ANAHEIM

82ND ANNUAL MEETING

PROGRAM BOOK

THE AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA
& CLINICAL CONGRESS OF ACUTE CARE SURGERY

SEPTEMBER 20-23, 2023

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

2023 AAST ANNUAL MEETING DISCLOSURES

https://qr.page/g/1GyfAGLJECR

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

Schedule Tab

82ND ANNUAL MEETING OF THE AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA AND CLINICAL CONGRESS OF ACUTE CARE SURGERY

GENERAL SCIENTIFIC PROGRAM SCHEDULE

September 20 – September 23, 2023 • Anaheim, CA

MONDAY, SEPTEMBER 18, 2023

7:30 AM - 4:00 PM — Emergency Surgery Course (additional fee)
Redondo

TUESDAY, SEPTEMBER 19, 2023

7:30 AM - 6:00 PM — Registration
Ballroom Reg Desk

7:30 AM - 4:00 PM — Emergency Surgery Course (additional fee)
Redondo

7:30 AM - 4:30 PM — AAST Board of Managers Meeting
Laguna AB

8:00 AM - 5:00 PM — Military Symposium
Avalon A

5:00 PM - 6:00 PM — Military Reception *(Invite Only)*
Avalon B

10:00 AM - 1:00 PM — Geriatric Committee: Falls Prevention Event
(Invite Only)

1:00 PM - 5:00 PM — Pre-sessions
Mastery of Trauma Techniques and Practice: The 2023 AAST Continuous Certification Course

Laparoscopic Transcystic Common Bile Duct Exploration:A Hands-On Seminar

Taking the Next Step: A Comprehensive Approach to Making the Transition to Independent Investigator (Part 1)

6:30 PM - 8:30 PM — HemoSonics, LLC-Satellite Symposium
Capistrano

WEDNESDAY, SEPTEMBER 20, 2023

6:30 AM - 6:00 PM — Registration
Ballroom Reg Desk

6:30 AM - 7:30 AM — Resident/Student/In-training Fellow Breakfast
Huntington A-C
Presenter: Patrick Reilly, MD

Ongoing — Lactation Room
Lido C

6:30 AM - 7:45 AM — Committee Meetings I
ACS Program Directors, Communications Committee, Education Committee, HealthCare Economics Committee, Prevention Committee, Research and Education Fund

7:30 AM - 8:30 AM — Breakfast
Pacific Promenade

8:00 AM - 8:30 AM — Welcome
Pacific Ballroom

8:30 AM - 11:10 AM — **Session I: Plenary Papers 1-8**
Moderator: Eileen Bulger, MD **Recorder**: Karen Brasel, MD, MPH
Pacific Ballroom A-B

Paper 1 **8:30 AM - 8:50 AM**
PLATELET EXTRACELLULAR VESICLES AS A HEMOSTATIC ADJUNCT IN HEMORRHAGIC SHOCK
Presenter: Samantha Durbin, MD Discussant: Matthew Neal, MD

Paper 2 **8:50 AM - 9:10 AM**
THE INJURED MONOCYTE: THE LINK TO THE DEVELOPMENT OF CHRONIC CRITICAL ILLNESS AND POST-DISCHARGE MORTALITY FOLLOWING SEVERE INJURY
Presenter: Joseph Cuschieri, MD Discussant: Scott Brakenridge, MD, MSCS

Paper 3 **9:10 AM - 9:30 AM**
RISK-STRATIFIED THROMBOPROPHYLAXIS EFFECTS OF ASPIRIN VERSUS LOW-MOLECULAR-WEIGHT HEPARIN IN ORTHOPAEDIC TRAUMA PATIENTS
Presenter: Deborah Stein, MD, MPH Discussant: Charles Wade, PhD

Paper 4 **9:30 AM - 9:50 AM**
MULTICENTER EVALUATION OF FINANCIAL TOXICITY AND LONG-TERM PHYSICAL & MENTAL HEALTH AFTER INJURY
Presenter: John Scott, MD, MPH Discussant: Kristan Staudenmayer, MD, MSc

Paper 5 **9:50 AM - 10:10 AM**
DAMAGE CONTROL VS EARLY DEFINITIVE FIXATION OF DIAPHYSEAL LOWER EXTREMITY FRACTURES IN TBI PATIENTS: THE EAST BRAIN VS BONE MULTI-INSTITUTIONAL TRIAL
Presenter: Mira Ghneim, MD Discussant: John Scott, MD, MPH

Paper 6 **10:10 AM - 10:30 AM**
THE SILENT KILLER IN TRAUMA: THE IMPLICATIONS OF MALNUTRITION ON OUTCOMES OF OLDER ADULTS
Presenter: Hamidreza Hosseinpour, MD Discussant: Sharon Henry, MD

Paper 7 **10:30 AM - 10:50 AM**
DO HOSPITAL BASED EMERGENCY MEDICAID PROGRAMS FOR THE UNINSURED BENEFIT TRAUMA CENTERS? A MIXED-METHODS STUDY
Presenter: Lisa Marie Knowlton, MD, MPH Discussant: Joseph Minei, MD, MBA

Paper 8 **10:50 AM - 11:10 AM**
THE INTERACTION BETWEEN GERIATRIC & NEIGHBORHOOD VULNERABILITY: DELINEATING PRE-HOSPITAL RISK AMONG OLDER ADULT EGS PATIENTS
Presenter: Cheryl Zogg, PhD, MSPH, MHS Discussant: Vanessa Ho, MD, MPH

11:00 AM - 7:00 PM — Exhibits Open
California BR Configuration

11:00 AM - 7:00 PM — Donor Lounge
California BR configuration

11:10 AM - 11:40 AM — Break in the Exhibit Hall
California BR Configuration

11:40 AM - 12:40 PM — **Session II: Presidential Address,**
"'WE ARE IN THIS TOGETHER:' THE POWER OF SOCIAL CONNECTION"
Presenter: Eileen Bulger, MD
Pacific Ballroom

12:45 PM - 2:00 PM — Lunch Sessions I

360 Care of the Older Adult EGS patient

Defining the Acute Care Surgeon : FTE's, Compensation and Career Trajectory

International Case Conference Session

Leading the Charge: Thriving as an Early- and Mid-Career Surgeon in the AAST

On-Call with NextGen Masters in Acute Care Surgery: Navigating Complex Cases

Reviewing a Manuscript, Using Multivariate Analysis, and Disclosing Conflicts of Interest: What you need to know.

12:45 PM - 2:00 PM — Avita Medical – Product Theater
(Hot Lunch will be Served)
California BR Configuration

2:05 PM - 5:45 PM — **Session IIIA: Papers 9-19**
Moderator: Joseph Cuschieri, MD; **Recorder**: Krista Kaups MD, MS
Pacific Ballroom A-B

Paper 9 — **2:05 PM - 2:25 PM**
DIMETHYL MALONATE PROTECTS THE LUNG IN A MURINE MODEL OF ARDS
Presenter: Sharven Taghavi, MD, MPH, MS — Discussant: Rondi Gelbard, MD

Paper 10 — **2:25 PM - 2:45 PM**
DO VIRTUAL SURGICAL INTENSIVISTS ENHANCE ICU LIBERATION IN SURGICAL PATIENTS?
Presenter: Erika Allen, MD — Discussant: Babak Sarani, MD

Paper 11 — **2:45 PM - 3:05 PM**
SIRT1 DELETION EXACERBATES PNEUMONIA
Presenter: Hanna Labiner, MD — Discussant: Matthew Lissauer, MD

Paper 12 — **3:05 PM - 3:25 PM**
USING MICROFLUIDIC SHEAR TO ASSESS TRANSFUSION REQUIREMENTS IN TRAUMA PATIENTS
Presenter: Leslie Vuoncino, MD — Discussant: Christopher Dente, MD

Paper 13 — **3:25 PM - 3:45 PM**
ENDOTHELIOPATHY OF TRAUMA IN CHILDREN: ADMISSION SYNDECAN LEVEL IS ASSOCIATED WITH INJURY AND OUTCOMES
Presenter: Katrina Morgan, MD — Discussant: Bindi Naik Mathuria, MD, MPH

Paper 14 — **3:45 PM - 4:05 PM**
NETOSIS OCCURS EARLY AFTER TRAUMA: DEVELOPMENT OF A MURINE POLYTRAUMA MODEL
Presenter: Taleen MacArthur, MD — Discussant: Joseph Rappold, MD

Paper 15 **4:05 PM - 4:25 PM**
ENDOTHELIAL DYSFUNCTION IS DAMPENED BY EARLY ADMINISTRATION OF FRESH FROZEN PLASMA IN A RODENT BURN SHOCK MODEL
Presenter: Edward Kelly, MD Discussant: Samuel Mandell, MD, MPH

Paper 16 **4:25 PM - 4:45 PM**
DELAYED TXA AFTER TBI IMPEDES LEARNING, MEMORY; EARLY TXA IS FAVORABLE BUT NOT IN SHAM ANIMALS
Presenter: Michael Coons, BA Discussant: Mayur Patel, MD, MPH

Paper 17 **4:45 PM - 5:05 PM**
A BENZODIAZEPINE-SPARING APPROACH TO PREVENTING AND TREATING ALCOHOL WITHDRAWAL SYNDROME
Presenter: Mary McCullough, MD Discussant: Kaitlin Ritter, MD

Paper 18 **5:05 PM - 5:25 PM**
EXERCISE DOWN-REGULATES THE INFLAMMATORY RESPONSE AND DAMAGE ASSOCIATED MOLECULAR PATTERNS IN MURINE MODEL OF SEPSIS
Presenter: Adrian Camarena, MD Discussant: Kaushik Mukherjee, MD, MS

Paper 19 **5:25 PM - 5:45 PM**
POST-TRAUMATIC PNEUMONIA EXACERBATES BONE MARROW DYSFUNCTION
Presenter: Gwendolyn Gillies, MD Discussant: Nicole Werner, MD, MS

2:05 PM - 5:45 PM **Session IIIB: Papers 20-30**

Moderator: Rosemary Kozar, MD, PhD; **Recorder**: Michaela West, MD, PhD
Pacific Ballroom A-B

Paper 20 **2:05 PM - 2:25 PM**
ASSOCIATION BETWEEN GEOSPATIAL ACCESS TO TRAUMA CENTER CARE AND MOTOR VEHICLE CRASH MORTALITY IN THE UNITED STATES
Presenter: Vishal Patel, MPH Discussant: Cherisse Berry, MD

Paper 21 **2:25 PM - 2:45 PM**
RCT TO STUDY EFFECT OF IMMEDIATE POST OPERATIVE PROSTHESIS VS CONVENTIONAL PROSTHESIS ON BALANCE & QOL IN BK AMPUTEES FOLLOWING TRAUMA
Presenter: Sushma Sagar, MD Discussant: Navpreet Dhillon, MD

Paper 22 **2:45 PM - 3:05 PM**
IMPLEMENTATION OF THE 300CC-RULE SAFELY DECREASES CHEST TUBE PLACEMENT IN TRAUMATIC HEMOTHORAX
Presenter: Abdul Hafiz Al Tannir, MD Discussant: Alexandra Briggs, MD

Paper 23 **3:05 PM - 3:25 PM**
WHEN IS IT SAFE TO START VTE PROPHYLAXIS AFTER BLUNT SOLID ORGAN INJURY? A PROSPECTIVE AAST MULTI-INSTITUTIONAL TRIAL
Presenter: Morgan Schellenberg, MD, MPH Discussant: Douglas Schuerer, MD

Paper 24 **3:25 PM - 3:45 PM**
ASSOCIATION OF FOUR GEOGRAPHIC VULNERABILITY INDICES WITH FIREARM VIOLENCE IN A MAJOR US CITY
Presenter: Ann Polcari, MD, MPH, MSGH Discussant: Leah Tatebe, MD

Paper 25 **3:45 PM - 4:05 PM**
WOULD YOU RATHER: QUANTIFYING PERCEPTIONS OF FUNCTIONAL STATUS AFTER TRAUMATIC BRAIN INJURY
Presenter: Amelia Maiga, MD, MPH Discussant: Weidun Alan Guo, MD, PhD

Paper 26 **4:05 PM - 4:25 PM**
GOALS OF CARE ARE RARELY DISCUSSED PRIOR TO FUTILE TRAUMA TRANSFER: IT'S OKAY TO SAY "NO"
Presenter: Nellie Trenga-Schein, BA Discussant: Anastasia Kunac, MD

Paper 27 **4:25 PM - 4:45 PM**
DOES FRAILTY IMPACT FAILURE-TO-RESCUE IN GERIATRIC TRAUMA PATIENTS?
Presenter: Mitsuaki Kojima, MD, PhD Discussant: Lisa Kodadek, MD

Paper 28 **4:45 PM - 5:05 PM**
WHOLE BLOOD ON THE SCENE OF INJURY IMPROVES CLINICAL OUTCOME OF THE TRAUMA PATIENTS
Presenter: Jaromir Koci, MD, PhD Discussant: Juan Duchesne, MD

Paper 29 **5:05 PM - 5:25 PM**
AN ANALYSIS ON THE USE OF COLD STORED PLATELETS IN COMBAT TRAUMA
Presenter: Andrew Fisher, MD Discussant: Jason Sperry, MD, MPH

Paper 30 **5:25 PM - 5:45 PM**
GETTING OUT OF THE BAY FASTER: ASSESSING TRAUMA TEAM PERFORMANCE USING TRAUMA VIDEO REVIEW
Presenter: Rachel Appelbaum, MD Discussant: William Chiu, MD

6:00 PM - 7:00 PM Welcome Reception
California BR A-C

7:00 PM - 8:30 PM WITS Reception
Avalon

THURSDAY, SEPTEMBER 21, 2023

6:15 AM - 7:15 AM International Attendee Breakfast
Huntington A-C

6:15 AM - 7:15 AM Committee Meetings II

Acute Care Surgery Committee, Critical Care Committee, Disaster Committee, Diversity, Equity, and Inclusion Committee, Geriatrics Committee, Patient Assessment Committee

7:00 AM - 8:00 AM Breakfast in Exhibit Hall

7:00 AM - 2:00 PM Registration
Ballroom Reg Desk

7:00 AM - 2:30 PM Exhibits Open
California BR A-C

7:00 AM - 2:30 PM Donor Lounge
California BR A-C

Ongoing Lactation Room
Lido C

7:30 AM - 9:30 AM **Session IV: Papers 31-36**

Moderator: Christine Gaarder, MD, PhD; **Recorder:** Deborah Stein, MD, MPH

Pacific Ballroom A-B

Paper 31 **7:30 AM - 7:50 AM**

PROSPECTIVE VALIDATION OF A HOSPITAL TRIAGE PREDICTIVE MODEL TO DECREASE UNDERTRIAGE: AN EAST MULTICENTER STUDY

Presenter: Elise Biesboer, MD Discussant: James Byrne, MD, PhD

Paper 32 **7:50 AM - 8:10 AM**

THIN AIR, THICK BLOOD: HIGH ALTITUDE TRAUMA CENTERS HAVE INCREASED DEEP VENOUS THROMBOSIS RATES

Presenter: Franklin Wright, MD Discussant: Eric Ley, MD

Paper 33 **8:10 AM - 8:30 AM**

LONG WAVELENGTH LIGHT EXPOSURE REDUCES SYSTEMIC INFLAMMATION AND ACUTE ORGAN INJURY FOLLOWING POLYTRAUMA IN MICE

Presenter: Mohammadreza Zarisfi, MD Discussant: Todd Costantini, MD

Paper 34 **8:30 AM - 8:50 AM**

A HETEROGENOUS POPULATION OF EXTRACELLULAR VESICLES MOBILIZE TO LUNG POST-INJURY

Presenter: Todd Costantini, MD Discussant: Timothy Pritts, MD

Paper 35 **8:50 AM - 9:10 AM**

THE EFFECT OF CIRCLE OF WILLIS ANATOMY ON OUTCOMES FOR BLUNT CEREBROVASCULAR INJURIES

Presenter: David Bassa, MD Discussant: Ryan Dumas, MD

Paper 36 **9:10 AM - 9:30 AM**

LOW-VOLUME PEDIATRIC TRAUMA CENTERS ACHIEVE BETTER OUTCOMES THAN HIGH-VOLUME ADULT TRAUMA CENTERS IN TREATING INJURED CHILDREN

Presenter: Sai Krishna Bhogadi, MD Discussant: Eileen Bulger, MD

9:30 AM - 10:00 AM Break in Exhibit Hall

10:00 AM - 11:00 AM **Session V: Panel I**

"COMMUNITY ENGAGEMENT MODELS FOR VIOLENCE PREVENTION"

Panelists: Charity Evans, MD; Ashley Williams, MD; Deepika Nehra, MD; Kate Stadeli, MD; Moderator: Rochelle Dicker, MD

Pacific Ballroom

11:00 AM - 11:30 AM **Session VI: Scholarship Presentations**

"DEVELOPING METRICS TO ASSESS DISPARITIES IN ACCESS TO TRAUMA CARE IN WASHINGTON STATE"

Presenter: Rebecca Maine, MD, MPH

"IMPACT OF LUNG MACROPHAGE POLARIZATION ON POSTTRAUMATIC INFECTION"

Presenter: Anupamaa Seshadri, MD

"THE EFFECT OF PARACRINE FACTORS SECRETED FROM ADIPOSE DERIVED STEM CELLS ON HEALING IN A BURN WOUND MODEL"

Presenter: Alison Smith, MD, PhD

ASSOCIATE MEMBER MENTORING SCHOLARSHIP
Presenter: Tanya Anand, MD, MPH

11:30 AM - 12:30 PM **Session VII: Fitts Lecture,**
"ENDURE, ADAPT, SURVIVE AND THRIVE"
J. Wayne Meredith, MD
Pacific Ballroom

12:30 PM - 12:45 PM Break – *Head to Poster Session and collect your headphones and listening device*

12:45 PM - 1:45 PM **Session VIII: Poster Session**
California D

1:40 PM - 3:00 PM Cerus Corporation/Haemonetics – Product Theater
(Hot Lunch will be Served)
California BR A-C

1:40 PM - 3:00 PM Lunch on Own

1:45 PM - 6:00 PM Add-on Sessions
The 2023 AAST Neurocritical Care Update and Board Review Course
Taking the Next Step: A Comprehensive Approach to Making the Transition to Independent Investigator (Part 2): Shark Tank

1:45 PM - 6:00 PM Leadership Academy *(Invitation only)*
Capistrano

2:00 PM- 5:00 PM Prytime Medical Devices, Inc-Satellite Symposium
El Capitan

2:30 PM - 5:00 PM JTACS Editorial Board Meeting
(Invite Only)

4:30 PM - 6:30 PM Teleflex-Satellite Symposium
Palos Verdes

6:00 PM - 7:00 PM Leadership Academy Reception
Vista Lounge

5:00 PM - 8:00 PM SCCPDS Board of Directors Meeting *(Invite Only)*
Monterey

5:00 PM - 6:00 PM Virtual Job Fair Social Hour *(Open to all)*
Avalon AB

6:00 PM - 7:30 PM Associate Member Happy Hour
(AAST Associate Members Only)
Avalon AB

6:30 PM - 8:30 PM Trauma Prevention Coalition *(Invite Only)*
Santa Monica

FRIDAY, SEPTEMBER 22, 2023

6:15 AM - 7:15 AM Committee Meetings III
Associate Member Council , International Committee, Military Committee, Multi-Institutional Trials Committee, Palliative Care Committee, Pediatrics Committee

6:15 AM - 7:15 AM — Board of Managers Meeting
(Invite Only)

7:00 AM - 8:00 AM — Breakfast in Exhibit Hall
California BR configuration

7:00 AM - 1:30 PM — Exhibits Open
California BR configuration

7:00 AM - 1:30 PM — Donor Lounge
California BR A-C

7:00 AM - 3:00 PM — Registration
Ballroom Reg Desk

Ongoing — Lactation Room
Lido C

7:30 AM - 10:30 AM **Session IX: Papers 37-44**

Moderator: Jason Smith, MD, PhD, MBA; **Recorder:** Brittany Bankhead, MD, MS
Pacific Ballroom A-B

Paper 37 **7:30 AM - 7:50 AM**
PRIMARY CARE FOLLOW-UP IMPROVES OUTCOMES IN OLDER ADULTS FOLLOWING EMERGENCY GENERAL SURGERY ADMISSION
Presenter: Matthew Guttman, MD, PhD Discussant: Marta McCrum, MD, MPH

Paper 38 **7:50 AM - 8:10 AM**
DOOR-TO-PROPHYLAXIS TIME" AS A NOVEL QUALITY IMPROVEMENT METRIC IN PREVENTION OF VENOUS THROMBOEMBOLISM FOLLOWING TRAUMATIC INJURY
Presenter: Mike Van Gent, DO Discussant: Martin Schreiber, MD

Paper 39 **8:10 AM - 8:30 AM**
FASTER REFILL IN AN URBAN EMS SYSTEM SAVES LIVES: A PROSPECTIVE PRELIMINARY EVALUATION OF A PREHOSPITAL ADVANCED RESUSCITATIVE CARE BUNDLE
Presenter: Kristen Nordham, MD, MS Discussant: David Hampton, MD

Paper 40 **8:30 AM - 8:50 AM**
TO PLATE OR NOT TO PLATE: A PROPENSITY MATCHED ANALYSIS OF OUTCOMES IN PATIENTS UNDERGOING RIB FIXATION; AN MTQIP STUDY
Presenter: Laura Krech, MPH Discussant: Raminder Nirula, MD, MPH

Paper 41 **8:50 AM - 9:10 AM**
UNDERSTANDING FINANCIAL TOXICITY BURDEN AFTER INJURY: HIGHER TOXICITY ASSOCIATED WITH WORSE MENTAL HEALTH
Presenter: Saba Ilkhani, MD, MPH Discussant: Gregory Jurkovich, MD

Paper 42 **9:10 AM - 9:30 AM**
EXPLORING A NEW DEFINITION OF TRAUMA-INDUCED COAGULOPATHY: TEG AND ROTEM ABNORMALITIES ARE ASSOCIATED WITH MORTALITY
Presenter: Shyam Murali, MD Discussant: Matthew Kutcher, MD, MS

Paper 43 **9:30 AM - 9:50 AM**
KETAMINE FOR ACUTE PAIN AFTER TRAUMA (KAPT): A PRAGMATIC, RANDOMIZED CLINICAL TRIAL
Presenter: James Klugh, MD Discussant: Thomas Carver, MD

Paper 44 **9:50 AM - 10:10 AM**
WOULD YOU BE SURPRISED? PROSPECTIVE MULTICENTER STUDY OF THE SURPRISE QUESTION AS A SCREENING TOOL TO PREDICT MORTALITY IN TRAUMA PATIENTS
Presenter: Samir Fahkry, MD Discussant: Kathleen O'Connell, MD, MPH

9:00 AM - 5:00 PM AAST Pipeline Program Workshop
Avalon A

10:10 AM - 10:30 AM Break in Exhibit Hall
California BR configuration

10:30 AM - 11:00 AM **Session X: Expert Surgeon**
"CHALLENGING CURRENT NOTIONS ABOUT QUALITY IMPROVEMENT AND RESEARCH"
Presenter: Lillian Kao, MD, MS
Pacific Ballroom

11:00 AM - 12:00 PM **Session XI: Panel II**
"INNOVATIVE APPROACHES TO RESEARCH IN ACUTE CARE SURGERY"
Pacific Ballroom
Panelists: Zara Cooper, MD, MSc; Elliott Haut, MD, PhD; Deborah Stein, MD, MPH;
Moderator: Eileen Bulger, MD

12:00 PM - 1:15 PM Lunch with Exhibitors *(AAST Sponsored)*
California A-C

12:00 PM - 1:30 PM TSACO Editorial Meeting *(Invite Only)*
Laguna

12:00 PM - 1:15 PM Lunch Sessions II

Disaster Surgical Surge: When Mass Trauma Threatens to Overwhelm Your Operating Rooms

In pursuit of American College of Surgeons EGS Verification: A Nuts and bolts guide to verification

Management of Pediatric Trauma Patients: Optimal care in every facility

Solutions to Achieving Health Equity and Eliminating Health Care Disparities within Acute Care Surgery

Updates and Tips on Billing for Trauma and Surgical Critical Care

We Have to Talk: Navigating Difficult Discussions and Decisions for Acute Care Surgeons

12:00 PM - 1:15 PM AstraZeneca – Product Theater
California BR configuration

1:15 PM - 4:55 PM **Session XIIA: Papers 45-55**
Moderator: Hans-Christoph Pape, MD; **Recorder**: Rachael Callcut, MD, MSPH
Pacific Ballroom A-B

Paper 45 **1:15 PM - 1:35 PM**
THE MORTALITY BURDEN FROM VARIATION IN PROVISION OF SURGICAL CARE IN EMERGENCY GENERAL SURGERY
Presenter: Vanessa Ho, MD, MPH Discussant: Angela Ingraham, MD, MS

Paper 46 **1:35 PM - 1:55 PM**
IMPROVING OUTCOMES IN EMERGENCY GENERAL SURGERY: CONSTRUCT OF A COLLABORATIVE QUALITY INITIATIVE
Presenter: Mark Hemmila, MD Discussant: Garth Utter, MD

Paper 47 **1:55 PM - 2:15 PM**
IS NON-OPERATIVE MANAGEMENT OF APPENDICITIS INFERIOR IN THE COVID-19 ERA?
Presenter: Emily Grimsley, MD Discussant: Shahin Mohseni, MD, PhD

Paper 48 **2:15 PM - 2:35 PM**
SURGICAL STABILIZATION OF RIB FRACTURES FOLLOWING FLAIL CHEST: AN ANALYSIS OF CENTER-BASED VARIABILITY IN PRACTICE AND OUTCOMES
Presenter: Mathieu Hylands, MD, MSc Discussant: Mark Seamon, MD

Paper 49 **2:35 PM - 2:55 PM**
ECONOMIC RISK FACTORS OF RURAL FIREARM VIOLENCE IN THE UNITED STATES
Presenter: Sarabeth Spitzer, MD Discussant: Ronald Stewart, MD

Paper 50 **2:55 PM - 3:15 PM**
STRUCTURAL RACISM, RESIDENTIAL SEGREGATION, AND EXPOSURE TO TRAUMA: THE PERSISTENT IMPACT OF REDLINING
Presenter: James Bradford, BS Discussant: Randi Smith, MD, MPH

Paper 51 **3:15 PM - 3:35 PM**
IMPLEMENTATION EVALUATION OF TELE-TRIAGE PATHWAYS FOR BURN CENTER CONSULTATIONS AND TRANSFERS
Presenter: Nina Clark, MD Discussant: Sharmila Dissanaike, MD

Paper 52 **3:35 PM - 3:55 PM**
TRAUMA SURGEONS EXPERIENCE COMPASSION FATIGUE - A MAJOR METROPOLITAN AREA STUDY
Presenter: Lea Hoefer, MD Discussant: Jennifer Hartwell, MD

Paper 53 **3:55 PM - 4:15 PM**
VALIDATION OF THE TRAUMA CENTER FINANCIAL VULNERABILITY METRIC
Presenter: Bryan Campbell, DO Discussant: Robert Martin, MD

Paper 54 **4:15 PM - 4:35 PM**
DEEP LEARNING ALGORITHM FOR TRAUMATIC SPLENIC INJURIES DETECTION AND SEQUENTIAL LOCALIZATION
Presenter: Chien-Hung Liao, MD Discussant: Caroline Park, MD, MPH

Paper 55 **4:35 PM - 4:55 PM**
A COMPARATIVE ANALYSIS OF TRANEXAMIC ACID DOSING STRATEGIES IN TRAUMATIC MAJOR HEMORRHAGE
Presenter: Finn Gunn Discussant: Susan Rowell, MD, MBA

1:15 PM - 4:55 PM **Session XIIB: Papers 56-66**

Moderator: Jamie Coleman, MD; **Recorder**: Matthew Martin, MD
Pacific Ballroom C-D

Paper 56 **1:15 PM - 1:35 PM**
SEX-SPECIFIC DIFFERENTIAL EXPRESSION OF EXOSOMAL MIRNA FOLLOWING SEVERE TRAUMA
Presenter: Jennifer Munley, MD Discussant: Niels Martin, MD

Paper 57 **1:35 PM - 1:55 PM**
ALTERED PLATELET MITOCHONDRIAL FUNCTION ASSOCIATED WITH HYPERCOAGULABILITY IN A RODENT FRACTURE MODEL
Presenter: Matthew Kutcher, MD, MS Discussant: Julie Goswami, MD

Paper 58 **1:55 PM - 2:15 PM**
SILENCING HEPATIC MCJ IN AGED MICE ATTENUATES ENDOPLASMIC RETICULUM STRESS AND DECREASES LIVER INJURY AFTER MAJOR TRAUMA.
Presenter: Juan Idrovo, MD Discussant: Anupamaa Seshadri, MD

Paper 59 **2:15 PM - 2:35 PM**
WHERE YOU GET HURT MATTERS: IMPACT OF GEOGRAPHY AND EMS SYSTEM RESOURCE AVAILABILITY ON AIR MEDICAL TRANSPORT AFTER TRAUMA
Presenter: Jamison Beiringer, BS Discussant: Mark Gestring, MD

Paper 60 **2:35 PM - 2:55 PM**
DIRECTED WORK-UP OF SELECT PENETRATING NECK INJURIES IS SAFE: HARD SIGNS CONTINUE TO SOFTEN
Presenter: Dina Filiberto, MD Discussant: Walter Biffl, MD

Paper 61 **2:55 PM - 3:15 PM**
CUES TO CARE: CHRONIC DISEASE DIAGNOSIS IN YOUNG ADULT TRAUMA PATIENTS
Presenter: Ursula Adams, MD, MBA Discussant: Joshua Brown MD, MS

Paper 62 **3:15 PM - 3:35 PM**
ANALYSIS OF LIPID METABOLITES DERIVED FROM GUT MICROBIOTA IN ISCHEMIA-REPERFUSION MODEL
Presenter: Keita Nakatsutsumi, MD Discussant: Jon Simmons, MD

Paper 63 **3:35 PM - 3:55 PM**
THROMBOPROPHYLAXIS AFTER SPLENIC ANGIOEMBOLIZATION: WHEN IS IT SAFE TO START?
Presenter: Brianna Cohen, MD Discussant: William Brigode, MD

Paper 64 **3:55 PM - 4:15 PM**
DEATH BY THE MILE: INEQUITIES IN TRAUMA CENTER ACCESS IN BOSTON
Presenter: Michael Poulson, MD, MPH Discussant: Glen Tinkoff, MD

Paper 65 **4:15 PM - 4:35 PM**
GIFTS: GERIATRIC INTENSIVE FUNCTIONAL THERAPY SESSIONS- FOR THE OLDER TRAUMA PATIENT
Presenter: Diane Wintz, MD Discussant: Ashley Meagher, MD, MPH

Paper 66 **4:35 PM - 4:55 PM**
HYPOXIA DYSREGULATES THE TRANSCRIPTION OF MYOENDOTHELIAL JUNCTION PROTEINS INVOLVED WITH THE PRODUCTION OF NITRIC OXIDE
Presenter: David Bar-Or, MD Discussant: Nikolay Bugaev, MD

5:00 PM - 6:30 PM Business Meeting *(members and invited guest only)*
Pacific Ballroom AB

7:00 PM - 7:30 PM Reception
Pacific Promenade

7:30 PM - 11:00 PM Experience AAST Auction and Annual Banquet
Pacific Ballroom CD

SATURDAY, SEPTEMBER 23, 2023

7:00 AM - 8:00 AM New Member Breakfast
El Capitan A

7:30 AM - 8:30 AM Breakfast
Pacific Ballroom Promenade

7:30 AM - 10:00 AM Lactation Room
Lido C

8:00 AM - 9:18 AM **Session XIII: Quickshot Session I 1-13**

Moderator: Jennifer Gurney, MD
Pacific A-B

Quickshot 1 **8:00 AM - 8:06 AM**
REDUCING DONOR SKIN IN SOFT TISSUE RECONSTRUCTION USING AN AUTOLOGOUS CELL HARVESTING DEVICE COMBINED WITH MESHED AUTOGRAFT
Presenter: Sharon Henry, MD Discussant: Amy Liepert, MD

Quickshot 2 **8:06 AM - 8:12 AM**
GEOSPATIAL ACCESS TO ACS/AAST VERIFIED EGS CENTERS IN THE US: STRATEGIC OPPORTUNITIES FOR THE EGS VERIFICATION PROGRAM
Presenter: David Silver, MD, MPH Discussant: Lara Senekjian, MD

Quickshot 3 **8:12 AM - 8:18 AM**
THE FRAILTY SPECTRUM: CHANGING THE BINARY CLASSIFICATION OF FRAILTY
Presenter: Qaidar Alizai, MD Discussant: Esther Tseng, MD

Quickshot 4 **8:18 AM - 8:24 AM**
CHANGES IN PAYER MIX OF NEW AND ESTABLISHED TRAUMA CENTERS: THE NEW TRAUMA CENTER MONEY GRAB?
Presenter: Diane Haddad, MD, MPH Discussant: Patricia Ayoung-Chee, MD, MPH

Quickshot 5 **8:24 AM - 8:30 AM**
CHEMOKINE RESPONSE CHANGES WITH RATE OF TRANSFUSION: MIXED MESSAGES FOLLOWING INJURY
Presenter: Stephanie Savage, MD Discussant: Prerna Ladha, MD, MBBS

Quickshot 6 **8:30 AM - 8:36 AM**
MESENCHYMAL STEM CELLS DO NOT PRODUCE MEASURABLE HYPER-COAGULABILITY ON VISCOELASTIC TESTING
Presenter: Lydia Buzzard, BS Discussant: Sharven Taghavi, MD, MPH

Quickshot 7 **8:36 AM - 8:42 AM**
HOSPITAL EXPERIENCE WITH GERIATRIC TRAUMA IMPACTS LONG-TERM SURVIVAL
Presenter: Manuel Castillo-Angeles, MD, MPH Discussant: Joseph Posluszny, MD

Quickshot 8 **8:42 AM - 8:48 AM**
ANALYSIS OF NEIGHBORHOOD SOCIOECONOMIC DISADVANTAGE INDICES AND INJURY MECHANISM PATTERNS: DOES THE INDEX MATTER?
Presenter: Miharu Arase, MD, PhD Discussant: Alaina Lasinski, MD

Quickshot 9 **8:48 AM - 8:54 AM**
PROPOSED EVIDENCE-BASED REVISION OF THE AMERICAN ASSOCIATION FOR SURGERY OF TRAUMA RENAL TRAUMA ORGAN INJURY SCALE: SECONDARY ANALYSIS OF THE MULTI-INSTITUTIONAL GENITOURINARY TRAUMA STUDY (MIGUTS)
Presenter: Rano Matta, MD, MSc Discussant: Alexander Schwed, MD

Quickshot 10 **8:54 AM - 9:00 AM**
CHARACTERIZING USE OF SPLENIC ARTERY EMBOLIZATION TO TREAT BLUNT SPLENIC INJURY: WHO BENEFITS?
Presenter: Ajai Malhotra, MD Discussant: Jay Collins, MD

Quickshot 11 **9:00 AM - 9:06 AM**
IMPACT OF PREHOSPITAL TOURNIQUETS ON PENETRATING EXTREMITY INJURIES: BLOOD SAVING OR TIME DELAY?
Presenter: Leah Tatebe, MD Discussant: Caitlin Fitzgerald, MD

Quickshot 12 **9:06 AM - 9:12 AM**
IMPLEMENTATION OF A PERCENTAGE OF PREDICTED FORCED VITAL CAPACITY RIB FRACTURE PROTOCOL RESULTS IN IMPROVED ICU UTILIZATION
Presenter: Jennifer Baker, MD Discussant: Jennifer Hubbard, MD

Quickshot 13 **9:12 AM - 9:18 AM**
SURGICAL APGAR SCORES PREDICT COMPLICATIONS AFTER EMERGENCY GENERAL SURGERY LAPAROTOMY
Presenter: Brett Tracy, MD Discussant: Nancy Parks, MD

9:18 AM - 9:40 AM Break

9:40 AM - 10:58 AM **Session XIV: Quickshot Session II 14-26**
Moderator: Patrick Reilly, MD

Quickshot 14 **9:40 AM - 9:46 AM**
TRANEXAMIC ACID IS NOT ASSOCIATED WITH A HIGHER RATE OF THROMBOTIC-RELATED REINTERVENTION AFTER MAJOR VASCULAR INJURY REPAIR
Presenter: Sina Asaadi, MD Discussant: TBD

Quickshot 15 **9:46 AM - 9:52 AM**
PROSTAGLANDIN E-MAJOR URINARY METABOLITES AS A NEW BIOMAKER FOR ACUTE MESENTERIC ISCHEMIA
Presenter: Keisuke Suzuki Discussant: Ida Molavi, MD

Quickshot 16 **9:52 AM - 9:58 AM**
SURGEON PRACTICES AND BARRIERS TO FIREARM SAFETY COUNSELING IN CLINICAL PRACTICE: A CROSS-SECTIONAL STUDY
Presenter: Shelbie Kirkendoll, DO, MS Discussant: Thomas Duncan, DO

Quickshot 17 **9:58 AM - 10:04 AM**
BONE ANCHOR FIXATION IN THE REPAIR OF BLUNT TRAUMATIC ABDOMINAL WALL HERNIAS: A WESTERN TRAUMA ASSOCIATION MULTICENTER STUDY
Presenter: Kevin Harrell, MD Discussant: Allison McNickle, MD

Quickshot 18 **10:04 AM - 10:10 AM**
COMPARISON OF MILITARY AND CIVILIAN SURGEON OUTCOMES WITH EMERGENT TRAUMA LAPAROTOMY IN A MATURE MILITARY-CIVILIAN PARTNERSHIP
Presenter: Parker Hu, MD Discussant: Kenji Inaba, MD

Quickshot 19 **10:10 AM - 10:16 AM**
EFFECTS OF LOCAL HYPOTHERMIA ON LIMB VIABILITY IN A TRAUMATIC MODEL OF ACUTE LIMB ISCHEMIA DURING PROLONGED DAMAGE CONTROL RESUSCITATION
Presenter: Emily Kao, MD Discussant: Sigrid Burruss, MD

Quickshot 20 **10:16 AM - 10:22 AM**
FUNCTIONAL OUTCOMES AFTER ECMO IN A TRAUMA POPULATION
Presenter: Jamie Robinson, MD Discussant: Abhijit Pathak, MD

Quickshot 21 **10:22 AM - 10:28 AM**
LEVERAGING MACHINE LEARNING TO PREDICT MORTALITY: WHEN TO STOP IN TRAUMA RELATED ULTRA-MASSIVE TRANSFUSION
Presenter: Courtney Meyer, MD, MPH Discussant: Joshua Hazelton, DO

Quickshot 22 **10:28 AM - 10:34 AM**
LONG-TERM OPIOID USE AFTER TRAUMA: INCIDENCE AND RISK FACTORS
Presenter: Matthew Benns, MD Discussant: Katie Iverson, MD, MPH

Quickshot 23 **10:34 AM - 10:40 AM**
OPERATIVE TRAUMA AND MORTALITY: THE ROLE OF VOLUME
Presenter: Sarah Hatfield, MD, MPH Discussant: David Shatz, MD

Quickshot 24 **10:40 AM - 10:46 AM**
PROPENSITY WEIGHTED ANALYSIS OF CHEMOPROPHYLAXIS AGENTS FOR PREVENTION OF VENOUS THROMBOEMBOLISM IN SEVERE TBI PATIENTS: AN EAST SPONSORED MULTI-CENTER TRIAL
Presenter: Sirivan Seng, MD Discussant: Parker Hu, MD

Quickshot 25 **10:46 AM - 10:52 AM**
RISK FACTORS FOR EMERGENCY DEPARTMENT UTILIZATION AND READMISSION AFTER TRAUMATIC INJURY: IS FOLLOW-UP REALLY THAT IMPORTANT?
Presenter: Sophia Smith, MD Discussant: Marissa Boeck, MD, MPH

Quickshot 26 **10:52 AM - 10:58 AM**
SURVIVING BUT NOT THRIVING AFTER GUNSHOT WOUND: PROSPECTIVE STUDY OF PTSD, QOL, AND EMPLOYMENT
Presenter: Isaac Howley, MD, MPH Discussant: Bethany Strong, MD, MS

11:00 AM Meeting Adjourned

AAST ABSTRACTS OF PAPERS

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 20, 2023
8:00 AM – 8:30 AM

Location: Pacific Ballroom
Presiding: Eileen Bulger, MD

SESSION I:

PLENARY PAPERS #1- 8
Wednesday, September 20, 2023
8:30 AM - 11:10 AM

Location: Pacific Ballroom
Moderator: Eileen Bulger, MD
Recorder: Karen Brasel, MD, MPH

Session I: Plenary Papers 1-8
Paper 1: 8:30 AM - 8:50 AM

PLATELET EXTRACELLULAR VESICLES AS A THERAPEUTIC AGENT IN HEMORRHAGIC SHOCK

Samantha Durbin, MD; Lydia Buzzard, BS; Karen Minoza, MD; Moqing Liu, PhD; Joseph Garay, PhD; Alpa Mahuvakar, PhD; Shibani Pati, MD, PhD; Martin Schreiber, MD
Oregon Health & Science University
Invited Discussant: Matthew Neal, MD

Introduction: Hemorrhage accounts for the majority of preventable deaths after trauma. Resuscitation is guided by several studies that demonstrate improved outcomes in patients receiving whole blood or a balanced administration of blood products. Platelets present a logistical challenge due to a short shelf life and need for refrigeration. One alternative is platelet derived extracellular vesicles (PEVs). PEVs are particles secreted from platelets that express several important surface receptors, have hemostatic effects and mitigate inflammation and vascular injury similar to platelets. PEVs are lightweight, safe, easily transportable, stable over a wide temperature range and have a long shelf-life. This study aimed to elucidate the therapeutic effects of PEVs in a rat model of uncontrolled hemorrhage.
Methods: Male rats were anesthetized and femoral vessels cannulated. Vital signs (MAP, HR, and RR) were monitored. Electrolytes, lactate and ABG were obtained at baseline, 1-hour and 3-hours post injury. Laparotomy was performed, 50% of the middle hepatic lobe excised and the abdomen packed with gauze. Rats received 2 mL PEVs or lactated ringers (LR) over 6 min at the time of injury. Peritoneal blood loss was quantified using pre-weighed gauze at 5, 15, 30, 45 and 60 minutes. Laparotomy was closed 1-hour post-injury. Animals were monitored 3-hours post-injury then euthanized. Generalized Linear Mixed Effects models and ANOVA were done to assess effects of treatment and time on lactate and MAP.
Results: 21 rats were included (11 LR 10 PEV). Overall blood loss was between 6-10 ml and not significantly different between groups. There was a 19% mortality rate in the LR group and 0% mortality in the PEV group ($p=0.03$). The LR group had significantly higher lactates at 1 hour ($p = 0.025$) and 3 hours ($p = 0.016$). At baseline, 5 and 30 minutes, there was no difference in MAP. At 15, 45, 60, and 180 minutes the MAP of the PEV group was significantly higher than the LR group.
Conclusion: Early studies are encouraging regarding the potential use of PEVs in uncontrolled hemorrhagic shock based on improved survival, hemodynamics and end organ function.

Session I: Plenary Papers 1-8
Paper 2: 8:50 AM - 9:10 AM

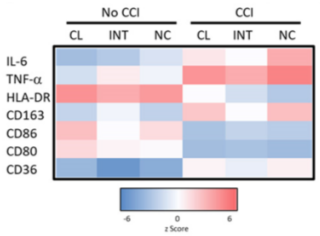
THE INJURED MONOCYTE: THE LINK TO CHRONIC CRITICAL ILLNESS AND MORTALITY FOLLOWING INJURY

Joseph Cuschieri, MD; Lucy Kornblith, MD;
Shibani Pati, MD, PhD; Adrian Piliponsky, PhD
UCSF San Francisco General Hospital
Invited Discussant: Scott Brakenridge, MD, MSCS

Introduction: Severely injured patients may go on to develop chronic critical illness (CCI). An altered innate phenotype is thought to play a role but remains poorly elucidated. The primary aim of this study was to characterize the innate immune populations following severe injury, and their relationship to the development of CCI and long-term outcomes.

Methods: In a 3-year study, patients that suffered severe trauma were followed up to 1 year following injury. Patient demographics and outcomes were collected. An ICU length of stay of $\geq$14 days with persistent organ failure defined CCI. Blood obtained at days 1 and 5 underwent flow cytometry for monocyte phenotypic expression (classical, CL; intermediate, INT; non-classical, NC), HLA-DR expression, and activation. Measures and outcomes were analyzed by Pearson's correlation and two-sided paired t-tests.

Results: Of the 80 patients enrolled, 26 (32.5%) developed CCI. Patients with CCI were more severely injured (32.4$\pm$5.2 vs. 29.6$\pm$4.1, p=0.01) and received more pRBCs (8.9$\pm$4.1 vs. 4.7$\pm$3.8, p<0.01) compared to patients without CCI. CL and INT monocytes were not different, but NC monocytes were significantly reduced by more than 2-fold in patients with CCI. Overall, significant changes in cytokine expression and cell receptors were noted within each monocyte subpopulation. These changes were consistent with an increased pro-inflammatory phenotype, but decreased phagocytic capacity and antigen presentation in patients with CCI (Figure). HLA-DR expression was significantly decreased in patients with CCI at both days 1 and 5. Development of CCI and presence of this unique monocyte phenotype was associated with a significant increased risk for infection, discharge to long-term care facility, and poor functional status and mortality at 1 year.



Conclusion: This altered NC phenotype with decreased phagocytic capacity and antigen presentation found in CCI likely contributes to poor long-term recovery. Early identification of this unique phenotype could help predict and treat patients at risk for CCI to improve outcome.

Session I: Plenary Papers 1-8
Paper 3: 9:10 AM - 9:30 AM

RISK-STRATIFIED THROMBOPROPHYLAXIS EFFECTS OF ASPIRIN VERSUS LOW-MOLECULAR-WEIGHT HEPARIN IN ORTHOPAEDIC TRAUMA PATIENTS

Robert V. O'Toole, MD; Nathan N. O'Hara, PhD;
Deborah M. Stein, MD, MPH; Anthony R Carlini, MS;
Katherine P. Frey, PhD; A. Britton Christmas, MD; Joseph Cuschieri, MD;
Reza Firoozabadi, MD; Greg E. Gaski, MD; Elliott R. Haut, MD, PhD;
Matthew E Kutcher, MD; Debra Marvel, BS; William Obremskey, MD;
Gerard P. Slobogean, MD; Renan C. Castillo, PHD
R. Adams Cowley Shock Trauma Center
Invited Discussant: Charles Wade, PhD

Introduction: A recent randomized trial concluded that thromboprophylaxis with aspirin was noninferior to low-molecular-weight heparin (LMWH) in preventing death in orthopaedic trauma patients. This planned secondary analysis sought to determine if these results apply to high-risk patients. We aimed to determine if the effect of aspirin versus LMWH differed based on patients' baseline risk of venous thromboembolism (VTE).
Methods: A pragmatic randomized controlled trial was conducted at 21 trauma centers in North America. 12,211 adult patients were enrolled who indicated for thromboprophylaxis due to an operatively treated extremity fracture or pelvis or acetabulum fracture. The Caprini Score was used to calculate patients' baseline risk of VTE, stratifying the sample into risk quartiles ranging from low (< 1%) to high risk (>10%). The primary outcome was a composite of thromboembolic outcomes within 90 days. We assessed treatment effects using the win ratio method. We compared the outcomes hierarchically; death, pulmonary embolism, deep vein thrombosis, and bleeding. The secondary outcome added an ordinal measure of patient-reported thromboprophylaxis satisfaction as the fifth component in the composite outcome.
Results: In the high-risk quartile (n=3052), 46% of patients had a femur fracture, 42% had a pelvis or acetabulum fracture, 48% had a thoracic injury, 39% had a spinal injury, and 35% had a head injury. In the high-risk quartile, there was no statistical difference in the effect of aspirin compared to LMWH on the composite outcome (win ratio, 0.95; 95% CI, 0.83 – 1.09, p=0.48). When patient-reported thromboprophylaxis satisfaction was considered, favorable outcomes were 68% more frequent when assigned to aspirin as compared to LMWH (win ratio, 1.68; 95% CI, 1.60 – 1.77; p< 0.001).
Conclusions: Thromboembolic outcomes are similar when either aspirin or LMWH is used for prophylaxis in trauma patients with orthopaedic injuries. This result held true even when considering patients at highest risk of VTE.

Session I: Plenary Papers 1-8
Paper 4: 9:30 AM - 9:50 AM

MULTICENTER EVALUATION OF FINANCIAL TOXICITY AND LONG-TERM PHYSICAL & MENTAL HEALTH AFTER INJURY

John W. Scott, MD, MPH; Tandis Soltani, MD;
Geoff Anderson, MD, MPH; Amelia Conatser; Cairo de Souza, BA;
Emily Evans, BS; Zachary Goodwin; Julia Kelm, BS; Iman Mekled, MPH;
Janessa Monahan, MSW; Esther Oh, MPH;
Bryant Oliphant, MD, MBA, MS; Mark R. Hemmila, MD
University of Michigan
Invited Discussant: Kristan Staudenmayer, MD, MS

Introduction: Financial toxicity (FT) encompasses the subjective and objective financial strain due to illness, treatment, and recovery. Although our understanding of long-term health-related quality of life (hrQoL) after injury is improving, little is known about long-term financial wellbeing after injury, risk-factors for FT, or the association between FT and hrQoL.
Methods: Patients from six trauma centers were contacted 1-18 months after discharge and evaluated for the five elements of FT: out-of-pocket (OOP) spending, medical debt, job or income loss, non-medical bills, and unaffordable care. Five measures of hr-QoL (Table) were also evaluated using the EuroQol-5D-5L. Multivariable regression models including 18 patient, injury, treatment, and system traits (Table) were used to evaluate for risk-factors of FT as well as associations between FT and hrQoL outcomes.
Results: Among the 256 respondents, 48% were female, median age was 63y, median ISS was 10, and median follow-up was 5.4 months (IQR: 2.6m-7.1m). Across the five FT elements, 37% had OOP spending >$1000, 26% had medical debt, 31% had job or income loss, 29% had difficulty with non-medical bills, and 18% reported delayed/forgone care due to costs. On multivariable analyses evaluating patient, injury, and system traits, FT was not associated with inpatient treatment intensity (e.g ICU care, length of stay, operation); however, FT was associated with younger age, higher ISS, SVI, and insurance status. On risk-adjusted analyses, FT was independently associated with worse hrQoL in all five EuroQol-5D-5L domains (Table).
Conclusion: Two-thirds of trauma survivors from six hospitals experience some element of financial toxicity months after discharge. The independent association between FT and hrQoL suggests that interventions to mitigate FT may optimize long-term recovery.

Table. Health-related quality of life outcomes, by increasing levels of Financial Toxicity

Moderate, Severe, or Extreme Difficulty with:	No FinTox	1-2 FinTox Elements	3-5 FinTox Elements	Risk-Adj *P* Value*
	(n= 86)	(n= 120)	(n = 50)	
Walking about	**29%**	**38%**	**50%**	<0.001
Washing and dressing self	**11%**	**25%**	**28%**	<0.001
Doing usual activities	**31%**	**45%**	**52%**	0.001
Pain or discomfort	**28%**	**36%**	**58%**	<0.001
Anxiety or depression	**12%**	**23%**	**25%**	<0.001

FinTox = Financial Toxicity, scale 0-5. *Risk-adjusted P-value across the three categories of Financial Toxicity; **Adjusted for**: age, sex, race/ethnicity, health insurance type, social vulnerability index (SVI), baseline comorbidities, prior mental health diagnosis, injury severity score (ISS), maximum head abreviated injury scale (AIS), injury mechanism, operative intervention, intensive care unity (ICU) stay, non-home discharge, transfer status, trauma center, survey year, and months since discharge. Standard errors clustered at trauma centers.

Session I: Plenary Papers 1-8
Paper 5: 9:50 AM - 10:10 AM

DAMAGE CONTROL VS. EARLY DEFINITIVE FIXATION OF DIAPHYSEAL LOWER EXTREMITY FRACTURES IN TBI PATIENTS: THE EAST BRAIN VS. BONE MULTI-INSTITUTIONAL TRIAL

Mira Ghneim, MD, MS; Joseph Kufera, MA; Lourdes Swentek, MD; Jill Watras, MD; Alison Smith, MD; Dalier Rodriguez Mederos, MD; Kyle Cunningham, MD; Scott Norwood, MD; Lewis E. Jacobson, MD; Lawrence Lottenberg, MD; William Shillinglaw, MD; Jeffry Nahmias, MD, MHPE; Miklosh Bala, MD; Deborah M. Stein, MD, MPH; The EAST Brain vs. Bone Study Group
R. Adams Cowley Shock Trauma Center
Invited Discussant: John Scott, MD, MPH

Introduction: The association between damage control orthopedics (DCO) vs. early definitive fixation (EDF) of lower extremity (LE) fractures & neurologic outcomes remains unclear. This study aimed to determine whether DCO vs. EDF & timing (≤ 24 hours vs. > 24 hours) of LE fracture fixation impact neurologic outcomes in patients with TBI.
Methods: A prospective observational study was conducted across 30 level-1 trauma centers between (03/2019-03/2022). Inclusion criteria were age ≥ 18, head AIS score > 2, & a femur or tibia diaphyseal fracture. Comparisons were made between the external fixation (Ex-Fix) with conversion to intramedullary nailing (IMN) group vs. the IMN only group, & the Ex-Fix with conversion to open reduction & internal fixation (ORIF) vs. the ORIF only group. Neurologic outcomes were measured by discharge Revised Rancho Los Amigos Scale score (R-RLAS). Multivariable regression models were used to identify independent predictors of a lower R-RLAS score at discharge.
Results: Of the 520 patients enrolled in the study, 42 (8.1%) underwent Ex-Fix to IMN, 171 (33%) underwent IMN, 51(9.8%) underwent Ex-Fix to ORIF, &142 (27%) underwent ORIF. After adjusting for confounders, neither method nor timing of LE fixation influenced the discharge R-RLAS score. However, head AIS (OR 6.92, 95% CI 3.2-15) was associated with a lower R-RLAS score at discharge in the IMN group. In the ORIF group, age (OR 1.03, 95% CI 1.01-1.05), & head AIS (OR 2.5, 95% CI 1.22-5.13) were associated with a lower R-RLAS score at discharge & higher post-resuscitation motor scores of 4-5 (OR 0.45, 95% CI 0.2-0.99) & motor score of 6 (OR 0.35, 95% C0.13-0.95) were associated with a higher R-RLAS score at discharge.
Conclusion: Neurologic outcomes in TBI patients with concomitant LE fractures are impacted by severity of the head injury itself & not the fracture fixation technique or timing. Therefore, the LE fracture fixation strategy may not need to be delayed or modified due to concern for worsening neurologic outcomes in this patient population.

Session I: Plenary Papers 1-8
Paper 6: 10:10 AM - 10:30 AM

THE SILENT KILLER IN TRAUMA: THE IMPLICATIONS OF MALNUTRITION ON OUTCOMES OF OLDER ADULTS

Hamidreza Hosseinpour, MD; Khaled El-Qawaqzeh, MD;
Louis J. Magnotti, MD, MS, FACS; Sai Krishna Bhogadi, MD;
Adam Nelson, MD; Qaidar Alizai, MD;
Tanya Anand, MD, MPH, FACS; Christina Colosimo, DO, MS;
Michael Ditillo, DO, FACS; Bellal Joseph, MD, FACS
The University of Arizona
Invited Discussant: Sharon Henry, MD

Introduction: The impact of malnutrition on both short-term & post-discharge outcomes in geriatric trauma patients remains unclear. We aimed to evaluate the impact of malnutrition on a multi-institutional cohort of patients.
Methods: This is a secondary analysis of the AAST Frailty Multi-institutional Trial. All patients (≥65 yrs) presenting to one of seventeen Level I/II trauma centers (2019-2021) were included and stratified by the simplified Geriatric Nutritional Risk Index (sGNRI=albumin (measured within 24 hrs in g/dL) + BMI (kg/m^2)/10): severe (sGNRI<5), moderate (5.5>sGNRI≥5.5), & mild malnutrition (6>sGNRI≥5.5), & good nutritional status (sGNRI≥6). Outcomes included index admission mortality, complications, discharge to skilled nursing facility/rehab (SNF/rehab), length of stay (LOS), & 3-month post-discharge readmissions, falls, complications, & mortality. Multivariable regression analyses were performed.
Results: 1,321 patients were identified. 22% suffered from malnutrition (Severe Malnutrition: 3%; Moderate Malnutrition: 7%; Mild Malnutrition: 13%). Mean age was 77±8 yrs; median ISS was 9 [5-13] & 69% had falls. Severe malnutrition had higher rates of sepsis, pneumonia, discharge to SNF/rehab, index-admission mortality, longer LOS & 3-month mortality (**Table**). On multivariable analyses, severe malnutrition was associated with sepsis (aOR 8.7, 95% CI [2.6-29.1], p<0.001), pneumonia (aOR 4.4, 95% CI [1.2-16], p=0.025), index-admission mortality (aOR 4.1, 95% CI [1.4-11.6], p=0.008) & 3-month mortality (aOR 16.9, 95% CI [4.5-63.7], p<0.001) compared to good nutrition. Moderate malnutrition was associated with index admission mortality (aOR 5.5, 95% CI [1.6-19.1], p=0.008). On linear regression, improved nutritional status (increasing sGNRI) was associated with shorter hospital LOS (β= -0.45, 95% CI [-0.85, -0.058] p=0.025).
Conclusion: In this large multi-center cohort of geriatric trauma patients, nearly 25% of patients suffered from malnutrition. Malnutrition was an independent predictor of worse index-admission and 3-month post discharge outcomes. These findings underscore the need for nutritional screening & interventions at admission to improve outcomes of geriatric trauma patients.

Malnutrition Status	**Good** (N=1,036)	**Mild** (N=166)	**Moderate** (N=86)	**Severe** (N=33)	***p***
Index Admission					
Mortality, n (%)	43 (4.2)	8 (4.8)	7 (8.1)	5 (15.2)	**0.013**
Sepsis, n (%)	19 (1.8)	3 (1.8)	3 (3.5)	4 (12.1)	**<0.001**
Pneumonia, n (%)	22 (2.1)	8 (4.8)	4 (4.7)	3 (9.1)	**0.018**
Discharge to SNF/rehab., n (%)	414 (40)	77 (46.4)	46 (53.5)	17 (52)	**0.030**
LOS, d, median [IQR]*	4 [2-6]	5 [3-8]	5 [3-8]	5 [3-8]	**<0.001**
3-month Post-Discharge**	**N=881**	**N=143**	**N=64**	**N=28**	
Mortality, n (%)	11 (1.3)	3 (2.1)	4 (6.3)	4 (14.3)	**<0.001**

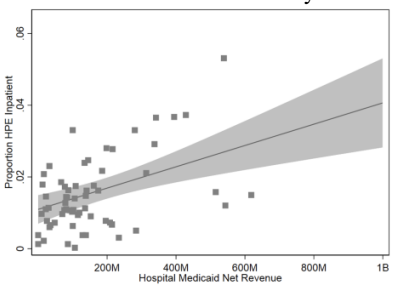
SNF=skilled nursing facility; LOS= length of stay; ICU = Intensive Care Unit; d=days *=Among Survivors; **=Among Survivors of index admission and complete follow-up information

Session I: Plenary Papers 1-8
Paper 7: 10:30 AM - 10:50 AM

DO HOSPITAL EMERGENCY MEDICAID PROGRAMS FOR THE UNINSURED BENEFIT TRAUMA CENTERS? A MIXED-METHODS STUDY

Lisa Knowlton, MD, MPH, FACS, FRCSC; Katherine Arnow, MSc;
Linda Tran, PhD; Amber Trickey, PhD; David Spain, MD, FACS;
Todd Wagner, PhD; Arden Morris, MD, MPH, FACS
Stanford School of Medicine
Invited Discussant: Joseph Minei, MD, MBA

Introduction: Hospital Presumptive Eligibility (HPE) is a temporary Medicaid insurance available to vulnerable uninsured patients at hospitalization. HPE insurance is intended to offset care costs for patients and hospitals and increase access by providing a pathway to sustaining long-term Medicaid. More than 70% of HPE approved trauma patients sustain Medicaid within the year, but less is known about the implications that HPE programs have on trauma centers. We aimed to characterize incentives for HPE participation across trauma centers statewide, as well as describe the association with HPE and hospital Medicaid reimbursement. We hypothesized that there would be financial and operational incentives for enrolling uninsured trauma patients in HPE.
Methods: We performed an explanatory sequential mixed-methods study analyzing a customized California Department of Health Care Services (DHCS) claims dataset for HPE-approved patients merged with Office of Statewide Planning and Development (OSHPD) annual hospital financial reports for state verified adult trauma centers (2016-22). Our primary outcome was Medicaid net revenue. We also conducted thematic analysis of semi-structured interviews with stakeholders (social workers, financial counselors) across select sites to understand incentives for HPE participation (n=10).
Results: Among 79 Level I-IV trauma centers, 67 (85%) treated adult HPE patients and were matched to state financial records. 24% were considered safety-net hospitals with a mission to provide care to the indigent, and 21% were Level I trauma centers. Median net Medicaid revenue was $115,112,760 (IQR $75,751,392-$214,446,224) and increased over time with higher proportions of HPE patients. There was a significant positive association between % HPE patients and net Medicaid revenue (Figure 1). Stakeholder interviewees explanatory incentives for HPE participation included: improved patient satisfaction and equitable access to post-discharge care (e.g. rehabilitation), thus shortening hospital stay, and reduced need for hospital financial assistance alternatives.
Conclusion: HPE programs are a promising pathway not only for long-term insurance coverage for trauma patients, but also play a role in trauma center and safety-net viability, as well as equitable access to care. Future opportunities include patient interviews and longitudinal follow-up to better understand HPE implications on long-term health services utilization and financial health.



Session I: Plenary Papers 1-8
Paper 8: 10:50 AM - 11:10 AM

THE INTERACTION BETWEEN GERIATRIC & NEIGHBORHOOD VULNERABILITY: DELINEATING PRE-HOSPITAL RISK AMONG OLDER ADULT EGS PATIENTS

Cheryl K. Zogg, PhD, MSPH, MHS; Jason R. Falvey, DPT, PhD;
Lisa M. Kodadek, MD; Kristan L. Staudenmayer, MD, MS;
Kimberly A. Davis, MD, MBA
Yale School of Medicine
Invited Discussant: Vanessa Ho, MD, MPH

Introduction: When presenting for EGS care, older adults frequently experience increased risk of adverse outcomes owing to factors related to age ('geriatric vulnerability') and the social determinants of health unique to the places in which they live ('neighborhood vulnerability'). Little is known about how such factors collectively influence adverse outcomes. We sought to explore how the interaction between geriatric and neighborhood vulnerability influences EGS outcomes among older adults.

Methods: Older adults, ≥65 years, hospitalized with an AAST-defined EGS condition were identified in the 2016-2021 Florida State Inpatient Database. Latent variable models combined the influence of patient age, extent of multimorbidity, and Hospital Frailty Risk Score into a single metric of 'geriatric vulnerability.' Variations in geriatric vulnerability were then compared across differences in 'neighborhood vulnerability' as measured by variations in Area Deprivation Index, Social Vulnerability Index, Minority Health Social Vulnerability Index, and their corresponding subthemes (*e.g.* access to transportation).

Results: A total of 374,220 older adults were included. Risk-adjusted differences in 30- and 365-day mortality are presented in **Table 1**. For patients living in the least vulnerable neighborhoods, increasing geriatric vulnerability resulted in up to six-times greater risk of death (30-day HR[95%CI]: 6.32[4.49-8.89]). The effect was more than doubled among patients living in the most vulnerable neighborhoods, where increasing geriatric vulnerability resulted in up to fifteen-times greater risk of death (30-day HR[95%CI]: 15.12[12.57-18.19]). When restricted to racial/ethnic minority patients, the multiplicative effect was four-times as high, resulting in corresponding 30-day hazard ratios for mortality of 11.53(4.51-29.44) versus 40.67(22.73-72.78). Similar patterns were seen for differences in 30- and 365-day readmission and major morbidity.

Conclusions: Both geriatric and neighborhood vulnerability have been shown to affect pre-hospital risk among older patients. The results of this study build on that work, presenting the first in-depth look at the powerful multiplicative interaction between these two factors. The results show that where a patient resides can fundamentally alter expected outcomes for EGS care such that otherwise less vulnerable patients become functionally equivalent to those who are, at baseline, more aged, more frail, and more sick.

Highest Neighborhood Vulnerability (Area Deprivation Index results)

	All Older Adults						Racial/Ethnic Minority Patients					
	30-day Mortality			365-day Mortality			30-day Mortality			365-day Mortality		
	HR	95%CI		HR	95%CI		HR	95%CI		HR	95%CI	
Geriatric Vulnerability												
Q1-2 (lowest)	1.00	–		1.00	–		1.00	–		1.00	–	
Q3	**3.52**	**2.83**	**4.37**	**3.27**	**2.70**	**3.96**	**8.72**	**4.62**	**16.44**	**7.29**	**4.29**	**12.37**
Q4	**5.26**	**4.29**	**6.46**	**4.62**	**3.85**	**5.54**	**12.20**	**6.58**	**22.62**	**10.42**	**6.24**	**17.37**
Q5 (highest)	**15.12**	**12.57**	**18.19**	**12.24**	**10.39**	**14.42**	**40.67**	**22.73**	**72.78**	**30.13**	**18.64**	**48.69**

Lowest Neighborhood Vulnerability (Area Deprivation Index results)

	All Older Adults						Racial/Ethnic Minority Patients					
	30-day Mortality			365-day Mortality			30-day Mortality			365-day Mortality		
	HR	95%CI		HR	95%CI		HR	95%CI		HR	95%CI	
Geriatric Vulnerability												
Q1-2 (lowest)	1.00	–		1.00	–		1.00	–		1.00	–	
Q3	0.88	0.51	1.51	0.78	0.46	1.33	2.41	0.77	7.53	2.41	0.78	7.54
Q4	1.58	1.00	2.49	**1.68**	**1.10**	**2.58**	**7.23**	**2.68**	**19.51**	**7.24**	**2.68**	**19.51**
Q5 (highest)	**6.32**	**4.49**	**8.89**	**5.61**	**4.04**	**7.79**	**11.53**	**4.52**	**29.44**	**11.53**	**4.51**	**29.44**

Table 1. Risk-adjusted differences in 30- and 365- day mortality

SESSION II:
PRESIDENTIAL ADDRESS

"WE ARE IN THIS TOGETHER": THE POWER OF SOCIAL CONNECTION"

Wednesday, September 20, 2023
11:40 AM - 12:40 PM

Location: Pacific Ballroom
Presenter: Eileen Bulger, MD

AAST President

SESSION IIIA:

PAPERS #9–19
Wednesday, September 20, 2023
2:05 PM - 5:45 PM

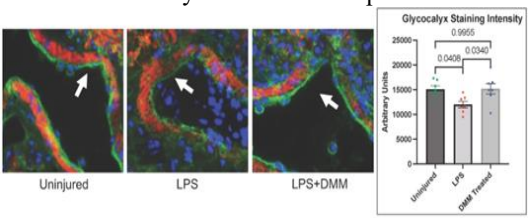
Location: Pacific Ballroom A-B
Moderator: Joseph Cuschieri, MD
Recorder: Krista Kaups, MD, MS

Session IIIA: Papers 9-19
Paper 9: 2:05 PM - 2:25 PM

DIMETHYL MALONATE PROTECTS THE LUNG IN A MURINE MODEL OF ARDS

Sharven Taghavi, MD, MPH, MS; Juan Duchesne, MD;
Farhana Shaheen, BS; Derek Pociask, PhD;
Jay Kolls, MD; Olan Jackson-Weaver, PhD
Tulane School of Medicine
Invited Discussant: Rondi Gelbard, MD

Introduction: Succinate (SI) is a pro-inflammatory citric acid cycle metabolite that accumulates in tissues during certain pathophysiological states. Dimethyl malonate (DMM) is a competitive inhibitor of succinate dehydrogenase, which has been shown to reduce SI accumulation. We hypothesized that DMM would protect against inflammation in a murine model of ARDS.
Methods: C57BL/6 mice were given ARDS via 67.7 ug of intra-tracheally administered lipopolysaccharide (LPS). DMM (50 mg/kg) was administered via tail vein injection 30 minutes after injury, then daily for 3 days. The animals were sacrificed on day 4 after bronchoalveolar lavage (BAL). BAL cell counts were performed to examine cellular influx. Supernatant protein was quantified via Bradford protein assay. Animals receiving DMM (n=8) were compared to those receiving sham injection (n=8). Cells were fixed and stained with FITC-labelled wheat germ agglutinin to quantify the endothelial glycocalyx (EGX).
Results: Total cell counts in BAL was less for animals receiving DMM (6.93×10^6 vs. 2.46×10^6, p=0.04). The DMM group had less BAL macrophages (168.6 vs. 85.1, p=0.04) and lymphocytes (527.7 vs. 248.3; p=0.04). DMM animals had less protein leak in BAL (1.48 vs. 1.15 ug/ul, p=0.03). Treatment with DMM resulted in greater staining intensity of the EGX in the lung (Figure). Untreated animals had a greater degree of weight loss than treated animals (14.3% vs. 4.8%, p=0.04). DMM prevented the upregulation of MCP-1 (1.66 vs. 0.92 RE, p=0.02) and ICAM-1 (1.40 vs. 1.01 RE, p=0.05).
Conclusions: DMM reduces lung inflammation and capillary leak in ARDS. This may be mediated by protection of the EGX and inhibition of MCP-1 and ICAM-1. DMM may be a novel therapeutic for ARDS.



Session IIIA: Papers 9-19
Paper 10: 2:25 PM - 2:45 PM

DO VIRTUAL SURGICAL INTENSIVISTS ENHANCE ICU LIBERATION IN SURGICAL PATIENTS?

Erika Allen, MD; Susan L. Evans, MD, MBA; Toan Huynh, MD; Mary Jordan, MD; Rita Brintzenhoff, MD; Marie Mercer, RN; Nehal Thakkar, MD; Addison May, MD, MBA
Carolinas Medical Center
Invited Discussant: Babak Sarani, MD

Introduction: Most critical care of surgical patients is managed by medical providers. Surgical Intensivists (SI) have a perioperative pattern recognition which facilitates rapid resuscitation and ICU liberation. We hypothesized that introduction of a Virtual Surgical Critical Care (VSCC) service, utilizing our Tele-Critical Care platform, may help reduce ventilator, ICU and hospital and days for surgical patients.
Methods: SI virtually evaluated surgical patients in 9 system-wide ICUs, provided consultation, and communicated with bedside medical and surgical teams. The SI recorded assessment of care prior to VSCC consultation as Optimal Practice (Opt), Generally Accepted Practice Standards (GAPS) met with Opportunity for Improvement (OFI), or GAPS not met (GAPSnm); reason for non-optimal care; and frequency of recommendation acceptance in a REDCap database. Reasons for non-optimal care were converted to measurements of opportunity days (Vent, ICU or hospital days) based on an assessment definition of 2 days for GAPSnm and 1 day for OFI. Multiple opportunities were only counted once per patient in order of highest to lowest priority (vent days, ICU days, hospital days).
Results: In initial 4 months of VSCC, 186 patients, the 3 most frequent opportunities were prolonged ventilation (7 GAPSnm, 34 OFI) for 48 excess ventilator days; delayed resuscitation (21 GAPSnm, 30 OFI) for 72 excess ICU days; delayed nutrition (9 GAPSnm, 33 OFI) for 51 excess hospital days. Excessive sedation contributed to 22% of the opportunities. As 55% of recommendations were accepted by bedside teams, annualized opportunities were 57.6, 86.4, 61.2 ventilator, ICU and hospital days respectively.
Conclusions: VSCC consultation identified opportunities to decrease ventilator, ICU and hospital days for surgical patients in a large healthcare system through optimal sedation practices, timely resuscitation and nutrition management. Incorporation of the VSCC recommendations could result in improved ICU outcomes with decrease in lengths of stay.

Session IIIA: Papers 9-19
Paper 11: 2:45 PM - 3:05 PM

SIRT1 DELETION EXACERBATES PNEUMONIA

Hanna Labiner, MD; Kelli Sas, PhD; Nick Wolf;
Emma Perez; Carrie A. Sims, MD, PhD
The Ohio State University
Invited Discussant: Matthew Lissauer, MD

Introduction: Despite antibiotic use and aggressive pulmonary toilet, pneumonia remains a common and highly lethal complication of traumatic injury. SIRT1, an NAD dependent deacetylase, has anti-inflammatory properties and has been shown to reduce the severity of ARDS in polymicrobial sepsis. The impact of SIRT1 in acute pneumonia, however, remains unknown. We hypothesize that SIRT1 deletion in pneumonia increases illness severity and recruitment of pro-inflammatory leukocytes.
Methods: 10–14-week-old male and female C57BL/6J (WT) mice and cre-inducible SIRT1 knockout (S1KO) mice were inoculated with $2.5x10^5$ CFU pseudomonas aeruginosa. Bronchoalveolar lavage fluid (BALF) and serum were plated on pseudomonas-selective cetrimide agar. Lung protein expression was evaluated by western blot and lung leukocyte populations quantified by flow cytometry. Data were analyzed by one-way ANOVA using Prism software.
Results: In WT mice, lung SIRT1 protein levels initially increased in the first 2hr following infectious insult ($p<0.0001$) and then precipitously declined to below baseline from 4-12hr ($p<0.01$). SIRT1 levels appeared to begin to recover between 24-48hr but were still significantly lower than baseline ($p=0.04$). SIRT1 expression over time was inversely proportional to the severity of hypothermia and bacterial burden in the lung. By 12hr post-infection, SIRT1 levels in WT mice were comparable to levels in S1KO mice, and there was no difference in temperature or bacterial growth between these two groups. S1KO mice had a significantly higher percentage of immature neutrophils ($p=0.029$) and a lower percentage of mature neutrophils compared to WT mice ($p=0.038$).
Conclusion: Pneumonia creates a functional SIRT1 knockdown in mice, and this decrease correlates with clinical severity. SIRT1 deletion causes a left shift in neutrophil response within the first 12hrs, potentially indicating SIRT1 deletion leads to a more severe acute inflammatory response. Targeting SIRT1 may prevent excessive inflammation and subsequent lung injury seen in early pneumonia.

Session IIIA: Papers 9-19
Paper 12: 3:05 PM - 3:25 PM

USING MICROFLUIDIC SHEAR TO ASSESS TRANSFUSION REQUIREMENTS IN TRAUMA PATIENTS

Leslie H. Vuoncino, MD; Anamaria J. Robles, MD; Ashli C. Barnes, BS;
Leonardo W. Graeff, BS; Taylor L. Riedley, BS;
Anthony R. Calabro, PhD; Nico T. Vincent, BS; Nithya Tippireddy, BS;
Kimi M. Tanaka, BS; Randi J. Mays, MSW, PMP;
Lucy Z. Kornblith, MD; Rachael A. Callcut, MD, MSPH, FACS
UC Davis Medical Center
Invited Discussant: Christopher Dente, MD

Introduction: Viscoelastic assays have widely been used for evaluating coagulopathies but lack the addition of shear stress important to in vivo clot formation. Stasys technology subjects whole blood to shear forces over factor-coated surfaces. Microclot formation is analyzed to determine clot area (CA) and platelet contractile forces (PCF). We hypothesize this novel assay will provide utility about trauma-induced coagulopathy and transfusion requirements.
Methods: Blood samples were collected on adult trauma patients from a single-institution prospective cohort study of high-level activations. Patient and injury characteristics, transfusion data, and outcomes were collected. Thromboelastography (TEG), coagulation studies, and Stasys were run on paired samples collected at admission. Stasys clot area (CA) and platelet contractile forces (PCF) were quantified as area under the curve calculations and maximum values according to manufacturer normal ranges. Data was compared using Pearson's correlation.
Results: From March 2021-January 2023, 108 samples were obtained. Median age was 37 (IQR 28-52), patients were 78% male. 72% suffered blunt trauma, 26% had an injury severity score (ISS) ≥25. A decrease in Stasys clot area (CA) correlated with transfusion of red blood cells (RBCs) at 12-24 hours ($p=0.04$), fresh frozen plasma (FFP) at 12-24 hours ($p=0.09$), and platelets (PLTs) at 6-12 hours ($p=0.08$). Elevated platelet contractile forces (PCF) positively correlated with prothrombin time (PT; $p=0.06$), while decreased PCF correlated with higher ISS ($p=0.047$). A decreased maximum PCF showed negative correlation with overall transfusion in 24 hours ($p=0.04$) as well as transfusion of RBCs, FFP, and PLT in the first six hours ($p=0.02$, $p=0.02$, $p=0.03$, respectively).
Conclusion: Assessing coagulopathy in real-time remains challenging in trauma patients. In this pilot study, we demonstrated that microfluidic approaches incorporating shear stress could predict transfusion requirements at time of admission as well as requirements in the first 24 hours.

Session IIIA: Papers 9-19
Paper 13: 3:25 PM - 3:45 PM

ENDOTHELIOPATHY OF TRAUMA IN CHILDREN: ADMISSION SYNDECAN LEVEL IS ASSOCIATED WITH INJURY AND OUTCOME

Katrina M. Morgan, MD; Elissa Abou Khalil, MD;
Barbara A. Gaines, MD; Christine M. Leeper, MD, MS
University of Pittsburgh Medical Center
Invited Discussant: Bindi Naik Mathuria, MD, MPH

Introduction: The contribution of the endothelium to trauma-induced coagulopathy has not been thoroughly investigated in injured children.
Methods: This is a prospective observational study of injured children (age <18) presenting to an academic pediatric trauma center as a highest-level trauma activation. Syndecan-1 level was collected at 0 and 24 hours following hospital arrival. Children were categorized by injured vs uninjured based on results of trauma evaluation. Demographics, injury characteristics, vital signs, and clinical labs were recorded. A composite clinical outcome was defined as death or receipt of any blood product transfusion within 24 hours of hospital arrival. Statistical tests were performed to 1) characterize Syndecan levels in a pediatric cohort; 2) assess impact of injury characteristics and therapeutics on Syndecan levels; and 3) assess for any association between Syndecan level and outcomes.
Results: There were 121 subjects included in the analysis: 96 (79%) injured and 25 (21%) uninjured. There were no differences between groups in age [median (IQR) 11 years (4-14)], sex (68% male), or race. The injured cohort had median (IQR) injury severity score (ISS) of 16 (9-21), 75% blunt mechanism, 26% received blood product transfusion, 3% 24-hour mortality, 6% in-hospital mortality rate. Median (IQR) Syndecan level on admission was significantly higher in injured vs uninjured cohort [44 (21-75) vs 25 (17-42); p=0.04]. Admission base deficit was significantly correlated with Syndecan level (r= 0.8, p<0.001); no association with traumatic brain injury or injury mechanism was seen. Regarding outcomes, children with elevated Syndecan on admission had significantly increased odds of poor outcome; every 10 ng/mL increase in Syndecan was associated with 10% increase in the odds of death or transfusion (p<0.001). Transfusion with any blood product was associated with significant decrease in syndecan from 0 hours to 24 hours [delta syndecan = -17 (-64- -5) vs -8 (-19-2); p <0001].
Conclusion: Elevated admission Syndecan level, suggestive of endotheliopathy, was associated with shock and poor outcomes after injury in children. Larger cohort studies are required to fully describe the complexities of TIC and investigate the benefit of therapies targeting endotheliopathy in pediatric trauma.

Session IIIA: Papers 9-19
Paper 14: 3:45 PM - 4:05 PM

NETOSIS OCCURS EARLY AFTER TRAUMA: DEVELOPMENT OF A MURINE POLYTRAUMA MODEL

Taleen A. MacArthur, MD; Dhanya Ramachandran, MD; Grant M. Spears, BS; Kent R. Bailey, PhD; Riley Thompson, BS; Dong Chen, MD; Jing-Fei Dong, MD; Rosemary A. Kozar, MD; Julie Goswami, MD; Matthew T. Auton, PhD; Myung S. Park, MD
Mayo Clinic
Invited Discussant: Joseph Rappold, MD

Introduction: Neutrophil Extracellular Traps (NETs) contribute to trauma-induced coagulopathy. We aimed to develop a murine polytrauma model that induces thromboinflammatory response i.e., NETosis and accelerated thrombin generation.
Methods: Male mice (8 – 12 weeks) were either subjected to polytrauma (n = 10) – gastrocnemius crush, femur fracture, and laparotomy – or placed in an uninjured control group (n = 9). The mice were sacrificed via cardiac puncture performed 3 hours after injury. Whole blood samples were processed to platelet poor plasma for thrombin kinetics (Calibrated Automated Thrombogram), myeloperoxidase (MPO), and von Willebrand Factor (vWF) measurements. Lung tissue was collected, and immunohistochemistry was performed to assess for Citrated H3 (Cit H3) and MPO. A cluster of NETosis was defined as three or more distinct neutrophils staining for Cit H3 at 400 X magnification. Data presented either as mean (SD) or median (IQR) with p value of < 0.05 being significant.
Results: Animals subjected to polytrauma had accelerated thrombin generation compared to controls, characterized by greater median peak height (nM) (61.3 [41.2, 73.2] vs. 28.4 [19.5, 37.5], $p = 0.035$), and shorter time to peak (min) (3.37 [2.81, 3.81] vs. 4.5 [4.08, 4.75], $p = 0.046$). Markers of neutrophil activation were greater following polytrauma than in controls (median MPO (ng/ml) 961.1 [858.1, 1116.8] vs. 481.3 [438.0, 648.9], $p = 0.004$). Paradoxically, plasma vWF, a marker of endotheliopathy, decreased following polytrauma compared to controls (median (ng/ml) 108.1 [99.5, 111.4] vs. 186.7 [166.4, 198.1], $p < 0.001$). NETosis, as evidenced by number of clusters of Cit H3 in the lung, was greater in polytrauma than in controls (mean 3 [2.9] vs. 0.2 [0.7], $p = 0.009$).
Conclusions: This murine polytrauma model demonstrates increased sequestration of NETs in lungs and accelerated thrombin generation, as early as three hours following injury.

Session IIIA: Papers 9-19
Paper 15: 4:05 PM - 4:25 PM

ENDOTHELIAL DYSFUNCTION IS DAMPENED BY EARLY ADMINISTRATION OF FRESH FROZEN PLASMA IN A RODENT BURN SHOCK MODEL

Eriks E. Ziedins, BS; Edward Kelly, MD; Bonnie Carney, PhD;
Lauren Moffatt, PhD; Jeffrey Shupp, MD
MedStar Washington Hospital Center
Invited Discussant: Samuel Mandell, MD, MPH

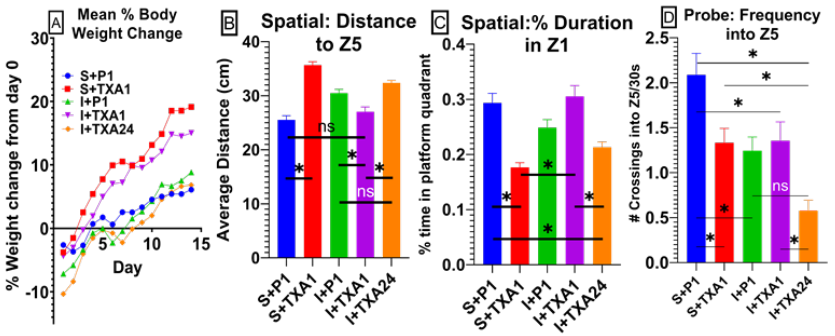
Introduction: Endothelial dysfunction has been implicated in the pathogenesis of burn shock affecting patients with large thermal injury. In response to injury, glycocalyx components like Syndecan-1 (SDC-1) are shed into circulation and have been used as a marker of endothelial damage. Previous work in our lab has shown crystalloid only resuscitation does little to mitigate the loss of endothelial function and resulting vascular leakage. However, we have also shown that plasma inclusive resuscitation (PIR) with fresh frozen plasma (FFP) ameliorates endothelial damage as demonstrated functionally with Evan's Blue Dye (EBD) assay. There remains a paucity of information regarding optimal timing and dosing of PIR and conflicting literature on the utility of SDC-1 as a marker. Therefore, we aimed to further examine the impact of PIR on endothelial dysfunction and glycocalyx shedding using clinically translatable timing and dosing.
Methods: Spraque-Dawley rats were used to create large thermal burns and uninjured controls. Rats were subjected to 40% total body surface area scald burn after which they were resuscitated with LR only or with LR plus early 1ml boluses of FFP (equivalent to a 250cc bolus in a 70kg human) at hours 0,2,4, and 8 hours post-injury. Blood was taken pre-injury and at hours 0,2,4,8,12 and 24 hours. Plasma SDC-1 levels were quantified by ELISA. Data are expressed as fold change from baseline.
Results: LR+early FFP administration reduced EBD extravasation when compared to LR only groups. LR only SDC-1 peaked at hour 8 (5.23, $p<0.05$). LR+early FFP SDC-1 peaked at hour 4 (2.60, $p<0.01$). When comparing LR only vs LR+FFP group, SDC-1 levels were reduced in the LR+FFP group at hour 8, 12 and 24 (5.23 vs. 2.07, $p<0.01$, 4.49 vs. 2.05, $p<0.01$, 3.82 vs 2.08, $p=0.01$, respectively).
Conclusions: Early administration of LR+FFP reduces the magnitude of SDC-1 shedding when compared to LR only resuscitation, consistent with our previous functional EBD assay results in this model. The present data add alignment of the two assays and provide further evidence of FFP's ability to mitigate endothelial dysfunction after thermal injury. The data also support the use of circulating SDC-1 as a surrogate marker of endothelial integrity.

Session IIIA: Papers 9-19
Paper 16: 4:25 PM - 4:45 PM

DELAYED TXA AFTER TBI IMPEDES LEARNING, MEMORY: EARLY TXA IS FAVORABLE BUT NOT IN SHAM ANIMALS

Michael Coons, BA; Matthew Culkin, BS; Advait Thaploo;
Priyanka Bele, MD; Kevin Browne; Christina Jacovides, MD;
Patricia Santos Carlin, MD; Lewis J. Kaplan, MD;
Douglas Smith, MD; Jose L. Pascual, MD, PhD
Perelman School of Medicine at the University of Pennsylvania
Invited Discussant: Mayur Patel, MD, MPH

Introduction: Early but not late tranexamic acid (TXA) preserves blood-brain-barrier integrity, but it is unclear if dose timing affects cognitive recovery beyond hours post-injury. We hypothesized that early (1h post-TBI) TXA but not late (24h post-TBI) administration improves animal cognitive recovery for 14 days.
Methods: CD1 male mice (n=25) were randomized to severe TBI (Injury, I, controlled cortical impact) or sham craniotomy (S) followed by IV saline at 1h (placebo, P1) or 30mg/kg TXA at 1h or 24h (TXA1, TXA24). Daily body weights, Garcia Neurological Test (GNT) scores and Morris water maze exercises quantifying swimming traffic in the platform quadrant (Z1) & platform area (Z5) were recorded for up to 14 days.
Results: Of injured groups, I+TXA1 allowed fastest weight gain for 14 days (FigA) and only I+TXA1 showed rapid (day 1) normalization of GNT ($p=0.01$ vs. I+P1, I+TXA24). In summative spatial trials, compared to I+TXA1, I+TXA24 worsened learning (FigB: distance to Z5, FigC: % time in Z1, $*p<0.05$). Compared to I+TXA1, I+TXA24 worsened memory with less Z5 time (0.51 vs 0.16s, $p<0.01$) and crossing frequency into Z5 (FigD). Unexpectedly, TXA in uninjured animals (S+TXA1) demonstrated faster weight gain (FigA), but worse learning and memory (FigB-D).
Conclusion: TXA administration 24h post-TBI consistently worsens cognitive recovery compared to TXA administered 1h post injury. TXA in sham animals may lead to detrimental effects on cognition.



Session IIIA: Papers 9-19
Paper 17: 4:45 PM - 5:05 PM

A BENZODIAZEPINE-SPARING APPROACH TO PREVENTING AND TREATING ALCOHOL WITHDRAWAL SYNDROME

Mary A. McCullough, MD; Preston Miller III, MD; Tamriage Martin, BS; Kristin Rebo, PharmD; Greg Stettler, MD; Robert Martin, MD; Morgan Cantley, PharmD; Elizabeth Schilling, PhD; Jason Hoth, MD, PhD, Andrew Nunn, MD
Wake Forest School of Medicine
Invited Discussant: Kaitlin Ritter, MD

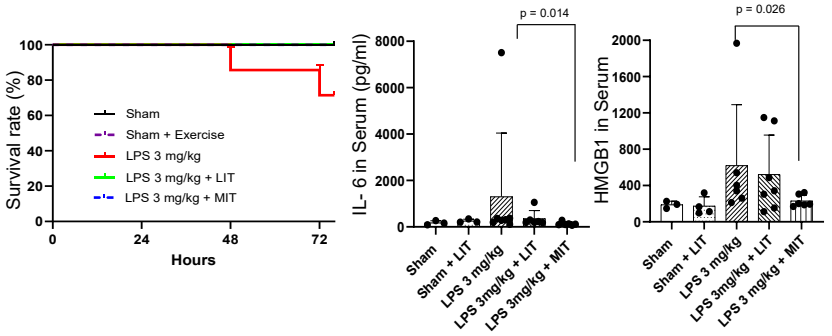
Introduction: Alcohol withdrawal syndrome (AWS) represents significant cost to the hospitalized trauma population from a clinical and financial perspective. Historically, AWS has been managed with benzodiazepines. Despite their efficacy, benzodiazepines carry a heavy side effect profile. Recently, benzodiazepine sparing protocols for the prophylaxis and treatment of AWS have been used in medical patient populations. No such protocol has been developed and examined for safety and efficacy specifically within a trauma patient population.
Methods: In December of 2019, we implemented a benzodiazepine-sparing protocol for trauma patients identified as at risk for alcohol withdrawal on admission. Trauma patients admitted to an academic Level 1 trauma center before (CONV) and after (BS) the protocol implementation were compared. Outcomes examined include morphine milligram equivalent (MME) dosing rates, lorazepam equivalent dosing rates as well as CIWA scores, hospital length of stay (LOS), ICU LOS, and ventilator days.
Results: 387 conventional (CONV) and 135 benzodiazepine sparing (BS) patients were compared. ISS (13 vs 16, $p=0.08$) and admission alcohol levels (99 vs 147, $p=0.08$) were similar. Patients in the BS pathway had a lower maximum daily CIWA-Ar (3.98 vs 3.00, $p=0.03$). While MME/day was not different between groups (31.5 vs 33.4, $p=0.52$), mean lorazepam equivalents per day was significantly lower in the BS group (1.14 vs 0.23mg, $p<0.01$). LOS and vent days were not different between the groups.
Conclusion: Implementation of a benzodiazepine sparing pathway to both prevent and treat alcohol withdrawal syndrome in trauma patients is safe, reduces the daily maximum CIWA-Ar, and significantly decreases the need for benzodiazepines. Futures studies will focus on additional outcomes that are affected by avoiding AWS and benzodiazepines in the trauma population.

Session IIIA: Papers 9-19
Paper 18: 5:05 PM - 5:25 PM

EXERCISE DOWN-REGULATES THE INFLAMMATORY RESPONSE AND DAMAGE ASSOCIATED MOLECULAR PATTERNS IN MURINE MODEL OF SEPSIS

Qing Ma, PhD; Adrian Camarena, MD; Ayman Ali, MD;
Krista Haines, DO, MA; Joseph Fernandez-Moure, MD, MS;
Sean Montgomery, MD, Suresh Agarwal, MD
Duke University
Invited Discussant: Kaushik Mukherjee, MD, MS

Introduction: Despite the adoption of the "Sick Role," exercise has been demonstrated to improve outcomes in ICU patients; however, the rationale for why it is beneficial remains elusive.
Methods: 22 week old, male wild-type mice were divided into 5 groups: Sham, Sham+Exercise, Lipopolysaccharide injection of 3mg/kg (LPS), LPS+Low Intensity Exercise (LIT), and LPS+Moderate Intensity Exercise (MIT). Exercise was performed 22 hrs after LPS injection and daily, with LIT being ambulation at 2 m/min and MIT being 4 m/min. In addition to mortality, Interleukin (IL)-1B, IL-6, IL-10, tumor necrosis factor (TNF), and High Mobility Group Box-type 1 (HMGB1) were assessed daily for 72 hrs.
Results: Non-exercised mice exposed to LPS survived of 71.43% at 72 hours whereas those exposed to LPS + exercise had a survival of 100%. TNF levels dropped within 24 hours in exercised mice; however these equalized over 72 h. At 72 hrs, IL-6 levels were significantly lower in MIT compared to LPS, where IL-1B and IL-10 levels were similar. HMGB1 levels were significantly lower in the MIT group compared to LPS alone.
Conclusions: Marked decreases in inflammatory response and damage associated molecular patterns are seen within 72 hours in septic mice exposed to exercise. More work is needed to elucidate the mechanistic underpinning of this phenomenon.



Session IIIA: Papers 9-19
Paper 19: 5:25 PM - 5:45 PM

POST-TRAUMATIC PNEUMONIA EXACERBATES BONE MARROW DYSFUNCTION

Gwendolyn Gillies, MD; Jennifer Munley, MD; Lauren Kelly, MD; Erick Pons, BS; Kolenkode Kannan, PhD; Letitia Bible, MD; Philip Efron, MD; Alicia Mohr, MD
University of Florida Gainesville
Invited Discussant: Nicole Werner, MD, MS

Introduction: Pneumonia is a common complication after severe trauma, and these patients have worse outcomes with increased mortality. Critically ill trauma patients also have significant alterations in hematopoiesis that manifest as myeloid dysfunction and persistent anemia. Using a preclinical model of polytrauma and pneumonia, we sought to determine the impact on bone marrow function.
Methods: Male and proestrus female Sprague-Dawley rats (n=16/group) aged 9-11 weeks were subjected to either polytrauma (PT) (lung contusion, hemorrhagic shock, cecectomy, and bifemoral pseudofracture), or PT with postinjury day 1 Pseudomonas pneumonia (PT+PNA) and compared to naïve. Weight, urine norepinephrine (NE), % splenic erythroid progenitor cells (%CD45/71/117+), and bone marrow erythroid progenitors (CFU-GEMM, CFU-E, and BFU-E) were measured on day 7. Comparisons between naïve, PT and PT+PNA groups were performed with GraphPad. Significance was defined as *p<0.05 vs. naïve; **p<0.05 vs. PT counterpart.
Results: On day 7, PT+PNA rats lost significant weight compared to PT and naïve rats (-3.3g*,** vs. +3.3g and +16.2g). Urine NE was significantly higher in PT+PNA rats compared to both PT and naïve (70*,**vs. 27 and 31 ng/mL). Hemoglobin was significantly lower in PT+PNA compared to naïve (10.8* g/dL vs. 12.1 g/dL). PT+PNA had more splenic erythroid progenitors and compared to PT and naïve (4.1*,** vs. 1.1% and 0.8%). Growth of bone marrow CFU-GEMM, CFU-E, and BFU-E was all significantly inhibited following PT+PNA when compared with PT alone on day seven.
Conclusion: Pneumonia exacerbates persistent anemia and bone marrow dysfunction following polytrauma which impacts morbidity. In order to improve outcomes following trauma and critical illness, we need to better understand the pathophysiology during this chronic phase of illness.

SESSION IIIB:

PAPERS #20-30

Wednesday, September 20, 2023

2:05 PM - 5:45 PM

Location: Pacific Ballroom C-D

Moderator: Rosemary Kozar, MD, PhD

Recorder: Michaela West, MD, PhD

Session IIIB: Papers 20-30
Paper 20: 2:05 PM - 2:25 PM

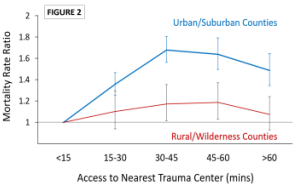
ASSOCIATION BETWEEN GEOSPATIAL ACCESS TO TRAUMA CENTER CARE AND MOTOR VEHICLE CRASH MORTALITY IN THE UNITED STATES

Vishal Patel, MPH; Grace Rozycki, MD; Jeffery Jopling, MD;
Madhu Subramanian, MD; Alistair Kent, MD, MPH; Mariuxi Manukyan, MD; Joseph Sakran, MD, MPA, MPH; Kent Stevens MD, MPH;
Elliott Haut, MD, PhD; Avery B. Nathens MD, PhD;
Carlos Brown, MD; James P. Byrne, MD, PhD
Johns Hopkins University
Invited Discussant: Cherisse Berry, MD

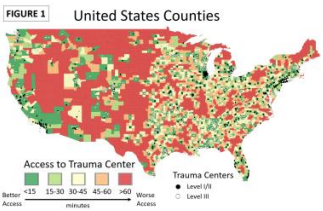
Introduction: Timely access to trauma care is highly variable across the United States (US). Motor vehicle crashes (MVC) remain a leading cause of trauma death. The objective of this study was to measure the association between geospatial access to trauma center care and MVC mortality in US counties.

Methods: We performed a population-based analysis of MVC fatalities in 3,141 US counties representing the entire US population (2017-2020). ACS or state-verified level I-III trauma centers (n=1,054) were mapped using ArcMap. Geospatial network analysis estimated the ground transport time to the nearest trauma center from the population-weighted centroid of each county. In this way, the exposure was the average access time (AT) to trauma care for each county population. The outcome was county MVC mortality rate, derived using NHTSA's FARS database. Mixed-effects negative binomial regression was used to measure the association between AT and county MVC mortality, adjusting for population demographics (age, sex, race), social vulnerability index, rurality, population density, nearest trauma center level of designation, helicopter EMS access, and state traffic safety laws. Effect modification was explored between AT and rurality.

Results: During the study period 92,398 people died in fatal crashes in the US. Approximately 60% of the US population resided in 536 (17%) counties with AT<15mins, while 6% of the population resided in 1,092 (35%) counties with AT>60mins (**Figure 1**). Longer AT was associated with higher risk-adjusted MVC mortality (AT, <15 vs >60mins; 5 vs. 15 deaths/100,000 person-years; Mortality Rate Ratio, 1.48; 95% CI, 1.42–1.55). This relationship differed significantly between urban/suburban and rural/wilderness counties (P for interaction, <0.001). AT and MVC mortality were significantly lower in urban/suburban vs. rural/wilderness counties (median AT, 28 vs. 64 mins; MVC mortality, 6 vs. 17 deaths/100,000 person-years). However, the risk-adjusted association between longer AT and MVC mortality was significantly greater in urban/suburban counties (**Figure 2**), indicating that other crash or trauma system-related factors likely predominate in rural environments.



Conclusions: Access to trauma center care is significantly associated with MVC mortality across the spectrum of rurality. However, variations in access are associated with mortality to a lesser degree in rural/wilderness counties. These data highlight the need to elucidate the disparate roles of trauma system factors between rural and urban environments.



Session IIIB: Papers 20-30
Paper 21: 2:25 PM - 2:45 PM

RCT TO STUDY EFFECT OF IMMEDIATE POST OPERATIVE PROSTHESIS VS CONVENTIONAL PROSTHESIS ON BALANCE & QOL IN BK AMPUTEES FOLLOWING TRAUMA

Sushma Sagar, MS; Junaid Alam, MS; Nida Mir, PhD Scholar; A. S. Moorthy, PhD; Rajesh Sagar, MD; Pranabh Kushwaha, MS; Subodh Kumar, MD; Amit Gupta; Biplab Mishra; Pratyusha Priyadarshini; Abhinav Kumar, DNB, FNB, FACS; Narendra Choudhary; Dinesh Bagaria
All India Institute of Medical Sciences New Delhi India
Invited Discussant: Navpreet Dhillon, MD

Introduction: Lower-extremity amputations have a significant impact on an individual's mental and physical well-being. Amputee rehabilitation presents a number of challenges in providing holistic care to such patients. Immediate post-operative prosthesis (IPOP) application has multiple benefits which include quicker wound healing and early maturation of the stump, reduction in post-operative pain, edema, and phantom pain.
Methods: A total of 60 patients (30 in each group) were randomized. Intervention group patients received IPOP within 24 hours of amputation and control group patients were treated as per standard institute protocol and received conventional prosthesis post maturation of the stump.
Results: Both the groups were comparable in terms of age and gender distribution. 84.2% of patients in group A and 86.4% in group B had ISS and NISS scores less than 15. Majority of the patients in both the groups had MESS ≤7. At 12 weeks, the mean scores of QOL for physical domain (29.0 ± 0.9 vs. 23.1 ± 1.3), psychological domain (23.0 ± 1.1 vs 19.6 ± 1.2), social domain (12.9 ± 1.2 vs. 8.2 ± 1.5) and environmental domain (30.2 ± 0.8 vs. 21.9 ± 1.9) were found to be statistically insignificant in IPOP group over conventional group. Statistically significant difference in AMP score was observed at 12 weeks (29.1 ± 3.5 vs 17.3 ± 2.9). Depression and anxiety decreased significantly in IPOP group. The mean scores of TAPES were found to be significant in group A over group B in psychosocial domain (47.6 ± 2.6 vs 33.6 ± 2.9), in activity restriction domain (21.3 ± 3.7 vs 13.5 ± 2.0) and in prosthetic satisfaction domain (20.3 ± 1.8 vs 15.3 ± 3.2) at 12 weeks. The mean scores of PST were significant in group A over group B for overall directional control (52.7 ± 9.3 vs 41.2 ± 6.7) and overall stability index (0.46 ± 0.22 vs 0.69 ± 0.20)
Conclusion: IPOP in below knee amputees following trauma improves overall quality of life, decreases depression and anxiety, increases mobility of the patient and improves balance as compared to the patients receiving standard treatment and conventional prosthesis.

Session IIIB: Papers 20-30
Paper 22: 2:45 PM - 3:05 PM

IMPLEMENTATION OF THE 300CC-RULE SAFELY DECREASES CHEST TUBE PLACEMENT IN TRAUMATIC HEMOTHORAX

Abdul Hafiz Al Tannir, MD; Elise A. Biesboer, MD; Morgan Tentis, BS; Bryce B. Patin, BS; Morgan Maring, BS; Patrick B. Murphy, MD; Rachel S. Morris, MD; Jacob Peschman, MD; Mary Schroeder, MD; Lewis Somberg, MD; Thomas W. Carver, MD; Marc A. de Moya, MD
Medical College of Wisconsin/Froedtert
Invited Discussant: Alexandra Briggs, MD

Introduction: Traumatic hemothorax (HTX) is effectively managed with a tube thoracostomy (TT); however, TT may carry a high complication rate. In 2017, a guideline was implemented at a Level I trauma center to observe any traumatic HTX ≤300cc in hemodynamically normal patients. We hypothesized that this guideline would decrease TT placement with no increase in failure rates.
Methods: This is a single-center retrospective review of all adult patients admitted with a HTX on computed tomography (CT) before (2015-2016) and after (2018-2019) the guideline implementation. Exclusion criteria were TT placement prior to CT scan, absence of CT scan, death within 5 days of admission, and a concurrent pneumothorax >20mm. HTX volume was calculated using Mergo's formula: $V=d^2xL$ (V: volume; d: depth; L: length). The primary outcomes included observation rates, TT placement, and observation failure, defined as the need for TT, video-assisted thoracoscopic surgery, or thoracotomy ≥24 hours after admission.
Results: A total of 391 patients met the inclusion criteria, of which 59% (n=230) were admitted after guideline implementation. There were no significant differences in demographics, comorbidities, or injury characteristics across both cohorts. After guideline implementation, there was a significant increase in observation rate (71% vs 52%; p-value<0.001) and a decrease in TT placement (42% vs 61%; p-value<0.001). A higher percentage of patients with a HTX ≤300cc (80% vs 60%; p-value<0.001) were observed. On multivariate analysis, the post-implementation cohort were more than twice as likely to be observed (AOR: 2.39; 95%CI: 1.56-3.62; p-value<0.001). There were no significant differences in observation failure (18% vs 24%; p-value=0.34), pulmonary complications (20% vs 25%; p-value=0.34), 30-day readmission (7% vs 6%; p-value=0.22), or 30-day mortality (3% vs 5%; p-value=0.22) rates. The post-implementation group had a shorter hospital (10 vs 13 days; p-value=0.04) and intensive care unit (4 vs 6 days; p-value=0.04) length of stay (LOS).
Conclusion: The implementation of the 300cc guideline led to a decrease in TT placement correlated with a decreased LOS with no increase in failure or complication rates.

Session IIIB: Papers 20-30
Paper 23: 3:05 PM - 3:25 PM

WHEN IS IT SAFE TO START VTE PROPHYLAXIS AFTER BLUNT SOLID ORGAN INJURY? A PROSPECTIVE AAST MULTI-INSTITUTIONAL TRIAL

Morgan Schellenberg, MD, MPH, FRCSC, FACS;
Natthida Owattanapanich, MD; Brent Emigh, MD; Jan-Michael Van Gent, DO;
Tanya Egodage, MD; Patrick B. Murphy, MD; Chad G. Ball, MD;
Audrey L. Spencer, MD; Kelly Vogt, MD, PhD, FRCSC;
Jessica A. Keeley, MD; Stephanie Doris, DO; Marissa Beiling, DO;
Megan Donnelly, MD; Kenji Inaba, MD; The AAST VTE Prophylaxis Study Group
Los Angeles General Medical Center
Invited Discussant: Douglas Schuerer, MD

Introduction: The optimal time to initiate venous thromboembolism (VTE) chemoprophylaxis (VTEp) after blunt solid organ injury remains controversial as VTE mitigation must be balanced against bleeding promulgation. Evidence from primarily small, retrospective, single-center work suggests VTEp ≤48h is safe and effective. This study was undertaken to validate this clinical practice.
Methods: Blunt trauma patients presenting to 19 participating trauma centers in North America were screened over one year (08/2021-07/2022). Inclusions were age >15 years; ≥1 liver, spleen, or kidney injury; and initial nonoperative management (NOM). Exclusions were transfers, ED death, pregnancy, and concomitant bleeding disorder/anticoagulation/antiplatelet medication. *A priori* power calculation stipulated the need for 1158 patients. Time of VTEp initiation defined study groups: Early (≤48h of admission) vs. Late (>48h). Bivariate and multivariate analyses compared outcomes.
Results: In total, 1173 patients satisfied study criteria with 589 (50%) liver, 569 (49%) spleen, and 289 (25%) kidney injuries. Median patient age was 34 [25-49] years and 67% (n=780) were male. Median ISS was 22 [14-29] with AIS Abdomen 3 [2-3] and median AAST grade of solid organ injury 2 [2-3]. Early VTEp patients (n=864, 74%) had significantly lower rates of VTE (n=28, 3% vs. n=21, 7%, p=0.007); comparable rates of NOM failure (n=39, 5% vs. n=21, 7%, p=0.12); and lower rates of post-VTEp blood transfusion (n=145, 17% vs. n=71, 23%, p=0.016) when compared to Late VTEp patients (n=309, 26%) (Fig. 1). Late VTEp was independently associated with VTE (OR 2.23, p=0.049).
Conclusion: Early initiation of VTE chemoprophylaxis was associated with significantly reduced rates of VTE with no increase in bleeding complications. VTEp initiation ≤48 hours is therefore safe and effective and should be the standard of care for patients with blunt solid organ injury.

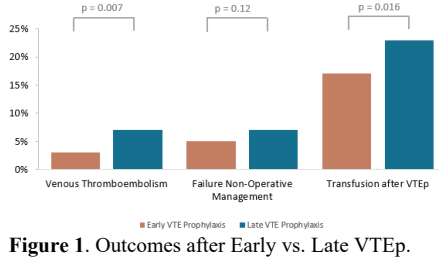


Figure 1. Outcomes after Early vs. Late VTEp.

Session IIIB: Papers 20-30
Paper 24: 3:25 PM - 3:45 PM

ASSOCIATION OF FOUR GEOGRAPHIC VULNERABILITY INDICES WITH FIREARM VIOLENCE IN A MAJOR US CITY

Ann Polcari, MD, MPH, MSGH; Lea Hoefer, MD;
William Ian McKinley, MD; Tanya Zakrison, MD, MPH;
Selwyn Rogers, MD, MPH; Mark Slidell, MD, MPH;
Andrew Benjamin, MD, MS,
University of Chicago Medicine
Invited Discussant: Leah Tatebe, MD

Introduction: The recently developed Firearm Violence Vulnerability Index (FVVI) is a machine learning algorithm that uses population characteristics to predict shooting incidents at the census-tract level. FVVI was trained using firearm violence data from 7 major U.S. cities and showed precision when tested in Chicago, but it has not yet been compared to other pre-existing vulnerability indices. This study compares FVVI's accuracy to the Social Vulnerability Index (SVI), Area Deprivation Index (ADI), and Childhood Opportunity Index (COI).

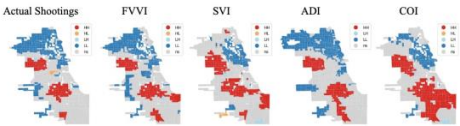
Methods: Open-access 2015-2021 shooting incident data from the Chicago Data Portal was merged at the census tract level with risk scores from the FVVI, SVI, COI, and ADI. Spatial autoregressive models were created for each index to estimate the association between vulnerability and shooting incidents. Risk scores were re-scaled so that the regression coefficient represents the increase in shooting incidents within a census tract associated with each decile increase in vulnerability. Global and local Moran statistics were used to estimate geospatial associations, as shown on choropleth maps (Figure).

Table 1. Comparison of Vulnerability Indices

Vulnerability Index	Regression Coefficient	R^2	p-value
FVVI	5.35	0.69	<0.001
SVI	1.94	0.28	<0.001
ADI	1.91	0.39	<0.001
COI	2.60	0.38	<0.001

Results: All four vulnerability indices had a statistically significant positive association with shooting incidents (Table 1), though FVVI demonstrated the strongest association ($R^2 = 0.69$). For each decile increase in the FVVI, shooting incidents increased by 5.35 per 1000 population.

Conclusion: Each studied vulnerability index was predictive of shooting incidents at the census tract level, but FVVI outperformed the other pre-existing indices. Therefore, the FVVI might be the best measure for firearm violence risk stratification when developing public health prevention strategies, in policymaking and allocating resources, and for conducting firearm injury research.

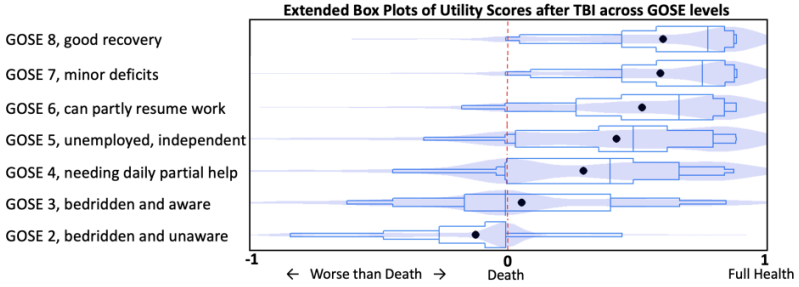


Session IIIB: Papers 20-30
Paper 25: 3:45 PM - 4:05 PM

WOULD YOU RATHER: QUANTIFYING PERCEPTIONS OF FUNCTIONAL STATUS AFTER TRAUMATIC BRAIN INJURY

Amelia Maiga, MD, MPH; Madison Cook, MD;
Mina Nordness, MD, MPH; Yue Gao, MS; Shayan Rakhit, MD;
Erika Rivera, MD; Frank Harrell, PhD; Mayur Patel, MD, MPH
Vanderbilt University Medical Center
Invited Discussant: Weidun Alan Guo, MD, PhD

Introduction: Recovery after Traumatic Brain Injury (TBI) is variable and measured using the validated TBI clinical trial endpoint, Glasgow Outcome Scale-Extended (GOSE). A recent public survey quantified some GOSE states as worse than death. However, no health utilities exist for disability after an actual TBI. We hypothesized that intervals between GOSE health states are non-linear and unequal, with some states viewed worse than death.
Methods: This national computer-adaptive survey following EQUATOR/ CHERRIES guidelines recruited adult surrogates of TBI dependents (injury >1 year prior). Using a standard gamble approach in randomized order, surrogates gave preferences for their loved ones' post-TBI categorical health states from GOSE 2-8. We calculated median [interquartile range, IQR] health utilities for each GOSE state, from -1 (worse than death) to 1 (full health), with 0 as reference (death, GOSE 1).
Results: Of 515 eligible, 298 surrogates (58%) consented and completed the scenarios on TBI patients' behalf. Their TBI dependents had a current median GOSE 5 [3-7], with 53% having undergone craniectomy or craniotomy, 35% feeding tube, and 24% tracheostomy. GOSE 2, GOSE 3, and GOSE 4 were rated worse than death by 89%, 64%, and 38%, respectively. The relationship was nonlinear, and intervals were unequal between states, with a bimodal distribution for GOSE 4 (see Figure).
Conclusion: In this index study of surrogate perceptions of patients' actual post-TBI disability, poor neurologic outcomes, GOSE 2-4, were perceived as worse than death by at least one in three. Acknowledging limitations of selection and response bias, these long-term perceptions may inform earlier post-TBI shared decision making.



Session IIIB: Papers 20-30
Paper 26: 4:05 PM - 4:25 PM

GOALS OF CARE ARE RARELY DISCUSSED PRIOR TO FUTILE TRAUMA TRANSFER: IT'S OKAY TO SAY "NO"

Nellie Trenga-Schein, BA; David Zonies, MD, MPH; Mackenzie Cook, MD
Oregon Health & Science University
Invited Discussant: Anastasia Kunac, MD

Introduction: In 2020 the Critical Care Committee of the AAST ranked addressing goals of care in the acute care setting as the number one research priority. It is unknown how often the physician-to-physician transfer conversation includes discussion of patient goals of care. We hypothesized that physicians would rarely discuss goals of care (GOC) on transfer calls, even when faced with patients with catastrophic injuries.
Methods: We completed a retrospective cohort study of trauma patients between 2018 and 2022 who were transferred to a level 1 trauma center and died or were discharged to hospice without surgical intervention within 48 hours. Transfer call recordings were analyzed for GOC conversations.
Results: A total of 5,562 patients were accepted as transfers and 82 (1.5%) met criteria as potentially inappropriate. Eighty of the 82 patients had recorded transfer center calls and were analyzed. The most common transfer reason was traumatic brain injury (TBI) and need for neurosurgical capabilities (51%) followed by complex multisystem trauma (23%). There was explicit discussion of code status prior to transfer in 16/80 patients (20%) and a GOC conversation for 8/80 patients (10%). Appropriateness of transfer was discussed for 17/80 patients (21%) and at least one physician expressed explicit concerns of futility for 11/80 patients (14%), all of whom were subsequently transferred. Code status was changed immediately upon arrival for 12/80 patients (15%) and 8/41 patients (20%) transferred specifically for neurosurgical intervention were deemed to have non-survivable injuries based on the imaging and exam from the referring hospital.
Conclusions: Among a group of profoundly injured trauma patients, all of whom died or discharged to hospice within 48 hours of transfer, an explicit discussion of GOC and appropriateness of transfer occurred in less than 20%. This suggests that even when the catastrophic nature of patient injury is understood, transfers still occur, and patients and their families are subjected to an expensive, disruptive, and displacing experience with little to no anticipated benefit. A discussion of GOC and therapeutic objectives should be considered in all severely injured trauma patients prior to transfer.

Session IIIB: Papers 20-30
Paper 27: 4:25 PM - 4:45 PM

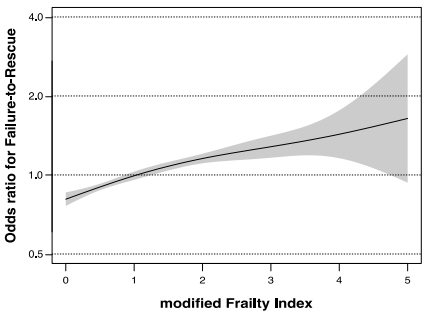
DOES FRAILTY IMPACT FAILURE-TO-RESCUE IN GERIATRIC TRAUMA PATIENTS?

Mitsuaki Kojima, MD; Koji Morishita, MD; Tomohisa Shoko, MD;
Bishoy Zakhary, MPH; Todd Costantini, MD;
Laura Haines, MD; Raul Coimbra, MD, PhD
Tokyo Women's Medical University, Adachi Medical Center
Invited Discussant: Lisa Kodadek, MD

Introduction: Failure-to-rescue (FTR), defined as death after a major complication, has been studied as a metric of trauma quality. However, it is unclear whether FTR is affected by patient frailty, especially in the geriatric trauma population. We hypothesized that frailty increased risk of FTR in geriatric trauma patients

Methods: A retrospective cohort study was conducted using the TQIP database between 2015 and 2019. The cohort consisted of geriatric trauma patients (age ≥ 65 years) with an Injury Severity Score (ISS) of > 15, who survived ≥ 48 hours after admission. Frailty was assessed using the modified 5-item frailty index (mFI). Patients were divided into two groups: frail (mFI ≥ 2) and non-frail (mFI < 2). Logistic regression analysis and a generalized additive model (GAM) were used to examine the association between FTR and patient frailty after controlling for age, sex, type of injury, level of trauma center, ISS, and vital signs on admission.

Results: A total of 65,384 geriatric trauma patients were included in the analysis, of whom 34.1% were frail (mean mFI; frail: 2.3 vs. non-frail: 0.9, $p < 0.001$). Compared with those in the non-frail group, frail patients were more likely to be older (age 77.0 vs. 75.0 years, $p < 0.001$), have a lower ISS (19 vs. 21, $p < 0.001$), and have a higher incidence of FTR (7.8% vs. 6.0%, $p = 0.002$). Logistic regression analysis revealed that frailty was an independent predictor of FTR (odds ratio [CI]: 1.32 [1.23–1.42], $p < 0.001$). The GAM plots also showed that the incidence of FTR increased linearly with the increase in mFI after adjusting for confounders (*Figure*).



Conclusion: Our study shows that frailty independently contributed to an increased risk of FTR in geriatric trauma patients. The impact of patient frailty must be considered if FTR is used as a measure of the quality of trauma care.

Session IIIB: Papers 20-30
Paper 28: 4:45 PM - 5:05 PM

WHOLE BLOOD ON THE SCENE OF INJURY IMPROVES CLINICAL OUTCOME OF THE BLEEDING TRAUMA PATIENTS

Jaromir Koci, MD; Anatolij Truhlar, MD; Vit Rehacek, MD;
Michal Plodr, MD; Eva Cermakova, PhD;
Jan Trlica, MD; Jana Berkova, MD
University Hospital Hradec Kralove, Czech Republic
Invited Discussant: Juan Duchesne, MD

Introduction: Application of the whole blood to the trauma patients on the scene of injury is still not standard clinical approach. Nevertheless, initial data regarding the efficacy are positive.
Methods: We conducted single center, prospective, observational cohort study with application of one unit of packed red blood cells and one unit of fresh frozen plasma (during 2018 to 2020 years) or two units of low titer group 0 whole blood (during 2020 to 2022 years) to the bleeding trauma patients on the scene of injury by Helicopter emergency medical service. As an inclusion criteria, we used vital signs or severe anatomical injuries (hypotension bellow 100 mmHg, penetrating thoracic/abdominal injuries, unstable chest wall, unstable pelvis, open pelvic fracture and/or crush of lower limb). Primary outcomes were: feasibility, 24-hour and 30-day mortality, 24-hour transfusion requirements, 24-hour cumulative fluid balance and initial INR. As a control cohort there were included patients from prospective collected trauma database with the same inclusion criteria from the years 2016 to 2018.
Results: During the study periods there were enrolled 55, 43 and 47 patients respectively. The 24-hour mortality was the same, however, 30-day mortality was better in both intervention groups (16,3 % vs. 13,9 % vs. 14,8 %, p=0,42). We found significant decrease requirement of 24-hour transfusion volume (4986 ml vs. 4355 ml vs. 4121 ml, p<0,05), significant decrease of 24-hour cumulative fluid balance (10 207 ml vs. 8 038 ml vs. 7 869 ml, p<0,05) and significant decrease of the initial INR (1,17 vs. 1,13 vs. 1,10, p<0,05). There was no transfusion related reaction in any patients.
Conclusion: Application of the whole blood on the scene of injury to the trauma patients by HEMS is a safe procedure. There are positive effects on 30-day mortality, coagulation profile and decrease of the transfusion requirements. Likewise, multicenter prospective study is needed for confirmation of the positive effect of this treatment to mortality.

Session IIIB: Papers 20-30
Paper 29: 5:05 PM - 5:25 PM

AN ANALYSIS ON THE USE OF COLD STORED PLATELETS IN COMBAT TRAUMA

Andrew D. Fisher, MD; Brock A. Graham, MPH; Steven G. Schauer, DO;
Caryn Stern, PHD; Andrew P. Cap, MD, PhD;
Jennifer M. Gurney, MD; Stacy A. Shackelford, MD
US Army
Invited Discussant: Jason Sperry, MD, MPH

Introduction: Damage control resuscitation has evolved over the past 20 years. The use of whole blood and/or components in 1:1:1:1 ratio of red blood cells, plasma, platelets, and cryoprecipitate are now the standard. However, there are limitations of room temperature stored platelets, mainly the short shelf-life of 5-7 days. Cold stored platelets while not lasting as long in circulation once transfused, can be stored for 10-14 days.
Methods: We used the Department of Defense Trauma Registry (DoDTR) and Armed Forces Medical Examiner System (AMFES) to identify casualties who received room temperature stored (RTSP) and/or cold stored platelets (CSP) between January 1, 2016 and February 29, 2020. Analysis was performed using Chi-square test, Fisher's exact, and Wilcoxon signed rank sum test. A logistic multivariable model was used to compare CSP to RTSP with outcome of death.
Results: A total of 302 patient were identified, with 158 (52.3%) in the RTSPs cohort and 144 (47.7%) in the CSPs cohort. In both groups, most were male and similar in age. The mean injury severity score (ISS) was higher in the CSPs cohort (24, standard deviation [SD] 13.6) vs RTSP cohort (21.6, SD 12.5, $p = 0.0236$). Twenty-four percent of the RTSPs cohort underwent surgery, whereas 13.2% of the CSPs cohort underwent surgery, $p = 0.016$. There was no difference in survival RTSP 88% and CSP 86.8%, $p = 0.7596$. Blood product and fluid administration was significantly higher in the CSP cohort. Massive transfusion was performed in 33.5% of the RTSP cohort and 53.5% of the CSP cohort, $p = 0.0005$.
Conclusion: This is the first analysis of recipients of CSPs compared to RTSPs from a combat setting, representing the initial US military experience with CSP transfusion. In our findings, the use of CSPs were not inferior to RTSPs. Given the improved logistics of a cold-stored product that facilitate availability in forward deployed locations, the desirable characteristics of CSP shown by in vitro studies, and the results of the initial US military experience, we recommend continued use of CSP in military environments.

Session IIIB: Papers 20-30
Paper 30: 5:25 PM - 5:45 PM

GETTING OUT OF THE BAY FASTER: ASSESSING TRAUMA TEAM PERFORMANCE USING TRAUMA VIDEO REVIEW

Amelia W. Maiga, MD, MPH; Michael A. Vella, MD, MBA;
Rachel D. Appelbaum, MD; Fei Ye, PhD; Rebecca Owens, MS;
Daniel Holena, MD; Ryan Dumas, MD; TVRC Investigators
Vanderbilt University Medical Center
Invited Discussant: William Chiu, MD

Introduction: Minutes matter for trauma patients in hemorrhagic shock. While trauma team performance has been shown to impact patient outcomes, how team function impacts the time to the next phase of care has not been rigorously evaluated. We sought to measure trauma team performance. We hypothesized that better performance scores would be associated with decreased time to the next phase of trauma care.
Methods: This prospective multicenter observational study included hypotensive (SBP <90mmHg) trauma patients at 19 centers. Using Trauma Video Review, we analyzed team performance with the validated T-NOTECHS scale (nontechnical skills scale for trauma) in 5 domains: leadership, cooperation and resource management, communication, assessment/decision making, and situational awareness. The primary outcome was minutes from patient arrival in the trauma bay to next phase of care (e.g., operating room, interventional radiology); deaths in the bay were excluded. Secondary outcomes included time to initiation and completion of the first unit of blood. Associations between team dynamics and outcomes were assessed with a linear mixed effects model adjusting for injury severity score (ISS), injury mechanism, initial blood pressure and heart rate, number of team members, and the training level and gender of the trauma team lead.
Results: 442 patients met inclusion criteria. The median ISS was 22 [IQR 10-34] and the majority (61%) sustained blunt trauma. Median time to next phase of care was 24[17-35] minutes. Better leadership, communication, assessment/decision making, and situational awareness scores were all independently associated with faster times to next phase of care (all $p<0.05$). Each 1-point worsening in the T-NOTECHS score (scale, 5-15) translated to 1.6 minutes more in the bay. The median number of resuscitation team members was 12[10-15], and larger teams were slower ($p<0.05$). A better situational awareness score was associated with faster completion of the first unit of blood by 4-5 minutes on multivariate modeling ($p<0.05$).
Conclusions: Better team performance is associated with faster transitions to the next phase of care in hypotensive trauma patients, and larger teams are not always faster. Trauma team training should focus on optimizing team performance towards hemorrhage control.

SESSION IV:

PAPERS #31–36

Thursday, September 21, 2023

7:30 AM - 9:30 AM

Location: Pacific Ballroom

Moderator: Christine Gaarder, MD, PhD

Recorder: Deborah Stein, MD, MPH

Session IV: Papers 31-36
Paper 31: 7:30 AM - 7:50 AM

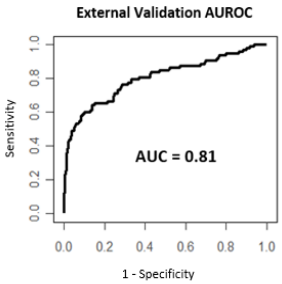
PROSPECTIVE VALIDATION OF A HOSPITAL TRIAGE PREDICTIVE MODEL TO DECREASE UNDERTRIAGE: AN EAST MULTICENTER STUDY

Elise A. Biesboer, MD; Courtney Pokrzywa, MD; Basil Karam, MD;
Benjamin Chen; Aniko Szabo, PHD; Bi Qing Teng, MS;
Sharfuddin Chowdhury, MBBS; Mark R. Hemmila, MD;
Michal Radomski, MD; Matthew Bernard; Brian K. Yorkgitis, DO;
Benjamin Weston, MD; Christopher J. Tignanelli, MD;
Marc A. de Moya, MD; Rachel S. Morris, MD
Medical College of Wisconsin
Invited Discussant: James Byrne, MD, PhD

Introduction: Tiered trauma team activation (TTA) allows systems to optimally allocate resources to an injured patient. Target under and overtriage rates of <5% and <45% are difficult for centers to meet, and high variability exists. Our objective was to externally validate a machine learning model deployed in the pre-hospital setting to predict Need for Emergent Intervention in Six hours (NEI-6), an indicator of need for TTA.

Methods: The model was previously developed, validated, and published using data from 31 US trauma centers. As part of an EAST multicenter trial, data was collected prospectively at 4 sites using a previously developed Trauma Intervention Prediction (TIP) mobile application. A weighted multiple logistic regression model was used to revise the previously developed model using the original dataset and 1 of the prospective sites. Three prospective sites (2 US, 1 International) were held out for external validation. Missing data was handled by median imputation and including indicator variables for missingness. An area under the receiver operating curve (AUROC) curve and area under the precision recall curve (AUPRC) was assessed in the validation cohort.

Results: A total of 14,421 patients were used in the training dataset. There were 579 patients in the external validation dataset across 3 sites. The model had an undertriage rate of 8.5% and an overtriage rate of 50.8% with AUROC of 0.81 and AUPRC of 0.63 in the validation set. Variables with the greatest association to NEI-6 included stab wound, assault intentionality, and central gunshot wound.



Conclusion: The revised TIP mobile platform hosting the NEI-6 predictive model approaches recommended under and overtriage rates, while significantly reducing variability of TTA across centers. A multi-institutional prospective randomized controlled trial is necessary to further compare TIP vs the standard of care.

Session IV: Papers 31-36
Paper 32: 7:50 AM - 8:10 AM

THIN AIR, THICK BLOOD: HIGH ALTITUDE TRAUMA CENTERS HAVE INCREASED DEEP VENOUS THROMBOSIS RATES

Franklin L. Wright, MD; Thomas Schroeppel, MD, MS;
Michael Bronsert, PhD; Shane Urban, BS; Stephanie Vega, MBA;
Michael W. Cripps, MD; Warren Dorlac, MD; Whitney Jenson, MD; Lauren Steward, MD; Clay Cothren Burlew, MD;
Jen Baker, MD; Robert McIntyre, MD
University of Colorado
Invited Discussant: Eric Ley, MD

Introduction: Relative hypobaric and hypoxic conditions in high altitude environments produce physiologic consequences. Patients undergoing elective orthopedic procedures performed at altitudes > 4000 ft have higher deep venous thrombosis (DVT) and pulmonary embolism (PE) rates compared to those performed at <= 1000 ft. Similar findings are seen in patients with pelvic fractures and following bariatric surgery. We hypothesize that venous thromboembolism (VTE) rates will be elevated at high altitude centers.
Methods: This is a retrospective review of the American College of Surgeons Trauma Quality Improvement Program (TQIP) database from 2014-2019. Adults (age >= 18) are divided into LOW (< 1001 ft) or HIGH (> 4000 ft) altitude treatment by zip code analysis. VTE rates are compared by multivariable regression analysis as well as using a 1:2 propensity matched model.
Results: 79.1% of patient encounters occurred at low altitude (678 centers) and 4.8% were at high altitude (61 centers). DVT rates for all 4,052,240 patient encounters over 6 years were 0.32% at low altitude centers and 0.44% at high altitude centers; risk-adjusted odds ratio (OR) for DVT at high altitude was 1.51 [95% CI 1.41-1.62]. In patients with an Injury Severity Score (ISS) >= 16, the DVT rate was 1.08% (LOW) vs 1.56% (HIGH); risk-adjusted OR for DVT at high altitude with ISS>=16 was 1.66 [1.52-1.82]. PE rates were 0.15% (LOW) vs 0.16% (HIGH) for all patients (risk-adjusted OR 1.13 [1.01-1.26]); in the ISS>=16 sub-group the PE rates were 0.45% (LOW) vs 0.38% (HIGH) (risk-adjusted OR 0.96 [0.80-1.14]). Under the propensity matched model, DVT rates at higher altitude had an OR of 1.67 [1.52-1.81] for all patients.
Conclusion: Following traumatic injury, DVT rates are increased by 51-67% in higher altitude treatment facilities compared to their low elevation peers without a large effect on the PE rate. High altitude treatment is a risk factor for post-traumatic DVT and should be incorporated into risk models for post-traumatic complications.

Session IV: Papers 31-36
Paper 33: 8:10 AM - 8:30 AM

LONG WAVELENGTH LIGHT EXPOSURE REDUCES SYSTEMIC INFLAMMATION AND ACUTE ORGAN INJURY FOLLOWING POLYTRAUMA IN MICE

Mohammadreza Zarisfi, MD; Zachary Secunda, BA, MA;
Patricia A. Loughran, PHD; Matthew R. Rosengart, MD;
Elizabeth A. Andraska, MD; Matthew Neal, MD
UPMC Presbyterian Hospital
Invited Discussant: Todd Costantini, MD

Introduction: Evidence suggests that variation in light exposure strongly influences the dynamic of inflammation, coagulation, and the immune system. Polytrauma induces systemic inflammation that can lead to end-organ injury. Here, we hypothesize that long-wavelength red light exposure reduces post-trauma inflammation and end-organ injury by comparison with short-wavelength blue light and ambient light.
Methods: C57Bl6 mice underwent a validated polytrauma model (cardiac puncture/hemorrhage, pseudo-femoral fracture, and liver crush injury) performed following 72 hours of exposure to red (617nm, 1,700lux), blue (321nm, 1,700lux), and fluorescent white light (300lux) (n = 6-8/group). The animals were sacrificed at 6- and 48-hours post-trauma. Plasma samples were evaluated and compared for pro-inflammatory cytokines expression level and markers of liver and renal injury. One-way ANOVA statistical tests were applied to compare study groups.
Results: Strikingly, long wavelength red light markedly reduced inflammatory response at 6 hours post-polytrauma compared to blue and ambient light, as evidenced by decreased levels of Il-6 (88.43 ± 32.95 vs 231.33 ±122.49 and 211.60 ± 89.25 pg/ml, respectively; $p < 0.05$) and MCP-1 (214.06 ± 44.61 vs 408.97 ± 78.35 and 350.03 ± 27.92 pg/ml; $p< 0.001$ and 0.0001, respectively). In addition, ALT concentrations in red-light-exposed animals were found to be lower at 6 hours post-polytrauma compared to ambient light (3100 ± 1089.26 vs 4710 ± 1008.41 IU/ml; $p< 0.05$), suggesting attenuation of acute liver injury. Concentration of cystatin C were also reduced following red-light exposure (2763.12 ± 228.58 and 3473.60 ± 328.26 pg/ml, ($p< 0.01$)), indicated reduced AKI.
Conclusion: Prophylactic exposure to long wavelength red light is associated with reduced systemic inflammation and minimized acute organ injury following polytrauma. Adjustments in light exposure may provide a novel strategy to reducing trauma related morbidity.

Session IV: Papers 31-36
Paper 34: 8:30 AM - 8:50 AM

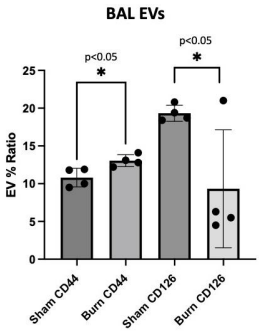
A HETEROGENOUS POPULATION OF EXTRACELLULAR VESICLES MOBILIZE TO LUNG POST-INJURY

Todd W. Costantini, MD, FACS; Park Dong-Jun, PhD;
Jenny Kezios, BS; Jessica L. Weaver, MD, PhD;
Raul Coimbra, MD, PhD, FACS; Brian P. Eliceiri, PhD
University of California San Diego
Invited Discussant: Timothy Pritts, MD

Introduction: Acute lung injury (ALI) and subsequent resolution following severe injury are coordinated by a complex lung microenvironment that includes extracellular vesicles (EVs). Here we focus on addressing the heterogeneity of EVs in the bronchioalveolar lavage (BAL) by applying recent advances in single vesicle flow cytometry (vFC). We hypothesized that specific immune-relevant mediators expressed on BAL EVs are candidate biomarkers of injury and injury resolution and are potential therapeutic targets in post-trauma ALI.

Methods: Mice were subjected to 30% TBSA cutaneous burn injury and underwent collection of BAL fluid 4 hours post-injury and compared to sham. EVs were purified from BAL by size exclusion chromatography (SEC) then subjected to size and concentration analysis. vFC was performed using fluorescent antibodies to quantify the expression of specific cell surface markers on individual EVs. Next, we evaluated human BAL specimens from injured patients to establish translational relevance of the mouse vFC analysis. Human BAL was collected from intubated patients following trauma or burn injury (n=4), EVs were purified by SEC and subjected to vFC analysis to evaluate for EV heterogeneity.

Results: A diverse population of EVs was mobilized to the alveoli after burn injury in mice. Quantitative BAL vFC identified significant increases in macrophage-derived CD44+ EVs (pre-10.8% vs. post-injury 13%, $p<0.05$) and decreases in IL-6 receptor alpha (CD126) EVs (pre-19.3% vs. post-injury 9.3%, $p<0.05$) (see Figure). BAL from injured patients also contained a heterogeneous population of EVs derived from myeloid cells, endothelium, and epithelium sources, with CD44+ EVs being highly detected.



Conclusion: Injury causes mobilization of a heterogeneous population of EVs in both animal models and injured patients. Defining EV release after injury will be critical in identifying diagnostic and therapeutic targets to limit post-injury ALI.

Session IV: Papers 31-36
Paper 35: 8:50 AM - 9:10 AM

THE EFFECT OF CIRCLE OF WILLIS ANATOMY ON OUTCOMES FOR BLUNT CEREBROVASCULAR INJURIES

David Bar-Or, MD; Stephanie Jarvis, MPH; Forrester Lensing, MD;
David Hamilton, MD; Matthew Carrick, MD;
Carlos H. Palacio Lascano, MD; David Bassa, MD;
Maxwell Busch, MD; David Acuna, MD;
Samantha Greenseid, MD; Daniel Ojala, DO
Medical City of Plano
Invited Discussant: Ryan Dumas, MD

Introduction: Few small studies have evaluated the effect of the Circle of Willis (COW) anatomy among blunt cerebrovascular injuries (BCVI) on outcomes.
Methods: This retrospective cohort study included adult trauma patients with BCVI (7/17-8/21) admitted to 5 Level I and 13 Level II-IV trauma centers. Patients with abnormal COW anatomy were compared to those with normal COW anatomy. Those with anterior abnormalities (anterior cerebral artery, anterior communicating artery, and internal carotid artery) were further compared to those with posterior abnormalities (posterior cerebral artery). Outcomes included stroke, length of stay (LOS) intensive care unit LOS (ICULOS), intracranial hemorrhage (ICH), and mortality, $p<0.05$.
Results: Of the 561 BCVIs, 17% (93) had an abnormal COW. There was a higher proportion of strokes (10% vs 4%, $p=0.04$) among those with an abnormal COW than for those with a normal COW. Patients with an abnormal COW suffered ICHs more often than those with a normal COW (37% vs 20%, $p=0.002$). There were no differences in the ICULOS (4 days vs 3, $p=0.16$), LOS (7 days vs 7, $p=0.66$), or the mortality rate (9% vs 7%, $p=0.66$) for patients with an abnormal vs normal COW, respectively. Of those with an abnormal COW, 84% (78) had an anterior abnormality, 13% (12) had a posterior abnormality, 3% (3) patients had an abnormal posterior communicating artery. There was no difference in the stroke rate for anterior vs posterior abnormalities ($p=0.41$). Patients with anterior abnormalities were more likely to have an ICH than those with posterior abnormalities (41% vs 0%, $p=0.04$). ICULOS was significantly longer for patients with an anterior abnormality than for those with posterior abnormalities (5 days vs 2, $p=0.01$). LOS was also significantly longer for those with anterior abnormalities than those with posterior (8 days vs 4, $p=0.03$). Mortality rates were similar by anterior vs posterior abnormalities ($p>0.29$).
Conclusions: Patients with an abnormal COW were significantly more likely to have a stroke and an ICH than those with a normal COW. Among patients with an abnormal COW, there was no difference in the stroke rate when comparing anterior to posterior abnormalities, but patients with anterior abnormalities were more likely to have an ICH, had a significantly longer LOS and ICU than patients with posterior abnormalities.

Session IV: Papers 31-36
Paper 36: 9:10 AM - 9:30 AM

LOW-VOLUME PEDIATRIC TRAUMA CENTERS ACHIEVE BETTER OUTCOMES THAN HIGH-VOLUME ADULT TRAUMA CENTERS IN TREATING INJURED CHILDREN

Sai Krishna Bhogadi, MD; Christina Colosimo, DO, MS;
Qaidar Alizai, MD; Audrey L. Spencer, MD;
Hamidreza Hosseinpour, MD; Adam Nelson, MD;
Khaled El-Qawaqzeh, MD; Lourdes Castanon, MD, FACS;
Louis J. Magnotti, MD, MS, FACS; Bellal Joseph, MD, FACS
The University of Arizona
Invited Discussant: Eileen Bulger, MD

Introduction: Despite growing evidence of volume-outcome relationship in trauma, there is a paucity of data on the performance of high-volume adult trauma centers in managing pediatric trauma patients. We aimed to compare the outcomes of pediatric trauma patients managed at high pediatric volume adult Level I/II trauma centers (ATC) which are not pediatric verified to those managed at lowest volume pediatric level I/II trauma centers (LI/II PTC).

Methods: In this analysis of 2017 ACS-TQIP database, all pediatric trauma patients (<18 yrs) were included. Patients with missing information on facility identifiers were excluded. Patients were stratified based on the designation of the treating trauma center (TC) (level I/II ATC and level I/II PTC). TCs were classified into tertiles based on volume of patients (low [LV], middle [MV], and high volume [HV]). Outcomes were in-hospital complications and mortality. Multivariable logistic regression analyses were performed. Sub analysis was performed on patients with severe injuries (ISS >15).

Results: 83,419 patients managed at 393 centers (282 ATC; 111 LI/II PTC) were identified, of which 32% were treated at ATCs, 49% at LI PTCs, and 19% at LII PTCs. The mean age was 10 yrs, and 65% were male. The median ISS was 2 [1–6]. The overall rate of mortality and major complications were 1.5% and 1%, respectively. The median [IQR] number of pediatric trauma patients managed at HV ATC, LV LI PTC, and LV LII PTC were 276 [224 – 382], 318 [241 – 503], and 185 [141 – 211], respectively. On multivariable regression analyses, LV LI & LII PTCs were independently associated with lower odds of mortality and complications compared to HV ATC. The results of sub analysis on severely injured patients remained the same (**Table**).

Conclusions: LV PTCs outperform HV ATCs in the management of pediatric trauma patients. LV LII PTCs treat a smaller number of pediatric trauma patients compared to HV ATC, but still have better outcomes. These findings call for improved access to pediatric trauma centers.

Table: Independent Effect of ATC & PTC on Complications and Mortality (Overall)

Complications	aOR	95% CI	*p*	Mortality	aOR	95% CI	*p*
HV ATC	Ref	Ref	Ref	HV ATC	Ref	Ref	Ref
LV LII PTC	0.63	0.44-0.91	0.02	LV LII PTC	0.64	0.44-0.92	0.02
LV LI PTC	0.72	0.54-0.95	0.01	LV LI PTC	0.52	0.38-0.70	<0.01
Independent Predictors of Complications and Mortality (ISS > 15)							
Complications	**aOR**	**95% CI**	***p***	**Mortality**	**aOR**	**95% CI**	***p***
HV ATC	Ref	Ref	Ref	HV ATC	Ref	Ref	Ref
LV LII PTC	0.49	0.31-0.79	0.04	LV LII PTC	0.60	0.39-0.92	0.02
LV LI PTC	0.58	0.40-0.82	0.03	LV LI PTC	0.44	0.31-0.63	<0.01

SESSION V: PANEL I

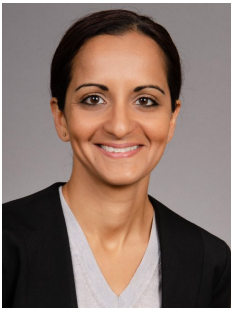
Thursday, September 21, 2023
10:00 AM - 11:00 AM

"Community Engagement Models for Violence Prevention"

Location: Pacific Ballroom
Panelists: Charity Evans, MD;
Ashley Williams, MD;
Deepika Nehra, MD;
Kate Stadeli, MD
Moderator: Rochelle Dicker, MD


CHARITY EVANS, MD


ASHLEY WILLIAMS, MD


DEEPIKA NEHRA, MD


KATE STADELI, MD


ROCHELLE DICKER, MD

SESSION VI: SCHOLARSHIP PRESENTATIONS

Thursday, September 21, 2023
11:00 AM - 11:30 AM

Location: Pacific Ballroom

"Developing Metrics to Assess Disparities in Access to Trauma Care in Washington State"

REBECCA MAINE, MD, MPH

"Impact of Lung Macrophage Polarization on Posttraumatic Infection"

ANUPAMAA SESHADRI, MD

"The Effect of Paracrine Factors Secreted from Adipose Derived Stem Cells on Healing in a Burn Wound Model"

ALISON SMITH, MD, PHD

Associate Member Mentoring Scholarship
TANYA ANAND, MD, MPH

SESSION VII:
FITTS LECTURE

"ENDURE, ADAPT, SURVIVE AND THRIVE"

Thursday, September 21, 2023
11:30 AM - 12:30 PM

Location: Pacific Ballroom
Presenter: J. Wayne Meredith, MD
Introduction: Eileen Bulger, MD
AAST President

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.

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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

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 *(Cancelled)*
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 VIII:

POSTERS

Thursday, September 21, 2023

12:45 PM - 1:45 PM

Location: California D

GROUP ONE
SHOCK/TRANSFUSION
POSTERS #1-9

Aussama Nassar, MD;
Samuel Mandell, MD, MPH

GROUP TWO
GERIATRICS AND
TRAUMA SYSTEMS
POSTERS #10-18

Tasce Bongiovanni, MD;
Jay Yelon, DO

GROUP THREE
EMERGENCY GENERAL
SURGERY AND TRAUMA
POSTERS #19-28

Nicole Goulet, MD;
Nicole Stassen, MD

GROUP FOUR
THORACIC TRAUMA AND
TRAUMA SYSTEMS
POSTERS #29-38

Michael Dalton, MD, MPH;
Charles Butts, MD

GROUP FIVE
NEUROTRAUMA
POSTERS #39-48

Galinos Barmparas, MD;
Christine Cocanour, MD

GROUP SIX
PEDIATRICS AND
INJURY PREVENTION
POSTERS #49-58

D'Andrea Joseph, MD;
David Blake, MD, MPH

GROUP SEVEN
TRAUMA SYSTEMS AND
GLOBAL HEALTH
POSTERS #59-68

Chris Dodgion, MD;
James Byrne, MD, PhD

GROUP EIGHT
CRITICAL CARE
POSTERS #69-78

Saman Arbabi, MD, MPH;
Rachel Appelbaum, MD

GROUP NINE
HEALTH DISPARITIES
POSTERS #79-88

Rondi Gelbard, MD;
Adel Elkbuli, MD, MPH, MBA

GROUP TEN
ABDOMINAL TRAUMA
POSTERS #89-98

Kazuhide Matsushima, MD;
Amy Kwok, MD

SESSION IX:

PAPERS #37-44

Friday, September 22, 2023

7:30 AM - 10:30 AM

Location: Pacific Ballroom C-D

Moderator: Jason Smith, MD, PhD, MBA

Recorder: Brittany Bankhead, MD, MS

Session IX: Papers 37-44
Paper 37: 7:30 AM - 7:50 AM

PRIMARY CARE FOLLOW-UP IMPROVES OUTCOMES IN OLDER ADULTS FOLLOWING EMERGENCY GENERAL SURGERY ADMISSION

Matthew P. Guttman, MD, PhD; Bourke W. Tillmann, MD;
Avery B. Nathens, MD, PhD; Susan E. Bronskill, PhD; Refik Saskin, MSc;
Liisa Jaakkimainen, MD, MSc; Anjie Huang, MSc; Barbara Haas, MD, PhD
Sunnybrook Health Sciences Center
Invited Discussant: Marta McCrum, MD, MPH

Introduction: While pre-operative optimization improves outcomes for older adults undergoing major elective surgery, no such optimization is possible in the emergent setting. Surgeons must identify post-operative interventions to improve outcomes among older EGS (emergency general surgery) patients. Our objective was to examine the association between early follow-up with a primary care physician (PCP) and the risk of nursing home acceptance or death in the year following EGS admission among older adults.

Methods: Using population-based administrative health data in Ontario, Canada (2006-2016), we followed all older adults (≥65 years) for one year after hospital admission for EGS conditions. A multivariable Cox model was used to identify the association between early post-discharge follow-up with a patient's PCP and the time to nursing home acceptance or death while adjusting for confounders.

Results: Among 76,568 older EGS patients, 32,087 (41.9%) were seen by their usual PCP within 14 days of discharge and 9,571 (12.5%) were accepted to a nursing home or died within one year. PCP follow-up was associated with a lower risk of nursing home acceptance or death compared to no follow-up (HR 0.87, 95% CI 0.84–0.91). This effect was consistent across age and frailty strata, patients managed operatively and non-operatively, and patients who had both high and low baseline continuity of care with their PCP.

Conclusions: Timely follow-up with a familiar PCP was associated with a reduced risk of nursing home acceptance or death among older adults following EGS admission. Creating structures and processes of care to ensure that such follow-up is routinely arranged during discharge planning represents a potential key intervention as part of ongoing efforts to provide senior-friendly EGS care.

Session IX: Papers 37-44
Paper 38: 7:50 AM - 8:10 AM

"DOOR-TO-PROPHYLAXIS TIME" AS A NOVEL QUALITY IMPROVEMENT METRIC IN PREVENTION OF VENOUS THROMBOEMBOLISM FOLLOWING TRAUMATIC INJURY

Jan-Michael Van Gent, DO; Thomas Clements, MD; David Lubkin, MD;
Carter Kaminski, DO; Jonathan Bates, BS;
Thaddeus Puzio, MD; Bryan A. Cotton, MD
The University of Texas Health Science Center at Houston
Invited Discussant: Martin Schreiber, MD

Introduction: Numerous strategies have shown promise in decreasing venous thromboembolism (VTE) including early initiation of chemoprophylaxis, reducing missed doses, weight-based dosing, and dose adjustment using anti-Xa levels. However, many centers struggle with prolonged chemoprophylaxis initiation times. We hypothesized that door-to-prophylaxis initiation time would be the strongest modifiable risk for VTE, even after adjusting for competing risk factors.

Methods: A prospectively maintained trauma registry was queried for all patients admitted 07/17-10/21 who (1) were 18 years and older, (2) arrived as level-1 trauma activation, and (3) received emergency release blood products. Patients with deep vein thrombosis or pulmonary embolism were assigned to the VTE group, while those without were assigned to the No VTE cohort. Door-to-prophylaxis was defined as time from hospital arrival to first dose of VTE chemoprophylaxis (measured in hours). Univariate and multivariate analyses were then performed between the two groups.

Results: 2,047 patients met inclusion (106 VTE, 1,941 No VTE). There were no differences in baseline or demographic data. VTE patients had higher ISS (29 vs. 24), more evidence of shock by arrival lactate (4.6 vs. 3.9) and received more post-ED transfusions (8 vs 2 units); all $p<0.05$. While there was no difference in need for enoxaparin dose adjustment or missed doses, door-to-prophylaxis time was longer in the VTE group (35 vs 25 hours; $p=0.009$). Controlling for age, sex, ISS, lactate, and post-ED transfusions, every hour delay from time of arrival increased likelihood of VTE by 1.5% (OR 1.015, 95% CI 1.004-1.023, $p=0.004$).

Conclusion: Increased door-to-prophylaxis time was significantly associated with an increased likelihood for VTE. Chemoprophylaxis initiation is one of the few modifiable risk factors trauma surgeons have to combat VTE, therefore, early initiation is paramount. Additionally, similar to door-to-balloon time in treating myocardial infarction and door-to-tPA time in stroke, "door-to-prophylaxis time" should be considered as a hospital metric for prevention of VTE in trauma.

Session IX: Papers 37-44
Paper 39: 8:10 AM - 8:30 AM

FASTER REFILL IN AN URBAN EMS SYSTEM SAVES LIVES: A PROSPECTIVE PRELIMINARY EVALUATION OF A PREHOSPITAL ADVANCED RESUSCITATIVE CARE BUNDLE

Jacob Broome, MS; Kristen Nordham, MD, MS; Danielle Tatum, PhD; Mark Piehl, MD; Valerie J. De Maio, MD; Sharven Taghavi, MD, MPH, MS; Olan Jackson-Weaver, PhD; Charlie Harris, MD; Alison Smith, MD, PhD; Emily Nichols, MD; Thomas Dransfield, NRP; David Rayburn, MD; Meg Marino, MD; Jennifer Avegno, MD; Juan Duchesne, MD
Tulane University School of Medicine
Invited Discussant: David Hampton, MD

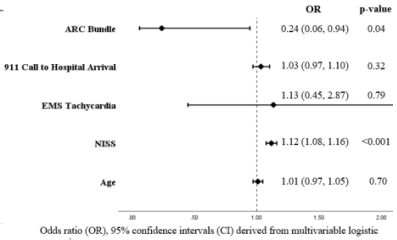
Introduction: Military experience has shown a benefit to advanced resuscitative care (ARC) in severe hemorrhage. The benefits of ARC for trauma in civilian EMS systems with short transport intervals are still unknown. We hypothesized that ARC implementation in an urban EMS system would reduce hospital mortality.
Methods: This was a prospective analysis of ARC bundle administration between 2021 and 2022 in an EMS system with 70,000 annual responses. The ARC bundle consisted of calcium, tranexamic acid (TXA), and packed RBCs via a rapid infuser. ARC patients were compared to trauma registry controls from 2016 to 2019. Included were patients with penetrating injury and SBP≤90mmHg. Excluded were isolated head trauma or prehospital cardiac arrest. In-hospital mortality was the primary variable of interest.
Results: Included were 195 patients (ARC=51, controls=144): median age of 32 years, with no difference in demographics, EMS vitals, or new injury severity score (NISS) between groups (**A**). At hospital arrival, ARC patients had lower median heart rate and shock index than controls (p=0.01). 24-hour mortality and in-hospital mortality were lower in the ARC group (p≤0.04). Multivariate regression revealed an independent reduction in hospital mortality with ARC (OR 0.24, 95%CI 0.06-0.94) (**B**).
Conclusion: Early ARC in a fast-paced urban EMS system is achievable and may improve physiologic derangements while decreasing patient mortality. ARC closer to the point of injury warrants consideration.

A. Univariate comparison of ARC vs controls.

Variable	Controls (n=144)	ARC Bundle (n=51)	p-value*
EMS Characteristics	median (IQR)	median (IQR)	
SBP, mmHg	80 (62-88)	71 (60-83)	0.22
HR, bpm	101 (72-126)	103 (72-136)	0.35
Shock Index	1.20 (0.87-1.60)	1.22 (0.77-1.77)	0.92
Endotracheal Intubation	11 (8%)	0 (0%)	0.04
911 Call to Hospital Arrival	20 (15-24)	24 (20-31)	<0.01
Hospital Characteristics			
ED SBP, mmHg	107 (80-124)	114 (88-140)	0.42
ED HR, bpm	97 (75-121)	79 (62-101)	0.01
ED Shock Index	0.88 (0.70-1.26)	0.79 (0.50-1.03)	0.01
NISS	17 (4-27)	18 (12-34)	0.07
24 Hour Mortality	27 (19%)	3 (6%)	0.03
In-hospital Mortality	33 (23%)	5 (10%)	0.04

*Mann Whitney U for medians; Chi-square for frequencies
Systolic Blood Pressure (SBP), Heart Rate (HR), Emergency Department (ED)

B. Adjusted odds ratios for hospital mortality.



Odds ratio (OR), 95% confidence intervals (CI) derived from multivariable logistic regression

Session IX: Papers 37-44
Paper 40: 8:30 AM - 8:50 AM

TO PLATE OR NOT TO PLATE: A PROPENSITY MATCHED ANALYSIS OF OUTCOMES IN PATIENTS UNDERGOING RIB FIXATION: AN MTQIP STUDY

Alistair J. Chapman, MD, FACS; Laura Krech, MPH; Chelsea Fisk, BS;
Matthew Lypka, MPH; Charles J. Gibson, MD;
Steffen Pounders, BS; Alan Davis, PhD
Corewell Health West Butterworth Hospital
Invited Discussant: Raminder Nirula, MD, MPH

Introduction: Rib fractures account for nearly 15% of all trauma admissions in the United States, and have numerous downstream consequences post-injury, including chronic pain, decreased functional capacity, and inability to return to work. Historically, multi-modal pain control has been the accepted management strategy. Open reduction and internal fixation (ORIF) of rib fractures is now regularly performed but remains controversial due to lack of consensus on surgical indications. The aim of our study is to determine the impact of ORIF on patient outcomes.
Methods: Michigan Trauma Quality Improvement Program (MTQIP) data from January 1st, 2013, through June 30th, 2022, was used to identify patients who underwent ORIF for 3 or more traumatic rib fractures. 510 ORIF patients were propensity matched across 25 independent variables to 510 non-operatively managed (No-ORIF) patients. Primary outcomes included were death or hospice; secondary outcomes included were pulmonary complications (Acute Respiratory Distress Syndrome (ARDS), pneumonia, Ventilator Associated Pneumonia (VAP), pulmonary embolism (PE), and Intensive Care Unit (ICU) and hospital length of stay (HLOS).
Results: Forty seven out of 510 No-ORIF patients died or were transitioned to hospice, compared to 8 of the 510 ORIF patients ($p=<0.001$). For complications, VAP was higher in the ORIF cohort ($p=.05$). The ORIF group had a longer median ICU (6 versus 4 days $p=<0.001$) and median HLOS (10 days versus 6 days, $p=<0.001$). A sub-analysis of patients >65 years of age identified 16 deaths or hospice in the No-ORIF group and 5 deaths in the ORIF group ($p=0.038$), a mortality proportion that is almost three times higher in No-ORIF patients.
Conclusion: This study demonstrates a survival advantage for patients with 3 or more rib fractures who undergo rib fixation, even after accounting for other traumatic injuries and comorbid conditions through a robust propensity analysis. ORIF carries risks, it impacts VAP and increases both ICU and HLOS, however, the mortality benefit justifies these outcomes. The findings suggest that ORIF should be strongly considered in the rib fracture treatment algorithm, particularly for geriatric patients. This study provides additional support for performance of fixation in the elderly trauma patient with robust, validated data in well matched patient populations.

Session IX: Papers 37-44
Paper 41: 8:50 AM - 9:10 AM

UNDERSTANDING FINANCIAL TOXICITY BURDEN AFTER INJURY: HIGHER TOXICITY ASSOCIATED WITH WORSE MENTAL HEALTH

Saba Ilkhani, MD, MPH; Abbie Naus, MD;
Nathaniel Pinkes, MPH; Sabrina Sanchez, MD, MPH;
John Hwabejire, MD, MPH; John W. Scott, MD, MPH;
Kavitha Ranganathan, MD; Juan Herrera-Escobar, MD, MPH;
Ali Salim, MD; Geoff Anderson, MD, MPH
Brigham & Women's Hospital
Invited Discussant: Gregory Jurkovich, MD

Introduction: Financial toxicity (FT) is one of many challenges trauma survivors face. There is a lack of consensus on how to define and approach FT across all healthcare fields. We aimed to better understand post-trauma financial burden and how it affects long-term outcomes for patients.
Methods: Adult trauma patients with ISS ≥9 treated at one of three level-1 trauma centers were followed 6–12 months after discharge and interviewed.
Results: Of 567 total patients, 44% (250/567) suffered some form of FT after injury. FT was independently associated with younger age (OR 0.97 [95% CI: 0.95–0.98]), longer hospital stay (OR 1.05 [1.01-1.08]), lower education levels (OR 1.87 [1.26-2.75]), having two or more comorbidities (OR 2.20 [1.13-4.28]), and injury mechanisms including road accidents (OR 2.95 [1.59-5.48]) and intentional injuries (OR 4.23[1.33-13.44]). A strong social support network was protective against FT (OR 0.42[0.24-0.74]). No significant relationship was found with ISS, sex, race, ICU days, Medicaid status, or household size. After adjustment for confounding, patients with FT had worse mental health scores based on the Patient Reported Outcome Measure Index System (PROMIS). There was a significant negative linear relationship between the level of FT and worse mental health outcomes.
Conclusion: Nearly half of the surveyed patients experienced some form of FT after injury, demonstrating a substantial burden. Our findings suggest that patients who are younger, have less formal education, have multiple comorbidities, or have longer hospital stays may have a greater risk of FT and worse mental health outcomes. We must work to better understand the complex relationship between FT and patient, medical, and social factors to mitigate this undue burden of FT on our trauma patients.

Financial Toxicity component	Percent
1.Less income	23.09%
2.New governmental aid	18.74%
3.Problem paying bills	22.46%
4.Lost their job	8.99%
5.No care because of the cost	6.41%

Mental health scores and FT levels		
FT Grade	**Coefficient**	**P-value**
Grade 1	-2.15(-3.34 - -0.98)	0.000*
Grade 2	-4.58 (-6.03 - -3.14)	0.000*
Grade 3	-5.47 (-7.30 - -3.62)	0.000*
Grade 4	-5.56 (-8.18 - -2.92)	0.000*

Session IX: Papers 37-44
Paper 42: 9:10 AM - 9:30 AM

EXPLORING A NEW DEFINITION OF TRAUMA-INDUCED COAGULOPATHY: TEG AND ROTEM ABNORMALITIES ARE ASSOCIATED WITH MORTALITY

Shyam Murali, MD; Nicolas Chanes; Eric Winter, BS; Allyson Hynes, MD;
Madhu Subramanian, MD; Alison Smith, MD, PhD;
Mark J. Seamon, MD; Jeremy Cannon, MD
University of Pennsylvania
Invited Discussant: Matthew Kutcher, MD, MS

Introduction: Trauma-induced coagulopathy (TIC) carries significant risk, including increased mortality. Traditional TIC definitions rely on labs that result slowly and do not highlight therapeutic targets. We hypothesized that a TIC Score, based on TEG and ROTEM, is associated with packed red blood cell (pRBC) transfusion and in-hospital mortality.
Methods: This retrospective cohort study used a database of adult patients undergoing massive transfusion at seven level 1 trauma centers (2012-2018). A "TIC Score" was developed, with 1 point assigned for abnormal R-time (>8.9min) for TEG or coagulation time (>79sec) for ROTEM, α-angle (<65degrees), or maximum amplitude (MA, <55mm). TIC+ patients (TIC Score 1-3) were compared to TIC- patients (TIC Score 0). TIC Score composition and abnormal cutoff values were adjusted to investigate optimal thresholds. Multiple logistic and negative binomial regression were used to control confounders related to injury mechanism, presenting physiology, and hospital facility, while evaluating the association between abnormal TIC values, in-hospital mortality, and 24-hour pRBC transfusion.
Results: Of 1,499 total patients, 591 (39.4%) were TIC+ as defined by the baseline abnormal cutoff values. On adjusted analysis, patients with an abnormal maximum amplitude had increased pRBC transfusion volumes ($p<0.001$). Each unit increase in TIC Score was associated with a 24.8% increase in pRBC transfusion volume ($p<0.001$). Abnormal TIC Score components including α-angle ($p=0.015$) and maximum amplitude ($p=0.034$) also predicted mortality. Each increase in TIC Score was associated with a 53.1% increase in mortality risk ($p<0.001$). AUROC for TIC Score was 0.658; among patients with any TIC abnormalities, sensitivity and specificity were 59.5% and 67.8%, respectively. Unequal weighting of TIC Score components and adjustments to normal/abnormal cutoff thresholds maintained, but did not improve, the model's predictive power.
Conclusions: TIC Scores are independently associated with pRBC transfusion volume and mortality. This association persists with adjustment of abnormal cutoff thresholds and unequal weighting of TIC components.

Session IX: Papers 37-44
Paper 43: 9:30 AM - 9:50 AM

KETAMINE FOR ACUTE PAIN AFTER TRAUMA (KAPT): A PRAGMATIC, RANDOMIZED CLINICAL TRIAL

James M. Klugh, MD; Thaddeus J Puzio, MD; Michael W. Wandling, MD; Chelsea Guy-Frank, MD; Charles Green, PhD; Paulina B. Sergot, MD; Samuel J. Prater, MD; Julius Balogh, MD; Christopher T. Stephens, MD; Charles E. Wade, PhD, Lillian S. Kao, MD, MS; John A. Harvin, MD, MS
McGovern Medical School
Invited Discussant: Thomas Carver, MD

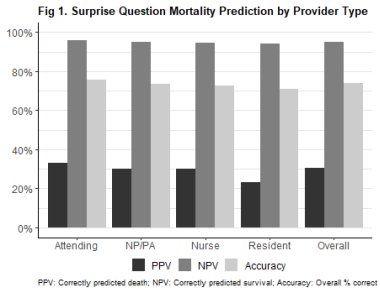
Introduction: Non-narcotic intravenous medications may be a beneficial adjunct to oral multimodal pain regimens (MMPRs) which reduce but do not eliminate opioid exposure and prescribing after trauma. We hypothesized that the addition of a sub-dissociative ketamine infusion (KI) to oral MMPR reduces inpatient opioid exposure.
Methods: Eligible adult trauma patients admitted to the intermediate or intensive care unit were randomized upon admission to our institutional MMPR per usual care (UC) or UC plus sub-dissociative KI for 24 to 72 hours after arrival. The primary outcome was morphine milligram equivalents per day (MME/d) and secondary outcomes included total MME, discharge with an opioid prescription (OP%), and rates of ketamine side effects. Bayesian posterior probabilities (pp) were calculated using neutral priors.
Results: A total of 300 patients were enrolled, 144 to KI and 156 to UC. Baseline characteristics were similar between groups. The injury severity scores for KI were 19 [14, 29] versus UC 22 [14, 29]. The KI group had a lower rate of long-bone fracture (37% versus 49%) and laparotomy (16% versus 24%). KI had an absolute reduction of 7 MME/day, 96 total MME, and 5% in OP%. Additionally, KI had a relative risk (RR) reduction of 19% in MME/day (RR 0.81 [0.69 – 0.95], pp = 99%), 20% in total MME (RR 0.80 [0.64, 0.99], pp = 98%), and 8% in OP% (RR 0.92 [0.76, 1.11], pp = 81%). The KI group had a higher rate of delirium (11% versus 6%, RR 1.37 [0.79, 2.21], pp = 86%); however, rate of other side effects such as arrythmias and unplanned intubations were similar between groups.
Conclusion: Addition of a sub-dissociative ketamine infusion to an oral MMPR resulted in a decrease in opioid exposure in severely injured patients. Sub-dissociative ketamine infusions can be used as a safe adjunct to decrease opioid exposure in monitored settings.

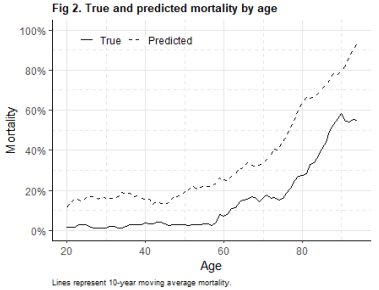
Session IX: Papers 37-44
Paper 44: 9:50 AM - 10:10 AM

WOULD YOU BE SURPRISED? PROSPECTIVE MULTICENTER STUDY OF THE SURPRISE QUESTION AS A SCREENING TOOL TO PREDICT MORTALITY IN TRAUMA PATIENTS

Melissa R. Hoffman, MD, ND; Andrea Slivinski, DNP, RN;
Yan Shen, PhD; Dorraine Watts, PhD;
Ransom Wyse, MPH; Samir Fakhry, MD
Mission Hospital
Invited Discussant: Kathleen O'Connell, MD, MPH

Introduction: The Surprise Question (SQ) ("Would I be surprised if the patient died within the next year?") is a validated tool used to identify patients with limited life expectancy. As it may have potential to expedite palliative care interventions per ACS TQIP Palliative Care Best Practices Guidelines, we sought to determine if trauma team members could utilize the SQ to accurately predict 1-year mortality in trauma patients.
Methods: A multicenter, prospective, cohort study collected data (8/20-2/21) on trauma team members' responses to the SQ at 24 hours from admission. One-year mortality was obtained via social security death index records. Positive/negative predictive values (PPV/NPV) and accuracy were calculated overall, by care team role, and by patient age.
Results: Ten Level I/II centers enrolled 1172 patients (87.9% blunt). Median age was 57 (IQR 36-74), median ISS 10 (IQR 5-14). Overall 1-year mortality was 13.3%. Positive predictive value (PPV), was low (30.1%) regardless of role (Fig 1). Mortality prediction minimally improved as age increased (PPV highest between 65-74 years old, 34.5%), but consistently trended to over-prediction of death, even in younger patients (Fig 2).
Conclusions: Trauma team members' ability to forecast 1-year mortality using the SQ at 24 hours appears limited perhaps due to overestimation of injury effects, pre-injury conditions and/or team bias. This has implications for the TQIP Guidelines and suggests that more research is needed to determine the optimal time to screen trauma patients with the SQ.





SESSION X:
EXPERT SURGEON LECTURE

"CHALLENGING CURRENT NOTIONS ABOUT QUALITY IMPROVEMENT AND RESEARCH"

Friday, September 22, 2023
10:30 AM - 11:00 AM

Location: Pacific Ballroom
Presenter: Lillian Kao, MD, MS

SESSION XI: PANEL II

Friday, September 22, 2023
11:00 AM - 12:00 PM

"Innovative Approaches to Research in Acute Care Surgery"

Location: Pacific Ballroom C-D
Panelists: Zara Cooper, MD, MSc;
Elliott Haut, MD, PhD;
Deborah Stein, MD, MPH
Moderator: Eileen Bulger, MD

ZARA COOPER, MD, MSc

ELLIOTT HAUT, MD, PhD

DEBORAH STEIN, MD, MPH

SESSION XIIA:

PAPERS #45-55
Friday, September 22, 2023
1:15 PM - 4:55 PM

Location: Pacific Ballroom A-B
Moderator: Hans-Christoph Pape, MD
Recorder: Rachael Callcut, MD, MSPH

Session XIIA: Papers 45-55
Paper 45: 1:15 PM - 1:35 PM

THE MORTALITY BURDEN FROM VARIATION IN PROVISION OF SURGICAL CARE IN EMERGENCY GENERAL SURGERY

Vanessa P. Ho, MD, MPH; Christopher W. Towe, MD;
Wyatt P. Bensken, PhD; Elizabeth Pfoh, PhD; Jarrod Dalton, PhD;
Alfred Connors, MD; Jeffrey A. Claridge, MD; Adam Perzynski, PhD
MetroHealth Medical Center
Invited Discussant: Angela Ingraham, MD, MS

Introduction: For older adults with an emergency general surgery (EGS) condition (EGSc: appendicitis, diverticulitis, cholecystitis, hernia, peptic ulcer, bowel obstruction, ischemic bowel), guidance for operative decision-making guidance is limited. We hypothesized that patients who received treatment (either operative or nonoperative) which was discordant with a propensity model-driven likelihood of having an operation would have poorer outcomes than patients who received model-concordant care.
Methods: Adults aged 65+ with EGSc from the 2016-2017 National Inpatient Sample were identified. Each patient was assigned a propensity score (PS) for the likelihood of undergoing an operation, modeled from factors such as diagnosis, age, gender, race, shock, frailty, and hospital EGS volumes. A PS cutoff of 0.5 was used to define low probability (LP) and high probability (HP) for operation. Four groups were defined, of which two were model-concordant (LP-No Surgery, HP-Surgery) and two were model-discordant (HP-No Surgery, LP-Surgery). Adjusted logistic regression estimated the odds of in-hospital mortality for the four groups.
Results: Of 375,546 admissions (median age 77, 56% female), 21.2% underwent surgery. 14.5% had model-discordant care: 5.9% HP-No Surgery and 8.7% LP-Surgery. Model-discordant care was associated with significantly increased mortality (Table).
Conclusions: Nearly one in seven EGS patients received model-discordant care, which was associated with an increased odds of in-hospital mortality. Decreasing variation in use of operative management for EGS conditions may represent a substantial opportunity to improve care.

Factor	N (%)	Odds Ratio
Model Concordant: LP-No Surgery	274,025 (73.3%)	1 (ref)
Model Concordant: HP-Surgery	45,428 (12.2%)	0.83 (0.74-0.92)
Model Discordant: HP-No Surgery	21,879 (5.9%)	2.06 (1.86-2.27)
Model Discordant: LP- Surgery	32,655 (8.7%)	1.57 (1.49-1.65)

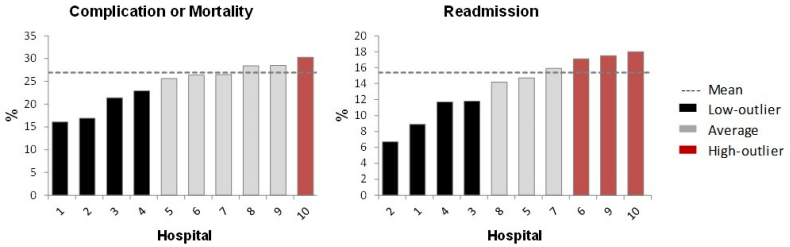
Session XIIA: Papers 45-55
Paper 46: 1:35 PM - 1:55 PM

IMPROVING OUTCOMES IN EGS: CONSTRUCT OF A COLLABORATIVE QUALITY INITIATIVE

Mark R. Hemmila, MD; Pooja Neiman, MD, MPA;
Beckie Hoppe, RN, MSN; Laura Gerhardinger, MA; Kim Kramer, PA-C, MS;
Jill Jakubus, PA-C, MHSA, MS; Judy Mikhail, RN, PhD; Amanda Yang, MD;
Hugh Lindsey, MD; Roy Golden, MD; Eric Mitchell, MD;
John W. Scott, MD, MPH; Lena Napolitano, MD
University of Michigan
Invited Discussant: Garth Utter, MD

Introduction: Emergency general surgery (EGS) conditions are common, costly, and highly morbid. The proportion of excess morbidity due to variation in health systems and processes of care is poorly understood. We describe the construct of a collaborative quality initiative (CQI) for EGS.
Methods: Data were collected at 10 hospitals from 7/2019-12/2022. Five cohorts were defined: acute appendicitis, acute gallbladder disease, SBO, emergency laparotomy, and overall aggregate. Processes and outcomes investigated involved operative vs. non-operative mgmt, morbidity, mortality, and readmissions. Multivariable risk adjustment accounted for variations in demographic, comorbid, anatomic, and disease traits.
Results: There were 16,696 index cases and 2,847 patients with one or more readmission events. Overall aggregate mortality was 3.3%, morbidity 28%, and readmissions 17% (Table). Significant variation in outcomes between hospitals was observed after risk adjustment in the overall cohort (Figure).

EGS Disease Cohort	Index Cases	Non-op Cases	Mortality	Non-op Mortality	Complication or Mortality	Readmit
Acute Appendicitis	4,391	14%	0.3%	0.7%	21%	12%
Acute Gall Bladder Dx.	7,140	16%	1%	6%	23%	13%
Small Bowel Obstruction	3,283	66%	4%	4%	38%	27%
Emergency Laparotomy	1,882	0%	16%	--	64%	27%
Overall Aggregate	16,696	24%	3%	5%	30%	17%



Conclusions: A multihospital EGS collaborative reveals high morbidity with substantial variability in processes and outcomes among hospitals. Targeted collaborative quality improvement efforts can identify outliers in EGS care and are needed to optimize outcomes.

Session XIIA: Papers 45-55
Paper 47: 1:55 PM - 2:15 PM

IS NON-OPERATIVE MANAGEMENT OF APPENDICITIS INFERIOR IN THE COVID-19 ERA?

Emily A. Grimsley, MD; Michael P. Rogers, MD; Haroon M. Janjua, MS; Ricardo Pietrobon, MD, PhD; Jose Diaz, MD; Paul C. Kuo, MD, MS, MBA; Meagan Read, MD; on behalf of the N3C Consortium
University of South Florida Morsani College of Medicine
Invited Discussant: Shahin Mohseni, MD, PhD

Introduction: Previous studies on non-operative management (NOM) of acute appendicitis indicated comparable outcomes to surgery, but the effect of the COVID-19 pandemic on appendicitis outcomes remains unknown. The National COVID Cohort Collaborative (N3C) is a national database we use to study the effect of COVID-19 infection and pandemic-induced changes in healthcare delivery on patient outcomes. We compared outcomes of patients with acute appendicitis who underwent operative and NOM during the COVID-19 pandemic.
Methods: N3C was queried for adult patients with acute appendicitis who underwent NOM or appendectomy. We captured COVID-19 status: CA had positive test <2 weeks before treatment; CN tested negative on admission; and CR (recovered) had positive test >2 weeks before treatment. COVID vaccination status was noted, when available. Intention-to-treat was utilized for NOM. Propensity matching was performed.
Results: 50,383 patients: 18,738 underwent NOM (treatment failure rate 1.95%) and 31,645 appendectomy. NOM had higher mortality than operative (overall 2.1 vs. 0.4%, 30-day 0.4 vs. 0.1%, $p<0.01$). Amongst NOM, compared with CN, CA had longer LOS (1.78 vs. 1.42 days, $p<0.01$), higher 90-day mortality (1.2 vs. 0.7%, $p=0.04$), lower 90-day readmission (11.5 vs. 7.2%, $p<0.01$), but no difference in rate of failure of NOM (2.6 vs. 2.0%). Amongst operative, compared with CN, CA had no difference in LOS (1.31 vs. 1.29 days), 90-day readmission (5.6 vs. 5.8%), or 90-day mortality (0.1 vs. 0.1%). After propensity matching, CN-NOM (vs. CN-operative) had higher 90-day readmission (OR 2.09, $p<0.01$), 30-day complication (OR 1.28 $p<0.01$), and 90-day mortality (OR 5.11, $p<0.01$). COVID vaccination status did not significantly change outcomes when treatment and COVID status were held constant.
Conclusion: This study demonstrates a higher mortality rate amongst NOM of appendicitis than previously reported. After propensity matching, NOM of appendicitis remained inferior, indicating the altered healthcare delivery during the COVID-pandemic negatively affected patient outcomes.

Session XIIA: Papers 45-55
Paper 48: 2:15 PM - 2:35 PM

SURGICAL STABILIZATION OF RIB FRACTURES FOLLOWING FLAIL CHEST: AN ANALYSIS OF CENTER-BASED VARIABILITY IN PRACTICE AND OUTCOMES

Mathieu Hylands, MD, MSc; David Gomez, MD, PhD;
Bourke Tillmann, MD; Barbara Haas, MD, PhD;
Avery B. Nathens, MD, PhD
Sunnybrook Health Sciences Center
Invited Discussant: Mark Seamon, MD

Introduction: There is wide variability in practice with regards to patient selection for surgical stabilization of rib fractures (SSRF). It is however not known whether this variation influences patient outcomes. Our objective is to determine if patients with a flail chest treated at trauma centers with a more liberal approach to SSRF have improved patient-important outcomes.
Methods: Using the Trauma Quality Improvement Project registry, we performed a retrospective cohort study of adults (16-80) admitted to a level I or II trauma center after sustaining a flail chest (2016-2020). We excluded patients treated at centers with 5 or fewer admission for flail chest per year. We used logistic regression to calculate the observed to expected rate of SSRF across centers, adjusted for case-mix. Hierarchical models were used to assess the association between the case-mix adjusted SSRF rate of the hospital at which a patient was treated and mortality. Secondary outcomes included days of mechanical ventilation, independent status at discharge, and tracheostomy. We performed a secondary analysis of associations between SSRF and outcomes, using an instrumental variable (IV) to adjust for measured and unmeasured characteristics that confound the decision to proceed with SSRF.
Results: We identified 26,575 patients with a flail chest across 354 trauma centers, of which 5,702 (21%) underwent SSRF. The median rate of SSRF across centers was 18% (IQR 7-33%), while case-mix adjusted rates ranged from 0 to 24%. Higher center-level quintiles of risk-adjusted rates of SSRF were not associated with mortality (p=0.30) or days of mechanical ventilation (p=0.08) but were associated with higher rates of tracheostomy (p=0.04) and lower rates of independent discharge (p=0.04). In the IV analysis, patient-level SSRF was associated with decreased hospital mortality (OR=0.75, 95% CI 0.72-0.77). As one would expect if patients survived in the SSRF cohort that would otherwise have died, SSRF was also associated with longer duration of mechanical ventilation (+1.58 days, 95% CI 1.52-1.65).
Conclusion: Patients treated at centers with a more liberal approach to SSRF do not appear to have lower hospital mortality, when compared to patients treated at centers with a more restrictive approach. There is a patient-level association between SSRF and improved mortality, but residual confounding by unmeasured institutional factors unrelated to SSRF cannot be ruled out.

Session XIIA: Papers 45-55
Paper 49: 2:35 PM - 2:55 PM

ECONOMIC RISK FACTORS OF RURAL FIREARM VIOLENCE IN THE UNITED STATES

Sarabeth Spitzer, MD; Ali Salim, MD; Molly Jarman, PhD
Brigham & Women's Hospital
Invited Discussant: Ronald Stewart, MD

Introduction: The incidence of firearm injury in the US has increased steadily over the past thirty years. Urban and rural firearm violence are known to have very different epidemiology, especially considering intent of injury. While the relationship between socioeconomic factors and urban firearm injury is well established, less is known about socioeconomic risk factors for firearm injury in rural settings. We sought to identify community characteristics associated with firearm injury in rural communities.
Methods: We performed a nationwide, retrospective cohort study of rural census tracts using firearm injury incidence data from the Gun Violence Archive (2014-2019), linked with community-level socioeconomic data from the Agency for Healthcare. We used zero inflated negative binomial regression models to assess the relationship between per capita firearm injuries and median household income, median home price, median rental price, the Gini index (income inequality).
Results: Each year, 7,180 rural census tracts were included in our analysis. Over our study period, there were 4,617 individuals killed and 4,593 nonfatally injured in rural areas by firearms. Of the rural census tracts examined, all firearm injuries occurred in only 13.3% of tracts. When evaluating economic variables, median income, median rent, and Gini coefficient were statistically significant to $p<0.0001$. For every $1,000 increase in median income, there was an associated 4% decrease in firearm injuries per capita. For every $100 increase in rent, there is an associated 10% increase in firearm injury per capita. Complete income inequality (Gini = 1.0) was associated with a 2.6x increase in incidence of firearm injury per capita, compared to complete equality (Gini = 0.0). Home value was not associated with incidence of firearm injury.
Conclusion: In rural settings, lower incomes, higher rent, and greater income inequality are associated with an increased incidence of firearm injury. This suggests economic distress may contribute to firearm injury in rural communities. Efforts to prevent firearm injury in rural settings should address socioeconomic factors as social determinants of health.

Session XIIA: Papers 45-55
Paper 50: 2:55 PM - 3:15 PM

STRUCTURAL RACISM, RESIDENTIAL SEGREGATION, AND EXPOSURE TO TRAUMA: THE PERSISTENT IMPACT OF REDLINING

James M. Bradford, MD; Simin Golestani, MD; Maya Eldin; Tatiana Cardenas, MD; Marc Trust, MD; Marissa Mery, MD; Jayson Aydelotte, MD; Pedro GR Teixeira, MD; Joseph J. DuBose, MD; Lawrence H. Brown, PHD; Michelle S. Bach, BS; Michelle Robert, MBA; Sadia Ali, MPH; Deborah Salvo, PHD; Carlos VR Brown, MD
Dell Medical School
Invited Discussant: Randi Smith, MD, MPH

Introduction: As part of New Deal era federal housing policy, the Home Owners Loan Corporation (HOLC) developed maps grading US neighborhoods by perceived financial security. Neighborhoods with high concentrations of racial and ethnic minorities were deemed financially unstable and denied federal investment, a practice colloquially known as redlining. The aim of this study was to assess the association of historical redlining within a southern US city to spatial patterns of penetrating traumatic injury.
Methods: Retrospectively collected data from violent penetrating trauma admissions between January 1, 2014 – December 31, 2021, at the single Level 1 trauma center in a southern US city were utilized for analysis. Using ArcGIS, addresses where the injury took place were geocoded and spatial joining was used to match them to their corresponding census tract, for which 1935 HOLC financial designations are classified as: “Hazardous”, “Definitely Declining”, “Still Desirable” or “Best”. Tracts with financial designations of “Hazardous” and “Definitely Declining” were categorized as redlined. The incidence rate ratio comparing rates of penetrating trauma among historically redlined vs. non-redlined census tracts was calculated.
Results: 1,404 violent penetrating trauma admissions were identified for the study period, of which 226 occurred within the geographic boundary of the 1935 HOLC map and had valid location data for geospatial analysis. Among these, 58% occurred in historically redlined census tracts. The incident rate per 100,000 person years in redlined areas was 31.7 compared with 10.9 in non-redlined census tracts (IRR=2.9, 2.2-3.8, $p<0.001$).
Conclusions: Neighborhoods subjected to discriminatory redlining practices in 1935 continue to experience an almost 3-times higher incidence rate of violent penetrating trauma today. These results underscore the persistent impacts of structural racism and of historical residential segregation policies on exposure to trauma, and the need to address the social determinants of health to eliminate health disparities.

Session XIIA: Plenary Papers 45-55
Paper 51: 3:15 PM - 3:35 PM

IMPLEMENTATION EVALUATION OF TELE-TRIAGE PATHWAYS FOR BURN CENTER CONSULTATIONS AND TRANSFERS

Nina Clark, MD; Lauren Agoubi, MD, MA;
Xinyao DeGrauw, MD, PhD, MPH; Barclay Stewart, MD;
Saman Arbabi, MD, MPH; Monica Vavilala, MD;
Fred Rivara, MD, MPH; Tam Pham, MD
University of Washington
Invited Discussant: Sharmila Dissanaike, MD

Background: Consultation, outpatient referrals and transfers can be more efficient when injured patients are accurately triaged by urgency and complexity. In 2017, our regional burn center implemented a novel system in which transfer nurses (RNs) triage patients to defined pathways after review of securely transmitted images: green pathway for direct outpatient referral, blue pathway for discussion with the on-call burn provider, red pathway for consideration of transfer through the burn provider for non-severe burns, or black pathway for rapid transfer of severe burns. We analyzed trends in system adoption, resource optimization, and triage fidelity after pathway implementation.
Methods: The RE-AIM (reach, effectiveness, adoption, implementation, maintenance) framework was used to evaluate the implementation of this system. We analyzed transfer records for all acute burn referrals from 1/2017-12/2019 (reach). Primary outcomes were pathway assignment (adoption), change in provider call volume (adoption and effectiveness), and concordance of pathway assignment with disposition (implementation).
Results: 5,257 burn referrals were triaged between 2017-2019. In 9/2017, RN-directed training efforts increased pathway adoption from 22% to >90% by 2018. From 2018-2019, green pathway calls triaged by RNs reduced calls to burn providers by a mean of 40±11 calls/month (27% of all calls). Over 84% of low acuity (green/blue) pathway patients were triaged to outpatient follow up ($p<0.001$). There was substantial agreement between triage RN's and burn providers in determining triage to low- (green/blue) vs. high- (red/black) acuity pathways and transfer disposition (kappa=0.74). From 2018-2019, triage to red pathway decreased 10% and transfer from red pathway decreased by 9% ($p<0.001$). This system remains in use.
Conclusion: We demonstrate successful implementation of well-adopted and high-fidelity tele-triage pathways. This model maintains the role of specialized centers while improving resource allocation by task-shifting triage of lower acuity patients, which may have positive implications for other transfer systems.

Session XIIA: Papers 45-55
Paper 52: 3:35 PM - 3:55 PM

TRAUMA SURGEONS EXPERIENCE COMPASSION FATIGUE – A MAJOR METROPOLITAN AREA STUDY

Lea Hoefer, MD; Leah Tatebe, MD; Purvi Patel, MD; Anna Tyson, MD; Samuel Kingsley, MD; Grace Chang, MD Matthew Kaminsky, MD; James Doherty, MD; David Hampton, MD
University of Chicago Medicine
Invited Discussant: Jennifer Hartwell, MD

Introduction: Compassion Fatigue (CF), the physical, emotional, and psychological impact of helping others, is composed of three domains, Compassion Satisfaction (CS), Secondary Traumatic Stress (STS), and Burnout (BO). Trauma surgeons (TS) experience work-related stress resulting in high rates of CF which can manifest as irritability, insomnia, or gastrointestinal disorders. We hypothesized that TS experience CF and there are potentially modifiable systemic factors to mitigate its symptoms.
Methods: All TS in a major metropolitan area were eligible. Personal and professional demographic information was obtained. Each participant completed five validated surveys: 1) Professional Quality of Life Scale (Pro-QOL), 2) Perceived Stress Scale (PSS), Multidimensional Scale of Perceived Social Support (MSPSS), 3) Adverse Childhood Events (ACE) Questionnaire, 4) Brief Coping Inventory (BCI), and 5) Toronto Empathy Questionnaire (TEQ). CF subscale scores (low risk:27-30, moderate:31-35, high:36-40, extremely high:>40) were recorded. Linear regression analysis assessed the demographic and environmental factors association with BO, STS, and CS. Variables significant on univariate analysis were included in multivariate models of BO, STS, and CF. Significance was $p \leq 0.05$.
Results: There were 57 TS (response rate:75.4% (n=43); Caucasian: 65% (n=28), male:67% (n=29)). TS experienced CF (BO:26 (IQR:21-32), STS:23 (IQR:19-32), CS:39 (IQR:34-45)). The PSS score was significantly associated with increased BO (Coef: 0.52, 95% CI:0.28-0.77) and STS (Coef: 0.44. 95% CI:0.15-0.73), and decreased CS (Coef: -0.51, 95% CI: -0.80- -0.23) ($p<0.01$). Night shifts were associated with higher BO (Coef 1.55, CI 0.07-3.03, $p=0.05$), conversely day shifts were associated with higher STS (Coef 1.94, CI 0.32-3.56, $p=0.03$). Higher TEQ scores were associated with greater CS (Coef 0.33, CI 0.12-0.55, $p<0.01$).
Conclusion: TS perform daily activities while experiencing moderate BO and STS. Identification of work- and system-related stressors may help inform CF reduction efforts.

Session XIIA: Papers 45-55
Paper 53: 3:55 PM - 4:15 PM

VALIDATION OF THE TRAUMA CENTER FINANCIAL VULNERABILITY METRIC

Bryan Campbell, DO; Richard Calvo, PhD; Andrea Krzyzaniak, MA; Alexander Marrotte, MD; Derek Benham, MD; Michael Sise, MD; Vishal Bansal, MD; Matthew Martin, MD
Scripps Mercy Hospital
Invited Discussant: Robert Martin, MD

Introduction: Trauma centers serve some of the most vulnerable populations. Financial pressures may impact the lasting presence of these centers in communities. We evaluated the validity of the Financial Vulnerability Score (FVS) on changes to trauma center status and longevity.
Methods: Data was obtained from the RAND Corporation Hospital Cost Reports containing detailed financial characteristics and metrics. Hospital data were evaluated for calendar years 1996–2021. Adult trauma center levels (I, II, or III) were identified using the ACS Verified Trauma Center lists from 2003–present. Centers were matched to financial data using a probabilistic matching algorithm on name, address, city, and state. The FVS was calculated using six variables of financial liquidity and risk based on a national analysis and categorized as high, medium, or low risk. Exact logistic regression was performed to investigate multivariable probability for closure and loss of trauma verification.
Results: There were 558 adult trauma centers identified; 468 had full data to calculate the FVS: 160 (34%) were Level I, 184 (39%) were Level II, 102 (22%) were Level III, and 22 (5%) lost ACS verified status by the end of the study period. Among Level I hospitals, 28% were high risk compared to 30% of Level II and 49% of Level III ($p < 0.001$). There were 8 total closures detected, all in Level 2 or 3 centers. Closures among the high risk category were 3.7% vs. 0% in the moderate risk, and 1.2% in the low risk ($p = 0.041$). In the high-risk category, centers that lost their trauma verification were 14 times more likely to close compared to Level I centers ($p = 0.011$), and in the low risk category were 16.3 times more likely to close ($p = 0.058$).
Conclusion: The rate of closures over the study period was low but was significantly associated with higher financial vulnerability. Level 2 and 3 centers have significantly higher financial vulnerability and risk for closure or loss of verification. Association of ACS verification status and closure rate deserves further analysis.

Session XIIA: Papers 45-55
Paper 54: 4:15 PM - 4:35 PM

DEEP LEARNING ALGORITHM FOR TRAUMATIC SPLENIC INJURIES DETECTION AND SEQUENTIAL LOCALIZATION

Chien-hung Liao, MD; Chi-Tung Cheng, MD, PhD; Hou-Shian Lin, MS; Chi-Po Hsu, MD; Chi-Yuan Fu, MD
Chang-Gung Memorial Hospital
Invited Discussant: Caroline Park, MD, MPH

Background: Splenic injury is the most common solid visceral injury in blunt abdominal trauma, and high-resolution abdominal computed tomography (CT) can adequately detect the injury. However, these lethal injuries sometime have been overlooked in current practice. Deep learning algorithms have proven their capabilities in detecting abnormal findings in medical images. The aim of this study is to develop a three-dimensional, unsupervised deep learning algorithm for detecting splenic injury on abdominal CT using a sequential localization and classification approach.

Methods: The data set was collected in a tertiary trauma center on 600 patients who underwent abdominal CT between 2008 and 2018, half of whom had splenic injuries. The images were split into development and test datasets at a 4:1 ratio. A 2-step deep learning algorithm, including localization and classification models, was constructed to identify the splenic injury. Model performance was evaluated using the area under the receiver operating characteristic curve (AUROC), accuracy, sensitivity, specificity, PPV, and NPV. Grad-CAM heatmaps from the test set were visually assessed.

Results: A total of 480 patients, 50% of whom had spleen injuries, were included in the development dataset, and the rest were included in the test dataset. All patients underwent contrast-enhanced abdominal CT in the emergency room. The automatic 2-step Efficient Net model detected splenic injury with an AUROC of 0.901 (95% CI:0.836-0.953). At the maximum Youden index, the accuracy, sensitivity, specificity, PPV, and NPV were 0.88, 0.81,0.92, 0.91, and 0.83, respectively. The heatmap identified 96.3% of splenic injury sites in true positive cases.

Conclusions: The deep learning model can identify splenic injury on CT and further application in trauma scenarios is possible.

Session XIIA: Papers 45-55
Paper 55: 4:35 PM - 4:55 PM

A COMPARATIVE ANALYSIS OF TRANEXAMIC ACID DOSING STRATEGIES IN TRAUMATIC MAJOR HEMORRHAGE

Finn Gunn; Rheanna Stevenson; Andrea Rossetto;
Paul Vulliamy, PhD; Karim Brohi, Ross Davenport, PhD
Centre for Trauma Sciences - Queen Mary University of London
Invited Discussant: Susan Rowell, MD, MBA

Introduction: Tranexamic acid (TXA) is a life-saving treatment for traumatic hemorrhage, but the optimal dose and timing of administration remain unknown. Different doses have been proposed for bleeding and traumatic brain injury, and alternative treatment strategies including single bolus, repeated bolus or a bolus plus infusion. The aim of this study was to determine the effect of different TXA dosing strategies on clinical outcomes in bleeding trauma patients.
Methods: This was a secondary analysis of a perpetual cohort study from a single Level 1 trauma center in the United Kingdom. Adult patients who activated the local major hemorrhage protocol (MHP) and received TXA were included. Primary outcome was 28-day mortality. Secondary outcomes were 24-hour mortality, multiple organ dysfunction syndrome (MODS), venous thromboembolism (VTE) and fibrinolysis measured by ROTEM.
Results: Over an 11-year period, 520 patients were included. Three dosing groups were identified: 1g bolus only (n=317), 1g bolus + 1g infusion over 12 hours (n=80), and 2g bolus (n=123). Demographics and admission physiology were similar, but there were moderate differences in injury severity (median ISS: 25, 29 & 25); and admission systolic blood pressure (median SBP: 99, 108, 99 mmHg) across the 1g, 1g+1g and 2g groups. 28-day mortality was 21% in each of the treatment groups. The incidence of MODS was significantly higher in the bolus+infusion group (84%) vs 1g bolus (64%) and 2g bolus (62%) group, p= 0.002, but this relationship did not remain significant on multivariate analysis. VTE rates were similar in the 1g bolus (5%), 2g bolus (8%) and bolus+infusion groups (8%). There was no difference in ROTEM Maximum Lysis at 24 hours: 5% in both the 1g and 2g bolus groups vs 4% in bolus + infusion group.
Conclusion: In this study clinical outcomes and 24-hour fibrinolysis state were equivalent across the three different dosing strategies of TXA. Single bolus administration is likely preferable to a bolus+infusion regimen. A 1g bolus may be sufficient but further work is required in specific sub-populations, in particular patients with traumatic brain injury.

SESSION XIIB:

PAPERS #56-66
Friday, September 22, 2023
1:15 PM - 4:55 PM

Location: Pacific Ballroom C-D
Moderator: Jamie Coleman, MD
Recorder: Matthew Martin, MD

Session XIIB: Papers 56-66
Paper 56: 1:15 PM - 1:35 PM

SEX-SPECIFIC DIFFERENTIAL EXPRESSION OF EXOSOMAL MIRNA FOLLOWING SEVERE TRAUMA

Jennifer Munley, MD; Micah Willis, BS; Gwendolyn Gillies, MD; Kolenkode Kannan, PhD; Valerie Polcz, MD; Jeremy Balch, MD; Evan Barrios, MD; Shannon Wallet, PhD; Robert Maile, PhD; Letitia Bible, MD; Philip Efron, MD; Alicia Mohr, MD
University of Florida College of Medicine
Invited Discussant: Niels Martin, MD

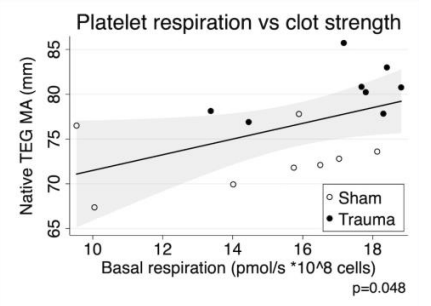
Introduction: Severe trauma disrupts bone marrow function and is associated with persistent anemia and altered hematopoiesis. Previously, plasma-derived exosomes isolated after trauma have been shown to suppress *in vitro* bone marrow function. However, the cargo contained in these vesicles has not been studied. We hypothesized that trauma plasma-derived exosomes exhibit microRNA (miR) changes that impact bone marrow function after severe injury.
Methods: Plasma was collected from a prospective, cohort study of trauma patients (n = 15; 7 males, 8 females) with hip and/or femur fractures and an injury severity score (ISS) ≥ 15; elective total hip arthroplasty (THA) patients (n = 8; 4 males, 4 females) served as operative controls. Exosomes were isolated from plasma with the Invitrogen Total Exosome Isolation Kit and RNA was isolated using a miRNeasy Mini Kit. Direct quantification of miRNA was performed by NanoString Technologies on a human miRNA gene panel and analyzed with nSolver with significance defined as $p<0.05$.
Results: There were no differences in age or sex distribution between trauma and THA groups; the average ISS was 23. Trauma plasma-derived exosomes had 60 miR identities that were significantly downregulated and 3 miR upregulated when compared to THA ($p<0.05$). Thirteen miR have a direct role in hematopoiesis regulation, including miR-223 and miR-451a. Further, male trauma plasma-derived exosomes demonstrated downregulation of 150 miR compared to male THA ($p<0.05$). Female trauma plasma-derived exosomes demonstrated downregulation of only four miR and upregulation of two miR compared to female THA ($p<0.05$).
Conclusion: We observed sexual dimorphism in miR expression from-plasma-derived exosomes following severe trauma. Understanding sexually dimorphic miR expression provides new insight into sex-based changes in postinjury systemic inflammation, immune system dysregulation, and bone marrow dysfunction and will aid us in more precise future potential therapeutic strategies.

Session XIIB: Papers 56-66
Paper 57: 1:35 PM - 1:55 PM

ALTERED PLATELET MITOCHONDRIAL FUNCTION ASSOCIATED WITH HYPERCOAGULABILITY IN A RODENT FRACTURE MODEL

James B. Littlejohn, MD; Emily E. Grenn, MD; Kristen T. Carter, MD, MS; Ana C. Palei, PharmD, PhD; Frank T. Spradley, PhD; Jonathan P. Hosler, PhD; Ngoc H. Hoang, PhD; Kristin S. Edwards, PhD; Matthew E. Kutcher, MD, MS
University of Mississippi Medical Center
Invited Discussant: Julie Goswami, MD

Introduction: Post-injury hypercoagulability occurs in >25% of injured patients, increasing risk of thromboembolic complications. Understanding the specific role of platelets is challenging due to a lack of clinically relevant measures of platelet function. Platelet mitochondrial respirometry may serve as a marker of global platelet function, but has not yet been correlated with functional coagulation studies.
Methods: Wistar rats underwent isoflurane anesthesia, bilateral hindlimb fibula fracture, soft tissue and muscular crush injury, and bone homogenate injection (n=8), versus sham anesthesia (n=8). Animals were sacrificed at 24h. Basal respiration, mitochondrial leak rate, maximal oxidative phosphorylation, and Complex IV activity were measured in intact platelets using high-resolution oximetry (Oroboros Oxygraph O2k). Results were normalized to platelet cell number. Citrated native thromboelastography (TEG) was performed in triplicate.
Results: Citrated native TEG maximal amplitude (MA) was significantly higher (80.4+/-2.9 vs. 72.7+/-3.5 mm, p<0.001) in trauma compared to sham rats 24h after injury. Injury was not significantly associated with differences in intact platelet mitochondrial leak rate (p=0.467) or maximal oxidative phosphorylation (p=1.00), but showed a trend towards increased basal respiratory rate in trauma vs. sham animals (17.0+/-2.0 vs. 14.6+/-3.2 pmol/s per 10^8 cells). Overall, platelet basal respiration significantly correlated with native TEG-MA (Pearson's r=0.501, p=0.048).
Conclusion: Platelet mitochondrial basal respiration correlates with the degree of post-injury hypercoagulability in this rodent hindlimb fracture model. Several mitochondrial-targeted therapeutics exist in common use that are under-explored but hold promise as potential antithrombotic adjuncts.



Session XIIB: Papers 56-66
Paper 58: 1:55 PM - 2:15 PM

SILENCING HEPATIC MCJ IN AGED MICE ATTENUATES ER STRESS AND DECREASES LIVER INJURY AFTER MAJOR TRAUMA

Andrea Qualman, BS; Akshay Pratap, MD; Mercedes Rincon, PhD; Elizabeth J. Kovacs, PhD; Juan-Pablo Idrovo, MD
University of Colorado
Invited Discussant: Anupamaa Seshadri, MD

Introduction: Burns are a devasting form of trauma. Elderly burn patients exhibit a lower survival rate compared with their younger counterparts. The liver of elderly burn victims shows significant injury, contributing to poor outcomes. Burns induce mitochondrial dysfunction leading to endoplasmic reticulum (ER) stress and, ultimately, hepatocyte dead. Aging alone is an important predisposing factor for mitochondrial and organelles dysfunction. Methylation-controlled J protein (MCJ) is a negative regulator of mitochondrial metabolism. The reduction or absence of MCJ promotes mitochondrial respiration without increasing reactive oxygen species promoting cellular homeostasis. Thus, we hypothesize that MCJ reduction can ameliorate burn-induced liver injury in aged animals.
Methods: Aged (20-months) female C57BL/6 mice were randomly assigned to 3 experimental groups, Sham, Burn Vehicle (BV), and Burn + Treatment (BT). The burn vehicle and burn treatment groups were subjected to boiling water using a template to generate full-thickness 20% total body surface area scald burn. While the burn vehicle received PBS, the treatment group received MCJ SiRNA tagged to N-acetyl galactosamine (GalNac) subcutaneously 1 hour after the burn. Mice were euthanized 48 hours after the burn. Liver histology and western blots were compared.
Results: VB demonstrated a 60% increase of MCJ in liver tissue compared to the sham, and BT showed a 70% decrease in MCJ compared to the sham. While histology in BV showed edema, massive microvesicular steatosis, and enlarged stellate cells, the liver of BT exhibited minimal histological changes with a 40% reduction in the damage score compared to BV. Western blot analysis of ER stress markers in liver tissue showed a significant elevation (40% PDI, 50% eIF2α, and 60% CHOP) in BV compared to the sham. The burn + GalNac MCJ siRNA-treated animals show a significant reduction of PDI, eIF2α, and CHOP by 50%, 60%, and 65%, respectively, compared to the BV.
Conclusion: Silencing hepatic MCJ in aged mice after burn injury mitigates endoplasmic reticulum stress and decreases hepatic damage. Further mitochondrial and ER functional studies will complement these findings to elucidate MCJ's role in this pathology.

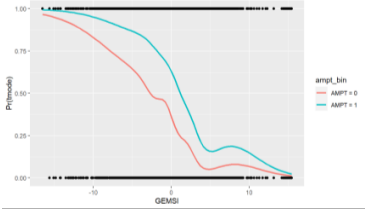
Session XIIB: Papers 56-66
Paper 59: 2:15 PM - 2:35 PM

WHERE YOU GET HURT MATTERS: IMPACT OF GEOGRAPHY AND EMS SYSTEM RESOURCE AVAILABILITY ON AIR MEDICAL TRANSPORT AFTER TRAUMA

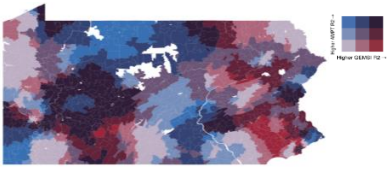
Jamison Beiriger, BS; Liling Lu, MS; Rae'Nell Durham;
David Silver, MD, MPH; Joshua B. Brown, MD, MS
Drexel University
Invited Discussant: Mark Gestring, MD

Introduction: Air medical transport (AMT) improves outcomes for severely injured patients. The decision to fly patients is complex and must consider both patient and system factors. Our objective was to evaluate the interaction between geography, patient factors, and EMS system resource availability on transport mode after trauma.

Methods: Patients transported by EMS in PTOS from 2000-2017 were included. We used our previously developed Air Medical Prehospital Triage (AMPT, ≥2 points triage to AMT) score and the Geographic EMS Index (GEMSI, higher indicates more/closer EMS/trauma system resources) as measures for patient factors and EMS system resource availability. Geographic weighted regression determined the association of AMT rate with AMPT score and GEMSI. R^2 values of each were mapped by zip code. A multilevel logistic regression model determined the association of AMT with variables selected by Gaussian process tree-boosting to compute feature importance.



Results: 275,053 patients were included. There was significant variation in the importance of both patient (AMPT score) and EMS system resources (GEMSI) on AMT rate (*Map*). A positive AMPT score had less impact on AMT at both low and high GEMSI values (*Graph*). When stratified by GEMSI quartile, patient factors were more important in the 2nd and 3rd quartiles, while less important in the 1st and 4th quartiles.



Conclusion: There is significant geographic variation of the importance of patient and system factors associated with AMT. Patient factors become less important in low system resource settings with high AMT as well as high resource settings with low AMT. These findings can help tailor EMS transport mode triage strategies and warrants further study of the interplay between patient and system factors in prehospital care.

Session XIIB: Papers 56-66
Paper 60: 2:35 PM - 2:55 PM

DIRECTED WORK-UP OF SELECT PENETRATING NECK INJURIES IS SAFE: HARD SIGNS CONTINUE TO SOFTEN

Dina M. Filiberto, MD; Cory Evans, MD; Tyler Holliday, MD;
James Babowice, DO; Emily K. Lenart, DO;
Andrew J. Kerwin, MD; Saskya Byerly, MD
University of Tennessee Memphis
Invited Discussant: Walter Biffl, MD

Introduction: Management of penetrating neck injuries (PNI) has evolved over time, more frequently relying on increased utilization of diagnostic imaging studies. Directed work-up following initial computed tomography imaging has resulted in increased use of angiography and decreased operative interventions. We sought to evaluate management strategies after directed work-up, hypothesizing increased use of non-operative therapeutic interventions and lower mortality.
Methods: Patients with PNI over a five-year period were identified from a single center trauma registry. Demographics, injuries, physical exam findings, diagnostic studies and interventions were collected. Patients were stratified by management strategy [directed work-up (DW) and immediate operative intervention (OR)] and compared. Outcomes included therapeutic non-operative intervention [endovascular stent, embolization, dual antiplatelet therapy (DAPT), or anticoagulation (AC)], non-therapeutic neck exploration, length of stay (LOS), and mortality.
Results: Of 436 patients with PNI, 143 (33%) patients had vascular and/or aerodigestive injuries. Of these, 115 (80%) patients underwent DW and 28 (20%) patients underwent OR. There were no differences in demographics or injury severity score between groups. Patients in the DW group were more likely to undergo therapeutic non-operative intervention compared to the OR group (25% vs 7%, $p=0.046$). There were no differences in post-intervention stroke, leak, or LOS. The DW group had fewer non-therapeutic neck explorations (0% vs 15%, $p <0.0001$) and lower mortality (9% vs 26%, $p=0.020$) compared to the OR group. Of the 71 patients who presented on admission with hard signs (hemorrhage, expanding hematoma, massive subcutaneous air, hematemesis, focal neurological deficit), there was no difference in mortality between DW and OR groups (17% vs 21%, $p=0.546$). 60% of patients with vascular hard signs and 78% of patients with aerodigestive hard signs underwent DW.
Conclusion: Directed work-up for patients with PNI is associated with fewer non-therapeutic neck explorations and lower mortality. Selective use of endovascular management, AC and DAPT is safe.

Session XIIB: Papers 56-66
Paper 61: 2:55 PM - 3:15 PM

CUES TO CARE: CHRONIC DISEASE DIAGNOSIS IN YOUNG ADULT TRAUMA PATIENTS

Ursula Adams, MD, MBA; Jaclyn Portelli Tremont, MD, MPH;
Avital Yohann, MD, MPH; Joshua Aldridge, MD;
Stephanie Riggins, MD; Michelle Brownstein, MD;
Anthony Charles, MD, MPH; Pascal Osita Udekwu, MBBS, MHA/MBA
WakeMed
Invited Discussant: Joshua Brown, MD, MS

Introduction: A trauma admission may be a young adult's sole contact point with the healthcare system and is a key opportunity for screening and early diagnosis of chronic disease. The burden of undiagnosed disease (UD) in the young adult trauma population is unknown. This study estimates the prevalence of undiagnosed diabetes (DM), hypertension (HTN), obesity, and alcohol and substance use specifically in a young adult trauma population, determines risk factors for UD, and compares outcomes between patients with and without UD.

Methods: This is a multicenter, retrospective cohort study of young adult trauma patients 18-40 years old admitted between 2018-2020. State trauma registry data and individual chart review were examined for evidence of undiagnosed DM, HTN, obesity, or substance and alcohol use. Patient demographics and outcomes were compared between cohorts with evidence of UD or no-UD. A multivariable regression model was built to assess risk factors predictive of UD.

Results: The analysis included 6,307 admitted patients. Of these, 4,843 (76.8%) had evidence of at least one UD, most commonly HTN or obesity. In multivariable models, the strongest predictors of UD were age (aOR: 0.98, 95% CI 0.98-0.99), male sex (aOR 1.43, 95% CI 1.26-1.64) and being uninsured (aOR 1.60, 95% CI 1.40-1.83). Only 24.5% patients had evidence of a primary care physician (PCP), and this did not decrease the odds of UD. Patients with UD were more often referred to a PCP on discharge (13.7% vs 7.5%, $p<0.001$), and had lower readmission rates (4.0 vs 5.9%, $p=0.002$). Inpatient complications and hospital length of stay did not differ between UD and no-UD groups.

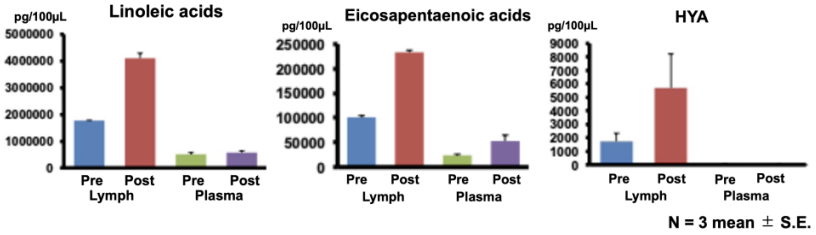
Conclusion: Undiagnosed disease burden is high in young adult trauma patients, especially those with traditional sociodemographic risk factors and even in patients with access to primary care. Pre-trauma presence of a PCP does not improve rates of chronic disease diagnosis, but post-trauma referral to a PCP does decrease readmission rates. Shorter hospital stays in young adults may obscure the full impact of UD during a trauma admission. Early diagnosis of chronic disease requires rigorous, standard screening measures that are initiated by trauma centers.

Session XIIB: Papers 56-66
Paper 62: 3:15 PM - 3:35 PM

ANALYSIS OF LIPID METABOLITES DERIVED FROM GUT MICROBIOTA IN ISCHEMIA-REPERFUSION MODEL

Keita Nakatsutsumi, MD; Koji Morishita, MD; Tomohiro Adachi, MD; Akira Suekane, MD; Keisuke Suzuki, MD; Mitsuaki Kojima, MD; Makoto Arita, PhD; Yasuhiro Otomo, MD
Tokyo Medical and Dental University Hospital
Invited Discussant: Jon Simmons, MD

Introduction: Disruption of intestinal barrier caused by intestinal ischemia due to hemorrhagic shock, is one of the major contributors of multiple organ damage (MOD) after severe trauma. Mesenteric lymph plays an important role as a route for transporting inflammatory mediators including lipids. Post-biotics such as 10-hydroxy-cis-12-octadecenoic acid (HYA), have received much attention and been applied as treatment for several diseases, however, the relation between post-biotics and MOD has not been clarified enough. The aim of the present study is to analyze lipid metabolites derived from gut microbiota in intestinal ischemia-reperfusion rat model.
Methods: Male Sprague-Dawley rats underwent laparotomy, and their mesenteric lymph duct and superior mesenteric artery (SMA) were exposure. The SMA was clamped in 60 minutes followed by120 minutes-reperfusion. The mesenteric lymph and the plasma were collected before and after intestinal ischemia. The lipids in the samples were extracted and liquid chromatography/electrospray ionization mass spectrometry was performed.
Results: Linoleic acids increased after intestinal ischemia in both samples with predominance of lymph. Eicosapentaenoic acids and docosahexaenoic metabolized from linoleic acids, showed similar dynamics. In contrast, HYA which is formed when linoleic acids are metabolized by enterobacteria, was observed only in the lymph samples and highly increased after intestinal ischemia (before ischemia: 1730 ± 605 pg/μL vs. after: 5700 ± 2530 pg/μL).
Conclusion: HYA, one of the lipid metabolites derived from gut microbiota, increased in the mesenteric lymph after intestinal ischemia. Further studies are required to evaluate effect of HYA for MOD.



Session XIIB: Papers 56-66
Paper 63: 3:35 PM - 3:55 PM

THROMBOPROPHYLAXIS AFTER SPLENIC ANGIOEMBOLIZATION: WHEN IS IT SAFE TO START?

Brianna L. Cohen, MD; Nicole B. Lyons, MD; Christopher O'Neil, MD; Walter A. Ramsey, MD; Edward Lineen, MD; Carl Schulman, MD; Kenneth Proctor, PhD; Jonathan P. Meizoso, MD, MSPH; Nicholas Namias, MD; Enrique Ginzburg, MD
University of Miami Miller School of Medicine
Invited Discussant: William Brigode, MD

Introduction: Thromboprophylaxis (TPX) in trauma is complicated by the risk of bleeding versus that of venous thromboembolism (VTE). Among blunt splenic injuries managed by angioembolization, we hypothesized that early initiation of TPX would be associated with increased risk of bleeding without decreasing the rate of VTE.
Methods: The ACS TQP database from 2017-19 was queried to identify all blunt trauma patients who underwent splenic angioembolization within 24 hours of arrival. Cases with missing data, <24-hour hospital length of stay, other serious injuries, and surgery prior to angioembolization were excluded. Bleeding complications were defined by splenectomy, additional embolization, or blood transfusion after the initiation of TPX. Thromboembolic complications were defined by DVT or PE. Data were compared with chi-squared and multi-variate logistic regression at the 95% confidence interval.
Results: Of 1,102 included patients, 84% had high grade (III-V) splenic injuries and 73% received TPX. Splenectomy after initial angioembolization was more common for those with TPX initiation within the first 24 hours (5.7% vs 1.7%, p=0.004), whereas delayed initiation of TPX (after 72 hours) were more likely to have PE (2.3% vs 0.2%, p=0.001). Overall, thromboembolic complications increased daily after day 3 and there were no bleeding complications with TPX initiated after day 5.
Grade of injury, ISS, age, race, BMI, gender, and type of TPX (heparin versus LMWH) were not independent risk factors for either bleeding or thromboembolic complications. However, time to TPX initiation was an independent risk factor for bleeding 0.983 (95% CI 0.97-0.996) and for thromboembolic complications 1.02 (95% CI 1.01-1.03).
Conclusion: This is the first study to address optimal timing of TPX after splenic angioembolization in trauma patients. Initiation of TPX between 24 and 72 hours achieves the safest balance in minimizing bleeding risk while reducing the risk of thromboembolic complications.

Session XIIB: Papers 56-66
Paper 64: 3:55 PM - 4:15 PM

DEATH BY THE MILE: INEQUITIES IN TRAUMA CARE FOR BOSTON'S VICTIMS OF FIREARM VIOLENCE

Michael Poulson, MD, MPH; Santo Torres, MD, MPH;
Noelle Saillant, MD; Sabrina Sanchez, MD, MPH; Jonathan Jay, DrPH, JD;
Daniel Holena, MD; Kelly Kenzik, PhD;
Sandro Galea, MD, DrPH; Dane Scantling, DO, MPH
Boston Medical Center
Invited Discussant: Glen Tinkoff, MD

Introduction: Limited research has shown that access to an urban trauma center (TC) is uneven and trauma deserts, often described as a distance of 5 miles or more from a TC, are associated with increased mortality. We sought to evaluate the relationship of TC proximity with firearm injury mortality in Boston and describe racial inequities in access that may exist. We hypothesized that firearm injury mortality would increase with distance from a TC and that distance to care would be disproportionately larger for Black residents.

Methods: Firearm mortality data were obtained from the Gun Violence Archive between 9/2019-1/2023. Race and ethnicity for shooting victims was obtained from the Boston Police Department. Racial/ethnic composition as well as geographic data at the census tract level were obtained from the 2020 United States Decennial Census. TC locations were obtained from the American College of Surgeons. TC and shooting locations were geocoded with concentric buffers in increments of one mile for all TCs. Mortality and racial composition by distance to a TC was tabulated using Chi Square tests.

Results: During the study period, there were 825 shootings with complete addresses and 123 resultant deaths (14.9%). All city TCs (N=5) are level one. Black residents made up 23.5% of the Boston population, 84.4% of shooting victims and 89.4% of shooting deaths. Mortality significantly increased with each mile from a trauma center ($p=0.004$, Figure 1) and nearly doubled after two miles (11.6% to 21.0%, $p<0.001$, Figure 1). The proportion of Black residents per census tract was higher the further away the census tract was from a TC ($p<0.001$); the majority of Boston's Black population (60%) lives more than two miles from a TC.

Conclusions: Boston trauma deserts appear to begin even closer to TCs than in other cities. Increased distance from TC care is associated with increased mortality after a gunshot wound and access to life saving trauma care is not equal. Black residents bear the majority of firearm injuries and deaths but live disproportionately further from trauma care. Improving geographic access to a trauma center or otherwise reducing time to care could offset such inequities.

Session XIIB: Papers 56-66
Paper 65: 4:15 PM - 4:35 PM

GIFTS: GERIATRIC INTENSIVE FUNCTIONAL THERAPY SESSIONS - FOR THE OLDER TRAUMA PATIENT

Diane Wintz, MD; Kathryn Schaffer, MPH; Jennifer Hites; Kelly Wright; Eileen Carroll; Stacy Nilsen; Thuji Lhamu
Sharp Memorial Hospital
Invited Discussant: David Livingston, MD

Introduction: Focusing on cost and resource allocation for comprehensive geriatric (GERI) care models, we have observed older admitted patients (pts) have improved outcomes when ancillary therapeutics (AT) of physical (PT), occupational (OT), speech (SLP), respiratory (RT) and sleep wake hygiene (SWH) are prioritized against the medical treatment plan. Many GERI pts have met medical inflection, where AT is more contributory to positive outcomes than is medical care. This pilot describes outcomes of trauma pts in a hospital-wide program focused on GERI-specific AT.
Methods: GERI trauma pts, independent prior to admission, were screened for enrollment at one Level II trauma center from Aug 2021-Dec 2022. Enrolled pts (EP) were admitted to trauma or general medicine floors and received repetitive PT, OT, SLP, RT with attention to SWH throughout hospitalization and compared to non-enrolled pts (NEP) with similar DRGs. FRAIL pts (score of 5) or those from skilled care were excluded in both EP and NEP groups. Retrospective review of records for pt demographics, AT metrics and outcomes was completed, and data statistically evaluated.
Results: 224 EP (28 trauma-tr) were compared to 574 NEP (148 tr). EP had shorter length of stay (LOS) (3.8 vs 6.1, $p<0.0001$); ambulated earlier (13 hrs from admission vs 39 hrs, $p=0.0005$); and were more likely to discharge home (56% vs 27%, $p<0.0001$). Tr EP v NEP showed tr-EP had decreased LOS by one day; time to ambulation compared to medical EP (23 hrs v 11hrs) but still sooner than all NEP (39h); There were no delirium events among tr-EP, but delirium accounted for 3% of all EP cohort versus 27% in NEP ($p<0.0001$).
Discussion: Although the tr-EP cohort was small in this pilot, results support feasibility to include GERI tr pts in hospital-wide programs with GERI specific AT. It is evident that GERI AT are beneficial and should emphasize the importance of mobility and cognitive strategies to yield shorter LOS and provide pts the best opportunity to avoid delirium and discharge home.

Session XIIB: Papers 56-66
Paper 66: 4:35 PM - 4:55 PM

HYPOXIA DYSREGULATES THE TRANSCRIPTION OF MYOENDOTHELIAL JUNCTION PROTEINS INVOLVED WITH THE PRODUCTION OF NITRIC OXIDE

Gregory Thomas, BS; Kaysie L. Banton, MD; Raymond Garrett, MD; Carlos H. Palacio Lascano, MD; David Acuna, MD; David Bar-Or, MD
Swedish Medical Center
Invited Discussant: Nikolay Bugaev, MD

Introduction: Myoendothelial junctions (MEJs) are distinct structures that form through the elastic lamina's fenestrae and allow endothelial cells to connect directly with vascular smooth muscle cells. As a result, these junctions promote heterocellular communication as well as the rapid transmission of chemical signals that control vascular tone. MEJs contain hemoglobin alpha (HBA) and endothelial nitric oxide synthase (NOS3) protein complexes. Evidence suggests that these proteins, along with the activity of cytochrome b5 reductase (CYTB5R3), appear to control the production, scavenging, and diffusion of nitric oxide (NO) in the vascular wall. This study aimed to examine how hypoxia affected the regulation of proteins involved in the production of nitric oxide (NO) in MEJs.
Methods: A cell culture model was used to conduct a longitudinal transcriptional study on primary human brain microvascular endothelial cells (HBMEC) exposed to cobalt chloride ($CoCl_2$), a hypoxia mimetic. In brief, HBMEC were cultured to a confluent monolayer and then exposed to $CoCl_2$ dose responses for up to 48 hours. After that, total RNA was isolated, and quantitative reverse transcription PCR was carried out with primers for NOS3, CYB5R3, and HBA2. Finally, $\Delta\Delta$Ct gene expression was used to calculate the relative gene expression of these targets after normalization to the housekeeping gene GAPDH.
Results: When HBMEC were exposed to $CoCl_2$, the amount of detectable NOS3 and CYB5R3 mRNA in these cultures decreased in both a time- and dose-dependent manner (up to -100-fold and -23-fold respectively). $CoCl_2$ treatment, conversely, resulted in detectable levels of HBA2 mRNA being observed in these cells after 24 hours, with the elevation lasting for 48 hours.
Conclusions: These findings suggest that hypoxia may cause dysregulation of proteins and enzymes found in MEJs that control NO production. Furthermore, a loss of NO due to suppressed production and/or increased scavenging may contribute to the pathology of conditions characterized by loss of vascular control, such as cerebral vasospasm after subarachnoid hemorrhage or pulmonary hypertension. Further research into the expression of these factors in the presence of hypoxia and the production of NO in coculture models of brain endothelial cells and vascular smooth muscle cells with intact MEJ-like structures is warranted.

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 an-other 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 cov-ered in his published manuscripts include the following:

1960	Distribution changes in extraceullular fluid during acute hemorrhage(with G. Tom Shires, M.D.)
1963	Use of dextran
1963	Use of hypertonic glucose
1969	Diagnostic abdominal paracentesis in trauma
1970	Fluid resuscitation of hemorrhagic shock
1971	Use of Ringer's lactate during shock
1974	Oxygen-hemoglobin dissociation curve
1975	Stroma-free hemoglobin
1985	Ultrasound detection of fluid collection
1986	Endopeptidase in human lung

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

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

2022 Lisa Marie Knowlton, MD, MPH
2021 M. Victoria Purvis Miles, MD
2020 Sydney Radding, MD

SESSION XIII:

QUICKSHOTS #1–13

Saturday, September 23, 2023

8:00 AM - 9:18 AM

Location: Pacific Ballroom A-B

Moderator: Jennifer Gurney, MD

Session XIII: Quickshot Session I 1-13
Quickshot 1: 8:00 AM - 8:06 AM

REDUCING DONOR SKIN IN SOFT TISSUE RECONSTRUCTION USING AN AUTOLOGOUS CELL HARVESTING DEVICE COMBINED WITH MESHED AUTOGRAFT

Sharon Henry, MD; Steven Mapula, MD; Mark Grevious, MD; Neil Mashruwala, MD; Herbert Phelan, MD; Jeffrey Shupp, MD; Joseph Molnar, MD; Kevin Foster, MD
R.A. Cowley Trauma Center
Invited Discussant: Amy Liepert, MD

Introduction: The Autologous Cell Harvesting Device is a regenerative medicine platform that enables clinicians to prepare autologous skin cell suspension (ASCS) from a small sample of the patient's skin at point-of-care. The system was FDA-approved in September 2018 for treating acute thermal burn wounds. This study was designed to evaluate safety and effectiveness of ASCS in conjunction with widely meshed autografts in patients undergoing reconstruction of full-thickness, non-thermal skin defects such as those resulting from trauma and surgery.
Methods: This was a prospective, randomized, within-subject, blinded evaluator, multicenter, controlled study conducted under FDA IDE 13053. Patients ≥ 5 years of age with an acute non-thermal skin defect were eligible for enrollment. An autografting plan for closure was developed in accordance with the investigators' standard of care. Two comparable study treatment areas each ≥80 cm2 in size were randomized to receive autografting treatment consistent with the investigator's pre-identified plan (Control) or ASCS treatment in combination with an autograft meshed more widely than identified in the plan (e.g. 2:1 autograft vs. 3:1 autograft + ASCS). Co-primary effectiveness endpoints included 100% healing at (or prior to) 8 weeks post-treatment confirmed at two consecutive study visits at least two weeks apart and the ratio of donor site to treatment area expansion ratios.
Results: Sixty-five patients with surgical (63%) and traumatic (37%) skin defects were treated. Both the healing and donor-sparing co-primary endpoints were met; healing of the ASCS treatment area was non-inferior to Control ($p=0.005$), and donor skin sparing associated with ASCS treatment was superior to Control ($p<0.025$), with an average 30% reduction in donor skin required. There was a similar safety profile between ASCS and Control.
Conclusion: Compared to the standard of care, the application of ASCS with a widely meshed autograft resulted in comparable healing outcomes and an average of 30% less donor skin required for closure. The Autologous Cell Harvesting Device offers a simplified approach to soft tissue reconstruction by reducing skin needed without compromising healing outcomes.

Session XIII: Quickshot Session I 1-13
Quickshot 2: 8:06 AM - 8:12 AM

GEOSPATIAL ACCESS TO ACS/AAST VERIFIED EGS CENTERS IN THE US: STRATEGIC OPPORTUNITIES FOR THE EGS VERIFICATION PROGRAM

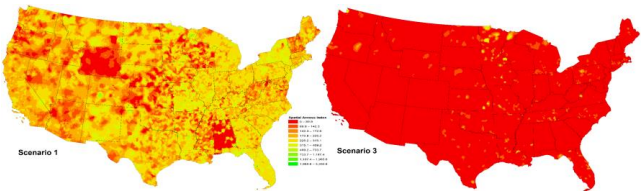
David S. Silver, MD, MPH; Jamison Beiriger, BS;
Liling Lu, MS; Matthew D. Neal, MD;
Andrew B. Peitzman, MD; Joshua B. Brown, MD, MS
University of Pittsburgh
Invited Discussant: Lara Senekjian, MD

Introduction: The ACS and the AAST have released a framework for verification of EGS centers. Geospatial access to care has been associated with mortality for EGS patients. Given the novelty of this program, it is unclear which centers may pursue verification and how this translates to access. Our objective was to assess geospatial access to EGS verified centers and potential disparities under different scenarios.

Methods: We used AHA hospital characteristics data and the known 5 pilot EGS verified centers to devise 3 scenarios of centers pursing EGS verification: (1) all EGS advanced capable hospitals; (2) 75%ile of pilot center capabilities/volume; (3) quaternary referral centers indicated by liver or lung transplant programs. We used enhanced 2-step floating catchment area methods to calculate a spatial access index (SPAI) for each census block group in the US based on 60min drive time to the nearest EGS verified center under each scenario. To evaluate potential disparities in geospatial access based on social determinates of health, we compared the SPAI across quartiles of the Area Deprivation Index (ADI) within each scenario. We also compared the difference in SPAI from the lowest (least disadvantaged) to highest (most disadvantaged) ADI quartile across the three scenarios.

Results: EGS verification was assigned to 1932 centers under Scenario 1 (EGS capable), 307 centers under Scenario 2 (75%ile of pilot centers), and 146 centers under Scenario 3 (quaternary centers). SPAI declined over the scenarios (226.6 [111.7, 330.7]; 51.8 [0,126.1]; 6.2 [0, 62.2], $p<0.001$; Figure). Within each scenario, SPAI also declined as the ADI quartile increased ($p<0.001$). Scenario 2 had the largest disparity in SPAI between the 1st and 4th ADI quartiles (-49.0), followed by Scenario 3 (-32.4) and Scenario 1 (-14.7).

Conclusion: Geospatial access to EGS verified centers may vary significantly depending on how the program is implemented across the US. More disadvantaged communities may bear the burden of lower access. Further work to study regional needs can allow a strategic implementation of the EGS verification program to optimize outcomes while minimizing disparities for EGS patients.



Session XIII: Quickshot Session I 1-13
Quickshot 3: 8:12 AM - 8:18 AM

THE FRAILTY SPECTRUM: CHANGING THE BINARY CLASSIFICATION OF FRAILTY

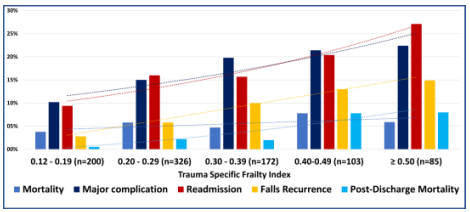
Qaidar Alizai, MD; Audrey L. Spencer, MD; Hamidreza Hosseinpour, MD;
Christina Colosimo, DO, MS; Sai Krishna Bhogadi, MD;
Adam Nelson, MD; Collin Stewart, MD; Khaled El-Qawaqzeh, MD;
Louis J. Magnotti, MD, MS, FACS; Bellal Joseph, MD, FACS
The University of Arizona
Invited Discussant: Esther Tseng, MD

Introduction: Frailty is shown to predict poor outcomes. However, the spectrum of accumulated physiologic deficits, once a patient is identified as frail, is unknown. We aimed to assess the dynamic association between increasing frailty and outcomes among frail geriatric trauma patients.

Methods: This is a secondary analysis of the AAST Frailty Multi-institutional Trial. All patients (≥65 yrs) presenting to one of seventeen Level I/II trauma centers (2019-2021) were included. Frailty status was measured using the trauma-specific frailty index (TSFI), ranging from 0 to 1. After excluding non-frail patients, frail patients were then stratified based on TSFI scores: 0.12-0.19, 0.20-0.29, 0.30-0.39, 0.40-0.49, and ≥0.50. Multivariable analysis was performed to identify the effect of increasing TSFI on in-hospital and 3-month post-discharge outcomes of frail patients.

Results: We identified 886 frail patients. The mean age was 78±8 years and 47% were males. Median ISS was 9 [4-12], 75% following a low-level fall. Overall, 16% had a complication, and 5% died during the index admission. Of all survivors with a complete follow-up, 19% were readmitted within 3 months of discharge, 7% had a fall recurrence, 8% had a post-discharge complication, and 3% died within 3 months of discharge. In-hospital and post-discharge outcomes worsened as the frailty score increased (**Figure**). On multivariable analysis, every 0.1 increase in TSFI score among frail patients was associated with higher odds of in-hospital mortality (OR 1.196; p=0.023), major complications (OR 1.329; p<0.001), as well as 3-month readmission (OR 1.264; p<0.001), fall recurrence (OR 1.490; p<0.001), major complications (OR 1.329; p<0.001) and mortality (OR 1.65; p<0.001).

Conclusions: Increasing TSFI score, independent of age, is significantly associated with worse outcomes in frail geriatric trauma patients. These findings suggest that the frailty syndrome goes beyond a binary stratification of patients into Non-Frail and Frail and should be considered as a spectrum of increasing vulnerability to poor outcomes.

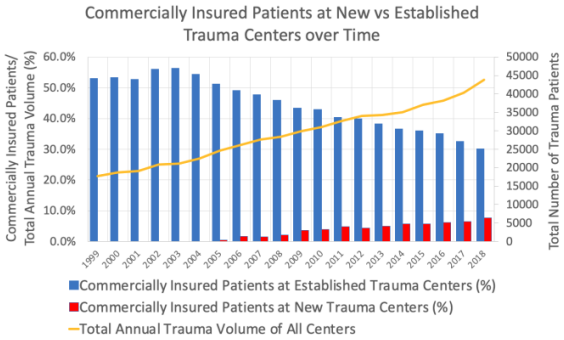


Session XIII: Quickshot Session I 1-13
Quickshot 4: 8:18 AM - 8:24 AM

CHANGES IN PAYER MIX OF NEW AND ESTABLISHED TRAUMA CENTERS: THE NEW TRAUMA CENTER MONEY GRAB?

Diane N. Haddad, MD, MPH; Justin Hatchimonji, MD;
Satvika Kumar, BA; Jeremy W. Cannon, MD; Patrick M. Reilly, MD;
Patrick K. Kim, MD; Elinore J. Kaufman, MD, MSHP
University of Pennsylvania
Invited Discussant: Patricia Ayoung-Chee, MD, MPH

Introduction: Rising numbers of trauma centers (TC) across the country have not been shown to improve trauma outcomes. Establishment of new TCs may not reflect community or geographic need and can impact case mix and volume at existing TCs. We hypothesized that newly designated TCs would see a disproportionate share of commercially insured patients, possibly imposing financial stress on existing centers.
Methods: We collected data from all accredited adult TCs in Pennsylvania using the state trauma registry including patients aged ≥16, 1999-2018. We compared patient characteristics and payer mix between TCs established before and after 2004 when state payment policy changed. We used multivariable logistic regression to assess the relationship between payer and odds of presentation to a new vs. established TC after 2010.
Results: 26 established and 15 new TCs were evaluated. Of 326,204 patients, 2010-2018, 282,579 (85%) were treated at established TCs. New TCs treated more blunt trauma (95.6% vs 91.8%, p<0.001) and more elderly patients (49.7% vs 40.7%, p<0.001). In multivariable analysis, patients presenting to new TCs were more likely to have Medicare (OR 2.1, 95% CI 1.9-2.2) and commercial insurance (OR 1.8, 95% CI 1.7-1.9) compared to Medicaid. Over time, fewer patients at established TCs and more patients at new TCs had private insurance (Figure).
Conclusions: With the opening of new centers, payer mix changed unfavorably at established TCs. New TCs can improve access to care, but trauma system development should consider community and regional needs, as well as impact on existing centers. System sustainment may require innovative payment approaches to address these disparities.



Session XIII: Quickshot Session I 1-13
Quickshot 5: 8:24 AM - 8:30 AM

CHEMOKINE RESPONSE CHANGES WITH RATE OF TRANSFUSION: MIXED MESSAGES FOLLOWING INJURY

Stephanie Savage, MD; Ben L. Zarzaur, MD, MPH; Patrick Carney, MD; Erin Fox, PhD; Charles Wade, PhD; John Holcomb, MD
University of Wisconsin School of Medicine and Public Health
Invited Discussant: Prerna Ladha, MD, MBBS

Introduction: Chemokines are a key component of the inflammatory response and activate and mobilize neutrophils, macrophages, and Natural Killer (NK) cells to manage injury. The purpose of this study is to understand how the rate of packed red blood cell (PRBC) transfusion may impact the chemokine response. We hypothesize that rate of transfusion, rather than total PRBCs, has a fundamental effect on this response.
Methods: The PROPPR dataset was used in this retrospective analysis. All patients received a 1:1:1 or 1:1:2 transfusion for their resuscitation. Rate of transfusion was defined as the Critical Administration Threshold (CAT) status, in which 3 units of PRBC are given in any 60-minute period. Total number of CAT+ episodes in the first two hours after injury were used to define rate of transfusion and were compared to total PRBC volume at 24 hours. Longitudinal response of key chemokines IL-8, IP-10, Eotaxin, MIP-1a, MIP-1b, MCP-1 and RANTES, were measured serially over 72 hours and compared to rates of transfusion.
Results: Of 680 enrolled patients, 267 were included in this analysis. ISS was not significantly different regardless of rate of PRBC transfusion (Table). Increasing rates of transfusion were associated with decreases in IL-8 ($p<0.0001$), Eotaxin ($p=0.0008$), IP-10 ($p=0.0008$), MIP-1b ($p=0.0265$), and MCP-1 ($p=0.0002$). MIP-1a was not significant. RANTES was significantly increased ($p=0.0005$). Conversely, there were no associations between chemokine expression and 24 hour PRBC volume.

	No CAT^{1} (0)	Low CAT^{1} (1-2)	Mid CAT^{1} (3-4)	High CAT^{1} (>5)
ISS	28 (SD 14.7)	28.3 (SD 14.6)	33.9 (SD 17.6)	35.1 (SD 15.3)
p-value	-ref-	0.9408	0.1268	0.0552

Conclusion: The rate of blood product transfusion, rather than the total PRBC volume or severity of injury, has a fundamental impact on the expression of chemokines following injury. However, the immunologic message is mixed. Increased transfusion rates are associated with elevations in RANTES, crucial to leukocyte migration. However, related chemokines with similar function are notably suppressed. These data may reflect early discoordination in the inflammatory response in a subset of massively resuscitated patients.

Session XIII: Quickshot Session I 1-13
Quickshot 6: 8:30 AM - 8:36 AM

MESENCHYMAL STEM CELLS DO NOT PRODUCE MEASURABLE HYPERCOAGUABILITY ON VISCOELASTIC TESTING

Lydia Buzzard, BS; Sawyer Smith, MD, MBA; Alix Dixon, MD; S. James El Haddi, MD; Maria Appleman, PhD; Sarayu Subramanian, MD; Brandon Behrens, MD; B Madtson; A Goodman; James Murphy, MD; Belinda McCully, PhD; Amonpon Kanlerd, MD; Alpa Trivedi, PhD; Shibani Pat, MD, PhD; Martin Schreiber, MD
Oregon Health & Science University
Invited Discussant: Sharven Taghavi, MD, MPH, MS

Introduction: Mesenchymal Stem Cells (MSCs) have been studied as a treatment in trauma and in lung injury to modulate inflammation. However, due to their ability to express tissue factor (TF), they have been considered a thrombogenic risk. This study used swine injury models to demonstrate the safety of MSCs with respect to hypercoagulability.
Methods: 83 juvenile female Yorkshire crossbred swine were randomized to injury groups including pulmonary contusion (PC) alone, PC plus liver injury, a control group, and treatment groups including LR, FFP, KCentra, and MSCs. Blood samples for TEG were collected at baseline as well as at 1 hour, 3 hours, 6 hours, and every subsequent 6 hours until 48 hours post-injury. Effects were analyzed in R with generalized mixed linear models and ANOVA.
Results: 2 subjects were excluded due to early deaths unrelated to the models. At 6 hours post-injury, KCentra produced significantly lower R times compared to MSCs ($p = 0.005$), Control ($p = 0.007$), LR ($p = 0.04$), and FFP ($p = 0.02$) while R times in the MSC group were not significantly different from control, LR, or FFP. R times were not significantly different by treatment at any other time points.
Conclusion: This study found that R time is not significantly impacted by administration of MSCs when compared to controls. This suggests that while MSCs may express TF, they do not produce pathologic hypercoagulability in relevant animal models of uncontrolled hemorrhagic shock and trauma.

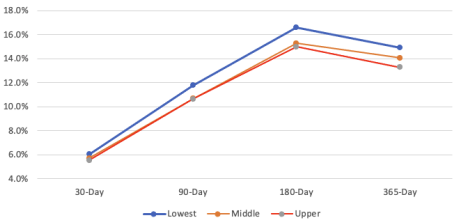
Session XIII: Quickshot Session I 1-13
Quickshot 7: 8:36 AM - 8:42 AM

HOSPITAL EXPERIENCE WITH GERIATRIC TRAUMA IMPACTS LONG-TERM SURVIVAL

Manuel Castillo-Angeles, MD, MPH; Cheryl K. Zogg, PhD, MSPH, MHS; Molly Jarman, PhD; Reza Askari, MD; Stephanie Nitzschke, MD; Ali Salim, MD; Zara Cooper, MD, MSc; Joaquim M. Havens, MD
Brigham & Women's Hospital
Invited Discussant: Joseph Posluszny, MD

Introduction: It has been established that hospital experience measured by geriatric trauma proportion (GTP) is associated with in-hospital mortality among geriatric patients. However, these studies are limited to short-term outcomes. Our goal was to determine the impact of GTP on long-term survival among older trauma patients.
Methods: This was a retrospective analysis of Medicare inpatient claims (2014-2015) of geriatric trauma patients admitted in Florida. GTP was calculated by dividing the number of geriatric trauma patients by the overall adult trauma volume in each hospital. Hospitals were then categorized into tertiles of GTP. Our main outcome was mortality at 30, 90, 180, and 365 days. Controlling for demographic, injury severity, comorbidities, and hospital-level characteristics, multivariate logistic regression analysis was performed to identify the association between GTP and long-term survival.
Results: We included 64,125 geriatric trauma patients from 161 hospitals. Mean age was 82.53 (SD 8.40), 68.5% were female, 92.3% were white, and mean ISS was 8.93 (SD 5.49). The tertiles of GTP had medians of 48%, 66%, and 78% respectively. No level 1 trauma centers were categorized within the highest GTP tertile. As compared with hospitals in the lowest tertile, patients treated at the highest tertile were associated with lower mortality at 90 days (OR 0.88, 95% Confidence Interval [CI] 0.81–0.97), 180 days (OR 0.88, 95% CI 0.81–0.95), and 365 days (OR 0.90, 95% CI 0.84–0.96).

Figure: Risk-adjusted mortality based on GTP tertiles.



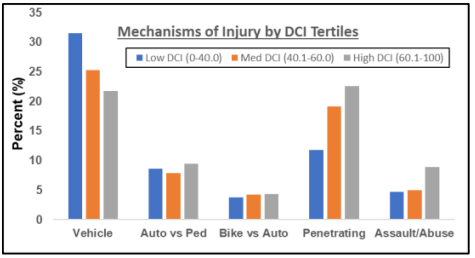
Conclusion: Higher GTP is associated with improved long-term outcomes. However, mortality following trauma among geriatric patients continues to increase for six months, and this effect is especially pronounced at low GTP centers.

Session XIII: Quickshot Session I 1-13
Quickshot 8: 8:42 AM - 8:48 AM

ANALYSIS OF NEIGHBORHOOD SOCIOECONOMIC DISADVANTAGE INDICES AND INJURY MECHANISM PATTERNS: DOES THE INDEX MATTER?

Miharu Arase, MD, PhD; Monica Wong, MS;
Kenji Inaba, MD; Kazuhide Matsushima, MD;
Morgan Schellenberg, MD, MPH; Matthew Martin, MD
LAC & USC Medical Center
Invited Discussant: Alaina Lasinski, MD

Introduction: Social determinants of health, including measures of community or neighborhood distress, has an increasingly appreciated role in trauma care. We sought to examine differences in injury patterns and mechanisms by neighborhood socioeconomics, and to compare two of the most commonly used neighborhood distress indices.
Methods: Patients with traumatic injuries at a Level 1 safety net center over 1-year were identified. Area Deprivation Index (ADI) and Distressed Communities Index (DCI) were used to determine the neighborhood socioeconomic status. Injury mechanisms and patterns were analyzed and stratified by ADI and DCI categories. The correlation between ADI and DCI tertiles was also analyzed.
Results: A total of 4950 patients were included in this study. Among them, 3933 patients were analyzed with ADI, and 4497 patients were analyzed with DCI. Greater disadvantage areas determined by ADI or DCI (higher ADI or higher DCI) were strongly associated with increased penetrating injuries (both $p<0.01$). Higher DCI was also associated with increased rates of assault/abuse mechanisms ($p<0.01$) but there was no association with ADI. In contrast, less disadvantaged areas defined by DCI had increased vehicular injuries ($p<0.001$), but no differences were seen with ADI. Direct comparison of ADI versus DCI categorizations showed a weak correlation ($R=0.35$, $p<0.001$) between the two measures.



Conclusion: Increasing neighborhood disadvantage scores identified populations at higher risk for penetrating and assault/abuse injury mechanisms. There was only a weak correlation between DCI and ADI, with DCI demonstrating greater ability to differentiate injury mechanism patterns and incidence.

Session XIII: Quickshot Session I 1-13
Quickshot 9: 8:48 AM - 8:54 AM

PROPOSED EVIDENCE-BASED REVISION OF THE AAST RENAL TRAUMA ORGAN INJURY SCALE

Rano Matta, MD; Sorena Keihani, MD; Kevin Hebert, MD;
Raminder Nirula, MD; Marta McCrum, MD, MPH;
Joshua J. Horns, PHD; Jeremy B Myers, MD;
Multi-institutional Genito-Urinary Trauma Study Group (MiGUTS)
University of Utah
Invited Discussant: Alexander Schwed, MD

Introduction: To update and improve the American Association for Surgery of Trauma (AAST) renal trauma grading using important thresholds for bleeding control intervention from the Multi-Institutional Genitourinary Trauma Study (MiGUTS).
Methods: We conducted a secondary analysis of MiGUTS phase-2. This was a multi-center retrospective study including patients with high grade renal trauma from 7 Level-1 trauma centers from 2013-2018. All eligible patients were assigned new renal trauma grades based on revised criteria. The primary outcome used to measure injury severity was intervention for renal bleeding. Secondary outcomes included intervention for urinary extravasation, units of packed red blood cells (PRBCs) transfused within 24 hours, and mortality. To test the revised grading system, we performed mixed effect logistic regression adjusted for multiple baseline demographic and trauma covariates. We determined the area under the receiver-operator curve (AUC) to assess accuracy of predicting bleeding interventions from the revised grading system and compared this to 2018 AAST organ injury scale.
Results: We included 549 patients with AAST Grade III-V injuries and CT scans based on the 2018 system (III: 52% (n=284), IV: 45% (n=249), and V: 3% (n=16)). Among these patients, 89% experienced blunt injury (n=491) and 12% (n=64) underwent intervention for bleeding. After applying the revised grading criteria, 55% (n=306) were downgraded and 4% (n=23) were upgraded; specifically, 44% (n=7) were downgraded from V to IV, and 60% (n=150) were downgraded from IV to III. The revised renal trauma grading system demonstrated improved predictive ability for bleeding interventions (2018 AUC = 0.805, revised AUC = 0.882; p=0.002) and number of units of PRBCs transfused. When accounting for urinary injury in the revised system, there was no difference in its predictive ability.
Conclusion: Using a revised renal trauma grading system, which does not include urinary collecting system injury a significant number of injuries are downgraded. This revised renal trauma grading system better delineates the need for hemostatic interventions than the current AAST grading system.

Session XIII: Quickshot Session I 1-13
Quickshot 10: 8:54 AM - 9:00 AM

CHARACTERIZING USE OF SPLENIC ARTERY EMBOLIZATION TO TREAT BLUNT SPLENIC INJURY: WHO BENEFITS?

Jamie Benson, BA, AEMT; Stas Amato, MD, MSc;
Solomon Feuerwerker, MD; Turner Osler, MD, MSc; David Hosmer, PhD;
Amanda Galenkamp, BS, MS; Gary An, MD; Ajai Malhotra, MD
University of Vermont Medical Center
Invited Discussant: Jay Collins, MD

Introduction: Splenic artery embolization (SAE) is an adjunct to non-operative management (NOM) to reduce failure rates and increase splenic salvage following blunt splenic injury (BSI). The published literature is mixed as to whether increasing SAE rates are associated with increased splenic salvage rates. The current study aims at determining whether higher SAE rates correlate with increased splenic salvage. We hypothesize that facilities with higher SAE rates will have higher splenic salvage rates.
Methods: The National Trauma Data Bank (2016-19) was queried for all patients presenting with BSI. Patients undergoing splenectomy <6-hours of presentation were considered operatively (OP) managed with spleens not-salvaged. Remaining patients were considered NOM. Facility keys were obtained for each patient, and SAE rates for each facility were calculated. Among the NOM patients (with or without SAE) those who underwent a delayed splenectomy were considered NOM failures with spleens non-salvaged. NOM patients, with or without SAE who did not undergo a delayed splenectomy were considered as spleens salvaged. Facility level SAE rates were correlated with splenic salvage rates.
Results: 76,354 adult patients met inclusion. 14.87% were OP. Of the 85.13% NOM, 4.67% underwent SAE. Median SAE utilization was 3.79% of BSI (IQR: 1.27-6.76%) but varied from 0-100% across centers. Median facility salvage rate was 83.18% (IQR: 77.97-88.57%). Centers in the bottom (Q1) quartile of SAE use had significantly lower overall salvage rates than the top (Q4) quartile (82.99% vs 84.25% - $p < 0.001$). On subgroup analysis based on splenic grade, there was a divergent dose response relationship with higher SAE centers having higher salvage rates for high grade (III-V) injuries, and the opposite for low grade (I-II) injuries (Fig.)
Conclusions: Centers with high rates of SAE utilization for BSI have a higher rate of overall splenic salvage, BUT *only* for high grade spleen injuries. For low grade spleen injuries, increased utilization of SAE is associated with lower overall salvage. These results suggest that SAE should be utilized *more* for high grade spleen injuries while there should be a *pause* in utilization for low grade injuries.

Session XIII: Quickshot Session I 1-13
Quickshot 11: 9:00 AM - 9:06 AM

IMPACT OF PREHOSPITAL TOURNIQUETS ON PENETRATING EXTREMITY INJURIES: BLOOD SAVING OR TIME DELAY?

Leah Tatebe, MD; Andrew Dennis, DO; Stephen Wisniewski, PhD; Bryan A. Cotton, MD; Brian Harbrecht, MD; Bellal Joseph, MD, FACS; Ernest Moore, MD; Mayur B. Patel, MD, MPH; Martin Schreiber, MD; Jason Sperry, MD MPH; Frank Guyette, MD, MS, MPH
Northwestern University
Invited Discussant: Caitlin Fitzgerald, MD

Introduction: Prehospital interventions, such as tourniquet (TQ) placement, can be life-saving but also can potentially prolong time on scene. We sought to assess if prehospital TQ usage was associated with reduced blood transfusion or more time on scene.
Methods: Using an eight-center cohort of adult Level 1 trauma admissions from 2017 to 2021, we isolated a nested case-control cohort included penetrating extremity injury with an abbreviated injury score (AIS)>1 and excluded non-extremity AIS>4 to reduce confounding by blood transfusion. TQ patients were matched 1:1 with non-TQ patients by AIS extremity score. Sensitivity analysis was conducted for ballistic, non-ballistic, and arterial injuries. Primary outcome was difference in units transfused in the first 24h with power analysis of n=28 needed to find a 1-unit increase in transfusion. Secondary outcomes included scene time, hospital vitals, and 24h mortality.
Results: Of 77,854 patients, 8986 patients met inclusion and 227 (2.5%) had TQ usage. After matching, 214 were analyzed, where 107 TQ patients were paired with 107 without TQ, with median cohort age=30 (IQR 24, 40), 86% male, AIS upper extremity=3 (0, 3), AIS lower extremity=1 (0, 3), field shock index=0.9 (0.73, 1.2). By mechanism, 122 were ballistic (57%), 92 were non-ballistic (43%), and 198 (93%) had arterial injuries. There was no increase in blood usage at 24hrs in those without a TQ (matched cohort: 0.17 additional units [95%CI: -0.098, 0.44; p=0.21], ballistic: 0.04 [-0.3, 0.39; p=0.81], non-ballistic: 0.34 [-0.09, 0.78; p=0.12], arterial: 0.17 [-0.12, 0.46, p=0.24]). Similarly, no increase in blood usage was seen at 3hr or 6hrs. Among secondary outcomes, patients with a TQ had no difference in scene time, hospital vitals, or 24-hour mortality.
Conclusion: In this multicenter case-control cohort, prehospital TQs for extremity penetrating injuries were not associated with decreased blood usage or prolonged scene time. Limitations include lack of data on if the TQ was arterio-occlusive, missing extremity outcome data, and retrospective study design. Given the widespread use and reported TQ effectiveness, future investigations to evaluate the quality of TQ application and identify which patients would benefit from TQ application.

Session XIII: Quickshot Session I 1-13
Quickshot 12: 9:06 AM - 9:12 AM

IMPLEMENTATION OF A PERCENTAGE OF PREDICTED FORCED VITAL CAPACITY RIB FRACTURE PROTOCOL RESULTS IN IMPROVED ICU UTILIZATION

Jennifer E. Baker, MD; Kevin N. Harrell, MD; Joshua D. Billings, MD;
Stephanie Vega, MBA; Shane Urban, BS;
Michael W. Cripps, MD; Catherine G. Velopulos, MD
University of Colorado
Invited Discussant: Jennifer Hubbard, MD

Introduction: Current protocols to determine disposition of traumatic rib fractures rely on age and number of rib fractures. These protocols ignore the real issue of pulmonary mechanics and physiology resulting in unnecessarily high ICU admissions. We hypothesize that using a protocol based on percentage of predicted forced vital capacity (%FVC) will have better predictive value for disposition and save valuable resources.
Methods: A retrospective review from a single level I trauma center was performed from 1/2019 to 9/2022. The rib fracture protocol was changed on 1/20/2021from utilizing number of fractured ribs/age to utilizing %FVC creating old and new cohorts for comparison. We also compared patients who had a recorded %FVC in the new protocol cohort to non-intubated patients in the old protocol cohort.
Results: A total of 1150 patients were evaluated, 581 in the old protocol and 569 in the new protocol cohorts, and there were no significant demographic or injury characteristic differences. There was a significant decrease in number of ICU admissions after implementation of the new protocol (61.9% vs. 37.6%, $p \leq 0.05$); the drop in ICU admissions due to chest injury (admitted due to rib fracture protocol criteria alone) was more profound (45.6% vs. 12.1%, $p \leq 0.05$). While there was no difference between hospital length of stay (LOS), the ICU LOS was significantly shorter (1 [0,4] vs. 0 [0,3] days, $p \leq 0.05$). When looking at the patients with recorded %FVC (n=349) vs. non-intubated patients in the old protocol cohort (n=501), these significant decreases remain the same (ICU admissions (55.9% vs. 18.1%, $p \leq 0.05$); ICU admissions due to chest injury (163 [58.2%] vs. 22 [34.9%], $p \leq 0.05$); ICU LOS (1 [0,3] vs. 0 [0,0] days, $p \leq 0.05$)). There was a trend towards decreased hospital LOS in the %FVC, however this was not significant (4 [2,9] vs. 3 [1,7] days, $p=0.055$). On linear multivariable analysis, the initiation of the %FVC protocol resulted 0.77 fewer days in the ICU when compared to the old protocol non-intubated cohort ($p<0.001$).
Conclusion: Using a rib fracture protocol based on %FVC decreased the number of ICU admissions and ICU LOS, even in patients with no recorded %FVC. Our protocol may provide better resource utilization and prevent unnecessary ICU admissions.

Session XIII: Quickshot Session I 1-13
Quickshot 13: 9:12 AM - 9:18 AM

SURGICAL APGAR SCORES PREDICT COMPLICATIONS AFTER EMERGENCY GENERAL SURGERY LAPAROTOMY

Brett M. Tracy, MD; Shruthi Srinivas, MD; Holly Baselice, MPH; Rondi B. Gelbard, MD; John Loftus, MD; Julia R. Coleman, MD, MPH
Ohio State University
Invited Discussant: Nancy Parks, MD

Introduction: The Surgical Apgar Score (SAS) is a 10-point validated score comprised of 3 intraoperative variables (blood loss, lowest heart rate, and lowest mean arterial pressure). Lower scores are worse and predict major postoperative complications. The SAS has not been applied in emergency general surgery (EGS) but may help guide postoperative disposition. We hypothesize that SAS can predict complications in EGS patients undergoing a laparotomy.
Methods: We performed a retrospective review of adult patients at a single, quaternary care center who underwent an exploratory laparotomy for EGS conditions within 6 hours of surgical consultation from 2015 to 2019. Patients were grouped by whether they experienced a postoperative complication (systemic, surgical, and/or death). Multivariable regression was performed to predict complications, accounting for SAS and other statistically significant variables between groups. Using this model, predicted probabilities of a complication were generated for each SAS.
Results: The cohort comprised 482 patients: 32.8% (n=158) experienced a complication while 67.2% (n=324) did not. Patients with complications were older, frailer, more often male, had worse SAS (6 vs 7, p<.0001) and ASA scores, and higher rates of pneumoperitoneum (p=0.0003) and open abdomens (p<.0001). On multivariable regression, a decreasing SAS independently predicted complications (aOR 0.85, 95% CI 0.75-0.96, p=0.009). An SAS ≤4 was associated with a 49.2% predicted chance of complications, greater rates of septic shock (9.7% vs 12.3%, p=0.01), respiratory failure (20.5% vs 10.8%, p=0.02), and death (24.1% vs 7.5%, p<.0001). An SAS ≤4 did not correlate with surgical complications (p=0.1).
Conclusion: The SAS accurately predicts postoperative complications in EGS patients undergoing urgent laparotomy, with an SAS ≤4 identifying patients at risk for septic shock, respiratory failure, and mortality. This tool can aid in rapidly determining postoperative disposition and resource allocation.

SESSION XIV:

QUICKSHOTS #14–26

Saturday, September 23, 2023

9:40 AM - 10:58 AM

Location: Pacific Ballroom A-B

Moderator: Patrick Reilly, MD

Session XIV: Quickshot Session II 14-26
Quickshot 14: 9:40 AM - 9:46 AM

TRANEXAMIC ACID IS NOT ASSOCIATED WITH A HIGHER RATE OF THROMBOTIC-RELATED REINTERVENTION AFTER MAJOR VASCULAR INJURY REPAIR

Sina Asaadi, MD; Kaushik Mukherjee, MD, MSCI, FACS; Liang Ji, PhD; Xian Luo-Owen, MD, PhD; Maryam B. Tabrizi, MD; Richard D. Catalano, MD; Joseph DuBose, MD; Martin G. Rosenthal, MD
Loma Linda University Medical Center

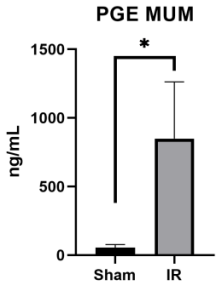
Introduction: Tranexamic acid (TXA) is associated with lower mortality and transfusion in trauma patients, but its role in thrombotic complications is unclear. We investigated whether TXA increases the risk of thrombosis-related failure (TRF) in major vascular injuries (MVI).
Methods: The PROspective Observational Vascular Injury Treatment (PROOVIT) registry was queried from 2013 to 2022 for MVIs repaired with an open or endovascular intervention. The relationship between the TXA administration and TRF was examined.
Results: The TXA group (n=297) had higher rates of hypotension at admission (33.6% vs 11.5%, p<0.001), need for continuous vasopressors (41.4% vs 18.4%, p<0.001), and pRBC transfusion (3.2 vs 2.0 units, p<0.001) during the first 24 hours compared to the non-TXA group (n=1941), although demographics, injury pattern, and interventions were similar. Cryoprecipitate (9.1% vs 2%, p<0.001), and anti-coagulant administration during the intervention (32.7% vs 43.8%, p<0.001) were higher in the TXA group; there was no difference in the rate of factor VII use between groups (1% vs 0.7%, p=0.485). TRF was not different between the groups (6.3% vs 3.8 p=0.141) while the rate of immediate need for re-operation (10.1% vs 5.7%, p=0.006) and overall re-operation (11.4% vs 7%, p=0.009) was significantly higher in the TXA group. Patients in TXA had 7%, 19%, and 33% higher unadjusted odds of thrombosis-related failure, need for immediate re-intervention, and overall re-operation, respectively. However multivariate logistic regression analysis showed no significant association between TXA and a higher rate of immediate need for re-intervention (OR=1.19; 95% CI=0.75-1.88; p=0.465), overall re-operation rate (OR=1.33; 95% CI=0.82-2.17; p=0.249) and thrombotic events in a repaired vessel (OR=1.07; 95% CI=0.60-1.92; p=0.806) after adjusting for type of injury, vasopressor infusions, blood product and anticoagulant administration, and hemodynamics.
Conclusion: Tranexamic acid is not associated with a higher risk of thrombosis-related failure in major vascular injury repairs. Further prospective studies to examine dose-dependent or time-dependent associations between Tranexamic acid and thrombotic events in major vascular injuries are needed.

Session XIV: Quickshot Session II 14-26
Quickshot 15: 9:46 AM - 9:52 AM

PROSTAGLANDIN E - MAJOR URINARY METABOLITE IS A NOVEL BIOMARKER FOR ACUTE MESENTERIC ISCHEMIA

Keisuke Suzuki, MD; Koji Morishita, MD, PhD;
Tomohiro Adachi, MD; Akira Suekane, MD, PhD;
Kouhei Yamamoto, MD, PhD; Keita Nakatsutsumi, MD, PhD;
Panu Teeratakulpisarn, MD; Mitsuaki Kojima, MD, PhD;
Yasuhiro Otomo, MD, PhD; Raul Coimbra MD, PhD
Tokyo Medical and Dental University Hospital
Invited Discussant: Ida Molavi, MD

Introduction: Acute mesenteric ischemia (AMI) is a vascular emergency caused by a disruption in the small intestine's blood supply. Despite advances in diagnostic, interventional, and surgical procedures, AMI remains a life-threatening condition. Prostaglandin E-Major Urinary Metabolite (PGE-MUM) is stable in urine and has been described as a useful biomarker of inflammation of the intestinal mucosa. We investigated whether the level of PGE-MUM in a murine intestinal ischemia-reperfusion (IR) model correlated with the degree of ischemia.
Methods: We performed superior mesenteric artery occlusion (60 min) followed by reperfusion and resuscitation with normal saline for 6 hours (IR group) in rats. Sham animals underwent an identical procedure without ischemia (Sham group). Serum Lactate levels were measured at the end of resuscitation. Small intestine specimens from animals in each group were obtained for histologic examination using an injury scoring system (0–5) after the resuscitation phase. Urine samples were taken at the end of resuscitation, and changes in PEG-MUM levels after intestinal IR and in Sham animals were analyzed.
Results: Lactate levels in the IR and sham groups did not differ to a statistically significant extent (2.1±0.6 vs.1.5±0.2 mmol/L). The histologic injury score of the IR group was significantly greater than that of the sham group (4.3±0.6 vs 0.6±0.9; $p<0.05$). PGE-MUM levels in the IR group were significantly increased in comparison to those in the sham group (849.3±370.7 vs. 55.5±22.5 ng/mL; $p<0.05$).
Conclusions: We found that intestinal IR induced a marked increase in urinary PGE-MUM levels. To our knowledge, this is the first report to evaluate the role of the urinary PGE-MUM level after intestinal ischemia.



Session XIV: Quickshot Session II 14-26
Quickshot 16: 9:52 AM - 9:58 AM

SURGEON PRACTICES AND BARRIERS TO FIREARM SAFETY COUNSELING IN CLINICAL PRACTICE: A CROSS-SECTIONAL STUDY

Shelbie D. Kirkendoll, DO, MS; Casey M. Silver, MD;
Avery B. Nathens, MD, MPH, PHD; Anne Stey, MD, MS;
Kathryn Jackson, MS; Brendan Campbell, MD, MPH
American College of Surgeons
Invited Discussant: Thomas Duncan, DO

Introduction: Surgeons have previously struggled to incorporate firearm safety guidance into clinical practice, and their current rates of counseling are relatively unknown. Additionally, barriers and potential facilitators of counseling practices by surgeons have not been well studied.
Methods: We created an anonymous cross-sectional survey utilizing previously published instruments and performed pilot testing (n=13) at the annual meeting of the American Association for Surgery of Trauma (2022). The finalized survey was distributed the survey via quick response (QR) code during two sessions at American College of Surgeons (ACS) Clinical Congress (2022): The ACS Committee on Trauma's Injury Prevention Pillar meeting and a special session entitled *"Surgeons on the Front Lines of Gun Violence".* Eligible participants included surgeons and surgical trainees that attended at least one of these two sessions.
Results: A total of 116 individuals completed the survey, of which the majority were male (n=72, 62%), attending surgeons (n=110, 94.8%), and treated trauma patients (n=72, 63%). Few participants (n=44, 38%) reported counseling patients on firearm safety as part of their clinical practice, and practices did not vary significantly by age, gender, surgical specialty, or census region. The majority of respondents (n=103, 89%) believed that surgeons should provide firearm safety counseling, however, most of these respondents (n=60, 58%) did not counsel their own patients on firearm safety. The most commonly cited barriers to counseling were lack of time (n=47, 40.5%), appropriate training (n=43, 37.1%), and firearm knowledge/experience (n=36, 31.0%). Patient education resources (n=76, 65.5%) and additional personnel (n=70, 60.3%) were identified as potential resources to alleviate barriers.
Conclusion: While the majority of surgeon respondents believed that surgeons should provide firearm safety counseling to their patients, a majority did not provide it themselves. These findings suggest that interventions that do not rely on surgeons for implementation would be a more effective way to incorporate firearm safety counseling into clinical practice.

Session XIV: Quickshot Session II 14-26
Quickshot 17: 9:58 AM - 10:04 AM

BONE ANCHOR FIXATION IN THE REPAIR OF BLUNT TRAUMATIC ABDOMINAL WALL HERNIAS: A WESTERN TRAUMA ASSOCIATION MULTICENTER STUDY

Kevin Harrell, MD; Arthur Grimes, MD; Harkanwar Gill, MD; Jessica Reynolds, MD; Walker Ueland, MD; Jason Sciarretta, MD, FACS; Samual Todd, MD; Marc Trust, MD; Marielle Nguoe, BS; Bradley Thomas, MD; Sullivan Ayuso, MD; Aimee LaRiccia, DO; Chance Spalding, DO; Jeffry Nahmias, MD, MHPE; Robert Maxwell, MD
University of Tennessee College of Medicine Chattanooga
Invited Discussant: Allison McNickle, MD

Introduction: Blunt traumatic abdominal wall hernias (TAWH) are relatively rare but require a variety of operative techniques to repair. This includes bone anchor fixation (BF) when tissue tears off bony structures creating a hernia defect. This study aimed to provide a descriptive analysis of BF technique for blunt TAWH repair. In addition, BF and no-BF repairs were compared, hypothesizing increased hernia recurrence with BF repair.
Methods: A post hoc secondary analysis of the WTA blunt TAWH multicenter study was performed including all patients who underwent repair of their TAWH (01/2012-12/2018). Patients with BF were compared to those with no BF with bivariate analyses.
Results: 176 patients underwent repair of their TAWH with 41 (23.3%) undergoing tissue or mesh BF. Patients requiring BF most commonly had flank hernias (56.1%) and were repaired with open surgery (92.7%). 26 (63.4%) patients had tissue fixed to bone, with 7 of those reinforced with mesh. The remaining 15 (36.6%) patients had bridging mesh anchored to bone. The BF group had a similar age, sex, body mass index, and injury severity score compared to the no BF group (all $p>0.05$). The median defect size (8 vs. 8.5 cm, $p=0.206$), time to repair (1 vs. 1 days, $p=0.158$), as well as rate of hernia recurrence (9.8% vs. 12.7%, $p=0.786$) and surgical site infection (SSI) (12.5% vs. 15.6%, $p=0.823$) were all similar between cohorts (Table).
Conclusions: This largest series to date found that nearly one-quarter of TAWH repairs required BF. In contrast to the hypothesis, BF repairs had a similar rate of hernia recurrence and SSI compared to no BF repairs, suggesting this is a reasonable option for repair of TAWH. Future prospective studies are needed to investigate specific BF techniques and evaluate long-term outcomes including patient centered outcomes such as pain and quality of life.

Variable	No bone fix (n=135)	Bone fix (n=41)	p-value
Defect Size (cm)	8 [4.4-14.3]	8.5 [5.3-15.8]	0.206
Time to repair (days)	1 [0-3]	1 [1-3.5]	0.158
Recurrence	17 (12.7%)	4 (9.8%)	0.786
SSI	21 (15.6%)	5 (12.5%)	0.823

Session XIV: Quickshot Session II 14-26
Quickshot 18: 10:04 AM - 10:10 AM

COMPARISON OF MILITARY AND CIVILIAN SURGEON OUTCOMES WITH EMERGENT TRAUMA LAPAROTOMY IN A MATURE MILITARY-CIVILIAN PARTNERSHIP

Danny Lammers, MD; Rindi Uhlich, MD, MSPH; Omar Rokayak, DO; Nathan Manley, MD, MPH; Richard Betzold, MD; Parker Hu, MD
University of Alabama School of Medicine
Invited Discussant: Kenji Inaba, MD

Introduction: Medical readiness is of paramount concern for active-duty providers. Many of the military's single surgeon teams are staffed by non-trauma fellowship trained general surgeons. This coupled with low volumes of complex trauma in military treatment facilities has driven the armed forces to embed surgeons in high-volume civilian centers to enhance their skillset for the deployed environment. It is currently unclear what impact this strategy may have on patient outcomes in these civilian centers. We sought to compare emergent trauma laparotomy (ETL) outcomes between active-duty Air Force surgeons (AF) and civilian faculty at a major ACS verified level 1 trauma center.
Methods: Retrospective review of a prospectively maintained, single center database of ETL from 2019-2022 was performed. ETL was defined as laparotomy from trauma bay within 90 minutes of patient arrival. The primary outcome was to assess for all-cause mortality differences at multiple time points.
Results: 514 ETL were performed during the study period. 22% (113/514) of patients were hypotensive [systolic blood pressure (SBP) ≤ 90 mmHg] on arrival. Five AF surgeons performed 43 ETL compared to 471 ETL by civilian faculty. There were no differences in median ED length of stay (27 vs. 22 minutes; p=0.21), but operative duration was significantly longer for AF compared to civilian surgeons (129 vs. 110 minutes; p=0.01). There were no differences in intraoperative (5% vs. 2%; p=0.30), 6-hour (3% vs. 5%; p=0.64), 24-hour (5% vs. 5%; p=1.0), or in-hospital mortality rates (5% vs. 8%; p=0.56) between AF and civilian surgeons. AF surgeons did not significantly impact the odds of 24-hour mortality on multivariate analysis (OR 0.78; 95% CI 0.10, 6.09).
Conclusion: AF surgeons had equivalent rates of mortality following ETL when compared to their civilian counterparts at a single university, ACS verified level 1 trauma center. Military surgeons may benefit from valuable clinical experience, maintenance of technical skills, and mentorship from experienced civilian trauma surgeons without a deficit in quality of care.

Session XIV: Quickshot Session II 14-26
Quickshot 19: 10:10 AM - 10:16 AM

EFFECTS OF LOCAL HYPOTHERMIA ON LIMB VIABILITY IN A TRAUMATIC MODEL OF ACUTE LIMB ISCHEMIA DURING PROLONGED DAMAGE CONTROL RESUSCITATION

Emily Kao, MD; Xu Wang, MD; Kristyn Ringgold, PhD;
Jessica Snyder, DVM; Susan Stern, MD; Eileen Bulger, MD;
Nathan White, MD; Shahram Aarabi, MD
UCSF East Bay
Invited Discussant: Sigrid Burruss, MD

Introduction: New strategies are needed to mitigate further tissue injury during traumatic limb ischemia in cases requiring prolonged damage control resuscitation (pDCR). We hypothesized that external limb cooling would reduce local limb metabolism and ischemic tissue injury, and we secondarily compared two hypothermic temperatures.
Methods: 13 swine were anesthetized and instrumented, then underwent hemorrhage of 30mL/kg to induce shock. This was followed by induction of bilateral limb ischemia using both distal infrarenal aortic vessel loop and limb tourniquets, then resuscitation via previously published pDCR protocol. Animals were randomized to 5ºC or 15ºC cooling of one hind limb, with the contralateral hind limb serving as an uncooled control. After 5 hours of ischemia, blood flow was restored for 1 hour. Physiologic parameters, limb temperature, and tissue metabolites (glucose, lactate, and pyruvate) were routinely measured. Muscle and nerve biopsies were obtained upon conclusion of the 6-hour protocol.
Results: There were no significant differences in hemorrhage or resuscitation volumes between the 5ºC and 15ºC cooling groups. Average time to target temperature was significantly faster in the 15ºC group compared to the 5ºC group (51.1 minutes vs 134.0 minutes, p=0.01). Lactate and pyruvate levels were significantly lower in the cooled limbs compared to the 32ºC control limbs. There was no significant difference in lactate or pyruvate levels between the 5ºC and 15ºC limbs, or in tissue glucose between the three temperature groups. Mean histologic muscle score was significantly greater in the 5ºC group compared to control (p=0.03). There was no significant difference between the mean nerve scores of the 5ºC cooled limbs and paired control limbs, or between the mean muscle and nerve scores of the 15ºC cooled and paired control limbs.
Conclusion: Cooling to 15ºC could be achieved within 60 minutes and resulted in significantly reduced tissue metabolites compared to ambient room temperature while producing no significant increase in histologic muscle or nerve damage. In contrast, cooling to 5ºC significantly reduced tissue metabolites but also resulted in significantly higher histologic muscle damage. These results warrant further functional testing but suggest an approach to prevent of limb ischemia through local hypothermia.

Session XIV: Quickshot Session II 14-26
Quickshot 20: 10:16 AM - 10:22 AM

FUNCTIONAL OUTCOMES AFTER ECMO IN A TRAUMA POPULATION

Jamie Robinson, MD; Rebecca Maine, MD; Nick Johnson, MD; Barclay Stewart, MD; Alex Malloy, MD; Scott Brakenridge, MD, MSCS; Saman Arbabi, MD, MPH; Eileen Bulger, MD; Erika Bisgaard, MD
Harborview Medical Center
Invited Discussant: Abhijit Pathak, MD

Introduction: The use of extra-corporeal membrane oxygenation (ECMO) in trauma patients who develop ARDS is an effective rescue therapy. Data are limited on functional outcomes for these patients. We sought to evaluate functional outcomes for a cohort of trauma and burn patients who required ECMO for respiratory support.
Methods: We performed a retrospective cohort study of adult patients with traumatic injuries, near drownings, or burns who required veno-venous ECMO therapy at a single level I trauma center between 2016 and 2022. Demographics, ISS, ECMO data, complications, mortality, discharge disposition, and functional outcome as assessed by the modified-Functional Independence Measure (mFIM) at discharge were collected. Data were compared using student's t-test.
Results: Of the 28 ECMO patients that met inclusion criteria, 21 were trauma, 4 near-drownings and 3 were burn patients. A total of 25 were male (89) with an average age of 33 years and ISS of 32. Comparing survivors (n=16) and non-survivors (n=12), neither ISS (32 vs 35 p=0.66) nor days on ECMO pump (14 vs 8, p=0.21) differed. Survivors were cannulated later (6 days vs 2, p=0.02), and had longer hospital LOS (44.6 vs 11.5, p=<0.05), and ICU LOS (36.25 vs 11.33, p<=0.05). Bleeding complicated the course in 16 patients (57%); only 4 requiring interventions. Survival to discharge was 57% (16/28). Of these 44% (7/16) were discharged to inpatient rehab, 31% (5/16) were discharged home, and 13% (2/16) were discharged to skilled nursing facility. The mFIM was recorded for 12 patients; of whom, 100% (12/12) had full independence with expression, 83.3% (10/12) were completely independent with feeding function, and 75% (9/12) with complete or moderate locomotion function.
Conclusion: In trauma patients treated with VV ECMO, 60% survived to hospital discharge and we observed good functional outcomes in a majority of the survivors. Despite the high-risk population and known bleeding and thrombotic complications, these data suggest that ECMO is a viable rescue strategy in appropriately selected trauma patients.

Session XIV: Quickshot Session II 14-26
Quickshot 21: 10:22 AM - 10:28 AM

LEVERAGING MACHINE LEARNING TO PREDICT MORTALITY: WHEN TO STOP IN ULTRA-TRAUMA-RELATED ULTRA-MASSIVE TRANSFUSION

Courtney H. Meyer, MD, MPH; Andrew ElHabr, PhD; John Lyons, MD; Jason Sciarretta, MD, FACS; Jonathan Nguyen, DO; Randi Smith, MD, MPH
Grady Health System
Invited Discussant: Joshua Hazelton, DO

Introduction: Despite the widespread use of ultra-massive transfusion (UMT), defined as transfusion ≥20 red blood cell products within 24 hours of admission, for patients in hemorrhagic shock after trauma, mortality remains at 40-70%. In the current literature, there are no consensus guidelines directing utilization and/or cessation of this resource-demanding intervention. Furthermore, resuscitation is an inherently dynamic process, and our understanding of how the clinical and physiologic parameters associated with survivability may change with ongoing transfusion is limited. Therefore, this study sought to investigate the utility of time-specific machine learning models to predict mortality in trauma-related UMT and identify parameters associated with improved outcomes.
Methods: A retrospective cohort study was conducted at a large, academic Level I Trauma Center verified by the American College of Surgeons from May 2018 through November 2021. All trauma patients meeting criteria for UMT were included. The primary outcome of interest was in-hospital mortality. Data was obtained from the institutional trauma registry and served as input to develop time-specific decision tree machine learning models. Individual models were generated for 0-4, 4-8, 8-12, 12-16, 16-24 and 24-48 hours after the initiation of transfusion and evaluated for predictive accuracy. A 75% train/25% test split was used.
Results: 193 patients met inclusion criteria and collectively generated 37,509 individual temporal observations. They were predominantly black (81%) males (78%) with a median age of 29 years [IQR 24, 44]. The overall mortality rate was 54% (n=105). The deceased received a median of 80 [IQR 50, 110] total units of blood product compared to 50 [IQR 39, 62] in the survivors ($p < 0.001$). The 16- 24 -hour model had the greatest predictive accuracy with AUC 0.81 (0.72-0.90). Early after the initiation of transfusion, the strongest predictive factors for mortality were GCS and HR while in the later time intervals, serum lactic acid, pRBC:FFP ratios and total blood products transfused became more heavily predictive.
Conclusions: Clinical and physiologic parameters most predictive of survival during UMT change over time. This study's time-specific decision tree models were able to integrate these factors and predict mortality with accuracy as high as 81%. With refinement, these models have the potential to serve as real-time, evidence-based decision making tools to guide providers faced with the clinical and ethical challenges of UMT resuscitation. Further research is needed to define the generalizability of these models and validate their accuracy in a prospective manner. **Table 1**: Performance of time-specific decision tree models predicting mortality in trauma-related ultra-massive transfusion

Model Number and Time Window	Number of Patients		Number of Observations		ROC AUC (95% CI)	Primary Decision Tree Node
	N	% Survival	N	% Survival		
1: 0-4 Hours	160	49%	690	53%	0.78 (0.69-0.87)	GCS
2: 4-8 Hours	74	60%	252	63%	0.63 (0.51-0.76)	GCS
3: 8-12 Hours	117	65%	399	66%	0.71 (0.61-0.81)	Injury Type
4: 12-16 Hours	102	73%	348	68%	0.63 (0.51-0.74)	Total Blood Products
5: 16-24 Hours	116	72%	569	75%	0.81 (0.72-0.90)	Serum Lactic Acid
6: 24-48 Hours	115	75%	1,613	78%	0.61 (0.55-0.67)	Serum Lactic Acid

Session XIV: Quickshot Session II 14-26
Quickshot 22: 10:28 AM - 10:34 AM

LONG-TERM OPIOID USE AFTER TRAUMA: INCIDENCE AND RISK FACTORS

Matthew Benns, MD; Jeremy Gaskins, PhD;
Keith Miller, MD; Nicholas Nash, MD; Matthew Bozeman, MD;
Samuel Pera, MD; Jamie Coleman, MD; Jason Smith, MD, PhD;
Glen Franklin, MD; Brian Harbrecht, MD
University of Louisville School of Medicine
Invited Discussant: Katie Iverson, MD, MPH

Introduction: The opioid epidemic in the United States continues to lead to a substantial number of preventable deaths and disability. The development of opioid dependence has been strongly and proportionally linked to previous opioid exposure. Trauma patients seem to be at particular risk, as opioids are frequently utilized to control pain after injury. The purpose of this study was to examine the prevalence of opioid use before and after injury and to identify risk factors for long-term opioid use after trauma.
Methods: Records for all patients admitted to a Level 1 trauma center over a one-year period were analyzed. Demographics, injury characteristics, and hospital course were recorded. A multi-state Prescription Controlled Drug Monitoring Program database was queried to obtain records of all controlled substances prescribed from 6 months prior to the date of injury to 12 months after hospital discharge. Patients still receiving narcotics at 1 year were defined as long-term users and were compared against those who were not.
Results: 2992 patients were analyzed. 20.4% of patients had filled a narcotic prescription within the 6 months prior to injury. 53.5% of patients received opioids at hospital discharge. 12.5% of patients overall had long-term use after trauma. 5.9% of patients had long-term use and were opioid naïve. Significant univariate risk factors for long term use included male sex, length of stay > 8 days, injury severity score > 16, anxiety, depression, illicit drug use, orthopedic injuries, spine injuries, any surgery, and pre-injury use. On multi-variate analysis, the only significant predictor of long-term prescription opioid use was pre-injury use.
Conclusion: Opioid use has a high prevalence among trauma patients both pre-injury and during recovery. Pre-injury use is the strongest predictor of long-term use, but a concerning number of opioid naïve patients receive narcotics long-term. Caution and awareness of the risks of prescription opioids are important in the care of trauma patients.

Session XIV: Quickshot Session II 14-26
Quickshot 23: 10:34 AM - 10:40 AM

OPERATIVE TRAUMA AND MORTALITY: THE ROLE OF VOLUME

Sarah A. Hatfield, MD, MPH; Elizabeth Gorman, MD;
Nima Maghami, MD; Jian Shou, MD;
Robert J. Winchell, MD; Cassandra V. Villegas, MD, MPH
Weill Cornell Medicine/New York Presbyterian
Invited Discussant: David Shatz, MD

Introduction: Operative volume has been associated with improved outcomes across many surgical fields, but this relationship has not been clearly illustrated in trauma patients. This study sought to further evaluate the effect of operative trauma volume on mortality, hypothesizing that increased volume would be associated with reduced risk of death.
Methods: The National Trauma Data Bank (NTDB) was used to identify patients aged 18 years and older at adult Level I or II centers from 2017-2020 undergoing hemorrhage control surgery in the first 24 hours. Hierarchical logistic regression was performed to evaluate the effect of operative volume on in-hospital mortality, controlling for demographics, injury characteristics and physiology.
Results: There were 55,469 patients included in the analysis, treated at 516 trauma centers. Patients often presented in shock (56.6%), with a median ISS of 22 (IQR 14-34), and an overall mortality of 27%. After adjustment, operative trauma volume was associated with reduced mortality (OR 0.999, CI 0.997 – 1.000, p = 0.021). However, there was considerable variability in the volumes at each facility, with the top 5% of trauma centers seeing 86-294 operative traumas per year, while the remaining 95% of centers saw a median of 16 (IQR 7 – 32). To evaluate whether operative volume exhibited a uniform effect, the top 5% of trauma centers were excluded on subset analysis, with operative volume becoming non-significant in the remaining 489 centers (p=0.322).
Conclusion: Increasing operative trauma volume is protective in patients undergoing hemorrhage control surgery, but this mortality benefit appears to arise solely from very high-volume centers. Unlike elective specialty procedures, the time-sensitive nature of hemorrhage control surgery makes centralization at this level impractical. Efforts to further improve outcomes in this population should focus on modifiable factors that can be widely implemented, such as increased simulation training, as the operative volume threshold needed to improve mortality is much higher than that seen by most trauma centers.

Session XIV: Quickshot Session II 14-26
Quickshot 24: 10:40 AM - 10:46 AM

PROPENSITY WEIGHTED ANALYSIS OF CHEMOPROPHYLAXIS AGENTS FOR PREVENTION OF VENOUS THROMBOEMBOLISM IN SEVERE TBI PATIENTS: AN EAST SPONSORED MULTI-CENTER TRIAL

Asanthi Ratnasekera, DO, FACS; Sirivan Seng, MD; Daniel Kim, MD; Christina Jacovides, MD; Elinore Kaufman, MD, MSHP; Hannah Sadek, AGACNP-BC; Lindsey L. Perea, DO, FACS; Christina Monaco, DO; Ilya Shnaydman, MD, FACS; Alexandra Jeongyoon Lee, BS; Victoria Sharp, DO, FACS, FACOS; Angela Miciura, MD; Eric Trevizo, MD; Paula Ferrada, MD, FACS, FCCM, MAMSE; Kevin Schuster, MD, MPH
Crozer Chester Medical Center
Invited Discussant: Parker Hu, MD

Introduction: In patients with severe TBI, clinicians must balance preventing venous thromboembolism (VTE) with the risk of intracranial hemorrhagic expansion (ICHE). We conducted a multicenter, retrospective cohort study of severe TBI patients with the hypothesis that low molecular weight heparin (LMWH) would not increase risk of ICHE or VTE as compared to unfractionated heparin (UH).

Methods: We included patients with isolated severe TBI (AIS≥3) at 24 level I and II trauma centers, of patients ≥18 years of age, admitted from January 1, 2014 to December 31 2020. We compared patients who received subcutaneous UH and LMWH injections for chemical venous thromboembolism prophylaxis (VTEP) initiated during admission. Primary outcomes were VTE and ICHE. Secondary outcomes were mortality and neurosurgical interventions after VTEP administration. Covariate balancing propensity score weighting was utilized to balance demographic & clinical characteristics across two groups. Propensity score weighted logistic regression models were estimated for all outcomes with chemical VTEP agent as the predictor of interest.

Results: Of 3,936 patients, 984 patients received chemical VTEP, 482 UH and 502 LMWH. Overall, white patients were more likely to receive VTEP (White 65.9% vs. African American 22.4%, p<0.001). Patients on LMWH more often had pre-existing conditions such as liver disease (UH vs LMWH 1.7% vs. 4.4%, p=0.013), and coagulopathy (4.2% vs. UH 0.4%, p<0.001). Patients on UH had a higher incidence of ICHE (32% vs LMWH 25.9%, p=0.036). There were no differences in neurosurgical interventions performed after VTEP initiation between the two groups. There was a total of 29 VTE events (3%) in the cohort who received VTEP. The 7-day estimated rate without a VTE event was 99% overall, 99% in the LMWH group and 98% in the UH group. A log-rank test demonstrated no statistically significant differences in time to VTE across the two agents (p=0.253). A Kaplan-Meier curve was generated to visualize the probability of no VTE event over the study period (**Figure 1**). Propensity score weighted Cox proportional hazards modeling showed that patients receiving LMWH had a 34% decreased risk of VTE compared to those receiving UH but was not found to be statistically significant (Hazard Ratio=0.66, 95% CI=0.30-1.40, p=0.292).

Conclusion: In this large multi-center analysis, patients who received LMWH had similar risk of developing a VTE compared to those who received UH. There were no safety concerns when using LMWH compared to UH.

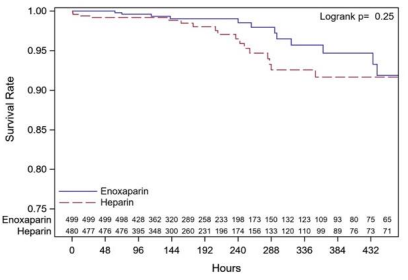


Figure 1: Time to VTE Event by Chemoprophylaxis Agent

Session XIV: Quickshot Session II 14-26
Quickshot 25: 10:46 AM - 10:52 AM

RISK FACTORS FOR EMERGENCY DEPARTMENT UTILIZATION AND READMISSION AFTER TRAUMATIC INJURY: IS FOLLOW-UP REALLY THAT IMPORTANT?

Sophia Smith, MD; Xuewei Zhao, BA; Kelly Kenzik, PhD;
Cara Michael, BS; Kendall Jenkins, MS; Sabrina Sanchez, MD, MPH
Boston Medical Center
Invited Discussant: Marissa Boeck, MD, MPH

Introduction: ED visits occur at a rate of 13-14% within 30 days of discharge from traumatic injury. Decreasing ED visits after trauma is a potential target for healthcare systems improvement. This study evaluates the factors associated with ED visits and readmissions after trauma, focusing on the impact of outpatient follow up.
Methods: A retrospective chart review was conducted of all trauma admissions from 12/1/2018 to 12/31/2019. Data from 2020 and 2021 was excluded due COVID-19. Exclusion criteria included age under 18, discharged as deceased, and those transferred to another service during their hospitalization. Categorical variables were compared using Pearson's Chi-square tests. Continuous variables were analyzed using two-tailed t-tests or Mann Whitney Wilcoxon tests for parametric and non-parametric variables, respectively. Logistic regression was used to create an model adjusted for relevant factors identified on univariate analysis. Statistical significance was designated at α=0.05. Analysis was completed using SAS Software Version 9.4 (SAS Institute Inc., Cary, NC, USA).
Results: 1,648 patients met inclusion criteria. The ED visit rate was 20.21% and the readmission rate was 6.98%. On multivariate logistic regression, associations with ED visits were neuropsychiatric conditions (OR 2.248, 95% CI 1.644-3.075), substance use disorder (SUD) (OR 2.467, 95% CI 1.788-3.403), injury location other than home (OR 1.823, 95% CI 1.242-2.674), and violent injury (OR 1.624 95% CI 1.217-2.166). On multivariate logistic regression neuropsychiatric conditions (OR 1.637, 95% CI 1.099-2.437), injury severity score (ISS) (OR 1.023, 95% CI 1.004-1.042), and discharge disposition other than home (OR 3.379, 95% CI 2.152-5.302) were associated with readmission. Attending follow up within 30 days did not have a significant association with ED visits (OR 1.186, 95% CI 0.839-1.675) or readmission (OR 0.910, 95% CI 0.571-1.448).
Conclusion: Outpatient follow up has been thought to reduce ED utilization and readmission after trauma. Our data suggests that emphasizing outpatient follow up is not an effective target in this population. Interventions should focus on supporting at-risk patients with neuropsychiatric conditions, SUD, higher ISS, and victims of violent trauma.

Session XIV: Quickshot Session II 14-26
Quickshot 26: 10:52 AM - 10:58 AM

SURVIVING BUT NOT THRIVING AFTER GUNSHOT WOUND: PROSPECTIVE STUDY OF PTSD, QOL, AND EMPLOYMENT

Isaac W. Howley, MD; Diana S. Arthur, BA; Brian R. Czarkowski, MD; Alexis B. Hess, MD; Saskya Byerly, MD; Dina M. Filiberto, MD; Emily K. Lenart, DO; Yasmin M. Ali, MD; Peter E. Fischer, MD; Andrew J. Kerwin, MD; Karen J. Derefinko, PhD
University of Tennessee Health Science Center
Invited Discussant: Bethany Strong, MD, MS

Introduction: Post-traumatic stress disorder (PTSD) is common following gunshot wounds (GSWs), with an incidence of 40-60%. Screening is uncommon in U.S. trauma centers, but undiagnosed PTSD may cause significant morbidity and detrimental effects on recovery. We hypothesized that GSW patients with PTSD experience attenuated quality of life (QoL) and impaired return to work.
Methods: This prospective observational pilot study at an urban Level 1 trauma center examined adult victims of GSW. Participants completed surveys during index hospitalization and at 1 and 3 months. Survey measures included QoL (PROMIS-29, with 7 components measured in standard deviations (SD) from the overall population norm plus a 0-10 pain score), PTSD (PC-PTSD), and employment. Survey data was linked to clinical records regarding injury severity and hospital course. Brain, spinal cord, accidental, and self-inflicted injuries were excluded.
Results: Sixty-three patients presenting between 3/22-9/22 completed the baseline survey, and 43 completed all 3 surveys. Median age was 29 (IQR 21-40), injury severity score 13 (9-17), and hospital length of stay 6 days (4-10). Laparotomy was performed in 28 patients (44%). Forty-nine patients (77.8%) were working prior to injury, 1 (2%) at 1 month, and 34 (54%) at 3 months. Eight (12.7%) patients screened PTSD+ at baseline; 38 (60.3%) screened PTSD+ at 3 months. Three-month PTSD+ patients were similar to PTSD- patients in all clinical and demographic variables. For 3-month PTSD+ patients, all PROMIS component scores were worse than for PTSD- patients: physical function 0.67 SD ($p=0.001$), anxiety 2.32 SD ($p<0.001$), depression 2.12 SD ($p<0.001$), fatigue 1.19 SD ($p<0.001$), sleep disturbance 2.39 SD ($p<0.001$), social roles/activities 1.72 SD ($p<0.001$), pain interference 1.11 SD ($p=0.004$), and pain score 7 vs 3 ($p=0.004$). There was no difference in employment at 3 months according to PTSD status (PTSD+ 33.3% vs PTSD- 40%, $p=0.641$).
Conclusion: Firearm injury causes significant psychosocial morbidity, including a large decline in employment. PTSD affects nearly 2/3rds of patients, consistent with prior reports. Even in this small pilot project, PTSD+ patients suffer from markedly reduced QoL.

POSTERS

SESSION VIII:

POSTERS

Thursday, September 21, 2023

12:45 PM - 1:45 PM

Location: California D

GROUP ONE
SHOCK/TRANSFUSION
POSTERS #1-9

Aussama Nassar, MD;
Samuel Mandell, MD, MPH

GROUP TWO
GERIATRICS AND
TRAUMA SYSTEMS
POSTERS #10-18

Tasce Bongiovanni, MD;
Jay Yelon, DO

GROUP THREE
EMERGENCY GENERAL
SURGERY AND TRAUMA
POSTERS #19-28

Nicole Goulet, MD;
Nicole Stassen, MD

GROUP FOUR
THORACIC TRAUMA AND
TRAUMA SYSTEMS
POSTERS #29-38

Michael Dalton, MD, MPH;
Charles Butts, MD

GROUP FIVE
NEUROTRAUMA
POSTERS #39-48

Galinos Barmparas, MD;
Christine Cocanour, MD

GROUP SIX
PEDIATRICS AND
INJURY PREVENTION
POSTERS #49-58

D'Andrea Joseph, MD;
David Blake, MD, MPH

GROUP SEVEN
TRAUMA SYSTEMS AND
GLOBAL HEALTH
POSTERS #59-68

Chris Dodgion, MD;
James Byrne, MD, PhD

GROUP EIGHT
CRITICAL CARE
POSTERS #69-78

Saman Arbabi, MD, MPH;
Rachel Appelbaum, MD

GROUP NINE
HEALTH DISPARITIES
POSTERS #79-88

Rondi Gelbard, MD;
Adel Elkbuli, MD, MPH, MBA

GROUP TEN
ABDOMINAL TRAUMA
POSTERS #89-98

Kazuhide Matsushima, MD;
Amy Kwok, MD

Poster #1

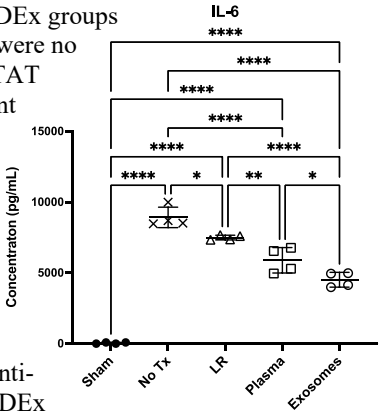
EFFECT OF RESUSCITATION USING PLASMA-DERIVED EXOSOMES IN A MURINE HEMORRHAGIC SHOCK MODEL

Nijmeh Alsaadi, MD; Joud Mulla, BS, MS;
Zachary Secunda, BA, MA; Matthew D. Neal, MD
University of Pittsburgh

Introduction: Hemorrhagic shock remains the second-leading cause of early trauma-related mortality. Transfusion of plasma products has been shown to increase survival. Exosomes, which are released by all cell types, are a type of extracellular vesicles currently being investigated as potential treatment options in other pathologies. In this study, we aim to investigate the effect of resuscitation using plasma-derived exosomes (PDEx) in a murine hemorrhagic shock model.

Methods: C57BL/6 (WT) mice were subjected to a fixed-pressure hemorrhagic shock model in which 50% of the total blood volume is withdrawn to achieve a mean arterial pressure of 25mmHg for a 3-hour duration. At 90 minutes, resuscitation using 200μL of LR, murine plasma, or $1x10^{10}$ murine PDEx was administrated. At 180 minutes, blood was collected, and TNF-a, IL-6, Syndecan 1 (Sdc 1), and thrombin-antithrombin complex (TAT) concentrations in plasma were measured using ELISA-based kits.

Results: In comparison to the sham group, TNF-a, IL-6 levels, and Sdc 1 levels increased in all treatment groups following hemorrhagic shock, with the highest concentrations being in the no treatment (Tx) group, followed by the lactated Ringer's (LR) treatment group. Alternatively, shock decreased TAT concentrations in the no Tx and LR groups to similar levels, with no significant level changes in the plasma and PDEx groups when compared to sham. Furthermore, there were no significant differences in TNF-a, Sdc 1, and TAT levels between the plasma and PDEx treatment groups. However, mice who received PDEx showed lower post-shock IL-6 values in comparison to mice who received plasma (4519 vs 5895 pg/mL, $p<0.0247$).



Conclusion: In mice, resuscitation using PDEx demonstrated comparable effects to plasma resuscitation. Furthermore, PDEx treatment showed lower IL-6 levels than those of plasma treatment, implying greater anti-inflammatory effects. Our data suggest that PDEx may be a future therapeutic option for traumatic hemorrhagic shock.

Poster #2

IL-1RA AND IL-10 IN ABDOMINAL REACTIVE ASCITES MAY REDUCE MESOTHELIAL ADHESION-LIKE FIBER FORMATION

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Swedish Medical Center

Introduction: Postoperative adhesions and subsequent bowel obstruction may occur following abdominal surgery. Appendectomy (appy) is an independent risk factor for adhesion-related rehospitalization. Disrupted during surgery, mesothelial cells (MCs) on the surface of the peritoneum secrete a sugar-rich glycocalyx to ensure a non-adhesive surface. Trauma and inflammation activate MCs to form adhesions, and pathologic adhesions may arise if adhesion fibrinolysis and MC secretion of glycocalyx is disrupted. Proteins disrupting these processes may originate from peritoneal reactive ascites (rA). Here, we analyze inflammatory mediators associated with distinct phenotypes of human MCs treated with rA collected during appy or adhesiolysis for small bowel obstruction (SBO).
Methods: This is a prospective observational IRB-approved study at three Level 1 trauma centers where peritoneal rA is collected prior to surgical intervention for non-perforated appendicitis or SBO. 71 cytokines/chemokines and 14 soluble receptors (HD48, HD23, HDSCR14; EVE Technologies) were quantified in rA. MCs were exposed to 48h of rA stimulation. Cell phenotypes were scored for 47 appy and 12 SBO rA by light, for adhesion-like fibers, and fluorescence microscopy, for glycocalyx, with labeled sugar-binding lectins: Concanavalin A and Wheat Germ Agglutinin. Scores over 3 independent experiments were clustered into 4 "fiber-lectin" (F-L) groups: No F-low L (NF-LL), No F-high-L (NF-HL), high-F-HL (HF-HL), and HF-LL. Prior abdominal surgeries (PAS) was dichotomized into No-PAS/PAS. Analyses were performed in Metaboanalyst 5.0.
Results: With 76 analytes detected in rA, 2-way ANOVA analysis of F-L and PAS showed significant differences in 19 and 10 analytes. Three analytes in common showed higher concentrations in NF-NL/No-PAS rA (adjusted $P<0.001$) and were Interleukin (IL)-1 receptor antagonist (RA), Eotaxin-2, and IL-10. NF-NL-associated rA showed a higher concentration of IL-8 compared to the other phenotypes (adjusted $P<0.001$).
Conclusions: Glycocalyx was associated with decreased proinflammatory IL-8. IL-1RA and IL-10 are anti-inflammatory and may reduce adhesion-like fiber formation in PAS rA-treated MCs, while increasing glycocalyx.

Poster #3

REAL TIME DETECTION OF GLYCOCALYX DEGRADATION FOLLOWING TRAUMA: A CONCEPTUAL USE OF THROMBOELASTOGRAPHY

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Introduction: Endothelial injury and glycocalyx shedding occur early after trauma/hemorrhagic shock (T/HS). It has been demonstrated that endothelial glycocalyx (EG) degradation is associated with increased vascular permeability and barrier dysfunction. It remains controversial as to whether EG components contribute to traumatic coagulopathy and resultant bleeding complications. Viscoelastic tests (VETs) such as thromboelastography (TEG) have been used to characterize hemostasis and coagulation following T/HS. Current VETs use activators to provide quicker results in patients following T/HS and other shock states. We hypothesize that use of these activators such as kaolin and tissue factor may affect TEG coagulation parameters vs. when no activators are used (Native TEG). This may minimize the resultant effect of glycocalyx components such as heparan sulfate (HS) or syndecan-1 (syn-1) on TEG results. This was studied using an *in vitro* model.

Methods: Citrated whole blood (WB) samples were recalcified and spiked with HS and syn-1 at clinically relevant concentrations. Blood samples were subsequently processed using a TEG-5000 or 6s analyzers. Parameters studied included citrated kaolin (CK) R time, R time with heparinase to detect a "heparin" effect (CKHR) and native TEG R time (no activators). Other parameters studied included angle and maximum amplitude (MA); clot dynamics and strength, respectively.

Results: Mean ± SD (N = 5 for each group)
*p<0.05 vs. Whole blood, #p<0.05 vs. Whole blood + HS (35µg/ml).

There was no effect on TEG parameters by syn-1, except for an increase in CK R time at the 200 ng/ml concentration.

	Whole blood	Whole blood + HS (35µg/ml)	Whole blood + HS (100µg/ml)
CK R time	6.0 ± 0.7	7.9 ± 0.3*	11.6 ± 0.5*#
CKH R time	6.4 ± 0.3 (Δ 0.4)	5.4 ± 0.5* (Δ 2.5)	5.5 ± 0.3* (Δ 6.1)
Native TEG R time	9.0 ± 0.5	15.8* ± 1.1	20.5 ± 1.3*#
MA	57.2 ± 3.3	53.9 ± 4.5	49.3 ± 2.8*
Angle	70.1 ± 6.2	65.6 ± 4.2	55.5 ± 4.1*#

*p<0.05 vs. Whole blood, #p<0.05 vs. Whole blood + HS (35µg/ml).

Conclusion: The anticoagulant effect of EG degradation products were associated with HS in this study. The results of our study suggest that the use of activators (Kaolin or tissue factor) may mask the effects of endothelial glycocalyx (EG) degradation products on TEG coagulation parameters. This was evident with native TEG or when comparing TEG R time ± heparinase. The latter comparison may be a novel real time and readily available test to identify "hidden" coagulation effects of EG degradation products.

Poster #4

A COMPARISON OF WHOLE BLOOD WITH TRANEXAMIC ACID TO OTHER RESUSCITATIVE MEASURES IN TRAUMA PATIENTS

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Introduction: Current resuscitative strategies for traumatic hemorrhagic shock include tranexamic acid (TXA) administration and use of whole blood (WB) or packed red blood cells (PRBC). Given the different coagulation properties of WB and PRBC, we aimed to determine if TXA had a significant impact on outcomes in transfused trauma patients.

Methods: Our institutional trauma registry was queried for all injured patients who received any transfusion between 2015 and 2022 within 4 hours of arrival. Patients were divided into three groups: 1) WB+TXA, 2) WB alone, or 3) PRBC+TXA. Demographics, vital signs, injury severity score (ISS), trauma score and injury severity score (TRISS), comorbidities, incidence of massive transfusion (MT), disposition from the Trauma Resuscitation Unit (TRU), 6-hour, 24-hour, and 30-day mortality were compared. We also compared the rates of pulmonary embolism (PE), deep vein thrombosis, unplanned returns to OR, acute kidney injury, and pulmonary complications.

Results: A total of 582 patients met inclusion criteria. There were no differences in ISS or TRISS between the cohorts. When compared to the PRBC+TXA cohort, the WB+TXA and the WB only cohorts were less likely to require MT or need surgical intervention emergently from the TRU. There was no difference in mortality. A higher rate of pulmonary embolism (PE) was noted in the WB+TXA cohort (See Table 1).

Conclusion: While the type of blood product transfused with or without TXA does not appear to affect mortality, trauma patients who receive WB with or without TXA are less likely to require MT or surgical intervention compared to PRBC with TXA. Additionally, WB with TXA may be associated with a higher rate of PE. Additional studies are needed to better assess this potential risk.

Table 1	TXA + WB (n=213)	WB only (n=302)	TXA + pRBC (n=67)	P-value
MT, n (%)	15 (7.0%)	16 (5.3%)	23 (34.3%)	**<0.0001**
OR, n (%)	87 (40.8%)	95 (31.5%)	41 (61.2%)	**<0.0001**
PE, n (%)	14 (6.6%)	8 (2.6%)	1 (1.5%)	**0.0434**

Poster #5

COMPARISON OF CLINICAL JUDGMENT VS THE BLEEDING RISK INDEX IN PREDICTING TRANSFUSION

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Introduction: Significant bleeding after trauma is the most frequent cause of preventable death. The Bleeding Risk Index (BRI) is a "big data" model that predicts the use of transfusion for adult trauma patients, based on automatically collected vital signs. We hypothesized that the BRI would predict blood transfusion with greater sensitivity and specificity compared to clinical judgment.
Methods: Within 10-15 minutes of arrival, a research team member requested paramedics, nurses (RN), and physicians (MD) to complete a survey using clinical judgment to predict a patient's transfusion outcomes, including un-cross matched red blood cell (UnX), or any transfusion within 6 and 24 hours. BRI predictions were calculated during the same timeframe. The areas under the Receiver Operating Curves (AUCs) were calculated for comparison.
Results: A total of 574 trauma patients were prospectively enrolled from August 2021 to June 2022, with mean age of 42.5 years (SD 18.3) and 78% being male. 11.6%, 27.5%, and 30.5% patients received UnX, or any transfusion within 6 and 24 hrs respectively. BRI prediction had AUCs 0.84, 0.85, and 0.81 for UnX, and any transfusion within 6 and 24 hours. Paramedics had AUROCs of 0.66, 0.66, and 0.70. RN had AUROCs of 0.76, 0.79, and 0.76. MD had AUROCs of 0.77, 0.79, and 0.77 respectively. Delong's AUC comparison showed that BRI predictions were significantly more sensitive and specific ($p<0.05$) compared to human experts' predictions, except that the algorithm performed similarly well ($p=0.065$) to MDs in predicting 24-hour blood transfusion.
Conclusions: This study demonstrated that BRI, generated from a large-scale dataset, predicts the urgent use of blood better than human experts during trauma resuscitation, and may be able to enhance decision-making in austere trauma settings by less experienced providers.

Poster #6

PARTIAL REBOA ENABLES CT IMAGING AND INCREASED USE OF ENDOVASCULAR HEMORRHAGE CONTROL

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Introduction: Historically, the use of REBOA was followed by immediate hemorrhage control, often accomplished through damage control techniques in the operating room. Numerous pre-clinical studies have demonstrated the benefits of partial REBOA, including early temporization of non-compressible truncal hemorrhage while mitigating distal ischemia. We hypothesize that the utilization of a REBOA device designed also to provide partial aortic occlusion (pREBOA) shifts Emergency Department (ED) disposition away from the operating room (OR) and towards computed tomography (CT) and endovascular interventions (EVIR) when compared to the previous ER-REBOA.

Methods: Data from the AAST AORTA Registry between 9/26/2013-1/10/2023 were used to compare the methods of hemorrhage control (OR vs EVIR) between patients treated with ER-REBOA and pREBOA. EVIR included any angiography procedure regardless of physical location, such as Interventional Radiology (IR), IR in the OR, or hybrid suite. OR interventions included other abdominopelvic hemorrhage control techniques, such as laparotomy or pre-peritoneal packing. Patients who did not survive to intervention were excluded.

Results: Both ER-REBOA and pREBOA groups were similar in initial demographics (Table 1); however, there was increased use of partial occlusion in the pREBOA group. pREBOA significantly altered the initial disposition of patients from the ED (p=0.03). When evaluating reasons for aortic occlusion, there was a significant increase in the use for stabilization to CT and a decrease in stabilization for OR(p=0.008). There was also a nearly doubled rate of endovascular-only procedures in the pREBOA group at 13.5% from 7.3% (p = 0.03). (Table 2)

Conclusion: The use of pREBOA was associated with a significant decrease in ED disposition to OR, an increase utilization of CT scan, and an increased use of EVIR as a means of hemorrhage control. While further research is required, these results suggest the use of pREBOA may reshape how providers triage critically ill patients to the OR, EVIR, or CT.

Table 1: Demographics, clinical presentation and injury severity among patients with ER-REBOA vs. pREBOA

Variable	ER-REBOA (n=752)	pREBOA (n=110)	P-value
Age	42	33	0.002*
% Penetrating	78.5%	78.5%	0.99
ISS	34	34	0.84
Initial SBP	97	98	0.63
Initial HR	105	110	0.51
Initial GCS	8	6	0.32
Prior CPR	22.3%	21.8%	0.90

Variables shown as median (Q1, Q3) or percentage.
Injury Severity Scale (ISS), Systolic Blood Pressure (SBP), Heart Rate (HR), Glascow Coma Scale (GCS), Cardio-Pulmonary Arrest (CPR)

Table 2: Outcomes between patients with ER-REBOA vs. pREBOA

Variable	ER-REBOA	pREBOA	P-value
% Zone 1 Occlusion	65.9% (740)	74.1% (108)	0.13
% Partial Occlusion	11.2% (170)	84.9% (106)	<0.0001*
REBOA Reason	n = 181	n = 96	0.008*
Stabilization for CT	18%	33%	
Stabilization for OR	46%	26%	
ED Disposition	n = 642	n = 96	0.03*
To OR	75.5%	67.7%	
To EVIR	7.3%	13.5%	

Outcome data between two groups based on available data; (n) specified for each analysis.
Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA), Emergency Department (ED), Operating Room (OR), Endovascular Interventional Radiology (EVIR).

Poster #7

PREDICTING HIGH-INTENSITY RESUSCITATION NEEDS IN INJURED PATIENTS FOLLOWING HEMOSTASIS

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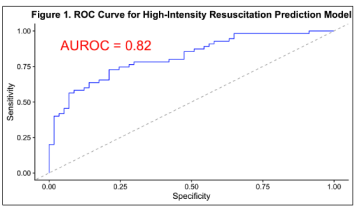
Introduction: Resuscitation needs following hemostasis are heterogeneous and influence outcomes and resource utilization. No predictive capability exists in the post-hemostasis phase of care to anticipate high-intensity resuscitation (HIR) needs. We sought to define HIR and hypothesized that HIR can be predicted from data available at the time of ICU admission.
Methods: Hemodynamic, laboratory, and procedure data for consecutive injured patients (2016-19) admitted to the trauma ICU following an emergent operation or angiographic intervention were reviewed. HIR thresholds were defined as: a) the top decile of blood products or crystalloid provided in the ICU (≥3 units, ≥4 liters, respectively) during hours 0-12 after admission and/or b) persistent vasoactive medication use, between ICU hours 2-12. The primary outcome (HIR) was a composite of *any* of the above criteria. Logistic regression models for HIR with predictor variables selected by LASSO regression were created using 70% of the cohort. Performance of the models was determined by AUROC using the remaining 30%.
Results: Data from six-hundred-and-five (605) subjects were analyzed. The median age was 39 [IQR: 28-52], ISS was 26 [IQR: 17-38], 79% were male and 41% of the cohort suffered penetrating injuries. HIR prevalence is depicted in **Table 1**. LASSO selected predictor variables included ICU admission: shock index, lactate, base deficit, hematocrit, and INR. The predictive model achieved an AUC of 0.82 (**Figure 1**) using only commonly available hemodynamic and laboratory data from the time of ICU admission.
Conclusions: Post-hemostasis, ICU admission data can predict subsequent high-intensity resuscitation. Though prospective model validation is warranted, the ability to predict HIR will help in determining future resource utilization and staffing in critical care environments.

Table 1. High-Intensity Resuscitation Prevalence

High-Intensity Resuscitation	36% (215/605)
Blood Products (≥3 units)	11% (67/605)
Crystalloid (≥4 liters)	15% (88/605)
Persistent Vasopressors (ICU 2-12h)	24% (143/605)



Poster #8

ROLE OF IONISED CALCIUM IN TRAUMA RESUSCITATION- A PROSPECTIVE STUDY AT A LEVEL I TRAUMA CENTER

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Background: Trauma resuscitation aims at early restoration of homeostasis by reversing the metabolic derangements caused predominantly by bleeding. With evolving evidence on trauma-induced hypocalcaemia it remains empirical to consider these perturbations early during trauma resuscitation. Nevertheless, no proper guidelines exist regarding evaluation of these dysregulations and also its supplementation. Hence, we designed a prospective study to analyze the role of ionized calcium in trauma resuscitation in our setting. The objective of this study was to establish the prevalence of hypocalcaemia in trauma patients and to analyse its association with mortality and the need for blood transfusion.
Methods: A prospective study was conducted on trauma patients admitted to a Level 1 trauma center in India between September 2020 and June 2022 who met the inclusion and exclusion criteria. Ionised calcium was analysed using arterial/venous blood gas immediately on arrival, after 6hrs, and on day 2 of injury. The amount of blood transfusion received by the patient was noted along with other demographic and in-hospital details.
Results: Of the 1961 patients eligible for the study 200 patients were recruited and analysed. 72.5% of patients were hypocalcaemic on arrival. There was a significant association between ionised hypocalcaemia and mortality (p-value 0.0085). Ionised calcium was also significantly associated with the need for blood transfusion (p-value <0.01). However, ionised calcium was not a sensitive or specific predictor in itself to predict the need for blood transfusion. Both the univariate and multivariable analysis showed ionised hypocalcaemia to be an independent predictor of mortality.
Conclusion: Ionized hypocalcaemia is widely prevalent among acutely injured. Hypocalcaemia at admission is associated with increased mortality as well as an increased need for blood transfusions.

Poster #9

THE FOG HAS NOT LIFTED: NO REDUCTION IN COMPLICATIONS FOR PARTIAL REBOA IN THE AAST AORTA REGISTRY

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Introduction: Resuscitative Endovascular Balloon Occlusion of the aorta (REBOA) is a potentially lifesaving, but polarizing therapy due to the associated morbidity and uncertainty of who might benefit. Techniques like partial (p)REBOA to provide hemodynamic support while reducing distal ischemia are now captured in the AAST Aortic Resuscitation in Trauma and Acute Care (AORTA) registry. We hypothesized that pREBOA would be associated with improved mortality and fewer adverse outcomes.

Methods: We queried the AAST AORTA registry for patient demographics, clinical characteristics, intervention characteristics, and outcomes between 2020-2022. Adult patients who received complete (c)REBOA or pREBOA were considered for inclusion. Patients were excluded if they had a head AIS ≥3 or an AIS of 6 in any body region.

Results: A total of 164 patients that met inclusion criteria were identified. Partial REBOA was used in 36% of cases. There was no significant difference in patient demographics, injury characteristics, or injury severity between pREBOA and cREBOA. There was no difference in mortality rate (44% vs 45%). After adjusting for potential confounders with Poisson regression analysis, no statistically significant difference in complications was detected between the two different REBOA approaches [adjusted IRR (95% CI): 1.11 (0.54-2.27), p = 0.777]. This association persisted during subgroup analysis of aortic Zone 1 vs. Zone 3 deployment. Notably, metrics on duration of cREBOA or pREBOA were not collected in the AORTA registry and >40% of patient entries were missing time to definitive hemorrhage control data.

Conclusion: Based on this registry analysis, pREBOA did not reduce morbidity or mortality compared to cREBOA. Improving granularity of important clinical metrics in the AORTA registry is essential to understanding whether patients will benefit from pREBOA and how to best guide implementation of this controversial resuscitation adjunct.

Poster #10

ADVANCING AN AGE-FRIENDLY INITIATIVE: INTEGRATING 4Ms INTO GERIATRIC TRAUMA CARE

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Introduction: The "4Ms" is an evidence-based framework integrating principles of what **M**atters most, **M**edication, **M**entation, and **M**obility in caring for older adults. This study aims to compare the effect of 4M's implementation on the outcomes of geriatric trauma patients.

Methods: A pre-post cohort study at a Level I trauma center (2019-2022). Frail geriatric (≥65) trauma patients and those ≥80 yrs, regardless of frailty status, were included. Frailty was measured within 24 hours of admission using the Trauma-Specific Frailty Index. Patients were stratified into PRE and POST implementation of 4Ms. Outcomes were in-hospital mortality, complications, delirium, LOS, discharge to rehabilitation centers or skilled nursing facilities (rehab/SNFs), and 3-month post-discharge readmissions, fall recurrences, and complications among survivors of index admission.

Results: 212 patients were identified (159 PRE, 53 POST). Mean age was 82 ±9 yrs and 52.4% were female. Median ISS was 9 [5-10] and most common mechanism of injury was fall (81%). PRE and POST groups were comparable in terms of demographics, vitals, injury parameters, operative interventions, and TSFI score ($p>0.05$). 61 (29%) patients had a major complication, 106 (50%) were discharged to rehab/SNFs, and 12 (6%) died during the index admission. POST group had increased discharge to rehab/SNFs (aOR 2.057, $p=0.036$), shorter hospital LOS ($\beta= -2.27$, $p=0.047$), lower risk-adjusted odds of delirium (aOR: 0.414, $p=0.037$) and 3-month post-discharge complications (aOR: 0.149, $p=0.043$) and readmissions (aOR: 0.122, $p=0.008$) (**Table**).

Conclusion: Integration of the 4M's framework in the care of older adult trauma patients was associated with improved clinical outcomes on index admission and 3 months post-discharge in this single-center study. Incorporation of the 4Ms may be beneficial for this growing population and should be further investigated in a multi-institutional cohort.

Table: The Risk-adjusted Effect of Geriatric Trauma Clinical Pathway on Outcomes

Index Admission	**aOR**	**95% CI**	***p*-value**
Mortality	0.259	0.03-2.053	0.201
Major Complications	0.948	0.48-2.29	0.906
Delirium	0.414	0.18-0.95	**0.037**
Discharge to SNF/Rehab	2.057	1.05-2.04	**0.036**
3-months Post-discharge	**aOR**	**95% CI**	***p*-value**
Readmissions	0.122	0.03-0.58	**0.008**
Fall Recurrence	2.410	0.79-7.30	0.120
Major Complications	0.149	0.04-0.95	**0.043**
Length of Stay	**β**	**95% CI**	***p*-value**
Hospital LOS (Days)	-2.271	-4.51 to -0.03	**0.047**

Poster #11

GERIATRIC TRAUMA TRANSFER: CURRENT PRACTICE AND PATIENT OUTCOME AFTER TRAUMATIC BRAIN INJURY

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Introduction: Geriatric patients with traumatic brain injury (TBI) are often transferred to higher level trauma centers; however, practice patterns and outcome of these patients have not been examined thoroughly in previous literature. The aim of this study was to evaluate the current practice and outcomes of geriatric patients transferred with TBI.
Methods: This is a retrospective cohort study using the American College of Surgeons Trauma Quality Improvement Program (ACS-TQIP) database 2017-2019. Geriatric patients (age ≥65) with isolated traumatic brain injury treated in Level 1 or 2 trauma centers. Injury characteristics, management of TBI, and outcomes were collected. In patients who were transferred from other hospitals, clinical factors associated with early (≤2 days) withdrawal of life support (EWLS) and overall withdrawal of life support (OWLS) were identified using the lasso regression and included in the final logistic regression models to evaluate the prediction performance.
Results: A total of 105,486 patients were included. Of the 48,606 (46.1%) patients transferred from other hospitals, 90.2% sustained TBI from fall-related injury mechanisms. More than 50% of the transfer patients had severe TBI (head Abbreviated Injury Scale [AIS] >3) and 18.7% had a midline shift on admission. Neurosurgical interventions were performed in 14.6%. The rates of EWLS and OWLS were 3.4% and 7.6%, respectively, and 11.3% with in-mortality or hospice care. Of note, 23.1% of the transfer patients with head AIS 5 underwent OWLS. The logistic regression model including basic clinical factors showed that the areas under receiver operating characteristic curves (AUC) for EWLS and OWLS were 0.932 and 0.905 (**Figure**).
Conclusion: While therapeutic transfers can improve the patient outcomes, our data suggest that the care of severely TBI patients is often withdrawn at tertiary care centers. The use of decision-support tools might be beneficial to provide improved shared decision-making discussion, and possibly avoid the long-distance interhospital transfer that may not change the management and patient outcome.

Poster #12

HOSPICE AND PALLIATIVE CARE UTILIZATION IN 16,004,232 MEDICARE CLAIMS: COMPARING TRAUMA TO SURGICAL AND MEDICAL INPATIENTS

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Introduction: Palliative care encounter (PCE) and hospice use are increasing in the geriatric inpatient population but limited research exists comparing usage rates among Trauma, Medical and Surgical specialties. The goal of this study was to determine if there are differences among these 3 groups in utilization rates of PCE and hospice.
Methods: Patients from CMS Inpatient Standard Analytical Files for 2016-20 aged ≥65 were analyzed. Patients with an NTDS qualifying ICD-10 injury code with AIS ≥2 were classified as "Trauma"; the rest as "Medical" or "Surgical" using DRG definitions. Patients were classified as having a Palliative Care Encounter (PCE) if they had an ICD-10 for PCE (Z51.5) and as Hospice Discharge (HD) if their hospital disposition was "Hospice" (home or inpatient). Proportions of use by specialty were compared by group and by subgroups with increasing risk of poor outcome.
Results: There were 16M hospitalizations from 1024 hospitals (9.3% Trauma, 26.3% Surgical, 64.4% Medical) with 53.7% female, 84.5% white, and 38.7% > 80 years. Overall 6.2% received a PCE and 4.1% a HD. Both rates were higher in Trauma patients (HD: 3.6%, PCE: 6.3%) vs. Surgical patients (HD: 1.5%, PCE: 3.0%), but lower than vs. Medical patients (HD: 5.2%, PCE: 7.5%). PCE rates increased in higher risk patient subgroups (Table) and were highest for inpatient HD.
Conclusion: In this near-population based study, PCE rates and HD rates varied significantly among specialties. Trauma patients had higher PCE and Hospice use rates than Surgical, but lower than Medical. These differences tended to be less pronounced as risk of poor outcome increased. Further studies are needed to inform efficient use of PCE and hospice resources especially as concerns the timing and selection of subgroups of patients at greatest need of these valuable but limited resources.

	Trauma	Surgical	Medical	Overall
	n=1,495,730	n=4,209,243	n=10,299,259	N=16,004,232
HD % Overall	3.6	1.5	5.2	4.1
PCE % Overall	6.3	3.0	7.5	6.2
PCE % by subgroup				
ICU stay	10.7	5.5	11.1	9.4
ICU≥5d	14.5	8.7	15.0	12.8
Ventilator	26.6	19.5	27.0	24.5
Home HD	56.0	53.4	55.7	55.5
Inpatient HD	63.7	60.8	64.2	63.8
Expired	55.9	47.1	57.2	55.0
Expired/HD combined	58.1	50.9	58.6	57.5

* Trauma significantly different from Medical and Surgical for all comparisons (p<.05).

Poster #13

NATIONWIDE IMPLEMENTATION OF GERIATRIC BEST PRACTICE GUIDELINES: ARE WE FALLING SHORT?

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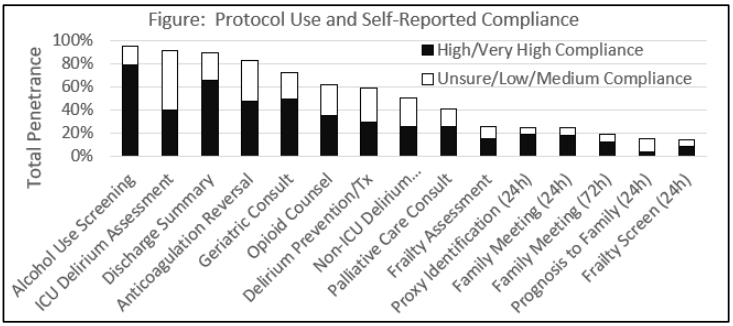
Introduction: Older patients are the fastest growing trauma population and have disproportionately poor outcomes. Despite publication of Geriatric Trauma Best Practice Guidelines (GT-BPG), implementation of these recommendations into practice remains unknown. We hypothesized that national protocol utilization and compliance with GT-BPG would be low.
Methods: TQIP-participating US trauma centers self-reported on protocol usage and compliance on 22 recommended items from the original GT-BPG including alcohol screening, delirium assessment, anticoagulation reversal, frailty assessment, proxy identification, use of family meetings, and others. Penetrance was defined as the proportion of centers with a protocol on a given item. Compliance was self-reported and grouped as high (>60%) or not high (≤60% or unknown).
Results: 156 centers self-reported protocol utilization (36% Level 1, 41% Level 2, 22% Level 3+). 11/22 had >50% penetrance into trauma centers (Figure). 2 of 22 items had both penetrance and high compliance: alcohol screening and use of a discharge summary. BPG recommending specific time frames were infrequently utilized (<30% penetrance).
Conclusion: Utilization of GT-BPG protocols remains low. Items most in use are ones established as best practice for younger trauma patients, while geriatric-focused items have low utilization. Focus on implementation strategies will be key to improve care of the geriatric trauma patient.



Poster #14

SUBSTANCE USE AND PRE-HOSPITAL CRASH INJURY SEVERITY AMONG U.S. OLDER ADULTS: A NATIONAL SURVEY

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Introduction: Every day, 700 US geriatric population (65+ years) sustain motor vehicle injuries. Substance use (alcohol and drugs) is a risk factor for crash involvement. With little known about geriatric substance use and injury outcomes, we assessed the association between substance use and crash injury severity.
Methods: This single-year cross-sectional analysis pooled the 2019 data from the U.S. National Emergency Medical (EM) Service Information System. The outcome variable was injury severity, defined using the EM Model and measured as low acuity, emergent, critical, and fatal injury. Predictor variables included substance use, defined as self or officer-reported alcohol and/or drug use. We controlled for age, sex, anatomical injured region, EM response time, location of the injury, rurality/urbanicity, and the time of the day. We performed a partial proportional ordinal logistic regression and reported the adjusted odds ratio (AOR) (plus 95% confidence interval (CI)) of worse injury outcomes (emergent, critical, and fatal injuries). Also, we assessed, through an interaction model, the predicted probabilities of substance use-related injury severity by rurality/urbanicity.
Results: Our sample consisted of 38,850 older adults, who sustained crash injuries as car occupants. The population was predominantly males (54%), aged between 65 and 74 years (61%). Approximately 69%, 25%, 5%, and 1% sustained low acuity, emergent, critical, and fatal injuries, respectively. Substance use-related case fatality rates were 1% and 8% in urban and rural areas, respectively. After controlling for patient, and crash characteristics, substance use was associated with 78% increased odds of worse injury outcomes compared to low acuity injuries (AOR: 1.78; 95% CI: 1.55 – 2.05). The predicted probability of critical injury was 7.8% (95% CI: 6.13 - 9.38) with the predicted probabilities being 7.4% (95% CI: 5.75 - 9.15) and 10.0% (95% CI: 4.71 - 15.21) in urban and rural areas, respectively.
Conclusion: Substance use is associated with worse geriatric crash injury severity, with the odds higher in rural areas. Routine substance use screening in the primary care setting may reduce motor vehicle crash injury risks among older adults.

Poster #15

VALIDATION OF THE ORTHOPEDIC FRAILTY SCORE FOR MEASURING FRAILTY IN HIP FRACTURE PATIENTS: A COHORT BASED ON THE UNITED STATES NATIONAL INPATIENT SAMPLE

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Introduction: The Orthopedic Frailty Score (OFS) has been proposed as a tool for measuring frailty in order to predict short-term postoperative mortality in hip fracture patients. This study therefore aims to validate the OFS using a large national patient register to determine its relationship with adverse outcomes as well as length of stay and cost of hospital stay.
Methods: All adult patients (18 years or older) registered in the 2019 National Inpatient Sample Database who underwent emergency hip fracture surgery following a traumatic fall were eligible for inclusion. The association between the OFS and mortality, complications, and failure-to-rescue (FTR) was determined using Poisson regression models adjusted for potential confounders. The relationship between the OFS and length of stay and cost of hospital stay was instead determined using a quantile regression model.
Results: An estimated 227,850 cases met the study inclusion criteria. There was a stepwise increase in the rate of complications, mortality, and FTR for each additional point on the OFS. After adjusting for confounding, an OFS ≥4 was associated with an over four-fold increase in the risk of in-hospital mortality [adjusted IRR (95% CI): 5.40 (2.37-12.33), p <0.001], a 36% increased risk of complications [adjusted IRR (95% CI): 1.36 (1.14-1.63), p <0.001], and an almost five-fold increase in the risk of FTR [adjusted IRR (95% CI): 5.92 (2.56-13.69), p <0.001], compared to OFS 0. Patients with OFS ≥4 also required half an additional day of care [change in median length of stay (95% CI): 0.51 (0.04-0.99), p = 0.033] as well as cost approximately $2,700 more to manage [change in median cost of stay (95% CI): 2,682 (2,040-3,325), p <0.001], compared to those with OFS 0.
Conclusions: Patients with an elevated OFS display a substantially increased risk of mortality, complications, and failure-to-rescue as well as a prolonged and more costly hospital stay.

Poster #16

HOW TRIAGE OF ELDERLY ANTICOAGULATED FALLS IMPACTS HOSPITAL FLOW

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Introduction: The issue of emergency department (ED) overcrowding and throughput are challenges at many hospitals. Triage algorithms can impact patient flow and are evaluated for overall appropriateness, but the correct trauma activation of anticoagulated patients ≥65 years of age with ground level falls is unknown. We hypothesized that triage category of these patients impacts ED throughput.
Methods: From July 2019 to December 2021, a prospective cohort study was conducted. We activated ground level falls in patients ≥65 years old on anticoagulants as Level 2 (trauma team managing patients) on even months and as Level 3 (emergency medicine managing patients) on odd months. Outcomes included admission rate, time to admit orders, ED length of stay, abdominal CT rate and mortality. Data was compared using Mann Whitney and Chi-squared or Fisher's exact tests for small sample sizes.
Results: 447 trauma activations were captured (Level 2=346, Level 3=101). The median injury severity score was 2 (IQR=1, 5) in Level 2 and 1 (IQR=1, 6) in Level 3 patients. Admission rates were similar for Level 2: 59% (95% CI 54, 64%) and Level 3: 50% (95% 40, 61%), p=0.13. Median time to admit orders was faster for Level 2 at 5.94 hours (95% CI 6.70, 8.16) than Level 3 at 7.33 hours (95% CI 7.47, 11.53) p=0.01. Median ED length of stay was shorter for Level 2 at 8.33 hours (95% CI 9.02, 10.11) than Level 3 at 9.22 hours (95% CI 10.64, 14.87) p=0.05. In admitted patients, the abdominal CT rate was higher for Level 2 (72%, 95% CI 65, 78%) than Level 3 (49%, 95% CI 35, 63%), p=0.002. No difference in the number of deaths was identified with 3 in Level 2 and 2 in Level 3 (p=0.32).
Conclusion: Admission and death rates were similar for anticoagulated, elderly patients with falls regardless of their level of trauma activation. A greater number of abdominal CTs were obtained for Level 2 activations. However, a significant decrease in time to admit orders and ED length of stay was identified in patients triaged as second-tier activations. Triage categories not only mobilize resources but also impact ED patient flow.

Poster #17

INCREASING COMPLEXITY OF ELDERLY INJURED PATIENTS: A NATIONWIDE ANALYSIS

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Introduction: With the aging US population, trauma centers are likely to treat increased numbers of elderly patients. The relative increase in elderly trauma patients and the complexity of these patients relative to the general population and to other inpatient populations remains unclear. We hypothesized that the population of patients in the National Trauma Databank has increased in both age and rate of comorbidities compared to a larger population of hospitalized and non-hospitalized US patients.
Methods: Demographic data were abstracted from three databases: Medical Expenditure Panel Survey (MEPS, general population), National Inpatient Sample (NIS, discharged patients), and National Trauma Databank (NTDB, injured patients). Critical comorbidities were generated from a pragmatic list of high-risk conditions that may confer additional morbidity or mortality using ICD-9 and ICD-10 diagnosis codes (2007 to 2019). Nonparametric two-sample tests were used to compare trends among MEPS, NIS, and NTDB.
Results: The median NTDB patient age increased from 37 (interquartile range [IQR] 21-56) years (2007) to 52 (IQR 28-71) years (2019), representing a significantly greater increase than the MEPS or NIS databases (p=0.026, p=0.002, respectively). The proportion of NTDB patients aged 65 or older experienced a greater increase in the rate of any critical comorbidity (46.1% to 80.8%; average yearly rate of change 2.89%) compared to their MEPS and NIS counterparts (p=0.005, p=0.017, respectively). The proportion of traumatically injured elderly patients in US centers has increased and the proportion of those patients with comorbid conditions has grown more rapidly than in other US patient populations (Figure 1).
Conclusions: Trauma centers are facing a large influx of multimorbid geriatric patients at a steep rate of increase. The need for added resources specific to the care of the elderly and the benefit of focusing injury prevention and comorbid condition mitigation efforts in this population merits specific exploration.

Poster #18

ORTHOPEDIC FRAILTY SCORE AND OUTCOMES IN SURGICALLY MANAGED ISOLATED TRAUMATIC SPINE INJURIES

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Introduction: With an aging global population, the prevalence of frailty in traumatic spinal injury (TSI) patients is steadily increasing. The aim of the current study is to evaluate the utility of the Orthopedic Frailty Score (OFS) in assessing the risk of adverse outcomes in patients with isolated TSI requiring surgery.
Methods: The TQIP database was queried for all adult patients (18 years or older) who suffered an isolated TSI due to blunt force trauma, between 2013-2019, and underwent spine surgery. Patients were categorized as non-frail (OFS 0), pre-frail (OFS 1), or frail (OFS ≥2). The association between the OFS and in-hospital mortality, complications, and failure-to-rescue (FTR) was determined using Poisson regression models, adjusted for potential confounding.
Results: A total of 39,391 patients were included in the current investigation. After adjusting for confounding, frailty was associated with a doubling in the risk of in-hospital mortality [adjusted IRR (95% CI): 2.11 (1.61-2.77), p <0.001], a 39% higher overall risk of complications [adjusted IRR (95% CI): 1.39 (1.06-1.82), p = 0.018], and a 125% higher risk of FTR [adjusted IRR (95% CI): 2.25 (1.36-3.72), p = 0.002], compared to non-frail patients.
Conclusion: The findings indicate that the Orthopedic Frailty Score could be an effective method for identifying frailty in traumatic spinal injuries patients in need of surgical intervention who are at a disproportionate risk of adverse events.

Poster #19

UNINTENDED EFFECTS OF AUTOMOTIVE INSURANCE POLICIES ON RETRIAGE OF SEVERELY INJURED PATIENTS

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Introduction: States maintain either no-fault or at-fault automotive insurance policies, with no-fault states having lower administrative barriers than at-fault states for clinical care reimbursement of motor vehicle collision injuries. However, it is unknown whether no-fault policies influence patterns in trauma care, including retriage, or same-day emergent transfer of injured patients to higher level care. Timely retriage reduces injury mortality similar to being taken directly to a high-level trauma center. Thus, our objective was to examine whether no-fault policies were associated with differences in retriage of severely injured patients.
Methods: We conducted a retrospective cross-sectional study of patients with severe (injury severity score >15) MVC injuries using the Healthcare Cost and Utilization Project State Emergency Department and Inpatient Databases for five states from 2016-2017. FL, MA, and NY are no-fault states, while MD and WI are at-fault states. Only Medicare patients were included to minimize confounding by other payers. The primary outcome was retriage, and secondary outcome was undertriage. Multivariable logistic regression was used to identify factors associated with both outcomes.
Results: A total of 2,110 patients from 251 hospitals were included. Median age was 70 years (interquartile range: 65-78), traumatic brain injury (35.6%) was most common, and median ISS was 25 (IQR: 17-33). Unadjusted rates of retriage were 2.6% in no-fault states and 9.3% in at-fault states ($p<0.001$). After adjusting for age, sex, race/ethnicity, ISS, Elixhauser, injury, hospital trauma volume, and state, no-fault states were associated with lower odds of retriage (adjusted odds ratio: 0.50, 95% confidence interval: 0.27-0.94) and higher odds of undertriage (aOR: 3.2, 95% CI: 2.2-4.7).
Conclusion: No-fault automotive insurance policies, compared to at-fault policies, were associated with less retriage and more undertriage of patients on Medicare with severe MVC injuries. Further study can better characterize how financial incentives may influence practice patterns for trauma and acute care.

Poster #20

NATIONAL STUDY OF TELETRAUMA USE IN US EMERGENCY DEPARTMENTS

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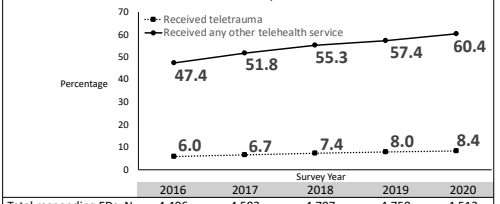
Introduction: Nearly 30 million rural Americans lack timely access to trauma care expertise available at level I/II trauma. Telehealth is an established approach to improve access to healthcare expertise using remote consultation. However, the use of telehealth in trauma (teletrauma) across the US is not known. We describe the prevalence, trends, and factors associated with teletrauma use and adoption among US emergency departments (EDs).

Methods: Data from the National Emergency Department Inventory (NEDI-USA) 2016-2020 were analyzed. NEDI-USA is a nationwide survey of all non-federal/non-specialty US EDs. The proportion of EDs using teletrauma vs any other telehealth service by year was calculated. Multivariable logistic regression was used to describe factors associated with teletrauma use in 2020 and with adoption between 2016-2020.

Results: Among 4,512 EDs with available survey data in 2020 (82% response rate), 379 (8%) reported receiving teletrauma vs 2,726 (60%) receiving any other telehealth service (Fig 1). Teletrauma use ranged between 0% (AL, CT, DC, IN, NJ, NV, OK, OR, RI, SC) to >60% (AR 61% SD 76%, ND 86%). Factors associated with teletrauma use included rural location [odds ratio (95% CI); 2.44 (1.77-3.36)], critical access hospital (CAH) [2.67 (1.83-3.88)] and basic stroke hospital [1.74 (1.32-2.30) vs non-stroke hospital] designations. Factors associated with adoption of teletrauma by 2020 included CAH [1.98(1.35-2.90)] and basic stroke hospital [1.42(1.04-1.94) vs non-stroke hospital] designation.

Conclusion: Teletrauma lags significantly behind other telehealth services in US EDs. We encourage more research on how teletrauma is being used and barriers to its wider implementation.

Fig 1: Proportion of US Emergency Departments using Teletrauma, 2016-2020



	2016	2017	2018	2019	2020
Total responding EDs, N	4,406	4,582	4,707	4,758	4,512
Received teletrauma, n	263	307	347	380	379
Received any other telehealth service, n	2,087	2,374	2,601	2,729	2,726

Poster #21

ANALYSIS OF PUBLICATION RATES OF PRESENTATIONS AT AMERICAN TRAUMA/ACUTE CARE SURGERY CONFERENCES

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Introduction: Trauma/acute care surgery research is presented at four major, annual American conferences: American Association for the Surgery of Trauma (AAST), Eastern Association for the Surgery of Trauma (EAST), Western Trauma Association (WTA), and Pediatric Trauma Society (PTS). We hypothesized that oral/quick shot presentations are published at higher rates than posters, and that publications committees are associated with increased publication rates.
Methods: Conference programs from 2015-2019 were included. Web searches f title, authors, and content determined publication status and citation volume.
Results: A total of 2356 presentations were included, with 1849 (78%) articles published in 166 journals, including 778 (33%) in Journal of Trauma and Acute Care Surgery (JTACS), the official publication of all associations. Presentations from WTA (78%) and EAST (74%) were published at higher rates than AAST (64%) and PTS (47%) ($p<0.001$). Overall, oral/quick shot presentations were published at higher rates (68% vs 32%, $p<0.001$) and in JTACS (84% vs 50%, $p<0.001$), but there was no difference in the impact factor (IF) of publishing journals or papers manuscripts compared to poster presentations. Published oral/quick shot manuscripts from AAST did have a higher IFs compared to posters, and those from EAST went to higher impact journals. Associations with publications committees (EAST and WTA) had highest publication rate overall and in JTACS. While posters are published at lower rates, the eventual impact of a published manuscript presented as a poster is equivalent to that of an oral/quick shot.
Conclusion: Most research presented at trauma conferences is published, with oral/quick shot presentations published at higher rates compared to posters. Publication committees may have value for selecting high-value research and increasing publication rates.

	AAST (1159)			EAST (438)			WTA (219)	PTS (540)		
	Orals & QSs (466)	Posters (693)	P value	Orals & QSs (321)	Posters (117)	P value	Orals (219)	Orals & QSs (348)	Posters (192)	P value
Published, N (%)	396 (85%)	346 (50%)	<0.001	250 (78%)	75 (66%)	<0.001	169 (77%)	348 (55%)	59 (31%)	<0.001
Published in JTACS, N (%)	281 (71%)	95 (28%)	<0.001	186 (74%)	23 (30%)	<0.001	147 (87%)	192 (22%)	4 (7%)	0.009
Years to Publication	1.35 ± 0.83	1.71 ± 1.04	<0.001	0.45 ± 0.80	1.13 ± 1.25	<0.001	0.28 ± 0.57	1.81 ± 1.24	1.61 ± 1.27	0.275
Publishing Journal IF	3.61 ± 1.56	3.69 ± 9.88	0.877	3.64 ± 1.82	2.89 ± 1.52	0.003	3.56 ± 0.82	3.78 ± 13.51	2.61 ± 1.41	0.54
3 year Manuscript IF	6.10 ± 7.48	4.49 ± 12.75	0.033	4.47 ± 4.78	3.52 ± 3.93	0.154	4.76 ± 4.10	2.44 ± 3.05	2.31 ± 2.68	0.376

2015-2019 publication rates for orals and quick shots (QS) combined vs. poster presentations by meeting. Presented as mean ± standard deviation unless noted.

Poster #22

SURGICAL TREATMENT OF COMBINED PELVIC INJURIES USING MATHEMATICAL AND COMPUTER MODELING

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Introduction: The search for new approaches to providing medical care to victims with severe combined pelvic injuries (CPI) using modern diagnostic methods and minimally invasive surgery is scientific and practical interest. The purpose was to refine the treatment results based on the analysis of the CPI structure, the use of optimal approaches to the choice of surgery, using modern hemostasis methods and minimally invasive internal fixation of pelvic ring, taking into biomechanical modeling.
Methods: We analyzed the frequency and structure of CPI in the level I trauma center for 10 years. A comparative analysis of the victims who underwent pelvic packing or angioembolization was carried out. The relationship between the retroperitoneal hemotomas parameters and the blood loss volume in various types of pelvic injuries was studied. Simulation was carried out using the ANSYS 16.1 system. To determine the outcome with high accuracy, predictive logit models were created. A new treatment and diagnostic algorithm for severe CPI and a method for choosing the optimal internal pelvic fixation have been developed. The immediate and long-term results were analyzed.
Results: Most often, CPI were after traffic accidents (55.9%) and falling (37.3%). 84.7% of victims were young people. ISS > 25 was in ½ of the victims. CPI was characterized by shock (55.2%) and significant blood loss volume (56.3%). In the analysis the pelvic hematoma volumes were: in moderate blood loss - 178.3±17.1 cm^3, in severe - 331.6±24.4 cm^3, extremely severe - 461.3±68.5 cm^3; among the victims with extravasation on CT - 517.5 [250; 835] cm3. A positive correlation was found between the blood loss volume and pelvic hemorrhage volume and prevalence. The choice of the surgical hemostasis method depends on the hemodynamics, the bleeding nature and other injuries. The developed algorithm allowed achieving optimal outcome in 79.4% cases. Analysis of thromboelastography allowed correcting the transfusion therapy. Biomechanical modeling of pelvic injuries allowed choosing the optimal method of minimally invasive fixation (MIF) in the first 12 hours. MIF allowed stabilization in 81.7%. The developed predictive logit-models made it possible to determine the outcome and apply MIF safely.
Conclusion: The developed algorithm allowed to reduce the total (from 13.5 to 20.5%) and 24-hours mortality rate (from 5.3 to 10.6%) and complications (from 51.4 to 34.5%).

Poster #23

DISTAL NEPHRON ROLE IN LETHAL CRUSH SYNDROME HYPERKALEMIA MAY HAVE TREATMENT IMPLICATIONS

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Introduction: Crush Syndrome causes loss of glomerular filtration rate (GFR) and lethal hyperkalemia. In austere environments, dialysis and intensive care may be unavailable. However, since potassium (K) is secreted by the distal nephron, excretion is not directly dependent on GFR and GFR-supporting therapy. Thus, investigation of the role of the distal nephron in crush syndrome hyperkalemia could yield life-saving intervention.
Methods: 23 female swine were anesthetized, subjected to sham surgery (n=5) or bilateral captive bolt blast injury (n=18) and randomized to treatment 30 minutes later with the proximal tubule protectant cilastatin sodium, cilastatin and calcitriol, or vehicle (untreated group). Blood and urine samples were obtained immediately before treatment (0 hour) and at 2 hours. 6-hour GFR was measured using iohexol clearance. Urine/plasma sodium (Na) and K were determined by flame photometry. Urine and plasma osmolality were quantified. K clearance, fractional excretion, and trans-tubular gradient were calculated. Analysis was completed in R.
Results: Plasma K did not change in shams (n=5, p=0.7). In injured, untreated animals (n=7), plasma K increased (p=0.03), accompanied by reduced K clearance (p=0.01) and creatinine clearance (p=0.03). Urine Na was high and was unchanged over time (p>0.05). There was no difference in the fractional excretion of K (p=0.67) between 0 and 2 hours, while the trans-tubular K gradient (TTKG) decreased (p=0.05). K clearance covaried with 2-hour creatinine clearance (p<0.001), but not with 6-hour GFR (p-value=0.28). Treated animals did not have significantly different K clearance at 2 hours compared to the untreated group (p>0.05).
Conclusion: Crush syndrome caused hyperkalemia accompanied by reduced K clearance which was not changed by cilastatin treatment. Together these data suggest that K excretion in early crush syndrome is decoupled from GFR and proximal tubule injury. Further mechanistic study may yield novel physiologic interventions in lethal hyperkalemia, potentially altering trauma and disaster care.

Poster #24

A COST-UTILITY ANALYSIS OF LAPAROSCOPIC SUBTOTAL CHOLECYSTECTOMY

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Introduction: Safe laparoscopic cholecystectomy requires obtaining a critical view, however in difficult dissections, accomplishing this view can sometimes be unsafe. There is no consensus for the optimal "damage control" strategy when unable to obtain a critical view safely. Several studies have compared the cost-effectiveness of open versus laparoscopic cholecystectomies, but none have compared reconstituted laparoscopic subtotal cholecystectomy (R-LSC) to fenestrated laparoscopic subtotal cholecystectomy (F-LSC). The complications such as bile leak and need for endoscopic retrograde cholangiopancreatography (ERCP) associated with R-LSC, must be weighed against complications of recurrent percutaneous interventions and completion cholecystectomy in F-LSC, while evaluating the cost associated with each procedure. We hypothesize that R-LSC is the more cost-effective strategy.
Methods: We performed a decision-analytic model using TreeAge software to evaluate the cost-effectiveness of a F-LSC versus R-LSC. Our base case was a patient with acute cholecystitis undergoing a LSC. Costs, probability, and Quality-Adjusted Life Years (QALYs) were generated from published literature.
Results: R-LSC was cost-effective at $7755 and 0.89 QALY compared to F-LSC at $7969 and 0.88 QALY. Deterministic analysis identified the probability of a bile leak and cost of ERCP as the most impactful variables in the study. One-way sensitivity analyses demonstrated that F-LSC becomes the cost-effective option over R-LSC when the probability of bile leak decreases to 7% from 18% or when the cost of an ERCP decreases to $642 from $8000.
Conclusion: R-LSC is more cost-effective with improved health utility compared to F-LSC. In R-LCS, the decreased prevalence of bile leak and decreased need for ERCP outweigh the increased need for multiple percutaneous interventions in F-LCS.

Poster #25

AN ESTIMATED BLOOD VOLUME-BASED ENOXAPARIN DOSING PROTOCOL IMPROVES VENOUS THROMBOEMBOLISM PROPHYLAXIS IN EMERGENCY GENERAL SURGERY PATIENTS

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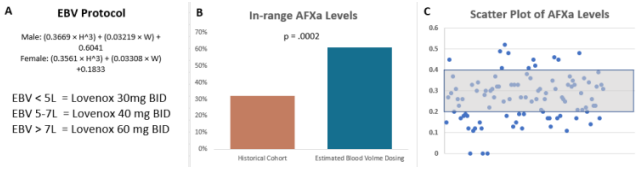
Introduction: Fixed-dose enoxaparin regimens do not provide adequate Xa inhibition in many surgical populations, and low Anti Factor Xa (AFXa) levels are associated with venous thromboembolism. We aimed to assess an individualized, estimated blood volume (EBV) based enoxaparin dosing protocol on AFXa levels in emergency general surgery (EGS) patients.
Methods: We performed a prospective observational trial of EGS patients admitted to an urban tertiary center. Adult patients without end-stage renal disease and who were otherwise eligible for VTE prophylaxis with enoxaparin were dosed with an EBV-based protocol (Fig 1A). The primary outcome was peak AFXa level obtained 2.5-6hrs at enoxaparin steady state. Accepted AFXa range was 0.2-0.4 IU/mL. Dose adjustment and AFXa re-evaluation was performed when appropriate. Secondary outcomes included bleeding and VTE events. The prospective cohort was compared to a historical cohort of EGS patients dosed with a fixed, BMI-based protocol.
Results: 100 consecutive patients with properly timed, steady state AFXa levels were included in the study. The majority of patients were female (55%), the mean age was 57 years, and the most common admission diagnosis was small bowel obstruction (23%). A total of 62% of patients required an operation. Initial AFXa was in-range in 61% of patients on EBV dosing and was significantly more likely to be in-range compared to the historical BMI-based cohort (Fig 1B, 1C, p =.0002). There were four patients who required a blood transfusion. Two of those patients had AFXa levels above 0.4. There were no VTE events on index admission.
Conclusion: An EBV-based enoxaparin dosing protocol improves VTE prophylaxis in EGS patients by increasing rates of in-range initial Anti Factor Xa levels.



Poster #26

CREATION OF A MULTIDISCIPLINARY INPATIENT COMPLEX PROCEDURAL TEAM MAY IMPROVE HOSPITAL EFFICIENCY

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Introduction: Hospitals struggle to perform routine but complex inpatient procedures in a cost-effective, timely and high-quality manner. Limited examples exist of procedural teams created to perform technically complex procedures. We created a multidisciplinary 'Inpatient Procedural Team ' (IPT) to meet the demand of non-vascular, non-enteral access bedside procedures and studied its impact on hospital efficiency.
Methods: IPT was comprised of APP's and sonographers with medical direction from an acute care surgeon, and expert collaboration with other specialties. IPT worked collaboratively with interventional radiology for scheduling of bedside procedures under sonographic guidance. IPT scope of practice included thoracentesis (T), paracentesis (P) and lumbar punctures (LP). We performed a before/after study evaluating consult completion time, case creation to procedure start time, and nursing hours saved.
Result: In five months, IPT performed 1036 procedures, averaging 7.6 ± 0.34 cases per day: 575 P, 466 T (17 including chest tubes) and 30 LP. Complication rates for P = 0.17%, T = 0.21%, LP and chest tube = 0%. We found a 69.2% decrease in consult completion time (9.75hrs vs 3hrs, $p < 0.0001$), a 79.3% decrease in case-creation-to-procedure start time (13.92hrs vs 2.88hrs, $p < 0.0001$). When compared to pre-IPT data, procedures were completed a mean 17.8hrs earlier than historic controls. 350 off-floor nursing hours were saved and 2000 patient transports to radiology and back were eliminated.
Conclusion: The IPT has shown to positively impact time to procedure, off floor nursing time, and patient transports while providing safe, high-quality care. Working collaboratively with IR, acute care surgery can assist APP's with bedside procedures to improve hospital efficiency.

Poster #27

FACTORS ASSOCIATED WITH THE NEED FOR LONG-TERM TOTAL PARENTERAL NUTRITION IN SURVIVORS OF ACUTE SUPERIOR MESENTERIC ARTERY OCCLUSION

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Background: Acute superior mesenteric artery (SMA) occlusion is an uncommon condition associated with high mortality. If extensive bowel resection is performed for patients with acute SMA occlusion and the patient survives, long-term total parenteral nutrition (TPN) may be needed due to short bowel syndrome. This study examined factors associated with the need for long-term TPN after the treatment of acute SMA occlusion.
Methods: We retrospectively analyzed 78 patients with acute SMA occlusion. Patients were abstracted from a Japanese database from institutions with at least 10 patients with acute SMA occlusive disease from January 2015 through December 2020,
Results: Among the initial cohort there were 41/78 survivors. Of these, 14/41 (34%) required permanent TPN who were compared with those who did not require long-term TPN (27/41, 66%). Compared to patients in the non-TPN group, those in the TPN group had significantly shorter remaining small intestine (90.7 cm vs. 218 cm, $P<0.01$), more patients with time from onset to intervention >6 hours ($P=0.02$), pneumatosis intestinalis on enhanced computed tomography scan ($P=0.04$), ascites (Odds Ratio 11.6, $P<0.01$), and a positive smaller superior mesenteric vein sign ($P= 0.03$). These were considered significant risk factors for needing long-term TPN. Age, gender, underlying disease, presence of peritoneal sign, presence of shock requiring vasopressors, site of obstruction (proximal vs. distal), and initial treatment (surgery vs. interventional radiology vs. thrombolytic therapy) were not significantly different between the two groups. Long-term TPN was significantly associated with longer hospital stay (52 vs. 35 days, $P=0.04$). Multivariate analysis identified the presence of ascites as an independent risk factor for needing long-term TPN.
Conclusion: The need for permanent TPN after treatment of acute SMA occlusion is significantly associated with longer hospital stay, longer time to intervention, and characteristic imaging findings (pneumatosis intestinalis, ascites, Smaller SMV sign). Ascites is an independent risk factor.

Poster #28

PERIOPERATIVE OUTCOMES OF SUPER- AND SUPER-SUPER OBESE PATIENTS WITH NECROTIZING SOFT TISSUE INFECTIONS

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Introduction: Necrotizing soft tissue infections (NSTI) are commonly encountered by the acute care surgeon, often in obese patients. However, little is known about the risk profiles of Class III obesity patients, specifically in the morbidly obese (MO, BMI ≥ 40-49.9), super-obese (SO, BMI ≥ 50-59.9), and super-super obese (SSO, BMI ≥ 60) patients with NSTI. The aim of this study is to investigate the perioperative outcomes of MO, SO, and SSO patients undergoing intervention for NSTI.
Methods: The National Surgical Quality Improvement Program database was queried for patients aged 18-90 years with BMI ≥ 40 undergoing surgery for NSTI from 2011-2021 based on ICD codes for gas gangrene, necrotizing fasciitis, and Fournier's gangrene. Patients were stratified into MO, SO, and SSO categories. The primary and secondary outcomes were 30-days postoperative mortality and morbidities. Descriptive statistics and multivariable logistic regression were performed.
Results: A total of 1,999 patients were included: 1,236 MO (61.8%), 489 SO (24.5%), and 274 SSO (13.7%). Average 30-day mortality for the MO, SO, and SSO cohorts were 8.6%, 6.5%, and 13.5% respectively (p=0.005). In multivariable analysis, both SO and SSO groups had higher odds of suffering from septic shock compared to MO patients (OR 1.42, 95%CI 1.05-1.9, p=0.021; and OR 1.66, 95%CI 1.15-2.41, p=0.007, respectively), and the odds of 30-day mortality for patients with NSTI was nearly doubled in the SSO group compared to MO cohort (OR 1.93, 95%CI 1.13–3.31, p=0.016).
Conclusion: We found that SO and SSO patients undergoing surgery for NSTI had different risk profiles compared to MO patients. Both SO and SSO patients had higher likelihood of developing postoperative septic shock, and the SSO group was also noted to have significantly higher odds of 30-days mortality compared to MO patients. These findings support the need for further stratification amongst Class III obesity patients undergoing surgical intervention for NSTI.

Poster #29

PROSPECTIVE, MULTICENTER EVALUATION OF GUNSHOT DETECTION TECHNOLOGY ON EMS DISPATCH AND TRANSPORT TIMES

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Introduction: Previous single-center research demonstrated that the use of a commercially available, acoustic gunfire detection, location, and notification system (gunshot detection technology=GDT) was associated with more rapid response and shorter prehospital transport times for gunshot wound (GSW) victims transported by both police and emergency medical systems (EMS). Our goal was to determine if these findings could be validated in a broader study of heterogeneous trauma systems.
Methods: We performed a 7-site, prospective, observational cohort study of adult patients who sustained a GSW in cities using GDT from June 2019 through July 2021. Demographics, dispatch time, response time, transport time, and clinical data were collected for patients transported by EMS. We compared shootings where GDT was utilized (GDT) versus those where it was not (nGDT). Exclusion criteria included incidents that did not occur in the confines of the city, non-EMS transport, and patients with incomplete data. Descriptive statistical analysis, t-test, Mann-Whitney U, $\chi 2$ test, as well as linear and logistic regressions were performed.
Results: A total of 1,348 GSW victims were included, GDT=371 (27.5%), nGDT= 977 (72.5%). Patients located by GDT were more likely to be black than white or Hispanic (89.2%/2.2%/6.7% vs. 67%/19.5%/11.3%, p<0.001). [Table 1] Physiologic parameters were similar between cohorts. Patients located by GDT were less likely to have suffered a severe head injury than patients in the nGDT cohort (5.1% vs. 10.0%, p=0.003). Median time for EMS dispatch to scene was not different between cohorts (GDT = 6 min [IQR, 4-8], nGDT = 6 min [IQR 4-8]. We also found no difference in transport time from scene to hospital between groups (GDT=10min [IQR 6-14], nGDT=10min [IQR 7-10]. Mortality was not significantly different between cohorts (15.9% vs. 17.2%, p=0.36).
Conclusions: This large, multicenter study was unable to demonstrate transport time or survival benefits for gunshot detection technology in trauma systems using EMS transport. Given previous work demonstrating improved prehospital transport times in a system that also utilized police transport, it is possible that there still may be a role of GDT in trauma systems, but this will require ongoing and individualized assessment.

Figure 1: Gunshot Detection Technology impact on EMS dispatch and transport times

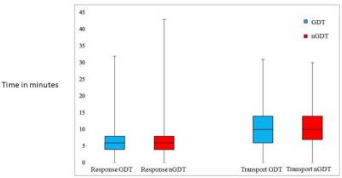

Table 1: Gunshot Detection Technology: demographics, clinical data, & outcomes

	GDT (Gunshot Detection Technology) Patients	nGDT (non-Gunshot Detection Technology) Patients	p-value
N	371	977	
Male Gender	522 (86.8%)	844 (86.4%)	0.85
Race			<0.001
White	8 (2.2%)	190 (19.5%)	
Black	331(89.2%)	655 (67.0%)	
Hispanic	25 (6.7%)	110 (11.3%)	
Arrival SBP	132 ± 48	127 ± 47	0.17
Arrival HR	83 ± 36	87 ± 34	0.07
ISS	9 [IQR 1-16]	9 [IQR 1-18]	0.11
Severely injured body regions			
Head AIS > 4	19 (5.1%)	98 (10.0%)	0.003
Chest AIS >4	21 (8.4%)	107 (11.0%)	0.24
Abdomen AIS >4	11 (8.9%)	88 (9.0%)	0.44
Extremity AIS >4	15 (3.0%)	56 (5.4%)	0.09
EMS dispatch to scene time (minutes)	6 [IQR 4-8]	6 [IQR 4-8]	0.11
EMS transport time to trauma center (minutes)	10 [IQR 6-14]	10 [IQR 7-10]	0.29
Prehospital Interventions			
Intubation	19 (5.1%)	79 (8.1%)	0.06
Needle decompression	26 (7.0%)	69 (6.3%)	0.27
Chest tube	64 (17.3%)	157 (14.0%)	0.14
Wound packing	87 (23.5%)	169 (16.2%)	<0.001
Mortality	59 (15.9%)	168 (17.2%)	0.36

*SBP = systolic blood pressure (mm Hg); HR = heart rate; ISS = injury severity score (scale 1-75, >15 = severe trauma, 75 = fatal); AIS = abbreviated injury score (scale 1-6, 6 = lethal); EMS = emergency medical services; IQR = interquartile range

Poster #30

A DECADE OF FIREARM INJURIES: HAVE WE IMPROVED?

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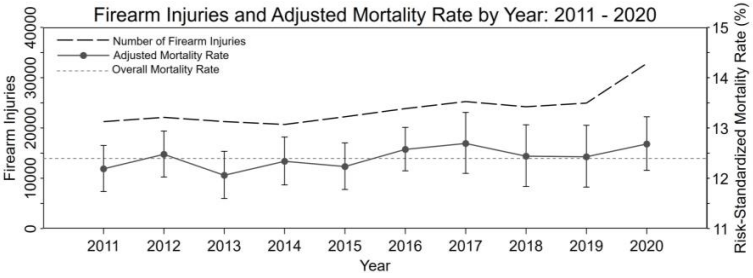
Introduction: Firearms injuries are a growing public health issue, with marked increases coinciding with the onset of the COVID-19 pandemic. This study sought to evaluate temporal trends, hypothesizing that despite a growing number of injuries, mortality would improve over the past decade.
Methods: Patients aged 18 years and older with firearm injuries from 2011-2020 were identified using the National Trauma Data Bank (NTDB). Trauma centers not present the entirety of the study period were excluded to allow for temporal comparison. Joinpoint regression and risk-standardized mortality rates were used to evaluate injury counts and adjusted mortality over time. A subgroup analysis was performed to describe centers with the largest increase in firearm injuries in 2020.
Results: A total of 238,674 patients met inclusion criteria. Firearm injuries increased by 31.1% in 2020, compared to an annual percent change of 2.4% from 2011-2019 ($p=0.01$). Unadjusted mortality declined by 0.9% from 2011-2020, but after controlling for demographics, injury characteristics and physiology, adjusted mortality increased from 12.2% to 12.7% for the same period. Subset analysis of centers with the largest change in firearm injuries in 2020 found that they were more often level I centers, with higher historical trauma volumes and percentage of firearm injuries ($p < 0.001$).
Conclusions: Firearm injuries pose an increasing burden to our trauma systems, with level I and high-volume centers seeing the largest growth in 2020. Despite centers seeing an increase in firearm injuries, mortality has remained unchanged over the past decade.



Poster #31

BENCHMARKING OF TRAUMA CENTER PERFORMANCE IN BLUNT MULTISYSTEM VERSUS PENETRATING TRUNCAL INJURY

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Introduction: Trauma center (TC) benchmarking seeks to identify and disseminate best practices used at high performing centers. However, the resources and care processes required to achieve optimal outcomes can varies between different mechanisms of injury. We hypothesized that there is poor agreement in TC risk-adjusted performance in the care of patients with blunt multisystem (BMS) and penetrating truncal (PT) injuries.
Methods: This was a retrospective cohort study using data derived from the National Trauma Databank (2017-2018). BMS (blunt trauma with AIS ≥ 3 in two or more body regions) and PT (penetrating trauma with AIS ≥ 3 in neck, chest, or abdomen) groups were defined. Patients with prehospital cardiac arrest or dead-on-arrival (HR=0, SBP=0, GCSmotor=1) were excluded. The cohort was further limited to hospitals treating at least 10 of each patient types over the study period. Mixed-effects multivariable logistic regression was used to calculate the observed-to-expected mortality ratio for each TC in both patient groups, adjusting for patient baseline and injury characteristics. TCs were identified as high, average, or low performers in both BMS and PT patient cohorts based on hospital outlier status derived from the regression models. The concordance between the performance of centers for BMS and PT patients was evaluated using the Kappa statistic.
Results: 93,890 cases were identified across 370 trauma centers, with 73,115 (75%) patients having blunt multisystem injuries and 25,774 (26.39%) having penetrating torso injuries were included. After adjustment, 46 centers were identified to be high performers for penetrating torso injuries, and 150 centers were found to be above performers for blunt multisystem trauma. The concordance between the performance of trauma centers for both injury types was found to be low (Kappa =0.118, p-value = 0.00053).
Conclusion: This study highlights the importance of considering injury type in benchmarking and quality improvement efforts in trauma care. The low concordance between performance for both injury types highlights the need for a more thoughtful approach to initiatives aimed at improving individual center level care.

Performance	Penetrating Truncal		
Multi-system Blunt	High n=46	Average n= 296	Low n=28
High, n=150	29	114	7
Average, n=193	11	165	17
Low, n=27	6	17	4

Poster #32

EPIDEMIOLOGY OF TRAUMATIC INJURY BASED ON TRAUMA QUALITY IMPROVEMENT PROGRAM DATA 2011-2020

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Introduction: Trauma remains a leading cause of morbidity and mortality across all age groups. The objective of this study was to assess inpatient trauma epidemiology, trends, injury mechanisms, severity, and outcomes in the United States over the last decade.
Methods: We merged annual data from the Trauma Quality Improvement Program (TQIP) database from 2011-2020. Analyses consisted of descriptive statistics for overall and yearly frequencies, proportions and means stratified by race/ethnicity, mechanism, and injury severity score (ISS). The statistical significance of trends was assessed with a linear regression term for year.
Results: There were 2,441,780 observations from 2011 to 2020. The mean age of injured patients increased from 44.4 in 2011 to 55.0 in 2020 ($p < 0.001$). The most common injury mechanism was falls (47.9%), followed by motor-vehicle collisions (21.72%), and firearms (8.16%). Throughout the decade, there were increases in falls (49.8% to 53.5%; $p < 0.001$), firearms (8.0% to 11.0%; $p <0.001$), and bicycle collisions (1% to 2.9%; $p <0.001$). The percentage of motor vehicle, motorcycle, and pedestrian-related injuries all decreased ($p <0.001$). Over the study period, 25.5% of patients were classified as severely injured (ISS 16-24), while 15.8% were critically injured (ISS>/=25); the number of patients who were severely or critically injured decreased over time from 47.8% in 2011 to 35.9% in 2020 ($p<0.001$). The number of patients treated at Level 1 trauma centers increased from 55.7% in 2011 to 62.2% in 2020 ($p < 0.001$). The number of patients who died from their injuries decreased from 5.6% in 2011 to 5.1% in 2020 ($p < 0.001$). Pedestrian collisions (9.9%) and firearms (9.1%) had the highest case fatality rates.
Conclusion: TQIP-participating hospitals have seen a dramatic increase in the mean age of the patients they treat, primarily driven by falls in an aging population. Gun violence hospitalizations saw a steady increase over the last decade.

Poster #33

RELEASED INTRACELLULAR CONTENTS MAY CONTRIBUTE TO PRESENTING HYPOCALCEMIA IN TRAUMA

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Introduction: Multiple studies have reported severely injured trauma patients presenting with low pre-transfusion ionized calcium (iCa, normal range 1.2-1.4mM) levels. iCa is necessary for coagulation, cardiac contractility, and vascular tone. The mechanisms by which iCa levels decrease remain unclear. We hypothesized that intracellular contents such as negatively charged phosphate ions and proteins released from damaged tissue bind calcium and contribute to low presenting iCa levels.
Methods: Blood was collected from 5 healthy donors into heparin vacutainer tubes. Liver, lung, kidney, and skeletal muscle from male C57BL/6 mice who had undergone laparotomy were flash frozen and ground with a mortar and pestle. The homogenized tissue was added to heparinized blood in amounts to simulate relative physiologic differences in mass. iStat CG8+ cartridges were used for measurement.
Results: Mean baseline iCa was 1.24mM±0.05. All tissue demonstrated a dose-dependent relationship with iCa. iCa in blood with liver tissue ranged from 1.09mM±0.06 (liver 15mg/mL, $p=0.01$) to 0.91mM±0.04 (60mg/mL, $p<0.001$). Blood with skeletal muscle iCa ranged from 0.94mM±0.03 (62.5mg/mL, $p=0.002$) to 0.62mM±0.07 (250mg/mL, $p<0.001$). Kidney ranged from 1.18mM±0.04 (2mg/mL, p=ns) to 1.13±0.02 (8mg/mL, $p=0.03$). Lung ranged from 1.16mM±0.03 (3mg/mL, p=ns) to 1.11mM±0.02 (12mg/mL, $p=0.03$). K demonstrated dose-dependent increase with all tissue types, with skeletal muscle and liver having the largest impact.
Conclusion: Damaged tissue contributes to presenting hypocalcemia by releasing intracellular contents. Elevated K represents release of intracellular contents. Calcium regulation in trauma is complex and involves renal losses, intracellular movement following cellular activation, and binding by circulating contents released by damaged tissue. Further work is needed to determine relative quantitative contribution of these mechanisms and how they evolve in order to guide optimal calcium management therapy.

Poster #34

TIME TO SURGERY STABILIZATION OF RIB FRACTURES: DOES IT IMPACT OUTCOMES?

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Introduction: Rib fractures are common, morbid and potentially lethal. Intuitively, if interventions to mitigate downstream effects of rib fractures can be implemented early, likelihood of developing these complications should be reduced. Surgical stabilization of rib fractures (SSRF) is one therapeutic intervention shown to be useful for mitigating complications of these common fractures. Our aim was to investigate the association between time to SSRF and complications among patients with isolated rib fractures undergoing SSRF.
Methods: The 2013-2019 ACS TQIP database was queried to identify those >18 with isolated thoracic injury undergoing SSRF. Patients were divided into three groups: SSRF≤2d, SSRF>2d but ≤3d, and SSRF >3d. Poisson regression, adjusting for demographic and clinical covariates, was used to evaluate the association between time to SSRF and the primary endpoint, in-hospital complications. Quantile regression was used to evaluate the effects of time to SSRF on the secondary endpoints, hospital and ICU length of stay (LOS).
Results: Out of 2,185 patients, 918(42%) underwent SSRF ≤2d, 432(20%) underwent SSRF>2d but ≤3d, and 835(38%) underwent SSRF >3d. Hemothorax was more common among patient undergoing SSRF >3d, otherwise all demographic and clinical variables were similar between groups. After adjusting for potential confounding, SSRF >3d was associated a with three-fold risk of composite in-hospital complications [adjusted incidence rate ratio (IRR): 3.15, 95% confidence interval (CI): (1.76-5.62); p<0.001], a 4-day increase in total hospital LOS [change in median LOS (95%CI):4.09(3.69-4.49), p<0.001], and a nearly 2-day increase in median ICU LOS [change in median LOS (95%CI): 1.70 (1.32-2.08), p<0.001] compared to SSRF≤2d.
Conclusion: Among patients undergoing SSRF in TQIP, earlier SSRF is associated with less in-hospital complications and shorter hospital stays. Standardization of time to SSRF as a trauma quality metric should be considered.

Poster #35

SEVERE ISOLATED CHEST TRAUMA AND PULMONARY CONTUSION: A CONTROVERSIAL CONTRAINDICATION TO RIB FIXATION

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Introduction: Pulmonary contusion (PC) is currently considered a relative contraindication to surgical stabilization of rib fractures (SSRF), but the data underlying this practice is scant. This study aimed to compare outcomes in patients undergoing SSRF vs. non-operative management (NOM) in PC.

Methods: The ACS-TQIP 2017-2020 was queried to identify patients with PC, three or more rib fractures, and with or without flail chest. Patients with severe extra-thoracic injuries were excluded. The outcomes evaluated were in-hospital mortality, ventilator-associated pneumonia (VAP), hospital and intensive care unit (ICU) length of stay (LOS), unplanned ICU admission, ventilator days, and tracheostomy rate. Propensity score matching (PSM) was performed to account for patient demographics, injury- and hospital-related characteristics. After matching, patients undergoing SSRF vs. NOM were compared. A subgroup analysis stratifying patients into major and minor PC was performed.

Results: Of the 48,757 patients included in the analysis, 3,271 (6.7%) underwent SSRF. Following PSM, 2,448 matched pairs of patients with PC were analyzed. SSRF was associated with lower in-hospital mortality (1.9% vs. 5.1%, p<.001), higher rates of unplanned ICU admission (6.7% vs. 4.2%, p<.001), and tracheostomy (10.7% vs. 8.4%, p=.006) compared to NOM. In the subgroup analyses, SSRF was associated with reduced mortality compared to NOM. Regardless of PC severity, SSRF was associated with longer hospital LOS, ICU LOS, and prolonged ventilator days compared to the NOM cohort (Table 1).

Conclusion: In patients with severe chest wall injury and PC, SSRF is associated with lower mortality despite PC severity, but at the expense of longer ICU and hospital stays. These findings indicate that SSRF may benefit patients with PC.

Table 1. Outcomes following propensity score matching of the non-operative versus SSRF treatment group according to pulmonary contusion severity.

Outcomes	All-severity pulmonary contusion (n=2,448 pairs)			Minor pulmonary contusion (n=673 pairs)			Major pulmonary contusion (n=590 pairs)		
In-hospital outcomes	Non-operative	SSRF	p-value	Non-operative	SSRF	p-value	Non-operative	SSRF	p-value
Mortality	126 (5.1%)	47 (1.9%)	**<0.001**	29 (4.3%)	11 (1.6%)	**0.004**	38 (6.4%)	15 (2.5%)	**0.001**
Ventilator Associated Pneumonia	72 (2.9%)	91 (3.7%)	0.13	14 (2.1%)	17 (2.5%)	0.59	25 (4.2%)	26 (4.4%)	0.89
Tracheostomy	205 (8.4%)	262 (10.7%)	**0.006**	33 (4.9%)	49 (7.3%)	0.068	59 (10.0%)	80 (13.6%)	0.058
Hospital length of stay	6 (2-12)	11 (6-17)	**<0.001**	6 (2-11)	10 (6-16)	**<0.001**	7 (3-14)	12 (7-19)	**<0.001**
Unplanned ICU admission	104 (4.2%)	165 (6.7%)	**<0.001**	34 (5.1%)	48 (7.1%)	0.11	26 (4.4%)	38 (6.4%)	0.12
ICU length of stay	3 (0-8)	6 (3-11)	**<0.001**	2 (0-6)	5 (2-9)	**<0.001**	3 (0-8)	7 (3-13)	**<0.001**
Ventilator Days	0 (0-3)	0 (0-6)	**<0.001**	0 (0-0)	0 (0-4)	**<0.001**	0 (0-4)	2 (0-8)	**<0.001**

Patients matched by age, sex, Body Mass Index (BMI), Injury Severity Score (ISS), Glasgow Coma Scale (GCS), flail chest, lung laceration, pneumothorax, hemothorax, and American College of Surgeons (ACS) designated level. Data are presented as median (IQR) for continuous measures, and n (%) for categorical measures. SSRF: Surgical stabilization of rib fractures; ICU, Intensive Care Unit.

Poster #36

PLANNED AND UNPLANNED REOPERATIONS AFTER THORACOTOMY FOR PENETRATING TRAUMA. LESSONS LEARNED AFTER 15 YEARS.

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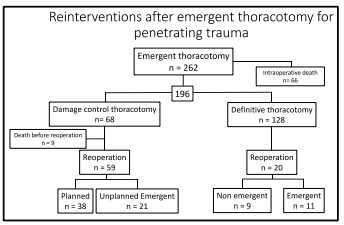
Fundacion Valle del Lili

Introduction: Specific information regarding reoperation after trauma thoracotomies (TT) is scarce. We analyzed the causes, treatment, and outcomes in patients managed in a high-complexity hospital in an upper-middle-income country, searching for strategies to reduce **unplanned reoperations** (UR) after penetrating chest trauma (PTT).
Methods: Patients ≥15 years treated with a TT for PTT between 2006 and 2020 were retrospectively reviewed. Trauma characteristics, surgical treatment, causes of reoperation, and outcomes were registered.
Results: Two-hundred-sixty-two TTs were performed. Intraoperative deaths occurred in 66 patients leaving 196 cases for analysis. Median (IQR) age was 26 (20 - 35) years; 95.9% were male. Gunshot wounds occurred in 59.6%. Resuscitative thoracotomy was required in 40 cases (20.1%), aortic occlusion in 55 (28.1%), and damage control thoracotomy (DCT) in 68 (34.7%), A "definitive" thoracotomy (DT) was performed in 128 (65.3%).
Nine DCT patients died before a reoperation. Seventy-nine subjects (40.3%) were reoperated. Twenty after a DT and 59 after a DCT. Thirty-two emergent UR were performed. Eleven after DT and 21 after a DCT. Nine DTs and 38 DCTs had non-emergent reoperations.
The most frequent causes of emergent UR were bleeding due to coagulopathy in 9 patients, surgical bleeding in 7, and missed injuries in 6 patients.
Planned reoperations for definitive repair included closure of the thoracic incision in 51 cases, unpacking (thoracic wall in 51, lung in 34, perivascular in 17), deferred major lung resections (four lobectomies, three pneumonectomies), and three vascular reconstructions.
DCT patients who survived until a scheduled reoperation had a similar mortality to non-DCT (8.5%). Mortality after an emergent (UR) was higher, (50%).
Conclusion: Technical errors leading to post-op bleeding were the most common cause of UR. Timely bleeding control, an a more systematic/selective post-op completion diagnostic work-up (CT angio, endoscopy, and/or angio-embolization) may reduce the need for emergent reoperations and their negative impact.



Poster #37

IMPACT OF LOW-PRESSURE NEGATIVE SUCTION WITH INTERCOSTAL TUBE DRAINAGE IN PATIENTS WITH THORACIC TRAUMA: A RANDOMISED CONTROLLED TRIAL

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Introduction: Thoracic trauma frequently includes a pneumothorax, haemothorax, or mixed hemopneumothorax, which may necessitate an intercostal drainage (ICD) for evacuation of air and fluid to improve breathing and circulatory functions. However, thoracic trauma-related problems such persistent /constant air leak, retained haemothorax, and empyema still happen in some patients even with ICDs. This study was designed to evaluate the benefits of using negative pleural suction with ICD tube in patients with thoracic trauma in terms of the duration of ICD, length of hospital stays, incidence of complications of thoracic trauma and need for additional interventions.

Methodology: Patients with thoracic trauma who underwent tube thoracostomy for pneumothorax, haemothorax, or hemopneumothorax were randomised into two groups: Group I in which under water seal drainage system was connected to a low-pressure negative suction (-20 cm H2O) and Group II where no suction was applied. Patients who required mechanical ventilation or emergency surgery at the time of admission to the emergency department (ED), patients with a past history of chronic pulmonary diseases and patients with severe traumatic brain injury were excluded from the study. Duration of ICD, length of hospital stays, the incidence of complications like recurrent pneumothorax, retained haemothorax, persistent air leak, etc and secondary interventions such as reinsertion of ICD, intrapleural streptokinase instillation (IPSI), video assisted thoracoscopic surgery (VATS) and thoracotomy were compared. This study was registered with Clinical Trial Registry of India (CTRI) (REF/2020/11/038403).

Results: A total of 654 patients with thoracic trauma who required ICD were assessed for their eligibility and 584 were excluded. Finally, 70 patients were randomised into two groups (35 in each group). Both the groups were comparable in terms of demographics, mechanism of injuries, primary survey findings etc. There were no statistically significant differences between both the groups in terms of duration of ICD (median of 4 days in each group; $p = 0.82$), hospital stay ($p = 0.47$) and ICD or injury related complications.

Conclusions: The use of negative pleural suction with under-water seal drainage system did not show any advantage in patients with traumatic pneumothorax, haemothorax, or hemopneumothorax in terms of duration of ICD, hospital stays, and other complications. A multicentre study with large sample size is required to reach a consensus.

Poster #38

A TALE OF SIZE IN TRAUMA: A MULTICENTER ANALYSIS OF SUREON PLACED SMALL-BORE THORACOSTOMY TUBES

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Introduction: Surgical dogma that larger chest tubes are better for thoracic drainage has been challenged in recent years with the introduction of surgeon-placed percutaneous catheters. The purpose of the study is to evaluate outcomes between small-bore (SB) and large-bore (LB) chest tubes with the hypothesis that SB catheters will have comparable complication rates including retained HTX and need for VATS.
Methods: A retrospective review was performed on all patients with a thoracostomy tube for traumatic PTX or HTX between 7/1/21-6/30/22 at 3 level-1 trauma centers. Exclusion criteria included ISS 75, tube placement at an outside hospital, in the operating room, or by a radiologist. SB catheters were defined as ≤14 Fr and LB tubes were ≥24 Fr. All other sizes were excluded. SB and LB chest tubes were compared.
Results: A total of 621 patients were included over the 24-month study period with 264 (42.5%) in the SB group and 357 (57.5%) in the LB group. Patients in the SB group were older (50.7 vs 43.6 years, $p<0.001$), had a higher rate of blunt injury (91.3% vs 73.1%, $p<0.001$), and a lower ISS (19.0 vs 26.5, $p<0.001$). The SB group had higher rates of COPD (8.7% vs 4.2%, $p=0.020$) and tobacco use (34.5% vs 21.0%, $p<0.001$). The SB group were more likely to have PTX (71.6% vs 43.1%, $p<0.001$) and less likely to have HTX (11.4% vs 17.4%, $p=0.011$) and HPTX (12.9% vs 37.8%, $p<0.001$) as an indication. The rates of retained HTX (3.8% vs 13.2%, $p<0.001$) and VATS (0.4% vs 6.7%, $p<0.001$) were lower in the SB group. No differences were seen in rates of ARDS, VAP, empyema, and unplanned intubation between the groups. Hospital LOS (6 vs 8 days, $p=0.005$) was shorter and mortality was lower in the SB group (8.0% vs 19.1%, $p<0.001$). Adjusted analysis identified that SB tubes were protective from retained HTX and mortality. A subgroup analysis was performed on HTX/HPTX, significant difference persisted in this higher risk group and adjusted analysis showed that SB chest tubes did not predict mortality.
Conclusion: SB catheters for traumatic PTX and HTX are safe and effective without increasing the rate of VATS for retained HTX. These catheters are an effective alternative to large bore drains.

Poster #39

ANTIPLATELET MEDICATIONS: MAYBE NO BIG DEAL?

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Introduction: Brain Injury Guidelines (BIG), using clinical presentation, computed tomographic imaging of the brain (CT), and preinjury medications, are meant to assist in the management of traumatic brain injury (TBI) patients with a goal of determining who would benefit from repeat CT (RCT), admission, and neurosurgery involvement (NSi). The use of antiplatelet medication (AP) or anticoagulants (AC) was classified as BIG3 regardless of CT findings. The goal of this study was to determine the natural progression of lesions that would have been classified as BIG1 based upon imaging but were upgraded to BIG3 based solely on AP +/- AC usage.
Methods: This is an IRB exempt, retrospective study of all blunt TBI patients presenting from 1/2020-12/2021 to a Level II Trauma Center. All patients had a normal neurological exam, lacked intoxication, and had a positive initial CT consistent with BIG1 criteria. Patients were then stratified based upon usage of AP, AC, or BOTH medications. Primary outcome was need for NSi. Secondary outcome was injury progression on RCT. Independent t-tests were performed with statistical significance defined as $p < 0.05$.
Results: 223 patients met inclusion criteria. Mechanism of injury was most commonly fall in all groups. RCT was obtained in 206 patients (92%). Platelet function screens (PFS) were performed on 49 of the BIG1+AP patients (77%). Of those screened, 27 patients (55%) had an abnormal PFS of which 70% were treated with DDAVP +/- platelets. Within the BIG1+AC group, warfarin (n=11) was utilized with an average INR 2.4 (1.8-3.3). Warfarin reversal (PCC +/- Vitamin K) was performed in 82% (n=9). Novel oral ACs comprised the remainder of BIG1+AC patients (n=16) which were treated with PCC in 56% (n=9). No patient in the BIG1+BOTH received any reversal agents. No BIG1, BIG1+AP, or BIG1+BOTH patient required NSi but RCT did reveal clinically insignificant injury progression in 5%, 3% and 0%, respectively. However, 4 patients (15%) in the BIG1+AC group worsened radiographically and 2 (7%) required surgery for evacuation of increasing intracranial hemorrhage (ICH). All BIG1+AC patients with worsening RCT had received reversal agents. (PCC 4/4; Vit K 1/4).
Conclusions: While the use of AC emerged as a statistically significant risk factor for ICH progression when compared to BIG1 alone and resulted in the need for NSi in 7% of patients, AP usage did not appear to confer the same risk. We believe the need for reflex admission and NSi in BIG 1+AP patients would benefit from future multicenter study.
SDH (subdural hematoma); SAH (subarachnoid hemorrhage); IPC (intraparenchymal contusion) *statistically significant difference compared to BIG1

	BIG1	BIG1+ AP	BIG1+AC	BIG1+BOTH
Total Patients	128	64	27	4
Initial CT findings (%)	SDH(58); SAH(51); IPC(5); >1(14)	SDH(55); SAH(52); IPC(6); >1(14)	SDH(58); SAH(53); IPC(5); >1(16)	SAH(100)
Reimaged	115 (89.8%)	60 (93.8%)	27 (100%)	4 (100%)
Stable	82 (71.3%)	41 (68.3%)	20 (74.1%)	2 (50%)
Improved	27 (23.5%)	17 (28.3%)	3 (11.1%)	2 (50%)
Worsened	6 (5.2%)	2 (3.3%)	4 (14.8%) *	0 (0%)
Intervention	0 (0%)	0 (0%)	2 (7.4%)	0 (0%)

Poster #40

APPLICATION OF THE MODIFIED BRAIN INJURY GUIDELINES MAY REDUCE LOW VALUE TRAUMA TRANSFERS

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Introduction: Traditional management of traumatic brain injury (TBI) has required substantial resource utilization including ICU admission, repeat CT imaging, and neurosurgical consultation. The modified Brain Injury Guidelines (mBIG) can be used to risk stratify patients with mild TBIs. These guidelines have the potential to reduce low value transfers in patients who would otherwise not require a higher level of care. This study is unique from prior validation studies in examining transferred patients as a pre-specified subgroup.
Methods: The primary objective was to retrospectively validate the mBIG and secondarily examine the safety of mBIG 1 for transfer patients. A 1-year retrospective analysis of adult trauma patients with a diagnosis of mild TBI evaluated at an urban level 1 trauma center with a large rural catchment area was performed. Primary outcome measures were rates of neurosurgical intervention, unplanned ICU admission, and in-hospital mortality. A subgroup analysis of mBIG 1 patients was performed based on transfer status.
Results: Among 230 patients identified, 37, 51, and 142 were classified into the mBIG 1, 2, and 3 categories respectively. Neurosurgical intervention was performed in 8.45% of mBIG 3 patients and no mBIG 1 or 2 patients. There was 1 unplanned ICU admission in the mBIG 2 and 3 groups. There were no neurosurgical interventions, unplanned ICU admissions, or in-hospital mortality in the mBIG 1 group regardless of transfer status. 92% of mBIG 1 patients transferred from other facilities were discharged home.
Conclusion: Application of the mBIG may help safely avoid low value transfers. In our study, mBIG 1 transfer patients suffered no adverse outcomes related to their TBI and could have potentially avoided transfer. As the vast majority of mild TBI patients with low-risk features return home from the hospital, allowing patients to safely remain within their community for care may be beneficial from a patient and resource-utilization perspective.

Poster #41

GCC INTUBATION THRESHOLDS AND OUTCOMES OF PATIENTS WITH TRAUMATIC BRAIN INJURY: THE NEED FOR TAILORED PRACTICE MANAGEMENT GUIDELINES

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Introduction: Intubation of patients with a Glasgow Coma Scale score (GCS) of 8 or below remains a standard practice across U.S. healthcare institutions. This study aims to re-evaluate the GCS threshold for intubation in patients presenting to the ED with a traumatic brain injury to optimize outcomes and provide evidence for future practice management guidelines.
Methods: We retrospectively reviewed the ACS-TQIP-Participant Use File (PUF) 2015-2019 for adult trauma patients 18 years and older who experienced blunt traumatic head injury and received computerized tomography. Multivariable regressions were performed to assess associations between outcomes and GCS intubation thresholds of 5, 8, and 10.
Results: In patients with a GCS ≤5, there were no differences in mortality (GCS ≤5: 26.3% vs GCS >5: 28.3%, adjusted p=0.08), complication rates (GCS ≤5: 9.1% vs GCS >5: 10.3%, adjusted p=0.91), or ICU length of stay (GCS ≤5: 5.4 vs GCS >5: 4.7, adjusted p=0.36) between intubated and non-intubated patients. Intubated patients at GCS thresholds ≤8 (26.2% vs. 19.1%, adjusted p<0.0001) and ≤10 (25.6% vs. 15.8%, adjusted p<0.0001) had significantly higher mortality rates than non-intubated patients. Intubation at all GCS thresholds >5 resulted in higher rates of complications, H-LOS, and ICU-LOS when compared to non-intubated patients with the same GCS score.
Conclusion: A GCS ≤5 was the threshold at which intubation in TBI patients conferred an additional benefit in disposition without worsened outcomes of mortality, H-LOS, or ICU-LOS. Trauma societies and hospital institutions should revisit existing guidelines & protocols concerning the GCS threshold as an indicator of when intubation is necessary and safe.

Poster #42

IS MAGNETIC RESONACE ANGIORGRPHY (MRA) EQUIVALENT TO CT ANGIOGRAPHY (CTA) FOR DETECTING BLUNT CEREBROVACULAR INJURY (BCVI)?

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Introduction: Magnetic resonance angiography (MRA) screening for blunt cerebrovascular injury (BCVI) is considered to have decreased accuracy compared to CT angiography (CTA). However, MRA may be a more convenient test if other magnetic resonance imaging (MRI) is also ordered. There have been few studies directly comparing MRA and CTA for the diagnosis of BCVI. We hypothesized that with modern high field MRA imaging CTA and MRA would be equivalent.
Methods: All trauma patients with blunt injury who underwent both CTA and MRA from 6/2013 through 6/2022 were identified using the trauma registry and medical record data. Imaging findings were reviewed, and grade of injury assigned if not graded on the initial imaging report. Additional data collected included time between studies, vessels injured and if a stroke referable to an injured vessel was present. Grade of injury was compared between the imaging modalities and interrater reliability between MRA and CTA was assessed with intraclass correlation coefficient.
Results: 127 patients underwent both CTA and MRA to screen for, confirm or follow up a BCVI. With respect to image grading the table demonstrates high grade correlation for BCVI between MRA and CTA (table, highlighted boxes). Median time between studies was 1 day IQR (1,2). There were seven injuries (6 grade I, 1 grade II) present on CTA not detected by MRA. There was one grade I injury by MRA not detected by CTA. The intraclass correlation coefficient across all grades demonstrated excellent agreement [0.981, 95% CI (0.973 – 0.987), $p<0.001$]. There were 22 strokes with 19 occurring in patients with BCVI of which 12 were potentially referable to the injured vessel. There were no strokes in the patients where CTA and MRA were discordant on the presence of an injury. The only stroke that occurred with discordant studies occurred where the MRA grade was II and the CTA grade was I.
Conclusions: Using modern MRA imaging there appears to be a high degree of agreement between MRA and CTA for BCVI. MRA could be considered an acceptable screening alternative to CTA when MRA is a more convenient imaging modality. Additional larger studies comparing high field strength MRA to CTA should be done to validate these findings.

Poster #43

IT'S ALL IN YOUR HEAD: SAFETY OF WEIGHT-BASED, TARGETED ENOXAPARIN PROPHYLAXIS IN TBI PATIENTS

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Introduction: Standard enoxaparin (LVX) dosing is inferior to weight-based, anti-Xa targeted dosing regimens for venous thromboembolism (VTE) prophylaxis in trauma patients. Despite this, many trauma guidelines support standard low-dose LVX (30mg BID) in patients with traumatic brain injury (TBI) for fear of expansion of intracranial hemorrhage (ICH) and adverse neurological outcomes. We hypothesized that weight-based, anti-Xa targeted dosing is safe and effective in trauma patients with TBI.

Methods: We retrospectively reviewed TBI patients admitted to a Level I trauma center from 2015-2022. Patients were cleared to start LVX 48 hours after stable CT head. TBI patients who received weight-based LVX (50-59kg, 30mg BID; 60-99kg, 40mg BID; ≥100kg, 50mg BID) and had a peak anti-Xa level assessed (3-5 hours after ≥3rd dose, goal 0.2-0.4 IU/mL) were included. Charts were reviewed to assess for ICH expansion after initiation of LVX.

Results: Of the 557 TBI patients included, 434 (77.9%) received 40mg BID and 58 (10.4%) received 50mg BID. There were eight instances (1.4% of total patients) of ICH expansion. One patient (1.5%) in the 30mg cohort developed ICH expansion; they also had a supra-prophylactic anti-Xa level. Seven patients (1.6%) in the 40mg cohort developed expansion (OR 1.05, 95% CI [0.13, 8.67], p=0.48); none of these patients were supra-prophylactic. No patients in the 50mg cohort developed ICH expansion after LVX initiation.

	30mg BID	40mg BID	50mg BID	p-value
Number (% total)	65 (11.7%)	434 (77.9%)	58 (10.4%)	
Anti-Xa Results				
Anti-Xa [median (IQR)]	0.28 (0.21–0.36)	0.28 (0.22–0.35)	0.24 (0.20–0.33)	0.207
% Anti-Xa in-range	70.8%	68.9%	72.4%	0.837
ICH Expansion				
Expansion of ICH on Enoxaparin	1 (1.5%)	7 (1.6%)	0 (0%)	0.623

Conclusion: In this single center pilot study, weight-based LVX dosing did not result in significant ICH expansion, directly challenging current VTE prophylaxis guidelines for patients with TBI. These results should serve as a platform for multi-center prospective data collection to ultimately determine the safety and efficacy of weight-based LVX prophylaxis regimens in TBI patients.

Poster #44

DEVELOPING A NATIONAL TRAUMA RESEARCH ACTION PLAN: RESULTS FROM THE VASCULAR RESEARCH GAP DELPHI SURVEY

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Introduction: The recent National Trauma Research Action Plan (NTRAP) was designed to identify high-priority research questions in trauma care. The objective of this study was to review vascular specific research questions within the NTRAP review.
Methods: Experts in trauma care were recruited to identify current gaps in research and use a consensus-driven Delphi survey approach to determine the priority of unanswered research questions. Participants ranked each question as low, medium, or high priority with consensus defined as ≥60% of participants in agreement. Priority level was determined based on the arithmetic mean Delphi score.
Results: 7,345 research questions were generated by NTRAP. Of those questions, 247 vascular-specific research questions were identified via a validated Search Strategy of which 167 (68%) questions met consensus. Of the questions meeting consensus, 24 (14%) questions were high priority, 141 (84%) were medium priority, and 2 (1%) were low priority.
Conclusion: 24 high priority vascular trauma research questions were generated by the NTRAP Research Priority Panel. Future research funding should be focused towards addressing these important questions.

Table 1. Top Five High-Priority Vascular Trauma Research Questions with the Highest Arithmetic Mean of the Delphi Scores

1) Pediatric Trauma: For pediatric trauma patients with possible neck injury, is there an optimal screening tool for determining which patients require a CT angiogram to rule out vascular injury?
2) Personnel/Staffing: Does a surgical team lead by a broadly trained General Trauma/ACS surgeon have equivalent limb salvage rates as compared to a specialty team with vascular/orthopedics/plastics specialists for major extremity trauma?
3) Open Pelvic Fractures: In adult patients with open pelvis fractures, does routine use of angio embolization versus OR exploration and fixation improve outcomes in patients with evidence of pelvic fracture associated bleeding?
4) Impact of Hybrid Trauma Bay: Does the use of a hybrid OR improve outcomes in trauma patients with pelvic fractures?
5) Endovascular: What is the long-term success rate of endovascular treatment for traumatic injury? What are the long-term outcomes of endovascular interventions on young trauma patients?

Poster #45

EMERGENCY VASCULAR REPAIRS IN TRAUMA: PREDICTORS OF POOR PROGNOSIS AND A NOVEL SCORING SYSTEM

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Introduction: Vascular injuries comprise 1-2% of all trauma patients and predictors of morbidity or mortality are unclear. The purpose of this study was to establish predictors of revascularization failures, and compare repairs performed by trauma- and vascular-trained surgeons.
Methods: We performed a single-institution, case-control study of consecutive patients with traumatic arterial injuries who underwent open repair between 2016 and 2021. Multivariable logistic regression was used to investigate covariates impacting the primary composite outcome of repair failure/revision, amputation, or in-hospital mortality.
Results: Among 165 patients, median age was 34 (IQR 23-46), 149 (90%) were male, 67 (41%) were African American, and 99 (60%) suffered penetrating injury. Popliteal (46%) and superficial femoral (44%) arterial injuries were most common. Interposition graft/bypass was the most frequent repair (n=107, 65%). Primary outcome was observed in 24 (15%) patients, including 7 (4%) repair failures/revisions, 13 (8%) amputations, and 10 (6%) in-hospital mortalities. Cases were more likely to have blunt injury (67% vs. 36%, p=0.006), higher median mangled extremity severity score (MESS; 9 vs. 6, p<0.001), same-day laparotomy (33% vs. 12%, p=0.013), same-day orthopedic procedure (67% vs. 43%, p=0.028), and anterior tibial (29% vs. 10%, p=0.017) or tibioperoneal (42% vs. 12%, p=0.001) injuries. Two independent predictors of the outcome were identified using multivariable analysis – MESS > 8 (OR: 19.4, 95%CI: 5.82 - 64.5, p<0.001) and same day laparotomy or orthopedic procedure (OR: 6.81, 95%CI: 1.70 - 27.2, p=0.007). Of note, repair outcomes were similar between operating surgeon specialties. A novel composite scoring system was developed by combining MESS score, same-day procedure, mechanism of injury, and injury location. This system demonstrated a sensitivity of 100% with a score of 0 and a specificity of 95% with a score > 3.
Conclusions: We have demonstrated that surgical outcomes following traumatic lower extremity arterial repairs are similar between trauma- and vascular-trained surgeons. Additionally, we have developed a novel predictive scoring system that may be used to counsel patients and their families as well as guide future management.

Poster #46

GETTING TO THE HEART OF BLUNT CARDIAC INJURY

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Introduction: In 2012, guidelines were published establishing screening criteria for blunt cardiac injury (BCI). However, these criteria (abnormal EKG or elevated troponin) may be overly broad, resulting in unnecessary testing. Additionally, the impact of EKG abnormalities and troponin elevation on clinical outcomes remains undefined.
Methods: Five-year (2016-2020) retrospective study of BCI in consecutive sternal fracture patients surviving >24h. Mechanism of injury (MOI), demographic, and outcome data were collected from the trauma registry. 12-lead electrocardiogram and cardiac enzyme data were also collected. Patients screened positive for BCI if they had an abnormal EKG or troponin within the first 24h. Patients were then dichotomized by BCI screening status, and multivariable logistic regression was used to determine the association between EKG changes, troponin elevation, and mortality. Zero-inflated and negative binomial generalized linear models were used to model the effect of BCI on hospital and ICU lengths of stay (LOS).
Results: Of 959 sternal fracture patients, 464 (48%) screened positive for BCI. Demographics and MOI were similar between groups. Patients screening positive experienced more ventilator days (0[0-2] vs 0[0-0]), longer ICU LOS (0[0-7] vs 0[0-2] days) and hospital LOS (7[3-17] vs 4[2-9] days), and greater mortality (40[9%] vs 10[2%]; all $p<0.0001$). After controlling for confounders, screening positive for BCI remained associated with increased mortality. However, only ST segment abnormalities were associated with this risk (OR 3.1, 95%CI 1.4-6.7, $p=0.004$). Troponin elevation was not associated with an increased risk of mortality, but initial and 48h peak troponin were both associated with increased ICU LOS (RR 1.19, 95%CI 1.06-1.34, $p=0.004$) and hospital LOS (RR 1.14, 95%CI 1.06-1.23, $p<0.0001$) (FIGURE).
Conclusion: In patients with sternal fracture, nearly half screened positive for BCI. Increased mortality was primarily associated with ST segment abnormalities, while troponin elevations were associated with increased ICU and hospital LOS. Revised screening criteria, including a consideration of specific EKG abnormalities, may help physicians better focus treatment efforts.

Poster #47

THE 59TH TEMPORARY INTRAVASCULAR SHUNT OFFERS SURGEONS AN UPGRADE FROM CURRENTLY AVAILABLE VASCULAR SHUNTS

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Introduction: In the context of extremity trauma, the use of Temporary Intravascular Shunts (TIVS) has become more commonplace because of the flexibility it provides surgeons in emergency environments. Since their inception, the design of these devices has not changed significantly. The aim of this study was to test a novel TIVS designed by the 59th Medical Wing against industry standard to evaluate patency and the value of new modifications in a large animal model.
Methods: Twelve female anesthetized swine (60kg - 80kg) underwent a 20% controlled hemorrhage and administration of heparinized saline to undergo hemodilution. All swine underwent an open retroperitoneal approach to access the left iliac artery. The left iliac was opened as the intended site for placement of the shunt devices. Six swine received a standard Sundt shunt, and six swine received the 59th TIVS shunt which included an additional side port. Quantitative flow data from a distal artery was collected for twelve-hours. At completion, an angiogram was performed to confirm patency of the shunt and distal flow.
Results: Out of the twelve animals in the study, all animals survived shunt placement and the twelve-hour ICU period. The 59th TIVS group had 100% patency by flow analysis and angiography. The average flow rate among the six novel intravascular shunts was 145.67 ± 45.62 ml/min. In comparison, all six Sundt shunts also maintained patency, with an average flow rate of 91.50 ± 26.51 ml/min. Analysis was performed on the distal flow data using an unpaired t-test, which calculated the p value as 0.03.
Conclusion: Using this swine model, the 59th TIVS proved comparable in terms of patency compared to the standard Sundt shunt. The addition of the side port to the novel intravascular shunt provides additional utility including immediate angiography, pressure measurement, and medication infusion. The 59th TIVS offers surgeons more flexibility to manage vascular injury with similar durability to current shunts.

Poster #48

OPERATING THEATER VERSUS EMERGENCY ROOM RESUSCITATION – AN ANALYSIS OF A FLY-BY PROTOCOL EFFECTS ON MORTALITY

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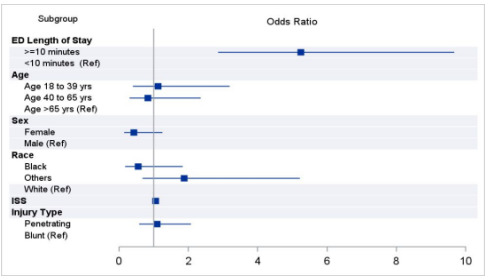
Introduction: The prompt initiation of resuscitation and control of hemorrhage leads to improved survival but optimal methods to achieve rapid treatment remains elusive. We, therefore, sought to determine if bypassing the trauma bay to perform resuscitative measures in the operating room were associated with improved outcomes in critically injured patients compared to those patients initially managed in the trauma bay.
Methods: Trauma patients admitted from 2017 to 2022 at a level 1 trauma center serving a rural population who spent less than 10 minutes in the ER (Fly-by) were propensity score matched to those who spent 10 or more minutes in the ER (Delay). The two groups were matched on injury mechanism, ISS, age and sex. Regression analysis was then performed to provide the odds of death based on whether patients were actually treated as Fly-by patients or not.
Results: After matching there were 131 patients in each group. Delay patients were more than 5 times more likely to die compared to Fly-by patients (OR= 5.24, $p<0.001$). Among the control variables, we found that patients who had higher mortality had a higher ISS score (OR = 1.057, $p<0.001$).
Conclusion:In the setting of rural trauma and prolonged transport times, a "fly-by" protocol maybe still be useful in reducing mortality. Further studies are needed to identify which treatment elements delivered in the operating room resuscitation are associated with these improved outcomes.



Poster #49

TRAUMA OUTCOME AND INJURY DISTRIBUTION IN CHILDREN AND ADULTS WITH PROTECTIVE DEVICES

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Introduction: Using protective devices can be lifesaving in motor vehicle accidents. There are differences in outcomes between children and adults who use these protective devices. This study investigates the trauma outcome and injury distribution in children and adults using protective devices.
Methods: We reviewed TQIP data from 2017-2019 for pediatric (1 month to 8 years) and adults (≥18 years) who had moderate to severe traumatic events (Injury severity score (ISS)> 9). Data were evaluated for cases that used child restraint devices or seat belt. Outcomes were mortality, cardiac arrest prior to hospitalization, injured region, hospital and ICU length of stay, and related complications.
Results: 158,432 patients were evaluated, including 2,509 pediatric patients and 155,923 adult patients. The mortality rate was 4.4% (6,928 patients). The majority of the traumatic injuries were soft tissue and skin injuries (33.5%), followed by head and neck injuries (30.8%) and thoracic injuries (23.6%). Pediatric patients were at risk of traumatic brain injuries compared to adults, while adults had higher rates of thoracic and abdominal injuries ($P< 0.001$). Overall Pediatric patients had higher trauma severity ($P< 0.001$) and lower initial total GCS ($P< 0.001$). Pediatric patients were also at higher risk for mortality, cardiac arrest prior to hospital, and requiring respiratory assistance ($P< 0.001$, for all). Adults had higher risk for unplanned admission to ICU ($P< 0.001$), unplanned intubation ($P< 0.001$) and ventilator-associated pneumonia ($P= 0.006$) as well as longer hospitalization ($P< 0.001$) and total days of ventilator support ($P= 0.001$).
Conclusion: There was a significant difference in the distribution of injury sites between adults and children that used protective devices. Brain injuries are more common in children while adults mainly sustain abdominal and thoracic injuries. Adults are better protected against traumatic brain injuries; however, pediatric protective devices demand further development and careful application to prevent traumatic brain injuries.

Poster #50

STATE-LEVEL ANALYSIS OF INTIMATE PARTNER VIOLENCE AND PERIPARTUM HOMICIDE: A CALL FOR UNIVERSAL SCREENING OF PREGNANT TRAUMA PATIENTS

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Introduction: Despite representing only 4% of the global population, the United States has the 5th highest number of intentional homicides in the world. Peripartum women represent a unique and vulnerable subset of homicide victims. This study aims to understand the risk factors for peripartum homicide.
Methods: This study evaluated homicides of peripartum women and a comparison population of women 12-50 years of age in the 2018-2020 National Violent Death Reporting System. Peripartum was defined as currently pregnant or within one year postpartum. A secondary analysis was performed to compare the peripartum homicide rates between states categorized as restrictive, neutral, or protective to abortion access based on recently publish data. Pearson's chi-squared and Wilcoxon rank-sum tests were used.
Results: There were 496 peripartum homicide victims compared to 8,644 non-peripartum victims. The peripartum group was younger (27.4 ± 71 vs 33.0 ± 9.6, $p<0.001$). Intimate partner violence (IPV) was more common in the peripartum homicide group (39.9% vs. 26.4%, $p<0.001$). Firearms were used in 63.4% of homicides among the peripartum group compared to 49.5% of homicides in the comparison population ($p<0.001$). Peripartum deaths per-capita were highest overall in Louisiana, Missouri, and Nevada. There was a significant difference in mortality rates between states based on policies regarding abortion access (protective: 0.110 vs. neutral: 0.134 vs. restrictive: 0.169 ($p<0.01$)).
Conclusion: Compared to non-peripartum peers, peripartum females are at increased risk for homicide due to IPV, specifically due to firearm violence. The rates of peripartum homicide increase as state policies become more restrictive to abortion access. There is a dire need for universal screening of peripartum trauma patients for IPV, firearm violence, and access to care. Identification of this population may help protect this vulnerable population.

Table 1: Rates of peripartum homicide in US states from 2018-2020 with varying access to abortion.

State Abortion Policy	Total Homicides	Total Population	Rate per 100,000	
Restrictive to Abortion Access	329	195,238,307	0.169	p<0.01
Neutral to Abortion Access	90	67,345,534	0.134	
Protective to Abortion Access	76	68,865,679	0.110	

Poster #51

THE ASSOCIATION BETWEEN FIREARM INJURY INTENT AND LETHALITY: THE NEED FOR TAILORED INTERVENTIONS

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Introduction: While the US has high quality data on firearm-related deaths, less information is available on those who arrive at trauma centers alive, especially those discharged from the ED. We sought to determine dominant causes of firearm-related in-hospital deaths, postulating that among those who survive to a trauma center, non-assault factors alone or in combination, might be important risk factors for in-hospital firearm-related deaths.
Methods: We conducted a large multi-center prospective cohort study of patients treated for firearm injuries at trauma centers participating in an ACS TQIP study from 3/2021-2/2022. Exposures included patient demographics, clinical injury-related factors, context of injury, and pre-existing mental health diagnoses. The primary outcome of interest was injury intent in order to determine factors associated with self-inflicted injuries and assaults. Measures of urbanicity and community distress (Distressed Communities Index) were utilized to better understand risk factors for lethal injury.
Results: There were 17,395 firearm-related injury encounters across 130 centers in 41 states. Overall, 10% of patients died. Assault and self-inflicted injury accounted for 77% of deaths, the latter being far more lethal than assaults. Using logistic regression, age ≥65, a history of military experience, mental illness, and living in a prosperous zip-code were risk factors associated with self-inflicted injury as compared to assaults.

Table 1. In-hospital Lethality of Firearm Injury by Intent

	Lethality, n (%)			
Injury Intent	**N (%)**	**Non-Lethal**	**Lethal**	**p-value**
Assault	12247 (70.4)	11239 (91.8)	1007 (8.2)	<0.0001
Self-Inflicted	758 (4.4)	380 (50.1)	379 (49.9)	
Unintentional	2122 (12.2)	2079 (98.0)	43 (2.0)	
Law Enforcement	160 (1.0)	129 (80.6)	31 (19.4)	
Missing	2108 (12.1)	1775 (84.2)	333 (15.8)	

Table 2. Predictors of Self-Inflicted Firearm Injury (Self-inflicted vs. Assault)

Variable	**OR**	**95% Confidence Interval**
Elderly (age ≥65)	8.53	(5.84-12.47)
Mental Illness	9.93	(7.86-12.55)
Military History	4.67	(2.81-7.74)
Prosperous zip-code	1.65	(1.20-2.27)

Conclusion: The risk factors for firearm-related injuries differ by intent. With the goal of reducing firearm-related deaths, strategies and interventions need to be tailored, with a greater focus on mental health interventions and accessibility of firearms and services given the high lethality of self-inflicted injury.

Poster #52

LONG GUN VIOLENCE IN CALIFORNIA VERSUS TEXAS: DOES LEGISLATION HELP REDUCE FIREARM VIOLENCE?

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Introduction: Long guns (LGs) (i.e., rifles or shotguns) are uniquely implicated in firearm violence and mass shootings. On 1/1/2019 California (CA) raised the minimum age to purchase LGs from 18 to 21. This study aimed to evaluate the incidence of LG violence in CA vs. Texas (TX), a state with rising firearm usage and fewer LG regulations, hypothesizing decreased LG firearm incidents in CA vs increased rates in TX after CA LG legislation.
Methods: A retrospective analysis of the Gun Violence Archive (2015-2021) was performed. An additional analysis of all firearm incidents within TX and CA was performed. CA and TX census data were used to calculate incidents of LG violence per 10,000,000 people. The primary outcome was the number of LG-related firearm incidents. Median yearly rates of LG violence per 10,000,000 people were compared for pre (2015-2018) vs post (2019-2021) CA LG legislation (Senate Bill 1100 (SB1100).
Results: Median LG incidents per 10,000,000 people decreased in CA post-SB1100 (4.21 vs 1.52, $p< 0.001$) by nearly 64%, whereas any gun firearm violence was similar pre vs post-SB1100 (77.0 vs 74.5 median incidents, $p=0.89$). In contrast, median LG incidents per 10,000,000 increased after SB1100 (4.34 vs 5.17 median incidents, $p=0.011$) by nearly 35% in TX, with any gun incidents also increasing by nearly 53% (83.48 vs 127.46, $p<.001$).
Conclusion: CA LG firearm incidents decreased following SB 1100 legislation whereas the incidence in TX increased during this same time. Meanwhile, the incidence of any firearm violence remained similar in CA but increased in TX. This suggests the sharp decline in CA LG incidents may be related to SB1100. Accordingly, increasing the age to purchase a LG from 18 to 21 at a federal level may help curtail LG violence nationally.

Poster #53

HOSPITAL-BASED VIOLENCE INTERVENTION PROGRAMS: A SYSTEMATIC REVIEW AND META-ANALYSIS OF THEIR EFFECT ON REINJURY AND VIOLENCE PERPETRATION

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Introduction: Levels of interpersonal violence in the United States have risen over the past decade despite the widespread use of criminalization strategies. Hospital-based violence intervention programs (HVIPs) represent an increasingly popular strategy to mitigate downstream effects of structural violence by addressing social determinants of health. The objective of this study is to perform an updated systematic review and quantitative synthesis to better assess the effectiveness of core programmatic elements of HVIPs.
Methods: We searched PubMed and six other databases using terms for hospital setting, violent injury, program, and reinjury/violence outcomes to identify studies assessing HVIPs that provide ≥3 months of intensive case management services to survivors of interpersonal violence. We assessed the primary outcome of reinjury and secondary outcome of violence perpetration and based our analysis on randomized controlled trials (RCTs) and moderate- to high-quality observational studies. For reinjury, we quantitatively pooled results using a random effects meta-analysis model. Given substantial heterogeneity in outcome measures for violence perpetration, we restricted our secondary analysis to qualitative review.
Results: Out of 9,576 studies identified in our search, 10 studies (n=2,447) met inclusion criteria for primary analysis, of which 7 were RCTs (n=701). Pooled data demonstrated an 8.2% (n=81/986) reinjury rate in HVIP vs. 11.9% (n=174/1,461) in comparison participants. Preliminary meta-analysis using available case analyses demonstrated a synthesized odds ratio of 0.55 (95% Confidence Interval [CI]: 0.33-0.91; $I^2 = 53.5\%$) for reinjury in the HVIP group compared to the control group and average risk ratio of 0.55 (95% CI: 0.25-1.19; $I^2 = 64.5\%$) when only including RCTs. Three of four (75%) RCTs showed reduced violence perpetration in HVIP participants.
Conclusion: HVIPs were associated with a ~45% reduction of reinjury and appear to be associated with reduced violence perpetration. The available literature suggests that increased funding for HVIPs is justified and should also be considered in the context of addressing structural drivers of violence.

Poster #54

CAN WE DISCHARGE CHILDREN WITH LOW-GRADE BLUNT LIVER OR SPLEEN INJURIES FROM THE ED

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Introduction: Recent studies suggest children with low-grade isolated blunt liver or spleen injuries (BLSI) are unlikely to require intervention and could be safely discharged from the emergency department (ED). Prior studies excluded patients retrospectively found to have other injuries, but clinical practice would need to identify children safe for discharge based on clinical presentation.
Methods: A secondary analysis of a prospective study of BLSI was performed. All patients with grade I or II liver or spleen injuries were evaluated for need for transfusion, laparotomy, laparoscopy, or angiography. Excel was used to model different scenarios to optimize safe discharge of low grade BLSI.
Results: Of 1004 patients in the prospective study, 433 (43%) had BLSI of grade I or II. By excluding patients with high grade pancreatic injury on CT scan (2), clinical signs of bleeding or Shock Index >1.5 (160), a GCS <10 (20), pelvic fractures (10), or femur fractures (5), a subset of 133 (31%) of low grade BLSI were identified. Of the 133, none had an intestinal injury requiring surgery for trauma. No patient required surgery for bleeding, or angiography. No patients required a blood transfusion, although 1 patient did receive an unindicated transfusion prior to arrival. 1 patient underwent a laparoscopic appendectomy at 96 hours post injury.
Conclusions: Among 1004 patients with blunt liver or spleen injury, 43% were low grade BLSI injuries. After excluding those with clinical signs of bleeding on arrival, associated injuries, fluid around the liver or spleen on CT, or elevated shock index, 31% of patients could have potentially been discharged from the ED. None of the 133 would have needed to return within 24 hours for an intestinal injury. Until safety is prospectively proven, reliable access to return care would still be mandatory to allow safe ED discharge.

Poster #55

EMERGENCY DEPARTMENT PEDIATRIC READINESS OF US TRAUMA CENTERS: ASSOCIATIONS WITH TRAUMA CENTER TYPE AND FACILITY CHARACTERISTICS

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Introduction: Emergency department (ED) pediatric readiness has been associated with lower mortality for injured children. Over the past decade, resources have been invested in improving pediatric readiness. This study aimed to quantify current levels of trauma center pediatric readiness and define associations between pediatric readiness and facility characteristics.

Methods: The study cohort included all centers contributing to the National Trauma Databank (NTDB) in 2021. Center characteristics and pediatric (0-15y) volume from the NTDB were linked to weighted pediatric readiness scores (wPRS) obtained from the National Pediatric Readiness Project 2021 national assessment. Univariate and multivariable analyses were used to determine associations between wPRS and facility characteristics.

Results: wPRS was reported for 77% (749/973) of NTDB centers, and was highest in ACS level 1 pediatric trauma centers (PTCs, Table). Annual pediatric volume, PTC designation, association with a pediatric hospital, and presence of a pediatric ward or intensive care unit (PICU) were all associated with higher wPRS on univariate analysis. Independent predictors of high wPRS included: ACS level 1 PTC verification, affiliation with a pediatric hospital, and presence of a PICU.

Conclusion: ED pediatric readiness in trauma centers remains variable and is associated with inpatient resources. Ongoing efforts to improve pediatric readiness at non-pediatric centers are needed, particularly in centers that routinely transfer children to higher level of care.

Weighted Pediatric Readiness Scores (wPRS) by Trauma Center Type

Center Type	N	Median (IQR) wPRS
ACS-verified level 1 pediatric trauma center (PTC)	59	98 (97, 100)
Freestanding PTC, not ACS level 1	21	96 (90-98)
Mixed adult/pediatric trauma center, not ACS level 1	68	92 (76-96)
Adult-only level 1 or level 2 trauma center	320	78 (66-92)
Level 3 or level 4 trauma center	251	72 (61-84)
Non-designated trauma center	30	79 (66-93)

Poster #56

FOLLOW-UP CT AND UNEXPECTED HEMOSTASIS DURING NOM FOR PEDIATRIC BLUNT LIVER AND SPLEEN INJURY

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Introduction: Non-operative management (NOM) for blunt liver and spleen injury (BLSI) has been widely accepted in pediatric populations. As pseudoaneurysm and its rupture are major complications in NOM, follow-up CT and prophylactic embolization with angiography are often conducted during NOM. However, results are conflicting regarding the utility of repeated CT for preventing unexpected hemorrhage. To elucidate whether early follow-up CT would decrease unexpected hemostatic procedure, we examined the data of a nationwide study on pediatric BLSI.
Methods: A post-hoc analysis of a multicenter observational cohort study on patients ≤ 16 years who had BLSI at 83 hospitals in 2008-2019 was conducted, and those who underwent NOM were included. Indications and timing of follow-up CT and treatment for pseudoaneurysm are decided by treating physicians without any predefined protocols. Incidence of unexpected hemostasis (laparotomy and/or emergency angiography for ruptured pseudoaneurysm), complications related to BLSI, and mortality were compared between patients with and without early follow-up CT ≤ 7 days after admission. Inverse probability weighting with propensity scores was conducted to adjust patient demographics, comorbidities, mechanism and severity of injury, vital signs, AAST grade for BLSI, angiography on the day of admission, and institutional characteristics.
Results: Among 1320 included patients, 552 underwent early follow-up CT imaging and the median duration to repeated CT was 3 days. The median AAST grades for liver/spleen injury were 3 and 2, and one fourth of patients underwent angiography on the day of admission. The incidence of unexpected hemostasis was rare and comparable between patients with and without early repeated CT (8 [1.4%] vs. 6 [0.8%]; adjusted OR, 1.44 [0.62-3.34]; p = 0.40). While 30-day mortality was 0.3% in both groups, patients with repeated CT scans more frequently underwent multiple angiographies (OR, 2.79 [1.32-5.88]) and had more complications related to BLSI, particularly bile leak (OR, 1.73 [1.04-2.87]).
Conclusion: Follow-up CT scans within one week after admission was not associated with reduced unexpected hemostasis in NOM for pediatric BLSI. Possible adverse events following early repeated CT were concerned.

Poster #57

PEDIATRIC TRAUMA PATIENT LEAVING AGAINST MEDICAL ADVICE: AN EXPLORATION OF CONTRIBUTING FACTORS

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Introduction: Leaving Against Medical Advice (AMA) has been on the rise in recent years, accounting for 1-2% of all hospital discharges with an average annual increase of 1.9%, leading to worse patient outcomes, disrupted patient care, and higher healthcare costs. However, AMA discharge has received limited studies, particularly in pediatric trauma patients. Although there is evidence of African American race and insurance status being associated with AMA in adult trauma patients, this relationship has yet to be explored in the pediatric trauma population. Our objective was to explore the demographic, socioeconomic, and clinical factors associated with leaving AMA in pediatric trauma patients.
Methods: We performed a retrospective analysis on pediatric trauma patients from 2017 to 2019 using the National Trauma Data Bank. Of the 2,24,196 patients included, 238 left AMA (0.1%). We examined patient characteristics, including age less than 18 years old, race, sex, Glasgow Coma Scale score, trauma type, primary payment methods, and Abbreviated Injury Scale. Multiple Logistic Regression models were utilized to determine the characteristics associated with leaving AMA.
Results: Black pediatric trauma patients were significantly more likely to leave AMA than nonblack patients (OR 1.99, 95% CI 1.50 to 2.63). Patients with self-pay coverage were more likely to leave AMA than those with other insurance coverage types (OR 1.76, 95% CI 1.18 to 2.61). Blunt trauma patients were more likely to leave AMA than those with penetrating trauma (OR 1.68, 95% CI 1.22 to 2.33). Older age was found to increase the odds of AMA discharge (OR 1.15, 95% CI 1.15 to 1.19). Pediatric patients with severe abdominal injuries and severe lower extremity injuries were less likely to leave AMA (OR 0.271, 95% CI 0.11 to 0.66 (OR 0.26, 95% CI 0.13 to 0.52).
Conclusion: Race, insurance, injury type, and age play a role in the AMA discharge of pediatric trauma patients. Black pediatric trauma patients exhibit a rate of AMA discharge that is twice that of nonblack patients. The issue of AMA discharge remains relevant, and addressing racial and socioeconomic factors may provide opportunities for future interventions in the pediatric trauma population.

Poster #58

RECENT CHANGES IN THE MANAGEMENT OF HIGH-GRADE BLUNT PANCREATIC INJURT IN CHILDREN: A NATIONWIDE TREND ANALYSIS, 2011-2021

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Introduction: The ideal management of pediatric patients with high-grade blunt pancreatic injury (BPI) involving pancreatic duct destruction remains controversial, while non-operative management (NOM) is widely adopted for low-grade BPI. The aim of this study was to assess the nationwide trends of the practice patterns and outcomes following high-grade BPI in children across pediatric (PTC), mixed (MTC), and adult trauma centers (ATC).
Methods: This is a retrospective analysis of the National Trauma Data Bank (NTDB) dataset. Our study cohort included pediatric patients (age ≤16 years) sustaining high-grade BPI (Abbreviated Injury Scale ≥ 3) from 2011 to 2021. Patients who did not undergo any pancreatic operation were categorized into the NOM group. Trauma centers were defined as PTC (level I/II pediatric only), MTC (level I/II adult and pediatric), and ATC (level I/II adult only). The primary outcome was the proportion of patients undergoing NOM, and the secondary outcomes included the use of endoscopic retrograde cholangiopancreatography (ERCP) and in-hospital mortality. A Cochran–Armitage test was used to examine whether a significant linear trend exists.
Results: A total of 812 children were analyzed. The median age was 9 years [IQR 6-13], 64% were male, and median ISS was 17 [10–25]. During the study period, there was a statistically significant upward linear trend in the use of NOM and ERCP among the overall cohort (range 48% to 66%; P_{trend} =0.035, range 6.1% to 19%; P_{trend} =0.029, respectively). The significant upward trend in the proportion of NOM was maintained in the combined subgroup of patients treated at PTC and MTC (P_{trend} =0.037), while no significant trend was noted in the subgroup of patients at ATC (P_{trend} =0.661). Overall, there was no significant trend in the mortality rate (P_{trend} =0.382).
Conclusions: This study found a significant trend toward an increasing indication of NOM and ERCP, particularly with direct involvement of pediatric centers. Further research is required to understand the factors driving these recent practice changes and their associations with patient outcomes.

Poster #59

STATEWIDE DISCHARGE DATA SUPPORTS DEVELOPMENT OF INCLUSIVE TRAUMA SYSTEM

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Introduction: American College of Surgeons verification and state designation of trauma centers (TC) are tools utilized to optimize outcomes in the care of injured patients. Where participation in organized care is optional, new legislation to mandate participation in an inclusive trauma system (TS) may require demonstration of an outcomes gap. Given differences in populations treated TC versus non TC (NTC), a validated risk adjusted methodology is required for comparison. ICD 10 based injury severity score (ICISS) has been validated and utilized for comparison of outcomes.
Methods: After IRB approval state Healthcare Cost and Utilization Project (HCUP) data 2018-2020 was utilized and TC and NTC compared. All patients, pediatric, non geriatric adult, geriatric patients, subgroups of femur fracture, and traumatic brain injury (TBI) groups were evaluated for mortality and complications.
Results: Of 3,316,016 discharges, 593,157 (17%) had at least one injury diagnosis code. After excluding transfer patients, 375,541 records remained. 56.5% of patients were treated at TC and had lower risk adjusted mortality, a lower frequency of acute kidney injury (AKI), ventilator associated mortality, pulmonary embolus and surgical site infection as well as lower mortality with AKI. In subgroup analysis comparisons were hampered by the disproportionate treatment of some subgroups at TC, including all pediatric subgroups, 82.8% of TBI and 97.6% of shock subgroups. Where statistical significance was achieved, increasing age, increasing severity of injury, female gender and treatment at a NTC adversely affected survival in multivariate analysis. More patients with proximal femur fractures were treated at NTC (55%) and there was no benefit from TC treatment on risk adjusted mortality. Race only influenced mortality outcomes in TBI 0-15.9 and AKI.
Conclusions: Comparison of outcomes in hospitals in a state with a non inclusive TS demonstrates improved outcomes in injury care at TC, as well as demonstration that current destination protocols bring the majority of patients with some significant injuries preferentially to TC. These data provide support for TS development, including consideration for a more inclusive TS where uniform clinical data acquisition can be used for risk adjustment. Limitations include the need to eliminate transferred patients to avoid duplication and the use of discharge codes for patient classification.

Poster #60

THE HIDDEN POST-INJURY BURDEN: FRAGMENTATION OF CARE AFTER BLUNT PANCREATIC INJURY

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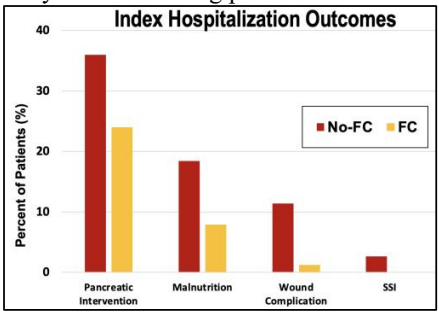
Introduction: Readmission to a different hospital leads to fragmentation of care (FC), and trauma patients may be uniquely vulnerable to FC. We analyzed FC incidence and outcomes after blunt pancreatic injuries (BPI).
Methods: The California Office of Statewide Health Planning Development dataset was evaluated for BPI (2016-2020). The primary outcome was FC rates by 6 months of discharge. FC were compared with those readmitted to their index admitting facility (no-FC). Distressed Communities Index (DCI) was used to measure socioeconomic factors.
Results: Among 539 patients with BPI, 264 met inclusion criteria. Over half of BPI (61%) experienced FC. Mechanism of Injury, Injury Severity Score, and abdominal Abbreviated Injury Score were similar between groups. Patients with FC had shorter index lengths of stay (4 v. 13 days) and shorter time to readmission (1 v. 15 days, both $p<0.01$). FC was less likely among patients who underwent operative interventions (36% v. 24%, $p=0.02$). There was no difference in age, sex, race, or intervention rates between groups at readmission. FC was more likely to occur among patients admitted to centers in low DCI areas. Patients with surgical site infections, malnutrition, or wound complications during index hospitalization were less likely to have FC (Fig). Among those with FC, 4% required intervention, and 1% died. Inflation-adjusted, median cost did not differ at the index hospitalization, nor the readmission between groups. Mortality during readmission did not vary by FC status.



Conclusion: BPI patients demonstrate a significant incidence of fragmentation of care. FC was more likely for centers in less distressed communities, and less likely for patients that had interventions, or incurred major wound or infectious complications.

Poster #61

COMMUNICATION MATTERS: THE IMPACT OF TRAUMA INFORMED CARE ON PATIENTS, FAMILIES, AND PROVIDERS

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Introduction: Trauma-informed care (TIC) is a set of principles designed to improve trauma care by recognizing the pervasive nature of trauma experiences; surgeon engagement can have significant impact on the trauma family experience. We aimed to characterize: 1) families' experience of communication in the Trauma Acute Care Surgery (TACS) ward, 2) differences between communication in TACS and the Surgical Trauma Intensive Care Unit (STICU), and 3) families' mental and emotional state.
Methods: This study was conducted at a Level 1 Trauma Center with a General Surgery Training Program. Surveys were collected from adult family members of patients admitted to TACS and STICU, as well as their attending and resident surgeons. Information access and communication with surgeons in TACS and STICU were compared using Wilcoxon rank sum test.
Results: TACS family members (N=42) and surgeons (N=27) completed surveys on 40 unique patients; data previously collected in the STICU included 88 families. TACS families reported meeting with a doctor less frequently (mean 3.44 times) than in STICU (mean 4.56; P=0.045). TACS families reported reduced information access, such as being able to get questions answered (50% TACS vs. 96% STICU; P<0.001) and being included in rounds (38% vs. 73%; P<0.001). Compared to STICU, TACS families agreed less frequently that the surgeon explained things in a way they could understand (71% vs. 90%; P=0.023) and listened carefully to them (69% vs. 85%; P=0.001). In TACS, families were less able to count on their friends for support (69% vs. 98%; P<0.001) and more likely to have little interest or pleasure in doing things (64% vs. 48%; P=0.024).
Conclusion: Family members report poorer quality of engagement with their providers, reduced access to information, and lower opinion of the quality of care after the ICU setting, while also experiencing less community support and increased anhedonia, a major symptom of depression. We recommend an increased focus on TIC principles in training and continuing education for both nurses and physicians to encourage care that increases patient and family control, validation, and empowerment for improved outcomes.

Poster #62

UNDERSTANDING THE NEEDS OF MEN EXPERIENCING DOMESTIC VIOLENCE WITHIN HOSPITAL-BASED VIOLENCE INTERVENTION PROGRAMS

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Introduction: An approach to reduce re-injury among trauma patients is linkage to hospital-based violence intervention programs (HVIPs) at time of injury. While domestic violence (DV) is a common cause of interpersonal violence, it is unclear what proportion of HVIP resources should be tailored to this violence type. We sought to characterize the extent of HVIP engagement dedicated to DV at a Level I Trauma Center, over five years. **Methods:** This study uses mixed methods to examine the needs of patients engaged by our hospital's HVIP due to DV. Bivariate analysis of HVIP data contextualized the prevalence of imminent risk factors among patients with chi-square testing. Qualitative methods uncovered perceptions of patients among HVIP frontline staff using constructivist grounded theory. We analyzed patient cases to understand how staff build rapport with DV patients and assess their needs regarding imminent risk and safe discharge. **Results:** Since 2018, our HVIP engaged more than 7,305 patients, with 12.5% presenting for injuries due to DV. Men and women have a similar likelihood of reporting DV, 57.2% and 42.8% ($p < 0.001$). Men engaged for DV report more imminent risk factors, relative to men engaged for community violence (CV) ($p < 0.001$). Factors include that someone currently wishes to harm the patient, patient was intended target, and patient experienced a similar injury in the past. Gendered stigma around DV deters men from seeking supports, including concerns with credibility and lack of confidence in ability to access services. Qualitative findings suggest HVIP staff occasionally misclassify an incident as CV, especially when a man is involved, and that there are challenges securing DV referrals for men. **Conclusion:** At a new Level I trauma center, a significant share of men engaged by our HVIP report DV. DV in men is frequently conflated with CV. HVIP staff build a unique relationship and rapport with patients that may foster a safe environment for DV disclosure, especially among men. There is an opportunity for HVIPs to develop improved protocols to support men experiencing DV.

Poster #63

UNRAVELING THE VALUE OF TRAUMA ACTIVATION PAGES USING NATURAL LANGUAGE PROCESSING AND CLINICAL INTUITION

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Introduction: Hospitals generally circulate trauma activation pages to alert providers of incoming trauma patients. The content of such pages is often limited, sometimes misleading and inaccurate, and there is minimal to no standardization of content. The optimal content and structure for conveying patient acuity and clinical requirements is unknown. In this study, we sought to investigate the correlation between content of trauma activation pages and injury severity, as measured by Injury Severity Score (ISS). Surgeons and natural language processing algorithms were asked to predict injury severity and determine if a page containing limited data could convey equivalent information to a full, unstructured page.
Methods: All trauma activations from 2017 to 2021 at a single, academic level 1 trauma center were identified; patient demographics, trauma activation pages, activation level, mode of arrival, and injury severity scores were obtained. Descriptive statistics were performed. First, we asked attending trauma surgeons and acute care surgical fellows (N=6) to predict patient ISS clusters and likelihood of requiring surgical or interventional procedure within 6 hours of presentation based on (a) limited data elements and (b) the full text of the page. Natural language processing methods were applied to assess the value pages. In particular, term frequency-inverse document frequency (text frequency) analysis was performed. Logistic regression was used to independently predict injury severity based on (a) limited data elements (patient demographics, activation level, and transfer status) and (b) the full text of activation pages. Feature importance of individual phrases was assessed within each group. Model performance was assessed using accuracy and area under the receiver operating characteristic curve.
Results: Data for 3,797 trauma activations were obtained. Mean patient age was 48 years (SD +/- 21). 21% (N=794) were classified as high priority ("STAT"). Nearly 53% of patients presented directly from the scene (N=2023), with the remainder being transferred after initial evaluation at another hospital. Median ISS was 5 (IQR 4-10). On average, activation pages contained 9.4 words. The following 5 words were most frequently included in the page: fall (N=1595), crash (N=1454), motor vehicle (N=1238), fracture (N=689), and struck (N=511). Surgeons correctly predicted the ISS clusters for 49.4% (355/718) and 42.9% (256/597) of pages based on full text and limited data only, respectively. Text frequency analysis had an accuracy of 67% (95% CI: 64-70%) to predict injury severity clusters. Accuracy dropped to 32.0% when using limited data elements in a logistic regression model (Panel A). Independent of model type, activation level was most highly correlated with severity (odds ratio = 1.89, $p<0.05$). Feature importance is stratified by injury severity (Panel B). Surgeons correctly predicted whether a patient would require an intervention within 6 hours of presentation in 80.9% and 83.9% of cases, though the positive predictive value was 25.9% and 24.6% based on predictions for full text and limited data.
Conclusion: The full content of trauma activation pages was more predictive of injury severity than a page that only included a limited subset of objective data. Surgeons showed similar capabilities; they were able to predict ISS clusters with higher performance when given more data. However, in all cases, trauma page information was only moderately predictive of ultimate injury severity. Future research is needed to further investigate the optimal content of trauma activation pages.

Poster #64

THE ABC SCORE DOES NOT PREDICT TRAUMATIC HEMORRHAGE IN AN INDIAN TRAUMA REGISTRY

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Introduction: In low- and middle-income countries (LMICs), the burden of trauma is high while access to blood products is limited. Effective decision-support tools are needed to help decide whether to mobilize scarce resources, such as massive blood transfusion. Our primary aim was to assess the performance of the Assessment of Blood Consumption (ABC) score - a common decision-aid for initiating massive blood transfusions in high-income country (HIC) trauma systems - within the Indian context.
Methods: We analyzed data from the Towards Improved Trauma Care Outcomes (TITCO) database, a prospective cohort of injured patients who presented to four Indian public hospitals between 2013 to 2015. We classified patients as having traumatic hemorrhage if they had an ICD-10 code for a solid organ injury and/or hemorrhage and also received at least one unit of transfusion. Test characteristics of the ABC score were assessed with area-under-the-receiver-operator characteristics (AUC) curves. Patient demographics, injury characteristics, and clinical outcomes were analyzed using multivariate logistic regression models to identify factors associated with traumatic hemorrhage.
Results: Of 5,080 patients were included in this analysis, 353 (6.95%) were identified as having traumatic hemorrhage and 4,727 (93.05%) were not. In this population, the ABC score had a sensitivity and specificity of 32.4% and 90.7%, respectively, when a cutoff of greater than or equal to 2 was used to predict bleeding. Logistic models revealed that road-traffic injury (RTI), arrival by private vehicle, elevated HR, low SBP, positive FAST, and mild GCS were all positively associated with traumatic hemorrhage.
Conclusion: The performance of the ABC is poor in the Indian context. Clinicians should use caution in applying decision-support tools developed for other contexts to their own. Several injury and patient characteristics were identified that may have more relevance to decision for transfusion in the urban Indian trauma setting.

Poster #65

THE STATUS OF ROAD SAFETY IN QATAR AFTER A DECADE OF ACTION: ANALYZING NATIONAL STATISTICS AND NATIONAL TRAUMA REGISTRY DATA

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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 be 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.

Poster #66

FROM TARGETS TO SOLUTIONS: IMPLEMENTING A TRAUMA QUALITY IMPROVEMENT BUNDLE IN CAMEROON

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Introduction: Global surgery research has been criticized for failing to transition from problem identification to solution implementation. A recent trauma quality improvement (TQI) program in Cameroon associated preventable deaths with deficiencies in primary survey evaluation and management. We introduced a context-specific TQI intervention to improve site-specific care gaps at a regional hospital in Cameroon.
Methods: Data on local trauma care practices were used to develop a bundle consisting of staff training, a trauma checklist, and monthly audit meetings. Trends in target process measures, including vital sign collection and primary survey performance, were compared between the six-month pre-intervention and post-intervention periods using chi-square analysis.
Results: Analysis included 246 pre-intervention and 217 post-intervention patients. Completion of all vital signs improved significantly after TQI implementation (Figure 1). Vital signs were measured more quickly (89% within 15 minutes vs. 78% pre-intervention, p <0.05) and more frequently (53% with repeated vitals vs. 8%, p <0.01). Primary survey assessment increasingly identified airway problems (8% vs. <1%, p <0.001) and breathing problems (10% vs. 3%, p <0.001) post-TQI, and interventions for respiratory issues (10% vs. 1%, p <0.001) and cervical collar placement (8% vs. 0%, p <0.001) were performed more frequently.
Conclusion: Implementation of a context-tailored TQI bundle was associated with significant improvements in previously identified target areas. Local data-derived interventions targeting frontline capacity can bridge the gap between recognized care deficits and tangible improvement in resource-limited settings.

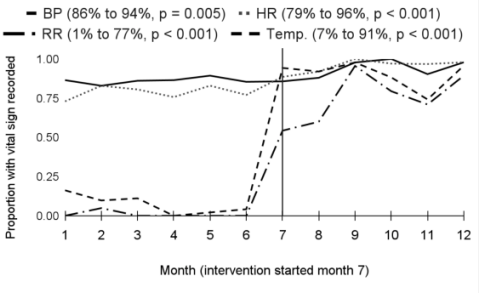

Figure 1: *Frequency of vital sign collection pre- vs. post-intervention*

Poster #67

ON MORTALITY RISK-ADJUSTMENT IN A CROSS-NATIONAL STUDY OF INJURED PATIENTS IN THE U.S. AND INDIA

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Introduction: Injury severity, typically measured by Injury Severity Score (ISS), is a major determinant of mortality after trauma. Adjusting for injury severity is essential when comparing mortality across different settings. Access to advanced imaging, critical for accurate ISS determination, is often severely limited in low/middle income countries (LMIC). Hence, ISS may not accurately reflect injury severity in these resource constrained environments. MGAP (Mechanism, Glasgow Coma Score, Age and blood Pressure), is not dependent upon imaging. The current study evaluates the accuracy of mortality prediction using MGAP versus ISS in an LMIC (India) and a high-income country (USA).
Methods: 2013-15 data from US National Trauma Data Bank (NTDB) and India Towards Improved Trauma Care Outcomes (TITCO) database was matched. Logistic regression models grouping patients within facilities were used to determine predictors of mortality. Models were varied to use ISS and MGAP for risk-adjustment, and the estimates compared. Inverse probability weighted regression adjustment (IPWRA) was used to estimate the population-level trauma mortality difference between the US and India.
Results: 687,407 adult patients (NTDB: 675,611; TITCO: 11,796) were included. Unadjusted mortality was significantly higher in India (23.15% vs 2.79% - $p < 0.001$). Overall, MGAP outperformed ISS for mortality prediction (AUROC 0.87 vs 0.81 - $p<0.001$). In NTDB, both scores performed well, though MGAP was superior (AUROC 0.88 vs 0.85 - $p<0.001$). In TITCO, while MGAP was highly predictive, ISS had poor predictability (AUROC 0.82 vs 0.58 - $p<0.001$) - Fig. The odds of mortality in India were higher with ISS based risk adjustment (OR 15.61, 95% CI 12.83-18.99) vs MGAP (OR 9.73, 95% CI 7.48-12.65). Using IPWRA, the difference between MGAP and ISS persisted, with ISS models showing an 11.4% relative increase in estimated mortality probability.
Conclusions: In low resourced environments with limited access to imaging after trauma, anatomical scores (e.g. ISS) are highly inaccurate for risk adjustment. Non-anatomical risk scores not dependent upon imaging intensity such as MGAP are highly accurate and superior to ISS.

Poster #68

TRENDS OF TRAUMA ADMISSIONS TO ICU DURING PANDEMIC: A TIME SERIES ANALYSIS

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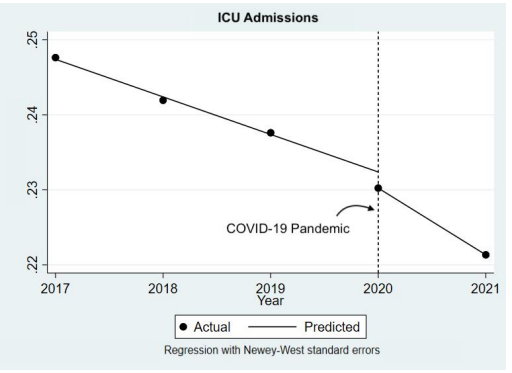
Introduction: During COVID-19 pandemic numerous modifications in management of patients was implemented in major trauma center to accommodate for the surge of ICU admissions while trauma admissions was at an all-time high. The aim of our study is to assess resource utilization during COVID-19 pandemic. We hypothesized that there was a decrease in ICU admissions among all trauma patients with similar characteristic during COVID-19 pandemic.

Methods: We performed a retrospective study of TQIP database (2017-2021), Patients admitted in 2017 - 2019 were defined as pre-pandemic period and 2020 and 2021 were defined as pandemic period. The primary outcomes were ICU admission. Secondary outcomes were mortality, hospital and ICU length of stay. Interrupted time series analysis was performed.



Results: Comparing pre-pandemic period to pandemic period patient attributes, and injury patterns were similar. Mortality rate was 3.5% on average. 59.3% of trauma patients were male and 74% were white. ICU admissions for trauma patient has been significantly reduced during pandemic (figure 1). While ICU length of stay remained similar (5.05 + 6.7 vs 5.23 + 6.8) for admitted patients, hospital length of stay was shorter during pandemic (5.3 + 8 vs 4.1 + 5.1).

Conclusion: ICU admissions of trauma patients have been declining over the years and this decline became steeper during pandemic. A natural hazardous phenomenon like pandemic which stressed healthcare systems nationwide triggered a rerouting of resource utilization, however outcomes for trauma patients remained similar.

Poster #69

THE COMMUNITY OF TRAUMA CARE: PARTNERING WITH STAKEHOLDERS TO IMPROVE INJURY OUTCOMES

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Introduction: Engaging trauma survivors/caregivers results in research findings that are more relevant to patients' needs and priorities. As such, their perspectives increase research significance; however, the underlying presumption is a lack of consensus. We aimed to describe stakeholder perspectives to assure research is meaningful, respectful, and relevant to the injured patient and their caregivers.
Methods: A multiphase, inductive exploratory qualitative study was performed, the first phase of which is described here. Virtual focus groups to elicit stakeholder perspectives and preferences were conducted across 19 trauma centers in the United States during 2022. Discussion topics were chosen to identify patients' motivation to join research studies, preferences regarding consent, suggestions for increasing diversity and access, and feelings regarding outcomes, efficacy, and exception from informed consent. The focus groups were audio recorded, transcribed, coded, and analyzed to identify the range of perspectives and common themes.
Results: Ten 90-minute focus groups included patients/caregivers (n=21/1) and researchers (n=14). Data analysis identified common themes emerging across groups (Table 1). The importance of trust and pre-existing relationships with the clinical care team pervaded the data across all groups.
Conclusion: Our findings reveal common themes in preferences, motivations, and best practices to increase participation in trauma research. The next phases will involve a vignette based survey to establish broad stakeholder consensus, followed by education and dissemination to share strategies to increase research engagement and relevance for patients, and form a panel of patients to support future research endeavors.

Table 1.

Topics of Discussion	Themes
Motivation to Participate	Altruism, New knowledge/perspective, Health status, Recognition of benefits of giving back
Informed Consent Best Practices	Timing, Researcher's approach/characteristics, Focus on altruistic nature, Trust/respect

Poster #70

ANTIBIOTICS AND SURGICALLY TREATED ACUTE APPENDICITIS, WHEN WHERE AND WHY?

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Introduction: Antibiotics within an hour of incision reduces the incidence of surgical site infection (SSI) in clean-contaminated abdominal surgery. Patients who undergo emergency surgery are often receiving treatment antibiotics and may not benefit from additional antibiotics immediately prior to skin incision though hospital protocols may recommend them. We hypothesized that additional prophylactic antibiotic coverage does not decrease incidence of SSI in emergency appendectomy patients.
Methods: We evaluated outcomes of patients after a policy change recommending pre-incision antibiotics regardless of ongoing antimicrobial therapy. We reviewed all adult patients at a single institution that underwent emergency appendectomies for acute appendicitis between 2013 and 2020. Variables included age, sex, perforation, body mass index (BMI), Elixhauser comorbidity index (ECI), surgical approach, emergency department antibiotics (EDA), and preoperative antibiotics. EDA were further subclassified into none, narrow and broad spectrum. The primary outcomes were superficial/deep and organ-space SSIs. Bivariable and multivariable logistic regression models were created to assess the independent impact of each strategy. Multivariable models compared those receiving pre-incision cefazolin to those receiving no pre-incision antibiotics.
Results: Patients (n= 1328) with a mean age (SD) of 39.5 (17.0) years (40% female) were reviewed. Age, sex, perforated appendicitis, EDA, ECI and BMI all were predictive of infection (table). Pre-incision antibiotics were not predictive of SSI (p= 0.632). After adjustment for age, sex, perforation, EDA, ECI and BMI only perforation [OR 17.08 95% CI (6.97 – 51.43)] and male sex [OR 2.75 95% CI (1.29 – 6.43)] were associated with organ-space infection while pre-incision cefazolin was not [OR 0.83 95% CI (0.38 – 1.97)]. ED broad spectrum antibiotics were associated with lower incidence of superficial/deep infection [OR 0.06 95% CI (0.00 – 0.68)] however pre-incision cefazolin was not [OR 0.71 95% CI (0.08 – 15.34)].
Conclusion: For patients undergoing emergency appendectomies who have received broad spectrum antibiotic treatment, additional pre-incision cefazolin does not reduce the incidence of superficial/deep or organ-space SSI.

Poster #71

ANTIHISTAMINES VS. RESUSCITATION AND COMPLICATIONS IN BURN INJURIES: A RETROSPECTIVE STUDY

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Introduction: In theory, management of vascular permeability after thermal injuries via antihistamines may reduce the histamine-mediated synthesis of reactive oxygen species, inflammation, and edema. Antihistamine use to target microvascular endothelial barrier dysfunction following thermal injuries in humans is not well known. The therapeutic application of histamine receptor antagonists may reduce resuscitation requirements and ultimately improve outcomes in thermal injuries.
Methods: A retrospective analysis was conducted using the EMR records at the University Medical Center in Lubbock, TX. We checked if the burn patients from July 2015 to July 2021 (N=199) had a previous prescription for antihistamines prior to the hospital visit and/or a 24-hour Medical Administration Record (MAR) of antihistamines during the hospital stay. The patients were grouped into three categories: control (no antihistamine usage), patients using H1 blockers, and patients using H2 blockers. Outcomes were assessed on infection rates, sepsis development, graft loss ≥ 20%, hospital LOS, acute kidney injury, amount of resuscitation fluid used, urine output, and mortality.
Results: Out of the participants, 39.7% used H2 blockers, and 7.7% used H1 blockers. Chi square analysis was used. When compared to the control group, there were no significant differences in outcomes relating to graft loss of over 20% or infection rates in patients using H1 or H2 blockers. However, only H2 blockers were found to significantly decrease mortality rates ($p=0.018$) in burn patients in comparison to the control group.
Conclusion: H2 blocker usage prior to or within 24 hours of a burn injury can potentially decrease mortality rates. The antagonistic mechanism of H2 blockers on histamine-mediated processes in a burn injury may contribute to improved vascular permeability management and, thus, decreased damage from burn-induced reactive oxygen species and edema.

Poster #72

DEVELOPMENT AND VALIDATION OF A PREDICTIVE MODEL FOR ACUTE RESPIRATORY DISTRESS SYNDROME AFTER TRAUMA

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Introduction: ARDS is a well-known complication after trauma associated with increased morbidity and mortality. Little is known about factors predisposing injury victims to develop ARDS. With the current project we aim to develop a predictive model for ARDS development after trauma.
Methods: The TQIP database (2013-2020) was queried. Patients ≥15 years with a hospital stay ≥48h were examined. Data were split into training and testing subsets at a 4:1 ratio. Uni- & multi-variable logistic regression models were fitted, and subsequently ten-fold cross-validated with a logistic LASSO model to select optimal penalization for AUC maximization. Variable selection cut-offs were determined with Yudens J-statistic.
Results: A total of 4,045,541 patients were analyzed. The selected LASSO model reduced the variable pool from 58 considered to 35, without sacrificing performance (all-models AUC 0.83). Male gender [O.R. 1.48 95% C.I. (1.43-1.53)], and BMI [1.01 (1.01-1.01)], as well as history of diabetes [1.13 (1.08-1.17)], bleeding disorders [1.94 (1.83-2.05)], COPD (but not smoking) [1.59 (1.52-1.67)], hypertension [1.16 (1.12-1.20)], prior MI [1.94 (1.76-2.14)], CHF [1.28 (1.20-1.37)], alcoholism [1.66 (1.59-1.73)] & cirrhosis [1.68 (1.53-1.85)] all predisposed for ARDS. Penetrating (and specifically firearm) injuries [6.44 (2.87-14.41)], as well as burns [3.01 (2.71-3.34)], motor-vehicle crashes [1.6 (1.54-1.67)] and struck pedestrians [1.58 (1.48-1.69)] also independently increased risk for ARDS, as did lower pressure [0.997 (0.997-0.998)], temperature [0.84 (0.82-0.86)], O2 [0.989 (0.987-0.99)], and GCS [0.87 (0.87-0.87)] in the ED. Patients with rib [1.56 (1.51-1.61)] (and especially flail chest [2.31 (2.16-2.47)]) and pelvic [1.19 (1.14-1.24)] (but not lower extremity) fractures, pulmonary contusions [1.94 (1.86-2.01)], and those requiring thoracotomy [2.04 (1.83-2.27)], or cranial decompression [2.30 (2.12-2.49)] had increased risk for ARDS. Contrast to published data, age and race were not predictors, and neither were plasma, platelet and cryoprecipitate transfusions. Red blood cells were [1.06 (1.05-1.07)].
Conclusion: Our validated model may be used as an online tool to determine patients at risk for ARDS development, so critical care admission and appropriate strategies and resources can be allocated.

Poster #73

DIVING DEEPER INTO POST-INJURY SEPSIS: EPIDEMIOLOGY OF CULTURE NEGATIVE AND RECURRENT SEPSIS

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Introduction: While critically injured trauma patients are known to be at high-risk for subsequent infection, patterns of negative microbiologic culture and recurrent sepsis events remain poorly understood.
Methods: We performed a retrospective analysis of 3,194 critically ill trauma patients admitted to our Level 1 Trauma Center between 2012-2020 requiring mechanical ventilation ≥3 days. Sepsis events were identified by a novel, automated method based on clinical data from the electronic health record, consistent with Sepsis-3 definitions. Culture results and recurrent sepsis episodes were determined and linked to clinical outcomes.
Results: The overall incidence rate of sepsis in this severely injured (median ISS 30, IQR 25-43) population was 24% (n=747/3194). The median time to onset of 1st sepsis episode was 8 days (IQR 6-11). Half of all initial sepsis events (n=372, 49%) occurred within the first 7 days, while only 12% (n=93) developed late, after day 14. Pre-existing organ dysfunction was common prior to sepsis onset (SOFA 3, IQR 2-6). While microbiologically confirmed pneumonia was the leading source of infection (n=342, 46%), one-third (n=249, 33%) of initial sepsis events were culture negative. More than one-third of septic patients (n=257, 34%) developed 1 or more additional sepsis episodes during their hospitalization. Compared to isolated septic episodes, a trajectory of recurrent sepsis was independently associated with baseline characteristics of shock on arrival, advancing age, and penetrating mechanism. Additionally, the incidence of chronic critical illness (61% vs 36%), as well as ventilator, ICU & hospital days, were all significantly greater in patients with recurrent sepsis events (all $p<0.001$).
Conclusion: A high rate of negative microbiologic cultures and pre-existing organ dysfunction are likely contributors to the challenges of timely and accurate diagnosis of sepsis among critically ill trauma patients. Recurrent sepsis episodes are associated with a clinical trajectory of chronic critical illness, which has been linked with an endotype of persistent inflammation and immunosuppression, and poor long-term outcomes.

Poster #74

EFFECT OF VOLUME RESUSCITATION ON CEFAZOLIN PHARMACOKINETICS IN TRAUMA PATIENTS

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Introduction: Cefazolin is regularly used as prophylaxis in trauma patients to avoid infection. However, evidence-based antibiotic dosing guidelines are lacking among patients receiving massive transfusion. We hypothesized that an association between volume resuscitation and cefazolin pharmacokinetics (PK) exists.

Methods: We conducted a prospective study to develop a population PK model using remnant blood samples of fifteen trauma patients meeting indications for cefazolin and initiation of massive transfusion protocol. Individual Bayesian estimates for cefazolin clearance (CL) and volume of the central compartment (V_c) were derived from the model. Linear regression was performed to evaluate associations between these PK parameters and various volume resuscitations received including whole blood, packed red blood cells (PRBCs), fresh frozen plasma (FFP), and crystalloids.

Results: Patients received between 525-2100ml of whole blood, 350-9223ml of PRBCs, 0-5265ml of FFP, and 1400-6025ml of crystalloid. The median cefazolin CL and V_c were 4.6 L/h (range 1.6-10.3 L/h) and 4.4 L (range 2.3-25.2 L), respectively. The p-value (*P*) and R^2 for the association between resuscitation type and cefazolin CL and V_c are listed in the table below.

Resuscitation type	CL	V_c
Whole blood	P=0.08, R^2=0.2	P=0.3, R^2=0.07
PRBCs	P=0.9, R^2=0.0004	P=0.6, R^2=0.02
FFP	P=0.9, R^2=0.002	P=0.2, R^2=0.1
Total blood products	P=0.9, R^2=0.001	P=0.3, R^2=0.01
Crystalloids	P=0.7, R^2=0.008	P=0.5, R^2=0.03
Total volume resuscitation	P=0.83, R^2=0.004	P=0.2, R^2=0.1

Conclusions: In this prospective pilot study, there was no statistically significant association between cefazolin PK parameters and the amount of volume resuscitation received. These data suggest that re-dosing of cefazolin should be conducted independent of the volume of blood products or crystalloid administered.

Poster #75

FACTORS ASSOCIATED WITH ANXIETY AND DEPRESSION AT ONE-YEAR POST-MAJOR TRAUMA: A MULTI CENTRE STUDY

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Introduction: Longer term recovery following trauma is impacted by physical and psychological factors. The presence and impact of anxiety and depression on longer term recovery in severely injured patients is unknown. This multi-site study investigated the prevalence of anxiety and depression at one year after trauma critical care admission.
Methods: Adult trauma patients admitted to four Level 1 Critical Care Units were enrolled over 18 months. Survivors were followed-up at one year post injury using EQ-5D-5L questionnaires (n=990). Patient responses were dichotomized into those with or without reported anxiety or depression.
Results: 295 questionnaires were completed (30% response rate). Two thirds (63%) reported anxiety or depression (AoD) at one year following injury, and this was associated with a worse overall health state ($p<0.0001$). Those with AoD were younger (53 years vs. 60 years, $p=0.03$) and more likely to have experienced psychological problems (16% vs. 5%, $p<0.01$). Injury severity was the same for both groups (median 25), but penetrating injury was more common (9% vs. 2%, $p=0.01$) in those with AoD. Anxiety and depression were associated with longer critical care (11 vs. 8 days, $p=0.04$) and hospital stays (32 vs. 24 days, $p<0.01$). All physical EQ-5D problems were worse in the presence of AoD, especially pain (severe/extreme pain 53% vs. 23%, $p<0.001$). In multivariable analysis, factors associated with anxiety and depression at one year were: younger age (OR 0.97 [95% CI 0.96-0.99] $p=0.008$), a previous psychological diagnosis (OR 3.2 [95% CI 1.4-7.3] $p=0.005$), penetrating injury (OR 10.6 [95% CI 1.9 – 57.7] $p=0.006$) and pain at follow up (OR 1.7 [95% CI 1.2-2.4] $p=0.002$).
Conclusion: Longer term anxiety and depression following significant trauma was common in those with previous psychological problems. Clinical assessment in hospital should include screening to identify those at risk. Improved longer term pain management may also enhance psychological recovery after injury.

Poster #76

FRAILTY SCORE AND INCENTIVE SPIROMETRY PREDICT ICU LENGTH OF STAY IN PATIENTS WITH RIB FRACTURES

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Introduction: Guidelines suggest mandatory Intensive Care Unit (ICU) stay for geriatric patients with rib fractures may improve outcomes. However, not all geriatric patients have the same degree of frailty. The Clinical Frailty Scale (CFS), a measure of physiologic condition, independently predicts adverse patient outcomes among geriatric patients. Incentive spirometry (IS) values are associated with the physiologic quality of the respiratory system. CFS and intake IS are values that can be quickly collected during patient triage. The objective of this study is to determine if CFS and intake IS are independently associated with ICU length of stay and discharge disposition in patients of age ≥ 45 with rib fractures.

Methods: Medical records from patients greater than 45 years-old with rib fractures admitted to a Level 1 trauma center from 2016 to 2019 were reviewed. Primary outcome was ICU length of stay ≥2 days, with a primary predictor of CFS. This was assessed using logistic regression and controlled for the following covariates: age, sex, ISS, chest AIS, GCS, Charlson score, IS (<500, 500-999, 1000-1499, 1500+, or missing), number of fractures, and bilateral rib fractures. Area under the curve (AUC) was calculated for this multivariable logistic regression model as well as for age, CFS, and IS independently. Mean CFS among the discharge disposition groups (home, facilities, death, or other) was assessed using linear regression.

Results: 883 patients were included. 361 patients (40.9%) had an ICU LOS ≥2 days. Higher CSF was significantly associated with an ICU LOS ≥2 days ($p=0.001$; OR for a one-point increase in CFS: 1.28 [95% CI: 1.11, 1.47]). The full model had an AUC of 0.74 (95% CI: 0.71-0.78), indicating good discrimination between patients with and without longer ICU LOS. Age on its own did not successfully discriminate between the two groups (AUC 0.50 [95% CI: 0.47-0.54]). CFS and the IS categories performed better than age, but each alone provided weak discrimination between the groups (CFS: AUC 0.56 [95% CI: 0.52-0.60], IS: AUC 0.63 [95% CI: 0.59-0.66]). Mean CFS differed by discharge disposition ($p<0.0001$). Patients discharged to a facility also had a higher average CFS than those discharged home (0.41 points [95% CI: 0.24, 0.58]).

Conclusion: Together, CFS and intake IS values may be useful in predicting ICU length of stay and discharge disposition for those with traumatic rib fractures. These results provide a simple assessment that may help to guide admission disposition and resource use for patients with rib fractures and varying degrees of frailty.

Poster #77

POTASSIUM IS AN EARLY INDICATOR OF MORTALITY, COMPLICATIONS, AND LENGTH OF STAY IN ADULT TRAUMA PATIENTS

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Introduction: The average trauma patient has a considerable amount of data collected in their initial evaluation with unclear significance. We hypothesized that an elevated potassium level in the first 24 hours of admission was associated with increased mortality and complications.
Methods: All adult trauma patients in our internal registry from 2016 to 2021 with laboratory results available from the electronic medical record were analyzed. The maximum and minimum serum potassium over the patient's first 24 hours after admission were determined and outcomes for mortality and complications were compared using risk-adjusted multivariable logistic regression. Linear regression compared differences in length of stay. For all tests, statistical significance was set as $p < 0.05$.
Results: We analyzed 8,220 adult trauma patients with 24-hour laboratory data. In the risk-adjusted multivariable analyses, greater peak serum potassium (SP) in the first 24 hours was associated with increased mortality (OR=1.53, $p < 0.001$), acute kidney injury (AKI) (OR=2.53, $p<0.001$), hemorrhagic shock (OR=2.75, $p<0.001$), multi-system organ failure (MOF) (OR=2.76. $p<0.001$), myocardial infarction (MI) (OR=1.98, $p<0.001$), severe sepsis (OR=2.04, $p<0.001$), and increased length of stay. This association persisted in those with blunt trauma. Cut-point analysis found that a peak serum level of 4.6 mEq/L was 81% specific for mortality and 4.47mEq/L correlated with increased mortality (OR=1.73, $p<0.001$), AKI (OR=2.05, $p<0.001$), and hemorrhagic shock (OR=2.14, $p=0.006$).
Conclusion: In the first 24 hours of admission, higher maximum SP levels were associated with increased mortality, AKI, hemorrhagic shock, MOF, MI, severe sepsis, unplanned extubation, ICU days, and hospital days in all trauma patients. A peak SP greater than 4.6 mEq/L was 81% specific for mortality and 4.47 mEq/L showed a correlation with mortality, AKI, and hemorrhagic shock, underscoring its possible use in acute care.

Poster #78

THE IMPACT OF BALANCED TRANSFUSION ON POST-HEMOSTASIS RESUSCITATION IN TRAUMA

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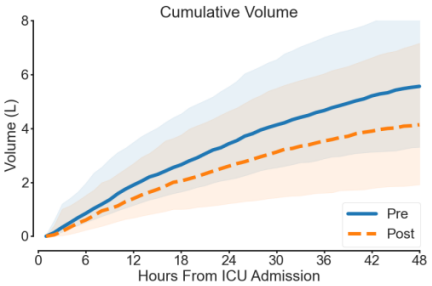
Introduction: Few interventions have changed the approach to trauma resuscitation as balanced blood product transfusion; yet, its impact on resuscitation after hemostasis remains unstudied. We sought to determine how post-hemostasis resuscitation has evolved after balanced transfusion and identify opportunities for further improvement.
Methods: We examined adult trauma patients transfused in the ED. Focusing on the post-hemostasis period after ICU arrival, we compared patient and injury characteristics, resuscitation over the first 48 hours of ICU admission, lab values, and outcomes pre- (2012-2015) and post-institutional implementation of balanced transfusion (2016-2019).
Results: The 2649 subjects were 70% male with blunt trauma (81%; ISS 27, IQR [17, 38]). Post-2015 (n=1472), patient and injury characteristics were similar apart from obesity (26% vs 10%, p≤0.001), compared with pre-2015. On ICU arrival, pH (7.37 vs 7.35, p≤0.001) and platelets (155 vs 149 10^3/μL, p≤0.001) were improved. In the ICU, more patients received blood (26% vs 13%, p≤0.001) and vasopressors (17% vs 12%, p≤0.001). Crystalloid volume (IVF) decreased (4.1 vs 5.6L, p≤0.001) and was given later in admission (Figure). Rate of INR >1.5 by 48 hours (43% vs 56%, p≤0.001) decreased, while AKI rose (8% vs 5%, p=0.02). Mortality was similar at 16%.
Conclusion: Post-2015, patients appear to be better resuscitated upon ICU arrival. In the ICU, resuscitation has shifted to embrace blood products and vasopressors, and move away from IVF. While coagulopathy has improved, the incidence of AKI is higher, with the potential for poorer outcomes. There remains room for improvement, perhaps through earlier and more targeted IVF administration.



Poster #79

DOES PIC SCORE PICK CORRECTLY? EVALUATION OF A PIC-BASED ADMISSION SYSTEM

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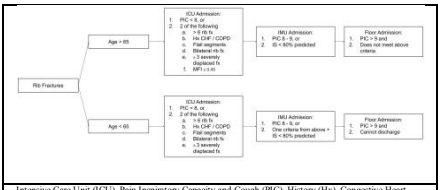
Introduction: Injury to the chest wall is common following blunt trauma and can lead to significant morbidity and mortality if not managed appropriately. A multitude of triage tools have been developed to guide clinical prognostication for this patient population, including the Pain, Inspiratory effort, Cough (PIC) score. First introduced in 2014, the PIC score system has gained momentum as a leading strategy for the triage of patients with chest wall injury. However, to date, the efficacy, accuracy, and safety of the PIC score system have not been validated outside of its original institution. This study evaluates the use of the PIC score system in initial Emergency Department (ED) triage, down-grade, and discharge criteria for trauma patients with chest wall injury at a single institution.

Methods: The original PIC algorithm triages patients by inspiratory capacity. On 12/1/2020, our institution implemented and expanded the criteria to include the PIC-score itself, age, and severity of chest wall injury. This is a retrospective study conducted at a large, academic Level I Trauma Center verified by the American College of Surgeons on patients with chest wall injuries, admitted between 1/1/2018-3/1/2022. The Pre-PIC (1/1/2018-11/20/2020) and Post-PIC (1/1/2021-3/1/2022) group were comprised based on admission date. Patients admitted during guideline implementation (12/1-31/2020) were excluded along with those who were not admitted, intubated or died in the ED, or unable to participate in PIC testing (see Figure 1).

Figure 1: Rib fracture triage algorithm for admission and down-grading



Intensive Care Unit (ICU), Pain Inspiratory Capacity and Cough (PIC), History (Hx), Congestive Heart Failure (CHF), Chronic Obstructive Pulmonary Disease (COPD), Fracture (Fx), Modified Frailty Index (MFI), Intermediate Care Unit (IMU), Incentive Spirometry (IS).

Results: There were 2,461 patients triaged to the Pre-PIC and 1,278 triaged Post-PIC group. The two cohorts did not differ significantly in baseline demographics or mechanisms of injury (see Table 1). Post-intervention, a greater proportion of patients were triaged to step-down units instead of the ICU ($p < 0.001$). There were no significant differences in ICU length of stay, hospital length of stay, total ventilator days, incidence of respiratory complications, or mortality in the pre versus post PIC groups. A sub-group analysis was performed to assess if patients triaged to units outside of the ICU in the Post-PIC group had less complications, however, found no differences in unplanned ICU admissions, complications, or LOS.

Table 1: Demographics, disposition and clinical outcomes of trauma patients with isolated chest wall injury before and after implementation of modified-PIC score guided admission

Variable	Overall (n = 3,739)	Pre-PIC (n = 2,461)	Post-PIC (n = 1, 278)	P-value
Age (mean years)	48.04	48.09	47.95	1.000
Percent male	69.3%(2,691)	69.6% (1,770)	68.6% (921)	1.000
Percent blunt	87.9%(3,416)	88.1% (2,239)	87.64%(1,177)	1.000
Base Deficit	-3.32	-3.35	-3.19	1.000
ISS (mean)	18.4	18.7	17.7	0.4614
Max AIS Thorax (median)	3	3	3	0.2551
ED Triage Floor Bed Step-Down Unit ICU Observation Unit Operating Room	35.4%(1,374) 4.6% (177) 34.7%(1,346) 2.6% (101) 22.8% (886)	34.6% (879) 2.3% (59) 36.3% (922) 2.8% (71) 24% (610)	36.9% (495) 8.8% (118) 31.6% (424) 2.2% (30) 20.6% (276)	<0.0001
ICU LOS	8.1	8.7	7.44	0.3806
Hospital LOS	11.36	11.75	10.63	1.000
Total Ventilator Days	11.49	11.88	10.47	1.000
Unplanned Return to ICU	3.8% (146)	3.2% (81)	4.8% (65)	0.5990
Unplanned Intubation	4.2% (164)	4.6% (116)	3.6% (48)	1.000
Sepsis	1.2% (45)	1.4% (35)	0.7% (10)	1.000
PE	1.5% (58)	1.5% 938)	1.5% (20)	1.000
Pneumonia	2.0% (78)	2.1% (52)	1.9% (26)	1.000
ARDS	1.5% (58)	1.8% (45)	0.98% (13)	1.000
CA w/ CPR	1.0% (39)	1.1% (28)	0.8% (11)	1.000
Mortality	3.2% (123)	3.4% (87)	2.7% (36)	1.000
Readmission	0.8% (31)	0.8% (21)	0.7% (10)	1.000

Injury Severity Score (ISS), Trauma Score & Injury Severity Score (TRISS), Intensive Care Unit (ICU), Length of Stay (LOS), Pulmonary Embolism (PE), Acute Respiratory Distress Syndrome (ARDS), Cardiac Arrest (CA).

Conclusions: This study demonstrates that implementation of a modified PIC-score triage system did not significantly alter the clinical course of patients with isolated traumatic chest wall injury treated at a high-volume trauma center. While our modified PIC-scoring system did triage less patients to the ICU initially, their hospital LOS, incidence of complications and mortality rates did not differ from the pre-PIC cohort. This suggests that further refinement of the PIC-scoring system is needed in order for this prognostication tool to reach a clinically impactful level.

Poster #80

COMMUNITY-LEVEL SOCIAL FACTORS AND FUNCTIONAL OUTCOMES AFTER EXTREMITY INJURY

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Introduction: Extremity injuries represent one of the most common injury patterns seen in the emergency department and are a common cause of long-term functional impairment. Although social determinants as a whole are known to play a key role in long-term trauma outcomes, it is unclear which social factors play a greater role so that interventions can be targeted and resources optimized. This study aimed to identify specific community-level social factors associated with long-term functional limitations after severe extremity injury.

Methods: Adult patients with a severe extremity injury (AIS>2) treated at one of three level-1 trauma centers were prospectively followed six to 12 months post-injury. These data were matched with Social Vulnerability Index (SVI) percentile rankings of 15 social factors at the census tract level (table). We used multivariable-adjusted regression models to assess for independent associations between social factors and functional limitations.

Results: A total of 1,454 patients were included [54% female, mean age 63.7 (SD= 21.5)]. Among them, 1,388 (95%) had an extremity AIS of 3, 1,075 (74%) had surgery, and 314 (22%) were admitted to the ICU. The most common injury type was a hip fracture (45%). Forty-five percent of patients reported a new functional limitation in performing an activity of daily living at 6-12 months post-injury. Several social factors were associated with increased odds of post-injury functional limitations.

Census tract-level variables	OR (95% CI)	P value
Socioeconomic status subindex		
Poverty rate, % under federal poverty level	**1.06 (1.01-1.10)**	**0.01**
Unemployment rate, %	1.02 (0.98-1.07)	0.36
Per capita income, scaled to multiple of $1000	**1.05 (1.01-1.11)**	**0.03**
Education, % age >=25 y with no high school degree	**1.05 (1.00-1.10)**	**0.03**
Household and disability subindex		
Age >=65 y, %	0.98 (0.94-1.03)	0.44
Age <=17 y, %	0.99 (0.95-1.03)	0.51
People with disability (noninstitutionalized), %	1.04 (0.99-1.08)	0.12
Single parent household, %	1.04 (1.00-1.08)	0.06
Minority status and language subindex		
Any racial/ethnic minority, %	1.04 (0.99-1.09)	0.10
Limited English proficiency, %	**1.05 (1.01-1.09)**	**0.02**
Housing and transportation subindex		
Housing in structures with >=10 units, %	1.02 (0.98-1.07)	0.32
Mobile homes, %	1.02 (0.98-1.07)	0.27
Occupied housing units people > rooms, %	1.04 (1.00-1.08)	0.08
Households without vehicles, %	**1.04 (1.00-1.08)**	**0.04**
People in institutionalized group residences, %	1.01 (0.98-1.05)	0.51

Boldface indicates statistical significance [P < 0.05 (two-sided)].
Owing to rescaling of the variables, ORs for each index shows the change in odds of each outcome for a 0.1 unit increase of the original index measure (scale from 0 to 1).
Per capita income necessarily reversed as high income equates with low vulnerability and vice versa.

Conclusion: Severe extremity injury patients from census tracts with a higher proportion of people living below 150% poverty, no high school diploma, limited English proficiency, no vehicles, and/or lower per capita income are more likely to have injury-related functional limitations in 6-12 months. To reduce these patients' long-term burden, interventions addressing social determinants should prioritize socioeconomic, language, and transportation barriers to care.

Poster #81

OSCILLATORY SHEAR STRESS REDUCES VEIN VALVE MICROTHROMBOSIS IN A CRITICALLY ILL HUMAN POPULATION

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Introduction: Deep Venous Thrombosis (DVT) causes significant morbidity and mortality after Trauma. We have previously shown oscillatory shear stress (OSS) genes maintain an anti-coagulant phenotype at vein valves that is lost in the presence of DVT and in static, critically ill patients. We hypothesized that restoration of OSS-inducing flow in critically ill humans would restore this protective phenotype and decrease spontaneous thrombosis using a Rapid Cycling Compression Device (RCCD).

Methods: Brain dead human organ donors who screened negative for DVT on arrival to our Organ Procurement Center (OPC) had an RCCD applied to a single lower extremity delivering 6 cycles/min of calf compression over < 1 second. The RCCD stayed in place until clinical organ procurement. The bilateral common femoral veins were harvested, and all vein valve segments were serially sectioned and stained with hematoxilyn and eosin (H&E). Microthrombi at vein valves from RCCD treated extremities were compared to those found at vein valves from contralateral nonRCCD treated extremities.

Results: Valves from 7 donors were evaluated (RCCD n= 18, no RCCD n=16). One non RCCD donor had a single valve with gross DVT visible. There was a significant reduction in microthrombosis at vein valves in limbs receiving RCCD therapy. (RCCD 11.1%, no RCCD 43.8%, p=0.038, Fisher exact test)

Conclusions: OSS flow to extremities using RCCD resulted in decreased micro and gross thrombosis in treated extremities in critically ill brain-dead donors. This cutting edge technology has the potential to change how we approach DVT prevention in trauma patients. Future studies will focus on characterization of the immunologic characteristics of microthrombi and their role/progression in DVT pathogenesis, and further reduction of gross DVT/macrothrombi at human vein valves with RCCD therapy.

Table 1 – Chi-squared analysis of thrombosis in RCCD vs no RCCD therapy

	No Thrombosis	Thrombosis	Total
RCCD	16	2	18
nonRCCD	9	7	16
Total	25	9	34
Chi-squared p = 0.016, Fisher Exact test p = 0.038			

Poster #82

DISPARITIES IN THE BURDEN OF TRAUMATIC INJURIES FROM INTERPERSONAL VIOLENCE IN PREGNANT WOMEN

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Introduction: Interpersonal violence (IPV)-related homicide often correlates with a history of non-fatal injuries. Pregnant women have an increased risk and severity of IPV, especially from an intimate partner; however, the nationwide burden and associated social disparities are not well described. The objective of this study is to describe the contemporary burden of IPV on pregnant women and identify patient characteristics associated with an increased risk of IPV.
Methods: The National Inpatient Sample was queried for all pregnant women between Jan 2016-Dec 2019. ICD-10-CM diagnoses were abstracted to generate an approximate Abbreviated Injury Scale (AIS) and Injury Severity Score (ISS). Traumatic injuries from IPV were identified as intentional injuries related to certain injury mechanisms (cut/pierce, firearm, struck by/against). Baseline characteristics were compared between the IPV and no-IPV groups. Multivariable regression was performed to identify clinical factors associated with IPV-related injuries.
Results: 29,735 pregnant patients presented with traumatic injuries with 1,105 (0.04%) identified as IPV. IPV patients had severe injuries (ISS >15) more frequently compared to non-IPV patients (95 [8.6%] vs 750 [2.6%], $p<0.001$). IPV patients were younger (median 25 years [IQR 21-30] vs 27 [23-32], $p<0.001$), more likely to be of Black race (550 [50%] vs 7,930 [29%], $p<0.001$), be in the lowest income quartile (590 [55%] vs 10,800 [38%], $p<0.001$), and have higher rates of substance use disorder (350 [32%] vs 5,380 [19%], $p<0.001$). Multivariable regression showed Black race (OR: 2.74, CI: 1.90-3.94, $p<0.001$) and substance use disorder (OR: 1.95, CI: 1.43-2.66, $p<0.001$) were associated with increased odds of IPV. Additionally, third trimester pregnancies had increased odds of their intimate partner being identified as the perpetrator of the trauma (OR: 1.71, CI: 1.05-2.80, $p=0.031$).
Conclusion: There are significant racial and social disparities in the burden of IPV during pregnancy. With the loss of federal protections to access abortion and the expectation these systemic changes may yield increases in IPV, it is imperative that clinicians recognize populations at increased risk for IPV to pursue targeted intervention and prevention services.

Poster #83

GEOCODING: THE IMPACT OF BEING TREATED AT THE NEAREST HOSPITAL

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Introduction: Trauma is a leading cause of death in many large inner cities around the world, in part due to high levels of interpersonal violence, transit accidents, and immature trauma systems.
We evaluated the impact of distance between the site of the injury and the hospital where the patients were first transported and treated. The impact of distance on the most remote poorly served highly violent neighborhoods (HVN) was analyzed.
Methods: We performed a secondary analysis of a prospectively collected cohort of moderate to severe trauma patients treated in four main trauma hospitals in our city between December 2012 and June 2013. We geocoded the injury site and the hospitals to calculate the distance traveled and travel time. Patients treated in the nearest hospital (group A) were compared with those who were taken to more distant sites. (group B). Groups were compared with Chi^2 test or Wilkoxon-Mann-Whitney tests, as needed. Unadjusted and adjusted ORs were calculated with multiple logistic regressions.
Results: We included 606 patients, 85.3% male. Penetrating trauma occurred in 56.3%. Seventy-two percent of the patients were treated in hospitals equivalent to level 1. Patients taken to the nearest hospital were older, less frequently had penetrating trauma, less frequently were uninsured, and less frequently came from (HVN). Trauma severity and survival probability were similar.

Effect of Being Treated at the Nearest Hospital

Variable	Group A	Group B	p
n	368	238	--
Male, n(%)	322 (87.5)	195 (81.9)	0.06*
Age, years, median (IQR)	28 (22 – 40)	32 (23 – 44)	0.04**
Penetrating trauma, n (%)	233 (63.3)	108 (45.4)	<0.001*
Uninsured, n (%)	68 (18.5)	19 (8.0)	<0.001*
ISS	16 (11 – 25)	18 (11 – 27)	0.16**
PS	0.99 (0.94 – 0.99)	0.99 (0.90 – 0.99)	0.33**
Agua-Blanca	105 (28.3)	16 (6.7)	<0.001*
Mortality	93 (25.3)	26 (10.9)	<0.001*

ISS. Injury Severity Score. PS Probability of survival.
* Chi2. **Wilcoxon-Mann-Whitney

Patients injured in HVN sites had a significantly lower probability of being treated in the nearest hospital. After adjusting for the relevant variables, the odds of death were lower when the patients were treated in the nearest hospital (adjusted OR 0.27 95% CI 0.14 - 0.52) and increased when they came from HVN (adjusted OR 1.85 95% CI 1.01 - 3.37).
Conclusions: Our results indicate that regions where disparities in care reflected by higher number of uninsured trauma patients arriving from poorer district were associated with longer distances and traveled time had a higher mortality. These data not only confirm the beneficial impact of trauma regionalization but also points to specific areas were specialized trauma centers need to be located.

Poster #84

HIGHER SOCIAL DEPRIVATION INDEX IS ASSOCIATED WITH INCREASED MORTALITY IN THE EGS POPULATION

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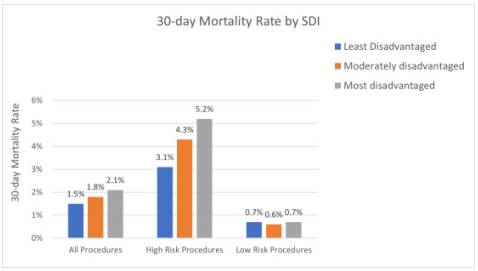
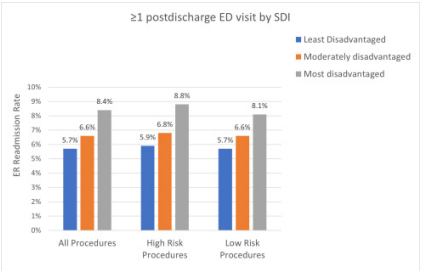
Introduction: Emergency General Surgery (EGS) disorders represent a wide spectrum of disease with high complication and mortality rates. Race, insurance and socioeconomic status have been associated with mortality in the EGS population. Social deprivation index (SDI) is a geographic area demographic index used to quantify variations in healthcare. We aimed to examine the mortality and complication rates of EGS procedures across a large integrated healthcare system.
Methods: This is a retrospective cohort study of adult EGS patients from 2017 through 2021 with CPT codes for high-risk (small bowel resection, colectomy, or peptic ulcer procedure) or low-risk procedures (appendectomy or cholecystectomy). Primary outcome was 30-day mortality; secondary outcomes were length of stay (LOS) and post-discharge ED visits.
Results: A total of 12,786 patient visits were analyzed, 4,148 high risk and 8,638 low risk procedures. High-risk EGS patients from high SDI areas experienced significantly greater mortality than those from low SDI areas (p=0.023, OR 1.95) when adjusted for age and gender. EGS patients from high SDI areas were more likely to have ≥1 post-discharge ED visit and have longer LOS than those patients from low SDI areas (p=0.008, OR 1.41 and p <.0001, respectively) when adjusted for age and gender.
Conclusion: Living in a high SDI area is associated with higher mortality, greater postoperative ED visits and longer LOS in the EGS population. This study highlights the need for geographically targeted interventions to match resources with EGS patients at highest risk for complications and death.





Poster #85

LOST IN TRANSLATION? COMPREHENSION OF CARE IN ENGLISH- VS. SPANISH-SPEAKING TRAUMA PATIENTS

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Introduction: Culturally responsive care is a core recommendation to reduce health disparities. Language barriers contribute to misunderstandings, dissatisfaction, and worse outcomes. This is exacerbated in trauma when communication is constrained by time, complexity, and competing priorities. We hypothesized that Spanish-speaking trauma patients (SSP) would have less accurate comprehension of care (CC) and discharge instructions compared to English-speaking patients (ESP).
Methods: We retrospectively reviewed discharges from a Level 1 trauma center 10/2021-03/2022 who were age ≥18, primarily ESP or SSP, discharge GCS ≥14, and without memory loss. Patients were surveyed <48 hours from discharge to assess CC. Patients self-rated CC on a Likert scale, and answered open-ended questions on CC and discharge instructions. Charts were reviewed to assess and rate concordance of CC with actual care.
Results: We included 46 patients (21 SSP, 25 ESP). Mean age was 48.3 years SSP, 43.3 ESP; 47% SSP were female vs. 32% ESP (p=0.28). 56% SSP had ≥ high school diploma vs. 72% ESP (p=0.34). Self-rated CC was similar, with both groups rating high understanding of their care and follow-up. SSP were less likely to accurately report diagnoses and home medications than ESP, even when corrected for education level, despite having high confidence in their comprehension of care.
Conclusion: Though both SSP and ESP self-rated their comprehension of their care highly, there were significant differences between groups' accuracy. Increased use of certified medical interpreters throughout hospitalization may improve language disparities in patient comprehension.

Component of Comprehension	% Near or Complete Concordance		p-value	Adjusted OR* [95% CI] REF=English	p-value*
	English	Spanish			
Diagnoses	92.0% (23)	57.1% (12)	**0.01**	0.11 [0.02, 0.64]	**0.01**
Inpatient Testing	84.0% (21)	66.7% (14)	0.17	0.33 [0.06, 1.7]	0.18
Inpatient Treatment	76.0% (19)	66.7% (14)	0.48	0.87 [0.21, 3.64]	0.85
Home Medication	84.0% (21)	57.1% (12)	**0.04**	0.20 [0.04, 0.91]	**0.04**
Home Care (non-medication)	76.0% (19)	52.4% (11)	0.09	0.32 [0.08, 1.27]	0.11
Follow-Up Appointments	68.0% (17)	38.1% (8)	**0.04**	0.32 [0.09, 1.13]	0.08
Return Precautions	64.0% (16)	38.1% (8)	0.08	0.34 [0.09, 1.25]	0.10

**Adjusted analysis accounting for patients' self-reported highest level of education*

Poster #86

RACIAL DISPARITIES IN POLICE TRANSPORTATION OF TRAUMA PATIENTS OVER TIME

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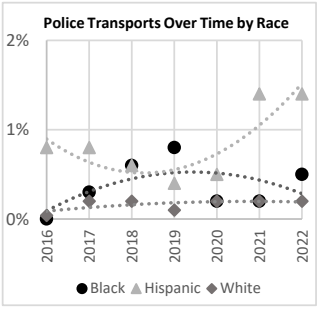
Introduction: The study objective was to determine if racial disparities exist among trauma patients brought in by police.
Methods: This retrospective cohort study included adult trauma patients admitted to six level I-II trauma centers in CO, TX, & KS (1/1/15-7/15/22). Transfer patients, and other or unknown races were excluded. Comparisons were made by race: non-Hispanic (NH) White, NH-Black, or Hispanic. The outcome was police transport, $\alpha<0.01$.
Results: Of 46,581 patients (77% NH-White, 17% Hispanic, 5% NH-Black), there was a disproportionately higher amount of Hispanic (0.9%) and NH-Black (0.4%) patients transported by police (n=128) when compared to NH-White (0.1%) patients, $p<0.01$. Hispanic patients were 6.4 (4.5, 9.2) times more likely to be transported by police than NH-White patients. NH-Black were 2.7 (1.3, 5.5) times more likely to be transported by police than NH-White patients. The most common cause of injury among Hispanic patients was a fall. For NH-Black and NH-White patients, the most common injury cause was assault, $p<0.01$. Hispanic patients' injuries were more severe than both NH-White and NH-Black patients, $p<0.01$. Over time, police transport of NH-White patients remained relatively constant, moderate $r^2=0.4$. For NH-Black patients there was a negative quadratic association over time with a peak in police transport in 2019 and a continuous decline since, moderate $r^2=0.3$. For Hispanic patients, there was a positive quadratic correlation with drop in police transports in 2019 followed by a consistent increase, strong $r^2=0.7$.



Conclusions: Hispanic and NH-Black patients were more likely to be police transports than NH-White patients. While police transport of NH-White patients has remained constant overtime, since 2019 police transport of Hispanic patients increased, and for NH-Black patients' police transport decreased. These data could be used to guide action addressing racial inequities in police transport, such as policies providing criteria for police transport of trauma patients.

Poster #87

RISK FACTORS FOR LOSS TO FOLLOW-UP AFTER TRAUMATIC INJURY: A SINGLE INSTITUTION STUDY IN AN URBAN, SAFETY NET, LEVEL 1 TRAUMA HOSPITAL

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Introduction: After traumatic injury, loss to follow up (LTFU) occurs at rates up to 47%, though the most recent data is a decade old. This study provides an updated assessment of risk factors for LTFU after trauma.
Methods: A retrospective chart review was conducted of trauma admissions from 12/1/2018 to 12/31/2019. Data from 2020 and 2021 was excluded due COVID-19. Exclusion criteria included age under 18, transferred to another service during hospitalization, and those with no scheduled follow up within 30 days. Categorical variables were compared using Pearson's Chi-square tests. Continuous variables were analyzed using two-tailed t-tests or Mann Whitney Wilcoxon tests for parametric and non-parametric variables, respectively. Logistic regression was used to create an model adjusted for relevant factors identified on univariate analysis. Statistical significance was designated at α=0.05. Analysis was completed using SAS Software Version 9.4 (SAS Institute Inc., Cary, NC, USA).
Results: 1,350 patients met inclusion criteria, with a 25.11% LTFU rate. In an unadjusted model, race/ethnicity, language, insurance status, employment, co-morbid psychiatric disorder or substance use disorder (SUD), trauma activation level, injury severity score (ISS), injury location and mechanism, length of hospital and ICU stay, disposition, and follow up scheduled at time of discharge were associated with a significantly lower LTFU. Multivariate logistic regression found insurance and employment status, SUD, and ISS remained significant. The final model was stratified by race due to interactions between race and the significant variables. In this model, white patients with non-private insurance had lower odds of LTFU compared to private insurance (OR 0.377, 95% CI 0.246 – 0.579), non-white patients with SUD had increased odds of LTFU compared to those without SUD (OR 2.77, 95% CI 0.944-0.988) and for each one-point increase in ISS their odds of LTFU decreased by 3.4% (95% CI 0.944-0.988).
Conclusion: Unmodifiable social determinants of health, including insurance status, employment status, and ISS, are associated with LTFU in the trauma population. Close attention should be paid to patients at risk for LTFU to ensure adequate engagement with the healthcare system.

Poster #88

IMPLEMENTATION OF AN OUTPATIENT PTSD SCREENING INITIATIVE AT A LEVEL 1 TRAUMA CENTER

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Courtney Edwards, DNP, MPH; Kristie Brown, DNP, APRN;
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Introduction: Psychosocial care for trauma patients is fragmented and often limited to inpatient acute crisis counseling. Many trauma patients are at risk for post-traumatic stress disorder (PTSD) but have limited resources after discharge. As part of a trauma-informed care initiative, an algorithm for outpatient PTSD screening was developed. We hypothesized that this would supplement inpatient screening processes and better capture patients at risk.
Methods: Retrospective single-center study conducted at a Level I trauma center between August 2022-January 2023. Trauma patients (≥18 years) seen for outpatient follow-up in Trauma Surgery, Physical Medicine & Rehabilitation (PM&R), Orthopedics, and Neurosurgery clinics were included. Patients were screened for PTSD utilizing the validated PC-PTSD-5 tool or clinical judgement. Rates of screening and follow-up were collected and barriers to care summarized.
Results: 49 trauma psychology referrals were obtained. 19 patients were screened via the PC-PTSD-5 tool, with 11 identified to be at risk for PTSD and provided outpatient referral. 38 referrals were made based on clinical judgment. Referrals were obtained from Trauma (55%), PM&R (29%), Orthopedics (14%) and Neurosurgery (0.06%). 28 new patient encounters were completed (57% virtual visits). There were 8 no-shows (29%). Reported barriers included financial hardship, insurance coverage, traumatic brain injury, and patient disinterest.
Conclusion: In this pilot study, implementation of outpatient PTSD screening at a Level I trauma center generated 49 referrals for psychosocial services. Though challenges persist, this screening process specifically addresses post-discharge needs for the trauma patient. Further research and program development are needed to improve adherence to validated PTSD screening and ensure comprehensive trauma-informed care for patients.

Poster #89

CHARACTERIZING HIGH-GRADE SPLENIC INJURIES TO GUIDE PROCEDURE CHOICE FOR INITIAL ANGIOGRAPHY

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Introduction: The Western Trauma Association and The Eastern Association for the Surgery of Trauma Guidelines for the management of adult blunt splenic trauma recommends angiography for patients with contrast blush on initial CT scan. The American Association for the Surgery of Trauma (AAST) Spleen Injury Score was updated in 2018 and reclassified all splenic injuries with a blush as Grade 4+. This study compared outcomes of patients requiring repeat splenic intervention after initial angiography (defined as repeat angiography or splenectomy) based on the new scoring system. We hypothesized that findings on initial CT imaging could indicate likelihood of requirement for repeat intervention.
Methods: A retrospective review was conducted of all patients presenting to a single Level I Trauma Center who underwent splenic angiography for splenic trauma between January 1, 2002, and December 31, 2021. Each patient's injury was graded using the revised 2018 AAST Spleen Injury Scale, and all Grade 4 and 5 splenic injuries were included in the study. High-risk features on CT imaging were defined as active extravasation, evidence of pseudoaneurysm, hilar injuries, multiple lacerations, or Grade 5 injuries. Data was analyzed using chi-square, one-way ANOVA and Mann-Whitney-U analysis.
Results: There were 153 patients with Grade 4 and Grade 5 injuries who underwent initial angiography. Of these, 44 (28.8%) underwent angiography alone (AO), 17 (11.1%) underwent proximal embolization (PE), and 92 (60.1%) underwent selective embolization (SE). There was no evidence of active extravasation at angiography in 36% (n=9) of patients who underwent initial angiography and required a repeat splenic intervention; each of these patients had Grade 5 splenic injuries, multiple splenic lacerations, or hilar lacerations on initial CT imaging. After initial angiography, 25 (16.3%) patients required repeat splenic intervention. Repeat intervention was required in 18.2% (n=8) AO patients, 16.3% (n=15) SE patients, and 11.8% (n=2) PE patients. All patients who required a second procedure after initial embolization had active extravasation and 96% (n=24) had a perisplenic hematoma on initial CT imaging. Furthermore, 60% (n=15) of the patients who required repeat intervention were classified as Grade 5 on initial CT scan. Of the patients who required repeat intervention, 28% (n=7) had a pseudoaneurysm or vascular irregularity identified during initial angiography. A greater percentage of patients in the repeat procedure group died versus those that did not require a repeat intervention (12.0 vs 3.9%). The repeat procedure group had more ventilator days (4.0 vs 2.5, $p < 0.001$), longer LOS (14.2 vs 10.7, $p < 0.001$), and a higher complication rate (63.6% vs 36.9%, $p = 0.016$) compared to patients who did not require a second procedure. There was no difference in the average procedural time of initial procedure for those that required repeat intervention and those that did not (38.9 vs 35.6 minutes $p = 0.901$).
Conclusion: The results demonstrate that all patients requiring repeat splenic intervention after initial angiography had evidence of high-risk features on initial CT imaging. Furthermore, Proximal Embolization patients were shown to require less repeat intervention. Overall, the requirement for repeat intervention is associated with worse outcome measures. Studies prioritizing PE in patients with high-risk features on CT imaging even without evidence of active extravasation on initial angiography should be considered.

Poster #90

DEAD SHOT: THE ROLE OF WHOLE-BODY COMPUTED TOMOGRAPHY IN THE MANAGEMENT OF PATIENTS WITH GUNSHOT WOUNDS TO THE TORSO

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Fundación Valle del Lili

Introduction: This study aims xto evaluate the safety and outcomes (number of surgical interventions and overall mortality) of whole-body computed tomography (WBCT) in the management of patients with gunshot wounds (GSW).
Methods: We conducted a cross-sectional, retrospective analysis of all patients with GSW's to the torso admitted at a Level 1 Trauma Center from January-2018 to December-2021. Patients with head AIS-scores >= 3 and ISS-scores<9 were excluded. Institutional WBCT protocol for penetrating trauma consists of a single-pass arterial and portal venous contrast scan that includes the neck, thorax, abdomen, and pelvis. All hemodynamically unstable (HU) patients [Systolic blood pressure (SBP) <100 mmHg and/or heart rate (HR) >120 bpm] taken to the scanner were transient responders (TR) to initial resuscitation.
Results: A total of 582 patients were included: 258 (44%) HU and 324 (56%) hemodynamically stable (HS). WBCT was performed in 135 (52%) and 175 (54%) patients of each group, respectively. In HS patients who did not have major surgery, the rate of minimally invasive procedures (MIP) increased by 150% in the WBCT group compared to the non-WBCT group. Among HU patients, the rate of major surgery decreased by 40% and the rate of MIP increased by 58% in the WBCT group vs. the non-WBCT group. In addition, overall mortality was lower in the WBCT group vs. the non-WBCT group, which was also true for TR [WBCT 4% vs. non-WBCT 15%, p=0.06]. None of the patients (HU or HS) died in the CT scanner. A sub-analysis including patients with injuries to multiple anatomical regions [N=204] showed that the MIP rate was 5 times higher in HS patients that had WBCT. On the other hand, the rates of major surgery [37% vs. 65%,p<0.01], overall mortality [6% vs. 28%, p<0.01], and TR mortality [6% vs. 19%, p=0.07] were all lower in HU patients that had a WBCT.

	Hemodynamic Stability (N = 582)					
	Unstable (n=258) 44%			Stable (n=324) 56%		
	WBCT (n=135) 52%	No WBCT (n=123) 48%	P value	WBCT (n= 175) 54%	No WBCT (n=149) 46%	P value
ISS, median (IQR)	17(13-26)	17(13-25)	0.8	16(10-20)	10(9-16)	<0.001
ISS > 15, n (%)	90(67%)	83(67%)	0.9	89(51%)	41(28%)	<0.001
SBP, mm Hg, median (IQR)	92(81-100)	80(64-95)	<0.001	123(112-133)	125(115-137)	0.2
SBP < 100 mm Hg, n (%)	110(81%)	111(90%)	0.04	NA	NA	-
No Major Surgery[1], n (%)	95(70%)	62(50%)	<0.001	123(70%)	113(76%)	0.2
Minimal Invasive Procedures[2], n/N (%)	47/95(49%)	19/62(31%)	0.02	49/123(40%)	18/113(16%)	<0.001
Overall Mortality, n (%)	5(4%)	19(15%)	0.001	0	1(1%)	0.45
Mortality TR, n/N (%)	5/130(4%)	10/102(10%)	0.06	0	1(1%)	0.45

1) No Major Surgery: No major incision was performed (Laparotomy, Thoracotomy, Sternotomy, or Cervicotomy)
2) Minimal Invasive Procedures: Laparoscopy, Thoracoscopy, and/or Thoracostomy
Abbreviations: ISS: Injury Severity Score, NA: Not Applicable, SBP: Systolic Blood Pressure, WBCT: Whole Blood Computed Tomography, TR: Transient Responders.

Conclusion: WBCT in hemodynamically unstable GSW patients who are transient responders is a safe and effective tool that can avoid unnecessary major surgeries and increase the use of minimally invasive procedures without impacting mortality.

Poster #91

DEMOGRAPHIC DIFFERENCES IN TIME-TO-OR FOR BLUNT AND PENETRATING ABDOMINAL TRAUMA PATIENTS

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Introduction: Both time-to-OR and socioeconomic (SES)/demographic factors have been shown to influence outcomes for abdominal trauma. This study characterizes the demographic variability of facilities with better trauma performance. We additionally evaluated patient factors and injury patterns of abdominal trauma victims after stratifying for time-to-OR.
Methods: This is a cohort study of TQIP data (2010-2020) including patients with abdominal trauma treated surgically within 6 hrs. Patients with abdominal AIS=6 and head, neck, or thorax AIS>2 were excluded. Hospitals were classified as slow, medium, or fast using 75th percentile time-to-OR. Patient demographics, clinical characteristics, and outcomes (time-to-OR, mortality, hospital LOS, time on ventilator, OR, and hospital disposition) were summarized by facility speed. Data are mean±SD.
Results: There were 55,950 patients from 2,730 facilities; a higher percentage of patients were male (83%), Black (36%), Hispanic (22%), and self-pay (27%) than the national average of those characteristics. There were 1163(43%) community, 374(14%) nonteaching, and 1166(43.1%) University hospitals, the majority of which were nonprofit (89%). For facilities, 76(3%) were categorized as slow, 2395 (88%) were medium, and 241(9%) were fast. Compared to fast hospitals, slow facilities had more female, white, and privately insured patients ($p<0.0001$). Slow hospitals had more blunt injuries (36.7%vs13%) and less penetrating injuries (63.1%vs87%). The overall Injury Severity Score and abdominal AIS score were similar across all facilities. Facility-level analysis showed an equal number of yearly abdominal trauma cases across all hospitals, with similar teaching and nonteaching hospitals ($p>0.05$). The mean time-to-OR for slow hospitals was 127.0±84 min compared to 52±51 for fast. Mean ICU LOS was longer in fast hospitals (7vs6 days), ventilator time was similar. Total LOS was longer for fast hospitals; these patients were significantly more likely to be discharged to home without services (73%vs67%).
Conclusion: Hospitals with faster door-to-OR time are large university centers with a higher proportion of uninsured minority patients with penetrating injuries. Though these hospitals get patients to the OR faster, they face more extended hospital LOS and difficulty discharging patients to skilled care.

Poster #92

FINDING THE SWEET SPOT: IMPACT OF ADMISSION GLUCOSE ON OUTCOMES IN TRAUMATIC COLON INJURIES

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Introduction: Perioperative hyperglycemia has long been associated with infectious complications in non-trauma patients undergoing colon surgery. Whether it plays a similar role in patients with traumatic colon injuries has yet to be established. The goal of this study was to examine the impact of admission blood glucose on outcomes in patients with traumatic colon injuries.
Methods: Consecutive patients over a 3-year period who underwent operative management of colon injuries were identified. Patient characteristics, mechanism and injury severity, admission glucose, intraoperative packed red blood cell transfusions (PRBC), use of intestinal diversion, and type of repair were recorded. Outcomes including mortality and colon-related morbidity (intraabdominal abscess formation or suture line failure) were collected and compared. Multivariable logistic regression (MLR) analysis was then performed to determine the impact of admission glucose on colon-related morbidity.
Results: 246 patients were identified: 108 with non-destructive injuries and 138 with destructive injuries. Of the destructive colon injuries, 38 underwent proximal diversion and 100 underwent resection and anastomosis. Patients with colon-related morbidity (n=70) were clinically similar to those without (n=68) with respect to age (31 vs 28 years-old, p=0.290), gender (82.9% male vs 91.2%, p=0.147), penetrating mechanism of injury (70% vs 64.7%, p=0.507), ISS (21 vs 19, p=0.303), admission systolic blood pressure (117 vs 122, p=0.174), and admission lactate (4.08 vs 3.16, p=0.151). There were no colon-related mortalities. Admission glucose (170 vs 142, p=0.021) and intraoperative PRBC transfusions (4 vs 0.5 units, p=0.0004) were higher in those patients who developed colon-related morbidity. MLR identified only intraoperative PRBC transfusions as an independent predictor of increased colon-related morbidity (OR=1.076, 95%CI 1.018-1.147, p=0.015).
Conclusion: While higher admission glucoses are associated with increased risk of intraabdominal abscess formation or suture line failure, intraoperative transfusion requirements remain the best independent predictor of colon-related morbidity.

Poster #93

HIGH-GRADE LIVER INJURIES WITH CONTRAST EXTRAVASATION MANAGED INITIALLY WITH ANGIOGRAPHY VERSUS OBSERVATION: A MULTICENTER STUDY

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Introduction: High grade (IV-V) liver injuries with active extravasation (HGLI+Extrav) are associated with significant risk of complications and mortality. For low grade injuries, an observation (OBS) first strategy is beneficial over initial angiography (IR), however, it is unclear if OBS is safe for HGLI+Extrav. Therefore, we evaluated the management of patients with HGLI+Extrav, hypothesizing that patients receiving initial IR will have decreased operative and mortality rates compared to initial OBS.

Methods: This is a secondary analysis of a prospective, observational, multicenter study. Patients with HGLI+Extrav managed with initial OBS or IR were included. Pregnant patients, non-traumatic hemorrhage, transfers, those with cirrhosis, or dead-on arrival patients were excluded. The primary outcome was need for operation. Secondary outcomes included liver-related complications and mortality. Bivariate comparisons of patients managed initially with OBS versus IR were performed.

Results: From 59 patients with HGLI+Extrav, 23 (39.0%) were managed with OBS, and 36 (61.0%) with IR initially. There was no difference in age, sex, mechanism of injury, or injury severity score between cohorts (all $p>0.05$). IR patients had an increased median heart rate (103 vs. 91, $p=0.04$) but statistically similar, albeit clinically different shock index (0.94 vs 0.75, $p=0.06$) compared to OBS patients. 75% of IR patients underwent angioembolization during first IR, whereas only 13% of OBS patients underwent any IR, with all undergoing angioembolization. IR patients had increased rates of operation (13.9% vs. 0%, $p=0.049$), but there was no difference in liver-related complications (44.4% vs 43.5%) or mortality (5.6% vs 8.7%) between cohorts (both $p>0.05$).

Conclusion: Over 60% of all patients with HGLI+Extrav were managed with IR initially. Patients selected for IR initially had an increased rate of operation yet similar rates of liver-related complications and mortality compared to patients selected by surgeons to be initially managed with OBS. This suggests that in appropriately selected HGLI+Extrav initial OBS may be reasonable. Future prospective randomized trials are needed to confirm these findings as there are concerns for selection bias within this observational study.

Poster #94

INTERRATER AGREEMENT OF CT GRADING OF BLUNT SPLENIC INJURIES: DOES THE AAST GRADING NEED TO BE REIMAGINED?

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Introduction: The Revised Organ Injury Scale (OIS) of the American Association for Surgery of Trauma (AAST) is the most widely accepted classification of splenic trauma. Splenic injury grade is a key factor for deciding on non-operative management, splenic embolization, and predicting risk of non-operative management failure. The objective of this study was to evaluate inter-rater agreement for CT grading of blunt splenic injuries.
Methods: CT scans in adult patients with splenic injuries at a level 1 trauma centre were independently graded by 5 fellowship trained abdominal radiologists using the AAST OIS for splenic injuries – 2018 revision. The inter-rater agreement for AAST CT injury score, as well as low-grade (I-III) versus high-grade (IV-V) splenic injury was assessed. Examinations with two rater disagreement in key clinical scenarios (no injury versus injury, and high versus low grade) were reviewed by a staff abdominal radiologist and trauma surgeon to identify possible underlying causes of disagreement.
Results: A total of 610 examinations were included in the study. The inter-rater absolute agreement was low (Fleiss kappa statistic 0.38, $p < 0.001$), but improved when comparing agreement between low and high grade injuries (Fleiss kappa statistic of 0.77, $p < 0.001$). There were 34 cases (5.6%) of minimum two-rater disagreement about no injury vs injury (AAST grade ≥ I). There were 46 cases (7.5%) of minimum two-rater disagreement of low grade (AAST grade I-III) versus high grade (AAST grade IV-V) injuries. Likely causes of disagreement were interpretation of clefts versus lacerations, peri-splenic fluid versus subcapsular hematoma, application of adding multiple low grade injuries to higher grade injuries, and identification of subtle vascular injuries.
Conclusion: There is significant disagreement in grading of splenic injuries using the existing AAST OIS for splenic injuries, including at key clinical cutoffs that can significantly impact patient management decisions.

Poster #95

MULTI-CENTRIC STUDY ON ORGAN DONATION AFTER TRAUMA: A HIERARCHICAL MACHINE-LEARNING CLUSTER ANALYSIS

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Introduction: Organ availability has always been a significant setback, and as the number of patients being added to waiting lists rises, the gap between organ supply and demand continues to increase. The primary aim of this study is to characterize subtypes of organ donors after major trauma and examine the relationship between the application of damage control strategies (DCS) and organ donation outcomes.
Methods: Prospective multicentric observational data were recorded from three major trauma centers in Northern Italy. A hierarchical machine-learning algorithm was used for clustering the patients. The functional response rate is defined as the proportion of organs that did not have primary dysfunction in the first 30 days from all transplanted organs.
Results: A significant difference between the clusters was found in the total number of DCS procedures applied (Cluster 1 4.31 ± 2.54 vs. Cluster 2 1.98 ± 1.54, $p<0.001$). With regards to the donation of solid organs, Cluster 1 has produced significantly more hearts (65% vs. 34%, $p=0.001$). The functional response rate was equal (93% vs. 93%, $p=0.929$).
Conclusion: Aggressive DCS to save trauma patients' lives does not negatively impact the chances of organ donation in suitable donors

Poster #96

PANCREATICODUODENECTOMY IN TRAUMA PATIENTS WITH GRADE IV-V DUODENAL OR PANCREATIC INJURIES: A MULTICENTER TRIAL

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Rutgers Robert Wood Johnson Medical School

Introduction: The utility of pancreaticoduodenectomy (PD) for high-grade traumatic injuries remains unclear and data regarding its use are limited. We hypothesized PD does not result in improved outcomes when compared to non-PD surgical management of grade IV-V pancreaticoduodenal injuries.
Methods: This is a retrospective, multicenter analysis from 35 Level-1 trauma centers from 1/2010-12/2020. Included patients were ≥ 15 years old with AAST grade IV-V duodenal and/or pancreatic injuries. The study compared operative repair strategy: PD vs non-PD.
Results: The sample (n=95) was young (26 years), male (82%), with penetrating injuries (76%). Non-PD patients (n=63) underwent primary repair alone (PRA, 35%) or complex repair with adjunctive measures (CRAM, 65%) such as pyloric exclusion, duodenectomy, and/or gastrojejunostomy. There was no difference in demographics or severity of illness (SBP, GCS, ISS, MTP) between PD (n=32) vs non-PD patients (all $p>0.05$). Anatomically, PD patients had more concomitant pancreaticoduodenal (91%vs 70%), grade V duodenal, grade V pancreatic, ampulla, pancreatic head, and pancreatic ductal injuries compared to non-PD patients (all $p<0.05$); however, 43% of grade V duodenal and 40% of grade V pancreatic injuries were still managed with non-PD. There was no difference in damage control, number of operations, duodenal leak, other anastomotic leak, mortality, or readmission between PD vs non-PD (all $p>0.05$). PD patients had more GI related complications and longer ICU and hospital length of stay compared to non-PD patients (all $p<0.05$).

Pancreaticoduodenectomy(PD) vs non-PD Outcomes in Grade IV-V Pancreaticoduodenal Injuries

	All Patients (n=95)	PD (n=32)	Non-PD (n=63)	p value
Duodenal Leak	22 (23%)	7 (22%)	15 (24%)	1.000
Anastomotic Leak	9 (10%)	5 (16%)	4 (6%)	0.159
Antibiotic Use for Leak	18 (19%)	3 (9%)	15 (24%)	0.105
Parenteral Nutrition	52 (55%)	21 (66%)	31 (49%)	0.190
GI Related Complication	50 (53%)	22 (69%)	28 (44%)	**0.031**
ICU Length of Stay (days)	10 [4-24]	17 [7-29]	6 [2-23]	**0.012**
Hospital LOS (days)	27 [13-42]	34 [24-45]	25 [9-38]	**0.017**
Mortality	19 (20%)	4 (13%)	15 (24%)	0.279

Conclusion: PD did not offer improved outcomes among patients with grade IV-V pancreaticoduodenal injuries. Without sound scientific support for PD outcome benefit, our results suggest PD may be overutilized.

Poster #97

PREPERITONEAL PELVIC PACKING INCREASES THE RISK FOR VENOUS THROMBOEMBOLISM IN ISOLATED SEVERE PELVIC FRACTURES

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Introduction: Preperitoneal pelvic packing (PPP) has been advocated as a damage control procedure to reduce bleeding from pelvic fractures and is included in the treatment algorithms of major trauma societies despite weak evidence.to support it. We hypothesized that venous stasis caused by PPP is associated with an increased risk of venous thromboembolism (VTE). In order to minimize other risk factors that complicate the interpretation of the results, the current study included only patients with isolated severe pelvic fractures.

Methods: This is a retrospective cohort analysis using the TQIP database (2016-2019). Adult patients with isolated severe blunt pelvic fractures (pelvis abbreviated injury score [AIS] ≥ 3, AIS ≤ 2 in all other body regions) were included. Patients who underwent PPP in the first 24 hours were matched to patients who did not using a 1:3 nearest propensity score match. Matching was performed based on demographics, vital signs on admission, comorbidities, injury characteristics, type and timing of initiation of VTE prophylaxis, and additional procedures including laparotomy, resuscitative endovascular balloon occlusion of the aorta [REBOA], and angioembolization. The rates of VTE were compared between the two groups.

Results: 11,594 patients with isolated severe pelvic fractures were identified, of which 71 underwent PPP in the first 24 hours. 64 patients in the PPP group were matched with 182 patients in the No-PPP group. There were no significant post-match differences between the groups in any of the baseline variables. PPP patients had significantly higher rates of VTE and deep vein thrombosis (DVT) (VTE: 14.1% vs 4.4% p=0.018, DVT: 10.9% vs 2.2% p=0.008) as well as higher in-hospital mortality (14.1% vs 2.2% p<0.001).

Conclusion: Preperitoneal pelvic packing use in the management of patients with isolated severe pelvic fractures is associated with an increased rate of VTE and DVT complications.

Poster #98

USE OF FUNNEL PLOTS TO IDENTIFY INDIVIDUAL SURGEONS AS SIGNIFICANT OUTLIERS IN MORTALITY AFTER EMERGENT TRAUMA LAPAROTOMY

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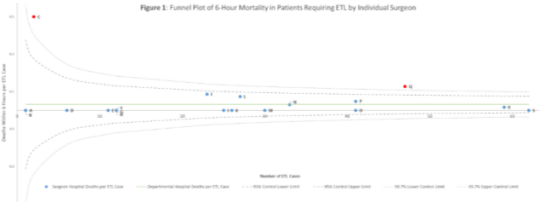
Introduction: Comparisons of surgeon-specific procedural outcomes are significantly affected by differences in patient case-mix and volume. Funnel plots are a widely accepted method to account for these differences and identify performance outliers. We applied this technique to further develop our work to compare individual surgeon outcomes following emergent trauma laparotomy (ETL) at a large level 1 trauma center.
Methods: Retrospective review of a single center database of ETL from 2019-2022. ETL was defined as laparotomy within 90 minutes of patient arrival, excluding those with Emergency Department (ED) thoracotomy. Intraoperative (OR), 6-hour, 24-hour, and in-hospital mortality rates were plotted using funnel plots with 95% and 99.7% confidence intervals.
Results: 19 faculty performed 471 ETL [median 25, range=1-62]. 21% (n=100/471) presented with hypotension (SBP≤90). Initial ED vitals/labs, ISS, AIS-Head, and AIS-Abdomen were all similar across individual surgeons. Overall mortality rates for the entire cohort by time period: OR: 2% (11/471); 6-Hour: 3% (15/471); 24-Hour: 5% (22/471); Hospital: 8% (39/471). ED length of stay ($p=0.004$) and operative duration ($p<0.001$) were significantly different in the group. Funnel plots showed that mortality was within the 95% confidence interval for most surgeons. There were two "probable outliers" (>99.7%) for 6-hour mortality (**Figure. 1**), one each at OR and 24-hour mortality, and none for hospital mortality.
Conclusion: Probable outliers in early mortality were identified while none were present for hospital mortality. Funnel plots are useful to identify the impact that individual surgeons have on ETL outcomes.



SAVE THE DATE

83RD ANNUAL MEETING OF AAST
AND
7TH WORLD TRAUMA CONGRESS

SEPTEMBER 11-14, 2024
PARIS HOTEL — LAS VEGAS, NV

82ND ANNUAL MEETING OF AAST AND CLINICAL CONGRESS OF ACUTE CARE SURGERY

SEPTEMBER 20-23, 2023

MON. 9/18/2023	FUNCTION	LOCATION
7:30 AM - 4:00 PM	**EMERGENCY SURGERY COURSE** (ADDITIONAL FEE)	REDONDO
TUES. 9/19/2023	**FUNCTION**	**LOCATION**
7:30 AM - 6:00 PM	**REGISTRATION**	BALLROOM REG DESK
7:30 AM - 4:00 PM	**EMERGENCY SURGERY COURSE** (ADDITIONAL FEE)	REDONDO
7:30 AM - 4:30 PM	**AAST BOARD OF MANAGERS MEETING**	LAGUNA AB
8:00 AM - 5:00 PM	**MILITARY SYMPOSIUM** (ADDITIONAL FEE)	AVALON A
10:00 AM - 4:00 PM	**RESEARCH SYMPOSIUM** (ADDITIONAL FEE)	AVILA AB
10:00 AM – 7:00 PM	**SPEAKER READY**	GREEN ROOM
1:00 PM - 5:00 PM	**PRE-SESSIONS**	LOCATION ON TICKET
6:30 PM- 8:30 PM	**SYMPOSIUM**	CAPISTRANO
WED. 9/20/2023	**FUNCTION**	**LOCATION**
6:00 AM - 6:00 PM	**SPEAKER READY**	GREEN ROOM
6:30 AM - 7:45 AM	**COMMITTEE MEETINGS I**	SEE MEETING APP
6:30 AM -7:30 AM	**STUDENT/RESIDENT/ IN-TRAINING BREAKFAST** (PRE-REGISTRATION REQUIRED)	HUNTINGTON A-C
6:30 AM - 6:00 PM	**REGISTRATION**	BALLROOM REG DESK
7:30 AM - 8:30 AM	**BREAKFAST**	PACIFIC PROMENADE
8:00 AM - 8:30 AM	**WELCOME**	PACIFIC BR
8:30 AM - 11:10 AM	**SESSION I: PLENARY PAPERS 1-8**	PACIFIC BR
11:00 AM - 7:00 PM	**EXHIBIT HOURS**	CALIFORNIA BR
11:00 AM - 7:00 PM	**DONOR LOUNGE**	CALIFORNIA BR
11:10 AM - 11:40 AM	**BREAK**	CALIFORNIA BR
11:40 AM - 12:40 PM	**SESSION II: PRESIDENTIAL ADDRESS**	PACIFIC BALLROOM
12:45 PM - 2:00 PM	**LUNCH SESSIONS I**	LOCATION ON TICKET
12:45 PM - 2:00 PM	**PRODUCT THEATER**	CALIFORNIA BR
2:05 PM - 5:45 PM	**SESSION IIIA: PAPERS 9-19**	PACIFIC BR A-B
2:05 PM - 5:45 PM	**SESSION IIIB: PAPERS 20-30**	PACIFIC BR C-D
6:00 PM - 7:00 PM	**WELCOME RECEPTION**	CALIFORNIA BR A-C
THURS. 9/21/2023	**FUNCTION**	**LOCATION**
6:00 AM - 6:00 PM	**SPEAKER READY**	GREEN ROOM
6:15 AM - 7:15 AM	**INTERNATIONAL ATTENDEE BREAKFAST** (PRE-REGISTRATION REQUIRED)	HUNTINGTON A-C
6:15 AM - 7:15 AM	**COMMITTEE MEETINGS II**	SEE MEETING APP
7:00 AM - 8:00 AM	**BREAKFAST IN EXHIBIT HALL**	CALIFORNIA BR
7:00 AM - 2:00 PM	**REGISTRATION**	BALLROOM REG DESK
7:00 AM - 2:30 PM	**EXHIBITS**	CALIFORNIA BR
7:00 AM - 2:30 PM	**DONOR LOUNGE**	CALIFORNIA BR
7:30 AM - 9:30 AM	**SESSION IV: PAPERS 31-36**	PACIFIC BR
9:30 AM - 10:00 AM	**BREAK IN EXHIBIT HALL**	CALIFORNIA BR
10:00 AM - 11:00 AM	**SESSION V: PANEL I,** "COMMUNITY ENGAGEMENT MODELS FOR VIOLENCE PREVENTION"	PACIFIC BR
11:00 AM - 11:30 AM	**SESSION VI: SCHOLAR-SHIP PRESENTATIONS**	PACIFIC BR
11:30 AM - 12:30 PM	**SESSION VII: FITTS LECTURE**	PACIFIC BR
12:30 PM - 12:45 PM	**BREAK - HEAD TO POSTER SESSION**	CALIFORNIA D
12:45 PM - 1:45 PM	**SESSION VIII: POSTER SESSION**	CALIFORNIA D
1:40 PM - 3:00 PM	**PRODUCT THEATER** (HOT LUNCH WILL BE SERVED)	CALIFORNIA BR A-C
1:45 PM - 6:00 PM	**ADD-ON SESSIONS**	LOCATION ON TICKET
1:45 PM - 6:00 PM	**LEADERSHIP ACADEMY** (PRE-REGISTRATION REQUIRED)	LAGUNA A-B
2:00 PM - 3:30 PM	**SYMPOSIUM**	EL CAPITAN
2:30 PM - 5:00 PM	**JTACS EDITORIAL BOARD MEETING** (INVITE ONLY)	SAN SIMEON AB
4:30 PM - 6:30 PM	**SYMPOSIUM**	PALOS VERDES
5:00 PM - 6:00 PM	**VIRTUAL JOB FAIR SOCIAL HOUR** (OPEN TO ALL)	AVALON AB
5:00 PM - 8:00 PM	**SCCPDS BOARD OF DIREC-TORS MEETING** (INVITE ONLY)	MONTEREY
6:00 PM - 7:30 PM	**ASSOCIATE MEMBER HAPPY HOUR** (AAST ASSOCIATE MEMBERS ONLY)	AVALON AB

FRI. 9/22/2023	FUNCTION	LOCATION
6:00 AM - 6:00 PM	**SPEAKER READY**	GREEN ROOM
6:15 AM - 7:15 AM	**COMMITTEE MEETINGS III**	SEE MEETING APP
7:00 AM - 8:00 AM	**BREAKFAST IN EXHIBIT HALL**	CALIFORNIA BR
7:00 AM - 1:30 PM	**EXHIBITS**	CALIFORNIA BR
7:00 AM - 1:30 PM	**DONOR LOUNGE**	CALIFORNIA BR
7:00 AM - 3:30 PM	**REGISTRATION**	BALLROOM REG DESK
7:30 AM - 10:30 AM	**SESSION IX: PAPERS 37-44**	PACIFIC BR
10:10 AM - 10:30 AM	**BREAK IN EXHIBIT HALL**	CALIFORNIA BR
10:30 AM - 11:00 AM	**SESSION X: EXPERT SURGEON LECTURE**	PACIFIC BR
11:00 AM - 12:00 PM	**SESSION XI: PANEL II,** "INNOVATIVE APPROACHES TO RESEARCH IN ACUTE CARE SURGERY"	PACIFIC BR
12:00 PM - 1:15 PM	**LUNCH SESSIONS II**	LOCATION ON TICKET
12:00 PM - 1:15 PM	**LUNCH WITH EXHIBITORS** (AAST SPONSORED)	CALIFORNIA A-C
12:00 PM - 1:30 PM	**TSACO EDITORIAL MEETING** (INVITE ONLY)	LAGUNA
12:00 PM - 1:15 PM	**PRODUCT THEATER** (HOT LUNCH WILL BE SERVED)	CALIFORNIA BR A-C
1:15 PM - 4:55 PM	**SESSION XIIA: PAPERS 45-55**	PACIFIC BR A-B
1:15 PM - 4:55 PM	**SESSION XIIB: PAPERS 56-66**	PACIFIC BR C-D
5:00 PM - 6:30 PM	**BUSINESS MEETING** (AAST MEMBERS ONLY)	PACIFIC BR AB
7:00 PM - 7:30 PM	**RECEPTION**	CALIFORNIA D FOYER
7:30 PM - 11:00 PM	**EXPERIENCE THE AAST AUCTION & BANQUET**	CALIFORNIA D
SAT. 9/23/2023	**FUNCTION**	**LOCATION**
7:00 AM - 8:00 AM	**NEW MEMBER BREAKFAST**	PACIFIC BALLROOM PROMENADE
7:30 AM - 8:30 AM	**BREAKFAST**	PACIFIC BR
8:00 AM - 9:18 AM	**SESSION XIII: QUICKSHOT SESSION I 1-13**	PACIFIC BR A-B
9:18 AM - 9:40 AM	**BREAK**	CALIFORNIA BR
9:40 AM - 10:58 AM	**SESSION XIV: QUICKSHOT SESSION II 14-26**	PACIFIC BR A-B
11:00 AM	**MEETING ADJOURNED**	PACIFIC BR