32%)	104 (55%)	
Hispanic	109 (39%)	35 (40%)	74 (39%)	
ISS	13.0 (9.0, 17.0)	13.0 (9.5, 19.0)	14.5 (9.0, 17.0)	0.2
Associated Fracture	130 (47%)	61 (70%)	69 (36%)	<0.001
Debridement	100 (36%)	55 (63%)	45 (24%)	<0.001
Fasciotomy				0.2
None	199 (72%)	63 (72%)	136 (72%)	
Index	66 (24%)	23 (26%)	43 (23%)	
Delayed	12 (4.3%)	1 (1.1%)	11 (5.8%)	
Amputation	48 (17%)	43 (49%)	5 (2.6%)	<0.001
Mortality during index hospitalization	48 (17%)	11 (13%)	37 (19%)	0.2
Insurance Type				0.004
Medicare/Medicaid	38 (14%)	17 (20%)	21 (11%)	
Private Insurance	42 (15%)	17 (20%)	25 (13%)	
Uninsured	87 (31%)	15 (17%)	72 (38%)	
Other	110 (40%)	38 (44%)	72 (38%)	
Median Household Income	48,939 (39,266, 67,251)	53,003 (40,444, 71,089)	46,847 (38,341, 65,805)	0.033

¹Median (IQR); n (%)
²Wilcoxon rank sum test; Fisher's exact test; Wilcoxon rank sum exact test

Figure 1: Residential Zip Codes of Blunt vs. Penetrating LEVT in Houston, TX.



REVERSE CONTRALATERAL PROXIMAL TIBIA PLATE FIXATION AND PROVISIONAL; REDUCTION PLATING IN THE TREATMENT OF HOFFA FRACTURE

Zhaohua Liu, MD

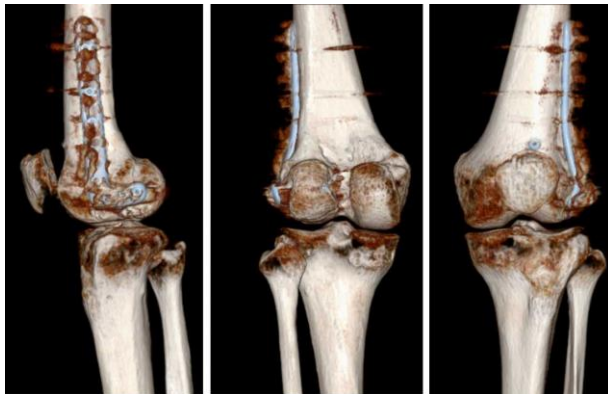
Invited Moderator: Mayur Narayan, MD, MPH, MBA, MHPE

Introduction: Hoffa fracture is a rare type of distal femoral fracture that occurs in the coronal plane of either femoral epicondyle. To date, screws in combination with lateral plate fixation are widely accepted to achieve stable fixation and good results. However, up to now, there has not been a specially designed anatomical plate for lateral fixation of Hoffa fracture. We published one case report of Hoffa fracture fixed with the reverse application of “L” shaped contralateral proximal tibia plate (RCPTP) and cannulated screws, and the successful repeatability of this fixation method and more operational details need to be demonstrated. Provisional reduction plating is often used in challenging fracture patterns. In this article, we present a technique for fixation of Hoffa fractures, in which a reconstructive plate or a distal radius plate is used to keep provision reduction of the fracture, while the definitive “L” shaped contralateral proximal tibia plate is applied.

Materials and methods: From Oct. 2019 to Dec. 2021 in a level 2 trauma center, two Hoffa fracture cases were treated with an “L” shaped contralateral proximal tibia plate and cannulated screws. Passive knee flexion and extension began on the first day after surgery and gradually increased to the range of knee flexion and extension. Week 4 passive knee flexion and extension activities 0° ~ 90°. Six to eight weeks after surgery, the patient began to walk non-weight-bearing with the help of crutches. The patient was allowed to carry partial weight on the toe point 8 weeks after surgery.

Results: Both cases with provisional reduction plating and “L” shaped contralateral proximal tibia plate fixation achieved fracture healing, and X-ray and CT scans showed fracture healing about 6 months after operation, allowing full weight bearing of the affected limb. The knee joint activity

of the Hoffa fracture of the lateral condyle without free bone fragments was 0~120°, and the knee joint HSS score was 71. The knee joint activity of the Hoffa fracture of the lateral condyle with free bone fragments was 0°~100°, and the knee joint HSS score was 78.



Conclusion: The use of “L” shaped contralateral proximal tibia plate fixation and the provisional reduction plating in the treatment of Hoffa fracture of femoral lateral condyle are repeatable, with satisfactory reduction, strong fixation, good fracture healing, and joint function.

Keywords: Hoffa fracture; Reverse contralateral proximal tibia plate; Open reduction; Internal fixation; Provisional reduction plating



**ORAL PAPERS IIA:
CRITICAL CARE
PAPERS 46 - 53**

Thursday, September 12, 2024

3:35 PM - 4:55 PM

Location: SKYVIEW I 26th Floor
Moderator: Rachel Appelbaum, MD

**INCIDENCE OF SURGICAL SITE INFECTION IN
CASUALTY DEPARTMENT AT A TERTIARY CARE
HOSPITAL IN BANGLADESH: RESULTS FROM A PILOT
SURGICAL SITE INFECTION SURVEILLANCE**

Mohammad Arif Hossain, MD

Invited Moderator: Rachel Appelbaum, MD

Introduction: Surgical site infection (SSI) is one of the key causes of healthcare-associated infections that develop within 30 days after surgery. The SSI incidence is high in casualty, especially in low and middle-income countries. We aimed to assess the surgical site infection rate among the surgery patients admitted to the casualty department.

Methodology: From 1st May to 31st July 2023, we piloted this surveillance in casualty department of Dhaka Medical College hospital. Following the World Health Organization's SSI protocol and methodology, we enrolled a total of 88 patients who went through surgery and followed up to 30 days. Wound swabs were collected from the patient who developed the SSI symptoms and sent for culture and sensitivity test.

Result: 40.9 % (36/88) of patients develop SSI symptoms, and the majority develop SSI symptoms during hospitalization time. However, 5% of patients develop their symptoms after discharge at home. SSIs were significantly associated ($p=0.02$) with contaminated/ unclean surgery and patient age. Infected patients had more than twofold average hospital stay compared to non-infected patients. Patient's sex and socio-economic condition were not associated with infections. Practices of laboratory investigation (C/S) were very low to confirm pathogens and assess pattern of antimicrobial resistance. However predominant organisms found in C/S test were E. Coli (36%) followed by P. Aeruginosa (36%) against which most sensitive antibiotics were Tigecycline (100%) and Colistin (90%). Some commonly used antibiotics were found to be resistant such as Ceftriaxone (100%) and Co-amoxiclav (100%) followed by Cefixime (80%) and Ceftazidime (67%).

Conclusion: The SSI rate was very high in casualty ward, which suggests that investment in infection prevention and control practice is required. C/S test investigation should be given routinely to identify the common pathogen and prescribe antibiotics based on evidence.

**MANAGEMENT OF ABDOMINAL, OPEN ABDOMEN, AND
LOSS OF DOMAIN WITH DERMIS AND AUTOLOGOUS
SUSPENDED-CELL TRANSPORTATION**

Alfredo Cordova, MD

Invited Moderator: Rachel Appelbaum, MD

Introduction: Abdominal sepsis is a life-threatening condition that carries a high morbidity and mortality risk, such as the formation of entero-cutaneous fistulae. Management is challenging, and current practice for initial management may consist of the use of polyglactin mesh or biologics to cover intra-abdominal content. Skin substitutes may enhance the development of an optimal wound bed for grafting and provide temporary wound coverage. Decellularized and lyophilized north Atlantic cod fish skin have been reported to have properties in the 4-stages of wound healing and have demonstrated successful wound granulation for chronic and acute wounds. Subsequent resurfacing with autologous split-thickness skin graft (STSG) and suspended skin cell transplantation (SSCT) may lead to faster and complete healing of the skin grafts with reduced donor sites. We describe five cases utilizing this technique for the management of abdominal sepsis, open abdomen, and loss of domain.

Methods: Five critically ill patients with multiple comorbidities presented with septic shock secondary to abdominal catastrophes requiring emergent damage control operations, including a 32-year-old alcoholic and cirrhotic female with necrotizing pancreatitis and abdominal compartment syndrome, a 51-year-old female who underwent liposuction complicated with bowel injury resulting in necrotizing soft tissue infection, a 76-year-old female who underwent sigmoid resection with Hartman's colostomy for perforated diverticulitis and experienced fascial dehiscence, 55-year-old morbid obese with remote with history of a gastric bypass presented with gastric outlet obstruction with a perforation just proximal to a gastrojejunostomy stricture, and a 61-year-old morbidly obese female with a history of opioid abuse presenting with bowel perforation from stercoral ulcer. All of the cases resulted in open abdomen with underlying bowel and were treated with fish dermal graft followed by autologous cell harvesting device (ACHD).

Results: Xenograft integration and optimal granulation tissue was evidenced in >95% of the surface area as early as 5 days after the product application. This was considered ideal for resurfacing. Skin coverage with meshed STSG and SSCT revealed nearly 100% skin graft take and epithelization within 2 weeks. Significant, donor site reduction with no donor site morbidity.

Conclusion: Decellularized and lyophilized fish dermis provides excellent wound coverage and enhances the formation of an optimal wound bed for grafting. Subsequent autologous SSCT reduces time of healing with smaller donor sites and donor site morbidity. For abdominal sepsis, open abdomen, and loss of domain, this technique should be considered as an alternative and efficacious treatment option.

**CORRELATION OF ICU ACQUIRED WEAKNESS(ICUAW)
MEASURED WITH MRC(MEDICAL RESEARCH
COUNCIL) SCORE WITH DIAPHRAGMATIC
EXCURSION(DE) MEASURED USING ULTRASOUND : A
PROSPECTIVE OBSERVATIONAL STUDY**

Vikas Saini, MD

Invited Moderator: Rachel Appelbaum, MD

Primary Objective: To assess the correlation between MRC sum score and diaphragmatic excursion measured using USG

Secondary Objective: To assess the sensitivity and specificity of Diaphragmatic excursion measured using USG in predicting the presence of ICUAW.

Methods: Patients admitted in the ICU(18-65yrs) without any prior muscular weakness on admission and ventilated for more than 48hrs were included in the study. We calculated the MRC-sum score by summing all the obtained strength values of the upper limbs and lower limbs. The diaphragmatic excursion was measured in three successive tidal volume breaths and vital capacity breaths. The mean of these readings was calculated and used for analysis. GE vivid IQ ultrasound machine was used for study.

Results: Out of 47 patients evaluated, 17(36.3%) patients had ICUAW. On comparing the relationship between the MRC sum score and DE normal breathing, we found a moderate correlation with a Spearman coefficient of 0.39 ($p=0.006$) but a weak correlation between the MRC sum score and DE deep breathing with a Spearman correlation coefficient of 0.27 which is not statistically significant. Among patients who had ICUAW, the patients who were not extubated had a mean DE of 9mm during normal breathing and 17.6mm during deep breathing was significantly less when compared to a mean of 11.1mm during normal breathing and 19.7 mm during deep breathing in patients who were extubated

Conclusions: Our study concludes that diaphragmatic measurement of USG can be used as a simple screening tool for predicting ICUAW and difficult to wean and extubate patients in a busy ICU

**PORPHYRINIZED CARBON QUANTUM DOTS WITH
BROAD-SPECTRUM ANTIBACTERIAL ACTIVITY TREAT
WOUNDS INFECTED BY DRUG-RESISTANT BACTERIA**

Mengwei Zhang, MD

Invited Moderator: Rachel Appelbaum, MD

Severe trauma is a significant global public health issue and a leading cause of mortality in patients under 45 years old. The complex environment at the trauma scene often leads to microbial exogenous infections that are difficult to control with single drugs. Rapidly killing pathogenic bacteria and controlling wound infections are fundamental tasks for improving the survival rate and prognosis of trauma patients. In this study, glucose and porphyrin derivatives were used as precursors to synthesize porphyrinized carbon quantum dots (pCQDs) via a hydrothermal method, which exhibited broad-spectrum antibacterial activity. pCQDs demonstrated good antibacterial activity against both Gram-positive and Gram-negative bacteria, and its minimum inhibitory concentration against methicillin-resistant *Staphylococcus aureus* (MRSA) can be as low as 0.5 μ g/mL. In a BALB/c mouse wound model infected with MRSA, the use of pCQDs effectively inhibited the progression of bacterial growth, accelerated wound healing, and significantly restored body weight. Furthermore, pCQDs showed good biocompatibility in vivo. Based on this, it was observed that pCQDs could target bacteria through their surface positive charge and hydrophobic properties, leading to bacterial membrane disruption and cell death, further elucidating the specific mechanism of carbon quantum dots' antibacterial action. These findings provide important theoretical and experimental basis for the clinical application of pCQDs in the treatment of drug-resistant bacterial.

OPTIMIZING ECMO RESCUE IN TRAUMA BY ESTABLISHING A PHENOTYPIC APPROACH TO PATIENT SELECTION

Larisa Shagabayeva, MD

Invited Moderator: Rachel Appelbaum, MD

Objective: There is evidence that extracorporeal membrane oxygenation (ECMO) is an effective salvage therapy in severely-injured patients, but survival trends have not been clearly defined. To fill this gap, one of the largest national samples of ECMO in trauma was reviewed to elucidate patient characteristics and compare survival outcomes across phenotypes.

Methods: All trauma patients on ECMO from 2017-2021 in the ACS Trauma Quality Improvement Program database were identified. Patients with burns and transfers were excluded. Three "phenotypes" were defined: type I was a patient with severe chest injuries (Thoracic AIS ≥ 4) that was placed on ECMO within two days of trauma. Type II was a patient without severe chest injuries (Thoracic Abbreviated Injury Score 4) that was placed on ECMO within two days of trauma. Type III was all other ECMO patients. Demographic and clinical

variables in these three groups were compared with differences set at $p < 0.05$.

Results: In a study population of 788 patients, there were 187 (23.7%) type I, 204 (25.9%) type II and 397 (50.4%) type III trauma ECMO cases. Most patients across all phenotypes were white males who sustained blunt injuries (Table 1). Injury severity score (38 vs 23 vs 28; $p < 0.001$) was highest in type I and admission systolic blood pressure was lowest in type I (108 vs 116 vs 120; $p = 0.002$). There were no differences in the rate of central line-associated bloodstream infection, deep vein thrombosis, myocardial infarction, or stroke ($p > 0.05$). Type III had higher rates of pulmonary embolism, acute kidney injury, severe sepsis, acute respiratory distress syndrome, and ventilator-associated pneumonia (all $p < 0.05$). Type I had significantly higher mortality than type II or type III ($p < 0.05$).

Conclusion: This is the first study to show differences in outcomes between trauma ECMO groups classified by injury and timing of ECMO cannulation, underscoring the heterogeneous indications for trauma ECMO. Patients with severe thoracic injuries pose unique challenges with a higher mortality compared to other regional injuries.

Table 1: Patient characteristics and outcomes across ECMO Types

	ECMO Phase			p-value
	Type I (N=187)	Type II (N=204)	Type III (N=397)	
Male, N (%)	158 (84.9)	156 (77.6)	341 (85.9)	0.030
Age, mean (SD)	30.7 (14.7)	35.0 (18.1)	35.3 (14.8)	0.003
Race, N (%)				0.230
American Indian	1 (0.5)	1 (0.5)	2 (0.5)	
Asian	4 (2.1)	4 (2.0)	11 (2.8)	
Black	73 (39.0)	63 (30.9)	109 (27.5)	
Pacific Islander	0 (0)	1 (0.5)	0 (0)	
Other	11 (5.9)	12 (5.9)	40 (10.1)	
White	87 (46.5)	116 (56.9)	220 (55.4)	
Blunt, N (%)	141 (75.4)	151 (74.0)	314 (79.1)	<0.001
ISS, mean (SD)	39 (15)	23 (13)	27 (13)	<0.001
SBP, mean (SD)	108 (40)	116 (40)	120 (36)	0.002
Hospital Complications, N (%)				
CLABSI	0 (0)	2 (1)	8 (2)	0.118
DVT	36 (19.4)	31 (15.3)	66 (16.7)	0.561
PE	7 (3.8)	14 (6.9)	41 (10.4)	0.019
Stroke	10 (5.4)	5 (2.5)	19 (4.8)	0.304
AKI	53 (28.3)	38 (18.7)	117 (29.6)	0.013
Sepsis	14 (7.5)	12 (5.9)	65 (16.4)	<0.001
ARDS	49 (26.2)	65 (32.3)	238 (59.9)	<0.001
VAP	20 (10.8)	21 (10.3)	76 (19.2)	0.003
MI	4 (2.2)	1 (0.5)	12 (3.0)	0.131
Mortality, N (%)	83 (44.4)	84 (41.2)	124 (31.2)	0.003

SELENIUM SUPPLEMENTATION IN CRITICAL ILL PATIENTS WITH ACUTE ABDOMEN— A PROSPECTIVE RANDOMIZED AND PLACEBO-CONTROLLED TRIAL

Yutung Wu, MD

Invited Moderator: Rachel Appelbaum, MD

Background: The antioxidant effect of selenium (Se) is important in human physiology, but the efficacy of additional selenium supplementation (SeS) for critical patients remains inconsistent in previous studies. The study aims to determine whether SeS can improve outcomes in critical ill patients with acute abdomen.

Methods: This was a 3-year patient-blinded, randomized controlled trial conducted in a single medical center. Patients aged more than 20 and admitted to the intensive care unit (ICU) within 48 hours after operations for acute abdomen were enrolled. All patients were randomly assigned to receive SeS (intravenous sodium selenium 400mcg/day for 7 days) or placebo. Serum Se levels were measured on the 1st and 8th day. Mortality, length of stay (LOS), sequential organ failure assessment (SOFA) scores, and complications were compared. All patients were followed up for 30 days.

Results: Among the total 33 patients enrolled, mean age was 63, and 18 received SeS (Table 1). There were no significant differences in general data, comorbidities, initial SOFA scores, or Se levels (73 vs 76 ug/L, p=.44). The 8th day Se level was significantly higher in the

SeS group (127 vs 93 ug/L, p<.01), as well as the change in Se level (79.5% vs 19.2%, p<.01). In-hospital and 30-day mortality (both 0 vs 0%), LOS, ICU LOS, serial SOFA scores, overall complications, and wound-related complications were all similar in both groups.

Conclusion: SeS in critical ill patients with acute abdomen did not significantly impact survival, organ failure scores, LOS, or complications. Further investigation is still needed to determine the optimal dose, duration, and benefit of SeS for critical ill patients.

Table 1. The epidemiology, serum selenium level, and outcomes of patients.

	Total N=33	Se N=18	No Se N=15	p
Age	63 (56-80)	72 (58-84)	61 (46-76)	.166
Male/Female (%)	25/8 (75.8/24.2)	15/3 (83.3/16.7)	10/5 (66.7/33.3)	.418
1 st day Se (ug/L)	75.7 (66.7-90.5)	73.0 (65.8-88.4)	76.1 (66.1-92.9)	.442
8 th day Se (ug/L)	119.1 (91.4-139.8)	126.8 (117.5-157.9)	92.6 (69.7-122.3)	.002
Change in Se level (%)	52.4 (19.0-80.7)	79.5 (59.4-93.9)	19.2 (6.0-27.6)	<.001
In-hospital mortality (%)	0 (0)	0 (0)	0 (0)	-
30 th day mortality (%)	0 (0)	0 (0)	0 (0)	-
1 st day SOFA score	3 (2-5)	3 (2-4)	3 (1-6)	.901
8 th day SOFA score	0 (0-1)	0 (0-1)	0 (0-2)	.442
14 th day SOFA score	0 (0-1)	0 (0-1)	0 (0-1)	.556
30 th day SOFA score	0 (0-0)	0 (0-0)	0 (0-0)	.873
Length of stay (days)	17 (11-23)	17 (15-23)	17 (11-24)	.580
Length of ICU stay (days)	5 (5-7)	5 (5-6)	6 (4-7)	.556
Complication (%)	13 (39.4)	6 (33.3)	7 (46.7)	.672
Wound infection	8 (24.2)	2 (11.1)	6 (40.0)	.101
Wound dehiscence	0	0	0	-

RISK FACTORS FOR POST TRAUMATIC EPILEPSY IN PATIENTS WITH NON-OPERATIVE TREATMENT: A RETROSPECTIVE OBSERVATIONAL STUDY

Hikaru Odera, MD

Invited Moderator: Rachel Appelbaum, MD

Background: Post-traumatic epilepsy (PTE) are common and debilitating complication of traumatic brain injury (TBI) and could have harmful impacts on the patients' life. Although it has been reported seizure prophylaxis could prevent early onset seizures, little is known about the progression of neural injury over time and how this injury progression contributes to late onset seizure development. Most TBI patients with conservative therapy could be discharged under short-term medical observation from the emergency department to home or the recovery hospital; therefore, it is clinically difficult to determine whether these patients experienced long-term epilepsy occurrence. In this study, we investigated the clinical course of patients with TBI with conservative therapy, using telephone interviews, to evaluate the occurrence rate of PTE and the risk factors associated with PTE.

Methods: This retrospective observational study enrolled patients with isolated TBI [head abbreviated injury scale (AIS) ≥ 3 , and other AIS 3] and were transferred to a tertiary emergency hospital in Japan and who underwent conservative therapy between January 1, 2020 and December 31, 2022. Occurrence of epilepsy within 1 year of admission for TBI was designated as the outcome. Multivariate logistic regression analysis was performed to assess the independent risk factors for the occurrence of epilepsy. Furthermore, we evaluated the occurrence interval after suffered TBI.

Results: A total of 86 patients were identified, and occurrence of epilepsy was observed in 2 patients. The median length of taking antiepileptic drugs after TBI was 7 days. Although the head injury severity was significant risk factors on multivariable analysis for developing PTE, significant difference was not observed in other factors including age, sex, type of injury. The history of mental disorder was significantly associated with a shorter occurrence interval of PTE.

Conclusions: In this cohort study, the incidence of PTE after isolated TBI with conservative therapy was found to be higher. These findings highlight the need for long effective antiepileptogenic therapies for the patients post TBI. Large-scale, long-term studies are required to confirm the results of this study.

**A RANDOMISED CONTROLLED DOUBLE-BLINDED
STUDY TO COMPARE KETAMINE-DEXMEDETOMIDINE
VERSUS KETAMINE-PROPOFOL COMBINATIONS FOR
OPIOID FREE ANESTHESIA IN PATIENTS UNDERGOING
BRACHIAL PLEXUS INJURY REPAIR**

Sameer Sethi, MD

Invited Moderator: Rachel Appelbaum, MD

Background and Aims: Opioid-free anesthesia enables enhanced recovery after surgery. Drugs acting on different pain receptors and pain transmission pathways both peripherally and centrally can be used. Primary aim was to compare dose of ketamine when co-administered with either dexmedetomidine or propofol.

Methods: A prospective, double blinded, randomized controlled study enrolling patients aged 18-65 years undergoing brachial plexus injury repair was conducted. Patients were randomised into Group P (propofol+ketamine) and Group D (Dexmedetomidine+ketamine). Dose of Propofol (induction+maintenance @100mcg/kg/min) and Dexmedetomidine(bolus of 1mcg/kg followed by maintenance @0.5 mcg/kg/hr) was fixed. Succinylcholine 1 mg/kg was given for muscle relaxation. Ketamine was administered as bolus of 1 mg/kg followed by infusion @1mg/kg/hr; switched off 20 minutes before end of surgery. A>20% increase in HR and MAP from the baseline value was considered inadequate analgesia and 0.5 mg/kg of ketamine bolus was given.

Results: Ketamine consumption in group D was 187.4± 30 mg as compared to propofol-ketamine group (132.9± 45.2 mg). Total ketamine consumption is significantly more in dexmed-ketamine group compared to propofol-ketamine group (p value0.001).Dexmed-ketamine group had longer time of extubation and awakening. Immediate postoperative pain scores were significantly less in dexmed-ketamine group. Post-operative sedation level and total analgesic requirement in first 24 hours after surgery was similar in both groups.

Conclusion: It is feasible to provide opioid free anesthesia as TIVA for adult patients undergoing brachial plexus injury repair under using propofol-ketamine or dexmed-ketamine combinations effectively.

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**ORAL PAPERS IIB:
THORACIC TRAUMA
PAPERS 54 - 62**

Thursday, September 12, 2024

3:45 PM - 5:15 PM

Location: SKYVIEW I 26th Floor

Moderator: Joseph Forrester, MD, MSc

IS A DELAY IN SURGICAL STABILIZATION OF TRAUMATIC RIB FRACTURES ASSOCIATED WITH INCREASED OPERATIVE TIMES AND WORSE OUTCOMES?

Lachlan Allen, MD

Invited Moderator: Joseph Forrester, MD, MSc

Purpose: Delayed SSRF has been postulated to be more difficult, due to technical issues related to bone healing and increased inflammatory tissue. This study aims to determine a relationship between timing of SSRF and intraoperative times, adjusting for all confounding factors. Additionally, clinical impacts of early vs delayed SSRF are evaluated.

Methods: A retrospective a-priori cohort study of all patients who underwent SSRF at a level 1 trauma centre over a 5-year period was performed. Participants were grouped into predefined cohorts; SSRF performed within 72 hours of admission, equal to or greater than 72 hours of admission and greater than 144 hours. Primary outcome was operative time between groups, secondary outcomes included post-operative complications and clinical outcomes. Multivariate regression analysis was performed on all relevant data factors.

Results: Mean operative times were SSRF <72hours: 235 minutes (r169-282), SSRF 72-144hrs: 227 minutes (r165-306), >144hours: 250 minutes (r 229-323) (p=0.39). SSRF performed <72 hours led to fewer post-operative complications (P<0.01), reduced hospital LOS (p=0.01), ICU LOS (p=0.01), reduced time on a ventilator (p=0.01) and reduced tracheostomy rates (p=0.01).

Conclusion: After accounting for confounding factors, delays in performing SSRF does not increase operative times. SSRF performed within 72 hours provides a clinical benefit.

	Less than 72 hours (n = 47; 54%)	72 to 144 hours (n = 32; 37%)	More than 144 hours (n = 8; 9%)	P
Operative Time (Minutes)	235 (169 – 282)	227 (165 – 306)	250 (229 – 323)	0.39
No. Post-Op Complications	1 (0 – 1)	2 (1 – 3)	3 (1 – 4)	<0.01
Hospital LOS (Days)	14 (9 – 17)	15 (11 – 26)	26 (16 – 48)	0.01
ICU LOS (Days)	0 (0 – 4)	5 (0 – 13)	13 (0 – 24)	0.01
Ventilator Length (Days)	0 (0 – 4)	4 (0 – 9)	9 (0 – 17)	0.01
Tracheostomy	0% (0)	6% (2)	25% (2)	0.01
Death	4% (2)	3% (1)	0% (0)	1.00

**RESUSCITATIVE MEDIAN STERNOTOMY PLUS
ENDOVASCULAR AORTIC OCCLUSION FOR
PENETRATING INJURIES IN THE BOX: AN ACE UP THE
SLEEVE**

Carlos Alberto Ordóñez Gelgado, MD

Invited Moderator: Joseph Forrester, MD, MSc

Introduction: Resuscitative thoracotomy and clamshell incisions are surgical approaches that have been used for severe penetrating thoracic outlet injuries. A median sternotomy (MS) is a potential alternative for access; however, it is controversial in hemodynamically unstable patients. This study aims to describe the experience of its use in combination with endovascular aortic occlusion.

Methodology: A prospective, observational study conducted at a level I trauma center from January 2018 to December 2023. We included all adult patients with severe (ISS>15) thoracic penetrating trauma who underwent a resuscitative median sternotomy with or without an endovascular aortic occlusion (REBOA). Patients with severe brain injury (AIS Head>3) were excluded. The primary outcome was overall mortality.

Results: A total of 40 patients were included. Twenty-two (55%) had a REBOA and 18 (45%) did not. The median age was 28 years (IQR 22-38), and 95% were male. Gunshot wounds were reported in 27 patients and stab wounds in 13. The median Injury Severity Score (ISS) was 25 (IQR 25-28). Fourteen patients required additional incisions (4 cervical extensions, 10 laparotomies). Patients who had a MS and REBOA: 21 had great vessel injuries, 12 had severe lung injuries and 3 had pulmonary hilar injuries. Hemorrhage control was achieved in all. Patients who underwent MS but did not have a REBOA: 10 had a great vessel injury and 8 had severe lung injuries. The REBOA group had a significantly lower systolic blood pressure upon arrival to the trauma bay 73 mmHg (IQR: 60-90) vs. 90 mmHg in the non-REBOA group (IQR: 83-132) $p=0.007$. Median systolic blood pressures were able to equalize among both groups within the first 5 minutes after achieving endovascular aortic occlusion and remained consistently similar at 30 and 60 minutes [90 mmHg (IQR: 84-99) vs. 95 mmHg (IQR: 89-110)] $p=0.6$. The median duration of aortic occlusion was 33 minutes (IQR: 26-70). Estimated blood loss was higher in the REBOA group [3000 ml (IQR: 2500-3050)] compared to the non-REBOA group [2000 ml (IQR 1000-3325)] $p=0.12$. Implementation of thoracic damage control surgery was more frequent in the REBOA group (77% vs. 28%; $p=0.004$). Overall mortality between groups was not statistically significant: 3 (13%) vs. 1 (5%) $p=0.2$.

Conclusion: A resuscitative median sternotomy for patients with penetrating thoracic injuries in the box is an effective approach to control major vascular injuries. Rescue maneuvers such as the use of a REBOA in these extremely difficult cases is not only feasible but may also be necessary to achieve hemorrhage control and avoid complete cardiovascular collapse.

HEART INJURY AS A PROGNOSTIC FACTOR IN BLUNT CHEST TRAUMA PATIENTS UNDERGOING OPEN CARDIOPULMONARY RESUSCITATION (OCPR): A TQIP STUDY

Yauren Chang, MD

Invited Moderator: Joseph Forrester, MD, MSc

Purpose: The efficacy of open cardiopulmonary resuscitation (OCPR) in trauma patients remains a topic of debate. This study examines the role of OCPR in the management of blunt chest trauma patients using nationwide real-world data.

Methods: From 2014 to 2015, we retrospectively queried the National Trauma Data Bank for patients with blunt chest trauma undergoing cardiopulmonary resuscitation (CPR). We analyzed their outcomes in the emergency department (ED), focusing on patients with initial signs of life. Additionally, we studied a subset of patients who survived beyond the ED, emphasizing the duration of survival after ED discharge.

Results: A total of 420 patients were included in the study, with 65 undergoing OCPR and 335 receiving conventional CPR. The average overall mortality rate was 88.1% (N=50). Among all patients receiving CPR for blunt chest trauma, those undergoing OCPR were younger (42.9 years vs. 51.1 years, $p=0.005$), exhibited a significantly higher incidence of heart injuries (27.3% vs. 17.9%, $p=0.006$), and had a lower Injury Severity Score (ISS) (36.6 vs. 28.5, $p=0.002$). In the case of blunt chest trauma patients subjected to OCPR, survivors demonstrated a notably higher incidence of heart injuries (66.7% vs. 20.3%, $p=0.029$). Conversely, for patients not administered OCPR, a trend emerged where survivors displayed a lower proportion of heart injuries (4.5% vs. 12.9%, $p=0.110$). Among all patients receiving CPR for blunt heart injury, patients undergoing OCPR exhibited significantly higher ED survival rates (81.3% vs. 40.5%, $p=0.005$) as well as overall survival rates (25.0% vs. 4.8%, $p=0.043$). The overall survival rate for patients after ED survival was 16.9% ($n=9$) beyond the first day post-ED discharge, 13.2% ($n=7$) beyond one week post-ED discharge, and 11.3% ($n=6$) over the long term.

Conclusion: In blunt chest trauma patients with heart injuries, open cardiopulmonary resuscitation (OCPR) showed potential benefit for improved outcomes. Nevertheless, overall survival rates remained low, underscoring the need for further research and multidisciplinary approaches in managing these cases.

PNEUMOTHORAX DETECTION IN THE ED: HOCUS POCUS?

Randeep Jawa, MD

Invited Moderator: Joseph Forrester, MD, MSc

Introduction: The incidence of pneumothorax (PTX) in polytrauma may be as high as 20%. We identified major trauma activations in which point of care ultrasound (POCUS) was performed. We assessed its ability to identify clinically significant PTX (tube thoracostomy placed within 2 hours) as compared to CT scan findings or clinical confirmation (ie rush of air).

Methods: All full adult trauma activations admitted from 2019-2022, excluding traumatic arrests, transfers from outside hospitals, or those without POCUS exam, were included. 541 subjects with 87 % of those being blunt injury patients were evaluated for presence or absence of tube thoracostomy, and accuracy of POCUS based on training level of providers. 100% of POCUS exams were reviewed by the POCUS director and an ultrasound fellowship trained faculty member for accuracy of data.

Results:

Total trauma patients	541
Injury Severity Score	16±13
Pneumothorax	76 (14%)
Chest tube for PTX (n)	53
Chest tube for clinically significant PTX	40
CXR sensitivity	47%
POCUS sensitivity - overall	41%
POCUS sensitivity clinically significant PTX	68%
POCUS positive predictive value for clinically significant PTX	100%
POCUS false negative rate	30%

Conclusion: Total PTX rate during study period was 14%. A chest tube was required in 70% of patients with PTX. The overall sensitivity of POCUS for detection of PTX was similar to CXR. POCUS sensitivity improved with level of training. POCUS has a high PPV for diagnosing clinically significant PTX. Quality review showed 12 total missed PTX with 6 of those being clinically significant. If POCUS sensitivity was adjusted for quality review interpretation, the overall sensitivity for diagnosing PTX was 57% and improved to 84% for clinically significant PTX. More attention to image acquisition and image interpretation may be needed.

BEYOND MEDIASTINAL WIDENING: INNOVATIVE SCREENING AND PREDICTION METHODS FOR AORTIC INJURY

Yu-Hao Wang, MD

Invited Moderator: Joseph Forrester, MD, MSc

Introduction: Mediastinal widening is commonly utilized and extensively taught as a screening mechanism for aortic injury in trauma patients. Despite its widespread use, an increasing body of evidence highlights the method's limited diagnostic accuracy. In response to this challenge, our study aims to develop and introduce a more accurate method for diagnosing aortic injury in this vulnerable patient population.

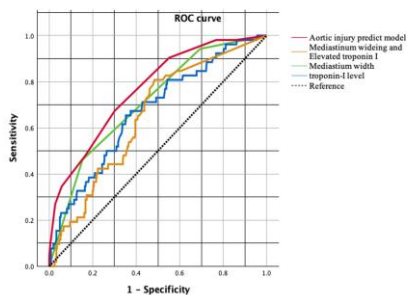
Materials and Methods: A retrospective analysis was conducted on patients who underwent chest CT scans at our hospital. The mediastinum width was measured on supine position X-rays. Patients were then categorized into two groups: those with aortic injuries and those without. Risk identification was performed through a logistic regression model, leading to the establishment of a final model. The accuracy of this model was compared to that of mediastinal widening alone through the construction of Receiver Operating Characteristic (ROC) curves.

Results: During the period from 2019 to 2022, a total of 495 patients with thoracic trauma received contrast-enhanced chest CT scans at our facility. Out of these patients, 52 experienced traumatic thoracic aortic injuries. We found that a mediastinum width > 8.5cm has a better predictive value than the cutoff value of 8cm. In multivariate

logistic regression analysis, significant risk factors for traumatic aortic injury included: shock (OR: 2.12, 95% CI: 0.98-4.59), left hemothorax (OR: 2.86, 95% CI: 1.47-5.78), mediastinum width > 8.5cm (OR: 3.48, 95%CI: 1.81-6.70), elevated Troponin-I (OR: 2.90, 95% CI: 1.45-5.81), and pericardial effusion (OR: 6.03, 95% CI: 1.77-20.48). Utilizing these significant predictors, a model was established after transferring the odds ratio to weighting. The resulting Receiver Operating Characteristic (ROC) curve yielded an Area Under the Curve

(AUC) of 0.754, demonstrating superior diagnostic accuracy compared to the use of mediastinal widening alone, which had an AUC of 0.632.

Conclusions: In conclusion, we identified a new significant risk factor for aortic injury, Troponin-I elevation. Also, combining shock upon admission, Troponin-I elevation, left hemothorax, pericardial effusion, and traditional mediastinal widening offers a straightforward, feasible, and acceptable screening method for Blunt Thoracic Aortic Injury (BTAI). This approach enhances detection, ensuring timely and accurate diagnosis.



Area under ROC	
Mediastinum width	0.672
Troponin-I	0.650
Mediastinum + Troponin-I	0.712
Aortic injury predict model	0.754

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EVOLUTION OF VIDEOTHORACOSCOPY IN THORACIC TRAUMA

Rafael Andrade-Alegre, MD

Invited Moderator: Joseph Forrester, MD, MSc

Objective: Videothoracoscopy for thoracic trauma has evolved through the years. More cases are performed everyday, and indications are expanding. Surgical experience and improvements in technology has contributed to this outcome. A retrospective analysis of videothoracoscopy in thoracic trauma is carried out at the Section of Thoracic Surgery in our institution.

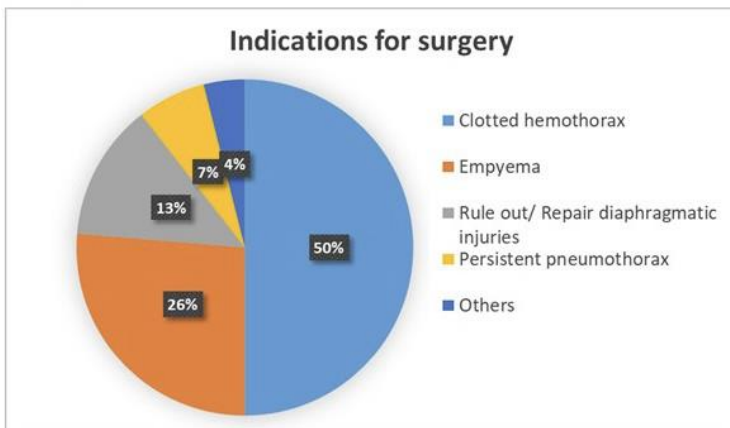
Methods: This is a retrospective analysis of all the patients with thoracic trauma managed by videothoracoscopy from January 2010 to December 2023 by a single surgeon. The following variables were included: epidemiological, type of trauma, time to surgery, diagnosis, procedure performed, surgical time, percentage of conversion, complications, mortality, postoperative days and follow up.

Results: 66 patients underwent videothoracoscopy for thoracic trauma. 61 were males (92.4%). Mean age was 30 years (+/- 13). 21 of the patients had gunshot wounds, 23 knives injuries and 22 blunt chest trauma. 65% of the cases were operated more than 7 days from suffering the trauma (range 8 to 48) (Fig.1). Main indications for surgery were: 38 clotted hemothorax, 20 empyemas, 10 rule out/repair diaphragmatic injuries, 5 persistent pneumothoraces and few uncommon cases: 2 empalments and 1 heart injury (Fig.

2). Some of the cases had more than 1 indication for surgery. Conversion rate was 2 (3%). Complications were 9 (13.6%), there was no mortality in this series. Almost double of the cases (43) were performed in the second half of the study.

Conclusions: Original indications for videothoracoscopy in thoracic trauma has expanded over the years, as more type of traumatic injuries are now approached through minimally invasive surgery. The experience gained and the safety of videothoracoscopy has allowed us to increase substantially the number of cases and type of traumatic chest injuries treated in the last years of the study. The low number of complications and the percentage of conversion supports its earned position in the management of thoracic trauma. An important number of the patients would benefit from earlier surgery, therefore efforts should be made for timely referrals.

Fig. 2



Others: 2 empalments, 1 penetrating heart injury

THORACIC IRRIGATION FOR TRAUMATIC HEMOTHORAX: A SYSTEMATIC REVIEW AND META-ANALYSIS

Nicole Lyons, MD

Invited Moderator: Joseph Forrester, MD, MSc

Introduction: Traumatic hemothoraces (HTX) are common, and tube thoracostomies (TT) are placed to drain them. However, residual blood, known as a retained HTX, can develop into a fibrothorax or empyema requiring secondary intervention. A recently proposed method to prevent retained HTX is irrigation of the thoracic cavity after TT placement. We hypothesized that patients treated with thoracic irrigation will have a lower failure rate.

Methods: Pubmed, EMBASE, and Scopus were searched from inception to March 2024 and the abstracts from 2019-2024 from three national trauma conferences were also screened. Studies with adult trauma patients with traumatic HTX who received a TT and reported outcomes of patients who underwent thoracic irrigation were included. The primary outcome was failure rate defined as retained HTX requiring a second intervention. Secondary outcomes included TT duration, hospital length of stay (HLOS), and infectious complications (empyema and pneumonia). Cumulative analysis was performed with Chi-square for dichotomous variables and unpaired t-test for continuous variables. A fixed effects model was applied for meta-analysis.

Results: Five studies were included in the analysis. There were two retrospective and three prospective observational studies. These studies included 1,261 patients who received 1,290 tube thoracostomies (483 irrigated, 807 nonirrigated). The mean age of patients was 40 years, 83% were male, average ISS was 17, and 42% had penetrating trauma. Failure rate was significantly lower in the irrigation group on cumulative analysis (10.8% vs 18.1%, $p=0.001$) and meta-analysis (relative risk=1.1, 95% confidence interval=1.04 to 1.21, $p=0.004$). Additionally, the irrigation group had a shorter HLOS (8.7 vs 10.5 days, $p=0.001$). TT duration was similar in both group (4.2 vs 5.5 days, $p=0.091$) and there was no difference in infectious complications (7.0% vs 8.8%, $p=0.264$).

Conclusions: Patients who undergo thoracic irrigation have a lower rate of retained HTX leading to less secondary interventions as well as a shorter HLOS. Thoracic irrigation for traumatic HTX should be considered, however, randomized studies are still needed prior to development of guidelines.

**MASSIVE HEMOTHORAX ASSOCIATED WITH
THORACIC VERTEBRAL FRACTURES: A
RETROSPECTIVE ANALYSIS**

Keita Sato, MD

Invited Moderator: Joseph Forrester, MD, MSc

Introduction: Traumatic hemothorax due to thoracic vertebral fracture can have a life-threatening outcome, hemorrhagic shock and severe coagulopathy. However, due to its rarity, epidemiology and clinical characteristics are not well known. We performed a retrospective analysis of trauma cases at our institution.

Methods: Patients diagnosed with thoracic vertebral fracture who were admitted to our trauma center between January 2021 and December 2022 were included. Of these cases, we excluded those with major vascular injuries, rib fractures, or other sources of hemorrhage. This allowed us to select cases in which hemothorax was caused by vertebral fractures, and to examine the patient's background, characteristics, and severity of injury.

We also focused on diffuse idiopathic skeletal hyperostosis (DISH) or ankylosing spondylitis (ASH) lesions and divided patients into DISH and non-DISH groups based on Resnick's criteria.

Results: Among 147 cases of thoracic vertebral fractures identified, many were isolated fractures due to falls, with 11 cases (7.5%) presenting with concomitant hemothorax. Among them, 6 cases (3.8%, mean age 80.7 years) had massive hemothorax, requiring hemostatic interventions in all cases. In all cases, hemorrhage from the vertebral bone perforated the pleura and resulted in hemothorax. All cases exhibited hemorrhagic shock and severe coagulopathy, resulting in three cases of fatal hemorrhage. Additionally, all cases showed evidence of DISH, and the occurrence of hemothorax was significantly associated with DISH ($p=0.017$).

Conclusion: Massive hemothorax complicating thoracic vertebral fractures was observed in 3.8% of cases, all of which had a severe clinical course. DISH may pose a risk in these cases because ossification of the anterior longitudinal ligament and tendons can cause a "lever arm effect" that makes even small forces susceptible to vertebral fractures. While vertebral hemorrhage associated with DISH is rarely discussed as a source of bleeding during the acute phase of trauma, the rich vascular network surrounding the vertebral body underscores its critical role as a potential source of fatal bleeding.

We will present a typical case of fatal hemothorax associated with DISH and discuss it along with specific methods of hemostasis.

**IMPACT OF THORACIC TRAUMA ON MORBIDITY AND
OUTCOME: SIX YEARS' EXPERIENCE FROM TERTIARY
CARE LEVEL 1 TRAUMA CENTRE IN INDIA**

Amit Singh, MD

Invited Moderator: Joseph Forrester, MD, MSc

Background: Trauma to thoracic region is fatal leading to 25 % of mortality. 85-90 % of thoracic patients can be rapidly stabilized and resuscitated. The aim of this study is to measure the overall morbidity, mortality among acute thoracic injury patients and then to correlate mortality with several demographic, pathological, and management factors.

Methodology: Retrospective observational study of records of thoracic injury patients admitted in trauma emergency between July 2018 to December 2024. The primary outcome was overall mortality. The secondary outcome was an association with age and sex, concomitant lung injuries, mechanical ventilation, ICU stay, need for ICD insertion, sepsis, pneumonia. and analgesia with overall mortality rate.

Results: Thoracic injuries comprised 21.9 % of all trauma admissions and the mechanism was blunt in 92.5% of cases. Road traffic accidents 89.7% followed by assault, were the most common modes of injuries. Longer ICU stay and longer Mechanical ventilation were noted in the mortality group as compared to survived group (p value less than 0.05). Associated lung injuries, sepsis, pneumonia has significant association. Overall mortality was found to be 21.6 %

Conclusion: Thoracic injuries isolated or in association with extra thoracic injuries poses significant risk to life. Concomitant lung contusions, pneumothorax, hemothorax and injury severity scores, and age are independent factors which contribute to higher mortality.



**ORAL PAPERS IIC:
TRAUMA SYSTEMS
PAPERS 63 - 72**

Thursday, September 12, 2024

3:55 PM - 5:35 PM

Location: SKYVIEW I 26th Floor

Moderator: Vanessa Ho, MD, PhD, MPH

**PREVENTABLE AND POTENTIALLY PREVENTABLE
DEATHS AMONG ROAD TRAFFIC FATALITIES IN CHIBA
PREFECTURE: PROBLEMS IN THE JAPANESE
HOSPITAL CARE SYSTEM REVEALED BY
INVESTIGATION OVER A 12-YEAR PERIOD**

Atsushi Hirabayashi, MD

Invited Moderator: Vanessa Ho, MD, PhD, MPH

Background: Few studies in Asia have evaluated the quality of hospital care for road traffic trauma over time.

Purpose: To clarify the details of preventable deaths (PD) and potentially preventable deaths (PPD) among road traffic fatalities in Chiba Prefecture, Japan, in order to evaluate the quality of transport hospital care and to identify problems in the Japanese trauma care system.

Methods: Among road traffic fatalities occurring within 24 h after traffic accidents from 2009 to 2020 in Chiba Prefecture, patients with signs of life (SOL+) at the time of emergency medical services (EMS) contact were included in the study. Information was collected from police, fire departments, and medical facilities, and each case was classified as PD, PPD, or not preventable death (NPD) at a case review meeting. Identified problems were counted, and multiple problems could be counted from one case.

Results: Of 824 road traffic fatalities, 161 (19.5%) were classified as PD or PPD. Bleeding was the cause of death in 123 of these cases (76.3%). Problems included errors in circulatory management during initial treatment (62 cases), errors in treatment strategy (56 cases), delays in diagnosis/treatment (34 cases), and delays in hemostasis (38 cases).

Conclusion: Among cases with SOL+ at EMS contact, 19.5% were PD or PPD, and 76.3% of these deaths were due to hemorrhage. Of PD and PPD cases, 62% had problems with circulatory control errors and delayed hemostasis in initial after arrival at the emergency department.

**OUTCOME OF SEVERE TRAUMA PATIENTS REQUIRED
DAMAGE CONTROL SURGERY BY THE DIFFERENCE
BETWEEN 'DOCTOR-CAR' AND AMBULANCE FROM
JAPAN TRAUMA DATA BANK**

Yohei Iwasaki, MD

Invited Moderator: Vanessa Ho, MD, PhD, MPH

Background: The doctor-car patient transport system has developed widely in Japan. Nowadays, prehospital emergency care by doctor-car system has been spreading. However, there is a knowledge gap on efficacy of doctor-car system for severe trauma cases.

Aim: The aim of this study is to compare ground transport system for severe trauma patients and assess efficacy of prehospital care by doctor-car.

Method: We used the Japan Trauma Data Bank (JTDB) version 2022 (N = 88,817). Study period was from 1st January 2019 to 31st December 2021. We extracted severe trauma cases (ISS 16 or more) transported from scene and required damage control surgery (DCS) from JTDB. We compared transportation systems of doctor-car (group D) and general ambulance operated by emergency medical systems (EMS) (group A). Primary outcome was survival rate. Secondary outcomes were transport time, time from arrival at hospital to DCS initiation and length of ICU stay.

Results: Total number of severe trauma cases was 28,490. The number of group D cases was fifty, and the number of group A cases was 911, separately. There was no statistical difference in survival rate between group D (78%) and group A (75%). Transport time (minute) was 15 [11, 25] in group D and 12 [8, 19] in group A. Time from arrival to DCS initiation (minute) was 126 [48, 291] in group D and 186 [89, 474] in group A. Length of ICU stay (day) was 6 [3, 14] in group D and 5 [1, 13] in group A.

Conclusion: There was no statistical difference in survival rate between doctor-car and general ambulance for severe trauma patients who required damage control surgery. It suggested that doctor-car system shortened time from arrival to DCS initiation and extended transport time slightly for severe trauma cases.

INSIGHTS INTO MILITARY-CIVILIAN TRAUMA SYSTEM INTEGRATION AND ITS EFFECTS ON BLOOD PRODUCT AVAILABILITY

Joseph Aryankalayil, MD

Invited Moderator: Vanessa Ho, MD, PhD, MPH

Introduction: In many countries, military and civilian trauma systems often operate in parallel. Increased integration offers potential to improve efficiency, capacity and outcomes for civilian and military populations. A pivotal challenge shared by both sectors is ensuring adequate access to blood, a critical resource for life-saving interventions.

Methods: We distributed an international survey that captures information on five key sectors of an integrated military-civilian trauma system: patient care, education/training, formal partnerships, global health engagement, and communication. Based on expert consensus, we created a standardized scoring system to quantitatively measure levels of integration, allowing classification into three distinct groups/tertiles, ranging from minimal (Type I) to robust (Type III). This method allowed analysis of the association of numerous trauma system factors with increased integration status.

Results: The international survey on military-civilian trauma system integration gathered 246 responses from 77 individual countries. Respondents were asked about timing and availability of various blood products within their local hospitals. The American College of Surgeons recommendation for massive transfusion availability in less than 15 minutes in trauma centers was used as the benchmark during analysis. 25% of Type I integration countries reported availability of a massive transfusion protocol in less than 15 minutes, compared to 53.8% of Type II integration countries, and 57.7% of Type III integration countries (Tau-b correlation $p < 0.05$). There was also a significant correlation between availability of packed red blood cells in less than an hour and increased integration status (Tau-b correlation $p < 0.05$). Blood storage capabilities underlying the rapid availability of blood products in higher integration countries was evaluated. On-site blood banking did not demonstrate any association with higher integration status, but there was a trend with utilization of local blood banking and higher integration status (Type I: 48%, Type II: 61.5%, 76.9%).

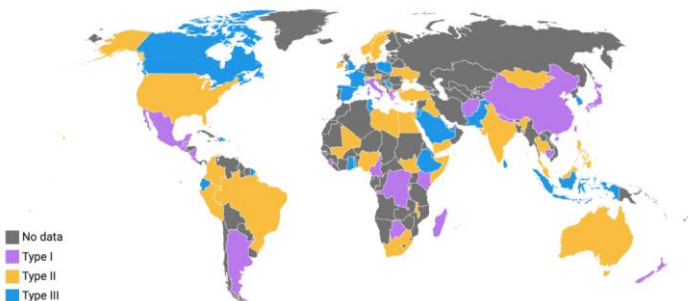
Conclusion:

Our survey findings advance understanding of the global landscape of military-civilian trauma system integration, including the association with improved

blood product availability with higher integration status, and the conducive nature of local blood banking for military-civilian integration. This study sets a foundation, for an adaptable framework for implementing meaningful trauma system integration to improve efficiency, capacity and patient outcomes.

Global Landscape of Civilian-Military Trauma System Integration

5 key domains were measured: patient care, education/training, formal partnerships, global health engagement, and communication. Countries were classified into three tertiles based on survey response scoring, ranging from Type I (least integration) to Type III (robust integration).



PRESENCE OF GERIATRIC CONSULT SERVICE IS ASSOCIATED WITH DECREASED HOSPITAL-LEVEL MORTALITY FOR GERIATRIC TRAUMA PATIENTS

Alexander Orboodabi, MD

Invited Moderator: Vanessa Ho, MD, PhD, MPH

Introduction: American College of Surgeons Geriatric Trauma Best Practice Guidelines recommend the inclusion of geriatricians as a key part of the care team for seriously injured older adults. We hypothesized that trauma centers with a geriatric consult service would have 1) more geriatric-focused processes for care and 2) lower hospital-level mortality for injured older adults.

Methods: TQIP-participating trauma centers were surveyed regarding compliance with geriatric-focused processes for care, including presence of geriatric consult service, palliative care consult service, geriatric pharmacists, standardized process for assessing frailty, and anticoagulation reversal protocols. We calculated hospital-level observed to expected (O:E) mortality for geriatric trauma patients treated at surveyed trauma centers using TQIP data, controlling for patient demographics, comorbidities, and injury severity. High-mortality hospitals were defined as those in the highest quartile of O:E ratio for mortality.

Multivariable logistic regression was performed to assess the association of geriatric consult service availability with high-mortality hospitals while controlling for other hospital-level characteristics, including ACS verification level, number of beds, teaching status, and compliance with other geriatric-focused processes for care.

Results: Geriatric consult services were available at 49 of the 145 included trauma centers (34%). Hospitals with a geriatric consult service were more likely to have level I designation (61% vs. 12%, P=0.001), a standardized processes for assessing frailty (43% vs. 15%, P=0.001), and availability of a geriatric pharmacist (55% vs. 33%, P=0.012) (Table 1). On unadjusted analysis, hospitals with a geriatric consult service were less likely to have higher-

than-expected mortality (18% vs. 50%, P=0.001). On adjusted multivariable logistic regression, presence of a geriatric consult service was associated with decreased odds of higher-than-expected mortality (OR 0.37, 95% CI 0.14-0.96, P=0.041).

	No Geriatric Consult Service (N = 96)	Geriatric Consult Service Available (N = 49)	P-Value
Availability of Palliative Care Consult Service	92 (96%)	49 (100%)	0.188
Availability of Geriatric Pharmacists	32 (33%)	27 (55%)	0.012
Standardized Process for Assessing Frailty	14 (15%)	21 (43%)	<0.001
Anticoagulation Reversal Protocol	81 (84%)	41 (84%)	0.545
Level I Trauma Center	11 (12%)	30 (61%)	<0.001
University Hospital	15 (16%)	26 (53%)	<0.001
Hospital size >400 beds	31 (32%)	36 (74%)	<0.001

Conclusion: Hospitals with a geriatric consult service have lower hospital-level mortality for older adult trauma patients and have more processes in place to assess and treat these patients. Geriatric specialists are an essential component of the trauma team for seriously injured older adults.

THE CORRELATION OF TRANSFER PATTERNS AND MORTALITY RATES AFTER ESTABLISHING A TRAUMA CENTER

Dowan Kim, MD

Invited Moderator: Vanessa Ho, MD, PhD, MPH

Background: The establishment of a trauma centers has significantly impacted the landscape of trauma care, often leading to changes in patient transfer patterns. Centralization of severe trauma patients refers to the trauma centers equipped with the resources, expertise, and facilities to provide the highest level of care for traumatic injuries. This study investigates the paradigm shift in transfer patterns before and after the implementation of a trauma center, focusing on the effects of transportation type distribution and outcomes.

Methods: This retrospective study based on Trauma Data Base between January 2017 and December 2022 at the single center. Demographic data, transfer patterns, trauma score, destination, distance, mode of transfer, and survival outcomes of all the patients were reviewed. The primary outcome was in-hospital mortality.

Results: During this period, the number of severe trauma patients was 3,426 (direct versus in-direct = 1,131 vs 2,315). And, direct transport increased from 18.6% to 40.1%, and especially the transport rate of severe trauma patients (ISS > 16) rose sharply from 22.1% to 50.7%. In contrast, the percentage of transfers from other medical institutions

decreased from 53% to 28% and the transport rate of severe trauma patients declined from 64.2% to 34.6%. The survival outcome of patients immediately direct transport with ambulance was statistically significantly improved ($p=0.03$).

Conclusion: Initial findings suggest potential improvements in patient outcomes in terms of reduced mortality rates and improved clinical management. In this study, we were able to compare changes of in hospital visit after the establishment of a regional trauma center. The number of patients visiting hospitals directly has increased, and we estimated that the prognosis of patients direct visiting hospitals may be not inferior after adjusting for the preventable death rate. We suggested centralized expertise and resources, streamlined communication and enhanced referral system will improve the mortality rate.

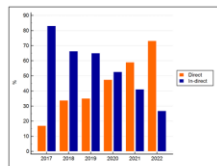


Fig. 1. Type of transfer to trauma center. Chi-squared test for trend ($p < 0.0002$)

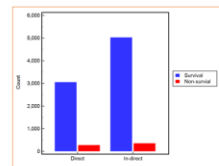


Fig. 2. Total comparison between patient transport pattern (Direct versus In-direct, in 2017)

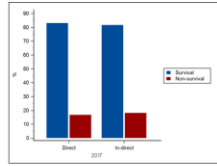


Fig. 3. Comparison of mortality between patient transport pattern (Direct versus In-direct, in 2022)

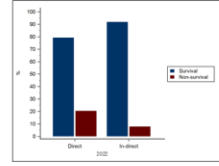


Fig. 4. Comparison of mortality between patient transport pattern (Direct versus In-direct, in 2022)

VARIABILITY IN CT IMAGING PRACTICES IN GERIATRIC TRAUMA: A SECONDARY ANALYSIS OF AN EAST MULTICENTER TRIAL

Arnav Mahajan, MD

Invited Moderator: Vanessa Ho, MD, PhD, MPH

Introduction: Computed tomography (CT) is an essential diagnostic tool for trauma care. However, limited guidance exists regarding when to obtain CT imaging for geriatric patients sustaining blunt traumatic injuries. We hypothesized there would be significant variability in CT imaging practices

Methods: A secondary analysis of an EAST Multicenter Trial at 18 trauma centers (TCs) (11/2020-12/2021) was performed. We included blunt trauma patients aged 65+ with a Glasgow Coma Scale ≥ 14 seen by a trauma team. We collected whether CT imaging was obtained of the following body regions: head, cervical spine, chest, abdomen/pelvis, thoracolumbar (T/L) spine. Variables analyzed included sex, TC level, and the team ordering scans (trauma surgery, emergency medicine [EM], or the referring hospital [OSH], defined as that team ordering $>50\%$ of scans for a patient). Logistic regression was performed to examine whether sex, TC level, or ordering team were associated with use of CT scans. Regressions were adjusted for injury mechanism, positive physical examination within the CT body region, anticoagulants, and age, with adjusted odds ratios (aOR, 95%CI) reported.

Results: For 5,001 patients, 4,762 CT scans were performed. Most patients were females (55%), 16% were treated at level 2 TCs, and 65% suffered ground level falls. CTs were most frequently performed on the head (96%) and least frequently on the T/L spine (22%). Trauma surgery teams ordered the majority (55%) of scans, followed by EM (35%) and OSH (10%). Level 2 TCs were associated with lower odds of receiving a CT of all body regions (Table). Compared to trauma surgery, EM team ordering was associated with lower odds of CT scans for all body regions besides head, and OSH ordering was associated with lower odds of scans for all regions besides T/L. Sex did not influence whether CTs were obtained.

Discussion: Our study demonstrated that non-clinical factors, such as TC level and primary ordering team, were associated with whether a patient received CT imaging, even after adjusting for clinical factors like physical exam findings and injury mechanism. These findings suggest that evidence based guidance is needed to support decision-making for imaging the geriatric trauma population.

Table 1: Adjusted Odds Ratios (aOR, 95% CI) for Computed Tomography Imaging by Body Region

Factor	Head	C-spine	Chest	A/P	T/L
Level 2 Trauma Center (vs. Level 1)	0.58 * (0.40, 0.86)*	0.63 * (0.47, 0.84)	0.77 * (0.65, 0.91)	0.81 * (0.68, 0.95)	0.43 * (0.34, 0.55)
Female Sex (vs. Male)	0.81 (0.59, 1.13)	0.99 (0.78, 1.24)	0.90 (0.78, 1.02)	0.91 (0.80, 1.04)	0.89 (0.77, 1.04)
EM Team (vs. Trauma Team)	1.08 (0.75, 1.55)	0.67 * (0.52, 0.87)	0.64 * (0.56, 0.74)	0.72 * (0.63, 0.83)*	0.46 * (0.39, 0.54)
OSH (vs. Trauma Team)	0.52 * (0.34, 0.80)	0.36 * (0.27, 0.50)	0.56 * (0.45, 0.70)	0.62 * (0.50, 0.77)	0.90 (0.70, 1.14)

ED = Emergency Medicine; C-spine = Cervical spine; A/P = Abdomen/Pelvis; T/L = Thoracolumbar spine

All Regressions adjusted for injury mechanism, physical examination, anticoagulants, age

** indicates $p < 0.05$*

DEVELOPING A GEOSPATIALLY INFORMED TRAUMA TRIAGE SYSTEM FOR IMPROVED PRE-HOSPITAL MANAGEMENT OF TRAUMA IN LOW- AND MIDDLE-INCOME COUNTRIES: A USER-CENTERED APPROACH

Arnav Mahajan, MD

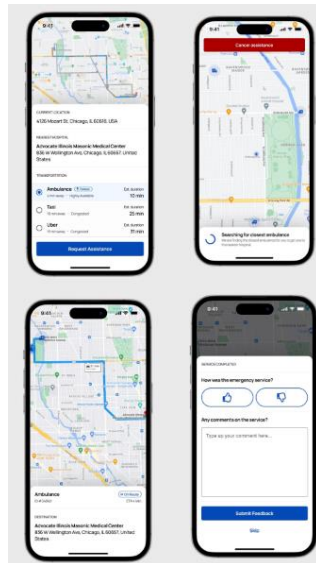
Invited Moderator: Vanessa Ho, MD, PhD, MPH

Introduction: Thailand lacks a true emergency ambulance service, resulting in only 7.28% of emergency cases being facilitated by ambulances. Of these, only 10% are advanced or basic life support ambulances. This results in a burden of traumatic injury that is unmet by current pre-hospital systems that requires an immediate solution. Here, we highlight the ongoing development of our proposed ambulance system, and to contextualize findings to other low-middle income countries.

Method: We have developed an application that uses Google Maps, OpenStreetMaps, and various ride-sharing service API's to input traffic information to help ambulance services and patients find the nearest hospital and the most optimum route to reach a Level 1 Trauma Center. Our application follows principals of user-centered design and meets the needs of stakeholders in Thailand.

Results: The application provides directions, location of hospitals and trauma centers, and a triage system based on the Medical Priority Dispatch System. The application provides accident reporting, safety tips, ambulance services, push notifications, and car service information. We have designed a patient facing model to address the needs of 93% of all patients, and an ambulance model to meet the needs of the remainder of the population that visits emergency departments annually.

Discussion: Developing a novel application to develop geographically informed triage and transport of traumatic injury patients in low-middle income countries is of vital importance. Thailand has implemented a policy that democratizes access to care, allowing patients to be transferred to either a private or public hospital and not be charged for the first 72 hours. This paper highlights the importance of increasing open access data to study geographic disparities of care as this is a major limitation in LMICs.



**VALIDATION OF REAL-TIME LOCATION SERVICE
(RTLS) PRE-HOSPITAL TIME TO ARRIVAL TOOL IN THE
SOUTHEAST MINNESOTA REGION USING AN
ADVANCED GEOSPATIAL MAPPING MODEL FOR
TRAUMA**

Sergio Navarro, MD

Invited Moderator: Vanessa Ho, MD, PhD, MPH

Background: Major trauma is a leading cause of premature death and disability worldwide, and many healthcare systems seek to improve outcomes following severe injury with provision of pre-hospital critical care, particularly in rural trauma care. This study developed and validated a geospatial model to implement a real-time location service (RTLS) tool with ability to provide estimated transport time looking at both ground emergency medical service (GEMS) and helicopter emergency medical service (HEMS) time of transport in the Southeast Minnesota regional area.

Methods: Pre-hospital data was extracted for the emergency response for trauma patients arriving at a Level I trauma center in the Southeast Minnesota region from Oct 2018 through Oct 2023. Data was extracted on location and time of incident, mechanism of injury, on-scene times, and transport teams, and hospital regions. A model was developed to predict transport time based on GEMS and HEMS, geographic location of injury, location of Level I trauma centers, atmospheric conditions, traffic conditions, seasonality, and day or night period. Time to other nearby Level I trauma centers, in addition to consideration of hospital capacity, as reported by the State of Minnesota, were also examined. Predicted times were compared to actual recorded transport times. Variance in repeated transport routes was also evaluated for the ten most common routes over both ground and flight times. Data reported as median, interquartile range defined as 25th and 75th percentile.

Results: Eight hundred and nine trauma incidents (361 GEMS, 448 HEMS) were included in the analysis. Using the RTLS tool, the mean predicted ground times and rotor flight times were found to be within 1% and 10% of actual GEMS and HEMS reported travel times, respectively. Actual transport time variance was assessed, with variance of GEMS at 20% (2%-35%), and HEMS at 27% (17%-38%).

Conclusion: Preliminary validation of a RTLS enhanced pre-hospital tool in a regional area, indicates that when combined with trauma center data, this tool provides key logistical information regarding severely injured patients. This tool may help inform enhanced pre-hospital critical care responses by GEMS and HEMS teams.

WITHDRAWN

THE IMPACT OF IMPLEMENTING THE JAPAN-AACN (D-CALL NET: DCN) DOCTOR DISPATCH SYSTEM

Tomokazu Motomura, MD

Invited Moderator: Vanessa Ho, MD, PhD, MPH

Introduction: In 2023, there were 308,000 traffic accidents in Japan, resulting in 365,000 injuries and 2,678 fatalities. Although emergency physician dispatch systems using helicopters (doctor helicopters) and emergency vehicles (doctor cars) have been developed in Japan, speeding up their implementation would be expected to save additional lives.

Physician Dispatch via Automated Accident Collision Notification (D-Call Net: DCN): Using approximately 2.8 million police data entries from 2000 to 2011, an algorithm was developed to link vehicular engineering data (e.g., Δv , collision direction, number of collisions, seatbelt usage) with the probability of serious injuries among car occupants. In the event of an accident, engineering data from the vehicle's event data recorder (EDR) are automatically sent to a dedicated server, where the probability of serious injuries is calculated. This information is then forwarded to the fire department command center and the hospitals serving as bases for doctor helicopters and doctor cars in the jurisdiction of the accident site. If the probability exceeds the threshold of 20%, the physician dispatch system is activated. Since 2015, implementation of this system has covered around 4.2 million vehicles, accounting for 7% of the 60 million passenger cars in Japan.

Results: To date, over 9,000 automatic reports have been received, resulting in physician dispatches via doctor helicopters and doctor cars. The system has facilitated the provision of medical care up to 29 min faster (65→36min.) for patients with conditions such as tension pneumothorax and intra-abdominal bleeding, thereby saving numerous lives.

Discussion: A trial operation of the second version of DCN has begun, in which pre- and post-accident video information from inside and outside the accident vehicle is also transmitted. This has the potential to save the lives of vulnerable road users (e.g., pedestrians and cyclists) and elucidate the realities of accidents preceded by conditions such as consciousness disorders due to intrinsic diseases.



**ORAL PAPERS IID:
TRAUMA EDUCATION
PAPER 73 - 78**

Thursday, September 12, 2024

3:35 PM - 4:35 PM

Location: SKYVIEW I 26th Floor

Moderator: Atsushi Nanashima, MD

Oral Papers IID: Trauma Education Paper 73 - 78

Paper 73: 3:45 PM – 3:55 PM

**HUMANITY & TRAUMA ABOVE ALL - BUILDING
BRIDGES THROUGH ADVANCED TRAUMA LIFE
SUPPORT (ATLS) COURSES FOR PALESTINIAN &
ISRAELI PHYSICIANS**

Adam Lee Goldstein, MD

Invited Moderator: Atsushi Nanashima, MD

Introduction & Aim: Working together is a fundamental tenet of improving outcomes for trauma victims. Advanced Trauma Life Support (ATLS) constitutes the foundation to optimize this care, and serves as a common language between providers. ATLS embodies the principles of teamwork, and therefore can facilitate respectable and sustainable partnerships between Palestinian and Israeli peers, while advancing trauma care. Methods: ATLS courses were conducted in equal groups of Palestinian and Israelis. A mixed method design study was conducted obtaining qualitative and quantitative data from a written survey and personal interviews. Results: One hundred and thirteen physicians participated in six courses, nineteen underwent in-depth interviews. In response to, what were your overall feelings about the course?, there was an average score of 9.1/10. Ninety-three percent of the participants answered 'yes' to wanting to maintain professional contact with their peers, and 63% said they would be interested in participating in social gatherings involving families. The interview responses showed that 95.6% felt the course had a positive benefit to their daily work. 82.4% had a positive response to cooperating and working together. 89.5% agreed that either of these groups face discrimination in their daily lives.

Conclusion: ATLS, and other similar initiatives that focus on teamwork and cooperation are ideal pathways to facilitate professional and personal relationships between Palestinians and Israelis. Such endeavors improve the treatment of trauma patients, advance the regional trauma system, and provide a framework for meaningful and sustainable relationships.

**MAINTAINING SURGICAL SKILLS IN AN ERA OF
DECLINING TRAUMA SURGERY CASES: INSIGHTS
FROM 12 YEARS OF TRAUMA SURGERY EXPERIENCE
IN A SURGICAL RESIDENCY PROGRAM FACILITY**

Tadao Kubota, MD

Invited Moderator: Atsushi Nanashima, MD

Background: Unlike in Western countries, trauma center consolidation has not progressed in Japan. This raises the question of who the appropriate providers for the decreased number of trauma surgeries are. Emergency surgeons performing trauma surgeries lack sufficient cases for skill refinement, while on the other hand, surgeons performing elective surgeries face the dilemma of not being able to handle trauma across organs due to sub-specialization. In this context, our institution has deliberately not pursued sub-specialization, and has been addressing various trauma surgery cases by regularly handling a wide range of general surgery fields.

Objective and Methods: We examined the types, sites, target organs, and procedures of trauma surgeries performed under general anesthesia at our institution from April 2012 to December 2023. Additionally, we investigated the content and annual trends of non-trauma surgeries performed during the same period to assess the appropriateness of general surgeons handling trauma surgeries and to consider future sustainability.

Results: Trauma surgeries averaged around 6 cases per year, accounting for approximately 1% of the total surgeries performed. Most surgeries were related to abdominal organs, which could mostly be managed with techniques from the field of gastrointestinal surgery. Although there were fewer cases, it seemed possible to handle surgeries for neck, chest, and vascular trauma through routine clinical practice such as thyroid surgery, lung and mediastinal tumor surgeries, and peripheral vascular surgeries. Issues identified include a decrease in non-gastrointestinal cases as sub-specialization progresses, and an increasing proportion of laparoscopic surgeries leading to a rise in inexperienced young surgeons in open surgery.

Conclusion: Handling trauma surgeries with fewer cases seemed possible by broadly addressing the scope of general surgery in routine clinical practice. Moving forward, it is necessary to consider the training content and quantity required to maintain skills in surgeries of the neck, chest, blood vessels, and open thoracic and abdominal surgeries.

**A PRIMARY STUDY OF A SURGICAL TRAUMA COURSE
ON ANIMAL MODELS IN MAINLAND CHINA**

Weiye Shi, MD

Invited Moderator: Atsushi Nanashima, MD

Introduction: The University of Hong Kong-Shenzhen Hospital (HKU-SZH) has developed a surgical trauma course that includes didactic lectures and practical sessions. During the operative session, surgeons were supposed to learn the principles of damage control surgery and treatment of specific organ injuries. The study aimed to assess the value of this course using participants' feedback and to investigate its future development.

Materials & Methods: The course curriculum consists of lectures and integrated operative practice on a live porcine model. 10 operating tables are fully equipped and participants performed all surgical procedures on a live animal model under general anesthesia. The surgical procedures are composed of penetrating trauma to the spleen, liver, small bowel, large bowel, diaphragm, lung, heart, inferior vena cava, iliac vessels, and aorta. Pelvic packing and temporary abdominal closure were taught as well. All procedures were ethical during the course. A questionnaire was sent to the 160 participants after completion of the course.

Results: We have held 6 courses since 2022 until now. Complete data were collected from 160 participants, who come from all over the country. Nearly all participants (158/160) reported they were satisfied with the course environment, structure, procedure, and content, and would like to attend this course next time. Splenectomy, cardiac, and aorta repair were the top three procedures they were interested in during the course. Approximately 98% of participants are prone to pass on the information and key materials they have learned at the course to colleagues and students at the home institutions. All of 160 participants preferred the course to be recommended to all regions in the country.

Conclusion: This primary study shows that operative trauma courses on animals significantly increased participants' ability to handle critically injured patients. This also indicates the benefits of this structured trauma training course not only in the short term but also in the long term goal. Moreover, we think that it is necessary to organize more training courses on large scale for specialized surgeons in mainland China.

**APPLICABILITY OF A LOW-FIDELITY SIMULATOR TO LEARN
EMERGENCY SURGICAL AIRWAY SKILLS IN MIDDLE-AND
LOW-INCOME ENVIRONMENTS**

Felipe Vega-Rivera, MD

Invited Moderator: Atsushi Nanashima, MD

Objective: To show a simulator developed at the Center for Teaching and Research in Surgery (CEIC) of the Angeles Lomas Hospital in Mexico, for the surgical practice for emergency surgical airway skill training (surgical cricothyroidotomy and percutaneous cricothyroidotomy).

Design: Porcine tracheas were acquired that included the esophageal portion posteriorly and the complete thyroid cartilage. These were dissected and prepared in a special way so that they could be odorless and fresh for the practice, mounted on a rigid surface and covered with synthetic skin for the development of the skill.

Method and survey: During the ATLS courses in our setting from May 2022 to January 2024, we apply this simulator in the surgical airway skill station. We included all the students participating in ATLS, everyone had its own model to learn and practice the skill by itself following the instructor indications. At the end, all the participants fill a 6 questions survey that evaluates the similarity and applicability for emergency surgical skills at the simulator. In parallel, the model was shown to a group of ORL surgeons, so that they could give their opinion regarding the model's similarity and applicability for these skills.

Results: From May 2022 to January 2024 a total of 9 ATLS courses were taught in which more than 90 participants filled the questionnaire showing that almost the 90% thought that this simulator was ideal of very usefull in the emergency surgical airway skill training, from the ORL group 100% of them thought that this simulator was ideal / very usefull in the same skills training.

Conclusions: This is a low-cost, easily reproducible simulator that is considered extremely useful in developing and maintaining skills related to obtaining an emergency surgical airway.

THE POWER OF MENTORSHIP: HOW TO RECRUIT AND RETAIN VALUABLE STAFF TO YOUR TRAUMA TEAM

Diane Wintz, MD

Invited Moderator: Atsushi Nanashima, MD

Introduction: Enthusiasm in healthcare careers has waned, becoming critically evident during COVID pandemic, which had tremendous impact on staff retention and recruitment. The trauma team (nursing and surgeons) committed to fierce mentorship, which re-inspired interest in teaching and team building. The recipients of the mentorship were Healthcare Partners (HCPs), employees at nursing-assistant level who were assigned to the trauma room during their shifts. Because the team did not include residents, fellows, students or other trainees, the HCPs received real-life, up-close experience from experts in their area of employment.

Methods: HCPs with a minimum of 6 months experience in the general emergency department (ED) were eligible to interview for the trauma position. Most selected HCPs were identified as strong team members during their mandatory, minimum 6 months by nurses or other staff. The trauma nursing team at a single level 2 trauma center designed their training curriculum. The initial class of HCPs were trained and then took on the responsibility of training each new class prior to matriculation. HCPs were expected to participate in monthly team building activities, to achieve competence in multiple areas of active resuscitation, and to respond to a variety of emergent situations where surgeons or nurses required tech-level support. Data regarding each HCP's tenure as well as post-HCP career was tracked from 2017-2023 and reviewed to understand retainment.

Results: There were 194 HCPs who worked in the ED full time over the 7 years. Ninety HCPs were dedicated to trauma and received the trauma nursing curriculum (46%). More than 80% of the HCPs year-over-year retained their employment in the trauma position. Almost all HCPs (88/90; 98%) either went on to major healthcare or pre-hospital careers or continued to work in this same capacity in trauma to date. One HCP moved out of state and was not able to be tracked.

Conclusion: Recruitment is possible through job opportunities within the field of interest. Retainment is realistic if the opportunity matches the needs or incites motivation in the employee. We have designed an effective mentorship plan which accomplishes both goals and could be replicated in any healthcare system.

TRAUMA HCP FINAL HEALTH CAREERS:

Year	Total HCP	TRAUMA HCP continued into next year	NEW trauma HCP/yr	Doctor	Nurse	PA	Fire/PD	medic	Allied health	Other	HCP to date
2017	78	43		3	18	6	1	1	4	2	8
2018	76	43	9		6	3					
2019	61	36	6		2	1			1		2
2020	72	44	14	1	4		2		1		6
2021	73	45	7		3						3
2022	66	35	3		1		1				1
2023	78	31	8		2		1				4
TOTAL	504	277	47 (90 total)	4	36	10	5	1	6	2	24

Oral Papers IID: Trauma Education Paper 73 - 78

Paper 78: 4:35 PM – 4:45 PM

**SURGICAL RESIDENCY TRAINING INNOVATIVE
CURRICULUM IN TRAUMA**

Nancy Lopez, MD

Invited Moderator: Atsushi Nanashima, MD

Training general surgery residents to excel in trauma activations and overall healthcare of trauma patients requires innovative curriculums. A collegial learning environment is fundamental as well as continuous assessment of resident progress. The objective of this curriculum is to train future surgeons to take care of trauma patients in a safe manner in a collegial learning environment with continuous reassessment of the progress, with the goal of fostering leadership, independent critical thinking skills, and procedural skills amongst surgical residents. New surgical residents introduced to trauma will require training before taking care of patients, a graduated curriculum created to enhance resident's performance during 5 years of residency and a monitoring tool to assess performance annually via the use of redcap to record evaluation sheets and to compare progression. Secondary goal includes empowering surgical residents become teachers to more junior residents and medical students.



SOCIETY OF TRAUMA NURSES SESSIONS

Thursday, September 12, 2024

Location: CHAMPAGNE 3/4



Society of Trauma Nurses Morning Session

8:00 AM - 12:20 PM

Welcome Opening

8:00 AM - 8:05 AM

Presenter: LeAnne Young, MSN, RN, TCRN

STN Session I:

Innovations in Trauma Nursing

8:05 AM - 10:05 AM

Moderator: LeAnne Young, MSN, RN, TCRN

STN Session II:

Global Trauma Systems

10:15 AM - 12:20 PM

Moderator: Maria Bautista-Durand, MSN,
APRN, FNP-C, CPNP

STN Session III:

Trauma Program Challenges

1:00 PM - 3:00 PM

Moderator: Linda Reinhart, MSN, RN, CNS,
CCRN, TCRN

STN Session IV:

Interesting Trauma Cases

3:10 PM - 5:05 PM

Moderator: Elizabeth Atkins, MSN, RN, TCRN

STN: Closing Remarks

5:00 PM - 5:05 PM

Moderator: LeAnne Young, MSN, RN, TCRN



**ORAL PAPERS IIIA:
NEUROLOGIC TRAUMA
PAPERS 79 - 85**

Friday, September 13, 2024

1:00 PM - 2:30 PM

Location: SKYVIEW I 26th Floor

Moderator: John Agapian, MD

WITHDRAWN

WITHDRAWN

**MODERATE TO SEVERE TRAUMATIC BRAIN INJURY
OUTCOMES - A TWENTY YEAR LONGITUDINAL
COHORT ANALYSIS**

Yuewei Xiao, MD

Invited Moderator: John Agapian, MD

Objectives: Although recognised as a leading cause of death and disability, it is unclear whether current treatment strategies have improved outcomes from blunt moderate to severe traumatic brain injuries (msTBI) due to a lack of available epidemiological data. This study sought to determine if in-hospital mortality and early functional outcomes of msTBI patients have changed over 20 years. Early functional outcomes were determined through the surrogate measure of the proportion of patients discharged directly to home.

Methods: This is a longitudinal cohort study with analyses of The Alfred Health Trauma Registry data between 1 January 2002 to 31 December 2021. Subjects were adults aged 16-70 years with blunt msTBI (Head Abbreviated Injury Scale AIS = 3-5) admitted to The Alfred Hospital Trauma Service - the largest major trauma service in Australia. Logistic regressions were used to determine mortality and discharge destination trends, as well as for subgroup mortality trends. A multivariable logistic regression model was used to assess trends in mortality outcomes, adjusting for changes to the injury severity of presentations over the period.

Results: A total of 8,222 subjects presented with msTBI over the 20 years, with 692 total deaths. The unadjusted in-hospital mortality rate declined significantly, from 12% in 2002 to 4% in 2021 (OR 0.96, 95% CI 0.95-0.97, p less than 0.001). Odds of death per annum remained the same after adjusting for changes to the injury severity of presentations (OR 0.96, 95% CI 0.93-0.99, p less than 0.001). The greatest improvements in mortality were seen in the oldest subpopulations (ages 50-70; 0.45% p.a. mean mortality reduction, p less than 0.001) and in those with the most severe head injuries (head AIS = 5; 0.6% p.a. mean mortality reduction, p less than 0.001). The proportion of subjects discharged to home increased from 31% to 61% over the period (OR 1.05, 95% CI 1.04-1.06, p less than 0.001).

Conclusions: Changes in neurotrauma care in Victoria (Australia) and The Alfred Hospital in the first two decades of the century have been associated with a marked reduction in mortality. These results foster optimism for the care of patients with moderate to severe brain injuries and support further innovations and investigations in neurotrauma care.

**RETROSPECTIVE VALIDATION OF THE BRAIN INJURY
GUIDELINES: MANAGEMENT OF TRAUMATIC BRAIN
INJURY AT A SINGLE COMMUNITY TRAUMA ONE
HOSPITAL**

Gianmarino Gianfrate, MD

Invited Moderator: John Agapian, MD

Traumatic brain injury (TBI) can lead to widespread devastating effects on the individual and the medical community. The incidence of traumatic brain injury has been on the rise since the early 2000s, up 20-30% since that time. The Brain Injury Guideline (BIG) Project 2013 set forth by the University of Arizona attempted to set specific guidelines for non-operative management and the necessity of neurosurgery evaluation for TBI. Today, the increased incidence of TBI and the use of oral anticoagulation have led to a major tax on medical resources.

In our retrospective cohort analysis, we explored all 121 traumatic brain injuries that were presented to St. Elizabeth Youngstown Hospital, a level I trauma center, in Youngstown, Ohio. Patients were classified according to neurologic examination results, CT imaging, use of intoxicants, tertiary neurological exam, and anticoagulation status. We then verified and cross-referenced our cohort with the already developed brain imaging guidelines for individual patients' need for observation, hospitalization, or neurosurgical consultation. Patients discharged had a follow-up neurosurgical evaluation 3-4 weeks after leaving the hospital.

80 patients had an abnormal head CT finding. In the BIG 1 category, all patients had a stable or improving repeat CT head scan at 4 hours, did not require intervention, had a normal inpatient and outpatient neurosurgical evaluation, and had a GCS of 15 on tertiary exam and before discharge. Patients within the BIG 2 category had worsening bleeds 16% of the time, but all were stable on 3rd CT scan. All BIG 3 patients required prolonged hospital stays with an all-cause mortality of 17%.

Without the resources of many larger institutions, regional and community trauma centers can rely on this guideline to help create an algorithm to streamline patient care. This can allow the limited resources to aid in other aspects of patient care. Using the criteria set forth by the BIG project in 2013, along with our institutional guidelines, we were able to authenticate a non-admission protocol for TBI. We believe this will aid in changing our current practice management guidelines that will support patient care and help distribute the demand for medical resources.

EPIDEMIOLOGY OF TRAUMATIC ATLANTOOCIPITAL DISLOCATION: NATIONAL REGISTRY STUDY

Kristin Salottolo, MD

Invited Moderator: John Agapian, MD

Introduction: Traumatic atlantooccipital dislocation (TAOD) is extremely rare and often considered fatal. We sought to describe the epidemiology, management, and outcomes of TAOD using a large National registry.

Methods: Patients with TAOD were identified from the National Trauma Data Bank (2017-2019) using ICD-10 diagnosis codes (S13.11); there were no exclusions. Chi-square tests were used to compare variables associated with mortality, which was examined as death in the emergency department (ED), death after admission, and survival to discharge. Multivariate logistic regression with backward selection was used to identify associations of surgical management, with either cervical fusion or internal fixation, for admitted patients. Significance was alpha=0.05.

Results: Overall, 0.1% (n=2,729) of trauma patients had TAOD. The median age was 37 (21-61) years, most (63%) patients presented with ED GCS 3-8, and most (55%) injuries were due to motor vehicle collision (MVC). Half (n=1,153) of patients survived, with 50% (n=564) of deaths occurring in the ED and 50% (n=572) after admission. Patients who survived were more likely to be older,

white, injured from falls, to have a concomitant C1 or C2 fracture or transverse ligament injury, and less likely to have polytrauma (ISS≥25), an ED GCS 3-8, and a TBI (Table 1). The rate of surgical

Table 1. Association with survival for patients with Traumatic atlantooccipital dislocation (TAOD, n=2,729)

Characteristic	Died in the ED (564, 24.6%)	Died after admission (n=572, 25.0%)	Survived to discharge (n=1153, 50.4%)	p value
Demographics				
Age < 18	11.5%	23.6%	19.1%	
Age 18-64	75.4%	58.4%	54.7%	
Age ≥65	13.1%	18.0%	26.2%	<0.001
Male sex	63.1%	62.2%	62.6%	0.95
Non-hispanic white	52.0%	63.5%	68.7%	<0.001
Cause of injury				
Motor vehicle collision	54.6%	60.5%	52.2%	
Pedestrian transport accident	30.3%	21.3%	9.2%	
Fall from height	3.6%	5.9%	15.3%	
Ground level fall	0.2%	2.5%	13.2%	
Other causes (<3% each)	11.4%	9.8%	10.1%	
Injury severity				
Polytrauma (ISS ≥25)	82.8%	82.9%	32.8%	<0.001
ED Glasgow coma score 3-8	98.4%	89.9%	32.4%	<0.001
ED hypotension (<90mmHg)	89.7%	38.6%	6.9%	<0.001
Concomitant diagnoses				
Traumatic brain injury	85.8%	85.0%	44.7%	<0.001
Transverse ligament injury	1.4%	10.8%	25.1%	<0.001
C1 (atlas) fracture	7.5%	17.3%	23.2%	<0.001
C2 (axis) fracture	4.3%	13.1%	21.0%	<0.001
Stabilization procedures				
Surgical (fusion, fixation)	0.0%	4.9%	45.5%	<0.001
Non-surgical (halo, traction, c-collar)	1.1%	9.6%	11.5%	<0.001

management was 32%. Variables that increased odds of surgery were transverse ligament injury (OR: 3.1 [2.3-4.0]), C2 axis fracture (OR: 2.2 [1.6-3.1]), an MVC injury (OR: 2.2 [1.4-3.7]) or pedestrian auto accident (OR: 2.0 [1.1-3.6]) vs. ground-level fall, age 18-65 (OR: 1.4 [1.3-2.4]) vs. under 18 years), and treatment at a level I trauma center (OR: 1.5 [1.1-1.9]), whereas there were decreased odds of surgery with ED GCS 3-8 (OR: 0.7 [0.5-0.9]) and ED hypotension (OR: 0.44 [0.3-0.6] vs. SBP > 90mmHg). Survival was greater with surgical vs. nonoperative management (95% vs. 54%).

Conclusion: TAOD was rare and devastating, resulting in 50% mortality. However, nearly all patients who were surgically stabilized survived. Patients with high mechanism injuries, concomitant upper cervical injuries, and stable vital signs were more likely to be surgically managed.

**DIFFERENTIAL IMPACT OF RACE ON TRAUMATIC
INTRACEREBRAL HEMORRHAGE INCIDENCE AND
OUTCOMES**

Erica Romo, MD

Invited Moderator: John Agapian, MD

Objective: To identify racial disparities in traumatic intracranial hemorrhage (tICH) etiology and outcomes to enhance prevention strategies.

Methods: This retrospective cohort study analyzed tICH cases among patients admitted to six US level I and II trauma centers between January 2016 and July 2022. Racial categories included Hispanic, Non-Hispanic (NH) White, NH Black, NH Asian American or Pacific Islander (AAPI), American Indian/Alaska Native (AIAN), and NH-Other. Mechanisms of injury (MOI) were classified as penetrating injury (PI), motor vehicle collision (MVC), fall from height (FFH), and ground level fall (GLF). Chi-square tests assessed racial differences in tICH incidence, MOI, substance use, comorbidities, and outcomes.

Results: Among 73,546 trauma admissions, tICH occurred in 12,674 cases (17%), with the highest incidence in AAPI/AIAN patients (24%) and the lowest in Black patients (15%) ($p < 0.001$). NH White patients had the highest percentage of individuals over 65 (58.5%), while those under 21 were more prevalent among NH Black and Hispanic groups (6.8% and 6.0%, respectively). NH White patients were more likely to use anticoagulants (16.5%), while AAPI/AIAN individuals exhibited a higher prevalence of dementia (12.3%). NH Black patients had the highest rate of positive toxicology results (50.4%), while Hispanic patients showed the highest prevalence of alcohol levels above 0.08 (40%). FFH was the most common MOI among NH White and AAPI/AIAN patients (43.2% and 43.4%, respectively), whereas penetrating injuries were most common among NH Black patients (10.5%). MVC-related tICH was more frequent in NH Black patients (34.4%), while FFH predominated in counterpart groups. Inpatient mortality accounted for 48% of all trauma fatalities, with no significant difference observed by race ($p = 0.11$).

Conclusion: Traumatic intracerebral hemorrhages account for a large proportion of deaths in trauma admissions. Although mortality does not differ by race, our study reveals significant racial disparities in traumatic intracerebral hemorrhage (tICH) incidence, mechanisms of injury and predisposing features such as comorbidities, age, and substance use. Tailored prevention strategies and interventions are warranted to address these variations and improve outcomes across diverse racial groups affected by tICH.

Paper 85: 1:40 PM – 1:50 PM
**ASSESSING THE IMPACT OF THORACIC
ENDOVASCULAR AORTIC REPAIR ON DELAYED
NEUROLOGICAL DETERIORATION IN PATIENTS WITH
BLUNT AORTIC INJURY AND TRAUMATIC BRAIN
INJURY: A TQIP STUDY**

Chih-Yuan Fu, MD

Invited Moderator: John Agapian, MD

Introduction: Blunt aortic injury (BAI) is recognized as a lethal, high-energy impact trauma often accompanied by other concomitant injuries. Although Thoracic Endovascular Aortic Repair (TEVAR) is frequently employed to address aortic injuries, reports indicate hemorrhagic complications associated with vascular intervention. This study aims to assess whether TEVAR is linked to delayed neurological deteriorations in patients with concurrent BAI and traumatic brain injury (TBI).

Methods: This study utilized the Trauma Quality Improvement Program (TQIP) dataset from 2022, focusing on patients with both BAI and TBI. Propensity score matching (PSM) was employed to eliminate baseline discrepancies between patients undergoing TEVAR and those who did not. Defined outcomes, specifically delayed neurological deterioration, were compared in these two groups after achieving a well-balanced PSM. Additionally, a multivariate logistic regression (MLR) analysis was conducted to identify independent factors contributing to delayed neurological deterioration in patients with concurrent BAI and TBI.

Results: The study included a total of 785 patients, with 147 patients undergoing TEVAR (18.7%) for BAI, and 13 (8.8%) experiencing delayed neurological deterioration post-TEVAR. Following a well-balanced 1:1 PSM (N=147), there was no significant difference in the probability of delayed neurological deterioration between patients undergoing TEVAR for BAI (7.5% vs. 8.1%, $p=0.223$). The MLR analysis indicated that TEVAR did not significantly elevate the probability of delayed neurological deterioration among patients with concurrent BAI and TBI (odds=1.07, $p=0.355$). Conversely, the abbreviated injury scale of the chest emerged as an independent factor influencing delayed neurological deterioration.

Conclusion: The study did not observe a higher probability of delayed neurological deterioration in patients undergoing TEVAR. Therefore, TEVAR can be performed in patients with concurrent BAI and TBI without a significantly heightened risk of delayed neurological deterioration.



**ORAL PAPERS IIIB:
ABDOMINAL TRAUMA II PA-
PERS 86 - 95**

Friday, September 13, 2024

1:00 PM - 2:40 PM

Location: SKYVIEW II 26th Floor

Moderator: Amanda Teichman, MD

BULL HORN INJURY- EMERGING PROBLEM OF URBAN INDIA: A CASE SERIES ANALYSIS FROM A LEVEL 1 TRAUMA CENTRE

Anita Singh, MD

Invited Moderator: Amanda Teichman, MD

Introduction: In different parts of the world, cattle afflicted injuries are witnessed only in areas where cattle farming is prevalent or in countries like Spain where bullfighting is a seasonal sport. But in the Indian sub-continent, these injuries are common throughout the year and are also seen in urban areas due to high prevalence of cattle farming. These animals usually cause injuries that have different characteristics such as large area of tissue damage, creation of cavities, twists and inoculation of aerobic and anaerobic bacteria. The injury patterns can present as variety of bizarre and complex wounds.

Methodology: A case series analysis of the patients admitted after sustaining bull horn injury to our Level I trauma centre was conducted over a span of 7 years. Their epidemiological parameters, injuries, management and outcomes were noted. We also classified these injuries in to primary, secondary, tertiary and quaternary which is not yet available in literature.

Results: 501 patients were admitted during the 7-year duration. The mean age was 47.9 years with a male: female ratio of 3.47:1. Most common mechanism of injury was with a combination of direct and indirect impact by the bull or its horns (54.3%). Majority patients were from rural areas (75.4%). The most common injuries were thoracic injuries in 47.8 % patients followed by abdominal (38.6%) and perineal injuries (8.3%). 193 (38.5%) patients were

conservatively managed but 308 (61.5%) patients required major interventions.

Conclusion:

Bull horn injuries are major cause of mortality and morbidity in developing world due to un-regularized farming structure.

Shelter homes

are needed to prevent them from wandering on roads and being cause of major RTI. We should understand the specific mechanism and pattern of these injuries with classification for better and specific management to reduce mortality. All types of bull horn injuries are needed to be reported to know exact incidence and prevalence. With strict regulations and precautions most of these injuries can be prevented.



**THE SIGNIFICANCE OF EARLY ARTERIAL-PHASIC IN
MULTIDETECTOR CT FOR BLUNT SPLEEN INJURED
PATIENTS: A CLINICAL OUTCOMES-ORIENTED STUDY**

Yu-Hao Wang, MD

Invited Moderator: Amanda Teichman, MD

Introduction: Blunt spleen injuries (BSI) present a significant diagnostic and management challenge in trauma care. Current guidelines recommend arterial phase contrast-enhanced multidetector computed tomography (CT) for detailed assessment. However, the optimal imaging phase for predicting clinical outcomes remains debatable. "This study investigates the impact of arterial-phasic imaging via multidetector CT in the early diagnosis (within the first 24 hours) and clinical outcomes of patients with blunt spleen injuries."

Method: A retrospective case-control study was conducted, analyzing data from adult patients with BSI treated at a single institution from 2019 to 2022. Patients were divided based on the CT phase performed—portal vein phase only, or with add-on arterial phase. Data collected included demographics, injury severity, spleen injury grade, and management outcomes. Employing Inverse Probability Treatment Weighting (IPTW) for group comparison.

Result: Of 170 patients assessed, 147 met the inclusion criteria and were divided into two groups: those receiving portal vein phasic-only CT (N=104) and those with add-on arterial phasic CT (N=43). The overall non-operative management (NOM) failure rate was 3.0% (4/132), the NOM-Observation (NOM-OBS) failure rate was 6.7% (4/60), and the spleen artery embolization (SAE) failure rate was 4.1% (3/73). After adjusting for covariates using inverse probability of treatment weighting (IPTW), the comparison between the add-on arterial phase and portal phase CT groups revealed similar overall NOM failure rates (3.0% vs. 2.2%, p-value: 0.721), NOM-OBS failure rates (3.8% vs. 6.2%, p-value: 0.703), and intra-abdominal bleeding-related mortality rates (4.8% vs. 2.1%, p-value: 0.335). Among the 43 patients who underwent an add-on arterial CT, only one was diagnosed with a tiny pseudoaneurysm attributable to the inclusion of the arterial phase."

Conclusion: Early dual-phase CT within 24 hours of presentation offers no added value over single-phase CT in managing blunt spleen injuries regarding clinical outcomes. Further research is needed to define the role of follow-up enhanced CT in this patient population.

CONCEALED PERIL: INFLUENCE OF SOLID ORGAN TRAUMA ON MESENTERIC INJURY DETECTION AND THE ROLE OF HEMODYNAMICS

Yauren Chang, MD

Invited Moderator: Amanda Teichman, MD

Introduction: Prompt detection and management of bowel and mesenteric injuries after blunt abdominal trauma are vital to reduce patient morbidity and mortality. We hypothesize that mesenteric injury combined with solid organ injury is associated with delayed surgical exploration.

Methods: A retrospective review from 2009 to 2023 identified patients with traumatic mesenteric injury in our hospital. Exclusions were penetrating trauma, patients under 18, no surgical intervention, and AIS head score more than or equal to 3. Our primary outcomes were overall survival and time from ED arrival to the OR. Delayed surgical exploration was defined as over 12 hours from ED to OR, and complicated mesenteric injury involved concurrent liver/spleen injury. Hemodynamic stability was determined by an SBP threshold of 90mmHg.

Results: Of 403 patients with mesenteric injury, 232 were analyzed. The average overall survival (OS) was 89.7%, with a mean time of 6.4 hours from ED to OR. Delayed surgical exploration was linked to longer hospital stays (25.0 vs. 15.8 days, $p=0.011$) but did not significantly alter OS (100% vs 88.5%, $p=0.142$). In hemodynamically stable patients ($n=189$), complicated injuries correlated with lower GCS (12.9 vs. 14.2, $p=0.022$), higher heart rate (104.2 vs. 96.3 bpm, $p=0.032$), and higher ISS (18.6 vs. 14.9, $p=0.023$), with no significant differences in OS (91.5% vs. 93.7%, $p=0.739$) or delayed surgery rates (10.6% vs. 11.3%, $p=1.000$). Conversely, in hemodynamically unstable patients ($n=43$), complicated mesenteric injuries had more delayed surgeries (25.0% vs. 0.0%, $p=0.031$), higher heart rates (118.4 vs. 93.1 bpm, $p=0.036$), and longer hospital stays (13.8 vs. 8.6 days, $p=0.043$), without impacting OS (75.0% vs. 74.3%, $p=1.000$).

Conclusion: In an unstable hemodynamic context, patients with complicated mesenteric injuries are at a higher risk for delayed surgical exploration, which may be associated with adverse outcomes. Such a risk is not evident in hemodynamically stable patients, emphasizing the importance of identifying concealed mesentery injury and hemodynamic stability in the management of these injuries.

**PROGNOSTIC FACTORS IN THE MANAGEMENT OF
BLUNT ABDOMINAL TRAUMA. OUR EXPERIENCE IN A
TERTIARY TRAUMA CENTER**

Agron Dogjani, MD

Invited Moderator: Amanda Teichman, MD

Introduction: Blunt abdominal trauma poses a significant challenge in the healthcare landscape, contributing substantially to morbidity and mortality across all age groups. The complex nature of intra-abdominal injuries often makes their identification and management a daunting task, as certain injuries may not immediately manifest during the initial assessment and treatment phase.

Prognostic factors play a crucial role in predicting outcomes and guiding the management of these patients. Here are key aspects to consider:

In Assessment as: Primary Survey: Secondary Survey: Imaging Studies:
Laboratory Tests:

Prognostic Factors as: Hemodynamic Stability: Injury Severity Score (ISS):
Specific Organ Injuries:

The severity of organ injuries influences prognosis; Age and Comorbidities:
Time to Intervention: Associated Injuries: Presence of injuries to other body
regions can complicate the overall management; Serial Examinations:

In Management as: Observation: Operative management: Non-operative
Management: Intensive Care Monitoring: Pain Management and Supportive
Care...

Material and Methods: Conducted at a unit center from December 2021 to
December 2023, our study focused on 240 patients who presented at the
University Hospital of Trauma (UHT) in Tirana, Albania.

The analysis employed the Kendal's tau correlation coefficient to explore
relationships between various variables. Data were meticulously presented
through tables and diverse charts. Statistical significance was determined with
values <0.05 (or 5%)...

Results: The outcomes of trauma treatment appear to be intricately linked to
several factors, including hemodynamic status, patient age, mechanism of
trauma, and the duration between trauma occurrence and hospital presentation.
These findings underscore the importance of a nuanced approach to trauma
management, emphasizing the need for tailored interventions based on
individual patient characteristics.

**A RETROSPECTIVE ANALYSIS OF PENETRATING STAB
ABDOMINAL INJURY AND MANAGEMENT: A SINGLE
INSTITUTIONAL EXPERIENCE**

Narendra Kumar, MD

Invited Moderator: Amanda Teichman, MD

Introduction: Penetrating stab abdominal injury is often a life-threatening condition, which is mainly associated with inflicted injuries and most of the victims being young aged. The most common organs injured are the small bowel (50%), large bowel (40%), liver (30%), and intra-abdominal vascular (8%). The diagnosis and management of penetrating injury has been drastically changes over past decades.

Aim: To understand the management of these patients to minimize the rate of negative laparotomy, morbidity and mortality.

Material and methods: A six-year duration retrospective study of 140 patients with penetrating stab abdominal injury at the King George Medical University, Lucknow (India).

Result: Total 140 patient admitted during the 6-year duration who sustained abdominal stab injury. The mean age was 35 years with male: female ratio of 10:1. Homicidal injuries are accounted for most of injuries 92.3%. Eighty-six in 140 (61.42%) patient undergoes exploratory laparotomy and in which procedure was therapeutic in 73.4% and in 26.6% non-therapeutic. Fifty-four in 140 (38.57%) patients managed non operatively.

Conclusion: Management of these patients is based on individuals' nature of injury, findings at presentation and organs involved. Majority of penetrating abdominal stab injury patients can be non-operatively with newer diagnostic modalities and clinical examination. These newer investigation modalities minimize the rate of negative laparotomy and mortality of patients. Diagnostic laparoscopy is a new modality in trauma which is useful in stable patient. It decreases patient hospital stay, unnecessary scar and surgical site infection.

**UNDERSTANDING HOSPITAL LENGTH OF STAY IN
TRAUMA LAPAROTOMY PATIENTS: A NATIONAL
TRAUMA DATABASE STUDY.**

Hayaki Uchino, MD

Invited Moderator: Amanda Teichman, MD

Background: Trauma laparotomy is a common surgical procedure for both blunt and penetrating abdominal trauma, encompassing interventions ranging from addressing injured abdominal organs, including life-threatening bleeding, to exploratory diagnostic procedures. The diverse range of patient conditions requiring trauma laparotomy leads to significant variability in hospital length of stay (LOS), posing challenges for effective patient care planning. This study aimed to determine factors associated with LOS in patients undergoing trauma laparotomy.

Methods: A retrospective analysis was performed using the National Trauma Data Bank from 2017 to 2019. Patients who underwent trauma laparotomy were identified based on ICD-10 codes and abbreviated injury scores. LOS was categorized into 3 groups (short 5 days, medium 5 to 11 days, long > 11 days). Tests for differences were employed to assess statistical differences between patients across each LOS group.

Results: A total of 27,434 trauma laparotomy patients were identified. The overall median LOS was 7.0 [5.0, 11.0] days. Laparotomy for hemorrhage control was performed in 9.9% of patients in the short LOS group, 22.5% in the medium LOS group, and 41.7% in the long LOS group. Patients in the long LOS group were more frequently treated at university hospitals and had a higher prevalence of being discharged to post-acute care facilities than home. Factors positively associated with short LOS (5 days) included self-inflicted injuries (vs. unintentional), penetrating mechanisms (vs. blunt), isolated abdominal trauma (vs. polytraumas), diagnosis of superficial wounds, and abdominal cavity surgeries (e.g., exploratory laparotomy). Conversely, factors positively associated with long LOS (> 11 days) were mechanisms such as falls, motor vehicle-related injuries, and gunshot wounds (vs. stab wounds), obesity (vs. normal weight), Medicare coverage (vs Medicaid), comorbid conditions, higher Injury Severity Score, transfusions, and injuries to major vessels and the pancreas.

Conclusion: This study identified factors associated with hospital LOS in patients undergoing trauma laparotomy. Understanding these factors holds the potential to introduce comprehensive targeted approaches, including pathway implementation, early discharge planning, and timely access to post-acute care, which may be particularly valuable in the current era of constrained healthcare resources.

**THE UTILITY OF SEQUENTIAL HEPATECTOMY FOR
HIGH-GRADE LIVER TRAUMA: A CASE SERIES**

Hirotaka Yamamoto, MD

Invited Moderator: Amanda Teichman, MD

Background: Damage control surgery (DCS) with or without adjunctive hepatic artery embolization is often performed during the initial operation in patients who sustain complex liver injuries with hemodynamic instability. However, extensive liver necrosis and a refractory biliary leak may require multiple percutaneous or endoscopic interventions and lead to increased liver-related morbidity and mortality. The purpose of this study is to present high-grade liver injury cases successfully treated by anatomical liver resection after the initial DCS or hepatic artery embolization and to reconsider the utility of sequential hepatectomy in complex liver trauma.

Methods: We retrospectively reviewed the medical records for all liver injury patients admitted to our hospital from January 2013 to December 2023. A total of 48 patients were identified. Of those, 11 patients were diagnosed with high-grade blunt liver injuries (AAST Grade III-V). The treatment modality and clinical outcome were explored.

Results: Of the 11 patients, 3 patients were managed with anatomical liver resection (hepatectomy group), and 8 patients were managed non-operatively (NOM group). Two patients in the hepatectomy group initially underwent DCS with perihepatic packing followed by hepatic artery embolization. Both patients had extensive injury to the hepatic right lobe complicated by biliary leak confirmed on cholangiography. Right hepatectomy was performed on post-injury day 7 and day 6, respectively. The third patient in the hepatectomy group was transferred from a local hospital for the management of liver injury. Vital signs were stable, but the computer tomography scan revealed extensive damage to the right lobe of the liver, along with a contrast blush extending to the peritoneal cavity. The patient underwent emergent hepatic artery embolization, and extended posterior-segmentectomy was performed on post-injury day 1. All 3 hepatectomy patients survived to the hospital discharge, and there were no liver-related complications. In comparison, the overall mortality and liver-related complication rate in the NOM group was 12.5% and 62.5%, respectively.

Conclusion: Our data suggest that anatomical liver resection during an early post-injury period can mitigate the risk of liver injury-related complications.

**DEVELOPING VIRTUAL REALITY EDUCATION OF
INTRAABDOMINAL HEMORRHAGIC DAMAGE
CONTROL SURGERY FOR YOUNG SURGEONS AND
MEDICAL STUDENTS**

Atsushi Nanashima, MD

Invited Moderator: Amanda Teichman, MD

The field of operative simulation systems using the latest computerized technology has witnessed significant advancements in the past two decades. Notably, the use of three-dimensional (3D) angiographic images from contrast-enhanced computed tomography (CT) has revolutionized surgical simulation and navigation, greatly enhancing the safety of surgical procedures. Recently, extended or cross-reality (XR) technology, such as virtual reality (VR) and augmented reality, has found applications in the field of surgery. To develop a VR platform for digestive surgery education with reasonable costs, We developed a prototype VR platform, VECTORS L&M (VLM), aiming to enhance the understanding of general surgery for students, interns, and young surgeons. The camera settings of the LUMIX GH5S were ISO 320, shutter speed 4000, anamorphic 3.3K, and 59.94 fps. The data captured using the Insta360 Pro2 camera was processed and converted into a 360-degree video. The operating field using the Insta360 Pro2 camera was used to convert the LUMIX footage into VR video format efficacy. The VLM provides four surgical contents including damage control surgical VR views from both 180-degree angles. The patient received traffic accidents and had a severe intraabdominal hemorrhage by liver laceration. Of the hemorrhagic shock with deadly triad, the patient underwent a damage control operation at the emergency room and a surgeon took an entire video with the wearable camera. This video was created with L.A.B. Co., and incorporates a virtual video. Twenty-eight participants and twenty students responded to our survey regarding trauma surgery. A majority (81%) reported positive experiences reality with the VR content and well-understood search for bleeding sources, Pringle's maneuver, and the adequate gauze-packing procedure under damage control surgery in comparison to classroom lectures. VR may be preferred over a fixed 2D video. Participants expressed the desire for future VR improvements, such as increased mobility, cloud connectivity, cost reduction, and better resolution. The VLM platform, coupled with this innovative teaching approach, offers experiential learning in intraabdominal trauma surgery, effectively enriching the knowledge of students and surgeons ahead of surgical education and training.

**LIVER INJURY WITH BLEEDING FROM EXTRAHEPATIC
COLLATERAL VESSELS ONLY: CASE SERIES.**

Natsuki Hashiba, MD

Invited Moderator: Amanda Teichman, MD

Introduction: Extrahepatic collateral arteries (EHAs) are clinically important when performing transarterial chemoembolization (TACE) of hepatocellular carcinoma (HCC). This is because blood flow from various arteries around liver to HCC is increased. Development of collateral arteries is related to size and location of tumor, and previous TACE or surgery. We report three very rare cases of liver injury with bleeding from EHAs only.

Case 1: 29-year-old male. He had a Grade IV liver injury in the posterior segment. Angiographic examination from the posterior hepatic branch showed no bleeding. Examination of the right inferior phrenic artery revealed extravasation, and embolization was performed.

Case 2: 67-year-old male. Hepatic injury was observed in dorsal caudal area of the anterior and medial segment with extravasation and a pseudaneurysm. There was no extravasation from the medial segment branch, and bleeding was detected only from the cholecystic artery.

Case 3: 43-year-old male. Hepatic injury was observed in cranial area of the medial segment, and no extravasation was seen from the left hepatic artery or the right inferior phrenic artery. Examination of the right internal thoracic artery revealed a pseudoaneurysm.

Discussion: All patients, with no history of liver disease, had blunt trauma due to traffic accident, and their intra-abdominal organ injury was only liver. The presence of intra-abdominal hemorrhage suggested rupture of liver capsule. However, angiography from hepatic arterial system showed no extravasation. Only studies from EHAs, which was assumed from respective injury site, showed extravasation, and hemostasis was successfully achieved in all cases. Injuries of EHAs could be caused by traction force applied to the fixed area of liver. Spontaneous hemostasis is not expected since there is no surrounding tissue or organ that could give compression. In particular, bare area, and segment IV, V and medial dorsal segment VI are the most frequently reported sites of collateral bleeding in HCC, and this knowledge is useful in liver injuries occurring in these areas.

Conclusion: Even though extravasation from hepatic artery is not detected during angiography, possible bleeding from EHAs should be considered especially when damaged site on contrast-enhanced CT is observed in the specific areas.

ANGIOEMBOLIZATION IN THE MANAGEMENT OF ABDOMINOPELVIC INJURIES: A 2-YEAR CASE SERIES AND EARLY EXPERIENCE FROM A MAJOR TRAUMA CENTER IN THE PHILIPPINES

Delbrynth Smigel, Rene Ogatis, MD

Invited Moderator: Amanda Teichman, MD

Introduction: Angioembolization (AE) plays a crucial role in the management of trauma by providing an effective and minimally invasive approach to treat abdominal solid organ and pelvic injuries. While it has been widely utilized in developed countries worldwide, there is paucity of data with the role of AE in the Philippines because of lack of accessibility to infrastructure, equipment, and skilled personnel in all of the identified trauma centers nationwide.

Methods: All patients with AIS ≥ 3 injuries in the liver, spleen, kidney, and pelvis, who underwent AE at our institution from April 2022 to March 2024, were included in the study. The patients’ demographic data, clinical presentation, imaging and intraoperative findings, and outcomes were collected.

Results: There were 16 patients included in the study. The median age was 29.5 years and 13 (81.3%) patients were males. 6 (37.5%) of the patients presented with hemodynamic instability at the emergency department. The main cause of injury was blunt trauma in 15 (93.8%) patients. The most common indication of AE was presence of active bleeding on CT scan. The most common injury was in the liver (37.5%), followed by the spleen (31.3%), kidney (18.8%), and the pelvis (18.8%). Of the 13 patients who had solid organ injuries, 9 (69.2%) were managed conservatively followed by AE. No failure of nonoperative management was documented. Moreover, 4/13 (30.8%) patients underwent damage control laparotomy followed by AE, wherein 3 had closure on the second surgery while 1 died due to cardiogenic shock on the 7th hospital day prior to third surgery. All patients who had pelvic injuries underwent AE prior to external fixation, with one case complicated by acute limb ischemia. Median hospital length of stay was 17 days for all patients.

Conclusion: Our data, though limited, exemplifies the significance of the utility of advanced interventional techniques in trauma care. Given the numerous studies reporting improvement

of outcomes when used as an adjunct to treatment approach, AE should be made available in all identified trauma centers throughout the country.

Profile of patients who underwent angioembolization from April 2022–March 2024

Patient	Age/Sex	Mechanism of Injury	Hemodynamic Status	Grading of Injured Organ that had AE	Management	Complications	HLOS in days	Outcome
1	17/M	B	Stable	Grade IV spleen	NOM + AE	None	17	Discharged
2	11/M	B	Stable	Grade IV kidney	NOM + AE	None	7	Discharged
3	62/M	B	Stable	Grade III spleen	NOM + AE	HAP	20	Discharged
4	20/M	B	Stable	Grade IV spleen	NOM + AE	None	20	Discharged
5	34/F	B	Unstable	Pelvic injury	AE + EF	Acute limb ischemia	62	Discharged
6	26/M	P	Unstable	Grade III liver	DCL + AE	None	19	Discharged
7	21/M	B	Stable	Grade V kidney	NOM + AE	Secondary HTN	16	Discharged
8	33/M	B	Stable	Grade IV liver	NOM + AE	HAP, ALF	9	Discharged
9	22/M	B	Stable	Grade IV liver	NOM + AE	None	8	Discharged
10	36/F	B	Stable	Pelvic Injury	AE + EF	Cardiac dysrhythmia	28	Discharged
11	29/F	B	Unstable	Pelvic injury	AE + EF	None	18	Discharged
12	28/M	B	Unstable	Grade IV liver	DCL + AE	Biloma	27	Discharged
13	34/M	B	Unstable	Grade IV liver	DCL + AE	Liver abscess	25	Discharged
14	30/M	B	Stable	Grade V spleen	NOM + AE	None	14	Discharged
15	35/M	B	Unstable	Grade IV liver	DCL + AE	Cardiac dysrhythmia, AKI, VAP, Sepsis, TIC	7	Mortality
16	30/M	B	Stable	Grade V spleen; Grade IV kidney	NOM + AE	None	15	Discharged

B = blunt; P = penetrating; NOM = nonoperative management; AE = angioembolization; EF = external fixation; DCL = damage control laparotomy; HTN = hypertension; HAP = hospital-acquired pneumonia; ALF = acute liver failure; AKI = acute kidney injury; VAP = ventilator-associated pneumonia; TIC = trauma-induced coagulopathy



**ORAL PAPERS IVA:
SYSTEMS/PEDIATRICS/
BURNS PAPERS 96 - 101**

Friday, September 13, 2024

2:40 PM - 3:50 PM

Location: SKYVIEW I 26th Floor

Moderator: Laura Haines, MD

IN THE MIDST OF CHAOS: NAVIGATING PAEDIATRIC BURN AND CHEMICAL INJURY CARE IN ARMED CONFLICT ZONES

Kathryn Campos, MD

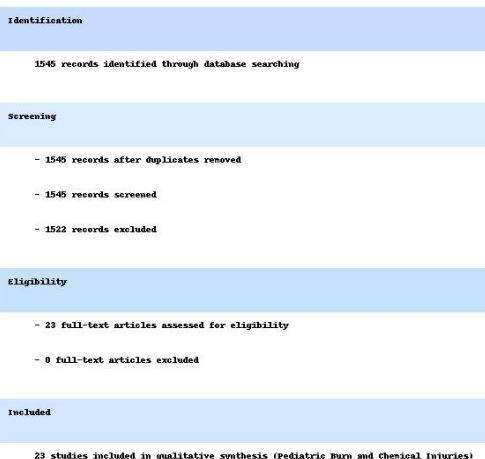
Invited Moderator: Laura Haines, MD

Introduction: Paediatric burn injuries, including chemical burns, present a unique and dire challenge in armed conflict settings. The vulnerability of children to such injuries, compounded by the chaos of war, calls for urgent attention and specialized care. This systematic review aims to evaluate the current landscape of paediatric burn care, particularly chemical burn injuries, in these high-risk environments and propose strategic interventions.

Methods: We conducted a comprehensive systematic review of 1,545 records across databases including PubMed, Embase, and Cochrane Library. Our focus was on reports that specifically addressed paediatric burn injuries and paediatric chemical burns within the context of armed conflicts.

Results: Out of the initial 1,545 records, 23 were selected for inclusion. These reports detailed various aspects of paediatric burn care, ranging from initial management and surgical interventions to long-term rehabilitation. They highlighted the complexity of treating chemical burns in children, underscoring the need for specialized resources and training in conflict zones. Despite the efforts detailed in these reports, a significant gap remains in both practical care strategies and policy-level interventions for these vulnerable populations.

Conclusion: The review underscores the acute need for targeted initiatives and enhanced infrastructure to address paediatric burn injuries, especially chemical burns, in armed conflict settings. Prioritizing paediatric care in these scenarios is not just a medical necessity but a humanitarian imperative. Collaboration between medical professionals, humanitarian organizations, and policymakers is crucial to improve outcomes for these young victims of war.



URGENCY TO BUILD PREHOSPITAL SYSTEMS IN INDIA TO IMPROVE MORTALITY

Divya Kewalramani, MD

Invited Moderator: Laura Haines, MD

Introduction: Chain of Survival (COS) emphasizes the importance of a trauma care framework in improving patient outcomes and reducing preventable deaths. Implementation in India has been hindered by inadequate infrastructure, limited resources, and the absence of a legal framework that guarantees access to timely care. To establish Right to Trauma Care (RTC) in India, it is essential to examine the current state of trauma care services and identify the gaps. This study aims to analyze data on trauma care delivery, focusing on the time taken to access medical treatment, availability of essential resources, and impact on patient outcomes.

Methods: A national stakeholder consultation convened government, medical, and civil society representatives in October 2023. Qualitative interviews were conducted to elucidate existing challenges in emergency medical services, encompassing pre-hospital care, ambulance services, and in-hospital treatment protocols. On-site audits of over 100 medical facilities and 50 ambulances across multiple states evaluated protocols, infrastructure, equipment, and human resources. Standardized checklists and assessment tools assessed trained staff availability, response times, guideline adherence, and patient outcomes. Thematic analysis identified common challenges; descriptive statistics summarized key audit findings.

Results: Audits found only 2% of medical facilities had adequate equipment, infrastructure, and manpower resources for providing trauma care. 91% of hospitals had ambulances which transported mostly deceased patients (98.5%), lacked equipment/oxygen (90%), and did not have trained personnel (95%). 30% of mortality was due to delayed emergency care. All hospitals lacked pre-hospital notification systems. There were no dedicated trauma surgeons and very few designated trauma centers. Orthopedic surgeons led trauma response in 50% of facilities without specific training in trauma care. 45% of registered deaths in 2020 (approximately 3.6 million) occurred without medical attention at time of death.

Conclusion: Audits and qualitative data demonstrated the lack of COS trauma care and high resulting mortality rate in India. These evidence-based insights seek to inform policymakers and healthcare authorities about the importance of establishing a statutory RTC framework in India. The RTC is not only a moral imperative but also a necessary step towards reducing the burden of traumatic injury in India.



ENHANCING CIVIL-MILITARY SYNERGY IN SURGICAL CARE: STRENGTHENING LOCAL HEALTH SYSTEMS FOR ROBUST HUMANITARIAN RESPONSE IN ARMED CONFLICT AND DISASTER SETTINGS

Kathryn Campos, MD

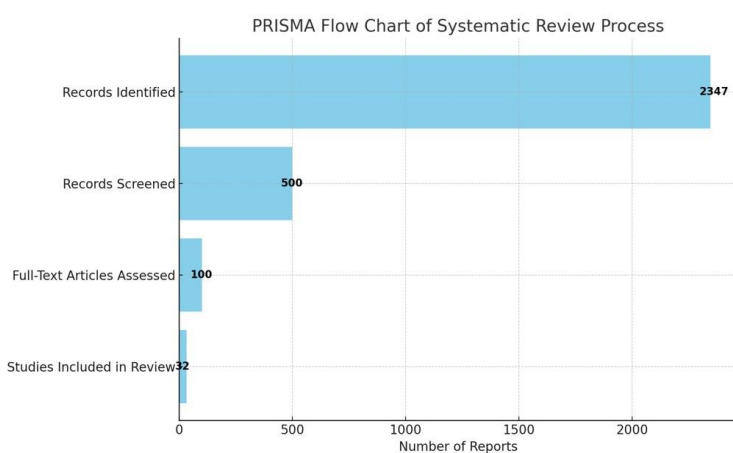
Invited Moderator: Laura Haines, MD

Introduction: The nexus between civil-military trauma care, surgical operations, and global health security in armed conflict and humanitarian disaster settings remains underexplored. This systemic review aims to bridge this gap by scrutinizing the interplay between these elements and their collective impact on the protection and medical treatment of civilians in conflict zones.

Methods: An extensive review of 2347 reports from databases including PubMed, Embase, and Google Scholar was undertaken. The criteria for inclusion focused on studies detailing civil-military emergency medical team operations, humanitarian surgical strengthening, and their role in enhancing global health security in austere environments.

Results: Of the initial pool, 32 reports met the inclusion criteria. They covered topics ranging from civil-military cooperation logistics in medical emergencies to enhancing surgical capacity in dire situations. A key theme emerged: the vital role of local healthcare workforce, HMOs, NGOs, and Civil-Military actors in developing and executing health security programs. This local involvement ensures contextual relevance and sustainability, thus improving surgical care effectiveness in conflict and disaster settings.

Conclusion: The review highlights a critical literature gap in integrating civil-military trauma care with humanitarian surgical strengthening and global health security. Emphasizing the need for locally informed health security programming, it calls for empowering civil-military, local healthcare workforce, HMO, and NGO coordination. This collaboration is essential for delivering effective surgical care and enhancing global health security in areas affected by armed conflict and humanitarian crises. The focus on local involvement and sustainable practices is key to long-term health system resilience in austere environments.



**CONFRONTING THE CRISIS: ADVANCING BURN INJURY
TREATMENT IN AUSTERE ENVIRONMENTS AMIDST
GLOBAL CHALLENGES**

Kathryn Campos, MD

Invited Moderator: Laura Haines, MD

Introduction: Burn injuries are a significant concern in austere environments, where access to specialized surgical care is often limited. This challenge is intensified by the destabilizing effects of armed conflicts and humanitarian crises on healthcare systems. Although recent initiatives have made strides in improving access to burn care, promoting injury prevention, and driving global advocacy, there is still a critical need for comprehensive research and sustainable solutions in burn care within these challenging settings.

Methods: Our systematic review encompassed several databases, including PubMed, Embase, and Google Scholar, to identify relevant literature on strategies for improving burn surgery in austere environments.

Results: Out of 1,232 identified records, 16 were deemed pertinent for review. These reports highlighted initiatives to improve access to burn surgical care and training in austere environments. They covered general aspects of civilian burn care access and injury types, along with interventions to strengthen burn surgical services. However, there was a notable lack of detailed quantitative and qualitative evaluations of burn surgery training and care implementation by local and humanitarian clinicians in these settings.

Conclusion: There is a paucity of comprehensive literature on initiatives to enhance burn surgical care and training programs in austere environments. Developing and prioritizing such initiatives, particularly in training for humanitarian surgical services, is essential to improve civilian health outcomes in humanitarian contexts.

**AUTOLOGOUS CELL HARVESTING DEVICE AND
COPOLYMER-BASED EPIDERMAL SKIN SUBSTITUTES
FOR THE MANAGEMENT OF PARTIAL-THICKNESS
FACIAL BURNS**

Alfredo Cordova, MD

Invited Moderator: Laura Haines, MD

Introduction: Facial burns may be devastating and disfiguring injuries leading to significant identity, social, psychological, and emotional issues. Hypertrophic scarring and dyspigmentation are common with operative and nonoperative management. Autologous split-thickness skin grafts may be indicated in some instances. The autologous "spray-on skin" (ASOS) has achieved definitive closure of burn injuries by enabling autologous skin cell suspension (ASCS) to be applied as an epidermal autograft achieving good scarring outcomes in addition to effective healing. Copolymer-based epidermal skin substitutes have been described to be used in combination with ASOS to cover treated dermal wounds. Combining both methodologies may allow for improved wound healing, earlier re-epithelialization, and lead to better aesthetic and functional outcomes for partial-thickness facial burns.

Methods: Eight patients with superficial and deep partial-thickness facial skin burns underwent tangential excision using the "hydro-scalpel". A partial thickness donor sample was harvested at 0.008 inch and ASCS was prepared through enzymatic and mechanical disaggregation utilizing ASOS. After early tangential excision, ASCS was evenly sprayed on the prepared bed wound on the face, and these areas were covered with Polylactic acid epidermal skin substitute. Dressings were removed by POD#7.

Results: Complete wound closure and early epithelialization and pigmentation was observed upon takedown of the dressings. No evidence of hypertrophic scarring, enhanced pigmentation or infection was observed upon 10, 30, and 60 days of follow-up. The patients experienced no complications and were pleased with the final outcome.

Conclusion: We demonstrate the efficacy of precise dermal excision followed by application of ASCS and copolymer-based epidermal skin substitute as a safe modality for the treatment of partial-thickness facial burns with improved functional and aesthetic outcomes.

DISPARITIES IN EMERGENCY NEUROSURGICAL ACCESS FOR TRAUMATIC BRAIN INJURY CARE IN THAILAND A GEOSPATIAL PERSPECTIVE

Arnav Mahajan, MD

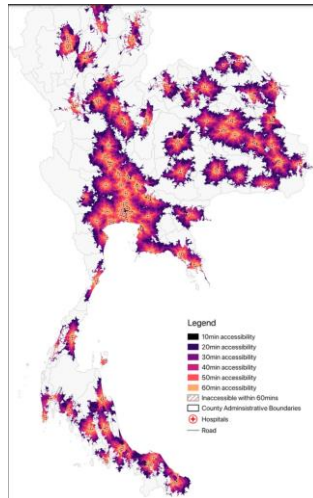
Invited Moderator: Laura Haines, MD

Introduction: The incidence of traumatic brain injury (TBI) in Thailand is high. This poses critical health system challenges as Thailand does not have dedicated trauma centers, forcing the referral of TBI cases to hospitals equipped with neurosurgical facilities for advanced treatment. The escalating incidence of TBI, coupled with a diminishing neurosurgical workforce, necessitates a critical evaluation of the nation's capacity to provide emergency neurosurgical trauma care.

Methods: We utilized geospatial mapping through QGIS and R to analyze the accessibility to definitive neurosurgical care for TBI patients. To model national TBI prevalence, we applied probabilistic sampling to a geospatial record of road traffic accidents in 2022. We stratified our results as national accessibility to emergency neurosurgical care, national accessibility for TBI care, and regional accessibility for TBI care. Accessibility metrics were reported as population and distance-to-care metrics.

Results: Out of 95 hospitals with neurosurgical capacity, 9 lacked full-time neurosurgical staffing. Using Dijkstra's algorithm, we identified that 44% of the population lacked access to any emergency neurosurgical center within an hour of care [Figure 1]. Probabilistic sampling estimated 94,096 potential TBI patients. Nationally, TBI patients would not be able to receive timely care in 24% of the cases. For the health service regions of Thailand, only 4/13 health regions had hospitals staffed with at least one neurosurgeon. For the three urban regions, the mean TBI patient travel distance was 6.2km (13 minutes). The sole rural hospital's mean distance was 96.8km (77 minutes).

Discussion: Our study illuminates a critical gap in Thailand's readiness to provide timely trauma care for TBI patients. The national disparity in access reflects urgent need to increase efforts for neurosurgical training, upskilling of general surgeons, and optimizing extant surgeon distribution to rural regions. The disparities between urban and rural care reflect a stark inequality that could have significant ramifications for patient outcomes. The data suggests that realignment towards regionalized trauma center networks for the 11 health regions that do not have neurosurgical care capacity could improve access to care.





**ORAL PAPERS IVB:
TRAUMA PREVENTION
PAPERS 102 - 111**

Friday, September 13, 2024

2:50 PM - 4:30 PM

Location: SKYVIEW II 26th Floor
Moderator: Thomas Duncan, DO

**APPLYING THE FIVE PILLAR APPROACH TO REDUCE
MOTORCYCLE DELIVERY DRIVER [MDD] INJURIES:
THE QATAR EXPERIENCE**

Rafael Consunji, MD

Invited Moderator: Thomas Duncan, DO

Background: During the COVID-19 lockdown period in Qatar, there was a marked increase in the dependence on motorcycle deliveries of food and groceries. This led to a significant increase in the number of registered motorcycles and injuries and deaths from injuries to MDDs. A multi-sectoral response to increase safety for MDDs was implemented, based on the Five-Pillar Approach recommended by the Global Plan for the Decade of Action for Road Safety [DoARS].

Objective: To describe the multi-sectoral response, to reduce injuries MDDs, based on the Five-Pillar Approach recommended for DoARS.

Programme Description: The problem was clearly identified and defined, it was brought to the attention of the National Traffic Safety Committee and the Traffic Directorate and a stakeholder meeting was convened. A plan to increase enforcement of licensing requirements for MDDs, implement high-visibility motorcycle designs requirements, safety training for all MDDs and increase public awareness was created and implemented.

Outcome and Learnings: Monitoring of MDD injuries through the Qatar National Trauma Registry showed a 20% reduction in moderate to severe MDD injuries despite a 320% increase in registered motorcycles.

Implications: A multi-sectoral motorcycle safety program, based on the recommended Five-Pillar Approach, can significantly reduce injuries to MDDs.

Conclusion: MDD injuries can be reduced through the identification of this high-risk and emerging injury risk area and the implementation of timely multi-sectoral injury prevention campaigns.

ACCESSIBILITY AND READABILITY OF ONLINE PATIENT EDUCATION MATERIALS ON FIREARM SAFETY: A CROSS SECTIONAL ANALYSIS OF HOSPITAL AND NATIONAL INJURY PREVENTION LITERATURE

Nicholas Beattie, MD

Invited Moderator: Thomas Duncan, DO

Introduction: Gun violence is a preventable public health crisis with rising epidemiologic trends. However, healthcare providers rarely disseminate firearm injury prevention resources. Therefore, patients may seek out online injury prevention resources (OIPRs), whose effectiveness as educational tools depends on their readability. Our investigation seeks to understand the practical utility and readability of firearm injury OIPRs provided by hospitals and national organizations.

Methods: We analyzed firearm injury OIPRs from two primary resources: trauma centers (TC) accredited by the American College of Surgeons, and national health organizations. We examined resources directed towards child safety. We assessed readability metrics using reading time, Flesch-Kincaid reading level, Flesch reading ease, and text compositional structure through korPus package on R. We excluded multimedia, and mixed-methods resources requiring an in-person component.

Results: 105 trauma centers offered firearm injury OIPRs. Level 1 TCs were more likely to provide resources for both adults (18% availability) and pediatrics (49% availability) compared to Level 2 (7%, adults; 18%, pediatrics) and Level 3 TCs (16%, adults). After removing duplicates, we included 53 hospital OIPRs and 23 national OIPRs. Notably, 11 TC OIPRs lacked pediatric injury prevention information, whereas all national OIPRs addressed this critical area. Average reading time of hospital resources was 169s (vs. 208s in national resources, $p=0.47$). Assessment of Flesch-Kincaid revealed resources from both groups were above the average recommended health literature 6th grade reading level (8.2 vs 8.2, $p=0.96$). Flesch reading ease demonstrated resources were fairly difficult to read between both OIPRs (63 v 58, $p=0.13$) [Figure 1].

Conclusion: The majority of current OIPRs on firearm injury fail to comply with recommended readability standards. Given the lack of healthcare provider counseling, this could exacerbate existing disparities in groups with lower health literacy and access to healthcare services. There is insufficient pediatric firearm safety education in 21% of hospital OIPRs, despite it being a leading cause of pediatric death in the United States. Future research should identify the role of commercial firearm safety information and standardize the readability of

firearm safety

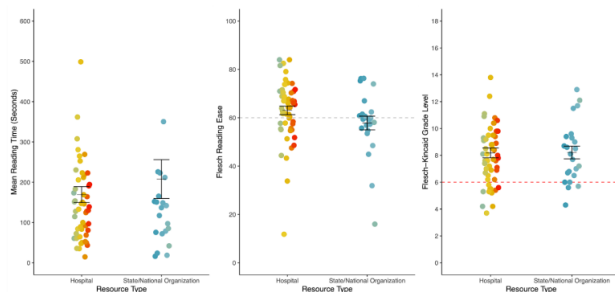
education materials. It

should also ensure

accessibility to

disproportionately

impacted populations.



CHARACTERIZING AND COMPARING BICYCLE INJURY TRENDS: STANDARD, MOUNTAIN, AND ELECTRIC BIKES IN THE UNITED STATES (2013-2022)

Ryan Frier, MD

Invited Moderator: Thomas Duncan, DO

Objective: The purpose of this study is to characterize and compare trends in injuries resulting from standard, mountain, and electric bicycles among adults in the United States.

Methods: Data were analyzed from the National Electronic Injury Surveillance System (NEISS) regarding standard, mountain, and electric bicycle injuries treated in U.S. emergency departments from 2013 - 2022. Sample weights were applied to determine trends in yearly incidence, patient demographics, and injury patterns.

Results: There were an estimated 2,814,236 bicycle injuries from 2013 - 2022 (standard: 2,655,278, mountain: 96,022, electric: 62,937). While standard bicycle injuries comprise the majority of total bicycle injuries, the proportions of mountain and electric bike injuries have increased over time (Table 1, Fig 1). Patients with mountain and electric bike injuries tend to be older (Fig 2). Mountain bike injuries more commonly involve upper extremities, particularly fractures and dislocations (Fig 3, 4). Electric bike injuries are more likely to involve the face and lower extremities (Fig 3), be associated with alcohol and drug use, and result in hospitalization (Table 3).

Conclusions: Injury patterns are significantly different between standard, mountain, and electric bikes. The rapid increase in the incidence of electric bikes may be a cause for concern, given an older patient age distribution, a greater association with alcohol and drug use, and a greater risk of hospitalization. The significant increase in upper extremity injuries among mountain bicyclists may indicate a greater need for specialized protective equipment such as elbow guards and body armor.

LOCALIZING GLOBAL ROAD SAFETY FRAMEWORKS: EFFICACY OF THE ZERO FATALITY CORRIDOR MODEL IN REDUCING ROAD CRASH MORTALITY IN INDIA

Divya Kewalramani, MD

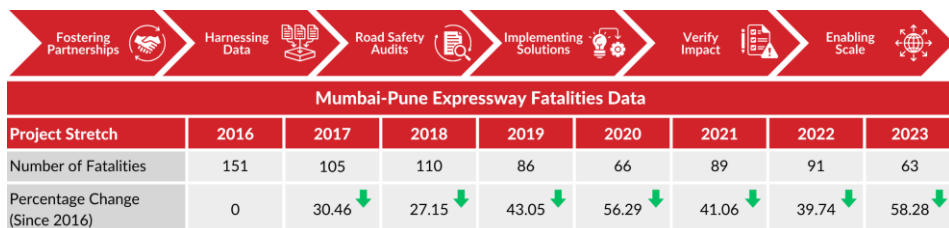
Invited Moderator: Thomas Duncan, DO

Introduction: Road safety in India faces critical challenges, including a shortage of ambulances, illegal parking, infrastructure issues, and a culture of lane indiscipline, exacerbating the risk of road crash fatalities (RCF). In 2017, SLF, in collaboration with the State of Maharashtra, India, introduced the ZFC model, an adaptation of the safe system approach focusing on road engineering, police enforcement, rapid emergency care, and community engagement. We hypothesized ZFC implementation (ZFC-I) would reduce mortality on high-risk highways in India, potentially serving as a replicable model for improving road safety.

Methods: In 2017, ZFC was first implemented on the deadliest highway in India, the Mumbai-Pune Expressway (MPEW). From 2010-2015, MPEW witnessed 1,758 accidents, resulting in 690 deaths and 1,655 serious injuries. By combining forensic crash investigation (application of Haddon's Matrix), crash reconstruction (PC-Crash 14), and scientific Crash Vulnerability Audits (CVA), the development of the ZFC model was rooted in a data-driven, evidence-based approach. This included resolving over 3,800 engineering defects, strengthening traffic law enforcement, enhancing emergency response capabilities with a network of ambulances and trained paramedics, and raising road safety awareness among road users and local communities. Fatality data was compared before and after the first 2017 ZFC-I from 2016 to 2023.

Results: Compared to 151 fatalities in 2016, implementation of ZFC on MPEW led to a significant reduction in RCF: 30% in 2017 ($p=0.01$), 43% in 2019 ($p=0.02$), 41% in 2021 ($p=0.001$) and 58 % in 2023 ($p=0.001$). Ambulance response times were reduced from 55 to 20 minutes ($p=0.001$) and patient handover times from 268 to 160 minutes ($p=0.01$), while increasing ambulance fleet utilization by 270% ($p=0.001$).

Conclusion: ZFC-I on MPEW resulted in sustained mortality reduction. This has resulted in work by the Government of India and SLF to replicate the model on 100 other high-risk highways.



PEDESTRIAN SAFETY IN QATAR AFTER A DECADE OF ACTION FOR ROAD SAFETY: ANALYZING NATIONAL STATISTICS AND NATIONAL TRAUMA REGISTRY DATA

Rafael Consunji, MD

Invited Moderator: Thomas Duncan, DO

Introduction: Road traffic injuries [RTIs] are the leading cause of preventable mortality in Qatar. In 2011, the country opted to participate in the Decade of Action for Global Road Safety [DoARS], with the goal to reduce the number of road traffic deaths and injuries by 50% by 2020. The objective of this study is to analyze indicators of road safety in Qatar, from 2011-2020, by combining national statistics and trauma registry data to report the status of road safety in Qatar and make recommendations to further improve road safety

Methods: Data on all patients with moderate to severe road traffic injuries seeking hospitalization and/or care from 2011-2020, were collected from the trauma registry of the national Level 1 trauma referral center. Monthly and annual aggregate data on road traffic deaths, injuries and motor vehicle crashes, from the publicly accessible website of the Ministry of Development, Planning and Statistics were likewise collected.

Results: The RTI death rate [per 100,000 population] was reduced by 61% and the RTI rate reduced by 38%, from 2011 to 2020. The pre-hospital RTI death rate dropped by 60% while the in-hospital RTI death rate was reduced by 65%. It is estimated that 858 potential road deaths were prevented during the DoARS in Qatar.

Conclusion: The participation in the Decade of Action for Global Road Safety, by complying with the UN-recommended 5-pillars approach, by Qatar has resulted in reductions in road deaths and injuries that exceed the goals set by DoARS.

**IMPACT OF THE COVID-19 STAY AT HOME ORDER AND
HOUSEHOLD INCOME ON PENETRATING TRAUMATIC
INJURY RATES**

Lindsey Braden, MD

Invited Moderator: Thomas Duncan, DO

Introduction: Unprecedented public health safety measures instituted in the state of California to reduce the spread of COVID-19, such as the mandatory statewide stay-at-home (SAH) order issued on March 19, 2020, led to significant social and economic disruptions in daily life. We conducted a retrospective analysis comparing assaults, penetrating injuries sustained, and related mortalities before and during the pandemic, and further explored the average income of the area of injury to determine if socioeconomic status was a determinant of violent crime incident rates.

Methods: This retrospective cross-sectional study utilized Kern Medical's trauma registry to identify patients in Kern County who presented to the emergency department with a gunshot wound (GSW), stab wound, or assault between March 2019 and February 2021. Each case was categorized as pre-COVID or COVID and further subclassified as lower income and higher income based on California census data.

Results: Our study found 803 patients met inclusion criteria. The overall incidence of stab wounds relatively decreased during COVID ($p=0.0027$) while the incidence of GSWs relatively increased ($p=0.0041$) (Table 2). Furthermore, higher-income areas had a relatively more significant increase of GSWs during COVID ($p=0.0004$) and concomitantly stab wounds significantly decreased ($p=0.0201$) (Table 3). Both lower and higher income areas, and especially the higher income areas, experienced a seemingly higher increase in mortality (Table 3).

Conclusion: The geographical distribution of trauma suggests that trauma prevention education should be delivered to the entirety of Kern County with emphasis directed toward aggressive crimes during times of heightened stress such as the Stay At Home Order.

CHARACTERISTICS OF TRAIN-RELATED INJURIES IN JAPAN: ASSOCIATIONS WITH SUICIDE

Kenta Shida, MD

Invited Moderator: Thomas Duncan, DO

Background: In Japan, the overall suicide rate is notably high, ranking as the seventh leading cause of death. Given the prevalence of train usage as a common method of transportation, it can be assumed that train-related injuries (TRI) often result from suicide. This study aims to elucidate the characteristics of TRI, including age distribution, injury sites and severity, and the association between these characteristics and suicide in Japan.

Methods: During the study period, cases of train-related traumas transported to hospitals across Japan were extracted from the Japan Trauma Data Bank (2019-2022). Analyses encompassed age, gender, cause of TRI, anatomical sites, severity of injuries, and invasive interventions.

Results: Among registered cases, a total of 462 patients were enrolled. The mean age was 43, with the 20s age group comprising the highest proportion (24.8%) (Figure 1). 61% were male, and the median Injury Severity Score was 25. The most common cause of TRI cases was suicide (55.6%), followed by accidents (34.5%), unknown causes (8.8%), and cases with missing data (1.1%). In this study, it was observed that suicides outnumbered accidents among individuals aged below 20, whereas accidents were more prevalent among individuals aged 70 and above (Figure 2). The mortality rate was 48.1%. Notable injuries, defined as AIS greater than or equal to 3, included head (52.4%), chest (49.9%), abdomen (9.0%), and pelvis/lower limbs (41.6%). When compared to cases with other causes, individuals in the suicide group were significantly more common at younger ages, predominantly females, had higher injury severity scores, and experienced severe head and chest injuries. However, no significant difference was observed between the suicide and other cause groups regarding mortality rates.

Conclusion: The cause of TRI in Japan predominantly stems from suicide. The clinical patterns observed in TRI exhibit some unique features. These findings may pave the way for future advancements in trauma care and potentially the prevention of TRI.

Fig 1. The Incidence Rate of TRI by Age Group

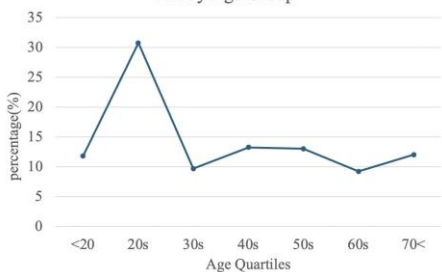
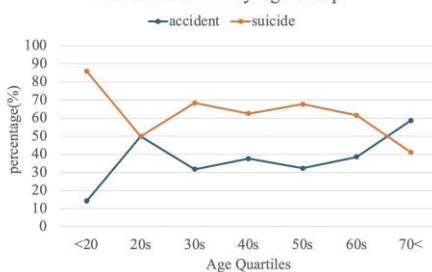


Fig 2. The Proportion of Suicides and Accidents in TRI by Age Group



**CHANGING PATTERNS OF TRAUMA ADMISSIONS
FOLLOWING SELF-HARM AND SUICIDE ATTEMPTS: A
FIVE-YEAR ANALYSIS IN A KOREAN REGIONAL
TRAUMA CENTER**

Byungchul Yu, MD

Invited Moderator: Thomas Duncan, DO

Background: The prevalence of self-harm and suicide is increasing in Korea. This study aims to investigate the changes in the prevalence of trauma admissions following self-harm and attempted suicide in a Korean Regional Trauma Center.

Methods: We analyzed data on admissions to Incheon Regional Trauma Center from 2017 through 2022. Patients were grouped by age (18, 18-65, >65 years), and demographics, mechanism of injury, injury severity, and mortality were analyzed across age groups.

Results: A total of 704 cases were included in this study: 47 (6.7%) patients were under 18 years old, 531 (75.4%) were aged 18-65 years, and 63 (8.9%) were over 65 years old. Over the years, the prevalence increased in the age groups of 18 and >65. The majority of cases involved stab injuries (333, 47.3%), followed by falls from height (216, 30.7%). In the 18 and >65 age groups, falls from height were the most common mechanism of injury. The overall mortality rate was 14.9%: 17% in the 18 age group, 11.5% in the 18-65 age group, and 25% in the >65 age group, respectively.

Conclusion: The findings of this study underscore the escalating prevalence of trauma admissions following self-harm and attempted suicide, particularly among the younger and older age groups, in Korea.

COULD SEVERE SANCTIONS PREVENT DRUNK-DRIVING INJURIES? A RETROSPECTIVE NATION-WIDE COHORT STUDY FROM THE NATIONAL HEALTH INSURANCE RESEARCH DATABASE

Ling-wei Kuo, MD

Invited Moderator: Thomas Duncan, DO

Background: Driving under the influence (DUI) contributes to a significant portion of traffic accidents in Taiwan. Among these crashes, alcohol-related incidents predominate in Taiwan. From 2008 to 2013, the administrative and legislative departments collaborated to adjust the amount of fines and the length of jail time penalty for drunk driving. The goal of this study is to analyze if the sanction change affected the incidence of drunk-driving and the subsequent hospital admission.

Methods: We retrospectively analyzed the data from the National Health Insurance Research Database (NHIRD) from 2004 to 2019. In this interval, three penalty changes were made in January 2008, December 2011, and June 2013. We employed interrupted time-series analysis (ITSA) method to examine the effect of different policy interventions on the number of drunk-driving injuries and deaths, and the related hospital admission outcomes.

Results: From January 2004 to January 2008, the number of drunk-driving injuries and deaths gradually increased over time. After the first penalty adjustment, the incidence showed an abrupt drop, but the time trend seemed similar to the first period with a gradual increase in numbers at the interval between January 2008 and December 2011. At the second law penalty adjustment, the incidence also demonstrated an immediate drop, and the slope showed a gradual decrease in the period of December 2011 to June 2013. At the third penalty adjustment, the incidence of drunk-driving injuries had another drop, but the trend of the last segment showed a stable incidence of drunk-driving numbers, with no obvious positive or negative effect.

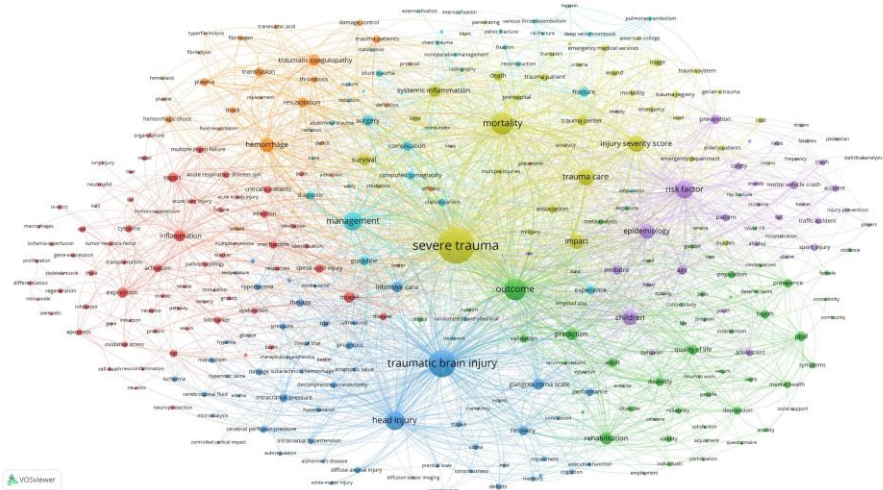
Conclusions: Increasing the fine and maximum jail sentence of DUI offenders seems to have an immediate effect on drunk-driving incidence, but the long-term effect of the policy change might have different outcomes after each adjustment. A plateau effect that blocks the deterrence of the maximum penalty might exist. Further long-term analysis should be conducted to examine the influence of the policy change.

BIBLIOMETRIC AND VISUAL ANALYSIS OF SEVERE TRAUMA LITERATURE IN THE PAST 20 YEARS

Rui Li, MD

Invited Moderator: Thomas Duncan, DO

Severe trauma is a fundamental discipline in medicine, with profound implications for patient care and outcomes. Over the past 20 years, the domain of severe trauma research has witnessed substantial evolution, marked by a surge in research activity and associated literature publications. This study embarks on an examination of the publication status within the severe trauma domain, aiming to elucidate prevailing research trends and identify areas warranting further development to guide future insights. We retrieved a total of 16,939 relevant publications in the severe trauma field over the past 20 years and conducted bibliometric analysis. Results indicate a steady growth in annual publications on severe trauma research, with the United States leading in both publication volume and citation frequency. We summarized productive countries/regions and research institutions and depicted a collaborative network among researchers and institutions, showcasing extensive cooperation across different countries and institutions. Significant progress has been made in severe trauma research in clinical diagnosis, treatment, epidemiology, prevention, and pathogenesis. However, despite advancements, the utilization of cutting-edge interdisciplinary methods in trauma-related research remains lagging. In conclusion, this study provides a comprehensive depiction of the current status of the severe trauma field and proposes opportunities and innovative directions for future development.





**ORAL PAPERS V:
QUALITY IMPROVEMENT
PAPERS 112 - 121**

Friday, September 13, 2024

3:50 PM - 5:00 PM

Location: SKYVIEW I 26th Floor
Moderator: Marcelo Ribeiro, PhD

Oral Papers V: Quality Improvement Papers 112 - 121
 Paper 112: 3:10 PM - 3:20 PM
**GETTING WITH THE GUIDELINES: GERIATRIC
 TRAUMA ACTIVATION**

Randeep Jawa, MD

Invited Moderator: Marcelo Riberio, PhD

Introduction: The ACS Committee on Trauma recently revised geriatric trauma activation criteria. Accordingly at our facility, the partial or full trauma team is activated for geriatric patients with SBP 110, HR >120, fall on anticoagulant/antiplatelets, any long bone fracture, or GCS13. We evaluated the effects of the revised criteria.

Methods: A retrospective review of the trauma registry at a level 1 trauma center for all patients age ≥ 65 years presenting to the ED who were hospitalized with blunt traumatic injury during the 11 months before (2022) and after (2023) institution of the revised trauma team activation criteria.

Results: Hospitalizations following trauma team activation meeting registry inclusion criteria.

	2023	2022	p-value
Partial and full trauma team activation (n)	382	158	-
Fall as mechanism of injury	83.0%	76.6%	0.06
Anticoagulant/antiplatelet use	66.0%	41.8%	0.001
Injury Severity Score (median, IQR)	9 (5,14)	11 (7, 19)	0.001
Head/Neck AIS ≥ 3 (%)	28.3%	34.8%	0.94
Hospital length of stay (days, median, IQR)	7 (5,11)	10 (5, 15)	0.001
ED disposition: ICU	44.8%	51.9%	0.17
Complications	29.8%	23.4%	0.22
In-hospital mortality	5.8%	10.1%	0.06

Conclusions: Trauma team activation reduced ($p > 0.001$) the time to index CT vs non-activations (2023: 46 min (IQR 39,57) vs 185 min (130, 251) and 2022: 48 min (IQR 42,63) vs 217 (145,302)). Post guideline implementation patients were more often on anticoagulants/antiplatelets, but were less severely injured, with shorter hospital length of stay. The volume of trauma activations that were admitted increased by 2.4-fold following the revised guidelines in 2023. Further the volume of trauma activations with injury meeting registry criteria not requiring hospitalization increased from 20 to 139. Finally the volume of trauma team activations that did not meet criteria for inclusion in the trauma registry increased over 9-fold from 87 to 821. Given the intensive resources required for trauma activation in less severely injured patients, further study is indicated for optimal activation criteria.

WITHDRAWN

COST-EFFECTIVENESS OF WHOLE-BODY COMPUTED TOMOGRAPHY (PAN-SCAN) FOR DIAGNOSTIC OF MULTIPLE TRAUMA PATIENTS IN PHRAPOKKLAO CHANTHABURI HOSPITAL

Tanapon Supapon, MD

Invited Moderator: Marcelo Riberio, PhD

Background: Patients with multiple injuries are challenged to evaluate and to exclude a potentially lethal condition. Rapid diagnosis is important to appropriately treat patients. Objectives: The purpose of this study was to compare classical imaging to whole-body computed tomography (pan-scan) in the initial evaluation of multiple trauma patients.

Material and Methods: This was a retrospective review of all multiple or high-risk trauma patients who received pan-scan during the initial evaluation at an urban trauma center from July 1, 2022 to January 31, 2024. Results: Between August 1, 2020 to January 31, 2021 and August 1, 2023 to January 31, 2024 patients were assessed for eligibility. Most, 618/927 (66.7%) received classical imaging and 474/1532 (30.9%) received pan-scan. There were no differences between cohorts in demographic data, hemodynamic status, Glasgow Coma Scale and mechanism of injury in emergency department. Missed or delayed diagnosis after pan-scan is zero per cent but thirty per cent in classical CT. Mortality rates were reducing for pan-scan and classical CT (2.1% vs 6.9%). Pan-scan may be preferable to classical CT during the initial assessment for possible multiple and high risk trauma patients because of a single contrast injection for whole body CT.

Conclusion: Around thirty percent of patients with multiple trauma had concomitant or silent injuries. For hemodynamically stable patients CT scanning identified those who require surgical intervention and those who may be managed non-operatively, therefore liberal CT-scanning is advisable for this patient group. Diagnosing patients with an immediate pan-scan does not reduce in-hospital mortality compared with the standard radiological work-up. Because of the increased radiation dose, future research should focus on the selection of patients who will benefit from immediate pan-scan.

Keywords: Multiple trauma, Whole body, Computed tomography scan. * Corresponding author. Department of Surgery, Phrapokkloa Hospital Chanthaburi, 22000, Thailand. E-mail address: Spon2359@gmail.com

**DISLODGE MENT RATE OF PERCUTANEOUS
ENDOSCOPIC GASTROSTOMY (PEG) TUBES IN TRAUMA
PATIENTS AT A LEVEL 1 TRAUMA CENTER**

William Tyler Crawley, MD

Invited Moderator: Marcelo Riberio, PhD

Introduction: PEG tubes are a commonly performed procedure in patients who require long-term, secured, enteral access. The procedure has grown in popularity due to its ease of placement, which can be performed at the bedside under conscious sedation. If the tube is removed in the first 4 weeks following placement, there is the risk of an uncontained gastrostomy as the stomach has not had time to adhere to the abdominal wall. Many of these incidents can be salvaged with the placement of a catheter through the site. These patients often then require replacement of the tube by IR, or, in more severe situations, exploration in the OR. Currently, there is no standard of care or best practice for how to appropriately secure these tubes.

Methods: This retrospective cohort study included adult trauma patients admitted to a level 1 trauma center between July 2018 – June 2023 who required PEG tube placement. Data was obtained from the hospital's trauma registry. All PEG placements were performed under the supervision of the core trauma faculty which included 7 critical care trained surgeons. PEGs were placed using a "pull" technique which was similar between all of the faculty. PEGs were secured using the rubber bumper provided in the kit.

Results: The charts of 184 patients admitted to the trauma ICU from July 2018 – June 2023 were reviewed. 16 patients were excluded due to insufficient data and 74 were excluded due to gastrostomy tube placement either surgically or by IR. This left 94 patients in our final analysis, of which, there was a 15% overall rate of early dislodgement, defined as removal less than 4 weeks following placement. For those with a dislodgement, 71% required IR intervention and 36% required exploration in the OR.

Conclusions: This single-center retrospective study highlights the high complication rate associated with PEG tube placement and the potential morbidity with early dislodgement. While techniques for PEG tube placement and methods for securing tubes are variable, our study documents the need for additional research and best practices in order to enhance the safety of this procedure

**EFFECTS OF CONSECUTIVE OVERNIGHT ON-CALL
SHIFTS ON TRAUMA SURGEONS' WELL-BEING: A
PSYCHOLOGICAL AND PHYSIOLOGICAL ANALYSIS**

Susan Hallbeck, Sergio Navarro, MD

Invited Moderator: Marcelo Riberio, PhD

Introduction: Surgeons are reporting burnout, which may be exacerbated by on-call/night shifts. Several studies have focused on surgeon burnout, but few simultaneously examined psychological and physiological metrics associated with burnout.

Methods: Eight attending trauma surgeons at a Level 1 Trauma Center were observed over three periods, consisting of nine consecutive days: three days before night shifts, three consecutive night shifts, and three days after night shifts. Participants completed Daily Wellness Surveys (DWS) evaluating stress and fatigue levels and wore a Fitbit Sense 2 (Fitbit Inc., CA, USA) to continuously track surgeons' heart rates (HR). Stress and fatigue levels were reported on a 7-point Likert Scale from 1 to 7 (1=lowest level of stress and fatigue to 7=highest). HRs were averaged over 30-minute intervals. Participants' baseline HRs were defined as participants' minimum recorded HR during the nine days. Changes in surgeons' HRs were calculated using percent differences between average HRs and baseline HR. ANOVA and post-hoc Student's t-tests were utilized to evaluate differences by period. Stress, fatigue, and HR were reported using medians (IQR).

Results: Five women and three men were enrolled for a collective sum of 72 days. HR data were collected during 60 days, and 64 DWS were completed. Night shifts had significantly greater levels ($p=0.0010$) of current stress (4, 4-5) than the three days before (3, 2.5-5) or the three days after (3, 2-4.25). The three days post-night shifts had significantly lower fatigue levels ($p=0.0006$) since waking (5, 4-6) relative to night shifts (6, 4.5-6) and the three days prior (5, 4-6). ANOVA revealed significant differences ($p\text{-value}=0.0001$) in the percentage increase of surgeons' HR relative to baseline when comparing before (58.27%, 40.21%-76.82%), during (58.33%, 40.98%-76.01%), and after night shifts (56.35%, 39.76%-76.25%).

Conclusion: This pilot study shows the impact of consecutive night shifts on stress and fatigue levels. Subjective stress and fatigue levels revealed night shifts were the most stressful while fatigue levels were minimized during off days. Changes in HR may be attributable to changes in activity, stress, fatigue, or physiological factors like dehydration. Additional work will explore the effects/correlations of these factors on HR and stress/fatigue levels.

**DOES THE AVAILABILITY OF NON-CROSS
MATCHED BLOOD IN THE TRAUMA BAY EFFECT
THE CARE OF TRAUMA PATIENTS? A
RETROSPECTIVE STUDY FROM A LEVEL-II
TRAUMA CENTER**

Adam Lee Goldstein, MD

Invited Moderator: Marcelo Riberio, PhD

Introduction: The standard of care for resuscitation of the hypotensive trauma victim requires timely administration of blood products. An integral part of the local trauma system is a precise and rapid utilization of blood products for transfusion. Unmatched type-O red blood cells (UORBC) are available in the emergency room (ER) of many trauma centers, with an increasing transition to whole blood. Despite the evidence recommending the use of blood products, many centers around the world do not have the ability to store and provide blood products in the ER. Here we examine the effect of available UORBC in the ER on the hospitalization and outcome of trauma patients. Method: A retrospective study at a level two trauma center comparing patients in the trauma bay the year before and the year after blood was stored in the ER. Results: A total of 116 patients arrived in the trauma bay over two years. Seventy four in the year before blood was stored in the ER, and 142 the year after. Within the cohort, there was a trend towards more emergency surgery in the year before (0.09), and significantly more total blood products given in the ER the year after (0.04). Subanalysis of only the patients receiving blood in the trauma bay showed in yr2 significantly more UORBC given in the trauma bay (0.05), MORE patients receiving UORBC (p 0.03), and more patients given blood while still in the ER (0.001). Between the two groups, also in the subanalysis, there was no significant difference in intensive care unit length of stay, mortality, or discharge disposition.

Conclusion: The availability of UORBC in the ER had no effect on patient outcome or hospital length of stay. Once blood was available in the ER, there was significantly more blood products given in the ER, and a trend towards less emergency surgeries.

**QUALITY IMPROVEMENT IN TRAUMA TRANSFERS
FROM AN EMERGENCY DEPARTMENT WITHOUT
LEVEL-ONE TRAUMA CAPABILITIES**

Brain Goldberg, MD

Invited Moderator: Marcelo Riberio, PhD

Introduction: This ongoing quality improvement project investigates the dynamics and implications of trauma transfers from the emergency department at a non-trauma center academic medical center to Level 1 Trauma Centers, focusing on enhancing patient outcomes and ensuring quality assurance. The study aims to comprehensively collect and review trauma transfer data, shedding light on patterns, indications, and clinical considerations influencing the trauma transfer process. By analyzing the process from the initial evaluation to ambulance transfer to trauma centers, this project seeks opportunities for improvement in patient care.

Methods: Beginning in July 2023, an electronic medical records report was run each month to identify patients transferred from the initial emergency department to a different receiving hospital in the previous month. A retrospective chart review was conducted of patient's who were transferred due to trauma. Their age, sex, chief complaint, mode of arrival, total time in the emergency department, receiving hospital, and what modality of imaging, if any, the patient received was examined.

Results: During the period July 2023 through December 2023, 40 patients were transferred to four different hospitals. The receiving hospital with the most transfers (n=37) was 0.6 miles away from the originating emergency department. Thirty-seven of the 40 patients had documented mechanisms of injury as either penetrating or blunt force trauma. The two most common chief complaints were gunshot wounds (n=9) and motor vehicle collisions (n=9). Twenty-five patients underwent some form of imaging in the emergency department at the initial hospital. Fifteen of those patients received an x-ray, two received CT scans, and eight received both x-rays and CT scans.

Conclusion: Quality assurance is a critical aspect of ensuring appropriate trauma transfers. While the mechanisms of injury for many patients were similar, there was variability regarding interventions, particularly imaging. By continuing to monitor these transfers, we can identify areas of improvement in the transfer process, implement measures that enhance the quality of care, and contribute to improved patient outcomes. Ultimately, the findings of this project have the potential to inform evidence-based guidelines, protocols, and metrics for trauma transfer, while ensuring timely, appropriate, and high-quality care for patients.

**AUTOMATIC DETECTION OF MULTIPLE
CRANIOCEREBRAL TRAUMA BASED ON DENOISING
DIFFUSION PROBABILISTIC MODEL**

Diya Sun, MD

Invited Moderator: Marcelo Riberio, PhD

Cranio-cerebral trauma is a serious threat to the lives of patients, and rapid localization of brain tissue injury is the key to trauma treatment. With the development of artificial intelligence, especially generative models, computer-assisted automatic detection models of multiple cranial trauma are increasingly emerging. There are supervised and unsupervised models according to the model training mode. Considering the high cost of manual trauma annotation on CT scans, unsupervised algorithms have shown advantages in practice. Based on a denoising diffusion probabilistic model, we propose a multi-trauma automatic detection method which can automatically generate an anomaly heat map that indicates the probability of occurring injuries on CT scans. The model consists of a gradually enhanced noise addition and denoising process based on deep neural networks. The neural network trained on health data without any annotation can encode information on healthy tissues. When confronting CT images of patients, the model can blur the traumatic area and reconstruct simulated healthy images of the patients, and the residual between the repaired image and the input image contains information about the damaged area. We conducted the experiment on CT images of cranial trauma, and the results showed that the model can effectively detect intracranial hemorrhage, intracranial gas, skull fractures, and other common injuries with high sensitivity. The DSC of intracranial hemorrhage segmentation can reach above 0.7, which is comparable to supervised algorithms of the same period. As far as we know, this is the first unsupervised multi-trauma detection model based on generative AI, providing a new idea for intelligent trauma care.

**ASSESSMENT OF TRAUMA QUALITY IMPROVEMENT
ACTIVITIES IN ASIAN COUNTRIES**

Koji Morishita, MD

Invited Moderator: Marcelo Riberio, PhD

Background: The implementation of trauma care systems has improved patient outcomes, but international differences remain. Trauma care can only be improved if we recognize and clarify the differences between countries. Therefore, our study aimed to investigate the status of trauma quality improvement programs (TQIPs) in Asian countries.

Methods: An anonymous online survey was distributed to members of the Asian Collaboration for Trauma (ACT). The survey assessed the presence of the four elements of TQIPs recommended by the WHO (i.e., morbidity and mortality [M&M] conference, preventable death panel, trauma registry, and audit filter).

Results: Thirty-seven respondents from ten Asian countries (Japan, South Korea, Thailand, China, Philippines, Sri Lanka, Malaysia, Singapore, Taiwan, and India) responded to the survey. Thirty-four (91.3%) respondents held an M&M conference, 14 (37.8%) held a preventable death panel, 27 (73%) had a trauma registry, and 14 (37.8%) used an audit filter. Eight (21.6%) respondents from five countries reported meeting all four elements of TQIPs. Most respondents answered that preventable death panels and the trauma registry were critical aspects that should be improved. Twenty-seven (73 %) respondents reported that a trauma databank existed. The type of trauma databank was nationwide for 15 (40.5%) respondents (three countries), hospital-based for 14 (37.8%) respondents (five countries), and region-based for one (2.7%) respondent (one country), Seven (18.9%) respondents from one country reported that there was no trauma databank. Regarding the trauma registry, the two most frequent barriers were the absence of time (29 respondents, 78.4%) and financial difficulties (22 respondents, 59.5%).

Conclusion: It is important to accumulate data on TQIPs and trauma registries to further develop the Asian trauma system.

WTC Posters



**WORLD TRAUMA
CONGRESS POSTER
SESSION:
STATION I**

Thursday, September 12, 2024
3:00 PM - 5:00 PM

Location: Rivoli
Moderator: Paul Albini, MD

World Trauma Congress Poster Session: Station I

Poster 1: 3:00 PM - 5:00 PM

**VIRAL SEPSIS IN CRITICALLY ILL PATIENTS REQUIRING
ICU CARE, AN OBSERVATIONAL STUDY FROM A
TERTIARY CARE HOSPITAL**

Ekta Gupta, MD

Invited Moderator: Paul Albini, MD

Background: Respiratory tract infections leading to sepsis remains an important cause of morbidity and mortality in critically ill patients requiring ICU care. In the Post COVID-19 era, viral infections have emerged as an important contributor of sepsis apart from bacterial causes. The aim of this study was to understand the role of respiratory viral infections in causation of sepsis in patients requiring ICU care.

Methodology: In this study, patients requiring admission in ICU from January 2019 to December 2022, with lower respiratory tract infection were reviewed. The criteria for sepsis was multiorgan failure with a change in the baseline SOFA (Sequential Organ Failure Assessment) score of more than equal to 2, as per the sepsis-3 definition. Respiratory viruses were identified using FilmArray 2.0 respiratory panel (BioFire Diagnostics, Utah, USA). Cases positive for SARS-CoV-2 were excluded.

Results: Out of 1391 patients enrolled in 23% (n=326), a viral etiology was detected. An overall male predominance 235 (72%) was seen. The mean age was 48.9±16.3 years. Among the viral etiologies detected, Rhinovirus/Enterovirus was the most frequent (142, 43%), followed by Influenza (73, 22%). Occurrence of sepsis was seen in 35% of RVI positive cases. Among these, isolated viral etiology with no other bacterial/fungal coinfection was found in 55% of patients. Patients with sepsis had a greater prevalence of associated co-morbidities. Most common comorbidity was diabetes (31,27%) followed by obesity (17, 15%). The requirement of mechanical ventilation as well as in-hospital mortality was higher in the sepsis group as compared to the non-sepsis group (p = 0.001). Higher age, hypertension and mixed-etiology, coinfections with virus and other pathogens, showed higher susceptibility to mortality.

World Trauma Congress Poster Session: Station I

Poster 2: 3:00 PM - 5:00 PM

**AGGRESSIVE OXYGEN DELIVERY STRATEGIES DURING
RESUSCITATION OF HEMORRHAGIC SHOCK AFFECTS
KIDNEY MITOCHONDRIAL FUNCTION**

Nicolas Prat, MD

Invited Moderator: Paul Albini, MD

Hemorrhagic shock results from a reduced delivery of oxygen to tissues thus producing ischemic metabolic insufficiency, but aggressive resuscitation strategies could be deleterious. We investigated in a porcine model if a degraded medical care of combat casualty (CC) characterized by prolonged permissive hypotension and normoxia prevents or induces mitochondrial dysfunction compared to hyperoxia and whole blood (WB) transfusion, in kidney, a particularly vulnerable organ to demand-supply O₂ mismatch.

Traumatic-hemorrhagic shock (THS) was obtained by bilateral muscular contusions and femoral fractures associated with 60% withdrawal of the total blood volume (TBV). Shock was prolonged during 90min to mimic a CC environment before resuscitation with 4 mL/kg hypertonic saline for normoxia group and with 20% TBV of WB for hyperoxia group. At 90min FiO₂ was set to 100% in hyperoxia group. Control group underwent the procedure in normoxia, with no hemorrhage, trauma, nor fluid resuscitation. To determine mitochondrial renal dysfunction, oxygen consumption rate of renal tissue was determined by high-resolution respirometry (HRR) at the end of the procedure (4h). HRR was performed on permeabilized renal biopsies. A substrate, inhibitor titration SIT protocol was then performed to measure respiratory capacities and oxidative phosphorylation of complex I (CI) and IV CIV. Animals were randomized to control (n=6), normoxia (n=8) and hyperoxia (n=6) groups and parameters were evaluated as non-parametric via a Wilcoxon test.

Despite the fact that a significant kidney impairment was induced by THS ([creatinine]_{4H}=1,5mg/dL [1,4-2,1], and 2mg/dL [1,35-2] vs 1,15mg/dL [1,1-1,25] for respectively normoxia, hyperoxia and controls, p=0,006 and p=0,0492), normoxia group showed no detrimental effect on renal mitochondrial function compared to control. Interestingly, hyperoxia with blood administration improved CI-driven mitochondrial respiration but decreases CIV respiration compared to normoxia (respectively p=0,0016 and p0,0001) and control (respectively p=0,0004 and p0,0001).

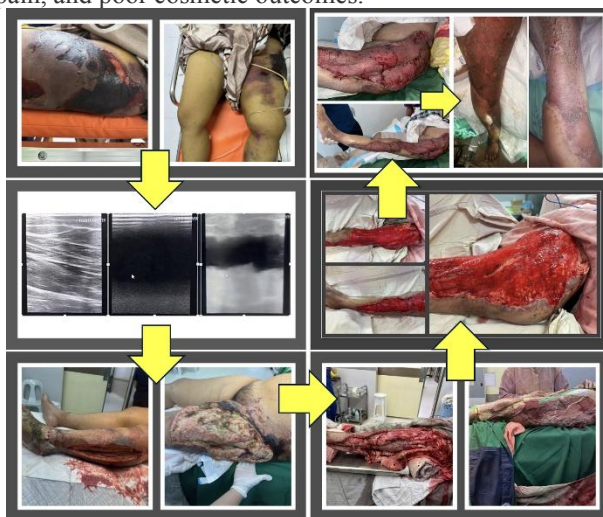
A typical CC medical care is safe and free of mitochondrial renal dysfunction during hemorrhagic shock. To preserve the vital prognosis and reduce delayed deaths, resuscitative strategies that preserve mitochondrial function should be more considered for shock patients in order to rather protect the ability of cells to utilize O₂ correctly than maximize the oxygen delivery.

UNVEILING THE HIDDEN WOUNDS: A CASE REPORT OF MORE-LAVALLEE LESION

Rene Ogatis, MD

Invited Moderator: Paul Albini, MD

Morel-Lavallée lesions (MLL) represent a rare, yet potentially debilitating consequence of trauma, wherein there is a closed soft tissue degloving injury that results in effusion containing hemolymph and necrotic fat. This commonly occurs over the great trochanter, flank, buttocks, and lumbodorsal regions. We report a case of a 17-year-old female who sustained crushing injury on the left thigh and initially presented with soft tissue contusion with no associated fracture. She came back a week later septic, with a 15×13 cm ecchymosis on the left thigh and a painful, tense left lower extremity with patchy areas of skin necrosis. Point-of-care ultrasonography of the left proximal lateral thigh revealed an anechoic space between the fascia and subcutaneous fat layer with no internal color flow. After resuscitation, she immediately underwent an emergency fasciotomy and repeated extensive debridement with negative pressure wound therapy, culture-directed antibiotic administration, hyperbaric oxygen therapy, and eventually a split thickness skin grafting and rehabilitation. Although MLL has been reported in literature, there is no current standard treatment algorithm for this pathology. Delay in diagnosis due to limited clinical experience has led to life-threatening consequences of infection, compartment syndrome, pain, and poor cosmetic outcomes.



FORCE OF PELVIC BINDERS – A COMPARISON OF MECHANICAL PERFORMANCE OF VARIOUS PRODUCTS

Naoki Matohara, MD

Invited Moderator: Paul Albini, MD

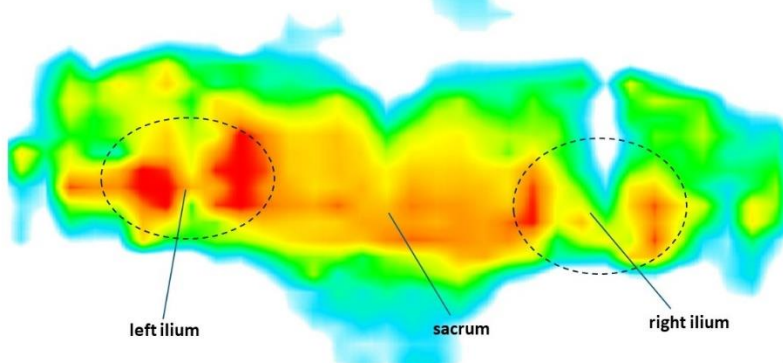
Background and Objective: Currently, several pelvic binders are commercially available, but their performance remains unclear. We hypothesized significant differences among these binders. This study aimed to measure the traction force of pelvic binders and pressure distribution on the skin and compare them.

Methods: Ten healthy men and women each wore Pelvicky®, T-POD®, SAM Sling®, and sheet wrapping. Traction force and pressure on the contacting skin were measured for each binder.

Results: The mean traction force was Pelvicky®: $113 \pm 12\text{N}$, T-POD®: $119 \pm 13\text{N}$, SAM Sling®: $126 \pm 8\text{N}$, sheet wrapping $96 \pm 8\text{N}$, showing significant differences among the binders. Moreover, considerable variability was observed among performers. Pressure distribution on the skin concentrated on prominent areas such as the anterior superior iliac spine and sacrum, with sheet wrapping exhibiting the lowest overall pressure.

Conclusion: Significant differences were observed in traction force and pressure on the skin among different pelvic binders. These disparities may impact clinical outcomes, warranting further research.

pressure distribution on the skin during pelvic binder application



World Trauma Congress Poster Session: Station I

Poster 5: 3:00 PM - 5:00 PM

SHORT-TERM TREATMENT OUTCOMES OF OPEN TIBIAL FRACTURES IN A TRAUMA CENTER

Masahiro Miyashita, MD

Invited Moderator: Paul Albini, MD

Introduction: In the management of open tibial fractures, adequate and early intervention for soft tissue injuries along with bone fixation is essential. Especially in cases of polytrauma patients transported to the emergency trauma center, timely treatment is indispensable alongside managing concurrent injuries that threaten systemic conditions.

Methods: A retrospective analysis was conducted on 26 cases of open tibial fractures admitted to our trauma center from April 2019 to September 2023, focusing on surgical waiting days, complications, and functional recovery.

Results: There were 21 male and 5 female patients. The average length of hospital stay was 10.3 days with a mean observation period of 11 months. According to the Gustilo-Anderson classification, there were 2 Grade I, 10 Grade II, 9 Grade IIIA, 4 Grade IIIB, and 1 Grade IIIC cases. Eight cases involved isolated injuries, while 18 had multiple traumas. External fixation was performed in 10 cases. The mean waiting time for final internal fixation surgery was 3.3 days. Complications included one case of superficial infection, one case of deep infection, one case of delayed union, and one case of nonunion. At the final follow-up, three cases were walking with a cane, while 23 were able to walk alone without canes.

Conclusion: Even in cases of multiple traumas, performing surgery as early as possible resulted in favorable outcomes with minimal severe complications.

World Trauma Congress Poster Session: Station I

Poster 6: 3:00 PM - 5:00 PM

**INTRAOPERATIVE USG IMAGING FOR CHEEKBONE
(ZYGOMATIC) FRACTURE REPAIR: A RETROSPECTIVE
STUDY**

Kuldeep Vishwakarma, MD

Invited Moderator: Paul Albini, MD

Objectives: Zygomatic complex (ZMC) fractures comprise up to 45% of all facial fractures second in frequency after nasal bone fracture. It becomes difficult to assess the perfect reduction of all the fractured sites through a limited surgical approach. This study aims to determine the feasibility and efficacy of intraoperative ultrasound imaging (USG) in the repair of ZMC fracture through a limited anterior approach.

Materials and methods: This single-center retrospective study evaluated the utility of intraoperative USG during corrective surgeries for ZMC fractures from 2020 to 2023. An intraoral vestibular incision was used to expose the Zygomaticomaxillary buttress region and for indirect reduction of the fractured zygomatic arch. An upper blepharoplasty incision was used to expose the fractured Frontozygomatic suture when indicated. Intraoperative USG was used to assess the perfect reduction of the unexposed fractured zygomatic arch.

Results: Three females and 12 males (mean age, 34.46 years; range, 26-55 years) were included. Reduced mouth opening (n=10) and facial deformity (n=8) were the most frequent indications for the repair of ZMC fracture. Mouth opening and facial symmetry were improved and satisfactory in all the cases.

Conclusion: Implementation of an intraoperative USG in ZMC fracture repair assists in obtaining predictable and accurate results. The equipment should be considered for precise operations such as ZMC fracture repairs particularly when using a limited surgical approach.

World Trauma Congress Poster Session: Station I

Poster 7: 3:00 PM - 5:00 PM

**MYOCARDIAL INJURY AND CALCIUM HOMEOSTASIS
REGULATION IN ANIMAL MODEL OF HEMORRHAGIC
SHOCK INDUCED ARRHYTHMIA**

Jingjing Ye, MD

Invited Moderator: Paul Albini, MD

Hemorrhagic shock (HS) is a serious global problem that kills 1.9 million people worldwide each year and is characterized by hemodynamic instability, tissue hypoperfusion and cellular hypoxia. Irreversible fatal arrhythmia and cardiac dysfunction caused by traumatic hemorrhage are the main causes of early death in hemorrhagic shock. We established lethal HS mouse model and found severe ventricular arrhythmias occurred in 45% to 55% of blood loss. In the isolated primary adult mouse cardiomyocytes, we also observed that the imbalance of sarcoplasmic reticulum and cytoplasmic homeostasis; the amplitude of calcium transient and the amplitude of sarcoplasmic contraction were decreased during hypoxia; and arrhythmia was induced by high-frequency electrical stimulation. To understand the calcium homeostasis mechanism and the appropriate myocardial protection may provide new target for hemorrhagic shock induced arrhythmia and improve survival rate.

World Trauma Congress Poster Session: Station I

Poster 8: 3:00 PM - 5:00 PM

**PEDIATRIC PATIENTS WITH OPEN PELVIC FRACTURE
TREATED IN THE HYBRID EMERGENCY ROOM SYSTEM
(HERS) BY A MULTIDISCIPLINARY TEAM: TWO CASE
REPORTS**

Tomoki Kanda, MD

Invited Moderator: Paul Albini, MD

Background: A hybrid emergency room system (HERS) is a trauma resuscitation room containing a computed tomography (CT) scanner, fluoroscopy unit, operating room setup, and angiography room setup. The initial resuscitation, diagnostic imaging, damage control surgery, and transcatheter arterial embolization (TAE) can be completed in one room without transferring the patient to the angio-suite or operating room. We report two cases of pediatric trauma patients with open pelvic fracture complicated by hemorrhagic shock treated in the HERS with feasible outcomes.

Case 1: A 9-year-old male who was run over his left leg by a truck. He was initially brought to another hospital in a shock. Initial evaluation revealed an open pelvic fracture, left lower limb degloving injury, splenic injury, left renal injury, perineal laceration with active bleeding. He was transferred from that hospital to our HERS with ongoing resuscitation. Immediately after we received him in the HERS, a damage control surgery including splenectomy and left nephrectomy, packing of the perineal wound, as well as TAE for hemorrhage from open pelvic fracture were performed simultaneously. The next day, he underwent pelvic external fixation, leg skin grafting, diverting loop colostomy, and perineal debridement. Injury severity score [ISS] 59, Revised Trauma Score [RTS] 4.1, TRISS Probability of survival [TRISS Ps] 0.11, respectively. He was discharged home 114 days after injury.

Case 2: An 11-year-old male who was involved in a motor vehicle collision was directly brought to our HERS in a shock. After initial resuscitation, a whole body-CT scan was taken within the HERS. It revealed unstable open pelvic fracture, open fracture of right lower leg, dislocated fracture of right hip, rectal injury, extraperitoneal bladder injury. TAE for hemorrhage from the pelvic fracture was performed in the HERS. Then he underwent external fixation of the pelvis, leg, and perineum debridement, and diverting loop colostomy. ISS 50, RTS 4.1, TRISS Ps 0.21, respectively. He was discharged home 112 days after injury.

Conclusion: HERS allows simultaneous resuscitation, diagnosis, and multidisciplinary treatment, and may be a useful modality for pediatric patients with open pelvic fracture.



WORLD TRAUMA CONGRESS POSTER

SESSION:

STATION II

Thursday, September 12, 2024

3:00 PM - 5:00 PM

Location: Rivoli

Moderator: Patricia Martinez Quinones,
MD, PhD

World Trauma Congress Poster Session: Station II

Poster 9: 3:00 PM - 5:00 PM

**HEMOSTATIC SPONGE BASED ON EASILY PREPARED
CROSSLINKED GELATIN AND SODIUM ALGINATE FOR
WOUND HEALING**

Jing Zhou, MD

Invited Moderator: Patricia Martinez Quinones, MD

Traumatic hemorrhagic shock is an important factor leading to human death; thus, it is critical to develop new hemostatic materials for emergency care during traumatic events. In the present study, a novel composite hemostatic sponge scaffold (GE/SA) was prepared by Ca^{2+} crosslinking and freeze-drying using gelatin and sodium alginate. GE, GE/SA1 (1:1), GE/SA2 (1:2), GE/SA3 (1:3), GE/SA4 (1:4) and commercial hemostatic sponge control samples were used to perform hemostasis experiments using a rat liver trauma model and a femoral artery trauma model. In addition, wound healing experiments were conducted using a rat dorsal full-layer skin defect model. Hemostasis time and blood loss values in the GE/SA3 group (liver hemorrhage model: 227.35 ± 3.22 mg, 77.83 ± 4.31 s; femoral artery bleeding model: 494.17 ± 48.66 mg, 76.50 ± 3.94 s) were significantly better than those in the other experimental groups and were similar to those in the commercial sponge group. In vitro experiments showed that SA promoted the adhesion and aggregation of platelets and red blood cells, which could further promote hemostasis by activating the clotting process. The results showed that the optimal ratio of gelatin to sodium alginate was 1:3, which provided a theoretical basis for the subsequent construction of a drug delivery system. The gelatin sodium alginate sponge scaffold prepared in the present study not only overcame the limitations of simple gelatin hemostatic sponges (such as decreased mechanical properties and poor hemostatic effects after water absorption) but also had excellent properties, such as good biocompatibility, low toxicity, high cost performance and good wound healing. Moreover, this scaffold had wide potential for clinical application.

World Trauma Congress Poster Session: Station II

Poster 10: 3:00 PM - 5:00 PM

**GUNSHOT AND BLAST INJURIES AND BLEEDING
CONTROL TRAINING FOR MEDICAL STUDENTS AT A
REGIONAL UNIVERSITY IN JAPAN**

Fumiaki Kawano, MD

Invited Moderator: Patricia Martinez Quinones, MD

Background: We have had little experience in treating patients with gunshot and blast wounds in Japan, and the medical students have few opportunities to learn about such trauma in the usual clinical lectures. In recent years, however, the Internet has made it easier to manufacture firearms and explosives, and the emergence of Lone Wolf terrorists as the Las Vegas mass shooting has become a reality according to the recent globalization in our country and we experienced an assassination of the Japanese Prime Minister in 2022. Thus, not only medical personnel but also many citizens have become aware that firearms and explosives are nearby and it is necessary to re-consider how education should be provided to medical professionals from the period of students.

Results: We gave a lecture on gunshot and blast injuries to medical students who were doing clinical practice between 2018 and 2019 as a pilot study. The purpose of this was to survey the awareness and ordinary knowledge of medical students. During the lecture, we also conducted practical training based on the American College of Surgeons' Bleeding Control Course. The results showed that medical students' awareness of gunshot or blast injuries, and mass casualty incidents was extremely low and, in addition, there was a lack of awareness of traumatology. Only about 5% of the students were able to explain the appropriate hemostatic technique including the Tourniquet procedure required in trauma cases. Practical training in bleeding control was given to all the medical students, and many could respond appropriately and use a combat tourniquet.

Conclusion: As traumatic injuries in Japan are mostly earthquakes, traffic accidents, falls, puncture wounds, and cuts, more education in emergency medicine is still focused on these injuries. The current social system has changed, and it is necessary to deepen knowledge of gunshot injuries and blast injuries as well, we stress desirable to actively conduct bleeding control training to spread this knowledge more widely at this stage.

World Trauma Congress Poster Session: Station II

Poster 11: 3:00 PM - 5:00 PM

A CASE OF RECTUS SHEATH HEMATOMA

Yoshitomo Ashitate, MD

Invited Moderator: Patricia Martinez Quinones, MD

Rectus sheath hematoma (RSH) is an infrequent condition that occurs when epigastric arteries bleed into the rectus sheath and sometimes acts like an acute abdomen. In view of the fact that it is a rare case without specific clinical signs, misdiagnosis and use of invasive manipulations for patients are possible.

A 43-year-old woman had tried to commit suicide by stabbing herself with a kitchen knife into her stomach and applied to our hospital. The knife was removed. Contrast-enhanced computed tomography (CT) scan revealed a hematoma in the right rectus sheath. She was diagnosed with RSH. We selected a conservative treatment. The treatment course was uneventful, and she was eventually discharged 2 days after the admission.

RSH is caused by bleeding into the rectus sheath from a damaged superior or inferior epigastric artery or its branches; moreover, it can result from a direct tear of the rectus muscle. Although RSH is rare, it can be a fatal condition with a reported overall mortality of 4%. Similar to our case, many cases of RSH are conservatively managed. However, for unstable patients, an aggressive treatment with angiographic vascular embolization is essential. Moreover, surgery is needed if the hemorrhage cannot be controlled by angiographic selective vascular embolization.

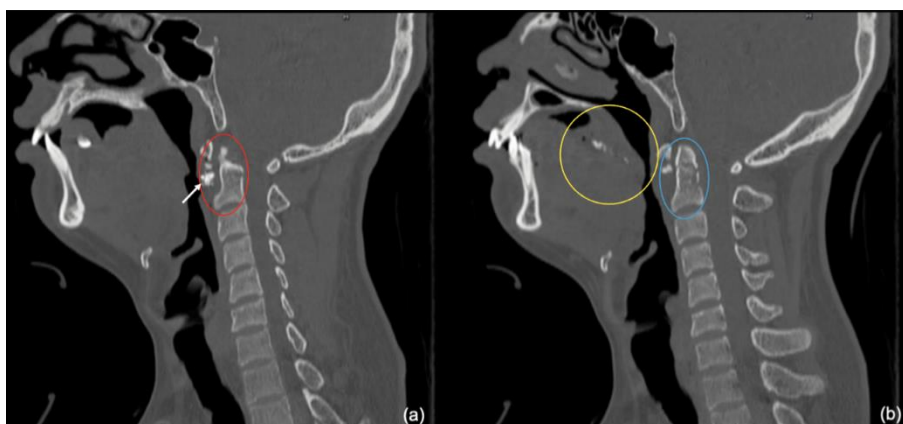
**THE VAPE GRENADE: A CASE OF MAXILLOFACIAL INJURIES
WITH C1-C2 FRACTURE SECONDARY TO ELECTRONIC
CIGARETTE BLAST INJURY**

Arden Aron Asuncion, MD

Invited Moderator: Patricia Martinez Quinones, MD

In recent years, the use of electronic cigarettes, as an alternative to conventional nicotine products has become increasingly popular. However, this trend has been accompanied by a rise in reported injuries caused by these devices. In this report, we present a case of a 24-year-old male who suffered a C1-C2 comminuted vertebral fracture, dental injuries, and avulsed lips and tongue, as a result of a vaporizing device explosion.

While electronic cigarette-related injuries can include thermal burns, blast injuries, and chemical pneumonitis, among others, the mechanism of injury in this report was due to a portion of the device acting as a projectile and penetrating through the patient's oral cavity through the posterior oropharyngeal wall, ultimately causing multiple dental fractures, avulsion of the lips, tongue, and uvula, and comminuted fractures of the C1-C2 vertebral fracture. Injuries from explosions from electronic cigarettes are a growing public health concern and can have serious consequences. Healthcare providers, policymakers, and the general public need to be aware of these potential risks and take steps to address them. This case underscores the need for injury prevention measures, such as strict product safety standards and public education campaigns, to eliminate the risk of injury associated with these vaporizing devices.





**WORLD TRAUMA
CONGRESS POSTER**

SESSION:

STATION III

Thursday, September 12, 2024

3:00 PM - 5:00 PM

Location: Rivoli

Moderator: Alexandra Brito, MD

**MODIFIED MESH-MEDIATED FASCIAL TRACTION, IN
CONJUNCTION WITH ORTHOPEDIC ALUMINUM SPLINTS**

Yoshiaki Kawai, MD

Invited Moderator: Patricia Martinez Quinones, MD

Introduction: Primary fascial closure (PFC) in cases of open abdomen (OA) resulting from severe abdominal trauma or infection is typically achievable. However, challenging instances may arise. Therefore, various surgical techniques have been reported. Among them, Mesh-Mediated Fascial Traction (MMFT) is one method used to achieve PFC. However, medialization with direct suturing of the abdominal wall's fascial edge may result in tissue injuries and multiple small defects, potentially leading to a "swiss cheese hernia". Here, we introduce a method to protect the fascial edge using orthopedic aluminum splints for MMFT.

Case: A 76-year-old female underwent emergency laparotomy with Hartmann's procedure for sigmoid colon perforation, leading to postoperative peritonitis. After prolonged open abdominal management (OAM), severe lateral fascial retraction hindered PFC.

Surgical Technique: A heavyweight polypropylene mesh (Prolene™) is utilized without suturing around the fascial edge. Orthopedic aluminum splints are positioned on each side of the abdominal wound, placed over the lateral edge of the rectus sheath. Underlay Prolene meshes are then secured using heavy braided suture passing through all layers of the abdominal wall, including the skin, with knots tied over the aluminum splints (Figure 1). The mesh is subsequently divided down the middle, and traction is applied while suturing the two halves together with a continuous suture. The midline cut mesh edges are resutured to enhance tension for fascial reapproximation. Incremental tightening every 2 days facilitates abdominal wall medialization, leading to successful PFC by day 18.

Conclusions: Modified MMFT, in conjunction with orthopedic aluminum splints, effectively addresses the challenges associated with prolonged OAM, thereby protecting fascial edges.



World Trauma Congress Poster Session: Station II

Poster 14: 3:00 PM - 5:00 PM

**A CASE OF LIGATION OF THE COMMON CAROTID
ARTERY PENETRATING TRAUMA WHO SURVIVED
WITHOUT NEUROLOGICAL DEFICIT**

Kaori Kono, MD

Invited Moderator: Patricia Martinez Quinones, MD

Background: Penetrating common carotid artery (CCA) injury is a dangerous trauma that can lead to fatal massive hemorrhage and severe neurological damage due to disruption of cerebral blood flow. Therefore, the principle of CCA injury treatment is restoration of blood flow through vascular repair, and ligation is only selected in the extreme case. We report a case in which a CCA disruption by penetrating trauma was ligated and the patient survived without neurological deficits.

Case presentation: A male in his thirties stabbed himself in his left neck. Upon arrival of the paramedics, a large amount of blood was seen at the scene, but the active bleeding from the wound had stopped. On arrival, he was alert and oriented, hypotensive but responded to initial resuscitative fluids. He was slightly hoarse. His physical examination revealed a 5cm transverse wound in the zone II of his left neck with non-expanding hematoma. Left CCA pulse was not palpable. Bruits and thrills were not present, neither. Noneurological abnormality was found. Contrast-enhanced computed tomography showed that the left CCA was thrombosed from its take-off from the aortic arch. The left neck exploration in the operating room revealed that the left CCA was completely transected, but there was no active hemorrhage because it was occluded by extensive thrombus on both the proximal and distal sides. It was determined that cerebral blood flow from the contralateral side was maintained, and both the proximal and distal ends of the dissected left CCA were ligated. Postoperatively, a brain MRI showed multiple micro-ischemic infarcts in the left cerebral hemisphere, but these were subclinical. He was discharged to a mental health facility without any neurological deficit except for residual hoarseness secondary to left recurrent nerve injury.

Conclusion: Although penetrating CCA injuries should be revascularized, ligation may be unavoidable to prevent massive hemorrhage and death and could be chosen without significant neurological damage when thrombotic occlusion is present and cerebral blood flow is maintained from the contralateral side.

**A CASE OF EARLY SURGICAL ESCHAROTOMY USING
INTRAVASCULAR TEMPERATURE MANAGEMENT IS
USEFUL FOR MAJOR DEEP BURN PATIENT**

Yuki Mochida, MD

Invited Moderator: Alexandra Brito, MD

Introduction: Body temperature management during burn surgeries is one of the most important factors for the prognosis of patients with major burns[1]. Although common methods of maintaining the body temperature involve administering warm fluids and raising the operating room temperature, it is often difficult to maintain the body temperature in cases of severe major burns[2]. We encountered a case of intravascular temperature management (IVTM) during a burn surgery and successfully maintained the body temperature of a patient who had a 95% deep burn surface area.

Method: The patient in her 20s had a 95% flame burn surface area for suicidal purposes. Five surgeries were performed within 1 week of the injury. Approximately 54% of the burn area was removed in four surgeries. A tracheostomy and some split-thickness skin grafting were performed in the last surgery. Chemical debridement of 27% of the burn area was performed. An IVTM catheter with three balloons (ICY heat exchange catheter and Thermogard XP console; Asahi Kasei Zoll Medical, San Jose, CA) was inserted from the femoral vein and used during the 3rd and 4th surgical escharotomies (this device was available only during this period).

Result: The patient had hypothermia of 35°C during surgeries without IVTM (1st, 2nd, and 5th escharotomies). These surgeries resulted in a drop in body temperature of 0.96°C per hour. Blood lactic acid levels increased after each surgery without IVTM. Conversely, surgeries with IVTM (3rd and 4th escharotomies) successfully maintained the body temperature above 36°C (Table.1). The IVTM device kept the three balloons of the catheter warm to prevent hypothermia during surgery. Blood lactic acid levels did not increase after each surgery with IVTM.

Conclusion: Using IVTM during surgical escharotomy for cases of major burns is useful for maintaining body temperature and can be a reliable strategy.

**THE EFFECT OF VACCUM-ASSISTED CLOSURE AFTER
ABDOMINAL SURGERY FOR A PATIENT WITH A
VENTRICULOPERITONEAL**

Naoki Oka, MD

Invited Moderator: Alexandra Brito, MD

Case: A 56-year-old male who has a history of hydrocephalus and ventriculoperitoneal shunt (VPS) placement was transferred from the district hospital. He was a motorcycle driver and collided with a car. His vital signs were stable except for a cerebral nervous system. At first, his consciousness was E3V4M5, but we decided to intubate him because his consciousness had deteriorated in emergency department.

We took a CT brain and it showed subarachnoid hemorrhage at the cerebellum and brainstem, bilateral acute subdural hematoma, mild ascending transtentorial herniation, and diffused brain edema with space of brain ventricle remained.

After admission, his blood pressure dropped to 70/53 mmHg. He was reevaluated and FAST was changed to positive in all three regions. We started resuscitation and decided to perform an exploratory laparotomy.

We found liver injury grade 2 at segment 5, splenic injury grade 1, non-expanding retroperitoneal hematoma at left zone 2, and the tip of VPS at the right upper quadrant. We decided to perform perihepatic and perisplenic packing and his blood pressure was going up after packing and resuscitation. We decided to keep the tip of VPS in his abdomen due to no contamination. Temporary abdominal closure with a handmade negative pressure dressing was performed.

We ordered negative pressure between 40 to 100 mmHg and sent the patient to the intensive care unit (ICU). But 3 hours later after going back to ICU, this patient developed polyuria (1,000ml/h). Because we were worried about central Diabetes Insipidus, we sent him to CT brain again and it showed the progression of diffused brain swelling with effacement of bilateral brain ventricle, ascending transtentorial herniation, and whole brain ischemia. This patient died on 4th postoperative day.

We think there are three reasons why herniation deteriorated; first impact, secondary brain injury due to hypotension, and negative pressure via VPS. Theoretically, if we give negative pressure to the brain ventricle, this negative pressure is applied to the whole cerebrum and it provokes ascending transtentorial herniation.

Conclusion: Ascending transtentorial herniation could be developed or deteriorated by negative pressure to the abdomen after abdominal surgery for a patient with a VPS.

World Trauma Congress Poster Session: Station III

Poster 17: 3:00 PM - 5:00 PM

**A CASE REPORT OF MANUAL COMPRESSION
HEMOSTASIS FOR BRACHIAL ARTERY TRANSECTION
WHILE BEING TRANSPORTED FROM AN ISOLATED
JAPANESE ISLAND**

Shunsuke Saito, MD

Invited Moderator: Alexandra Brito, MD

Background: When severe extremity trauma is recognized as active bleeding from a site where it is difficult to apply a tourniquet, it is sometimes difficult to determine how to temporarily stop bleeding during transfer to a hospital with limited medical supplies and time. In this report, we describe a case in which a patient was transferred from a hospital on an isolated Japanese island after manual compression hemostasis was performed while permissive hypotension for a transected brachial artery.

Case report: A 46-year-old man fell into a 2-meter-deep hole during construction work and was transported to the emergency department after removing a rebar from his right shoulder. The patient was in cardiopulmonary arrest when he arrived at the hospital, but his heartbeat resumed 8 minutes later by advanced cardiovascular life support. A whole-body CT scan showed a crushed fracture of the right humeral head and transection of the right brachial artery. Because it was difficult to apply a tourniquet to the bleeding from the brachial artery, manual compression hemostasis was performed while maintaining a systolic blood pressure of around 80 mmHg, and the bleeding was successfully controlled. Because the hospital in the isolated area was unable to provide definitive treatment and had a limited amount of blood in reserve, we decided to transfer the patient to a hospital and requested a helicopter, which departed from our hospital 3 hours after the patient's arrival. The patient arrived at the destination hospital 5 hours after the patient's arrival.

Conclusion: Manual compression hemostasis with permissive hypotension may be an option for temporary hemostasis in cases of severe extremity trauma with active bleeding from a site where it is difficult to apply a tourniquet, even if the patient takes a long time to be transported.

**MULTIORGAN DYSFUNCTION FOLLOWING DELAYED
TRAUMATIC HEPATIC PSEUDOANEURYSM AND BILOMA: A
CASE REPORT**

Rene Ogatis, MD

Invited Moderator: Alexandra Brito, MD

Hepatic pseudoaneurysm (HPA) is a rare, delayed complication following complex liver trauma. While most cases are asymptomatic and are incidentally diagnosed on CT angiography, very few patients present with life-threatening symptoms of bleeding and/or sepsis. This is a case of a 34-year-old female sustaining a stab wound in the right upper quadrant of the abdomen with hemodynamic instability on admission. On exploratory laparotomy, there was a bleeding AAST Grade III liver injury on segment IVa, which was primarily repaired. She was subsequently discharged with no complications and was advised for outpatient follow-up after a week. On the 10th day post-injury, she arrived at the ED with sepsis-induced multiorgan dysfunction syndrome. She presented with hemodynamic instability, altered sensorium, fever, jaundice, shortness of breath, and oliguria. CT angiography revealed a right hepatic artery aneurysm with surrounding biloma on segments IVa, VII and VIII. Selective angioembolization (SAE) of the right hepatic artery pseudoaneurysm using steel coils was performed, with improvement of jaundice. Coupled with fluid resuscitation, vasopressors and culture-directed antibiotic administration, multiple sessions of hemodialysis, lung-protective ventilatory support, sedation, and prone positioning, there was marked improvement of her condition. However, 5 weeks after SAE, she once again presented with bleeding. Repeat SAE was done on the right hepatic pseudoaneurysm, as well as percutaneous drainage of biloma. On the 6th week, she was discharged from the surgical intensive care unit with rehabilitation. Early detection of HPA is crucial to achieve better treatment outcomes in patients with severe liver trauma. However, in situations where complications develop, it is essential to implement a multidisciplinary approach in critical care management to improve patient survival.



Selective angiography via the celiac artery showed a 4.2 x 3.2 cm saccular outpouching in the right hepatic artery with intralésional coils.

World Trauma Congress Poster Session: Station III
Poster 19: 3:00 PM - 5:00 PM
HOMEMADE DYNAMIC FASCIAL CLOSURE
Taiki Yamataka, MD
Invited Moderator: Alexandra Brito, MD

Introduction: In most cases of open abdomen (OA) due to severe abdominal trauma or severe intra-abdominal infection, primary fascial closure (PFC) is feasible. However, in some instances, achieving PFC can be challenging. Here, we present a dynamic abdominal closure technique utilizing readily available medical materials.

Case and Surgical Technique: A 52-year-old man underwent emergency laparotomy with omental patch repair for a perforated duodenal ulcer, leading to postoperative peritonitis. Open abdominal management (OAM) with negative pressure wound therapy (NPWT) was adopted. On day 10, an enteroatmospheric fistula developed, necessitating laparostomy. Despite improvement in the general condition, severe lateral fascial retraction prevented PFC. Due to unavailability of commercial devices, homemade dynamic fascial closure (HDFC) was utilized on day 56. This involved utilizing transfusion tubes and orthopedic aluminum splints for fascial reapproximating. Incremental tightening was performed every 2 days facilitating medialization of the abdominal wall, and PFC was achieved on day 65.

Conclusions: The HDFC technique can offer cost-effective dynamic closure, addressing challenges posed by prolonged OAM.



Figure 1. Prolonged open abdomen with lateral fascial retraction (A), apply homemade dynamic fascial closure using a transfusion tube and orthopedic aluminum splints on day 56 (B) and perform definitive abdominal closure supported by tension-reduction suture on day 65 (C).

AGRICULTURAL FARM-RELATED INJURIES IN RURAL INDIA: A COMPREHENSIVE CASE SERIES

Abdul Vakil Khan, MD

Invited Moderator: Alexandra Brito, MD

Abstract: This paper presents a case series on diverse agricultural farm-related head injuries encountered in rural India. The study highlights unique challenges and interventions, showcasing four distinct cases involving winnowing fan blades, bull's horns, agricultural boring machines, and tractor farm ploughers. Surgical interventions, outcomes, and implications for rural healthcare are discussed.

Introduction: Agricultural activities contribute significantly to India's economy but pose inherent risks, including head injuries. This paper aims to shed light on the complexities of managing such injuries in a rural context.

Methods: Cases were collected from the trauma surgery department at AIIMS Patna. Inclusion criteria focused on head injuries related to agricultural machinery. Data included patient demographics, injury details, Glasgow Coma Scale (GCS) scores, surgical interventions, and outcomes.

Results:

1. ****Winnowing Fan Blade Head Injury:****
 - GCS E2V2M5 on admission, treated with surgical debridement.
 - Discharged after 30 days with improved GCS (E4V5M6).
2. ****Head Injury by Farming Bull's Horn:****
 - GCS E3V4M5 on admission, treated with enucleation and duraplasty.
 - Discharged on post-op day 15 with improved GCS E4V5M6
3. ****Agricultural Boring Machine Injury:****
 - GCS E3V3M5 on admission, treated with debridement and duraplasty.
 - Discharged on post-op day 20 with improved GCS E4V5M6
4. ****Head Injury by Tractor Farm Plougher:****
 - GCS E1V5M5 on admission, treated with debridement and duraplasty.
 - Discharged on post-op day 20 with GCS E4V5M6

Discussion: There are unique challenges of agricultural-related head injuries, emphasizing the need for prompt surgical intervention, diverse surgical techniques, and multidisciplinary care. Improvement in rural healthcare infrastructure and preventive strategies.

Conclusion: This case series underscores the critical importance of tailored approaches in managing agricultural farm-related head injuries. By understanding the nuances of these cases, healthcare providers can optimize interventions and improve outcomes in rural settings

World Trauma Congress Poster Session: Station III

Poster 21: 3:00 PM - 5:00 PM

**PANCREATICOGASTROSTOMY AS RECONSTRUCTION
FOR COMPLETE NECK TRANSECTION OF THE PANCREAS**

Jungchul Kim, MD

Invited Moderator: Alexandra Brito, MD

Background and Purpose: The optimal management for high grade pancreatic injuries remains controversial and depends on the location and extent of the injury. This article is to highlight the application of surgical method for pancreatic parenchymal preservation in patients with complete neck transection of pancreas.

Material and Methods: We present two similar cases of traumatic complete neck transection of the pancreas. Two patients: a 43-year-old man and a 23-year-old man admitted via the emergency department due to blunt abdominal trauma injury cause by struck on a motorcycle handle. Both patients' initial vital signs were stable. On physical examination they showed upper quadrant area pain. The laboratory findings showed leukocytosis and elevation of serum amylase level. An abdominal computed tomography (CT) showed a complete transection injury on the neck of pancreas. Two patients underwent exploratory laparotomy and complete transection of the pancreas neck area were revealed. Since both patients were hemodynamically stable, we performed primary repair of the remained pancreatic head parenchyma and duct. And pancreaticogastrostomy was done on poster area of stomach wall with preservation of the distal pancreas and spleen by handsewn suture. Both patients' postoperative courses were uneventful, and discharged with no other complications

Results: Pancreaticogastrostomy is feasible and reasonable technique. long-term exocrine, and endocrine pancreatic function may be preserved.

Conclusions: In selected cases of complete neck transection, when patients are hemodynamically stable and total transection of pancreatic parenchyme with disruption of the main pancreatic duct is found with clear margins on operative findings, pancreas preserving surgeries can be considered. Patient selection and decision making by operative findings should be carefully considered by experienced pancreatic surgeons.

Keywords: Pancreas, Pancreaticogastrostomy, Trauma



83RD ANNUAL MEETING OF AAST AND
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