74th Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery

September 9 — September 12, 2015

WYNN LAS VEGAS

LAS VEGAS, NV

HISTORICAL BACKGROUND

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*, initiated in 1961, and has approximately 1,300 members from 30 countries.

American Association for the Surgery of Trauma
(AAST)

Annual Meeting of AAST and Clinical Congress of Acute Care Surgery
Learning Objectives and Outcomes

- Exchange knowledge pertaining to current research practices and training in the surgery of trauma.

- Design research studies to investigate new methods of preventing, correcting, and treating acute care surgery (trauma, surgical critical care and emergency surgery) injuries.

CONTINUING MEDICAL EDUCATION CREDIT INFORMATION

Accreditation

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the American College of Surgeons and the American Association for the Surgery of Trauma. The American College of Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

AMA PRA Category 1 Credits™

The American College of Surgeons designates this live activity for a maximum of 30.25 *AMA PRA Category 1 Credits™.* Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Of the *AMA PRA Category 1 Credits*™ listed above, a maximum of 10.50 credits meet the requirements for Self-Assessment.

American College of Surgeons
Inspiring Quality:
Highest Standards, Better Outcomes
100+years

AMERICAN COLLEGE OF SURGEONS
DIVISION OF EDUCATION
Accredited with Commendation by the Accreditation Council for Continuing Medical Education

** CME and Self-Assessment Credits are available for:*
Wednesday: Acute Care Surgery-Maintenance of Certification (4 hrs), Pediatric Trauma Symposium (4 hrs) and Military Symposium (4 hrs)
Wednesday: Opening session, 1:00 -5:25 pm (4.5 hrs)
Thursday and Friday: Lunch Sessions only (1 hour each)
Total maximum number of Self-Assessment Credits available: 10.50 hours
Total number of CME Credits available are: 30.25

Attendees have the option of claiming CME and Self-Assessment Credit or just CME Credit for all sessions listed above.

STATEMENT OF ATTENDANCE FORM
THE AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA
74th Annual Meeting of AAST and Clinical Congress of Acute Care Surgery
Wynn Las Vegas, Las Vegas, NV, September 9-12, 2015

As a participant in this educational activity, indicate by marking (x) by each session you attended. To receive your CME certificate, follow the instructions below for completing the online evaluation. By September 12, 2015 all registered participants will receive an email with instructions for claiming CME Credit. **No paper forms will be accepted. The boxes below are for record-keeping purposes only. Claim credit for only the hours you attend.**

WEDNESDAY, SEPTEMBER 9, 2015 (total for day 10.5, including 8.5 for Self-Assessment Credit)

Optional Sessions (check one only):
____ ACS-MOC (4)*
____ Military (4)*
____ Pediatric Symposium (4)*
____ Trauma Prevention Coalition Symposium (4)

____ Session I: Papers 1-8 (2.75)*
____ Session II: Master Surgeon Lecture I (.5)*
____ Session III: Panel I (1.25)*
____ Session IV: Posters (2)

**Self-Assessment is available*

THURSDAY, SEPTEMBER 10, 2015 (total for day 7.00, including 1 Self-Assessment Credit)

____ Session V: Papers 9-13 (1.75)
____ Session VII: Papers 14-17 (1.25)
____ Lunch Sessions – pre-registration required (1)*
____ Session IXA or B: Papers 18-26 or 27-35 (3.00)

**Self-Assessment is available*

If you attended one of the six lunch sessions, check here: □

FRIDAY, SEPTEMBER 11, 2015 (total for day 8.75, including 1 for Self-Assessment Credit)

____ Session X: Healthcare Reform (.5)
____ Session XI: Quickshots (3)
____ Session XII: Fitts Lecture (1)
____ Lunch Sessions – pre-registration required (1)*
____ Session XIIIA or B: Papers 36-45 or 46-55 (3.5)

**Self-Assessment is available*

If you attended one of the six lunch sessions, check here: □

SATURDAY, SEPTEMBER 12, 2015 (total for day 4)

____ Session XIV: Papers 56-67 (4)

Total hours available: 30.25.

TOTAL CME HOURS CLAIMING:_____

TOTAL SELF-ASSESSMENT HOURS:_____
(To claim Self-Assessment Credit, you will be required to take tests for each session. The tests are located on the evaluation form.)

If you are a member of the American College of Surgeons, your completed CME information will be sent to "MY CME Portal Page" and will be updated with the credits within six (6) months of this activity. ACS ID #_____ - you will need this when completing the online evaluation.

ONLINE CME INFORMATION

All registered participants can obtain CME online only. To receive your CME for the 2015 Annual Meeting of AAST and Clinical Congress of Acute Care Surgery, please read over the instructions below. All CME forms must be completed within 30 days after the meeting (by October 12, 2015). *To be eligible for Self-Assessment Credit you MUST take AND pass the Self-Assessment Credit test within ten (10) business days of the session (September 25, 2015).*

On Saturday, September 12th, the email address on file (the email address you submitted on your registration form) will be sent an email with information for claiming your CME Credit for the 2015 Annual Meeting.

If you are an AAST Member and used the same email address in the AAST membership system to register for the meeting, your information is already in the AAST database and you have an account on the AAST website at www.aast.org. To claim CME Credit please click on the link on the home page once you have signed in using the "log in" button on the top right hand corner.

If you are not an AAST member, but have created an account on www.aast.org and used the same email address to register, you can claim CME by logging in using the account you created at www.aast.org and clicking on the "log in" button on the top right hand corner.

If you are not an AAST member and have not created an account, you will need to create an account. It is suggested that you create an account prior to Saturday, September 12th. However, if you choose not to do that, once you receive the email for CME, you will need to create an account. To create an account after September 12th, go to www.aast.org and click on "Create an Account" in the top right hand corner, once your account is created, please refer to the instructions emailed to you to claim CME Credit.

AMERICAN COLLEGE OF SURGEONS | DIVISION OF EDUCATION
Blended Surgical Education and Training for Life
Joint Providership Program

Disclosure Information

74th Annual Meeting of AAST and Clinical Congress of Acute Care Surgery

September 9-12, 2015

Las Vegas, NV

In accordance with the ACCME Accreditation Criteria, the American College of Surgeons, as the accredited provider of this activity, must ensure that anyone in a position to control the content of the educational activity has disclosed **all** relevant financial relationships with any commercial interest. Therefore, it is mandatory that both the program planning committee and speakers complete disclosure forms. Members of the program committee were required to disclose all financial relationships and speakers were required to disclose any financial relationship **as it pertains to the content of the presentations.** The ACCME defines a 'commercial interest' as "any entity producing, marketing, re-selling, or distributing health care goods or services consumed by, or used on, patients". It does not consider providers of clinical service directly to patients to be commercial interests. The ACCME considers "relevant" financial relationships as financial transactions (in any amount) that may create a conflict of interest and occur within the 12 months preceding the time that the individual is being asked to assume a role controlling content of the educational activity.

ACS is also required, through through our joint providership partners, to manage any reported conflict and eliminate the potential for bias during the activity. All program committee members and speakers were contacted and the conflicts listed below have been managed to our satisfaction. However, if you perceive a bias during a session, please report the circumstances on the session evaluation form.

Please note we have advised the speakers that it is their responsibility to disclose at the start of their presentation if they will be describing the use of a device, product, or drug that is not FDA approved or the off-label use of an approved device, product, or drug or unapproved usage.

The requirement for disclosure is not intended to imply any impropriety of such relationships, but simply to identify such relationships through full disclosure and to allow the audience to form its own judgments regarding the presentation.

Presenter	Nothing to Disclose	Disclosure		
		Company	Role	Received
A Peter Ekeh	No			
A. Britton Christmas, MD, FACS	No			
Adil H Haider	No			
Adrian Maung MD	No			
ALBERTO FEDERICO GARCIA	No			
Alexander Eastman	No			
Alexander Lorenzo Colonna	No			
Alexandros Nicolau Flaris	No			
Ali Salim, MD	No			
Alicia Mangram	No			
Alisa Cross	No			
Alison Wilson	No			
Allan B Peetz	No			
Allison Ertl	No			

Presenter	Nothing to Disclose	Disclosure		
		Company	Role	Received
ALVARO IGNACIO SANCHEZ ORTIZ	No			
Amy B. Christie	No			
Amy Goldberg, MD	No			
Andre Campbell	No			
Andrew B. Peitzman	No			
Andrew Bernard, MD	No			
Andrew Hubbard Miller	No			
Andrew J Kerwin	No			
Angela Neville	No			
Angela Sauaia	No			
Ann Marie Warren	No			
Ann Mosenthal	No			
Anna Bradford	No			
Ashley B Hink	No			
Ashley Mooney	No			
Atsushi Shiraishi	No			
Avery Nathans, MD, PhD, MPH		American College of Surgeons	Consultant	
Babak Sarani	No			
Barbara Gaines, MD	No			
Bellal Joseph	No			
Ben L Zarzaur	No			
Benjamin Michael Howard	No			
Bishwajit Bhattacharya	No			
Bradley M. Dennis	No			
Brian Eastridge	No			
Brian Patrick Smith	No			
Brian Zuckerbraun	No			
Bruce Chung	No			
BRYAN A COTTON	No			
Carlos Alberto Ordonez	No			
Carlos Brown, MD	No			
Carlos Rodriguez	No			
Cathy A Maxwell	No			
Chad G. Ball	No			
charles A Adams Jr Md	No			
Charles Fox	No			
Charles M. Psoinos	No			
Christian David Weber	No			
Christine Cocanour	No			
Christine Gaarder	No			

Presenter	Nothing to Disclose	Disclosure		
		Company	Role	Received
Christopher J Dente	No			
Christopher Paul Michetti	No			
Clay Cothren Burlew	No			
Daisy Chou	No			
D'Andrea Krista Joseph	No			
Daniel Eiferman	No			
Daniel Holena	No			
Daniel Marguiles, MD	No			
Danielle Tatum	No			
David Bar-Or	No			
David C Chang	No			
David Ciesla	No			
David Dries	No			
David Efon, MD	No			
David Feliciano	No			
David George Jacobs	No			
David Gourley	No			
David Harrington, MD	No			
David Hoyt	No			
David Livingston	No			
David Notrica	No			
David R King	No			
David Rodenberg	No			
David S. Plurad	No			
David Shatz, MD	No			
David Spain	No			
Deborah Kuhls, MD	No			
Deborah M Stein		Hospira		Research funding
Deborah Stein	No			
Dennis Bensard	No			
Dennis W Vane	No			
Dennis Y Kim	No			
Donald Jenkins	No			
Douglas J.E. Schuerer	No			
Edwrard Cornwell	No			
Eileen Bulger	No			
EIMAN ZARGARAN	No			
Elizabeth Benjamin	No			
Elizabeth Windell	No			
Elliott R Haut	No			
Emily EK Murphy	No			
Eric A. Toschlog	No			

Presenter	Nothing to Disclose	Disclosure		
		Company	Role	Received
Eric B Schneider	No			
Eric Elster	No			
Eric J Ley	No			
Eric Kuncir	No			
Eric Ley	No			
Eric Voiglio	No			
Erik Barquist, MD	No			
Ernest E Moore		Haemonetics and TEM		Research support
Faran Bokhari		Abbott Point of Care Testing	Speaker	Honorarium
Forest R. Sheppard	No			
Fred Luchette	No			
Fredric Pieracci		DePuy Synthes		Research grant
Fredric Pieracci		DePuy Synthes	Speaker	Honorarium
Frederick B Rogers	No			
Gail Toshie Tominaga	No			
Garth Utter	No			
Gary Michael Weissenfluh	No			
Gary Vercruysse	No			
George Kasotakis	No			
George Velmahos	No			
Glen Tinkoff, MD	No			
Grace Rozycki	No			
GRACE S. ROZYCKI, MD,MBA	No			
Grant O'Keefe, MD, MPH	No			
Grant Vincent Bochicchio	No			
Greg Beilman	No			
Greg Elton Hambright	No			
Greg J Beilman	No			
Gregory Jurkovich	No			
Gregory Victorino	No			
H. Gill Cryer	No			
Hasan B Alam	No			
Hee Soo Jung	No			
Henna Santry	No			
Henry R Moore	No			
Herb Phelan	No			
Hiroyuki Koami	No			
Howard R Champion	No			
Hyun Jin Cho	No			
Indermeet Bhullar	No			

Presenter	Nothing to Disclose	Disclosure		
		Company	Role	Received
Irfan Ahmed	No			
Isadora C Botwinick	No			
Itsurou Akamine	No			
J. Wayne Meredith	No			
Jack Sava	No			
James Byrne	No			
James Dunne	No			
James Hoth	No			
James M Haan	No			
James W Davis MD	No			
Jamie Jones Coleman	No			
Jan Leonard	No			
Jason L Sperry	No			
Jason Smith	No			
Jason Sperry	No			
Jay Johannigman	No			
Jay Menaker	No			
Jeanette Zhang	No			
Jeffery Wild	No			
Jeffrey A Claridge	No			
Jeffrey S Young	No			
Jeffrey Upperman	No			
Jeffrey Wild	No			
Jeffrey Young	No			
Jennifer Louise Hubbard	No			
Jeremy Cannon	No			
Jeremy Scott Juern	No			
Jesse Guardado	No			
Ji Hoon T Kim	No			
Jiselle Bock Heaney	No			
Joaquim Michael Havens	No			
John Andrew Harvin	No			
John B Holcomb	No			
John Fildes	No			
John J. Como, MD, MPH	No			
Jon Groner	No			
Jonathan P. Meizoso	No			
Jonathan Tilsed	No			
Jordan Weinberg	No			
Jose Diaz	No			
Jose L Pascual	No			
Joseph DuBose	No			

Presenter	Nothing to Disclose	Disclosure		
		Company	Role	Received
Joseph Galante	No			
Joseph J DuBose	No			
Joseph P. Minei, MD, MBA	No			
Joseph Rappold	No			
Joshua Burton Brown	No			
Joshua Wayne Gatson	No			
Juan Duchesne	No			
Karen Brasel	No			
Katherine Theresa Flynn-O'Brien	No			
Kathleen Hegranes	No			
Kathleen O'Connell	No			
Kazuhide Matsushima	No			
Kazuhiro Okada	No			
Kenji Inaba	No			
Kenneth G Proctor	No			
Kimberly Ann Thompson	No			
Kimberly Davis	No			
Kirellos R Zamary	No			
Krista Kaups, MD, MSc	No			
Kristan Lea Staudenmayer	No			
Kyle K Sokol	No			
L.D. Britt	No			
Larry C. Christopher Martin	No			
Laura J. Moore, MD	No			
Laura Nadine Godat	No			
Lawrence N. Diebel	No			
Lena Napolitano	No			
Leonidas G Koniaris	No			
Lewis Kaplan	No			
Linda Maerz, MD	No			
Lindsay C Bridges	No			
Louis J Magnotti	No			
Lynne Moore	No			
M. Margaret Knudson	No			
Margaret M Moore	No			

Presenter	Nothing to Disclose	Disclosure		
		Company	Role	Received
Marie Crandall, MD, MPH	No			
Mark Hemmila		Blue Cross Blue Shield of Michigan	Independent Contractor	Salary
Mark L Shapiro	No			
Mark Midwinter	No			
Mark Seamon	No			
Mark W. Bowyer MD	No			
Marko Bukur	No			
Martin A. Croce	No			
Martin A. Schreiber	No			
Martin Donald Zielinski	No			
Martin J Mangino	No			
Martin Rosenthal	No			
Martin Schreiber, MD	No			
Mary Ann Spott	No			
Mary C McCarthy	No			
Mary E. Fallat M.D.	No			
Masahiro Ojima	No			
Mason G. Fisher	No			
Matt Jacques Kaminsky	No			
Matthew B Bloom	No			
Matthew J Delano	No			
Matthew Martin	No			
Matthew Moore Carrick	No			
Mazhar Khalil	No			
Megan Brenner		Pryor Medical Inc.	Ownership, consultant	stocks, honorarium
Melvin Eugene Stone	No			
Micahel J. Sise	No			
Michael Aboutanos	No			
Michael Chang	No			
Michael Dubick	No			
Michael G Mount	No			
Michael L Foreman	No			
Michael Rotondo	No			

Presenter	Nothing to Disclose	Disclosure		
		Company	Role	Received
Michael William Cripps	No			
Michelle F Buehner	No			
Miguel Villalobos	No			
Misha Bhandari	No			
Mitchell Cohen	No			
Mitchell Daley	No			
Morgan Schellenberg	No			
Nancy Ewen Wang	No			
Naveen Fatima Sangji	No			
Nichole K Ingalls	No			
Nicole C Toscano	No			
Nicole Stassen	No			
Niels Martin	No			
Nikolas S. Kappy	No			
Nikolay Bugaev	No			
Nina Elizabeth Glass	No			
Noelle Nugent Saillant	No			
Norio Sato	No			
Orlando Kirton	No			
Orlando Kirton, MD	No			
Patrick Greiffenstein	No			
Patrick Langdon Bosarge	No			
Patrick M Reilly	No			
Paul Bankey	No			
Paul Joseph Chestovich	No			
Paul Maggio	No			
Peter C Jenkins	No			
PETER RHEE	No			
Philip Alexander Efron	No			
Philip Marshall Edmundson	No			
Rachael A Callcut	No			
Rachel M Russo	No			
Raminder Nirulal, MD, MPH	No			

Presenter	Nothing to Disclose	Disclosure		
		Company	Role	Received
Raul Coimbra	No			
Ravi S Radhakrishnan	No			
Raymond Fang, MD	No			
Raymond Georgen	No			
Rebecca Jo Weddle	No			
Rebecca Schroll	No			
Ricard N Townsend	No			
Richard Falcone	No			
Richard R. Kew	No			
Richard Sola	No			
Robert Allen Maxwell	No			
Robert David Winfield	No			
Robert J. Winchell	No			
Robert Letton	No			
Robert Mackersie	No			
Robert Maxwell	no			
Robert Sawyer	No			
Robrt Barraco, MD, MPH	No			
Rochelle A. Dicker	No			
Ronald I. Gross	No			
Ronald Maier	No			
Ronald Simon	No			
Ronald Stewart	No			
Ronald Tesoriero	No			
Rosemary Kozar	No			
Sam Arbabi	No			
Samir M. Fakhry	No			
Samuel Everette Long	No			
Sandro B Rizoli	No			
Sarah C Christiaans	No			
Sarah Majercik	No			
Sarah Murthi	No			
Sasha Adams	No			

Presenter	Nothing to Disclose	Disclosure		
		Company	Role	Received
Scott Brakenridge	No			
Scott D'Amours	No			
Scott Sagraves, MD	No			
Seong Keun Lee	No			
Shahid Shafi	No			
Shahram Aarabi	No			
Sharon Henry	No			
Shokei Matsumoto	No			
Sonlee West	No			
Stanley Kurek, Jr. DO	No			
Stephanie A Savage	No			
Stephanie Markle	No			
Stephen Barnes	No			
Stephen Flaherty	No			
Stephen Kaminski	No			
Steven Maximus	No			
Steven R. Shackford	No			
Steven Shackford	No			
Sundeep Guliani	No			
Suresh Agarwal, Jr., MD		Acute Innovations	Independent Contractor	Honorarium, research funding, intellectual property rights
Susan L Evans	No			
Susan Rowell, MD, MCR	No			
Tabassum Khan	No			
Takashi Fujita	No			
Tammy Kopelman	No			
Thomas Scalea	No			
Timothy Browder	No			
Timothy C Fabian	No			
Timothy Patrick Plackett	No			
Todd Rasmussen	No			
Todd W Costantini	No			
Tomohiko Orita	No			

Presenter	Nothing to Disclose	Disclosure		
		Company	Role	Received
Tomokazu Motomura	No			
Tony Rosen	No			
Travis Polk	No			
Vicente Jose Undurraga Perl	No			
Walter L. Biffl	No			
Warren Dorlac	No			
Weidun Alan Guo	No			
Wenjun Li	No			
Wenjun Z Martini	No			
William Cioffi, MD	No			
Yaser M K Baghdadi	No			
Yashihiro Otomo	No			
Yihan Lin		DePuy Synthes		Research support
Yo Hattori	No			
Zachary M Bauman	No			
Planning Committee				
Thomas Scalea	No			
David Spain	No			
Grace Rozycki	No			
David Harrington	No			
Orlando Kirton	No			
John Holcomb	No			
Todd Rasmussen	No			
Ernest E Moore		Haemonetics and TEM		Research Support
David Livingston	No			
Martin Croce	No			

SEVENTY-FOURTH ANNUAL MEETING
OF THE
AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA
AND
CLINICAL CONGRESS OF ACUTE CARE SURGERY
SEPTEMBER 9-12, 2015
WYNN LAS VEGAS
LAS VEGAS, NEVADA

GENERAL AND SCIENTIFIC PROGRAM SCHEDULE

Tuesday, September 8, 2015

3:00 - 7:00 pm	**REGISTRATION** Location: Registration Desk 2

Wednesday, September 9, 2015

6:30 am - 5:00 pm	**REGISTRATION** Location: Registration Desk 2

OPTIONAL PRE-SESSIONS (registration required)

7:00 - 11:30 am	ACS-MOC Location: Lafite 8
7:00 - 11:30 am	2015 Trauma Prevention Coalition Symposium and Summit Location: Lafite 6
7:00 - 11:30 am	Military Trauma Systems: Lessons for Civilian Model: Quality Improvement Location: Lafleur 1
7:00 - 11:30 am	Pediatric Trauma Update, 2015 Location: Lafleur 2
12:30 - 1:00 pm	**WELCOME** Location: Latour Ballroom Presiding: Thomas Scalea, MD AAST President

1:00 - 3:40 pm	SESSION I: PLENARY PAPERS 1-8
	Location: Latour Ballroom Moderator: Thomas Scalea, MD Recorder: David Spain, MD
1:00 pm Paper #1	MULTICENTER EXTERNAL VALIDATION OF THE GERIATRIC TRAUMA OUTCOME SCORE: THE PROGNOSTIC ASSESSMENT OF LIFE AND LIMITATIONS AFTER TRAUMA IN THE ELDERLY [PALLIATE] STUDY Presenter: Allyson Cook, MD Discussant: Steven Shackford, MD
1:20 pm Paper #2	INTRAOPERATIVE HYPOTENSIVE RESUSCITATION FOR PATIENTS UNDERGOING LAPAROTOMY OR THORACOTOMY FOR TRAUMA: EARLY TERMINATION OF A RANDOMIZED PROSPECTIVE CLINICAL TRIAL Presenter: Matthew Carrick, MD Discussant: Raul Coimbra, MD, PhD
1:40 pm Paper #3	IS THERE AN IMPENDING LOSS OF ACADEMICALLY PRODUCTIVE TRAUMA SURGEONS? Presenter: Nakul Valsangkar, MD Discussant: James Hoth, MD, PhD
2:00 pm Paper #4	CURRENT MANAGEMENT OF HEMORRHAGE FROM SEVERE PELVIC FRACTURES: RESULTS OF AN AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA MULTI-INSTITUTIONAL TRIAL Presenter: Todd Costantini, MD Discussant: Walter Biffl, MD

2:20 pm	Paper #5	TO NEARLY COME FULL CIRCLE: NONOPERATIVE MANAGEMENT OF HIGH GRADE IV-V BLUNT SPLENIC TRAUMA IS SAFE UTILIZING A PROTOCOL WITH ROUTINE ANGIOEMBOLIZATION OF ALL HEMODYNAMICALLY STABLE PATIENTS WITH HIGH GRADE IV-V INJURIES AND ALL PATIENTS WITH CONTRAST BLU Presenter: Indermeet Bhullar, MD Discussant: Martin Croce, MD
2:40 pm	Paper #6	THE HMGB1 SIGNAL PATHWAY IN SEVERE TBI; MECHANISM FOR REDUCED CEREBRAL EDEMA AND IMPROVED OUTCOME AFTER HEPARINOID ADMINISTRATION? Presenter: Joshua Marks, MD Discussant: Ronald Maier, MD
3:00 pm	Paper #7	WHEN SPEED IS NOT A VIRTUE: THE IMPACT OF SHORT PRE-HOSPITAL TIMES ON TRAUMA CENTER PERFORMANCE BENCHMARKING Presenter: James Byrne, MD Discussant: William Cioffi, MD
3:20 pm	Paper #8	MULTICENTER VALIDATION OF AAST GRADING SYSTEM FOR ACUTE COLONIC DIVERTICULITS AND PROPOSAL FOR EMERGENCY GENERAL SURGERY QUALITY IMPROVEMENT PROGRAM (EQIP) Presenter: Shahid Shafi, MD, MPH Discussant: Andrew Peitzman, MD

3:40 - 4:10 pm **SESSION II: MASTER SURGEON**

Location: Latour Ballroom

Severe ARDS Management in the ICU

Lena Napolitano, MD, MPH

4:10 - 5:25 pm	**SESSION III: TRAUMA CARE IN 2025 AND BEYOND** Location: Latour Ballroom Moderator: Robert Mackersie, MD Panelists: Jay Johannigman, MD: *From Here to Eternity-Enroute Care Today and Tomorrow* Hasan Alam, MD: *Defying Death* Mitchell Cohen, MD: *Modeling Clinical Gesthalt: Model and Data-Driven Approaches to Predicting Patient Trajectory and Improving Care.* Michael Chang, MD: *Replacement Parts: 3-D Printing and Stem Cells for Trauma Surgeons*
5:30 - 7:30 pm	**SESSION IV: Poster Session and Exhibit Hall Opening** Location: Lafite Ballroom 4, 5, 7 & 9

Poster	Category	Professors
1-10	Abdominal Trauma	Daniel Marguiles, MD and David Ciesla, MD
11-19	Acute Care Surgery	Krista Kaups, MD, MSc, and Grant O'Keefe, MD, MPH
20-31	Critical Care	Orlando Kirton, MD and Linda Maerz, MD
32-42	Burns and Neurological Trauma	David Harrington, MD and Glen Tinkoff, MD
43-53	Outcomes/Guidelines I	Raminder Nirula, MD, MPH and Jonathan Tilsed, MD
54-63	Outcomes/Guidelines II	David Efron, MD and Susan Rowell, MD
64-72	Pediatric and Trauma Systems I	Barbara Gaines, MD and David Shatz, MD
73-82	Shock/Transfusions I	Martin Schreiber, MD and Yasuhiro Otomo, MD, PhD

83-92	Shock/Transfusions II	Carlos Brown, MD and Ronald Simon, MD
93-101	Socioeconomic, Ethics & Education	Marie Crandall, MD, MPH and Deborah Kuhls, MD
102-111	Thoracic Trauma	Ali Salim, MD and Suresh Agarwal, Jr., MD
112-121	Trauma Prevention & Epidemiology	Robert Barraco, MD, MPH and Andrew Bernard, MD
122-130	Trauma Systems II	Avery Nathens, MD, PhD, MPH and Scott Sagraves, MD
131-140	Vascular Trauma, Extremity, and Soft Tissue	Amy Goldberg, MD and Raymond Fang, MD

6:30 - 8:30 pm **JOURNAL OF TRAUMA AND ACUTE CARE SURGERY EDITORIAL MEETING**
Location: Lafleur 2

8:30 - 10:00 pm **JOURNAL OF TRAUMA AND ACUTE CARE SURGERY RECEPTION**
Location: Montrachet 1 & 2

Thursday, September 10, 2015

6:15 - 7:30 am **MEDICAL STUDENTS/RESIDENTS/IN-TRAINING FELLOWS BREAKFAST (Ticketed Event)**
Lessons Learned on the Path to Leadership Location: Lafite 8
Presenter: Grace Rozycki, MD, MBA, AAST President-Elect

6:15 - 7:30 am **COMMITTEE MEETINGS**

Acute Care Surgery Committee	Lafite 6
Critical Care Committee	Chambertin 2
Disaster Ad Hoc Committee	Lafleur 2
International Relations Committee	Chambertin 1
Multi-Institutional Trials Committee	Lafleur 1
Prevention Committee	St. Julien

7:00 am - 4:00 pm **REGISTRATION**
Location: Registration Desk 2

7:00 - 9:00 am **CONTINENTAL BREAKFAST**
Location: Lafite Ballroom 4, 5, 7 & 9

7:00 am - 3:00 pm **EXHIBITS**
Location: Lafite Ballroom 4, 5, 7 & 9

7:30 - 9:10 am **SESSION V: ACUTE CARE SURGERY PAPERS 9-13**
Location: Latour Ballroom
Moderator: Kimberly Davis, MD, MBA
Recorder: David Spain, MD

7:30 am Paper #9 DERIVATION AND VALIDATION OF A NOVEL EMERGENCY SURGERY ACUITY SCORE (ESAS)
Presenter: Naveen Sangji, MD, MPH
Discussant: James Davis, MD

7:50 am Paper #10 SEVERE COMPLICATED CLOSTRIDIUM DIFFICLE INFECTION: CAN THE UPMC PROPOSED SCORING SYSTEM PREDICT THE NEED FOR SURGERY?
Presenter: Michelle Julien, MD
Discussant: Brian Zuckerbraun, MD

8:10 am Paper #11	RACIAL DISPARITIES IN EMERGENCY GENERAL SURGERY: DO DIFFERENCES IN OUTCOMES PERSIST AMONG UNIVERSALLY-INSURED MILITARY PATIENTS? Presenter: Cheryl Zogg, MSPH, MHS Discussant: Orlando Kirton, MD
8:30 am Paper #12	SURGICAL STRATEGIES AND OUTCOMES IN PATIENTS REQUIRING BOWEL RESECTION IN NON-TRAUMA ABDOMINAL EMERGENCIES Presenter: Maria Garcia-Garcia, MD Discussant: Jason Smith, MD
8:50 am Paper #13	ANTIBIOTICS FOR APPENDICITIS! NOT SO FAST Presenter: Mazhar Khalil, MD Discussant: Robert Sawyer, MD
9:10 - 9:40 am	**SESSION VI: SCHOLARSHIP PRESENTATIONS** Location: Latour Ballroom
9:40 - 10:00 am	**BREAK IN EXHIBIT HALL**
10:00 - 11:20 am	**SESSION VII: SHOCK TRANSFUSION PAPERS 14-17** Location: Latour Ballroom Moderator: Christine Cocanour, MD Recorder: David Livingston, MD
10:00 am Paper #14	THE AAST PROSPECTIVE AORTIC OCCLUSION FOR RESUSCITATION IN TRAUMA AND ACUTE CARE SURGERY (AORTA) REGISTRY: DATA ON CONTEMPORARY UTILIZATION AND OUTCOMES OF AORTIC OCCLUSION AND RESUSCITATIVE BALLOON OCCLUSION OF THE AORTA (REBOA) Presenter: Joseph DuBose, MD Discussant: Timothy Fabian, MD

10:20 am Paper #15 — DAMAGE CONTROL RESUSCITATION AND EMERGENCY LAPAROTOMY: FINDINGS FROM THE PROPPR STUDY
Presenter: Vicente Undurraga Perl, MD
Discussant: Ernest E. Moore, MD

10:40 am Paper #16 — ANGIOGRAPHIC EMBOLIZATION FOR HEMORRHAGE FOLLOWING PELVIC FRACTURE: IS IT "TIME" FOR A PARADIGM SHIFT?
Presenter: Ronald Tesoriero, MD
Discussant: John Holcomb, MD

11:00 am Paper #17 — COMPUTED TOMOGRAPHY IN HEMODYNAMICALLY UNSTABLE SEVERELY INJURED TRAUMA PATIENTS
Presenter: Juan Herrera-Escobar, MD
Discussant: David Feliciano, MD

11:30 am - 12:30 pm — SESSION VIII: PRESIDENTIAL ADDRESS
Location: Latour Ballroom
Presiding: Grace Rozycki, MD, MBA, AAST President-Elect

While my Guitar Gently Weeps
Thomas Scalea, MD, AAST President

12:30 - 1:45 pm — LUNCH SESSIONS (Locations listed on ticket)

Session I: **Surgical Emergencies in Soft Tissue Infections and Perianal Concerns: When is Intervention indicated?**
Moderator: Christopher Dente, MD
Presenters: Sharon Henry, MD and Angela Neville, MD

Session II: **Unusual Visceral Perforations: Dilemmas for the Acute Care Surgeon**
Moderator: Andre Campbell, MD
Presenters: Jose Diaz, MD and Stephen Barnes, MD

Session III: **Endovascular Approaches to Traumatic Injuries: REBOA, Stents, Angioembolization Hybrid OR Suites**
Moderator: Todd Rasmussen, MD,
Presenters: Joseph DuBose, MD; Megan Brenner, MD, MS and Scott D'Amours, MD

Session IV:	**Thoracic Injuries: Innovative Approaches/Management** Moderator: Mark Seamon, MD Presenters: Raminder Nirula, MD, MPH and Kenji Inaba, MD
Session V:	**How to Develop/Manage a Research Career and Obtain Funding** Moderator: David Hoyt, MD Presenters: Ronald Maier, MD and Rosemary Kozar, MD, PhD
Session VI:	**The Why and How of Adult ECMO-Outcomes, Indications and Starting a Program** Moderator: Robert Maxwell, MD Presenters: Jay Menaker, MD; Paul Maggio, MD, MBA and Jeremy Cannon, MD
1:45 - 2:00 pm	**BREAK IN EXHIBIT HALL**
2:00 - 5:00 pm	**SESSION IXA: PAPERS 18-26** Location: Latour Ballroom Moderator: Eric Voiglio, MD, PhD Recorder: Raul Coimbra, MD, PhD
2:00 pm Paper #18	A PROSPECTIVE, CONTROLLED CLINICAL TRIAL OF SURGICAL STABILIZATION OF SEVERE RIB FRACTURES Presenter: Fredric Pieracci, MD, MPH Discussant: Charles Adams, Jr., MD
2:20 pm Paper #19	LOW VOLUME RESUSCITATION FOR HEMORRHAGIC SHOCK: UNDERSTANDING THE MECHANISM OF PEG-20K Presenter: Valerie Plant, MD Discussant: Michael Dubick, PhD
2:40 pm Paper #20	A SAFE AND EFFECTIVE MANAGEMENT STRATEGY FOR BLUNT CEREBROVASCUALR INJURY: AVOIDING UNNECESSARY ANTICOAGULATION AND PREVENTING STROKE Presenter: Charles Shahan, MD Discussant: Clay Cothren Burlew, MD

3:00 pm	Paper #21	MULTICENTER EVALUATION OF TEMPORARY INTRAVASCULAR SHUNT USAGE IN VASCULAR TRAUMA Presenter: Kenji Inaba, MD Discussant: Faran Bokhari, MD
3:20 pm	Paper #22	THE PAINFUL TRUTH: THE DOCUMENTATION BURDEN OF A TRAUMA SURGEON Presenter: Joseph Golob, Jr., MD Discussant: Frederick Luchette, MD, M.Sc
3:40 pm	Paper #23	USE OF ENDOTRACHEAL TUBES WITH SUBGLOTTIC SECRETION DRAINAGE REDUCES VENTILATOR-ASSOCIATED PNEUMONIA IN TRAUMA PATIENTS Presenter: Jennifer Hubbard, MD Discussant: Andrew Kerwin, MD
4:00 pm	Paper #24	THE IMPACT OF PATIENT PROTECTION AND AFFORDABLE CARE ACT ON TRAUMA CARE: A STEP IN THE RIGHT DIRECTION Presenter: Bellal Joseph, MD Discussant: L.D. Britt, MD, MPH
4:20 pm	Paper #25	VOLUMETRIC ANALYSIS OF DAY OF INJURY COMPUTED TOMOGRAPHY IS ASSOCIATED WITH REHABILITATION OUTCOMES AFTER TRAUMATIC BRAIN INJURY Presenter: Sarah Majercik, MD, MBA Discussant: David Livingston, MD
4:40 pm	Paper #26	DISCOVERING THE TRUTH ABOUT LIFE AFTER DISCHARGE: LONG-TERM TRAUMA RELATED MORTALITY Presenter: Rachael Callcut, MD, MSPH Discussant: Alicia Mangram, MD

2:00 - 5:00 pm	SESSION IXB: PAPERS: 27-35
	Location: Lafite 1-3 Moderator: Ronald Stewart, MD Recorder: Edward Cornwell, III, MD
2:00 pm Paper #27	TRAUMA SYSTEM REGIONALIZATION IMPROVES MORTALITY IN PATIENTS REQUIRING TRAUMA LAPAROTOMY Presenter: David Schechtman, BS Discussant: Patrick Reilly, MD
2:20 pm Paper #28	TRAUMA CENTER CARE IS ASSOCIATED WITH REDUCED READMISSIONS AFTER INJURY Presenter: Kristan Staudenmayer, MD, MS Discussant: Adil Haider, MD
2:40 pm Paper #29	RURAL TRAUMA TEAM DEVELOPMENT COURSE DECREASES TIME TO TRANSFER FOR TRAUMA PATIENTS Presenter: Bradley Dennis, MD Discussant: Eric Kuncir, MD, MS
3:00 pm Paper #30	PRIMARY SAFETY BELT LEGISLATION AND HIGHER VIOLATION FINES SAVE LIVES Presenter: George Kasotakis, MD, MPH Discussant: Rochelle Dicker, MD
3:20 pm Paper #31	GEOGRAPHIC DISTRIBUTION OF TRAUMA CENTERS AND INJURY RELATED MORTALITY IN THE UNITED STATES Presenter: Joshua Brown, MD Discussant: James Haan, MD
3:40 pm Paper #32	IMPACT OF A STANDARDIZED PRE-HOSPITAL TRAUMA TRIAGE PROTOCOL IN A RURAL STATE Presenter: Alison Wilson, MD Discussant: Robert Winchell, MD
4:00 pm Paper #33	PEDIATRIC GUNSHOT WOUND RECIDIVISM: IDENTIFICATION OF HIGH-RISK YOUTH Presenter: Peter Gibson, MD Discussant: Jeffrey Upperman, MD

4:20 pm	Paper #34	TRENDS OF HOSPITALIZATIONS, DEATHS, AND COSTS FROM TRAUMA PATIENTS IN THE UNITED STATES, 2005-2010 Presenter: Alvaro Sanchez Ortiz, MD, MS Discussant: Nicole Stassen, MD
4:40 pm	Paper #35	IMAGING PRIOR TO TRANSFER TO DESIGNATED PEDIATRIC TRAUMA CENTERS (PTCs) EXPOSES CHILDREN TO UNNECESSARY RADIATION Presenter: Yana Puckett, MD Discussant: Stephen Kaminski, MD

Friday, September 11, 2015

6:15 - 7:30 am	**COMMITTEE MEETINGS**
ACS Program Directors Committee	Lafleur 2
Education/CME Committee	Alsace 2
Geriatric Trauma Committee	Chambertin 2
Military Liaison Committee	Lafite 8
Patient Assessment Committee	Lafite 6
Pediatric Trauma Committee	Alsace 1
Publications & Communication Committee	Chambertin 1

6:15 - 7:30 am **INTERNATIONAL ATTENDEE BREAKFAST (Ticketed Event)**
Location: Lafleur 1
Delivering Excellence in Emergency Surgery: The European Way
Presenter: Jonathan Tilsed, MD
ESTES President-Elect

7:00 am - 3:00 pm **REGISTRATION**
Location: Registration Desk 2

7:00 - 9:00 am **CONTINENTAL BREAKFAST**
Location: Lafite Ballroom 4, 5, 7 & 9

7:00 am - 2:00 pm **EXHIBITS**
Location: Lafite Ballroom 4, 5, 7 & 9

7:30 - 8:00 am **SESSION X: Featured Speaker**
Location: Latour Ballroom
HealthCare Reform: Where are We Going with the ACS and HR2
Presenter: David Hoyt, MD

8:00 - 10:55 am **SESSION XI: QUICKSHOTS**
Location: Latour Ballroom
Moderator: Gregory Jurkovich, MD

8:01am QS #1 THIS TOO SHALL PASS: A STUDY OF INGESTED SHARP FOREIGN BODIES
Presenter: Kirellos Zamary, MD
Discussant: Stanley Kurek, Jr., D.O.

8:08 am	QS #2	EXTRACELLULAR VITAMIN D BINDING PROTEIN-ACTIN COMPLEXES: AN IMMEDIATE PRODUCT OF TISSUE INJURY ASSOCIATED WITH PROINFLAMMATORY FUNCTIONS Presenter: Randeep Jawa, MD Discussant: Grant O'Keefe, MD, MPH
8:15 am	QS #3	IMPACT OF HIGH LEVEL TRAUMA CENTERS ON STATE-WIDE POPULATION BASED INJURY MORTALITY RATE Presenter: Ansab Haider, MD Discussant: Joseph Galante, MD
8:22 am	QS #4	TISSUE OXYGEN SATURATION BY NEAR INFRARED SPECTROSCOPY, AN EARLY NON-INVASIVE MARKER OF MORTALITY RISK IN A NON-HUMAN PRIMATE (RHESUS MACAQUE) MODEL OF HEMORRHAGIC SHOCK Presenter: Randy Crossland, PhD Discussant: Gregory Beilman, MD
8:29 am	QS #5	TRADING SCALPELS FOR SHEATHS: CATHETER BASED TREATMENT OF VASCULAR INJURY CAN BE EFFECTIVELY PERFORMED BY ACUTE CARE SURGEONS Presenter: Megan Brenner, MD, MS Discussant: Jack Sava, MD
8:36 am	QS #6	MANAGEMENT OF CIVILIAN PENETRATING CERVICOTHORACIC ARTERIAL INJURIES IN THE 21ST CENTURY: THE MORE THINGS CHANGE, THE MORE THEY STAY THE SAME? Presenter: Jordan Weinberg, MD Discussant: Charles Fox, MD
8:43 am	QS #7	UTILIZING SOCIAL MEDIA FOR COMMUNITY CONSULTATION AND PUBLIC DISCLOSURE IN EXCEPTION FROM INFORMED CONSENT TRIALS Presenter: Shannon Stephens, EMT-P Discussant: Peter Rhee, MD, MPH

8:50 am	QS #8	POST-DISCHARGE MORTALITY IN THE ELDERLY AFTER A FALL: OUT THE DOOR, BUT NOT OUT OF DANGER Presenter: Christine Leeper, MD Discussant: Michael Foreman, MD
8:57 am	QS #9	A COMPARISON OF TRADITIONAL AND NOVEL INJURY SCORING SYSTEMS IN A US LEVEL-I TRAUMA CENTER: AN OPPORTUNITY FOR IMPROVED INJURY SURVEILLANCE IN LOW- AND MIDDLE-INCOME COUNTRIES Presenter: Catherine Juillard, MD, MPH Discussant: Heena Santry, MD
9:04 am	QS #10	MAGNET-DESIGNATED HOSPITALS ARE ASSOCIATED WITH HIGHER SURVIVAL RATES FOR GERIATRIC TRAUMA PATIENTS Presenter: Tracy Evans, MD Discussant: Garth Utter, MD, MSc
9:11 am	QS #11	IMPLICATIONS OF THE TQIP INCLUSION OF NON-SURVIVABLE INJURIES IN PERFORMANCE BENCHMARKING Presenter: Jiselle Heaney, MD, MPH Discussant: Mark Hemmila, MD
9:18 am	QS #12	FUNCTIONAL STATUS, AGE AND LONG TERM SURVIVAL FOLLOWING TRAUMA Presenter: Allan Peetz, MD Discussant: Eric Ley, MD
9:25 am	QS #13	CLINICAL SIGNIFICANCE OF COMPUTED TOMOGRAPHY CONTRAST EXTRAVASATION IN BLUNT TRAUMA PATIENTS WITH A PELVIC FRACTURE Presenter: Jeremy Juern, MD Discussant: George Velmahos, MD, PhD
9:32 am	QS #14	EVALUATING THE TRADITIONAL DAY AND NIGHT IN AN ACUTE CARE SURGERY FELLOWSHIP: IS THE SWING SHIFT A BETTER CHOICE? Presenter: Paul Chestovich, MD Discussant: Grace Rozycki, MD, MBA

9:39 am QS #15	GENDER DIFFERNCES IN THE GENOMIC RESPONSE AND CLINICAL OUTCOMES AFTER BLUNT TRAUMATIC INJURY AND HEMORRHAGIC SHOCK: IS THERE A TRUE "GENDER GAP" AFTER SEVERE INJURY? Presenter: Scott Brakenridge, MD, MSCS Discussant: Sonlee West, MD
9:46 am QS #16	PEDIATRIC TRAUMA CENTERS AND AMERICAN COLLEGE OF SURGEONS COMMITTEE ON TRAUMA VERIFICATION: IMPACT ON MORTALITY Presenter: Emily Murphy, MD Discussant: Jeremy Cannon, MD
9:53 am QS #17	DIRECT TRAUMA TRANSPORT REDUCES MORTALITY IN RURAL TRAUMA Presenter: Henry Moore, III, MD Discussant: Babak Sarani, MD
10:00 am QS #18	SARCOPENIA AS A MARKER OF FRAILTY: PSOAS MUSCLE SIZE PREDICTS FUNCTIONAL OUTCOME IN MILD TO MODERATELY INJURED TRAUMA PATIENTS Presenter: Philip Edmundson, MD Discussant: A. Peter Ekeh, MD
10:07 am QS #19	MILITARY SURGEON CONFIDENCE IS IMPROVED BY PARTICIPATION IN A CIVILIAN TRAUMA TRAINING CENTER Presenter: Brian Smith, MD, MS Discussant: John Fildes, MD
10:14 am QS #20	DOES SEX MATTER? GENDER EFFECTS ON VENOUS THROMBOEMBOLISM RISK IN SCREENED TRAUMA PATIENTS Presenter: Allison Berndtson, MS Discussant: Jason Sperry, MD, MPH
10:21 am QS #21	PROSPECTIVE EVALUATION OF NUTRITIONAL ADEQUACY OF VOLUME BASED ENTERAL FEEDING IN A SINGLE CENTER TRAUMA/SURGICAL ICU Presenter: Ashley McCusker, MD, MSc Discussant: Timothy Browder, MD

10:28 am QS #22	CONTINUING TRAUMA: THE UNMET NEEDS OF TRAUMA PATIENTS IN THE POST-ACUTE CARE SETTING Presenter: Samir Fakhry, MD Discussant: Erik Barquist, MD
10:35 am QS #23	NATIONWIDE ABSENCE OF UNIFORM GUIDELINES FOR THE PRE-HOSPITAL USE OF TOURNIQUETS TO CONTROL SEVERE EXTREMITY EXSANGUINATION Presenter: Elie Ramly, MD Discussant: Laura Moore, MD
10:42 am QS #24	NO TIME TO BLEED: THE IMPACT OF TIME FROM INJURY TO THE OPERATING ROOM ON SURVIVAL IN PATIENTS WITH HEMORRHAGE FROM BLUNT ABDOMINAL TRAUMA Presenter: Abdul Alarhayem, MD Discussant: Mark Shapiro, MD
10:49 am QS #25	CARING FOR CRITICALLY INJURED CHILDREN: AN ANALYSIS OF 56 PEDIATRIC DAMAGE CONTROL LAPAROTOMIES Presenter: Miguel Villalobos, MD Discussant: Mary Fallat, MD
10:55 - 11:15 am	**BREAK IN EXHIBIT HALL**
11:15 am - 12:15 pm	**SESSION XII: FITTS LECTURE** Location: Latour Ballroom *Acute Care Surgery: No Time Yet for a Victory Lap* Presenter: L.D. Britt, MD, MPH
12:15 - 1:30 pm	**LUNCH SESSIONS** (Locations listed on ticket)
Session VII:	**Pediatric Trauma and Surgery in the Austere Environment: A Military and Civilian Review** Moderator: Matthew Martin, MD Presenters: Matthew Martin, MD; Gary Vercruysse, MD and Carlos Brown, MD

Session VIII:	**Severe Sepsis snd Septic Shock: What to do now that ARISE, PROCESS, and PROMISE holds no promise.** Moderator: Lewis Kaplan, MD Presenters: Niels Martin, MD; David Dries, MD and Sarah Murthi, MD
Session IX:	**Hemostatic Resuscitation: Update 2015 (What Ratio???)** Moderator: Martin Schreiber, MD Presenters: John Holcomb, MD; Mitchell Cohen, MD and Michael Sise, MD
Session X:	**Epic Fails in Trauma – Case Presentations** Moderator: Peter Rhee, MD Presenters: Martin Croce, MD and Donald Jenkins, MD
Session XI:	**The Good, the Bad and the Ugly: The Essential Attributes of a Great Manuscript Review** Moderator: Steven Shackford, MD Presenters: Angela Sauaia, MD, PhD; and Ernest E. Moore, MD
Session XII:	**Peripheral Vascular Repairs Gone Awry** Presenters: David Feliciano, MD and Raul Coimbra, MD, PhD
1:15 - 1:30 PM	**BREAK IN EXHIBIT HALL**
1:30 - 4:50 pm	**SESSION XIIIA: CRITICAL CARE/SHOCK PAPERS 36-45** Location: Latour Ballroom Moderator: Gregory Victorino, MD Recorder: Eileen Bulger, MD
1:30 pm Paper #36	DEGREE OF PLATELET DYSFUNCTION CORRELATES WITH SEVERITY OF TRAUMATIC BRAIN INJURY: A PROSPECTIVE STUDY OF TRAUMA PATIENTS Presenter: Matthew Ramsey, BS Discussant: Mitchell Cohen, MD

1:50 pm	Paper #37	HISTONE DEACETYLASE GENE EXPRESSION PROFILES ARE ASSOCIATED WITH OUTCOMES IN BLUNT TRAUMA PATIENTS Presenter: Martin Sillesen, MD, PhD Discussant: Philip Efron, MD
2:10 pm	Paper #38	CHARACTERIZING THE GUT MICROBIOME IN TRAUMA: SIGNIFICANT CHANGES IN MICROBIAL DIVERSITY OCCUR EARLY AFTER SEVERE INJURY Presenter: Benjamin Howard, MD, MPH Discussant: Lawrence Diebel, MD
2:30 pm	Paper #39	AN EARLY DECISION MODEL PREDICTS THE NEED FOR UNCROSSED MATCHED BLOOD (UnXRBC) AND MASSIVE TRANSFUSION (MT) FOLLOWING TRAUMA Presenter: Deborah Stein, MD, MPH Discussant: Bryan Cotton, MD
2:50 pm	Paper #40	BMI STRONGLY IMPACTS THE DIAGNOSIS AND INCIDENCE OF HIT IN THE ICU Presenter: Matthew Bloom, MD Discussant: Adrian Maung, MD
3:10 pm	Paper #41	LOW INTENSITY EXERCISE IN ACUTE PHASE IMPROVES LIPID METABOLISM AND SURVIVAL OF LPS-INDUCED SEPTIC MICE VIA ACTIVATION OF PGC-1 ALPHA EXPRESSION Presenter: Takayuki Irahara, MD Discussant: Paul Bankey, MD, PhD
3:30 pm	Paper #42	EARLY INITIATION OF EXTRACORPOREAL MEMBRANE OXYGENATION IMPROVES SURVIVAL IN ADULT TRAUMA PATIENTS WITH SEVERE ACUTE RESPIRATORY DISTRESS SYNDROME Presenter: Patrick Bosarge, MD Discussant: Robert Maxwell, MD

3:50 pm	Paper #43	INHIBITION OF HISTONE DEACETYLASE 6 RESTORES INNATE IMMUNE CELLS IN BONE MARROW IN A LETHAL SEPTIC MODEL Presenter: Ting Zhao, MD Discussant: Eileen Bulger, MD
4:10 pm	Paper #44	MODULATING THE ENDOTHELIOPATHY OF TRAUMA: FACTOR CONCENTRATE VS FRESH FROZEN PLASMA Presenter: Shibani Pati, MD, PhD Discussant: Juan Duchesne, MD
4:30 pm	Paper #45	HISTONE-COMPLEXED DNA LEVELS ARE ASSOCIATED WITH COAGULOPATHY, INFLAMMATION AND ENDOTHELIAL DAMAGE EARLY AFTER PEDIATRIC TRAUMA Presenter: Sarah Christiaans, MD Discussant: Hasan Alam, MD
1:30 - 4:50 pm		**SESSION XIIIB: PAPERS 46-55**
		Location: Lafite 1-3 Moderator: Rosemary Kozar, MD, PhD Recorder: Michael Rotondo, MD
1:30 pm	Paper #46	GERIATRIC TRAUMA: COGNITIVE IMPAIRMENT AND PHYSICAL FRAILTY PREDICT 6-MONTH OUTCOMES Presenter: Cathy Maxwell, PhD Discussant: Anne Mosenthal, MD
1:50 pm	Paper #47	CREATION OF A GERIATRIC TRAUMA SERVICE SIGNIFICANTLY DECREASES MORTALITY AND HOSPITAL LENGTH OF STAY Presenter: Douglas Schuerer, MD Discussant: Jeffrey Young, MD
2:10 pm	Paper #48	25 YEARS LATER: MESS (MANGLED EXTREMITY SEVERITY SCORE) REVISITED Presenter: Shahram Aarabi, MD, MPH Discussant: Mark Midwinter, CBE, QHS, MD

2:30 pm	Paper #49	CLASSIFICATION OF SOFT-TISSUE INJURIES IN OPEN FEMUR FRACTURES: RELEVANT FOR SYSTEMIC COMPLICATIONS? Presenter: Christian Weber, MD Discussant: Sharon Henry, MD
2:50 pm	Paper #50	LOWER EXTREMITY DUPLEX SURVEILLANCE DOES NOT REDUCE THE INCIDENCE OF PULMONARY EMBOLISM: A PROSPECTIVE STUDY OF TWO CENTERS Presenter: Steven Shackford, MD Discussant: Elliott Haut, MD, PhD
3:10 pm	Paper #51	EXTENDING THE GOLDEN HOUR: PARTIAL RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA (p-REBOA) IN A HIGHLY LETHAL LIVER INJURY MODEL Presenter: Rachel Russo, MD Discussant: Todd Rasmussen, MD
3:30 pm	Paper #52	EFFICACY OF A NOVEL FLUOROSCOPY-FREE ENDOVASCULAR BALLOON DEVICE WITH PRESSURE RELEASE CAPABILITIES IN THE SETTING OF UNCONTROLLED JUNCTIONAL HEMORRHAGE Presenter: Kyle Sokol, MD Discussant: Michael Sise, MD
3:50 pm	Paper #53	RANDOMIZED CONTROLLED TRIAL COMPARING DYNAMIC SIMULATION TO STATIC SIMULATION IN TRAUMA Presenter: Anthony Carden, MD Discussant: M. Margaret Knudson, MD
4:10 pm	Paper #54	POST-HOSPITALIZATION TREATMENT REGIMEN & RE-ADMISSION FOR C. DIFFICILE COLITIS IN MEDICARE BENEFICIARIES Presenter: Charles Psoinos, MD Discussant: Sasha Adams, MD
4:30 pm	Paper #55	DUI HISTORIES IN INTOXICATED INJURED BICYCLISTS Presenter: Steven Maximus, MD Discussant: A. Britton Christmas, MD

4:50 - 5:00 pm	**MILITARY AWARDS** Location: Latour Ballroom Presiding: Thomas M. Scalea, MD, AAST President
5:00 - 6:30 pm	**AAST ANNUAL BUSINESS MEETING** **AAST Members Only** Location: Latour Ballroom
7:30 - 10:00 pm	**AAST BANQUET** Location: Lafite 1-3

Saturday, September 12, 2015

7:00 - 8:00 am	**NEW FELLOWS BREAKFAST** **(Ticketed Event)** Location: Chambertin 2
7:00 - 10:00 am	**REGISTRATION** Location: Registration Desk 2
7:30 - 9:00 am	**BREAKFAST** Location: Lafite 1-3
8:00 am - 12:00 pm	**SESSION XIV: PAPERS 56-67** Location: Latour Ballroom Moderator: Grace Rozycki, MD, MBA Recorder: Karen Brasel, MD, MPH
8:00 am Paper #56	INTIMATE PARTNER VIOLENCE IS PREVALANT HERE TOO: THE FEASIBILITY OF DETERMINING PREVALENCE AT COMMUNITY HAIR SALONS Presenter: D'Andrea Joseph, MD Discussant: Eric Toschlog, MD
8:20 am Paper #57	AIRWAY MANAGEMENT FOLLOWING REPAIR OF CERVICAL TRACHEAL INJURIES: A RETROSPECTIVE, MULTICENTER STUDY Presenter: John Harvin, MD Discussant: J. Wayne Meredith, MD
8:40 am Paper #58	A STATEWIDE ANALYSIS OF TRAUMA CENTER LEVEL DESIGNATION AND MORTALITY FOR THE MODERATE TO SEVERE HEAD INJURED TRAUMA PATIENT Presenter: Daniel Wu, DO Discussant: Ronald Gross, MD
9:00am Paper #59	CRANIECTOMY FOLLOWING URGENT EVACUATION OF INTRACRANIAL HEMORRHAGE IMPROVES INTRACRANIAL AND CEREBRAL PERFUSION PRESSURES IN SEVERE TRAUMATIC BRAIN INJURED PATIENTS Presenter: Casey Allen, MD Discussant: Travis Polk, MD

9:20 am	Paper #60	TRAUMATIC ABDOMINAL WALL HERNIAS: LOCATION MATTERS Presenter: Jamie Coleman, MD Discussant: John Como, MD, MPH
9:40 am	Paper #61	OVER-TRANSFUSION OF PACKED RED BLOOD CELLS IN MASSIVE TRANSFUSION PATIENTS Presenter: Martin Zielinski, MD Discussant: H. Gill Cryer, MD, PhD
10:00 am	Paper #62	RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA (REBOA) MIGHT BE DANGEROUS IN PATIENTS WITH SEVERE TORSO TRAUMA-A PROPENSITY SCORE ANALYSIS SAYS ?" Presenter: Jun-Ichi Inoue, MD Discussant: Thomas Scalea, MD
10:20 am	Paper #63	PATTERN OF LAW ENFORCEMENT RELATED INJURIES IN THE US Presenter: David Chang, MBA, MPH, PhD Discussant: Alexander Eastman, MD, MPH
10:40 am	Paper #64	CYTOCHROME C ADMINISTRATION IMPROVES ACIDOSIS AND OXIDATIVE STRESS AND LIMITS ORGAN INJURY IN A RAT MODEL OF HEMORRHAGIC SHOCK Presenter: Susan Evans, MD Discussant: Saman Arbabi, MD, MPH
11:00 am	Paper #65	AN ANALYSIS OF NEUROSURGICAL PRACTICE PATTERNS AND OUTCOMES FOR MODERATE TO SEVERE HEAD INJURIES IN A STATEWIDE TRAUMA SYSTEM Presenter: Chet Morrison, PhD Discussant: Joseph Minei, MD
11:20 am	Paper #66	VANISHING NEED FOR EXTRAPERITONEAL PELVIC PACKING ASSOCIATED WITH IMPROVED RESUSCITATION STRATEGIES Presenter: Iver Anders Gaski, MD Discussant: Mark Bowyer, MD

11:40 am Paper #67	TIME AND PLACE OF DEATH FROM AUTOMOBILE CRASHES: RESEARCH ENDPOINT IMPLICATIONS Presenter: Howard Champion, MD, FRCS Discussant: Karen Brasel, MD, MPH
12:00 pm	Meeting Adjourned

BOARD OF MANAGERS 2014-2015

President.....Thomas M. Scalea, M.D.
Baltimore, Maryland

President-Elect.....Grace S. Rozycki, M.D., M.B.A.
Indianapolis, Indiana

Vice-President.....Richard Gamelli, M.D.
Maywood, Illinois

Secretary-Treasurer.....Martin A. Croce, M.D.
Memphis, Tennessee

Recorder and Program Chairman.....David A. Spain, M.D.
Stanford, California

Editor, *JOT-ACS*.....Ernest E. Moore, M.D.
Denver, Colorado

Past President 2011-2012..... J. Wayne Meredith, M.D.
Winston-Salem, North Carolina

Past President 2012-2013..... Robert C. Mackersie, M.D.
San Francisco, California

Past President 2013-2014..... William G. Cioffi, M.D.
Providence, Rhode Island

Manager-at-Large (2015).....Eileen M. Bulger, M.D.
Seattle, Washington

Manager-at-Large (2016).....Rosemary A. Kozar, M.D., Ph.D.
Baltimore, Maryland

Manager-at-Large (2017).....Edward E. Cornwell, III, M.D.
Washington, District of Columbia

Critical Care Manager-at-Large (2016).....Orlando C. Kirton, M.D.
Hartford, Connecticut

REPRESENTATIVES
OF
THE AMERICAN ASSOCIATION
FOR THE
SURGERY OF TRAUMA

2014-2015

REPRESENTATIVE TO THE AMERICAN BOARD OF SURGERY

Martin A. Croce, M.D. (2012-2015)
Memphis, Tennessee

REPRESENTATIVE TO THE BOARD OF GOVERNORS OF THE AMERICAN COLLEGE OF SURGEONS

Therese M. Duane, M.D. (2012-2015)
Richmond, Virginia

Kimberly A. Davis, M.D., M.B.A. (2013-2016)
New Haven, Connecticut

THE ABS TRAUMA, BURNS, & CRITICAL CARE COMPONENT BOARD

Robert C. Mackersie, M.D. (2010-2015)
San Francisco, California

Eileen M. Bulger, M.D. (2012-2015)
Seattle, Washington

REPRESENATIVE TO THE AMERICAN ASSOCIATION OF BLOOD BANKS

Colonel John B. Holcomb, M.D. (2007-2015)
Houston, Texas

REPRESENATIVE TO THE WORLD HEALTH ORGANIZATION

Raul Coimbra, M.D., Ph.D. (2012-2017)
San Diego, California

ARCHIVIST

Basil A. Pruitt, Jr., M.D. (1996-)
San Antonio, Texas

AAST COMMITTEES 2014 – 2015

OPERATING COMMITTEES

ACUTE CARE SURGERY COMMITTEE

Kimberly A. Davis, M.D., M.B.A., Chair (2016)
Christopher J. Dente, M.D., Vice-Chair (2015)
Vishal Bansal, M.D. (2015)
Andre R. Campbell, M.D. (2015)
Clay Cothren Burlew, M.D. (2015)
Therese M. Duane, M.D. (2015)
Rosemary A. Kozar, M.D., Ph.D. (2015)
Lisa A. Patterson, M.D. (2015)
Eric A. Toschlog, M.D. (2015)
Charles A. Adams, Jr., M.D. (2016)
Juan A. Asensio, M.D. (2016)
D'Andrea K. Joseph, M.D. (2016)
Grant E. O'Keefe, M.D., M.P.H. (2016)
Terence O'Keeffe, M.D. (2016)
Marc de Moya, M.D. (2017)
Jonathan Gates, M.D. (2017)
Joseph Minei, M.D. (2017)
Patrick Reilly, M.D. (2017)
Jay Yelon, M.D. (2017)
James W. Davis, M.D., Program Directors Committee Chair
Gregory J. Jurkovich, M.D., ex-officio (2016)
J. Wayne Meredith, M.D., ex-officio (2015)
Martin A. Croce, M.D., ex-officio (2016)
Robert C. Mackersie, M.D., ex- officio (2016)
William G. Cioffi, M.D., ex- officio (2017)
Thomas Scalea, M.D., ex- officio (2018)

PROGRAM DIRECTORS SUB COMMITTEE
of Acute Care Surgery Committee

James W. Davis, M.D., Chair
Indermeet Bhullar, M.D.
Clay Cothren Burlew, M.D.
Bryan A. Cotton, M.D.
Marc A. de Moya, M.D.
Jose Diaz, M.D.
Mark Falimirski, M.D.
John Fildes, M.D.
Ronald I. Gross, M.D.
Rajan Gupta, M.D.
D'Andrea K. Joseph, M.D.
Linda L. Maerz, M.D.
Addison May, M.D.
Nathan Mowery, M.D.
Terence O'Keeffe, M.D.
Lisa A. Patterson, M.D.
Jason Sperry, M.D., M.P.H.
Eric A. Toschlog, M.D.
Mbaga S. Walusimbi, M.D., M.S.

CRITICAL CARE COMMITTEE

Orlando C. Kirton, M.D., Chair (2016)
Scott B. Armen, M.D., M.S. (2015)
Lewis J. Kaplan, M.D. (2015)
Jana MacLeod, M.D. (2015)
Linda L. Maerz, M.D. (2016)
Laura J. Moore, M.D. (2016)
Erik Barquist, M.D. (2017)
Steven Johnson, M.D. (2017)
Matthew Lissauer, M.D. (2017)
Deborah Stein, M.D. (2017)
Ronald Simon, M.D. (2017)
Anuradha Subramanian, M.D. (2017)
Robert Maxwell, M.D., SCCPDS Representative

EDUCATIONAL DEVELOPMENT/MOC COMMITTEE

Lena M. Napolitano, M.D., Chair (2015)
Stephen L. Barnes, M.D., Vice Chair (2015)
Mitchell Jay Cohen, M.D. (2015)
Mark A. Newell, M.D. (2015)
Peter Rhee, M.D., M.P.H. (2015)
Scott G. Sagraves, M.D. (2015)
Mark J. Seamon, M.D. (2015)
Martin Schreiber, M.D. (2015)
Lynette A. Scherer, M.D. (2015)
Nicole A. Stassen, M.D. (2015)

GERIATRIC TRAUMA/ACS COMMITTEE

Robert D. Barraco, M.D., M.P.H., Chair (2017)
Sasha Adams, M.D. (2017)
Saman Arbabi, M.D., M.P.H. (2017)
Walter Biffl, M.D. (2017)
Karen J. Brasel, M.D., M.P.H. (2017)
Matthew Carrick, M.D. (2017)
Zara Cooper, M.D. (2017)
Samir M. Fakhry, M.D. (2017)
Bellal Joseph, M.D. (2017)
Rosemary A. Kozar, M.D., Ph.D. (2017)
David H. Livingston, M.D. (2017)
Frederick A. Luchette, M.D. (2017)
Frederick A. Moore, M.D. (2017)
Ann Mosenthal, M.D. (2017)
Carl Soderstrom, M.D. (2017)
Michael Truitt, M.D. (2017)
Alison Wilson, M.D. (2017)
Steven Vaslef, M.D. (2017)
Steven Shackford, M.D., ex-officio

INTERNATIONAL RELATIONS COMMITTEE

Ronald Maier, M.D., Chair (2017)
Michel Aboutanos, M.D., M.P.H., Vice Chair (2017)
Zsolt J. Balogh, M.D. (2015)
Raul Coimbra, M.D., Ph.D. (2015)
Gustavo P. Fraga, M.D., Ph.D. (2015)
Yasuhiro O. Otomo, M.D. (2015)
Thomas M. Scalea, M.D. (2015)
Stephen A. Deane, MBBS (2016)
Maria F. Jimenez, M.D. (2016)
Krista L. Kaups, M.D. (2016)
Jun Oda, M.D., Ph.D. (2016)
Juan C. Puyana, M.D. (2016)
Andrew W. Kirkpatrick, M.D. (2016)
Ernest E. Moore, M.D. (2016), Editor, *Journal of Trauma and Acute Care Surgery*
Alexander Eastman, M.D. (2017)
Paula Ferrada, M.D. (2017)
Enrique Ginzburg, M.D. (2017)
Eric Ley, M.D. (2017)
Jorge Neira, M.D. (2017)
Manuel Lorenzo, M.D. (2017)

INTERNATIONAL SOCIETY REPRESENTATIVES
of the International Relations Committee (two representatives from each)

European Society for Trauma and Emergency Surgery (ESTES)
Trauma Association of Canada
Pan American Trauma Society
International Association for Trauma Surgery and Intensive Care

MILITARY LIAISON COMMITTEE

Raymond Fang, M.D., Chair (2017)
Joseph M. Galante, M.D., Vice Chair (2017)
Bruce A. Bennett, M.D. (2015)
Richard J. Mullins, M.D. (2015)
Joseph F. Rappold, M.D. (2016)
Jeffrey P. Salomone, M.D. (2016)
Gary Vercruysse, M.D. (2016)
David Blake, M.D. (2017)
Jim Dunne, M.D. (2017)
Michael Dubick, M.D. (2017)
Kirby Gross, M.D. (2017)
John Kirby, M.D. (2017)
Donald Jenkins, M.D. (2017)
Matthew Martin, M.D. (2017)

MULTI-INSTITUTIONAL TRIALS COMMITTEE

Jason Sperry, M.D., M.P.H., Vice Chair (2017)
Bryan A. Cotton, M.D. (2015)
Jack A. Sava, M.D. (2015)
Clay Cothren Burlew, M.D. (2016)
Christine S. Cocanour, M.D. (2016)
Jay N. Collins, M.D. (2016)
Bryce R.H. Robinson, M.D. (2016)
Hasan Alam, M.D. (2017)
Demetrios Demetriades, M.D. (2017)
Joseph DuBose, M.D. (2017)
Kenji Inaba, M.D. (2017)
Darren Malinoski, M.D. (2017)
Reuven Rabinovici, M.D. (2017)
William G. Cioffi, M.D., ex-officio (2017)
Raminder Nirula, M.D., ex-officio (2017)

PATIENT ASSESSMENT COMMITTEE

Marie L. Crandall, M.D., M.P.H., Chair (2017)
Garth Utter, M.D., Vice Chair (2017)
Michel B. Aboutanos, M.D., M.P.H. (2014)
Peter Muskat, M.D. (2015)
Stephanie A. Savage, M.D. (2015)
Kevin M. Schuster, M.D. (2015)
Kristan L. Staudenmayer, M.D. (2016)
Suresh Agarwal, M.D. (2017)
Ronald Barbosa, M.D. (2017)
Carlos V.R. Brown, M.D. (2017)
David Ciesla, M.D. (2017)
Leslie Kobayashi, M.D. (2017)
Nathan Mowery, M.D. (2017)
Steven Ross, M.D. (2017)
John Schultz, M.D. (2017)
Gail T. Tominaga, M.D. (2017)
Robert Winchell, M.D. (2017)
Shahid Shafi, M.D., ex-officio (2017)

PEDIATRIC TRAUMA SURGERY COMMITTEE

Barbara A. Gaines, M.D., Chair (2016)
James Betts, M.D. (2016)
John Bilello, M.D. (2016)
Jeremy W. Cannon, M.D. (2016)
Richard Falcone, M.D. (2016)
Nilda M. Garcia, M.D. (2016)
Jonathan I. Groner, M.D. (2016)
Adil Haider, M.D. (2016)
Steven Kaminski, M.D. (2016)
M. Margaret Knudson, M.D. (2016)
Robert Letton, M.D. (2016)
Todd R. Maxson, M.D. (2016)
David Notrica, M.D. (2016)
L.R. Tres Scherer, M.D. (2016)

PREVENTION COMMITTEE

Carnell Cooper, M.D., Chair (2015)
Rochelle A. Dicker, M.D. (2015)
David G. Jacobs, M.D. (2015)
David P. Blake, M.D., M.P.H. (2016)
A. Peter Ekeh, M.D. (2016)
Richard Gonzalez, M.D. (2016)
Sidney F. Miller, M.D. (2016)
A. Britton Christmas, M.D. (2017)
John Hinsdale, M.D. (2017)
Deborah Kuhls, M.D. (2017)
Glen Tinkoff, M.D., Consultant, ex-officio (2015)

PUBLICATIONS AND COMMUNICATION COMMITTEE

Michael Rotondo, M.D., Chair (2017)
Kimberly K. Nagy, M.D., Vice Chair (2017)
Christopher C. Baker, M.D. (2015)
Walter Biffl, M.D. (2015)
Carlos V.R. Brown, M.D. (2015)
Stephen M. Cohn, M.D. (2015)
W. Alan Guo, M.D., Ph.D. (2015)
Ajai K. Malhotra, M.D. (2015)
Peter Rhee, M.D., M.P.H. (2015)
Susan Rowell, M.D. (2015)
Ali Salim, M.D. (2015)
Jack A. Sava, M.D. (2015)
Peep Talving, M.D., Ph.D. (2015)
Gregory P.Victorino, M.D. (2015)
Eric J. Kuncir, M.D., M.S. (2016)
Timothy A. Pritts, M.D. (2016)
S. Rob Todd, M.D. (2016)
Ben L. Zarzaur, Jr., M.D., M.P.H. (2016)
John Como, M.D., M.P.H., Ph.D. (2017)
Adrian Maung, M.D. (2017)
Alicia Mohr, M.D. (2017)
Russell Natua, M.D. (2017)
Jason Smith, M.D. (2017)

STANDING COMMITTEES

MEMBERSHIP COMMITTEE

Grace S. Rozycki, M.D., M.B.A., Chair (2015)
Richard Gamelli, M.D. (2015)
Eileen M. Bulger, M.D. (2015)
Martin A. Croce, M.D. (2016)
Orlando C. Kirton, M.D. (2016)
Rosemary A. Kozar, M.D., Ph.D. (2016)
Edward E. Cornwell, III, M.D. (2017)

NOMINATING COMMITTEE

J. Wayne Meredith, M.D., Chair (2015)
Robert C. Mackersie, M.D. (2016)
William G. Cioffi, M.D. (2017)
Thomas M. Scalea, M.D. (2018)
Grace S. Rozycki, M.D., M.B.A. (2019)

PROGRAM COMMITTEE

David A. Spain, M.D., Chair (2017)
Grace S. Rozycki, M.D. (2015)
David H. Livingston, M.D. (2015)
Martin A. Croce, M.D. (2016)
David Harrington, M.D. (2016)
Orlando C. Kirton, M.D. (2016)
Thomas M. Scalea, M.D. (2016)
John Holcomb, M.D. (2017)
Todd Rasmussen, M.D. (2017)
Ernest E. Moore, M.D., Editor, *The Journal of Trauma and Acute Care Surgery*, ex-officio

SCHOLARSHIP AND AWARDS COMMITTEE

Grace S. Rozycki, M.D., M.B.A., Chair (2015)
Richard Gamelli, M.D. (2015)
Eileen M. Bulger, M.D. (2015)
Jose Diaz, M.D. (2015)
Martin A. Croce, M.D. (2016)
Orlando C. Kirton, M.D. (2016)
Rosemary A. Kozar, M.D., Ph.D. (2016)
Edward E. Cornwell, III, M.D. (2017)

AD HOC COMMITTEES

DISASTER AD HOC COMMITTEE

Susan M. Briggs, M.D., M.P.H., Chair (2015)
Arthur Cooper, M.D. (2015)
Jay J. Doucet, M.D. (2015
Sharon Henry, M.D. (2015)
Donald H. Jenkins, M.D. (2015)
David, V. Shatz, M.D. (2015)
Jeffrey S. Upperman, M.D. (2015)
Eileen M. Bulger, M.D. (2017)
Jeannette Capella, M.D. (2017)
Ronald Gross, M.D. (2017)
A. Tyler Putnam, M.D. (2017)
EAST Representatives
Kyle Remick, M.D.
Daniel Grabo, M.D.

AAST STAFF

Sharon Gautschy, Executive Director
Tamara Jenkins, Senior Manager, Marketing and Communication
Jermica M. Smith, Program Manager
Karla Stuecker, Senior Meeting Planner, ACS
Bridget McLaughlin, Education Manager
Kyle Posego, Intern

AAST Research and Education Foundation Trustees 2014-2015

Appointed Trustees:

Michael J. Sise, M.D., Chair (2010-2015)

Dennis W. Vane, M.D., M.B.A., Treasurer (2008-2018)

Mark A. Malangoni, M.D. (2008-2015)

Anna M. Ledgerwood, M.D. (2010-2015)

Past President Trustees:

Andrew B. Peitzman, M.D. (2010-2015)

L.D. Britt, M.D., M.P.H. (2011-2016)

J. Wayne Meredith, M.D. (2012-2017)

Robert C. Mackersie, M.D. (2013-2018)

William G. Cioffi, M.D. (2014-2019)

Ex-Officio:

Thomas M. Scalea, M.D., AAST President (2014-2015)

Martin A. Croce, M.D., AAST Secretary-Treasurer (2013-2016)

FUTURE AAST MEETINGS

75th Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery

September 14-17, 2016
Hilton Waikoloa Village
Waikoloa, HI

76th Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery

September 13-16, 2017
Baltimore Marriott Waterfront
Baltimore, MD

77th Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery

September 26-29, 2018
Manchester Grand Hyatt
San Diego, CA

78th Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery

September 18-21, 2019
Sheraton Dallas
Dallas, TX

79th Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery

September 16-19, 2020
Hilton Waikoloa Village
Waikoloa, HI

PAST PRESIDENTS AND MEETING SITES

2014	Philadelphia, Pennsylvania	William G. Cioffi, M.D
2013	San Francisco, California	Robert C. Mackersie, M.D.
2012	Kauai, Hawaii	J. Wayne Meredith, M.D.
2011	Chicago, Illinois	L.D. Britt, M.D., M.P.H.
2010	Boston, Massachusetts	Andrew B. Peitzman, M.D.
2009	Pittsburgh, Pennsylvania	Gregory J. Jurkovich, M.D.
2008	Maui, Hawaii	Timothy C. Fabian, M.D.
2007	Las Vegas, Nevada	David V. Feliciano, M.D.
2006	New Orleans, Louisiana	C. William Schwab, M.D.
2005	Atlanta, Georgia	Steven R. Shackford, M.D.
2004	Maui, Hawaii	H. Gill Cryer, M.D., Ph.D.
2003	Minneapolis, Minnesota	David B. Hoyt, M.D.
2002	Orlando, Florida	Ronald V. Maier, M.D.
2001	No Meeting Due to 9/11	Ronald V. Maier, M.D.
2000	San Antonio, Texas	Frank R. Lewis, Jr., M.D.
1999	Boston, Massachusetts	J. David Richardson, M.D.
1998	Baltimore, Maryland	Anna M. Ledgerwood, M.D.
1997	Waikoloa, Hawaii	Anthony A. Meyer, M.D., Ph.D.
1996	Houston, Texas	Kenneth L. Mattox, M.D.
1995	Nova Scotia, Canada	Cleon W. Goodwin, M.D.
1994	San Diego, California	Ernest E. Moore, M.D.
1993	New Orleans, Louisiana	C. James Carrico, M.D.
1992	Louisville, Kentucky	Lewis M. Flint, M.D.
1991	Philadelphia, Pennsylvania	F. William Blaisdell, M.D.
1990	Tucson, Arizona	P. William Curreri, M.D.
1989	Chicago, Illinois	H. David Root, M.D., Ph.D.
1988	Orange County, California	Donald S. Gann, M.D.
1987	Montreal, Canada	Donald D. Trunkey, M.D.
1986	Honolulu, Hawaii	Francis C. Nance, M.D.
1985	Boston, Massachusetts	David S. Mulder, M.D.
1984	New Orleans, Louisiana	George F. Sheldon, M.D.
1983	Chicago, Illinois	Basil A. Pruitt, Jr., M.D.
1982	Colorado Springs, Colorado	Robert J. Freeark, M.D.
1981	Hot Springs, Virginia	Charles R. Baxter, M.D.
1980	Phoenix, Arizona	Leonard F. Peltier, M.D.
1979	Chicago, Illinois	Roger Sherman, M.D.
1978	Lake Tahoe, Nevada	William R. Drucker, M.D.
1977	Detroit, Michigan	Alexander J. Walt, M.D.
1976	Colorado Springs, Colorado	Joseph D. Farrington, M.D.
1975	Scottsdale, Arizona	John H. Davis, M.D.
1974	Hot Springs, Virginia	John A. Moncrief, M.D.
1973	Chicago, Illinois	Crawford Campbell, M.D.
1972	San Francisco, California	Moore Moore, Jr., M.D.
1971	New York City, New York	Curtis P. Artz, M.D.
1970	Chicago, Illinois	Sawnie R. Gaston, M.D.
1969	Portland, Oregon	John E. Raff, M.D.
1968	Montreal, Canada	Fraser N. Gurd, M.D.
1967	Chicago, Illinois	Edwin F. Cave, M.D.
1966	Santa Barbara, California	Raymond Householder, M.D.
1965	Philadelphia, Pennsylvania	William T. Fitts, Jr., M.D.

1964	Chicago, Illinois	Rudolph J. Noer, M.D.
1963	San Francisco, California	Oscar P. Hampton, Jr., M.D.
1962	Hot Springs, Virginia	Preston A. Wade, M.D.
1961	Chicago, Illinois	Harrison L. McLaughlin, M.D.
1960	Coronado, California	James K. Stack, M.D.
1959	Bretton Woods, New Hampshire	Truman G. Blocker, M.D.
1958	Chicago, Illinois	W.L. Estes, Jr., M.D.
1957	Hot Springs, Virginia	Charles G. Johnston, M.D.
1956	Santa Barbara, California	Warren H. Cole, M.D.
1955	Chicago, Illinois	Robert H. Kennedy, M.D.
1954	Atlantic City, New Jersey	Eslie Asbury, M.D.
1953	Chicago, Illinois	Martin C. Lindem, M.D.
1952	New York City, New York	Arthur R. Metz, M.D.
1951	Montreal, Canada	R. Arnold Griswold, M.D.
1950	Salt Lake City, Utah	Gordon M. Morrison, M.D.
1949	Atlantic City, New Jersey	Paul B. Magnuson, M.D.
1948	Chicago, Illinois	Casper F. Hegner, M.D.
1947	Atlantic City, New Jersey	Ralph G. Carothers, M.D.
1946	San Antonio, Texas	Grover C. Penberthy, M.D.
1945	No Meeting Due to War	Charles S. Venable, M.D.
1944	Chicago, Illinois	Charles S. Venable, M.D.
1943	No Meeting Due to War	Henry C. Marble, M.D.
1942	Boston, Massachusetts	Henry C. Marble, M.D.
1941	Montreal, Canada	Fraser B. Gurd, M.D.
1940	Atlantic City, New Jersey	Edgar L. Gilcreest, M.D.
1939	Hot Springs, Virginia	Kellogg Speed, M.D.

SEVENTY-FOURTH ANNUAL MEETING OF THE AMERICAN ASSOCATION FOR THE SURGERY OF TRAUMA AND CLINICAL CONGRESS OF ACUTE CARE SURGERY

Category 1 credit hours 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 9, 2015, 12:30 PM - 1:00 PM
LATOUR BALLROOM
PRESIDING: Thomas M. Scalea, M.D., AAST President

SESSION I: Plenary – Papers #1 - #8
Wednesday, September 9, 2015, 1:00 PM – 3:40 PM
LATOUR BALLROOM
PRESIDING: Thomas M. Scalea, M.D.
RECORDER: David A. Spain, M.D.

Session: I: Plenary Papers 1-8
Paper 1: 1:00-1:20

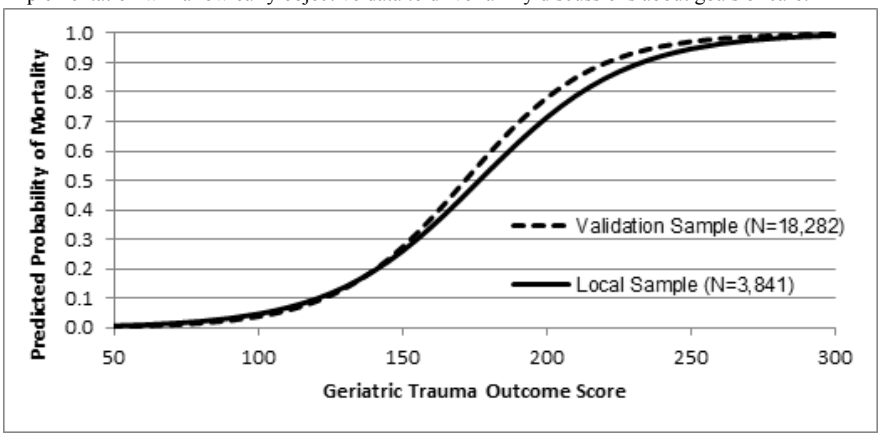
MULTICENTER EXTERNAL VALIDATION OF THE GERIATRIC TRAUMA OUTCOME SCORE: THE PROGNOSTIC ASSESSMENT OF LIFE AND LIMITATIONS AFTER TRAUMA IN THE ELDERLY [PALLIATE] STUDY

Allyson Cook MD, Bellal Joseph* MD, Kenji Inaba* MD, Paul Nakonezny Ph.D., Brandon Bruns MD, Jeff Kerby* MD,Ph.D., Karen Brasel* MD,MPH, Steven Wolf* MD, Joe Cuschieri* MD, Elizabeth Paulk MD, Ramona Rhodes MD,MPH, Scott Brakenridge MD, MSCS, Herb Phelan* MD, UT Southwestern/Parkland

Invited Discussant: Steven Shackford, MD

Introduction: Our core group has previously developed a prognostic tool for geriatric mortality during the index admission after injury. Easily calculated at bedside 24 hrs post-injury, the "Geriatric Trauma Outcome" (GTO) score is GTO=[age] + [ISS x 2.5] + [22 if transfused any PRBCs]. We sought to externally validate the locally-developed model with a large multicenter dataset.
Methods: Four geographically diverse level I trauma centers identified all subjects ≥65 years of age for the time period of the local study (1/1/2000 to 12/31/2013). Age, ISS, PRBCs transfused in the first 24 hours (if any), and mortality were extracted. The GTO model was specified using the formula [GTO= age + (ISS x 2.5) + 22(if given PRBC)] previously developed from the local sample. We then constructed a GTO model that became the sole predictor in a logistic mixed model to estimate the probability of mortality in the validation (test) sample, accounting for site as a random effect as to remove between-site variability. We estimated the misclassification (error) rate, Brier score, Tjur R-square (difference of the predicted probabilities of the two response levels), and AUC in evaluating the predictive performance of the locally-generated GTO model as a predictor of patient mortality in the validation sample in relation to the local sample.
Results: The two independent samples were similar in patient age and clinical characteristics. The local sample consisted of 3,841 subjects, mean age=76.55 yrs (SD±8.06), mean ISS=12.42 (SD±9.87); in-hospital mortality=10.75%; and 11.90% received a PRBC transfusion in the first 24 hrs. The validation (test) sample consisted of 18,282 subjects, mean age=77.01 years (SD±8.14), mean ISS=12.31 (SD±10.64), in-hospital mortality=10.86%, and 14.10% received a PRBC transfusion in the first 24 hrs. Fitting the locally-generated GTO model to the validation sample revealed that the parameter estimates from the validation sample were similar to those of the locally-generated GTO model with highly overlapping 95% confidence limits. Plots of the predicted probability of mortality by GTO score for both samples are shown in the figure. The error rate for the locally-generated GTO logistic model applied to the validation sample was 9.97% and was similar to the error rate of the fitted locally-generated GTO logistic model (9.79%). The Brier score, R-square, and AUC for the locally-generated GTO logistic model applied to the validation sample were 0.0737, 0.2495, and 0.8621, respectively, compared with 0.0775, 0.1998, and 0.8193, respectively, for the fitted locally-generated GTO logistic model from the local sample.

Conclusion:The GTO score accurately predicts probability of dying for injured elderly subjects. Implementation will allow early objective data to drive family discussions about goals of care.



NOTES

Session: I: Plenary Papers 1-8
Paper 2: 1:20-1:40

INTRAOPERATIVE HYPOTENSIVE RESUSCITATION FOR PATIENTS UNDERGOING LAPAROTOMY OR THORACOTOMY FOR TRAUMA: EARLY TERMINATION OF A RANDOMIZED PROSPECTIVE CLINICAL TRIAL

Matthew M. Carrick* MD, C. A. Morrison MD, James W. Suliburk MD, Michael A. Norman MD, Bradford G. Scott MD, Matthew J. Wall* MD, Kenneth L. Mattox* MD, Baylor College of Medicine

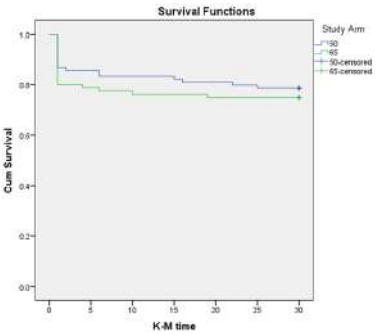
Invited Discussant: Raul Coimbra, MD, PhD

Introduction: Hemorrhagic shock is directly responsible for one-third of trauma related deaths. To date, there have been no studies evaluating intra-operative resuscitation goals for trauma patients in hemorrhagic shock. We hypothesized that intraoperative hypotensive resuscitation would improve survival for patients undergoing operative control of hemorrhage following penetrating trauma.

Methods: Penetrating trauma patients with a systolic blood pressure (SBP) less than or equal to 90 mm Hg were candidates for enrollment. Patients that required laparotomy or thoracotomy for operative control of hemorrhage were randomized to either an experimental group with a target minimum mean arterial pressure of 50 mm Hg (LMAP), or a control group of of 65 mm Hg (HMAP). Patients were followed for 30 days post-operatively for mortality as a primary outcome. Secondary outcomes included stroke, myocardial infarction, acute renal failure, coagulopathy, and infections complications.

Results: A total of 168 patients were enrolled, 86 in the LMAP group and 82 in the HMAP group. Seventy-six percent were the result of gunshot wounds and 24% stab wounds; 76% were male and, the mean age was 31. Baseline base excess (-11.1 mEq/L), hematocrit, systolic blood pressure, ISS, GCS, and AIS were similar between the two groups. MAP measurements intra-operatively were 65.5 $\pm$ 11.6 in the LMAP group and 69.1 $\pm$ 13.8 p=0.06 in the HMAP group. While the LMAP group had a statistically significant lower mortlity for those patients that survived to the ICU (2% for LMAP vs 12% HMAP p=0.013), there was no significant survival advantage at 30 days (Mantel-Cox Survival Chi-Square=0.33, df=1, Sig. 0.564) **(Figure)**. There was no significant difference in secondary outcomes.

The LMAP and HMAP complication rates were acute MI (3% vs 2% p=0.67), stroke (0% vs 3% p=0.15), renal failure (16% vs 13% p=0.67), coagulopathy (31% vs 37% p=0.45), and infections (60% vs 58%, p=0.82). The Data Safety Monitoring Board recommended early termination due to the unlikelihood of reaching a statistically significant difference in 30 day mortality by the end of enrollment.



Conclusion: Based upon these results, hypotensive resuscitation is a safe technique that does not increase end organ damage, infectious complications or coagulopathy. This study however, was unable to demonstrate that hypotensive resuscitation to an LMAP of 55 mmHg could significantly improve the primary outcome of 30 day mortality. While hypotensive resuscitation is potentially ameliorates the effects of life threatening hemorrhage, further study is necessary for the benefits of this strategy to be fully realized.

NOTES

Session: I: Plenary Papers 1-8
Paper 3: 1:40-2:00

IS THERE AN IMPENDING LOSS OF ACADEMICALLY PRODUCTIVE TRAUMA SURGEONS?

Nakul Valsangkar MD, Grace S. Rozycki* MD, Casi Blanton BA, Teresa A. Zimmers Ph.D., Teresa M. Bell Ph.D., David V. Feliciano* MD, Leonidas G. Koniaris MD,
Indiana University School Of Medicine, Department Of Surgery

Invited Discussant: James Hoth, MD, PhD

Introduction: The objective of this study is to compare the academic impact of trauma surgery faculty relative to faculty in general surgery and other surgery sub-specialties.

Methods: Scholarly metrics were determined for 3,850 faculty at the top 50 NIH-funded university-based and 5 hospital-based surgery departments

Results: **Results:** Overall, 317 trauma surgeons were identified (8.2%). This compared to 703 other general surgeons (18.2%) and 2830 other sub-specialty surgeons (73.5%). The average size of the trauma surgical division was 6 surgeons. Overall, 43% were assistant, 29% associate, 28% full professors, 3.1% had PhD's, 2.5% were MD, PhD's, and, 16.3% were division chiefs/directors. Compared with general surgery, there were no differences regarding faculty academic levels or leadership positions. Other surgical specialties had more full professors (39% vs. 28% $p < 0.05$) and faculty with research degrees (7.7% PhDs and 5.7% MD, PhDs). Median publications/citations were lower especially for junior faculty trauma surgeons (T) compared with general surgery (G) and other (O) surgical specialties- assistant professors (T: 9/76 vs. G: 13/138 and O: 18/241, $p < 0.05$), associate professors (T: 22/351 vs. G: 36/700 and O: 47/846, $p < 0.05$) and professors (T: 88/2234 vs. G: 93/2193, p = N.S [not significant for either publications/citations] and O: 99/2425, p = N.S). Publications/citations for division chiefs/directors were comparable with other specialties- T: 77/1595 vs. G: 103/2081 and O: 74/1738, p = N.S, but were lower for all non-chief faculty, T: 23/368 vs. G: 30/528 and O: 37/658, $p < 0.05$. Trauma surgeons were less likely to have current or former NIH funding than other surgical specialties (17 % vs. 27%, $p < 0.05$) and this included a lower rate of R01/U01/P01 funding (5.5% vs. 10.8%, $p < 0.05$).

Conclusion: Top trauma surgeons are as academically productive as other general surgeons and other surgical specialists. Junior trauma faculty, however, publish at a lower rate than other general surgery or sub-specialty faculty. This suggests an incipient contraction of academic achievement within trauma surgery and its impact across surgery. Drivers responsible for decreased academic productivity and lower NIH funding must be identified, understood and addressed.

NOTES

Session: I: Plenary Papers 1-8
Paper 4: 2:00-2:20

CURRENT MANAGEMENT OF HEMORRHAGE FROM SEVERE PELVIC FRACTURES: RESULTS OF AN AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA MULTI-INSTITUTIONAL TRIAL

Todd W. Costantini MD, Raul Coimbra* MD,Ph.D., John Holcomb* MD, Richard Catalano MD, Thomas M. Scalea* MD, Lashonda Williams MD, Scott Keeney DO, Jason Sperry* MD, Dimitra Skiada MD, Brian H. Williams MD, Alicia Privette MD, Forrest Moore* MD, Pelvic Fracture Study Group, AAST Multi-Institutional Trials Committee

Invited Discussant: Walter Biffl, MD

Introduction: There is no consensus as to the optimal treatment paradigm for patients presenting with hemorrhage from severe pelvic fracture. This study was established to determine the methods of hemorrhage control currently being employed in clinical practice.

Methods: This prospective, observational multi-center study enrolled patients with pelvic fracture from blunt trauma. Demographic data, admission vital signs, presence of shock on admission (SBP < 90mmHg or HR>120 or base deficit < -5), method of hemorrhage control, time to hemorrhage control, transfusion requirements, and outcome were collected.

Results: A total of 1339 patients with pelvic fracture were enrolled from eleven Level 1 trauma centers. 57% were male with a mean age of 47.1 ± 21.6 and ISS of 19.2 ± 12.7. In-hospital mortality was 9%. Angioembolization and external fixator placement were the most common methods of hemorrhage control utilized (see Table). 128 patients (9.6%) underwent diagnostic angiography with contrast extravasation noted in 63 patients. Therapeutic angioembolization was performed on 79 patients (5.9%). There were 178 patients (13.3%) with pelvic fracture admitted in shock with a mean ISS of 28.2 ± 14.1. In the shock group, 44 patients (24.7%) underwent angiography to diagnose a pelvic source of bleeding with contrast extravasation found in 27 patients. 30 patients (16.9%) were treated with therapeutic angioembolization. Aortic balloon occlusion (REBOA) was performed on 5 patients in shock and utilized by only 1 of the participating centers. Patients admitted in shock received an average of 11.8 ± 12.8 units of PRBCs and 10.3 ± 12.5 units of FFP. Mortality was 32% for patients with pelvic fracture admitted in shock.

Table: Pelvic Fracture Hemorrhage Control

	All Patients (n=1339)	Shock (n=178)
Angioembolization Alone	55 (4.1%)	19 (10.7%)
External Fixator Alone	78 (5.8%)	17 (9.6%)
Preperitoneal Pelvic Packing Alone	20 (1.5%)	6 (3.4%)
Embolization + External Fixator	11 (0.8%)	6 (3.4%)
Embolization + Pelvic Packing	6 (0.4%)	2 (1.1%)
External Fixator + Pelvic Packing	3 (0.2%)	1 (0.6%)
Embolization + External Fixator + Pelvic Packing	5 (0.4%)	1 (0.6%)
REBOA +/- any other	5 (0.4%)	5 (2.8%)

Conclusion: Patients with pelvic fracture admitted in shock have high mortality. Several methods were utilized for hemorrhage control with significant variation across institutions. The use of REBOA may prove to be an important adjunct in the treatment of patients with severe pelvic fracture in shock; however, it is in the early stages of evaluation and not currently used widely across trauma centers.

NOTES

Session: I: Plenary Papers 1-8
Paper 5: 2:20-2:40

TO NEARLY COME FULL CIRCLE: NONOPERATIVE MANAGEMENT OF HIGH GRADE IV-V BLUNT SPLENIC TRAUMA IS SAFE UTILIZING A PROTOCOL WITH ROUTINE ANGIOEMBOLIZATION OF ALL HEMODYNAMICALLY STABLE PATIENTS WITH HIGH GRADE IV-V INJURIES AND ALL PATIENTS WITH CONTRAST BLUSH

Indermeet Bhullar* MD, Daniel Siragusa MD, Todd Loper MD, Andrew Kerwin* MD, Eric Frykberg* MD, Orlando Health

Invited Discussant: Martin Croce, MD

Introduction: Non-operative management of hemodynamically stable high grade (IV-V) blunt splenic trauma injuries remains controversial given the high failure rates that persist despite angioembolization (AE) protocols. Contrast blush (CB) on admission computed tomography (CT) is the primary indicator for active bleeding and AE. However, CT scans can often miss CB; we have recently reported a false negative rate of 85% (17 of 20) for grade IV-V injuries that had no CB on CT but when angiography was performed demonstrated active bleeding. This may explain the high failure rates amongst these patients that are actively bleeding yet fail to get embolized due to a false negative CT. Based on this, the non-operative management (NOM) protocol for hemodynamically stable patients with blunt splenic trauma (BST) was modified in 2011 to include routine AE of high grade (IV-V) injuries along with CB Routine AE for grade III was excluded since our analysis indicated that this would result in a very low number of patients with active bleeding and a significant number of unnecessary angiograms. Patients were then followed prospectively from 2011 to 2014. The failure rates for the new protocol (2011-2014) were compared against the older protocol (2000-2010). The purpose of this study was to determine if the new AE protocol significantly lowered the failure rates for high grade injuries (IV-V) allowing for safe observation without surgery and if the exclusion of grade III injuries allowed for the prevention of unnecessary angiograms without affecting the overall failure rates.

Methods: The records of patients with BST from January 2000 to October 2014 at a Level I trauma center were retrospectively reviewed. Patients were divided into two groups based on the AE protocol utilized and failure rates of non-operative management (FNOM) were compared: Routine AE (RAE) protocol (2011-2014) with AE for all high grade (IV-V) injuries and all injuries with CB (grade I-V) was compared against the Selective AE (SAE) protocol (2000-2010) that only utilized AE for injuries with CB (grade I-V). The overall failure rates for grade (I-V) as well as the failure for low grade (I-III) and high grade (IV-V) injuries were compared for the two groups. Statistical analysis was performed with Fisher's exact test, and $\chi 2$ test.

Results: A total of 712 hemodynamically stable adult patients with BST underwent NOM from 2000 to 2014. Of these 522 (73%) were in the SAE group and 190 (27%) were in the RAE group. Evolving from the SAE to the RAE strategy resulted in a significantly lower overall FNOM rate (grade I-V) (SAE vs. RAE, 4.4% to 1.1%, p=0.037) (Table 1). While there was no significant decrease in FNOM for the low grade (I-III) group (SAE vs. RAE, 2% vs. 0%, p=0.21), there was a significantly lower FNOM rate for the high grade (IV-V) group with the RAE strategy (SAE vs. RAE, 19.2% vs. 2.9%, p=0.008). The FNOM rate for the Grade III injuries was 0% (0/33) supporting their exclusion from the routine AE protocol. This allowed for the prevention of 33 unnecessary angiograms without affecting the overall FNOM rate (1.1%).

Conclusion: Previously prohibitive failure rates limited NOM of high grade IV-V injuries. However, with the new routine AE protocol these failure rates were significant reduced (19% to 2%, p=0.008) to levels that allow for safe observation without surgery. Unnecessary AE (grade I-III without CB) was limited and one of the lowest overall (grade I-V) FNOM rates reported in the literature (1%) was achieved.

Failure Rate of Non-operative Management Based on Angio-embolization Protocol Utilized

GRADE	SAE (2000-2010) % (n)	RAE (2011-2014) % (n)	p
Low (I-III)	2% (8/444)	0% (0/122)	0.21
High (IV-V)	19% (15/78)	3% (2/68)	0.008
Total	4% (23/522)	1% (2/190)	0.04

Table 1 SAE: selective angioembolization protocol, RAE: routine angioembolization protocol

NOTES

Session: I: Plenary Papers 1-8
Paper 6: 2:40-3:00

THE HMGB1 SIGNAL PATHWAY IN SEVERE TBI; MECHANISM FOR REDUCED CEREBRAL EDEMA AND IMPROVED OUTCOME AFTER HEPARINOID ADMINISTRATION?

SHENGJIE LI MD, Rachel Eisenstadt BS, Kenichiro Kumasaka MD, Victoria E. Johnson MD, MBChB, Joshua Marks MD, Katsuhiro Nagata MD, Kevin D. Browne BS, Douglas H. Smith MD, Jose L. Pascual* MD,Ph.D., University of Pennsylvania

Invited Discussant: Ronald Maier, MD

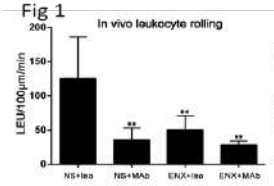
Introduction: Heparins have been shown to reduce cerebral edema and improve neurological recovery in stroke and traumatic brain injury (TBI), in part through blunting of cerebral leukocyte (LEU) recruitment. High mobility group box 1 (HMGB1) protein, an extracellular chemoattractant is known to induce neuroinflammation through blocking of LEU adhesion molecules. We hypothesized that enoxaparin (ENX) after TBI reduces leukocyte mediated edema through the HMGB1 signal pathway.

Methods: 23 CD1 male mice underwent severe TBI by controlled cortical impact (CCI: 1mm depth, 6m/sec) and were randomly assigned to receive either monoclonal antibody against HMGB1 (MAb) or its isotype (Iso) and either ENX (1mg/kg) or 0.9% normal saline (NS). The 4 groups were: NS+Iso (n=5), NS+MAb (n=6), ENX+Iso (n=6), ENX+MAb (n=6). ENX or NS were repeatedly administered at 2, 8, 14, 23 & 32h after TBI and MAb or Iso (25μg) was administered once, 2h after TBI. At 48h, cerebral intravital microscopy was used to visualize LEU interacting with endothelium and microvascular leakage of FITC-albumin. The Neurological Severity Score (NSS) was used to assess post-injury neurological recovery, wet-to-dry ratios determined cerebral and lung edema. ANOVA with Bonferroni correction was used for statistical comparisons.

Results: ENX and MAb similarly reduced in vivo LEU rolling in the injured hemisphere without displaying an additive effect (Fig 1). In vivo albumin leakage was greatest in vehicle-treated animals (35.4±4.3%) and similarly reduced by MAb (23.8±3.6%, $p<0.01$), ENX (23.1±1%, $p<0.01$), or both MAb+ENX (15.3±4.5%, $p<0.01$). CCI-induced ipsilateral cerebral edema (81.7±1.4%) was reduced by MAb (78.2±0.3%, $p<0.01$), ENX (77.9±0.5%, $p<0.01$), and MAb+ENX (77.2±0.3%, $p<0.01$). Post injury lung water (77.2±0.7%), was reduced by ENX (75.2±1.1%, $p=0.04$) and ENX+MAb (75.2%±1.2%, $p=0.03$) but not MAb alone (76.2±1.0%, $p=0.78$). Neurological recovery 24 and 48 hours after injury was lowest in the vehicle-treated group as compared to any of the treated groups without an additive effect between ENX and MAb (Fig 2)

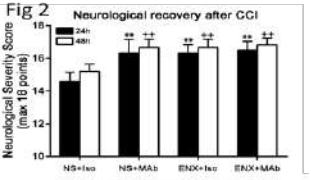
Conclusions: ENX reduces LEU recruitment to injured brain, diminishing cerebrovascular permeability and brain edema. ENX also hastens neurological recovery. Monoclonal antibody blockade against the chemoattractant HMGB1 produces equivalent reductions in LEU recruitment, cerebral edema and neurological activity that is not augmented with addition of ENX. ENX may cause these effects through blocking of the HMGB1 pathway of leukocyte activation.

Fig 1



**p<0.01 vs NS+Iso

Fig 2



24h: **p<0.01 vs NS+Iso; 48h: ++p<0.01 vs NS+Iso;

NOTES

Session: I: Plenary Papers 1-8
Paper 7: 3:30-3:20

WHEN SPEED IS NOT A VIRTUE: THE IMPACT OF SHORT PRE-HOSPITAL TIMES ON TRAUMA CENTER PERFORMANCE BENCHMARKING

James P. Byrne* MD, N. Clay Mann Ph.D., Christopher J. Hoeft MA, John P. Hunt* MD,MPH, Avery B. Nathens* MD,Ph.D., Sunnybrook Health Science Centre

Invited Discussant: William Cioffi, MD

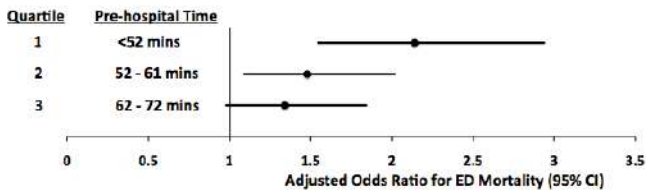
Introduction: External benchmarking of trauma center (TC) performance has become a requirement for verification by the American College of Surgeons (ACS) and is critical to improving quality of care. TCs function within a broader system, yet the impact of system-level factors on TC performance is unknown. Emergency medical service (EMS) performance, an important system factor, might affect the risk profile of patients arriving at TCs, and therefore impact center-level outcomes. Rapid transport by high performing EMS might favorably affect outcomes. Alternatively, rapid transport may result in arrival of more unsalvageable patients to the ED alive, when little can be done to modify their outcomes. To better inform TC performance benchmarking, we set out to explore the impact of EMS pre-hospital time, an important measure of EMS performance, on the rate of ED deaths at TCs across the United States.

Methods: We used a novel ecological study design, linking EMS data from the National EMS Information System (NEMSIS) to TCs participating in the ACS Trauma Quality Improvement Program (TQIP) by destination zip code. This approach provided regional pre-hospital times for populations of injured patients transported to TQIP centers. Total pre-hospital time (PHT), defined as the 90 th percentile EMS time (a standard EMS metric), was assigned to each TC as a new hospital-level variable. TCs were stratified by the overall median PHT into short EMS (SEMS) and long EMS (LEMS) time groups. Analyses were limited to patients aged ≥16 years with blunt or penetrating injury transported directly by land to urban TQIP centers. Hierarchical logistic regression modeling was used to determine the association of PHT with ED death after adjusting for baseline patient characteristics and injury severity.

Results: We identified 87,130 patients meeting inclusion criteria admitted to 100 urban TCs. Across all centers, the median PHT was 61 min and ED mortality was 1.1%. Patients transported to SEMS TCs had similar baseline and injury characteristics to those transported to LEMS TCs. However, centers with SEMS had significantly greater risk-adjusted ED mortality than centers with LEMS [OR 1.5, 95% CI: 1.2–1.9], a finding consistent across blunt [OR 1.6, 95% CI: 1.2–2.1] and penetrating [OR 1.5, 95% CI: 1.0–2.2] trauma. TCs in the quartile of shortest EMS times (<52 mins) had the highest risk adjusted ED mortality [OR 2.1, 95% CI: 1.6–2.9] compared to those within the longest quartile (Figure 1).

Conclusion: Regional EMS pre-hospital times affect the risk profile of patients transported to TCs in ways not captured in conventional risk adjustment. Performance benchmarking programs will need to incorporate measures of EMS performance in future evaluation of risk-adjusted mortality.

FIGURE 1: ADJUSTED ODDS RATIO OF ED DEATH BY PRE-HOSPITAL TIME QUARTILE



NOTES

Session: I: Plenary Papers 1-8
Paper 8: 3:20-3:40

MULTICENTER VALIDATION OF AAST GRADING SYSTEM FOR ACUTE COLONIC DIVERTICULITS AND PROPOSAL FOR EMERGENCY GENERAL SURGERY QUALITY IMPROVEMENT PROGRAM (EQIP)

Shahid Shafi* MD,MPH, Christopher S. Klekar MBA,MPH, Michel Aboutanos* MD,MPH, Suresh Agarwal* MD, Marie L. Crandall* MD,MPH, Oscar Guillamondegui* MD,MPH, Oliver Gunter* MD, Nathan T. Mowery* MD, Raminder Nirula* MD, Steven E. Ross* MD, Stephanie A. Savage* MD, MS, Kevin M. Schuster* MD, Stefano Siboni MD, Marc D. Trust MD, Garth H. Utter* MD, AAST Patient Assessment Committee

Invited Discussant: Andrew Peitzman, MD

Introduction: AAST has developed a new grading system for uniform description of anatomic severity of Emergency General Surgery (EGS) diseases, ranging from Grade I (mild disease) to Grade V (severe disease). The purpose of this study was to determine the association between AAST grades for Acute Colonic Diverticulitis and patient outcomes. A secondary aim was to assess the feasibility of EGS Quality Improvement Program (EQIP) using risk-adjusted center outcomes, similar to NSQIP and TQIP methodology.

Methods: This is a retrospective study of 1105 patients (one death) from 13 centers. At each center, two reviewers assigned AAST grades, blinded to the other reviewer's assignment. Inter-rater reliability was measured using kappa coefficient. Adverse patient outcome was defined as any of the following: death, complications, intensive care unit use, surgical intervention, or 30-day readmission. Relationship between grade and adverse outcomes was measured using multivariate logistic regression to control for age, comorbidities, and physiologic status at the time of admission. Final model was used to calculate Observed-to-Expected ratios (O-E, 95% confidence intervals) for adverse outcomes for each center.

Results: Median age was 54 years, 52% males, 43% minorities, and 22% required a surgical intervention. Almost two-thirds had Grade I or II disease (Table). There was high level of agreement for grades between reviewers (kappa 0.81). Regression analysis showed that higher disease grades were associated with increasing odds of adverse outcomes, after adjusting for age, comorbidities, and physiology (Table). O-E ratios showed one center with significantly higher than expected adverse outcomes and one center with significantly fewer than expected adverse outcomes.

Grade	N (%)	Adverse Outcomes	Odds Ratio (95% CI)
I	288 (26%)	52 (18%)	Reference Group
II	412 (37%)	122 (30%)	1.8 (1.1 to 2.8)
III	258 (23%)	112 (43%)	4.1 (2.5 to 6.7)
IV	50 (5%)	34 (68%)	13.2 (5.5 to 32.1)
V	97 (9%)	87 (90%)	40.1 (14.5 to 110)

Conclusion: AAST grades for Acute Colonic Diverticulitis are independently associated with patient outcomes. EQIP methodology that incorporates AAST grade, age, comorbidities, and physiologic status may be used for measuring quality of EGS care at centers. This requires wide spread adoption of EGS registries with uniform data elements, including AAST grades.

NOTES

WEDNESDAY, SEPTEMBER 9, 2015, 3:40 PM - 4:10 PM

SESSION II: MASTER SURGEON LECTURE

LOCATION: LATOUR BALLROOM

"Severe ARDS Management in the ICU"

Lena M. Napolitano, M.D., M.P.H.

Joyce and Don Massey Foundation Professor of Surgery
Division Chief of Acute Care Surgery
University of Michigan
Ann Arbor, Michigan

****

WEDNESDAY, SEPTEMBER 9, 2015, 4:10 PM - 5:25 PM

SESSION III:
PANEL I: Trauma Care in 2025 and Beyond

LOCATION: LATOUR BALLROOM

MODERATOR: ROBERT C. MACKERSIE, M.D.

Jay Johannigman, M.D.
From Here to Eternity-
En-route Care Today
and Tomorrow

Hasan Alam, M.D.
Defying Death

Mitchell Cohen, M.D.
Modeling Clinical Gesthalt:
Model and Data-Driven Ap-
proaches to Predicting
Patient Trajectory and
Improving Care

Michael Chang, M.D.
Replacement Parts: 3-D Printing
and Stem Cells for Trauma
Surgeons

SESSION IV:

POSTER SESSION/OPENING RECEPTION

WEDNESDAY, SEPTEMBER 9, 2015, 5:30 PM – 7:30 PM

LOCATION: LAFITE BALLROOMS 4, 5, 7, & 9

Poster #	Professors	Category
1-10	Daniel Marguiles, MD David Ciesla, MD	Abdominal Trauma
11-19	Krista Kaups, MD, MSc Grant O'Keefe, MD, MPH	Acute Care Surgery
20-31	Orlando Kirton, MD Linda Maerz, MD	Critical Care
32-42	David Harrington, MD Glen Tinkoff, MD	Burns and Neurological Trauma
43-53	Raminder Nirula, MD, MPH Jonathan Tilsed, MD	Outcomes/Guidelines I
54-63	David Efron, MD Susan Rowell, MD	Outcomes/Guidelines II
64-72	Barbara Gaines, MD David Shatz, MD	Pediatric and Trauma Systems I
73-82	Martin Schreiber, MD Yasuhiro Otomo, MD	Shock/Transfusions I
83-92	Carlos Brown, MD Ronald Simon, MD	Shock/Transfusions II
93-101	Marie Crandall, MD, MPH Deborah Kuhls, MD	Socioeconomics, Ethics & Education
102-111	Ali Salim, MD Suresh Agarwal, Jr., MD	Thoracic Trauma
112-121	Robert Barraco, MD, MPH Andrew Bernard, MD	Trauma Prevention & Epidemiology
122-130	Avery Nathens, MD, MPH, PhD Scott Sagraves, MD	Trauma Systems II
131-140	Amy Goldberg, MD Raymond Fang, MD	Vascular Trauma, Extremity, and Soft Tissue

SESSION V:

ACUTE CARE SURGERY

PAPERS #9 - #13

THURSDAY, SEPTEMBER 10, 2015, 7:30 AM – 9:10 AM

LATOUR BALLROOM

MODERATOR: KIMBERLY A. DAVIS, M.D., M.B.A.

RECORDER: DAVID A. SPAIN, M.D.

Session: V: Acute Care Surgery Papers 9-13
Paper 9: 7:30-7:50

DERIVATION AND VALIDATION OF A NOVEL EMERGENCY SURGERY ACUITY SCORE (ESAS)

Naveen F. Sangji MD,MPH, Jordan D. Bohnen MBA,MD, Elie P. Ramly MD, Matthew M. Hutter MD,MPH, Daniel D. Yeh* MD, David R. King* MD, Marc DeMoya* MD, Kathryn Butler MD, Peter J. Fagenholz MD, George C. Velmahos* MD,Ph.D., David C. Chang MBA,MPH,Ph.D., Haytham M. Kaafarani MD,MPH, Massachusetts General Hospital

Invited Discussant: James Davis, MD

Introduction: There currently exists no pre-operative risk stratification system for Emergency Surgery (ES). We sought to develop an Emergency Surgery Acuity Score (ESAS) that predicts perioperative mortality in the ES patient. Such a score could prove useful for: 1) pre-operative patient counseling; 2) identification of patients needing close postoperative monitoring; and 3) risk-adjustment in any efforts at benchmarking the quality of ES.

Methods: Using the 2011 American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database, we identified all surgical procedures that were classified as "emergent". A three step methodology was then performed. First, multiple logistic regression models were created to identify independent predictors (e.g. patient demographics, co-morbidities, and pre-operative laboratory variables) of 30-day mortality in ES. Second, based on the relative impact of each identified predictor (i.e. Odds Ratio), using weighted averages, a novel score was derived. Third, using the 2012 ACS-NSQIP database, the score was validated with evaluation of its c-statistic and ability to predict mortality at 30 days.

Results: From 280,801 NSQIP cases, 18,439 ES cases were analyzed, of which 1,598 (8.7%) resulted in death at 30 days. The multiple logistic regression analyses identified 22 independent predictors of mortality. Based on the relative impact of these predictors, ESAS was derived with a total score range of 0-29. This score has a c-statistic of 0.86 for mortality. The observed probability of 30-day mortality increased from 0% at a score of 0 to 100% at a score of 22 [Figure 1]. In the validation phase, 18,146 patients were included, the mortality rate was 7.2% and the c-statistic of ESAS was unchanged at 0.86.

Conclusion: A novel score was developed and validated that accurately predicts mortality in ES patients, the Emergency Surgery Acuity Score- ESAS.

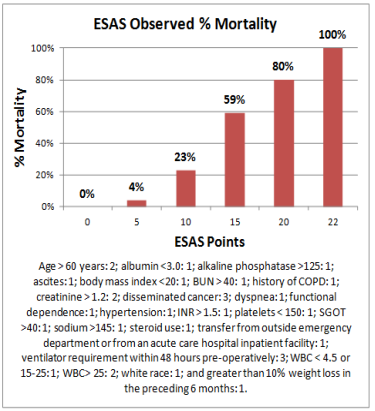


Figure 1: ESAS Variables, Points per Variable, and Observed Percentage Mortality.

NOTES

Session: V: Acute Care Surgery Papers 9-13
Paper 10: 7:50-8:10

SEVERE COMPLICATED CLOSTRIDIUM DIFFICLE INFECTION: CAN THE UPMC PROPOSED SCORING SYSTEM PREDICT THE NEED FOR SURGERY?

Michelle C. Julien MD, Geisinger Health System

Invited Discussant: Brian Zuckerbraun, MD

Introduction: Clostridium difficile infection (CDI) is one of the most common health care associated infections and it continues to have significant morbidity and mortality. The onset of fulminant colitis often requires total abdominal colectomy (TAC) with ileostomy, which has a mortality rate of 35% to 57%. University of Pittsburgh Medical Center (UPMC) developed a scoring system for severity and recommended surgical consultation for severe complicated disease. The aim of this study is to evaluate if the UPMC proposed scoring system for severe complicated CDI can predict the need for surgical intervention.

Methods: This is a retrospective review of all patients who developed severe complicated CDI at a tertiary care center between January 2007 and December 2012 as defined by the UPMC scoring system. Main outcomes were the need for surgical intervention and 30-day mortality. Criteria for CDI severity was compared between groups using chi-square or Fisher's exact test for categorical data, two sample t-tests for continuous, Wilcoxon rank sum test if continuous data is found to violate normality assumptions. Logistic regression was used to adjust for variables that were found to be significant in bivariate analysis.

Results: Eighty-eight patients had severe complicated CDI. Fifty-nine patients (67%) required surgery and twenty-nine did not. All patients were diagnosed with CDI by positive toxin assays. There was no difference between the groups with respect to age, gender, BMI, or co-morbidities. When comparing the surgical group to the non-surgical cohort, the surgical cohort averaged 20 points on the scoring system compared to 9 in the non-operative cohort. In patients with severe complicated CDI, 14 or more points predicted the need for surgery 75% of the time. Forty-two percent of the surgical cohort had respiratory failure requiring mechanical ventilation compared to 0% in the non-surgical cohort ($p < 0.0001$). Forty-nine percent of the surgical cohort required vasopressors for septic shock prior to surgery compared to 0% in the non-surgical cohort ($p < 0.0001$). Acute kidney injury (AKI) was present in 92% of the surgical cohort versus 72% within the non-surgical cohort ($p = 0.026$). Seventy-six percent of the surgical patients were admitted to the ICU prior to surgery. Within the non-surgical cohort, only 24% of patients required ICU stay during admission. Overall 30 day mortality in the surgical cohort was 30% and there was no mortality in the non-surgical cohort.

Conclusion: The UPMC scoring system for severe complicated CDI can help us predict patients who need a surgical consult and the need for surgical intervention. In patients with severe complicated CDI, evidence of end organ failure predicts surgical intervention.

NOTES

Session: V: Acute Care Surgery Papers 9-13
Paper 11: 8:10-8:30

RACIAL DISPARITIES IN EMERGENCY GENERAL SURGERY: DO DIFFERENCES IN OUTCOMESPERSIST AMONG UNIVERSALLY-INSURED MILITARY PATIENTS?

Cheryl K. Zogg MSPH, MHS, Wei Jiang MS, Muhammad Ali Chaudhry MD, Adil A. Shah MD, Stuart R. Lipsitz ScD, Joel S. Weissman Ph.D., Zara Cooper* MD, MSc, Ali Salim* MD, Stephanie L. Nitzschke MD, Louis L. Nguyen MBA,MD,MPH, Lorens A. Helmchen Ph.D., Linda Kimsey Ph.D., MSc, Samuel T. Olaiya Ph.D., Peter A. Learn MD, Adil H. Haider* MD,MPH, Center For Surgery And Public Health, Harvard Medical School & Harvard School Of Public Health, Department Of Surgery, Brigham And Women's Hospital

Invited Discussant: Orlando Kirton, MD

Introduction: Racial disparities in outcomes among emergency general surgery (EGS) patients are well described. As many minority patients are also uninsured, increasing access to care is thought to be a viable policy solution to mitigate these inequities. The objective of this study was to determine whether racial disparities in in-hospital, 30- and 90-day outcomes exist within a universally-insured population of military EGS patients.

Methods: Five years (2006-2010) of TRICARE (which provides universal insurance coverage to active/reserve/retired members of the US Armed Services and their dependents) data were queried. Adults (≥18y) with a primary EGS condition (as defined by AAST criteria) were included. Racial differences in demographic and clinical characteristics were compared using descriptive statistics. Risk-adjusted multilevel logistic regression, accounting for clustering of patients within hospitals was used to assess race-associated differences in in-hospital mortality and in mortality, major morbidity (pneumonia, PE, renal failure, UTI, CVA, MI, cardiac arrest, ARDS, sepsis, septic shock) and readmission rates at 30 and 90 days.

Results: Over the 5 years studied, 122,115 EGS patients were identified, of whom, 73.4% were White, 14.4% were Black, and 4.6% were of Asian/Pacific Islander (PI) descent. The largest population subgroups were active-duty (36.4%), males (55.5%), aged 45-64y (36.1%). Overall outcomes by race are presented (Table). Racial differences stratified by EGS diagnostic group, operative vs. non-operative technique, and direct (military hospitals) vs. purchased care (civilian hospitals) revealed similar trends.

Conclusion: Racial differences in surgical outcomes among universally-insured military EGS patients were largely not found; although, some disparities remain. This profound contrast with civilian data, will help to inform policy with the Department of Defense and disparities interventions nationwide, attesting to important differences potentially related to insurance, access to care, and military cultures and values.

Table 1. Risk-adjusted odds ratios (95% CI) for military EGS patients, by race

	Black	Asian/PI	Other
Mortality: In-hospital	1.23 [0.84-1.77]	1.92 [1.15-3.21]*	0.70 [0.37-1.34]
30-day	1.19 [0.96-1.47]	1.28 [0.92-1.78]	1.07 [0.81-1.41]
90-day	1.18 [1.00-1.40]	1.30 [1.01-1.68]*	1.05 [0.82-1.33]
Major Morbidity:			
30-day	1.31 [1.21-1.41]*	0.98 [0.85-1.11]	0.92 [0.82-1.03]
90-day	1.27 [1.17-1.36]*	0.94 [0.83-1.06]	0.88 [0.77-0.98]*
Readmission:			
30-day	0.96 [0.90-1.03]	0.83 [0.75-0.93]*	0.87 [0.80-0.95]*
90-day	0.95 [0.90-1.00]	0.76 [0.69-0.83]*	0.83 [0.78-0.90]*

Reference group = White patients; ***Denotes significance** (two-sided $p<0.05$)
Outcomes adjusted for: age; sex; active/dependent/retired; service; direct/purchased; Medicare eligibility; rank (a potential proxy of socio-economics); geographic region; Charlson Comorbidity Index (CCI); hospital-level factors

NOTES

Session: V: Acute Care Surgery Papers 9-13
Paper 12: 8:30-8:50

SURGICAL STRATEGIES AND OUTCOMES IN PATIENTS REQUIRING BOWEL RESECTION IN NON-TRAUMA ABDOMINAL EMERGENCIES

Maria P. Garcia-Garcia MD, Michael W. Parra MD, Juan C. Puyana* MD, Alvaro I. Sanchez MD,Ph.D., Juan C. Saenz MD student, Monica Morales Statistician, Juan P. Herrera-Escobar MD, Alejandro Calle MD, David A. Mejia MD, Paola A. Rodriguez-Ossa MD, Luis F. Pino MD, Carlos A. Ordonez* MD, Fundacion Valle del Lili

Invited Discussant: Jason Smith, MD

Introduction: Selective use of bowel anastomosis in patients undergoing DCL is a recognized strategy for the management of bowel injuries in trauma patients. However, there is insufficient evidence regarding the role and timing of anastomosis in DCL in non-trauma secondary peritonitis (NTSP). We aim to determine outcomes and management options after bowel resection (BR) and DCL in NTSP.

Methods: A retrospective review of patients (≥16 years) with severe NTSP undergoing BR after enteric perforations was performed (2003-2013). All patients without BR were excluded. Patients were divided into two groups: DCL group and definitive surgical procedure (DSP) group. DCL patients underwent segmental BR (ends left in discontinuity), temporary abdominal closure and subsequent delayed anastomosis (DA) or deferred ostomy (DO). DSP included either primary anastomosis (PA) or primary ostomy (PO).

Results: A total of 182 patients were included, mean age was 60.3 years (SD 17.2), 101 (55.5%) were male. Small bowel perforation occurred in 77 (42.3%) patients and colon perforation in 105 (57.7%). Septic shock on admission was present in 68 (37.4%) patients. ARDS developed in 34 (18.7%) cases and MOF in 25 (13.7%). Overall mortality was 39 (21.4%).

	APACHE II Mean (SD)	Total LOS Mean (SD)	ICU LOS Mean (SD)	MVD Mean (SD)	Fistula R Mean (%)	Ostomy C Mean (%)	Mortality Mean (%)
DCL n=72 (39.6%)	**17.5** (7.0)	**36.0** (37.4)	**18.7** (32.8)	**11.0** (9.5)	-	-	12 **(16.7)$**
DA n=60 (83.3%)	17.4 (7.2)	36.7 (40.6)	19.5 (35.8)	11.2 (9.6)	16 **(26.7)****	-	12 **(20.0)**
DO n=12 (16.7%)*	17.6 (6.2)	32.7 (13.5)	14.7 (8.7)	10.4 (9.8)	-	3 **(25.0)**	0 **(0)**
DSP n=110 (60.4%)	**17.1** (5.9)	**27.4** (23.7)	**12.2** (13.0)	**7.2** (10.8)	-	-	27 **(24.5)$**
PA n=51 (46.4%)	17.6 (5.6)	32.0 (29.9)	13.9 (15.1)	7.6 (10.2)	19 **(37.2)****	-	13 **(25.5)**
PO n=59 (53.6%)*	16.6 (6.1)	23.6 (16.1)	10.8 (11.0)	6.9 (11.4)	-	13 **(22.0)**	14 **(23.7)**

LOS=length of stay, MVD=mechanical ventilation days, R=rate, C=complications, *$p<0.01$, **$p=0.32$, \$$p=0.2$

Conclusion: Disease severity was similar among both groups (APACHE II=17), however the incidence of ostomies was significantly lower in patients with DCL as opposed to those that underwent DSP ($p<0.01$). Furthermore, DCL resulted in a decreased fistula and mortality rate when compared to DSP. This data shows that DCL is a safe and reliable surgical strategy in severe NTSP patients requiring bowel resection.

NOTES

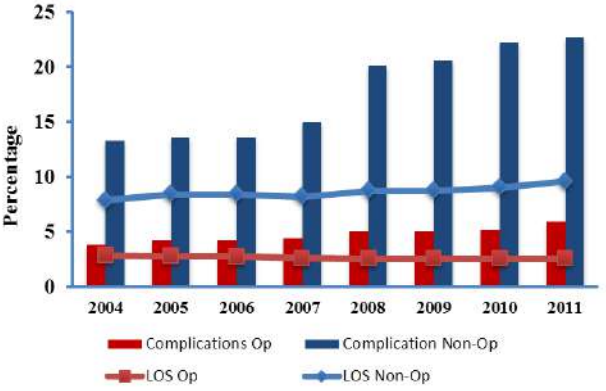
Session: V: Acute Care Surgery Papers 9-13
Paper 13: 8:50-9:10

ANTIBIOTICS FOR APPENDICITIS! NOT SO FAST

Mazhar Khalil MD, Bardiya Zangbar* MD, Peter Rhee* MD, MPH, Ansab A. Haider* MD, Narong Kulvatunyou* MD, Terence O'Keeffe* MD, Andrew Tang* MD, Rifat Latifi* MD, Randall S. Friese* MD, Gary Vercruysse* MD, Bellal Joseph* MD, University of Arizona - Tucson

Invited Discussant: Robert Sawyer, MD

Introduction:Emerging literature in acute appendicitis favors the non-operative management of acute appendicitis. However, the actual use of this practice on a national level is not assessed. The aim of this study was to assess the changing trends in non-operative management of acute appendicitis and its effects on patient outcomes.
Methods:We did an 8 year (2004-2001) retrospective analysis of National Inpatient Sample database. We included all in-patients with the diagnosis of acute appendicitis. Patients diagnosed with appendiceal abscess or patients who underwent surgery for any other pathology were excluded from the analysis. Jonckheere-terpstra trend analysis was performed for operative vs. non-operative management and outcomes.
Results:A total of 436,400 cases of acute appendicitis were identified. Mean age of the population was 33±19 years and 54% were male. There was no significant change in the number of acute appendicitis diagnosed over the study period ($p=0.2$). During the study period non-operative management of acute appendicitis increased significantly from 4.5% in 2004 to 6% in 2011 ($p<0.001$). Over the study period, hospital length of stay (5.6±7 to 6±8 days, $p<0.001$) and the rate of in-hospital complications (13% to 22%, $p<0.001$) increased significantly in non-operative management of appendicitis. When compared to operatively managed patients, non-operated patients has a higher hospital length of stay (6 ± 8 vs. 3 ± 4, $p<0.001$), in-hospital complications (18% vs. 5%, $p<0.001$), and hospital costs (35022 ± 70684 vs. 25968 ± 31795, $p<0.001$).
Conclusion:The non-operative management of appendicitis has increased over time; however, outcomes of non-operative management did not improve over the study period. A more in-depth analysis of patient and system demographics may reveal this disparity in trends.



NOTES

SCHOLARSHIP PRESENTATIONS

BY 2014-2015 AAST RESEARCH SCHOLARSHIP RECIPIENTS

THURSDAY, SEPTEMBER 10, 2015, 9:10 AM – 9:40 AM

LATOUR BALLROOM

PRESIDING: THOMAS M. SCALEA, M.D., AAST PRESIDENT

9:12 AM – 9:17 AM

Jacob Glaser, M.D.
UMMC/R Adams Cowley Shock Trauma Center
Baltimore, MD
AAST Research & Education Foundation Award (2014-2015)
Project Title: Through the Looking Glass: Will Early Noninvasive Imaging in TBI Predict the Need for Interventions?

9:19 AM – 9:24 AM

Jon Simmons, M.D.
University of South Alabama
Mobile, AL
AAST Research & Education Foundation Award (2014-2015)
Project Title: Mitochondrial DNA DAMPs – a pharmacological target in VAP

9:26 AM – 9:31 AM

Angela M. Ingraham, M.D., M.S.
University of Pittsburgh
Pittsburgh, PA
AAST Research & Education Foundation Emergency General Surgery Award
(2014-2015)
Project Title: Assessment of Emergency General Surgery Care Based Upon Quality Indicators

9:33 AM – 9:38AM

Jason Sperry, M.D., M.P.H
University of Pittsburgh
Pittsburgh, PA
The ACS, AAST and NIGMS Jointly Sponsored Mentored Clinical Scientist Development Award (K08/K23)
(2010-2015)
Project Title: Characterization of the mechanisms responsible for sex based outcomes following injury

SESSION VII:

SHOCK TRANSFUSION

PAPERS #14 - #17

THURSDAY, SEPTEMBER 10, 2015 10:00 AM – 11:20 AM

LATOUR BALLROOM

MODERATOR: CHRISTINE S. COCANOUR, M.D.

RECORDER: DAVID H. LIVINGSTON, M.D.

Session: VII: Shock Transfusion Papers 14-17
Paper 14: 10:00-10:20

The AAST Prospective Aortic Occlusion for Resuscitation in Trauma and Acute Care Surgery (AORTA) Registry: Data on contemporary utilization and outcomes of aortic occlusion and resuscitative balloon occlusion of the aorta (REBOA)

Joseph J. DuBose* MD, Tom Scalea* MD, Megan Brenner* MD, Dimitra Skiada MD, Kenji Inaba* MD, Jeremy Cannon* MD, Laura Moore* MD, John Holcomb* MD, David Turay MD, Xian Luo-Owen MD,Ph.D., Andrew Kirkpatrick* MD, James Xiao MD, David Skarupa* MD, Nathaniel Poulin* MD, R Adams Cowley Shock Trauma Center / University Of Maryland Medical System

Invited Discussant: Timothy Fabian, MD

Introduction: Resuscitative Aortic occlusion (AO) for resuscitation of patients in traumatic shock remains a controversial issue. Resuscitative Endovascular Balloon Occlusion of the aorta (REBOA) offers an emerging alternative to traditional AO.

Methods:The AAST Aortic Occlusion for Resuscitation in Trauma and Acute Care Surgery (AORTA) study group prospectively identified trauma patients requiring aortic occlusion from 8 ACS verified level I centers. Presentation, intervention and outcome variables were collected and analyzed. REBOA and open AO patients were compared.

Results: From Nov 2013-Feb2015, 114 AO patients were captured (46 REBOA; 68 Open); 80.7% male; 62.3% blunt injured. Median ISS was 31.5, arrival SBP < 90 mm Hg in 59.6%; 42.1% requiring pre-hospital CPR. AO occurred in the Emergency Department (ED) (73.7%) or Operating Room (OR) (26.3%). Improvement in hemodynamics with AO was observed in 62.3% [REBOA 29/67.4%; Open 42/61.8%); 36.0% achieving stability (SBP consistently > 90 mm Hg) [REBOA 22/46; 47.8%; Open 19/68; 27.9%, p = 0.014]. Reported access for REBOA was femoral cut-down (50%); US guided (10.9%) and percutaneous without imaging (28.3%). Imaging was used in 65.2% (52.2% plain film, 13.0% fluoroscopy). Deployment was achieved in zones I (78.6%), II (2.4%) and III (19.0%). Balloon migration occurred in 4.4%. A second AO attempt was required in 9.6% [REBOA 2/46, 4.3%; Open 9/68, 13.2%]. REBOA complications were rare (pseudoaneursym 2.1%; embolism 4.3%, 0% limb ischemia). There was no difference in time from AO initiation to successful completion between REBOA and Open patients [REBOA 6.6 ± 5.6 mins; Open 7.2 ± 15.1, p = 0.842]. There was no difference between REBOA or Open AO with regards to overall survival [Overall 21.1% (24/114); REBOA 28.2 (13/46); Open 16.1% (11/68); p = 0.120] or survival after AO initiation in the ED [Overall 9.5% (8/84); REBOA 15.2% (5/28); Open 5.9% (3/49); p = 0.16].

Conclusion: REBOA has emerged as a viable alternative to open AO in centers that have developed this capability. Ongoing maturation of the AAST AORTA database is required to determine the impact of REBOA utilization.

NOTES

Session: VII: Shock Transfusion Papers 14-17
Paper 15: 10:20-10:40

DAMAGE CONTROL RESUSCITATION AND EMERGENCY LAPAROTOMY: FINDINGS FROM THE PROPPR STUDY

Vicente J. Undurraga Perl MD, Brian Leroux Ph.D., Mackenzie R. Cook MD, Jeffrey D. Kerby* MD,Ph.D., Carolyn Williams RN, BSN, Kenji Inaba* MD, Charles E. Wade* Ph.D., Bryan A. Cotton* MD,MPH, Erin E. Fox Ph.D., Thomas M. Scalea* MD, Barbara C. Tilley Ph.D., John B. Holcomb* MD, Martin A. Schreiber* MD, for the PROPPR Study Group, Oregon Health & Science University

Invited Discussant: Ernest E. Moore, MD

Introduction: The Pragmatic Randomized Optimal Platelet and Plasma Ratios (PROPPR) trial has demonstrated that damage control resuscitation, a massive transfusion strategy targeting a balanced delivery of plasma-platelet-RBC in a ratio of 1:1:1, allows hemostasis to be achieved earlier in a higher percentage of severely injured patients than a 1:1:2 ratio, with a corresponding reduction in deaths due to exsanguination. With improved hemostasis, we hypothesized those patients receiving 1:1:1 ratio would have improved survival after emergency laparotomy.
Methods: Severely injured patients predicted to receive a massive transfusion admitted to 12 level I North American trauma centers were randomized to 1:1:1 versus 1:1:2 as described in the PROPPR trial. From these patients, the subset that underwent an emergency laparotomy, defined previously in the literature as laparotomy within 90 minutes of arrival, were identified. We compared rates and timing of emergency laparotomy as well as post-surgical survival at 24-hours and 30-days.
Results: Of the 680 enrolled patients, 613 underwent a surgical procedure, 359 underwent a laparotomy, and 310 underwent an emergency laparotomy. The proportions of patients undergoing emergency laparotomy were 48% (163/338) and 43% (147/342) for 1:1:1 and 1:1:2, respectively (p=0.20). Median time to laparotomy was 28 minutes in both treatment groups. Among patients undergoing an emergency laparotomy, the proportions of patients surviving to 24 hours and 30 days were similar between treatment arms, 24-hour 88.3% (144/163) for 1:1:1 and 85.0% (125/147) for 1:1:2 (p=0.49), and 30-day 81.6% (132/163) for 1:1:1 and 76.7% (112/147) for 1:1:2 (p=0.51).
Conclusion: We found no evidence that resuscitation strategy affects whether a patient requires an emergency laparotomy, time to laparotomy, or subsequent survival.

NOTES

Session: VII: Shock Transfusion Papers 14-17
Paper 16: 10:40-11:00

ANGIOGRAPHIC EMBOLIZATION FOR HEMORRHAGE FOLLOWING PELVIC FRACTURE: IS IT "TIME" FOR A PARADIGM SHIFT?

Ronald Tesoriero MD, Brandon Bruns MD, Mayur Narayan MD, MPH, MBA, Joseph Dubose* MD, Sundeep Guliani MD, Megan Brenner MD, Deborah Stein* MD, MPH, Thomas Scalea* MD, R Adams Cowley Shock Trauma Center

Invited Discussant: John Holomb, MD

Introduction: Major pelvic disruption with hemorrhage has a high rate of lethality. Angiographic embolization is the mainstay of treatment. Time spent awaiting mobilization of the resources needed to perform angiography allows ongoing hemorrhage. Alternative techniques, such as pre-peritoneal pelvic packing and aortic balloon occlusion (REBOA), now exist. We hypothesized that time to angiography and hemostasis using standard therapy would be vastly longer than anticipated.
Methods: A retrospective review was performed of all patients with pelvic fracture who underwent pelvic angiography at a level one trauma center over a 10 year period. The trauma registry was queried for age, sex, injury severity score (ISS), hemodynamic instability (HI) on presentation (SBP $\leq$ 90, HR $\geq$ 120), and transfusion requirements within 24hrs. Charts were reviewed for indications for, and time to, angiography, time to hemostasis by embolization, and mortality.
Results: 4712 patients were admitted with pelvic fractures during the study period. 344 (0.07%) underwent pelvic angiography. 71% were male. Mean age was 46 years. Mean ISS was 32. Mean 24 hour transfusion requirements were 9.4 units of RBC's and 11 units of FFP. 151 (43.9%) presented with HI and 104 (30%) received massive transfusion (MT). 212 (62%) had embolization. Median time to angiography was 286 min (interquartile range [IQR] 210-378) and time to hemostasis with embolization was 344 min (IQR 262-433). Median procedure time for embolization was 51 minutes (IQR 37-83). Times were significantly shorter when stratified for HI (HI 264 vs stable 309 min; $p=0.03$), and MT (MT 230 vs non-MT 317min; $p < 0.01$). However, time from admission to angiography still took nearly 4 hours. Overall mortality was 18%. Hemorrhage (16%) and sepsis/multiple organ failure (43.5%) accounted for most deaths.
Conclusion: Pelvic fracture hemorrhage remains a management challenge. In our trauma center, with robust resources, the median time to hemostasis was over 5 hours. Nearly 60% of deaths could be directly attributed to, or as a complication of, early uncontrolled hemorrhage. Earlier intervention by Acute Care Surgeons with techniques such as pre-peritoneal pelvic packing, REBOA, and utilization of hybrid operative suites with surgeon performed embolization may improve outcomes.

NOTES

Session: VII: Shock Transfusion Papers 14-17
Paper 17: 11:00-11:20

COMPUTED TOMOGRAPHY IN HEMODYNAMICALLY UNSTABLE SEVERELY INJURED TRAUMA PATIENTS

Juan P. Herrera-Escobar MD, Carlos A. Ordonez* MD, Juan C. Puyana* MD, Paola A. Rodriguez-Ossa MD, David A. Mejia MD, Alvaro Sanchez MD,Ph.D., Maria P. Garcia-Garcia MD, Monica Morales Statistician, Jhoana C. Rojas-Marquez MD, Amadeus Uribe Jose J. Serna MD, Luis F. Pino MD, Michael W. Parra MD, Universidad Del Valle

Invited Discussant: David Feliciano, MD

Introduction: Dynamic and efficient resuscitation strategies are now being implemented in severely injured hemodinamically unstable patients (HUP) as blood products become readily and more immediately available in the trauma room. Our ability to maintain aggressive resuscitation schemes in HUP allow us to complete diagnostic imaging studies before rushing patients to the operating room. As the criteria for performing CT scans in HUP continue to evolve, we evaluated our current practice in a cross sectional study at a regional level I trauma center over a two-year period (2012-2013).

Methods: Trauma patients (≥ 15 years old) with an injury severity score (ISS) >15 who met criteria of hemodynamic instability (Systolic Blood Pressure (SBP) <100 mmHg and/or Heart Rate >100 bpm and/or ≥4 units of Packed Red Blood Cells transfused in the trauma bay) were included. Isolated head trauma and patients who suffered a pre-hospital cardiac arrest were excluded. The main study outcome was mortality in both groups.

Results: We enrolled 171 patients. CT scans were performed in 80 HUP (47%) immediately upon arrival (CT Group); the remaining 91 patients (53%) went directly to the operating room (63 laparotomies, 20 thoracotomies), and/or 8 (9%) angio-suite (OA Group). Of the CT group, 43 (54%) were managed non-operatively, and 37 (46%) underwent surgery (15 laparotomies, 3 thoracotomies); and 2 (5%) angiography (CT OA Sub-Group). None of the mortalities in the CT group occurred in the CT suite or during their intra-hospital transfers.

Table 1. Hemodynamically Unstable Severely Injured Trauma Patients

Variables	OA Group (n= 91)		CT Group (n= 80)		p-value*
	Total*	Penetrating N=86(95%)	Total*	Penetrating N=37(46%)	
Age, mean (SD)	30.2 (12.1)	29.6 (11)	34.3 (15.5)	32.9 (16.7)	0.13
Male, n (%)	82 (90%)	78 (91%)	71 (89%)	36 (97%)	0.81
ISS, mean (SD)	25.9 (13.9)	25.6 (14)	27.5 (11.1)	26.3 (11.6)	0.02
HR, mean (SD)	113.6 (20)	113.8 (18.3)	111.7 (21.5)	110.8 (23)	0.35
SBP, mean (SD)	85.8 (22.3)	86.6 (22.2)	92.2 (18.6)	91.9 (15.7)	0.06
SBP <90 mmHg, n (%)	51 (56%)	47 (55%)	34 (43%)	15 (41%)	0.09
Patients with RBCT in ER, n (%)	42 (46%)	38 (44%)	19 (24%)	10 (27%)	< 0.01
Time (minutes), median (IR)	34 (20-62)	-	60 (50-75)	-	< 0.01
Mortality, n (%)	16 (18%)	13 (15%)	10 (13%)	2 (5%)	0.29

ISS: Injury Severity Score. Time: Time from admission to operating room HR: Hearth Rate
SBP: Systolic Blood Pressure RBCT: Red Blood Cells Transfusion ER: Emergency Room

Conclusion: There was no difference in mortality between CT and OA groups in HUP. CT scan was attainable in 47% of HUP and avoided surgery in 54% of the cases. Furthermore, CT scan was helpful in deciding definitive/specific surgical management in 46% scanned HUP that necessitated surgery post CT.

NOTES

THRUSDAY, SEPTEMBER 10, 2015, 11:30 AM – 12:30 PM

SESSION VIII: AAST PRESIDENTIAL ADDRESS

LOCATION: LATOUR BALLROOM

"While My Guitar Gently Weeps"

Thomas M. Scalea, M.D., President
American Association for the Surgery of Trauma

Honorable Senator Francis X. Kelly
Distinguished Professor in Trauma Surgery
Physician-in-Chief
System Chief for Critical Care
R Adams Cowley Shock Trauma Center
at the University of Maryland
Baltimore, MD
****

Presiding: Grace S. Rozycki, M.D., M.B.A.

AAST President-Elect, 2014-2015

SESSION IXA:

PAPERS #18 - #26

THURSDAY, SEPTEMBER 10, 2015, 2:00 PM – 5:00 PM

LATOUR BALLROOM

MODERATOR: ERIC J. VOIGLIO, M.D., Ph.D.

RECORDER: RAUL COIMBRA, M.D., Ph.D.

Session: XA: Papers 18-26
Paper 18: 2:00-2:20

A PROSPECTIVE, CONTROLLED CLINICAL TRIAL OF SURGICAL STABILIZATION OF SEVERE RIB FRACTURES

Yihan Lin MD, Maridi Rodil BS, Benoit Herbert MD, Robert Stovall* MD, Jeffrey Johnson* MD, Walter Biffl* MD, Ernest Moore* MD, Carlton Barnett* MD, Clay Cothren Burlew* MD, Charles Fox MD, Gregory J. Jurkovich* MD, Fredric Pieracci* MD, Denver Health Medical Center

Invited Discussant: Charles Adams, Jr., MD

Introduction: Previous studies of surgical stabilization of rib fractures (SSRF) have been limited by nonspecific fixation systems, small sample sizes, retrospective methodology, and inclusion of only patients with flail chest. We performed a prospective, controlled evaluation of SSRF as compared to optimal medical management for severe rib fracture patterns among critically ill trauma patients. We hypothesized that SSRF improves acute outcomes.

Methods: We conducted a two-year clinical trial at our level I trauma center. Patients with any of the following rib fracture patterns were included: flail chest; ≥ 3 fractures with bicortical displacement; ≥ 30% hemithorax volume loss; and either severe pain or respiratory failure despite optimal medical management. In the year 2013, all patients were managed non-operatively. In the year 2014, all patients were managed operatively. Standard analgesic, pulmonary toilet, and operative technique protocols were employed for both arms. Pulmonary contusions were quantified using the Blunt Pulmonary Contusion 18 (BPC18) score. Rib fracture pattern severity was quantified using the RibScore. Outcomes included respiratory failure (defined as need for mechanical ventilation), pneumonia, ventilator days, tracheostomy, length of stay, narcotic requirements, daily maximum incentive spirometer volume, and mortality. Univariate and multivariable analyses were performed. Data are expressed as mean (range), number (%), and odds ratio (OR) [95% confidence interval]. Statistical significance is $p<0.05$.

Results: 70 patients were enrolled; 35 in each group. For the operative group, time from injury to surgery was 2 days (0-3), operative time was 140 minutes (68 – 205), and the ratio of ribs fixed to ribs fractured was 0.47 (0.11 -1.00). The operative and non-operative groups were well matched with respect to age, body mass index, and pre-existing pulmonary disease. Injury patterns, including mechanism, injury severity score, and BPC18, were similar between groups. However, the operative group had a significantly higher RibScore (4 vs. 3, respectively, $p<0.01$) and a significantly lower incidence of intracranial hemorrhage (5.7% vs. 28.6%, respectively, $p=0.01$). After controlling for these differences, the operative group had a significantly lower likelihood of both respiratory failure (OR=0.22 [0.06, 0.77], $p=0.02$) and tracheostomy (OR=0.20, [0.05, 0.74], $p=0.02$). The average daily spirometry value was 280 mL higher in the operative group (59-850, $p=0.03$). Furthermore, there were non-significant trends towards a decreased likelihood of pneumonia (20.0% vs. 31.5%, respectively, $p=0.10$), ventilator days (6.4 vs. 10.6, respectively, $p=0.11$), ICU length of stay (8.3 vs. 10.4 days, respectively, $p=0.07$), and hospital length of stay (15.2 vs. 25.3 days, respectively, $p=0.11$) for the operative group as compared to the non-operative group. Narcotic requirements were comparable between groups. There were no mortalities.

Conclusion: In this clinical trial, SSRF as compared to best medical management appeared to improve acute outcomes among a group of critically ill trauma patients with a variety of severe fracture patterns.

NOTES

Session: XA: Papers 18-26
Paper 19: 2:20-2:40

LOW VOLUME RESUSCITATION FOR HEMORRHAGIC SHOCK: UNDERSTANDING THE MECHANISM OF PEG-20K

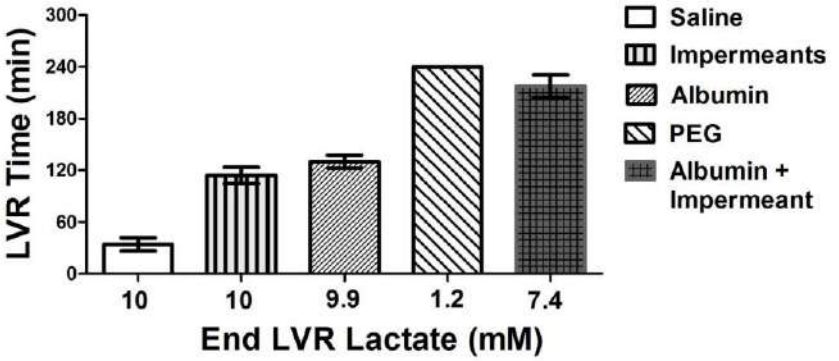
Valerie Plant MD, Dan W. Parrish MD, Susanne Lindell BSN, Ashley Limkemann MD, Heather Reichstetter LVT, Paula Ferrada* MD, Michel Aboutanos* MD, Martin J. Mangino Ph.D., Virginia Commonwealth University

Invited Discussant: Michael Dubick, PhD

Introduction: Hemorrhagic shock reduces oxygen delivery and compromises energy-dependent cell volume control, which leads to lethal cell swelling and no reflow from compressed capillaries. Ischemia-induced cell swelling can be reversed by cell impermeants such as raffinose, trehalose, gluconate, and polyethylene glycol-20k (PEG-20k), which also extend low volume resuscitation time (LVR) after shock. Of these impermeants, PEG-20k is orders of magnitude more effective. We hypothesize that PEG-20k acts as both an oncotic agent and an impermeant, which explains its superior performance by creating two osmotic gradients in the tissue for passive water movement. To support this, we tried to recapitulate the PEG-20k effect by using both a pure impermeant (gluconate) and oncotic (albumin) agent together.

Methods: Rats were hemorrhaged to a mean arterial pressure of 30-35 mmHg until arterial lactate reached 9-10 mM/L. Then, saline-based LVR solutions of 10% PEG-20k or 10% albumin/gluconate were administered at 10% blood volume. Once LVR is begun, the time for lactate to climb back to 9-10 mM/L was determined (LVR Time). A maximum time of 240 minutes was set.

Results: PEG-20k increased the LVR time 7-fold over the saline control and normalized blood pressure during the LVR period, relative to saline. The albumin-impermeant group extended the LVR time 6-fold over the saline control. Albumin alone or impermeants alone increased the LVR time 3-fold over saline, but the combination of both increased the LVR time almost as long as PEG-20k alone. Values are mean +/- SEM. All treatment groups are different from saline ($P<0.05$). Finally, the PEG and albumin-impermeant groups are not different.



Conclusion: These data are consistent with the hypothesis that PEG-20k may act as a hybrid impermeant and oncotic agent in low volume resuscitation following severe hypovolemic shock.

NOTES

Session: XA: Papers 18-26
Paper 20: 2:40-3:00

A SAFE AND EFFECTIVE MANAGEMENT STRATEGY FOR BLUNT CEREBROVASCUALR INJURY: AVOIDING UNNECESSARY ANTICOAGULATION AND PREVENTING STROKE

Charles P. Shahan MD, Louis J. Magnotti* MD, Shaun M. Stickley MD, Jordan A. Weinberg* MD, Leah E. Hendrick BA, Rebecca A. Uhlmann MS, Thomas J. Schroeppel* MD, Daniel A. Hoit MD, Martin A. Croce* MD, Timothy C. Fabian* MD, University of Tennessee Health Science Center - Memphis

Invited Discussant: Clay Cothren Burlew, MD

Introduction: Few injuries have produced as much debate with respect to management as have blunt cerebrovascular injuries (BCVI). Recent work (AAST 2013) from our institution suggested that 64-channel multi-detector computed tomographic angiography (CTA) could be the primary *screening* tool for BCVI. Consequently, our screening algorithm changed from digital subtraction angiography (DSA) to CTA, with DSA reserved for *definitive diagnosis* of BCVI following CTA positive studies or unexplained neurologic findings. The current study was done to evaluate outcomes, including the potential for missed clinically significant BCVI, since adopting this new management algorithm.

Methods: Patients who underwent DSA (positive CTA or unexplained neurological finding) over an 18-month period subsequent to the previous study (PS) were identified. Screening and confirmatory test results, complications, and BCVI-related strokes were reviewed and compared.

Results: 228 patients underwent DSA: 64% were male with mean age and Injury Severity Score of 43 and 22, respectively. 189 (83%) patients had a positive screening CTA. Of these, DSA confirmed injury in 104 (55%) patients; the remaining 85 (45%) patients (false positives) were found to have no injury on DSA. Five patients (4.8%) suffered BCVI-related strokes, unchanged from the PS (3.9%, p=0.756) – two were symptomatic at trauma center presentation, three occurred while receiving appropriate therapy. No patient with a negative screening CTA suffered a stroke.

Conclusions: This management scheme utilizing 64-channel CTA for screening coupled with DSA for definitive diagnosis was proven to be safe and effective in identifying clinically significant BCVI and maintaining a low stroke rate. Definitive diagnosis by DSA led to avoidance of potentially harmful anticoagulation in 45% of CTA positive patients (false positives). No strokes resulted from injuries missed by CTA.

NOTES

Session: XA: Papers 18-26
Paper 21: 3:00-3:20

MULTICENTER EVALUATION OF TEMPORARY INTRAVASCULAR SHUNT USAGE IN VASCULAR TRAUMA

Kenji Inaba* MD, Hande Aksoy MD, Juan Duchesne* MD, Rebecca Schroll MD, Jiselle Bock Heaney MD, Mark J. Seamon* MD, Joshua A. Marks MD, John A. Harvin MD, Ryan A. Lawless MD, Demetrios Demetriades* MD,Ph.D., LAC+USC Medical Center

Invited Discussant: Faran Bokhari, MD

Introduction: The indications, technical considerations and outcomes associated with Temporary Intravascular Shunting (TIVS) for vascular trauma in the civilian sector are poorly understood. The objective of this study was to perform a contemporary multicenter review of TIVS usage and outcomes.

Methods: Patients sustaining vascular trauma requiring TIVS insertion from 1/2005-12/2013 were retrospectively identified at four large US Level I trauma centers. Clinical demographics, operative details and outcomes were abstracted.

Results: A total of 271 vascular injuries (96.5% arterial) requiring TIVS were identified in 264 patients. Mean age 30.1 (range 4-89) years, 89.4% male, GCS 12.5±4.5, ISS 16.6±10.5, 20.8% ISS>25 and 75.6% penetrating. The most common mechanism was GSW (68.1%) followed by AvP (12.6%) and MVC (5.2%). Shunts were placed for Damage Control in 65.9%, staged repair for combined orthopedic and vascular injuries in 33.3% and for insufficient surgeon skillset in 0.7%. The most common vessel shunted was the SFA (26.1%) followed by Popliteal A (18.3%) and Iliac A (14.8%). The most common upper extremity vessel was the Brachial A (12%). The Argyle shunt (85.2%) was the most common conduit followed by chest tubes (9.2%). Average dwell time was 456 minutes (45-5400) with 10.6% placed on systemic heparinization. 74.8% survived to definitive repair, 72.6% survived overall. 97.3% of deaths occurred in those undergoing damage control shunting. Complications included thrombosis (13.4%), compartment syndrome (7%) and amputation (4.2%).

Conclusion: In the largest civilian experience with TIVS insertion to date, both damage control and staged orthopedic vascular injuries were found to be common indications for shunting. With an acceptable survival and complication rate, further prospective evaluation of its role in the management of vascular trauma is warranted.

NOTES

Session: XA: Papers 18-26
Paper 22: 3:20-3:40

THE PAINFUL TRUTH: THE DOCUMENTATION BURDEN OF A TRAUMA SURGEON

Joseph F. Golob, Jr., MD, John J. Como* MD, MPH, Jeffrey A. Claridge* MD, MS
MetroHealth Medical Center

Invited Discussant: Frederick Luchette, MD, MSc

Introduction: Implementation of the electronic medical record (EMR) has introduced several unintended consequences including introduction of unfavorable workflows and increased documentation demands. We intended to define the attending trauma surgeon's EMR documentation burden and its economic impact at a busy regional Level I trauma center.

Methods: A retrospective descriptive study was performed at an academic Level I trauma center. The EMR was queried to determine the number of documentation entries during 2014 for the eight attending trauma surgeons. These eight surgeons were then surveyed to estimate the duration of time it took to write each note type, and this mean time was used to calculate the total time needed for documentation. The hospital financial database was queried for 2014 hospital charges and work relative value units (WRVUs) for the trauma division and for the orthopaedic surgery and neurosurgery departments to generate a comparison. The charges and WRVUs were broken down into those generated from documentation (evaluation and management codes – E&M) and those generated from procedures (current procedural terminology codes – CPT).

Results: During 2014, there were 5,864 trauma activations with 3,111 patient admissions. The trauma attending surgeons wrote a total of 26,455 documentation entries. Seventy-four percent of these were progress notes, 15% were histories and physicals, 5% were operative notes, 3% were consults, and 3% were procedures. Of these notes, 92% were from inpatients. Documentation time estimates for the trauma service demonstrated that it took 1,760.5 hours or 73.3 24-hour days to complete these 26,455 notes. Financial data revealed that 44% of the trauma surgeon charges were directly related to documentation (Table 1). This compares to 14% for attending orthopaedic surgeons and 7% for attending neurosurgeons. Financial data also demonstrated that 55% of a trauma surgeon's WRVUs were directly related to documentation compared to 28% for orthopaedic surgeons and 19% for neurosurgeons (Table 2).

Table 1 – Total charges by E&M and CPT

	E&M Charges	**CPT Charges**	**Total Charges**
Trauma Surgery	$6,061,586 (44%)	$7,661,641 (56%)	$13,723,227
Orthopaedic Surgery	$4,245,376 (14%)	$25,631,894 (86%)	$29,877,270
Neurosurgery	$1,353,296 (7%)	$18,158,478 (93%)	$19,511,774
Total	$11,660,258 (18%)	$51,452,013 (82%)	$63,112,271

Table 2 – Total WRVUs by E&M and CPT

	E&M WRVUs	**CPT WRVUs**	**Total WRVUs**
Trauma Surgery	40332 (55%)	32371 (45%)	72703
Orthopaedic Surgery	31492 (28%)	80429 (72%)	111921
Neurosurgery	10657 (19%)	45907 (81%)	56564
Total	82481 (34%)	158707 (66%)	241188

Conclusion: Our data show that the EMR has introduced a significant documentation time burden to the busy academic trauma surgeon. The trauma surgeon's documentation burden is critical for defining hospital charges and WRVUs, and it differs from that of orthopaedic surgeons and neurosurgeons. Workflow changes, such as the introduction of scribes, may help the documentation burden and improve hospital charges and WRVUs of the trauma surgeon.

NOTES

Session: XA: Papers 18-26
Paper 23: 3:40-4:00

USE OF ENDOTRACHEAL TUBES WITH SUBGLOTTIC SECRETION DRAINAGE REDUCES VENTILATOR-ASSOCIATED PNEUMONIA IN TRAUMA PATIENTS

Jennifer L. Hubbard MD, Wade L. Veneman RRT, Rachel C. Dirks Ph.D., James W. Davis* MD, Krista L. Kaups* MD, MSc, UCSF Fresno

Invited Discussant: Andrew Kerwin, MD

Introduction: Patients suffering from traumatic injuries have a higher incidence of ventilator-associated pneumonia (VAP) compared to other critically ill patient populations. Previous studies of patients with predominantly medical diagnoses and use of endotracheal tubes allowing subglottic secretion drainage (ETT-SSD) have shown significant reduction in VAP rates. We hypothesized that use of ETT-SSD would reduce ventilator-associated pneumonia in trauma patients.

Methods: A retrospective review from 2010-2014 of adult trauma patients orotracheally intubated for more than 48 hours was performed at a level 1 trauma center. Patients were compared based on standard endotracheal tube (ETT) versus ETT-SSD. The primary outcome was incidence of VAP per 1000 ventilator days. The diagnosis of VAP was made by quantitative bronchoalveolar lavage (BAL) cultures as defined by Center for Disease Control (CDC) criteria.

Results: Of 1,135 patients included in the study, 667 patients had ETT and 468 had ETT-SSD. Groups did not differ by demographics, injury severity score (ISS), ICU length of stay, or total ventilator days. The VAP rate was lower in the SSD-ETT group and approached significance (SSD-ETT: 5.5 vs ETT: 7.8, p=0.059); however, the number of patients with a severe head or chest injury (AIS $\geq$ 3) differed between the two groups (p<0.001; p=0.031, respectively). Using binary logistic regression to control for these confounding variables, SSD-ETT was highly significant for reduction of VAP incidence (OR=0.6, 95% CI=0.4-0.9, p=0.027).

	ETT (n=667)	ETT-SSD (n=468)	P value
Mean Age (years)	44	45	0.42
ISS (mean)	24	25	0.68
Ventilatory days (mean)	13	13	0.69
ICU LOS	14	13	0.16
Chest AIS $\geq$ 3	311 (47%)	188 (40%)	0.031
Head AIS $\geq$ 3	350 (53%)	316 (68%)	<0.001
VAP rate	7.8	5.5	0.059

Conclusion: After controlling for confounding factors, ETT-SSD decreased overall VAP incidence in trauma patients. We recommend use of ETT-SSD in trauma patients to decrease VAP incidence in this high-risk patient population.

NOTES

Session: XA: Papers 18-26
Paper 24: 4:00-4:20

THE IMPACT OF PATIENT PROTECTION AND AFFORDABLE CARE ACT ON TRAUMA CARE: A STEP IN THE RIGHT DIRECTION

Bellal Joseph* MD, Ansab A. Haider MD, Bardiya Zangbar MD, Narong Kulvatunyou* MD, Mazhar Khalil MD, Andrew Tang* MD, Terrence O'Keeffe* MD, Rifat Latifi* MD, Donald J. Green* MD, Randall S. Friese* MD, Peter Rhee* MD, MPH, University of Arizona - Tucson

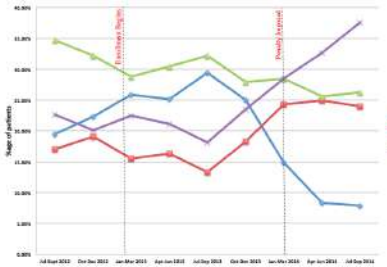
Invited Discussant: L.D. Britt, MD, MPH

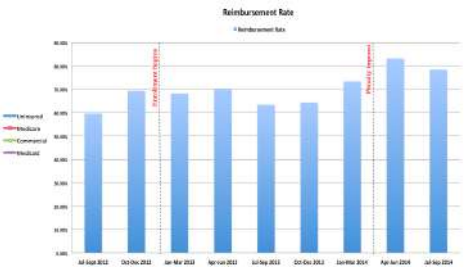
Introduction: The Patient Protection and Affordable Care Act (ACA) was implemented to guarantee health care for all Americans. The implementation of ACA is likely to influence the insurance status of Americans and reimbursement rates of trauma centers. The aim of this study was to assess the impact of ACA on the patient insurance status, hospital reimbursements and clinical outcomes at a Level I trauma center.

Methods: We performed a retrospective analysis of the trauma registry and financial database at our level I trauma center for a 27-month (July 2012- September 2014) period by quarters. Our outcome measures were: change in insurance status, hospital reimbursement rates (Total Payments/Expected Payments), and clinical outcomes pre and post-ACA (March, 2014). Jonckheere–Terpstra trend analysis was performed to assess trends in outcomes over each quarter (3 months).

Results: A total of 9,892 patients were included in the study. There was 15.1% reduction in the proportion of uninsured patients (23.2% vs. 8.1%; $p<0.001$) and a 13.8% increase in reimbursement rate (80.7% vs. 66.9%; $p<0.001$) in the post ACA period compared to the pre-ACA period. There was no difference in the mortality rate ($p=0.18$), complication rate ($p=0.67$), and hospital length of stay ($p=0.06$) between the two groups.

On trend analysis, there was a significant decrease ($p<0.001$) in the proportion of uninsured patients and commercially insured patients. During this same time there was a significant increase in Medicaid and Medicare patients. The hospital reimbursement rates ($p<0.001$) significantly increased over the study period. **(Figures 1 and 2)**





Conclusion: The implementation of ACA has led to a decrease in the number of uninsured and commercially insured trauma patients. There was a significant increase in Medicare and Medicaid trauma patients. This was associated with an increase in hospital reimbursements that substantially improved the financial revenues of trauma centers. There were also trends towards decreased rate of hospital admissions and shorter hospital length of stay.

NOTES

Session: XA: Papers 18-26
Paper 25: 4:20-4:40

VOLUMETRIC ANALYSIS OF DAY OF INJURY COMPUTED TOMOGRAPHY IS ASSOCIATED WITH REHABILITATION OUTCOMES AFTER TRAUMATIC BRAIN INJURY

Sarah Majercik* MBA,MD, Joseph Bledsoe MD, Joel MacDonald MD, Ryan Barrett MS, Susan Horn Ph.D., Michael Larson Ph.D., Ramona O. Hopkins Ph.D., David Pisani MD, Mark H. Stevens MD, David Ryser MD, Intermountain Medical Center

Invited Discussant: David Livingston, MD

Introduction:Quantitative neuroimaging is a relatively underused modality to classify severity and to predict outcomes of traumatic brain injury (TBI). Specific volumetric analysis of traumatic lesions in the acute setting has rarely been used to predict long-term patient outcomes after TBI. The purpose of this study was to investigate the relationship between acute brain injury lesion volume and eventual rehabilitation outcomes in patients with TBI at a single Level One Trauma Center.

Methods: All patients with a TBI who were admitted to our in-house rehabilitation unit after a stay on the acute care trauma service between February 2009 and July 2011 were prospectively identified and analyzed. Hospital and rehabilitation data points including demographic data and outcome variables such as cognitive and motor FIM scores, length of stay in the rehabilitation unit, and ability to return to home/independent living were abstracted from the medical record and the trauma registry. Cortical structure and injury lesion volumetrics were quantified in cubic centimeters on day-of-injury brain computed tomography (CT) scans using computer software created for this task. A multiple step-wise regression model using 13 independent variables (age, ISS, Head AIS, brain injury volume, Rotterdam score 1 or 2, Rotterdam score 3 or 4, Rotterdam score 5 or 6, anti-platelet agent use at admission, warfarin use at admission, ED GCS, need for neurosurgical procedure, need for endotracheal intubation in the field or in the hospital) was created to identify variables that predict outcomes after rehabilitation. $P<0.05$ was considered significant.

Results: 96 patients over the study period met inclusion criteria and had sufficient data to analyze. Mean age was 43±21 years, admission GCS was 8.4±4.8, ISS was 24.7±9.9, and head AIS 3.73±0.97. Acute hospital length of stay (LOS) was 12.3±8.9 days and rehabilitation LOS was 15.9±9.3 days. Volume of TBI lesions on the day of injury was negatively associated with cognitive FIM at the time of admission ($p=0.004$) and discharge ($p=0.004$) from the rehabilitation unit. Size of TBI lesions was also negatively associated with ability to be discharged to home after the rehabilitation stay ($p=0.006$). Day of injury TBI lesion volume did not show any association with 9-month FIM scores.

Conclusion: In a cohort of patients with moderate to severe TBI requiring a rehabilitation unit stay after the acute care hospital stay, day of injury brain injury lesion volume is associated with cognitive outcomes as measured by FIM at the time of admission and discharge from the rehabilitation unit. Further, injury volume also relates with ability to return to home. Volumetric imaging may have important implications in the future to help surgeons make realistic predictions in the acute phase about ultimate outcomes in TBI patients.

NOTES

Session: XA: Papers 18-26
Paper 26: 4:40-5:00

DISCOVERING THE TRUTH ABOUT LIFE AFTER DISCHARGE: LONG-TERM TRAUMA RELATED MORTALITY

Rachael A. Callcut MD, MSPH, Glenn Wakam BS, Amanda S. Conroy BA, Lucy Z. Kornblith MD, Benjamin M. Howard MD,MPH, Eric M. Campion MD, Mary F. Nelson RN, MPA, Matthew W. Mell MD, MS, Mitchell J. Cohen* MD, University of California, San Francisco

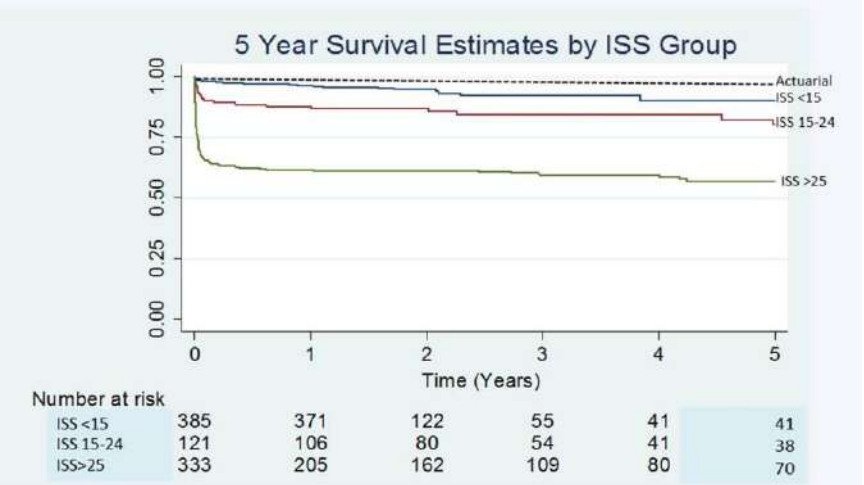
Invited Discussant: Alicia Mangram, MD

Introduction: Outcome after traumatic injury has typically been limited to determination at the time of discharge from the incident hospitalization or brief follow-up. This study is the first to investigate the natural history of long-term survival following traumatic injury.

Methods: All highest level activation patients prospectively enrolled in an on-going cohort study from 2005-2012 were selected. To allow for long-term follow-up, patients had to be enrolled at least 1 year prior to the latest available data from the National Death Index (NDI 2013). Time and cause of mortality was determined based upon institutional medical records or death certificates. Survival status was determined by the latest date of either care in our institution or query from the NDI. Kaplan-Meier curves were created stratified for injury severity (ISS). Survival was compared with estimated actuarial cohort survival based on age, gender, and race.

Results: 908 highest level activation patients with a median ISS of 18 were followed for a median 1.7 years (IQR 1.0 – 2.9 years) with a maximum follow-up of 9.8 years. Survival data was available on 99.8% of patients. Overall survival was 73% (663/908). For those with at least 2 year follow-up, overall survival was only 62% (317/509). Severity of injury predicted long-term survival (p<.0001) with those severely injured having the poorest outcome (57% survival at 5 years). For all ISS groups, survival was worse than predicted actuarial survival [p<0.001, FIGURE]. Excluding early deaths (<=30 days), observed survival was still significantly lower than estimated actuarial survival from day 31 to 5 years across ISS groups [p<0.002]. 18% (45/245 deaths) of all deaths occurred after 30 days and 80% (36/45) of these occurred post-hospital discharge. Amongst late deaths, 53% occurred between 31 days to 1 year post trauma. Trauma related mortality was the leading cause of post-discharge death accounting for 41% of the late deaths.

Conclusion: Post-discharge deaths represent a significant percentage of total trauma related mortality especially for those severely injured. Despite having 'survived' to leave the hospital, long term survival was worse than predicted actuarial survival suggesting that the mortality from injury does not end at 'successful' hospital discharge. Efforts should be undertaken to track deaths beyond hospital discharge to understand the true outcome following trauma.



NOTES

SESSION IXB:

PAPER #27 - #35

THURSDAY, SEPTEMBER 10, 2015, 2:00 PM – 5:00 PM

LAFITE 1, 2 & 3

MODERATOR: RONALD M. STEWART, M.D.

RECORDER: EDWARD E. CORNWELL, III, M.D.

Session: XB: Papers: 27-35
Paper 27: 2:00-2:20

TRAUMA SYSTEM REGIONALIZATION IMPROVES MORTALITY IN PATIENTS REQUIRING TRAUMA LAPAROTOMY

David W. Schechtman BS, Jack C. He MD, Debra Allen RN, BSN, Jeffrey A. Claridge* MD, MetroHealth Medical Center

Invited Discussant: Patrick Reilly, MD

Introduction: A regional trauma network (RTN) consisting of multiple hospital systems and collaboration with local EMS was established in 2010 to improve trauma outcomes. This study evaluates the impact of the trauma network on patient survival, ICU length of stay, and hospital length of stay in patients who required trauma laparotomy.
Methods: Patients who arrived via EMS and required trauma laparotomy from January 2008 to December 2013 were analyzed. Patients admitted during 2008-2009 and 2011-2013 were designated as pre-RTN and RTN groups respectively. 2010 was excluded as a transitional year. The primary outcome of the study was mortality. The two groups were also compared for age, gender, mechanism of injury, injury severity score (ISS), admission to procedure start time, length of stay, number of ICU days, and level of admitting trauma center.
Results: 569 patients were analyzed, 231 patients were pre-RTN and 338 were in the RTN group. Overall, mean age was 35.7 ± 17.1 and median ISS was 16 (25-75th percentile: 9-26). The two groups were compared in Table 1. Overall there was a 33% relative reduction in mortality from the pre-RTN to RTN group (p=0.035), and 29.7% more patients were triaged to a level I trauma center in the RTN group (p<0.001). Logistic regression showed that being in the RTN group was an independent predictor for survival (p=0.026) with odds ratio of 0.53 (95% CI 0.30-0.93). Patients with penetrating trauma had a non-significant decrease in mortality and a reduction of one day of ICU stay (p=0.001). Patients with blunt trauma had a significant reduction in mortality from 38.3% in the pre-RTN group to 22.6% in the RTN group (p=0.017).

All Patients	*Pre-RTN (n=231)*	*RTN (n=338)*	*p - value*
Age (mean ± SD)	36.3 ± 18.0	35.4 ± 16.4	ns
ISS (median, IQR)	16 (9-26)	16 (9-25)	ns
Male	85.7%	82.0%	ns
Blunt Trauma	35.1%	34.0%	ns
Triaged to a Level 1 Trauma Center	66.7%	96.4%	**<0.001**
ICU Days (median, IQR)	2 (0-6)	1.5 (0-6)	**0.047**
Hospital Mortality	19.9%	13.3%	**0.035**

Table 1 (SD, Standard deviation; IQR, interquartile range)

Conclusion: This study focused on the unique patient population that required trauma laparotomies. It showed trauma system regionalization led to a significant increase in the number of patients triaged to a level I trauma center, and reduction of ICU length of stay. More importantly, it demonstrated the benefit of regionalization by showing a significant reduction of hospital mortality in this critically injured patient population.

NOTES

Session: XB: Papers: 27-35
Paper 28: 2:20-2:40

TRAUMA CENTER CARE IS ASSOCIATED WITH REDUCED READMISSIONS AFTER INJURY

Kristan L. Staudenmayer* MD, MS, Thomas G. Weiser MD,MPH, Paul Maggio* MBA,MD, David Spain* MD, Renee Hsia MD, MSc Stanford University

Invited Discussant: Adil Haider, MD

Introduction: Trauma center care has been associated with improved mortality. It has not been shown if trauma center care is associated with readmissions at a population level. We hypothesized being treated in a trauma center would be associated with reduced readmission rates due to improved care.

Methods: We conducted a retrospective analysis of all hospital visits in California for patients with trauma using the Office of Statewide Health Planning and Development Database from 2007-2008. All hospital admissions and emergency department visits associated with injury were longitudinally linked. Counties were organized into those with and without trauma centers. Regression models were developed to predict readmissions controlling for patient variables, length of stay for initial hospitalization, living in a region with trauma center access, and triage patterns.

Results: A total of 211,404 patients were included in the analysis. Of these, 5,094 (2%) died during the index hospitalization. Of those who survived their initial hospitalization, 79,123 (38%) experienced one or more readmissions within one year. The majority of these were single admissions (n=42,043; 60%), but 40% (n=28,280) experienced multiple readmissions. Over 67% of readmissions were unplanned, and 8% of readmissions were associated with a primary diagnosis of trauma. After controlling for patient variables known to be associated with readmissions, triage to a Level I or II trauma center reduced the odds of readmission compared to not receiving care at a Level I or II trauma center (OR 0.89, $p<0.001$). The association between trauma center care and a reduction in readmissions at one year was also significant, but the magnitude of the effect was less (OR 0.96, $p<0.001$). Other factors associated with readmissions at both 30 days and one year included age, number of comorbidities, injury severity, and length of stay.

Conclusion: Readmissions after injury are common and are often unscheduled. While patient factors play a role in this, care at a trauma center is associated with decreased odds for re-admission, even when controlling for severity of injury. This suggests the benefits of trauma center care extend beyond improvements in mortality to improved long-term outcomes and ultimately reduced resource utilization.

NOTES

Session: XB: Papers: 27-35
Paper 29: 2:40-3:00

RURAL TRAUMA TEAM DEVELOPMENT COURSE DECREASES TIME TO TRANSFER FOR TRAUMA PATIENTS

Bradley M. Dennis MD, Oliver L. Gunter* MD,MPH, Melissa D. Smith RN, MSN, Catherine S. Wilson RN, MSN, ACNP-BC, Michael A. Vella MD, Mayur B. Patel MD,MPH, Timothy C. Nunez* MD, Oscar D. Guillamondegui* MD,MPH, Vanderbilt University Medical Center

Invited Discussant: Eric Kuncir, MD, MS

Introduction: The Rural Trauma Team Development Course (RTTDC) teaches initial management of the trauma patient to critical access hospitals with limited resources. The course emphasizes early stabilization and rapid transfer to definitive care with limited use of radiologic adjuncts. We hypothesize that the RTTDC will reduce the time from arrival to transfer.

Methods: We conducted a pre/post analysis of trauma patients who were transferred from critical access outside hospitals from 2012-2014. Data collected included demographics; ISS; CT imaging; method of transfer; times of arrival, call for transfer and discharge from outside hospital; and mortality. Using a difference-in-differences model, we compared transfer times of patients from critical access hospitals that participated in an RTTDC course to a control group of patients from similar centers that did not take part in the course. The model was adjusted for demographics, injury mechanism and ISS. Primary outcome was time to outside hospital transfer. Secondary outcomes were CT imaging rates and mortality.

Results:253 patients were available for study. Demographics, CT imaging and mortality rates were similar between the two groups. ISS was higher in the control group overall (17 vs 13, p=0.02), but remained consistent for each group across both time periods. The RTTDC group showed a 58-minute decrease (Figure) in time from arrival to call for transfer (p=0.01) and a 73-minute reduction in time to transfer (p=0.002). Compared to the control group, the RTTDC group had significantly greater reduction in time from arrival to transfer (-62 minutes, p=0.02).

Conclusion:RTTDC training significantly improved times to contact and transfer of rural patients to a trauma center without increasing mortality rate. There was no difference in the prevalence of CT imaging in either group. RTTDC is an effective trauma outreach program to improve the timeliness of patient transfers from critical access hospitals to regional trauma centers.

Pre/post comparison, individualized by exposure groups.

Variable	Pre	Post	
Arrival to call (min)	RTTDC pre	RTTDC post	*p-value*
	134 (71-176)	76 (54-131)	0.01*
	Control pre	Control post	
	100 (65-144)	121.5 (73.5-165)	0.28
OSH transfer time (min)	RTTDC pre	RTTDC post	*p-value*
	195 (120-251)	122 (91-176)	0.002*
	Control pre	Control post	
	153 (105-205)	184.5 (110-237.5)	0.31

NOTES

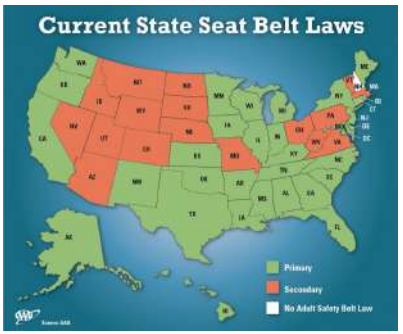
Session: XB: Papers: 27-35
Paper 30: 3:00-3:20

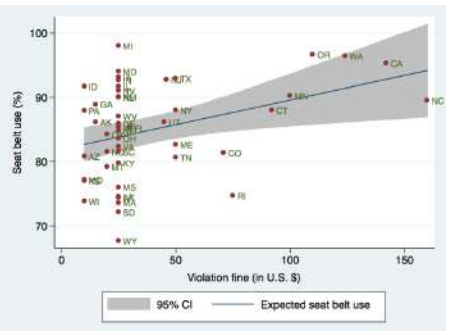
PRIMARY SAFETY BELT LEGISLATION AND HIGHER VIOLATION FINES SAVE LIVES

George Kasotakis MD,MPH, Pieter Smit MD, Alyssa VonPuttkammer BS, Lisa Allee MSW LICSW, Bedabrata Sarkar MD,Ph.D., Kofi Abbensetts MD, Robert Schulze* MD, Peter Burke* MD, Boston University Medical Center

Invited Discussant: Rochelle Dicker, MD

Introduction: Motor vehicle collisions (MVC) remain the primary cause of mortality among people aged 5-35 in the US, and a major source of morbidity in all age groups. While MVC-related morbidity and mortality has multiple contributing factors, the primary common end pathway is rapid deceleration. Although seat belts are widely known to mitigate this - reducing fatalities by 45-60% and preventing 50-65% of moderate to severe injuries – their use remains suboptimal. Several factors affect safety belt utilization, including age, socioeconomic status, public safety education programs, and state legislation (primary vs. secondary laws, and fine level associated with infractions). While the former factors are problematic or costly to intervene on, state legislation may be easier to target.
Methods: Data were obtained from the National Highway Traffic Safety Administration (NHTSA) and the Centers for Disease Control (CDC) regarding each of the 50 states' type of legislation and safety belt violation fines. Pertinent literature was also reviewed. A goal of increasing seat-belt use from the current rate of 85% to 90% was identified as appropriate at this stage. Data were reviewed to identify a relationship between legislation type and seat belt use, and regression models were fitted to measure the association between seat belt use and type of state legislation / levels of violation fines.
Results: Only 31 states currently have primary seat belt legislation. Enactment of, or upgrade to primary laws led to an increase in seat belt use by 33% (IQR 20-44%) and 14% (IQR 9-23%) respectively, while fatalities due to MVC decreased by 8% (IQR 3-14%). The average nationwide fine was also deemed to be 'affordable' at $39.50 (IQR $25-48) and fine level was found to be a strong predictor of seat belt use (effect estimate 0.08, 95% C.I. 0.02-0.13, p=0.01). By upgrading to primary safety belt legislation and increasing the fine to ≥$100, it is estimated that a 5.6-6.9% increase in seat belt use can be anticipated. This usage increase is estimated to help prevent 20,625 serious injuries, and save 1,417 lives and $4.5B in healthcare, property, and lost productivity annually.
Conclusion: All states should upgrade safety belt legislation to primary and increase fine levels to ≥$100. This would lead to significant reduction in MVC-associated morbidity and deaths.





NOTES

Session: XB: Papers: 27-35
Paper 31: 3:20-3:40

GEOGRAPHIC DISTRIBUTION OF TRAUMA CENTERS AND INJURY RELATED MORTALITY IN THE UNITED STATES

Joshua B. Brown MD, Matthew R. Rosengart* MD,MPH, Timothy R. Billiar* MD, Andrew B. Peitzman* MD, Jason L. Sperry* MD,MPH, University of Pittsburgh

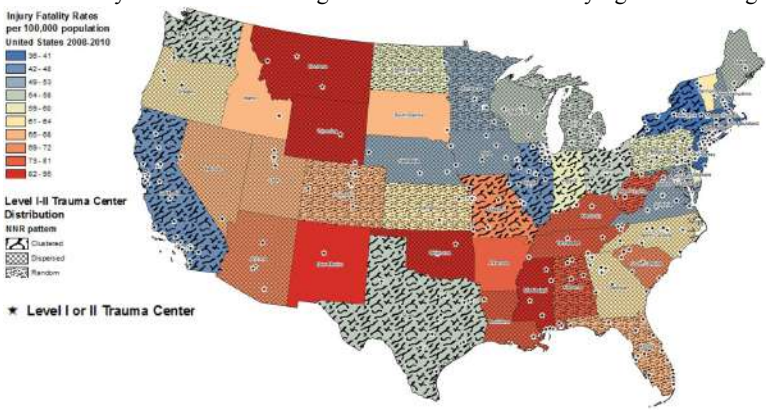
Invited Discussant: James Haan, MD

Introduction: Regionalized trauma care improves outcomes; however access to care is not uniform across the US. The objective was to evaluate whether geographic distribution of trauma centers is correlated with injury mortality across state trauma systems.

Methods: Level I and II trauma centers in the contiguous US in 2010 were mapped. State-level age-adjusted injury fatality rates per 100,000 people from 2008-10 were obtained. Fatality rates were evaluated for spatial autocorrelation using Moran's I. Nearest neighbor ratio (NNR) was obtained for each state. A NNR<1 indicates clustering while a NNR>1 indicates dispersion of state trauma centers. NNR were tested for significant difference from a random geographic distribution. Spearman correlation was performed between NNR and fatality rates. Mean fatality rate was compared between states with trauma center clustering vs dispersion. OLS and spatial-lag regression determined the association between fatality rate and NNR, controlling for state characteristics including ISS, air medical bases, income, education, and ratio of level I:II centers. Subgroup analyses were performed for firearm, violent, MVC, and TBI mortality.

Results: Injury fatality rates were spatially autocorrelated (Moran's I=0.35, p=0.001). Nine states had a clustered pattern (median NNR 0.55, IQR 0.48-0.60), 22 had a dispersed pattern (median NNR 2.00, IQR 1.68-3.99), and 10 had a random pattern (median NNR 0.90, IQR 0.85-1.00) of trauma center geographic distribution (7 states had ≤1 centers). Figure 1 illustrates fatality rates and geographic distribution pattern by state. Fatality rate and NNR had a small but significant correlation (r_S=0.34, p=0.03). Clustered states had a significantly lower fatality rate compared to dispersed states (53.5±9.9 vs 64.8±14.2, p=0.04). Spatial-lag regression outperformed standard OLS regression (LRT p=0.01) and demonstrated fatality rates increased 0.02 per 100,000 people for every 1 unit increase in NNR (p<0.01). Clustered states had lower fatality rates for MVC and TBI fatality rates, but not for firearm and violent fatality rates.

Conclusion: Geographic distribution of trauma centers appears to influence injury mortality with a more clustered pattern of state trauma centers associated with lower injury fatality rates. These results may have implications for trauma system planning and further study is needed to investigate the mechanisms underlying these findings.



NOTES

Session: XB: Papers: 27-35
Paper 32: 3:40-4:00

IMPACT OF A STANDARDIZED PRE-HOSPITAL TRAUMA TRIAGE PROTOCOL IN A RURAL STATE

Alison Wilson* MD, Nicole Cornell MS, Sherry Rockwell RN, David Kappel MD, West Virginia University

Invited Discussant: Robert Winchell, MD

Introduction: Rural trauma systems are challenged by EMS variation. A standardized, statewide, pre-hospital triage protocol was adopted. This study was to evaluate the impact of implementation of the protocol.

Methods: Retrospective analysis of state trauma registry evaluating 2 years before (PRE) and after (POST) implementation of standardized statewide triage protocol.

Results: There were 11,182 patients in the PRE group and 11,419 in the POST group. There was ↑ of trauma activations based on physiology (9.8% vs 14.5%, p<.0001) and ↓ based on mechanism (p<.0003) or anatomy (p<.0010). Full trauma team activations (FTTa) after patient arrival were ↓ by 20% (p<.0039) with ↑ of FTTa before arrival (p<.04). There was no difference in partial team activations. FTTa prior to arrival who had an ISS<9 decreased (p<.0014). ED LOS for ventilated patients ↓ by 30 min (p<.0001). The # of pts transported from scene to Level 1,2 ↑ while those transported to Level 3,4 ↓ (p<.0061). Transfers ↓ by 3% (p<.038). In Level 3,4 hospitals, pts requiring mechanical ventilation (MV) ↓ 50% (p<.0001). Of MV patients, ED LOS ↓ 63 min (p<.0001). LOS for non-ventilated patients did not ↓. Pts. in Level 3,4 with an ISS>24 decreased by 1/3 (p<.0008) but no ↓ in mortality. Statewide mortality decreased by 6% (p<.03)

	PRE	POST	p value
Scene to Level 1,2	31.5%	33.0%	0.006
Transferred	5.25%	4.94%	0.038
FTTa after Arrival	4.1%	2.7%	0.0013
ED LOS (mean in min)	151	120	<0.0001
Statewide Mortality	1.9%	1.68%	0.038

Level 3,4	PRE	POST	p value
Scene to Level 3,4	18.0%	17.5%	0.006
ISS > 24	1.43%	.95%	0.0008
Mech. Vent (MV)	9.71%	4.3%	<0.0001
MV ED LOS (mean min)	199	136	<0.0001

Conclusions: A standardized, statewide EMS triage protocol was successfully implemented and resulted in improvement in FTTa prior to patient arrival and improved field triage to a higher level of care as seen by ↑ field transports to Levels 1,2 with ↓ in 3,4 and ↓ transfer rates. The # of severely injured patients at Level 3,4 ↓ with decreased ED LOS for MV pts. The reduction in statewide mortality equates to ≈ 25 lives per year.

NOTES

Session: XB: Papers: 27-35
Paper 33: 4:00-4:20

PEDIATRIC GUNSHOT WOUND RECIDIVISM: IDENTIFICATION OF HIGH-RISK YOUTH

Peter Gibson MD, Adam D. Fox* DO, DPM, Irfan Ahmed MD, Rutgers-NJMS University Hospital

Invited Discussant: Jeffrey Upperman, MD

Introduction: Until recently, studies analyzing demographics and mechanisms of injury have not addressed the pediatric population. Although penetrating injury is the most common reason for pediatric trauma recidivism, there is a paucity of literature specifically looking at this population. With more than 11% of pediatric patients shown to not survive penetrating injuries, gunshot wounds (GSW) present a significant concern for children and their communities. The objective of this study was to identify those in the pediatric community at the highest levels of risk for suffering GSW on multiple occasions. Compiling patient demographic information, a population can be identified for implementation of appropriate interventions.

Methods: A retrospective review querying our urban level 1 trauma database was performed. Patients aged 0-18 sustaining GSW from 2000 to 2011 were selected. This was further refined to include those who returned to the hospital for another injury by firearm. Demographic data, including age of initial and subsequent presentation, gender, race, zip code, home address, and disposition of hospital stay were compiled. Local city data was compiled by zip codes as well as high schools within these areas. Demographics were analyzed for each patient domicile, proximity to local high schools, and the proximity to our level 1 trauma center.

Results: Over the 12 year study period 896 pediatric patients were discharged from the hospital after initial firearm injury with subsequent 8.8 % recidivism rate. All recidivists were male with the majority being African American (94.9 %). 14% of the time recidivists were between ages 13-15 and 86% were 16-18 at the time of first injury [Figure 1]. Recidivists overall mortality rate was 11.4 %. The subsequent incident occurs within the first year, two years, or three years 32%, 53% and 69% of the time respectively. Nine individuals in our study group suffered GSW on three separate occasions with a mortality rate of 22%. Regarding the domicile, 53 % of the patients were located in one of four zip codes which border one another and contain four public high schools. The remaining recidivists were dispersed throughout an area of 25 miles covering multiple school districts [Figure 2].

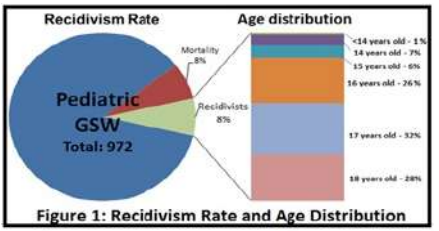


Figure 1: Recidivism Rate and Age Distribution

Conclusion: Recent data has shown that the trend of firearm violence is once again rising. This is a societal problem which cannot be ignored, and only through identifying those most at risk, can interventions be effective. Utilizing demographic data we have been able to identify an at-risk population where there is a greater than a one in twelve chance of getting shot multiple times. Also, we demonstrated a time frame in which the level of risk remains elevated. This study plays an important role in identifying an understudied at-risk population. Utilization of this type of demographic data can help target those at highest risk by allocating resources that can have the greatest impact on this societal burden.

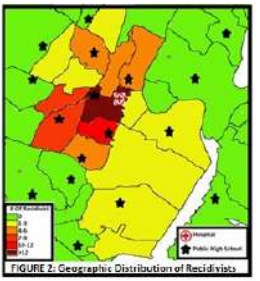


FIGURE 2: Geographic Distribution of Recidivists

NOTES

Session: XB: Papers: 27-35
Paper 34: 4:20-4:40

TRENDS OF HOSPITALIZATIONS, DEATHS, AND COSTS FROM TRAUMA PATIENTS IN THE UNITED STATES, 2005-2010

ALVARO I. SANCHEZ ORTIZ MD, MS, ROBERT T. KRAFTY Ph.D., MAURICIO A. RAMIREZ MD, MATHEW ROSENGART* MD,MPH, ANDREW B. PEITZMAN* MD, JUAN CARLOS PUYANA* MD, University of Pittsburgh

Invited Discussant: Nicole Stassen, MD

Introduction: There have been studies reporting declines in injury specific trends over time in the United States (US); nonetheless, injuries remain an important public health problem for this country. To properly allocate resources, trauma related trends require updating and characterization across the US. We aimed to evaluate trends of yearly estimates of hospitalizations, deaths, and costs (adjusted for inflation over time) associated with hospitalized injury patients.
Methods: From six years (2005-2010) of the Nationwide Impatient Sample (NIS) database, patients with discharge diagnoses of trauma were analyzed. Patients with severe (injury severity score>16) and with penetrating trauma were also analyzed separately. Yearly odds of hospitalizations and deaths and yearly averages of log-transformed costs were assessed using multilevel regressions controlled for demographics, comorbidity measures, and hospital characteristics. Analyses were repeated by US regions.
Results: There were 2,752,514 hospital discharges of trauma patients, accounting for 5.7% of total NIS discharges during 2005-2010. Fall-related injury accounted for 45.2% of trauma patients. Hospitalizations increased significantly from 5.5% to 6.3% during 2005-2010 (OR 1.025, 95%CI 1.014-1.036, $p<0.001$). In penetrating trauma, hospitalizations increased significantly over time only in the South region (OR 1.026, 95%CI 1.017-1.036, $p<0.001$). Overall mortality was 2.5%; it decreased significantly over time (OR 0.976, 95%CI 0.970-0.983, $p<0.001$). For penetrating trauma, mortality increased significantly (OR 1.044, 95%CI 1.011-1.078, $p=0.008$) during 2005-2010. Median costs decreased from $10,236 in 2005 to $9,299 in 2010 ($\beta$ -0.025, 95%CI -0.025 -0.024, $p<0.001$), a trend that was consistent among all US regions.
Conclusion: Trends for trauma showed increased trends in hospitalizations but substantial reductions in mortality and costs, perhaps related to continuous improvements in trauma care across the US. However, there were some demographic and regional variations. Trauma patients are becoming more comorbid and uninsured. In addition, falls became the leading mechanism of injury. Finally, mortality for penetrating trauma is increasing significantly over time. More effective fall prevention programs may reduce the burden of trauma-related hospitalizations. Violence and injury prevention efforts and trauma resources will need to be directed to accommodate the increasing trends of penetrating trauma.

NOTES

Session: XB: Papers: 27-35
Paper 35: 4:40-5:00

IMAGING PRIOR TO TRANSFER TO DESIGNATED PEDIATRIC TRAUMA CENTERS (PTCs) EXPOSES CHILDREN TO UNNECESSARY RADIATION

Yana Puckett MD, Matthew Caley MD, Shannon W. Farmakis MD, Louis W. Bonacorsi MD, Colleen M. Fitzpatrick MD, Kaveer W. Chatoorgoon MD, Jose Greenspon MD, Dennis W. Vane* MBA,MD, Cardinal Glennon Children's Medical Center
Invited Discussant: Stephen Kaminski, MD

Introduction:Pediatric trauma patients transferred to PTCs often have imaging at the originating hospital (OH) which is unnecessary based on Advanced Trauma Life Support (ATLS) guidelines or needs to be repeated because of technical issues. Additionally, the use of computed tomography (CT) has raised concerns about cancer risk from ionizing radiation leading many PTCs to adopt radiation dose reduction strategies. We hypothesized that pediatric trauma patients are exposed to unnecessary radiation from imaging prior to transfer.

Methods:A retrospective review was performed on all trauma patients who underwent CT imaging prior to transfer to our Level 1 PTC between 2010 and 2014. Data was collected on demographics, mechanism of injury, Glasgow Coma Scale (GCS), type of imaging, necessity for repeat imaging, appropriateness of imaging, and radiation dose delivered. Comparative radiation dosing was calculated using the dose length product (DLP [expressed in mcGy-cm]). In total, 1383 scans were performed prior to transfer. DLP data was not universally available from OH and for this reason we excluded all CT scans except CT of the Abdomen and Pelvis (CTAP) and CT of the Head (CTH). Scans were deemed clinically appropriate if they met ATLS guidelines (ATLS+) and not indicated if they did not meet ATLS indications (ATLS-). Some scans were repeated (ReCT) due to technical issues including lack of contrast when indicated, incomplete anatomical scan, poor quality. Median Δ DLP represents the difference in dosages patients received at OH vs. PTC. In instances where the study was not repeated, the comparison was made to standard calculated dosages for the same scan. Statistical Package for the Social Sciences (SPSS) software version 20 (SPSS, Chicago, IL) was used to perform statistical analysis.

Results:673 patients were analyzed. Average age was 11 years, and 65.4% were male.

	Total Overall	Median DLP PTC (Range)	Median DLP OH (Range)	Median Excess DLP	P-Value
Total Patients	673	217.6 (61.1-1139.8)	487.2 (134.3-2621.9)	269.6	<0.0001
Total CTAP	194	144.64 (61.12-1139.8)	407.68 (134.3-919.2)	376.69	0.004
Total CTH	528	228.11 (121.9-600.8)	797.50 (160-2289.5)	526.00	<0.001
CTAP ATLS+	152	146.0 (61.12-1139.8)	399.1 (134.3-2621.9)	253.1	0.005
CTAP ATLS+ ReCT	7	0.00 (0.0-0.0)	399.9 (149.1-399.9)	399.9	N/A
CTAP ATLS-	42	0.00 (0.0-0.0)	420.2 (256.7-546.5)	420.2	N/A
CTH ATLS+	514	224.8 (121.9-600.8)	726.4 (160.9-2289.5)	501.0	<0.0001
CTH ATLS+ ReCT	10	0.00 (0.0-0.0)	1072.1 (386.4-2289.5)	1072.1	N/A
CTH ATLS-	14	0.00 (0.0-0.0)	1053.9 (846.5-1261.2)	1053.9	N/A

Median DLP at PTC was 56.2% lower for all analyzed scans compared to OH ($p<0.0001$). Moreover, looking at relative decrease inradiation, DLP at PTC was 64.5% lower for CTAP and 71.4% lower for CTH. Children were exposed to a median radiation dose of 578.62 mcGy-cm for scans at OH that were completely unnecessary. Even when indicated (ATLS+) and technically correct, children received on average an additional 444.42 mcGy-cm of radiation at OH than they would have received had the scans been performed at PTCs using pediatric radiation reduction strategies.

Conclusion:Pediatric trauma imaging performed at transferring institutions often does not adhere to ATLS guidelines and exceeds required ionizing radiation dosages. These data indicate CT scanning of patients at OHs ultimately transferred to PTCs utilizing dose reduction strategies represents an area where pediatric radiation exposure is unnecessarily excessive. These data further confirm ATLS guidelines supporting prompt patient transfer without delay for imaging.

NOTES

FRIDAY, SEPTEMBER 11, 2015, 7:30 AM - 8:00 AM

SESSION X: FEATURED SPEAKER

LOCATION: LATOUR BALLROOM

HealthCare Reform:
Where are We Going with the ACS and HR2

PRESENTER: David B. Hoyt, M.D.

Executive Director
American College of Surgeons
Chicago, IL
****

SESSION XI:

QUICKSHOTS

FRIDAY, SEPTEMBER 11, 2015, 8:00 AM – 10:55 AM

LATOUR BALLROOM

MODERATOR: GREGORY J. JURKOVICH, M.D.

Session: XI: Quickshots
Paper QS1: 8:01-8:07

THIS TOO SHALL PASS: A STUDY OF INGESTED SHARP FOREIGN BODIES

Kirellos R. Zamary MD, James W. Davis* MD, Emily E. Ament MD, Rachel C. Dirks Ph.D., UCSF Fresno

Invited Discussant: Stanley Kurek, Jr., D.O.

Introduction: Gastrointestinal foreign body (GFB) ingestion is a common problem and often results in surgical consultation. Current literature is limited to case reports and fails to provide data regarding the management of sharp GFB ingestion. We hypothesized that patients who ingest sharp objects rarely have perforation or obstruction requiring surgical intervention.

Methods: Patients with GFBs were retrospectively reviewed from 1/05–9/14 at a level 1 trauma center with an acute care surgery program. Exclusion criteria were: leaving without being seen, unknown method of GFB entry, unknown GFB, GFB insertion per rectum, or ingestion of a blunt GFB. Data collected included patient demographics, length of stay, and results of operations that were performed.

Results: During the study period, there were 1169 hospital visits for GFB; 950 met exclusion criteria resulting in our study population of 219 sharp GFB ingestions. Average age was 30 ± 18, 62% were male, and 35% were incarcerated. Recidivism rate was 25%. The average length of stay was 3 days, which was prolonged due to psychiatric holds and consultations. Of the 219 patients, 169 (77%) had no intervention and none returned for complications. Forty-five patients (20%) underwent endoscopy: 27 patients had the sharp GFB removed, but none had perforation or bleeding; 4 had mucosal abnormalities noted with no further treatment. In 18 of the endoscopies (8% of total visits), no abnormalities or GFB were found. Six patients (3%) underwent surgery. Four patients underwent therapeutic surgical interventions: 3 for perforation and 1 for a necrotic gastrojejunal anastomosis (prior roux-en-Y gastric bypass) with distal GFB. Two patients underwent negative laparotomy; one included an enterotomy for removal of the GFB.

Conclusions: Necessary surgical intervention occurred in 4 (2%) patients with sharp GFB ingestions. 85% of patients required no intervention, and 13% underwent intervention without therapeutic significance. In the absence of peritonitis or psychiatric holds, these patients can be safely discharged from the Emergency Department with return precautions.

NOTES

Session: XI: Quickshots
Paper QS2: 8:08-8:14

EXTRACELLULAR VITAMIN D BINDING PROTEIN-ACTIN COMPLEXES: AN IMMEDIATE PRODUCT OF TISSUE INJURY ASSOCIATED WITH PROINFLAMMATORY FUNCTIONS

Richard R. Kew Ph.D., Randeep Jawa* MD, James Vosswinkel MD, Glenda Trujillo Ph.D., Stony Brook University Hospital

Invited Discussant: Grant O'Keefe, MD, MPH

Introduction: Actin is the most abundant intracellular protein in all cells and large amounts can be released into extracellular fluids during traumatic injury. The vitamin D binding protein (DBP) is an abundant plasma protein that has two principal functions, transport of vitamin D metabolites and scavenging G-actin released during tissue injury. DBP-actin complexes are among the earliest markers of tissue damage and plasma levels correlate positively with severity of injury. However, it is not known if DBP-actin complexes are inactive by-products of tissue injury or have bioactivity. The purpose of this study was to determine if a DBP deficiency could attenuate inflammation in a mouse model of lung injury.

Methods: With IACUC approval, ten-week old control (wild-type C57BL/6J: DBP+/+) and knock-out (DBP-/- on C57BL/6J background) mice received one 0.05 unit dose of bleomycin by oropharyngeal aspiration. Lung injury was evaluated after 7 or 14 days (n = 5-6/group). Cytokine levels on day 7 in bronchoalveolar lavage (BAL) fluid and whole lung homogenates were analyzed using a BioRad 23-plex mouse cytokine assay. BAL cells were quantitated and phenotyped by flow cytometry. Lung injury was assessed by histology on days 7 and 14. DBP-actin complexes were detected in BAL fluid using non-denaturing polyacrylamide gel electrophoresis and immunoblotting.

Results: All DBP knockout mice survived to day 21 and did not display overt signs of morbidity whereas all DBP+/+ mice died between day 14 and 16 and showed clear signs of respiratory distress. BAL fluid from wild-type mice had extensive DBP-actin complexes (50-75% of total DBP) whereas DBP-/- mice had no complexes but had evidence of free actin. Analysis of BAL fluid and lung tissue on day 7 showed that DBP-/- mice had dramatically less inflammation than wild-type animals. There were similar numbers of lung macrophages and lymphocytes in both strains of mice, but DBP-/- animals had significantly fewer lung neutrophils. Analysis of the cell-free BAL fluid on day 7 revealed that, compared to DBP+/+ animals, DBP-/- mice had almost no G-CSF (99% decrease) and a 92% reduction in IL-6. This difference was confirmed in day 7 lung homogenates where DBP-/- mice had an 81% decrease in G-CSF and 42% reduction in IL-6 compared to DBP+/+ animals. Day 7 BAL fluid from DBP-/- mice also had significant reductions in CXCL1 (38%), CCL2 (50%) and CCL4 (41%) levels versus wild-type mice. There were no differences between the two strains in the 18 other cytokines tested. Finally, histological analysis showed a marked decrease in lung fibrosis and collagen deposition in DBP-/- mice on day 14.

Conclusion: This is the first study showing that deletion of DBP in mice results in an attenuated inflammatory response in the bleomycin lung injury model. Absence of DBP-actin complexes in BAL fluid was associated with decreased lung cytokine levels, neutrophil recruitment, fibrosis and mortality. This work supports the concept that DBP can be targeted to modulate inflammation and limit tissue injury.

NOTES

Session: XI: Quickshots
Paper QS3: 8:15-8:21

IMPACT OF HIGH LEVEL TRAUMA CENTERS ON STATE-WIDE POPULATION BASED INJURY MORTALITY RATE

Mazhar Khalil MD, Ansab Haider MD, Tahereh Orouji Jokar* MD, Peter Rhee* MD, Bardiya Zangbar* MD, Narong Kulvatunyou* MD, Terence O'Keeffe* MD, Andrew Tang* MD, Rifat Latifi* MD, Donald J. Green* MD, Lynn Gries* MD, Bellal Joseph* MD, University of Arizona - Tucson

Invited Discussant: Joseph Galante, MD

Introduction:High level trauma centers provide the highest echelon of care for trauma patients. The distribution of trauma center across the states is extremely variable. The aim of this study was to assess the association between trauma center distribution and injury related mortality.

Methods:We did a one year analysis (2013) of CDC WISQARS database for all injury related deaths in a state. Number of trauma centers and their level of verification in each state were obtained from American College of surgeons' (ACS) trauma center registry. Area and the population of each state were obtained from US census data; and mean time to hospital after crash and vehicle miles travelled were obtained from National highway Traffic Safety Administration. States with at least one ACS verified trauma center were included in the analysis. States were divided into two groups based on the injury mortality rate: High injury mortality-HIM (mortality rate > national average) and low injury mortality LIM (mortality rate < national average). High Level Trauma Centers (HLTC) were defined as ACS verified level 1 and 2. Linear regression analysis was performed for the predictors of statewide injury mortality rate.

Results:A total of 47 states were included in the analysis with mean injury mortality rate of 84.6±15.5 deaths/100,000 population. 23 states were included in LIM and 24 in HIM. LIM states had higher number of total adult trauma centers (10.17±10.4 vs 4.33±3.5; p=0.03) and higher number of HLTC (8.43±10.2 vs 3.38±2.8; p=0.02). There was no difference in trauma center coverage area (13.1±16.3 vs 51.7±133.1 per 1000 sq.mi; p=0.1) and population per trauma center (17.9±32.6 vs 10.3±11.8 per 100,000 population; p=0.7) between the groups. On linear regression analysis, number of HLTC was the independent predictor of injury mortality rate (β [95% CI]: -0.6 [-1.2 - -0.04]; p=0.03).

Predictors of injury mortality rate			
	Beta	95% CI	p
No. of HLTC	**-0.6**	**-1.2 - -0.04**	**0.03**
PPM per trauma center	-0.3	-0.7 – 0.13	0.2
TC per 1000 sq. mi	0.02	-0.03 – 0.07	0.4
Male gender	-2.1	-10.8 – 6.6	0.6
Median population age	-0.1	-2.3-2.0	0.9
Time to hospital after crash	0.3	-0.2-0.9	0.2
Urban to rural VMT	-1.6	-2.9- -0.3	0.02

HLTC=High level trauma center (Level1 and 2), PPM=Population per million, VMT= Vehicle miles travelled

Conclusion:Presence of ACS verified trauma centers significantly impact the injury related mortality. Number of high level trauma centers is strongly correlated with lower state-wide injury mortality.

NOTES

Session: XI: Quickshots
Paper QS4: 8:22-8:28

TISSUE OXYGEN SATURATION BY NEAR INFRARED SPECTROSCOPY, AN EARLY NON-INVASIVE MARKER OF MORTALITY RISK IN A NON-HUMAN PRIMATE (RHESUS MACAQUE) MODEL OF HEMORRHAGIC SHOCK

Randy F. Crossland Ph.D., Antoni R. Macko Ph.D., James K. Aden Ph.D., Darren M. Fryer BS, Forest R. Sheppard MD, FACS Naval Medical Research Unit San Antonio

Invited Discussant: Gregory Beilman, MD

Introduction: Vital signs, such as blood pressure (BP) and heart rate (HR) are presently used as markers of physiological severity to triage patients and guide resuscitation; however, these markers are inconsistent in the acute phase of trauma. Interest in tissue oxygen saturation (StO 2) as an early marker of patient severity has grown; however, the value of StO2 remains to be determined. We investigated early StO2, end-tidal CO2 (ETCO2), HR and BP as predictive markers of impending mortality outcome in a non-human primate (NHP) model of severe hemorrhagic shock.

Methods: Hemorrhage was induced in anesthetized Rhesus Macaques by 60% left-lobe hepatectomy (T=0 minutes). StO2 (Deltoid), ETCO2, HR (ECG), and invasive mean arterial pressure (MAP) were continuously monitored through T=480 min. At T=120 min, bleeding was surgically controlled and blood loss (BL) quantified. Changes in StO2, HR, ETCO2 and BP values were compared between non-survivors (expired prior to T=480 min; n=5) and survivors (survived to T=480 min; n=11). Statistical comparisons utilized RM-ANOVA with Bonferroni correction and correlation analysis by Pearson r-squared, $p<0.05$ considered significant. Results reported as mean±SEM.

Results: BL was higher in non-survivors compared to survivors (53±2% vs. 41±3%, respectively; $p<0.02$). In non-survivors vs. survivors, baseline (T=0 min) MAP (79±9 vs. 78±4 mmHg; p=0.8), StO2 (91±2% vs. 92±2%; p=0.9), ETCO2 (38±1 vs. 40±1 mmHg; p=0.4) and HR (124±4 vs 102±6 bpm; p= 0.07) were equivalent. At T=5 minutes, StO 2 (55±10% vs. 78±3%; p=0.02) and ETCO2 (15±2 vs. 25±2 mmHg; p=0.0005) were lower, while MAP (18±1 vs. 23±2 mmHg; p=0.2) and HR (104±13 vs. 105±6 bpm; p=0.3) were similar in non-survivors compared to survivors, respectively (Figure 1). Correlation of vital markers over T=5-30 minutes to mortality demonstrated St2O, MAP, and ETCO2 equivalency with a significant group effect ($p\leq0.009$ for each parameter; R2=0.92, R2=0.91, and R2=0.90 respectively); whereas HR yielded the lowest correlation (p=0.8, R2=0.83).

Conclusion: In this study, StO2, ETCO2, and MAP strongly correlated with mortality; however, StO2 and ETCO2 were better acute, early, markers of subsequent mortality. Additionally, the continuous, non-invasive, "attach and forget" aspects of StO2 monitoring provide logistical benefits over other methodologies. These encouraging results warrant further investigation to optimally define a clinically meaningful StO2 threshold.

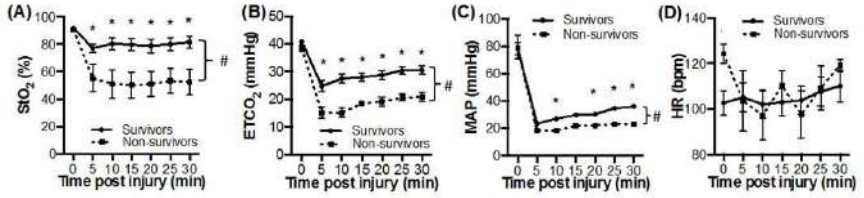


Figure 1: Early assessment of (A) StO2, (B) ETCO2, (C) MAP and (D) HR in non-survivors (n=5) vs. survivors (n=11). # group effect, $p\leq0.01$; *$p<0.05$ vs. survivors by RM-ANOVA.

NOTES

Session: XI: Quickshots
Paper QS5: 8:29-8:35

TRADING SCALPELS FOR SHEATHS: CATHETER BASED TREATMENT OF VASCULAR INJURY CAN BE EFFECTIVELY PERFORMED BY ACUTE CARE SURGEONS

Megan Brenner MD, MS, Melanie Hoehn MD, William Teeter MD, Deborah Stein* MD,MPH, Thomas Scalea* MD, University of Maryland Medical Center

Invited Discussant: Jack Sava, MD

Introduction: The skillset of the acute care surgeon can be expanded by formal training. We report the first series of traumatic vascular injury (TVI) treated by acute care surgeons trained in endovascular techniques (ACSTEV).

Methods: We retrospectively reviewed patients admitted to our trauma center with TVI over 5 months that survived over 24 hours and had catheter diagnosis and/or therapy by ACSTEV. Demographics, admission data, and outcomes were reviewed. Follow-up ranged from 0-150 days.

Results: Most patients were male (63%), and sustained blunt mechanism (91%). Mean age ($\pm$ SD) was 48.2 years ($\pm$ 21.9), and mean ISS was 32.1 ($\pm$ 11.8). Mean admission SBP, HR, GCS were 126.12 ($\pm$ 30.4), 101.21 ($\pm$ 28.2), and 10.8 ($\pm$ 4.73). 46 patients underwent 48 endovascular procedures for TVI: 32 angiograms and 16 venograms were performed. 2 pelvic angiograms and 1 aortic arch angiogram were negative and required no treatment. One SFA angiogram showed minor luminal defects requiring anti-coagulation only. Pseudoaneurysms were found in 17 vessels, vessel truncation in 4, active extravasation in 5, stenosis in 1, and dissection with thrombus in 1. 4 patients had resuscitative endovascular balloon occlusion of the aorta (REBOA) performed prior to catheter intervention for pelvic hemorrhage. Procedures included aortic repair (4), pelvic embolization (11), splenic embolization (5), lumbar artery embolization (1), bronchial artery embolization (1), profunda artery embolization (1), common carotid artery stent (1), celiac artery stent (1), inferior vena cava filter placement (14) and retrieval (2), and pharmaco-mechanical thrombolysis(1). Treatment material included coils (12), gelfoam (4), and nitinol plugs(3). No procedural or device-related complications occurred. Mortality was 14.7% unrelated to any endovascular procedure. 1 patient had repeat coil embolization of a pelvic pseudoaneurysm on POD#7.

Conclusion: Acute care surgeons trained in endovascular techniques can safely treat TVI with good success. We performed nearly 10 procedures per month underscoring the role of the ACSTEV for training and care of TVI in a high-volume trauma center.

NOTES

Session: XI: Quickshots
Paper QS6: 8:36-8:42

MANAGEMENT OF CIVILIAN PENETRATING CERVICOTHORACIC ARTERIAL INJURIES IN THE 21ST CENTURY: THE MORE THINGS CHANGE, THE MORE THEY STAY THE SAME?

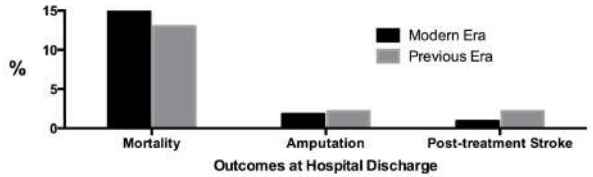
Jordan A. Weinberg* MD, Andrew H. Moore BS, Rebecca J. Teague BS, Tyler Ward BS, Joshua B. Wasmund MD, Elena M. Paulus MD, Louis J. Magnotti* MD, Thomas J. Schroeppel* MD, Stephanie A. Savage* MD, Gayle Minard* MD, George O. Maish* III, MD, Timothy C. Fabian* MD, Martin A. Croce* MD, University of Tennessee Health Science Center - Memphis

Invited Discussant: Charles Fox, MD

Introduction: The management of penetrating arterial injury at the thoracic outlet has long hinged on the fundamental principles of extensile exposure and vascular anastomosis. Nonetheless, treatment options have evolved to include both endovascular stent placement and the application of damage control temporary vascular shunts. The purpose of this study was to evaluate our recent experience with penetrating cervicothoracic arterial injuries in light of these developments in trauma care.

Methods: Patients with penetrating injuries to the innominate, carotid, subclavian, or axillary arteries managed at a single civilian trauma center between 2000 and 2013 were identified and categorized as the modern era (ME) cohort. The management strategies and outcomes pertaining to the ME group were compared to those of previously reported experience (PE) concerning injuries to the innominate, carotid, subclavian, or axillary arteries at the same institution from 1974 -1988.

Results: Over the two eras, there were 202 patients: 110 in the ME group and 92 in the PE group. Age (34 vs. 33) and gender (17% vs. 18% female) were similar between groups. No difference was observed between groups concerning the specific arteries injured ($p = 0.77$): innominate (ME: 3% vs. PE: 4%), carotid (40% vs. 38%), subclavian (28% vs. 24%), axillary (29% vs. 34%). The majority of injuries in both groups were managed with primary repair or graft (66% vs. 63%, $p = 0.62$). A similar proportion of injuries in each group were managed with anticoagulation alone (14% vs. 10%, $p = 0.40$). In the PE group, vessel ligation was performed in 7 cases, and there were no cases of temporary shunt placement or endovascular stent placement. In the ME group, vessel ligation was performed in 3 cases, and two cases were managed with temporary shunt placement. Endovascular stent placement was performed in 12 patients in the ME group. Outcomes at hospital discharge were similar (all $p > 0.05$) between groups (Figure).



Conclusion: In the modern era, outcomes following penetrating cervicothoracic arterial injury remain remarkably similar to the previous era. Endovascular stent is a viable option, but has limited impact on the overall management of penetrating injuries. Temporary shunt placement is also feasible, but is rarely deemed necessary. Proficiency with conventional vascular anatomic exposure and technique remains fundamental to the treatment of civilian cervicothoracic arterial injuries.

NOTES

Session: XI: Quickshots
Paper QS7: 8:43-8:49

UTILIZING SOCIAL MEDIA FOR COMMUNITY CONSULTATION AND PUBLIC DISCLOSURE IN EXCEPTION FROM INFORMED CONSENT TRIALS

Shannon W. Stephens EMT-P, Carolyn S. Williams RN, BSN, Randal Gray MA Ed, EMT-P, Jeffrey D. Kerby* MD,Ph.D., Henry E. Wang MD, MS, Patrick L. Bosarge MD, University of Alabama Birmingham

Invited Discussant: Peter Rhee, MD, MPH

Introduction: The U.S. Food and Drug Administration and Department of Health and Human Services outline regulations allowing an Exception From Informed Consent (EFIC) for research conducted in an emergency settings when obtaining prospective informed consent is not possible due to the potential subject's critical illness or injury. Acute care clinical trials utilizing EFIC must conduct community consultation and public disclosure (CC/PD) activities. Our objective is to describe our experience using social media to facilitate the CC/PD process in two traumatic injury clinical trials.

Methods: We conducted regional CC/PD activities for two multicenter trauma clinical trials: Pragmatic, Randomized Optimal Platelet and Plasma Ratios (PROPPR) and Prehospital Tranexamic Acid for Traumatic Brain Injury (ROC-TXA). As part of the CC/PD process, we developed research study advertisements using the social media website Facebook. The Facebook advertisement directed respondents to a regional study website that contained comprehensive trial information and methods for providing feedback. We targeted the advertisements to the expected age (15 years old or greater) and geographic groups (individuals with a registered Facebook account, who live within a 50 mile radius of the clinical trial site) for the trials. We determined respondent website interactions using Google analytics. The primary outcomes were the number of Facebook advertisement exposures and the number of referrals to the research study website. In addition, we determined the demographics of the respondents, the information accessed by respondents, and the number of participants who opted-out of each study. We analyzed the data using descriptive statistics.

Results: From October 01, 2012 – November 31, 2012 the Facebook PROPPR advertisement was displayed 5,001,520 times, (12 per target population), with 374 individuals selecting the advertisement for redirection to the regional study website. From August 01, 2014 – September 30, 2014 the Facebook ROC-TXA advertisement was displayed 3,806,448 times (8 per target population) with 790 individuals selecting the advertisement for redirection to the regional study website. Respondents to both advertisements were mostly male (52%), with the highest proportion between the ages 15-24 (28.2%). For both studies, web page engagement was brief (0-10 seconds) for most respondents (PROPPR 42.3%, ROC-TXA 30.4%). The most commonly accessed web pages were "Faculty & Staff" (PROPPR 13.2%, ROC-TXA 19.0%), "Q&A about trauma research" (PROPPR 6.4%, ROC-TXA 11.3%), "Training" (PROPPR 4.5%, ROC-TXA 5.2%), "Contact Us" (PROPPR 4.8%, TXA 5.6%), and "Opt-Out of Research" (PROPPR 2.2%, ROC-TXA 4.0%). Of 51 total individuals viewing the opt-out of research information (PROPPR 19, ROC-TXA 32), page engagement was modest (PROPPR 62 seconds, ROC-TXA 52 seconds), with no individuals requesting to opt-out of study participation.

Conclusion: In clinical trauma trials using EFIC, social media may provide a viable additional option for facilitating community consultation and public disclosure.

NOTES

Session: XI: Quickshots
Paper QS8: 8:50-8:56

POST-DISCHARGE MORTALITY IN THE ELDERLY AFTER A FALL: OUT THE DOOR, BUT NOT OUT OF DANGER

Christine M. Leeper MD, Marcus Hoffman MD, Matthew Kutcher MD, Matthew Rosengart* MD, Gregory Watson* MD, Timothy Billiar* MD, Andrew Peitzman* MD, Brian Zuckerbraun* MD, Jason Sperry* MD, University of Pittsburgh

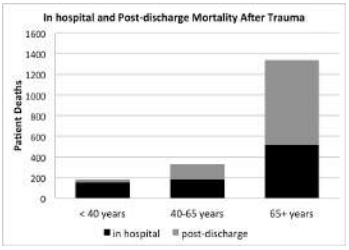
Invited Discussant: Michael Foreman, MD

Introduction: Traumatic injury remains a leading cause of death with the majority of literature focuses on in-hospital mortality. Little information exists regarding post-discharge mortality. Previous studies demonstrate that older patients are at greater risk for post-discharge death, with falls as a mechanism of injury predicting mortality. We sought to describe trauma-associated mortality in all age groups and characterize independent risk factors for post discharge mortality within 6 months of discharge in patients age 65 or greater who sustained a fall.

Methods: A retrospective analysis was performed using single institution trauma registry linked with the social security death index data from 2010-2014. Age was categorized by <40years, 40-65 years and 65+ years. We calculated mortality rates for all age categories then selected elderly patients with mechanism of injury of fall for further analysis. Backward stepwise Cox hazard regression was utilized to determine independent risk factors for in-hospital and out-of-hospital mortality.

Results: 23,7224 patients were analyzed, with inpatient and 6 month mortality as follows: age<40 [inpatient 154 (1.9%), post-discharge 31(0.4%)], age40-65 [inpatient 184 (2.2%), post-discharge 147 (1.7%)] age65+ [inpatient 513 (7.0%), post-discharge 825 (11.2%)]. Post-discharge death increases significantly with age ($p<0.001$) (figure1). For younger patients, predictors focused on injury severity and mechanism for both inpatient and post-discharge mortality. For age 65+, the only injury characteristic that predicted mortality was mechanism of injury=fall, confirming results from prior studies. Predictors of in-hospital mortality for elderly patients after fall were ISS (HR 1.03, 95%CI 1.02-1.04), head AIS (HR 1.48, 95%CI 1.37-1.61), cervical spine fracture (HR 1.34, 95%CI 1.03-1.74) serious cardiac complication (HR 1.46, 95%CI 1.08-1.97). Predictive factors for out of hospital mortality were ICU length of stay (HR 1.04, 95%CI 1.03-1.06), discharge to rehab (HR 2.41, 95%CI 1.85-3.14) or skilled nursing facility (HR 4.20, 95%CI 3.40-5.20), serious cardiac complication (HR 1.44, 95%CI 1.07-1.93).

Conclusion: Post-discharge death within 6 months of a traumatic event preferentially affects the elderly. Predictors of in-hospital death for age 65 or greater focused on injury related characteristics including injury severity score (ISS), head abbreviated injury scale (AIS) score and cervical spine fracture. Post-discharge mortality, however, is predicted by discharge disposition and ICU length of stay, which may simply be surrogate markers of frailty and deconditioning. Better characterization of this population is needed to identify the elderly patient at risk of death even after surviving to see discharge from the hospital.



NOTES

Session: XI: Quickshots
Paper QS9: 8:57-9:03

A COMPARISON OF TRADITIONAL AND NOVEL INJURY SCORING SYSTEMS IN A US LEVEL-I TRAUMA CENTER: AN OPPORTUNITY FOR IMPROVED INJURY SURVEILLANCE IN LOW- AND MIDDLE-INCOME COUNTRIES

Adam D. Laytin MD,MPH, Catherine J. Juillard MD,MPH, Martin Gerdin MD, Nobhojit Roy MPH, MBBS, MS, Bhakti Sarang MBBS, DNB Surgery, Vineet Kumar MD, Rochelle A. Dicker* MD, University of California, San Francisco

Invited Discussant: Heena Santry, MD

Introduction: Trauma is a global public health priority, with over 90% of deaths occurring in low- and middle-income countries (LMIC). In high-income countries (HIC), accurate surveillance including injury severity quantification is the cornerstone for trauma prevention and systems strengthening. In most LMIC, resources necessary to accurately quantify injury using traditional injury scoring systems are limited. Novel injury scoring systems appear to have adequate discrimination—the ability to differentiate between patients with high and low likelihood of mortality—in LMIC contexts. However, these scoring systems have not been widely tested where traditional injury scores can be accurately calculated. We hypothesize that novel injury scoring systems discriminate as well as traditional ones in a HIC with complete and comprehensive data collection.

Methods: Data from an American level-I trauma registry were used to compare six injury scoring systems. The three traditional scoring systems were the Injury Severity Score (ISS), Revised Trauma Score (RTS), and Trauma Injury Severity Score (TRISS). The novel scoring systems were the Kampala Trauma Score (KTS), Mechanism, GCS, Age and (Systolic Blood) Pressure (MGAP) score, and GCS, Age and Pressure (GAP) score. Each score was calculated for all adult trauma patients treated from 2008 to 2013. Bivariate logistic regression and ROC curve analysis were used to assess the discrimination of each scoring system.

Results: Among 17,049 patients, median age was 40 years and 71% were male. Penetrating mechanisms accounted for 15% of injuries and the hospital mortality rate was 4%. All six scores could be calculated in over 96% of cases and were highly significantly correlated with hospital mortality. While TRISS was most accurate in predicting mortality, KTS, MGAP and GAP all had superior discrimination, quantified by area under ROC curves, compared with both ISS and RTS.

Discrimination of six injury scoring systems in an American level-I trauma center.

Scores	Patients with Available Data, n (%)	p-value	Pseudo R-squared	AUROC
RTS	16595 (97.3)	<0.001	0.3267	0.8478
ISS	16856 (98.9)	<0.001	0.3055	0.8650
KTS	16595 (97.3)	<0.001	0.3953	0.9078
MGAP	16800 (98.5)	<0.001	0.4578	0.9336
GAP	16800 (98.5)	<0.001	0.4411	0.9334
TRISS	16413 (96.3)	<0.001	0.4857	0.9549

Conclusion: KTS, MGAP and GAP discriminate better than ISS and RTS in a resource-rich setting. These novel injury scoring systems, which are easier to implement in resource-poor settings than traditional scoring systems, can be used to accurately quantify injury severity. Implementation of these resource-appropriate tools in LMICs can improve injury surveillance, guiding quality improvement efforts and supporting advocacy for resource allocation commensurate with the volume and severity of trauma.

NOTES

Session: XI: Quickshots
Paper QS10: 9:04-9:10

MAGNET-DESIGNATED HOSPITALS ARE ASSOCIATED WITH HIGHER SURVIVAL RATES FOR GERIATRIC TRAUMA PATIENTS

Tracy Evans MD, FACS, Brian W. Gross BS, Frederick B. Rogers* MD, MS, FACS, Michael A. Horst Ph.D., Lisa Estrella MS, Nathan McWilliams MPA, RHIA, Jo Ann Miller RN, CCRN, Christina Martin RN, MSN, Claire Mooney MBA,RN, Lancaster General Hospital

Invited Discussant: Garth Utter, MD, MSc

Introduction: The impact of nursing care on trauma patient outcomes remains grossly understudied, specifically pertaining to the geriatric population. We sought to determine whether trauma centers with the performance-driven MAGNET recognition credential had improved outcomes over their non-MAGNET counterparts. We hypothesized that geriatric trauma patients admitted to MAGNET-designated hospitals would have improved survival over those treated at non-MAGNET facilities.

Methods: All geriatric (≥65) admissions from 2009-2011 to the 13 MAGENT and 17 non-MAGNET trauma centers in Pennsylvania were extracted from the Pennsylvania Trauma Systems Foundation State Registry. The impact of MAGNET status on mortality was assessed using a multivariable logistic regression model controlling for age, gender, logit transformation of the probability of death predicted by the TMPM model (TMPM-ais), and systolic blood pressure (SBP). A p-value <0.05 was considered significant.

Results: A total of 27,178 patients met inclusion criteria. MAGNET versus non-MAGNET facilities were statistically indistinguishable in terms of level of designation, in-house surgeons, surgical residency programs, and urban locations (Fischer's exact). Geriatric patients admitted to MAGNET trauma centers had significantly decreased odds of mortality compared to their non-MAGNET counterparts (OR: 0.85; 95% CU 0.77-0.95; p=0.004), when controlling for age, gender, TMPM-ais, and SBP.

Conclusion: Admission to a MAGNET-designated trauma centers resulted in a 15% reduction in mortality for the geriatric trauma population. We believe the MAGNET program's attention to nursing excellence has profoundly benefited the geriatric trauma patient in terms of improved survival.

Variable	Adjusted Odds Ratio (95% CI)	p-value
Magnet Hospital	0.85 (0.77-0.95)	0.004
Age	1.04 (1.04-1.05)	<0.001
Gender (male)	1.52 (1.36-1.69)	<0.001
TMPM-ais	2.23 (2.14-2.29)	<0.001
Systolic BP	0.99 (0.99-0.99)	<0.001
Constant	0.10 (0.05-0.19)	-
N = 27,178		
AUROC: 0.84		

NOTES

Session: XI: Quickshots
Paper QS11: 9:11-9:17

IMPLICATIONS OF THE TQIP INCLUSION OF NON-SURVIVABLE INJURIES IN PERFORMANCE BENCHMARKING

Jiselle B. Heaney MD,MPH, Rebecca Schroll MD, Jennifer Turney MD, Lance Stuke* MD,MPH, Alan B. Marr* MD, Patrick Greiffenstein MD, Rosemarie Robledo DO, MBS, Amanda Theriot FNP-c, Juan Duchesne* MD, Avery B. Nathens* MD,Ph.D., John Hunt* MD,MPH, Tulane School of Medicine

Invited Discussant: Mark Hemmila, MD

Introduction: The Trauma Quality Improvement Project (TQIP) is a nation-wide injury prediction model for performance benchmarking. Mortality is the primary outcome and may be affected by numerous variables such transport times, a high percentage of penetrating trauma, and the accuracy or completeness of the data recorded. These factors may hamper the model's ability to adequately stratify injury severity and act as a bench-marking tool. We hypothesize that at a mature level 1 high volume penetrating trauma center performance outcomes will be biased in the TQIP model due to the inclusion of a significant portion of patients with non-survivable injuries.

Methods: Data reported to TQIP was retrospectively obtained from the institutional trauma registry. Deaths included in the most recent TQIP analysis 2013-2014 were examined. Retrospective chart review was conducted for all patients with length of stay (LOS) ≤ 1 day to determine survivability of the injuries sustained. Non-survivable injuries were defined as: died in ≤ 2 hours, patients who under went ED or OR thoracotomy in extremis, patients who became organ donors or DNR, and patients who were documented by neurosurgery or general surgery tohave non-survivable injuries. O/E (observed-to-expected) ratios were calculated before and after exclusion of these patients.

Results: A total of 826 patients were reported to TQIP. There were 119 deaths with 46.2% (55 of 119) having a LOS of less than one day. Penetrating trauma accounted for 67.3% of these patients. 33 deaths occurred in the ED, with 63.3% (21/33) missing data, 14 patients went to the OR with 50.0% (7/14) missing data, and 8 patients died elsewhere with 0% (0/8) of these patients missing data. Thoracotomies were performed on 30.9% (17/55) of patients, and 41.8% (23/55) patients had significant traumatic brain injury (TBI). Non-survivable injuries accounted 90.9% (50 of 55 patients) of the deaths in patients with LOS≤ 1 day were excluded = 1.007. O/E ratio after all non-survivable injures with LOS ≤ 1 day were excluded = 0.895.

Conclusion: This study demonstrated that TQIP inclusion of patients with non-survivable injuries biases performance outcomes at an urban high volume penetrating trauma center. Missing data results in TQIP imputation of values, increasing inaccuracy. Institutions should focus on reporting complete data to improve accuracy. Further investigation is needed to determine if these findings exist at other similar institutions, and whether the current TQIP model needs revision to accurately identify and exclude patients with non-survivable injuries.

NOTES

Session: XI: Quickshots
Paper QS12: 9:18-9:24

FUNCTIONAL STATUS, AGE AND LONG TERM SURVIVAL FOLLOWING TRAUMA

Allan B. Peetz MD, Gabriel Brat MD, Ali Salim* MD, Reza Askari MD, Jessica E. Rydingsward BS, Clare M. Horkan MBBCh, Kenneth B. Christopher MD, Brigham and Womens Hospital

Invited Discussant: Eric Ley, MD

Introduction:It is well known that ICU survivors have a high mortality rate and often suffer long-term physical impairments such as, profound neuromuscular weakness and lower Quality of Life following hospital discharge. Similar long-term outcomes following trauma ICU survivors are not known. The purpose of the current study is to examine long-term mortality and its association with functional status at hospital discharge.

Methods:All adult trauma patients (age ≥ 18 years) requiring ICU admission who survived hospitalization between 1997 and 2011 were included. Data was obtained from a centralized clinical data registry. The exposure of interest was functional status defined as physical function assessed at the time of hospital discharge. Patients were assessed by a certified Physical Therapist on several well accepted parameters including: Bed Mobility, Transfers, and Gait level. Each assessment was graded on a scale of function (Independent, Stand by, Minimum, Moderate, Maximum, Total assistance, Not applicable) and transformed into an integer score based on a logistic regression model describing the risk of post discharge mortality. Adjusted odds ratios were estimated by multivariable logistic regression models. The primary outcome was all cause, post discharge mortality.

Results:We analyzed 3,565 patients. 60% were male, 78% were white and had a mean (SD) age of 55.0 (12.4) years. 16.8% of the cohort were readmitted within 30 days of discharge. The 365 and 720-day post discharge mortality was 17.5% and 22.8%. In a logistic regression model the lowest quartile of functional status at hospital dischargewas associated with 3.9 fold increased odds of 720-day post discharge mortality (adjusted OR 3.94 (95%CI 2.58-6.03, P<0.001) compared to patients with independent functional status. The effect modification of the functional status-post discharge mortality association is present relative to age (P interaction <0.001). Crude all-cause 720-day post discharge mortality rates were 10.2% and 37.4% in patients under 65 and over 65 respectively. In patients with the lowest quartile of functional status at hospital discharge, the odds of 720-day post discharge mortality compared to patients with independent functional status is stronger in older adults (>/=65: adjusted OR 3.24 (95%CI 1.67-6.31, P=0.001) than < 65: adjusted OR 2.49 (95%CI 1.37-4.55, P=0.003). Finally, improvement of functional status prior to discharge was associated with a 67.5% decrease in 90-day post discharge mortality [adjusted OR 0.32 (95%CI 0.17-0.61, P<0.001] compared to those patients who failed to improve.

Conclusion:In trauma ICU survivors, the mortality progressively increases up to two years after hospital discharge. In addition, the functional status at hospital discharge is predictive of long-term mortality. Most importantly, an improvement in functional status at discharge is associated with a significant reduction in short-term mortality.

NOTES

Session: XI: Quickshots
Paper QS13: 9:25-9:31

CLINICAL SIGNIFICANCE OF COMPUTED TOMOGRAPHY CONTRAST EXTRAVASATION IN BLUNT TRAUMA PATIENTS WITH A PELVIC FRACTURE

Jeremy S. Juern MD, David Milia MD, Panna Codner MD, Marshall Beckman MD, Lewis Somberg* MD, Travis Webb* MD, John A. Weigelt* MD, Medical College of Wisconsin

Invited Discussant: George Velmahos, MD, PhD

Introduction: Blunt pelvic fractures can be associated with major pelvic bleeding. Contrast enhanced computed tomography (CT) may show contrast extravasation (CE) in the pelvic hematoma, but the significance of CE on CT scan is debated. Our institution previously reported on the significance of CE on CT scan from the years 1998-2005. We sought to update our experience with CE on CT scan for the years 2009-2014 to determine the accuracy of CE in predicting the need for angioembolization.

Methods: This is a retrospective review of data from the prospectively maintained trauma registry and our electronic medical record. Patients seen from July 1, 2009 to September 7, 2014 with blunt pelvic fractures were included. Patients transferred from referring institutions as well as those without a contrast enhanced CT were excluded. Standard demographic, clinical, and injury data were obtained. Patient records were queried for presence of contrast enhanced axial imaging, contrast extravasation, performance of angiography, and angioembolization. Positive patients were those where CE was associated with active bleeding requiring angioembolization. All other patients were considered negative. The sensitivity, specificity, and positive and negative predictive value of CE on CT scan was determined.

Results: There were 497 patients during the study time period with blunt pelvic fracture meeting inclusion criteria and 75 patients (15%) had CE. Of those patients with CE, 30 (40%) underwent angiography, and 17 (23%) required angioembolization. The sensitivity, specificity, PPV, and NPV of CE on CT were 100%, 87.9%, 22.7% and 100% respectively. Two patients without CE underwent angiography but did not undergo embolization. Patients with CE had higher mortality (13 vs 6%, $p<0.05$) despite no significant difference in injury severity score (Table).

Table. Outcome Based on Contrast Extravasation on Computed Tomography

	CE	**No CE**
Angiography n,(%)*	28(37)	2(0.5)
Embolization n,(%)*	17(23)	0(0)
Mortality n,(%)*	10(13)	27(6)

$p<0.05$

Conclusions: This study reinforces that contrast extravasation on CT pelvis with blunt trauma is common, but most patients will not require angioembolization. Compared to our previous study, the sensitivity of CE on CT was higher while the specificity and PPV were both lower. We did not have any patients without CE requiring embolization. This is in contrast to the 33% rate of the previous study . This is likely due to both changes in our practice as well as the increased sensitivity of modern CT scanners.

NOTES

Session: XI: Quickshots
Paper QS14: 9:32-9:38

EVALUATING THE TRADITIONAL DAY AND NIGHT IN AN ACUTE CARE SURGERY FELLOWSHIP: IS THE SWING SHIFT A BETTER CHOICE?

Paul J. Chestovich MD, Nichole K. Ingalls MD, Douglas R. Fraser MD, Shawna L. Morrissey DO, John J. Fildes* MD, University of Nevada School of Medicine

Invited Discussant: Grace Rozycki, MD, MBA

Introduction: Trauma center schedules usually follow standard 12 hour day/night or 24 hour shifts, while resident and fellow trainees often follow a similar schedule. Fellowship trainees of Trauma and Acute Care Surgery require experience managing complex trauma patients, including both operative and non-operative cases. Although trauma admissions can be unpredictable, we sought to analyze our trauma volume to determine if a different scheduling model may increase exposure to complex and operative cases for trainees in Acute Care Surgery.

Methods: Our center's prospectively maintained trauma registry was queried for three events: trauma laparotomies, thoracotomies, and patients with ISS > 15. Ten years (2005-2014) of trauma volume were analyzed by hour of patient arrival. Three shifts were chosen to compare retrospectively: Day (7a-7p), Night (7p-7a) and Swing (12p-12a). The Swing shift was chosen since it covers the peak volume during the afternoon and evening hours, and is generally less disruptive to a weekly schedule and normal sleep patterns. A Visual Basic script was used to retrospectively populate a daily shift calendar. Frequency of events per shift were compared using Student's t-test, with $p < 0.05$ considered significant.

Results: During the study period, our center treated 8137 patients with ISS > 15, performed 2105 laparotomies and 479 thoracotomies. Daily trauma volume was plotted by hour of patient arrival (Fig 1). The frequency of events per 12 hour shift is shown in Table 1 below (avg ± SD). The frequency of patients with ISS>15 in the swing shift was higher than either day or night shifts ($p<0.001$). Frequency of laparotomies ($p<0.001$) and thoracotomies ($p=0.003$) were higher in the swing shift than the day shift, but not greater than the night shift (p=NS).

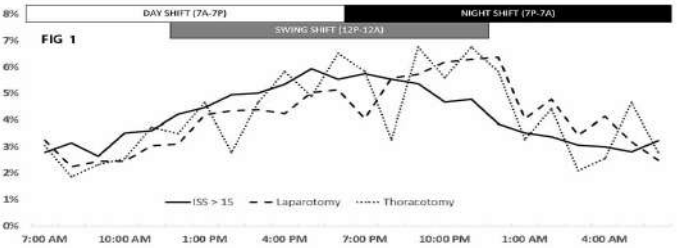


Table 1

Shift	ISS > 15	Laparotomy	Thoracotomy
Day (7a-7p)	1.15 ± 1.17	0.24 ± 0.52	0.054 ± 0.24
Night (7p-7a)	1.08 ± 1.16	0.31 ± 0.59	0.063 ± 0.25
Swing (12p – 12a)	1.37 ± 1.37 *†	0.32 ± 0.59 *	0.072 ± 0.27 *

Statistical significance compared to *day shift and †night shift.

Conclusion: Daily trauma volume follows a pattern which can be used to increase exposure to trauma cases. At our center, a swing shift was superior to day shift in all events compared, and greater than night shift for ISS>15. We believe that Acute Care Surgery training programs should analyze their trauma volume and schedule trainees to maximize exposure to complex trauma cases.

NOTES

Session: XI: Quickshots
Paper QS15: 9:39-9:45

GENDER DIFFERNCES IN THE GENOMIC RESPONSE AND CLINICAL OUTCOMES AFTER BLUNT TRAUMATIC INJURY AND HEMORRHAGIC SHOCK: IS THERE A TRUE "GENDER GAP" AFTER SEVERE INJURY?

Scott Brakenridge MD, MSCS, Maria-Cecilia Lopez BS, Philip Efron* MD, Jianyi Zhang Ph.D., Joseph Cuschieri* MD, Ronald Maier* MD, Joseph Minei* MBA,MD, Henry Baker Ph.D., Frederick Moore* MD, Lyle L. Moldawer Ph.D., University of Florida - Gainesville

Invited Discussant: Sonlee West, MD

Introduction: The effect of gender on differences in outcomes after severe traumatic injury remains debated, with conflicting supportive literature. Several recent interventional trials have failed to show benefit of sex hormone interventions after severe injury. Therefore, our understanding of gender differences after injury remains incomplete. We sought to determine the relationship of gender to the genomic response and clinical outcomes after severe traumatic injury and hemorrhagic shock.

Methods: Male and female blunt trauma patients in hemorrhagic shock were analyzed from a prospective, multi-institutional cohort study in order to assess for gender based differences in the genomic response and clinical outcomes. Logistic regression models were developed to assess the effect of gender on clinical outcomes after controlling for age, injury and shock severity, blood transfusion amount, and comorbidities. Peripheral blood leukocytes were analyzed via microarray analysis to evaluate genome-wide expression on days 0.5, 1, 4, 7, 14, 21 and 28 days after injury. Expression differences were identified with individual fold gene changes (FDR<0.001; vs. control, $p<0.05$) and functional pathway analysis.

Results: The cohort consisted of 1,285 (67%) male and 643 (33%) female blunt trauma patients. Injury and shock severity were similar between the two groups. There were small, but statistically significant differences in age (42 vs 44 yrs, $p<0.01$), BMI (27 vs 26, $p<0.001$), 12-hr blood transfusion (5.0 vs 4.0 U, $p=0.002$) and crystalloid administration (6.0 vs 7.0 L, $p<0.001$) between males and females, respectively. Genomic analysis revealed 474 genes with significant differential expression between males and females ($p<0.001$). The top 10 differentially expressed genes at each time point include genes associated with inflammation, innate immune function, cell adhesion and cell signaling. None of the genes in this subset were directly associated with sex hormones or the sex chromosomes. Organ failure was more severe (Marshall score 5.2 vs 4.4, $p<0.001$) with slower recovery (MOF recovery day 9.0 vs. 6.5, $p=0.01$) in males compared to females. However, multivariate analysis revealed that gender was not a significant independent risk factor for a complicated recovery (persistent organ dysfunction >14 days) or 28-day mortality.

Conclusion: There are gender-specific differences in the leukocyte genomic response to severe injury and hemorrhagic shock that are associated with more robust, and longer duration, multiple organ dysfunction in males. However, these expression patterns do not appear to be associated with gender specific genes, and do not translate to worsened gender-specific differences among inpatient outcomes, including ICU and hospital length of stay, persistent organ dysfunction or mortality.

NOTES

Session: XI: Quickshots
Paper QS16: 9:46-9:52

PEDIATRIC TRAUMA CENTERS AND AMERICAN COLLEGE OF SURGEONS COMMITTEE ON TRAUMA VERIFICATION: IMPACT ON MORTALITY

Emily E. Murphy MD, Mark D. Cipolle* MD,Ph.D., Glen Tinkoff* MD, Stephen Murphy MD, Barry Hicks* MD, Gerard Fulda* MD, Christianacare Health Services

Invited Discussant: Jeremy Cannon, MD

Introduction: Pediatric mortality is lower in states with American College of Surgeons Committee on Trauma (ACS COT) verified pediatric trauma centers (PTC) compared to states without verified PTCs. We hypothesize that mortality rates will be lower for severely injured children cared for at a PTC that is ACS verified.

Methods: Children ≤14 years old with an injury severity score (ISS) >15 were selected from the 2010 National Trauma Databank research dataset (NTDB RDS). Entries with missing ISS or age information were excluded. Patients who were dead on arrival were excluded. Univariate analysis was performed for age, gender, mortality, ACS adult verification and ACS pediatric verification. Significant variables were subsequently assessed by logistic regression. A subset analysis was performed on freestanding pediatric hospitals. A p-value of <0.05 was considered significant.

Results: The 2010 NTDB RDS included 11,859 pediatric patients with an ISS > 15. Univariate analysis was statistically significant for the primary outcome of mortality among the following variables: race, payment type, ISS, region, ACS adult verification and ACS pediatric verification. Other variables (gender, age, ethnicity, location of injury, hospital type and teaching status) were not statistically significant and were not included in logistic regression. The results of the logistic regression are displayed in table 1. ISS, region, race, payment and ACS pediatric level were significant among patients with an ISS >15. Subset analysis of freestanding pediatric hospitals demonstrated that ACS pediatric level (p=.007), ISS (p<0.001) and payment (p<0.001) had a significant impact on mortality, while region, race, gender and teaching status were non-significant.

		Mortality	P value
ISS	16-24	1.5% (131/8551)	<.001
	>24	22.3% (739/3308)	
ACS pediatric level	I	6.3% (218/3460)	.003
	II	7.1% (68/954)	
	N/a	7.8% (584/7445)	
ACS adult level	I	7.9% (320/4042)	.162
	II	7.8% (100/1289)	
	III	3.6% (6/167)	
	IV	0% (0/19)	
	N/a	7% (444/6342)	
Race	Black	10.3% (177/1720)	<.02
	White	6.8% (469/6925)	
	Asian	4.7% (11/236)	
	Other	7.2% (213/2978)	
Region	South	8.5% (370/4374)	.001
	Midwest	7.6% (225/2970)	
	West	6.9% (184/2658)	
	Northeast	4.8% (87/1826)	
	NA	12.9% (4/31)	
Payment	Self-pay	14.4% (103/713)	<.001
	Government insurance	7.7% (397/5174)	
	Private insurance	4.7% (189/3987)	
	Other	9.1% (181/1985)	

Conclusions: ACS pediatric verification is associated with decreased mortality of severely injured children in ACS verified adult trauma centers as well as in freestanding pediatric hospitals. ACS adult verification alone does not confer this mortality benefit. Race, payment and region are additional factors that impact pediatric trauma mortality.

NOTES

Session: XI: Quickshots
Paper QS17: 9:53-9:59

DIRECT TRAUMA TRANSPORT REDUCES MORTALITY IN RURAL TRAUMA

Henry R. Moore III, MD, Mary B. Voights RN, Joseph Burton DO, Uretz Oliphant MD,
Carle Foundation Hospital

Invited Discussant: Babak Sarani, MD

Introduction: The goal of trauma systems for many years has been 'get the right patient, to the right hospital, at the right time.' The American College of Surgeons, based on predominantly urban data, further directs ambulances to bypass local facilities if they will not meet the needs of the patient. And yet, when faced with greater than one hour transport times to a trauma center in the rural setting, is it best to stop at the local hospital for stabilization prior to continuing on to that 'right hospital for definitive care' or risk further instability given the very long interval of transport? The objective of our study is to determine if there will be improved outcome by transporting a specific cohort of severely injured patients directly to the trauma center from the initial injury site rather than transporting them to the nearest hospital which is a non-trauma center despite potentially long transport times.

Methods: All adult and pediatric trauma patients being transported or transferred from outside the local county who met regional criteria for the Direct Trauma Transport Protocol were included. The study period was December 2009 through December 2012. We conducted a retrospective review of our hospital trauma database and hospital records. Exclusion to direct transport was the need for an airway or EMS discretion. Primary endpoint was mortality. Secondary endpoints included: morbidity, hospital length of stay, ICU length of stay, days on the ventilator, and disposition at discharge. Cohort groups of patients transported directly to the trauma center were compared with patients that were transported first to a local hospital and then transferred to the trauma center. Analysis of Covariance (ANCOVA) and logistic regression were used to analyze the relationship between direct transport and the outcomes.

Results: 589 patients meet criteria. 291 were transported to another facility first, 298 were transported directly. Demographics were similar between the two groups. The groups demonstrated major trauma with very similar acuity and Injury Severity Scores (ISS) of 22.65 and 22.42 ($P = 0.8710$). Morbidity, length of stay (LOS), ICU days and ventilator days were similar between the two groups. The interval to definitive care was lower in the group transported directly (116.88min) versus those who went to another hospital first (189.16min). Mortality was significantly lower in the patients who were transported directly (22/194 or 11%), compared to those who went to another hospital first (42/198 or 21%) ($P=0.008$). Conversely, more patients from the direct transport group were discharged home (102/194 or 53%), vs. those who went to another hospital first (87/198 or 44%) ($P=0.087$). There was no statistical difference in the number of people who went to rehab or nursing homes.

Conclusion: Despite longer transport times in non-urban areas, direct transport and definitive management of severe injury at a level one trauma center improves mortality. The 'right place' and 'right time' in non-urban areas continue to be expert treatment at the level one trauma center, as in urban areas.

NOTES

Session: XI: Quickshots
Paper QS18: 10:00-10:06

SARCOPENIA AS A MARKER OF FRAILTY: PSOAS MUSCLE SIZE PREDICTS FUNCTIONAL OUTCOME IN MILD TO MODERATELY INJURED TRAUMA PATIENTS

Ryan Balogh MD, Philip Edmundson MD, Arash Shirvani MD, Ankit Shah MD, Jacob Roden-Foreman Megan Reynolds MS, Michael Foreman* MD, Baylor University Medical Center

Invited Discussant: A. Peter Ekeh, MD

Introduction:The term frailty attempts to capture a patient's vulnerability to clinical and functional decline over time. Although clinicians tend toward a Stewart-esque "I know it when I see it" threshold, frailty has proven difficult to quantify. The purpose of this study is to evaluate frailty as a predictor of long term outcomes in trauma patients using psoas muscle size as a metric.

Methods:Patients who were admitted to an urban ACS-COT Level I trauma center from March to December 2012 and had undergone an abdominal and pelvic CT scan as a part of their initial evaluation were selected from an ongoing concurrent functional outcome study. Functional data was gathered prospectively during initial hospitalization and 3, 6, and 12 months after injury. Functional outcome was measured using the Veterans Rand-12 Item Health Survey. All statistical models were stratified by injury severity score < 15 or > 15 and adjusted for age, gender, and pre-injury physical function scores. Radiographic data was viewed on Centricity PACS system which has a built in capability to trace a structure and calculate the area of the selection. A minimum of 20 points were used to measure the psoas muscle area on one side, taken at the slice in which both transverse processes of L4 could be seen. Exclusion criteria included psoas muscle or paravertebral hematoma, spine instrumentation, L4 fracture, scoliosis, motion degradation or artifact on CT and obvious asymmetry in psoas muscle diameter.

Results:123 patients met inclusion criteria and were included in the data analysis. Of those, 90 completed 3 month follow-up, 76 completed 6 month follow-up, and 66 completed 12 month follow-up. Pre-injury functional scores were similar when stratified by gender, with medians of 50.9 and 50.5 respectively. For ISS <15 psoas area was significantly associated with functional outcome scores at 3 ($p=0.02$), 6 ($p=0.0015$), and 12 ($p<0.0001$) months post injury, with an increase in psoas area at the time of injury corresponding to a higher functional score. Increased psoas muscle size was also associated with a decreased length of stay by a factor of 0.99 ($p=0.03$).

Conclusion:Psoas area proved to be a significant predictor of functional outcome at all follow-up time points for ISS<15 when controlled for age, gender and pre-injury function score. Further study is warranted to evaluate the feasibility of using psoas muscle size at presentation as a predictor of other short and long term endpoints.

NOTES

Session: XI: Quickshots
Paper QS19: 10:07-10:13

MILITARY SURGEON CONFIDENCE IS IMPROVED BY PARTICIPATION IN A CIVILIAN TRAUMA TRAINING CENTER

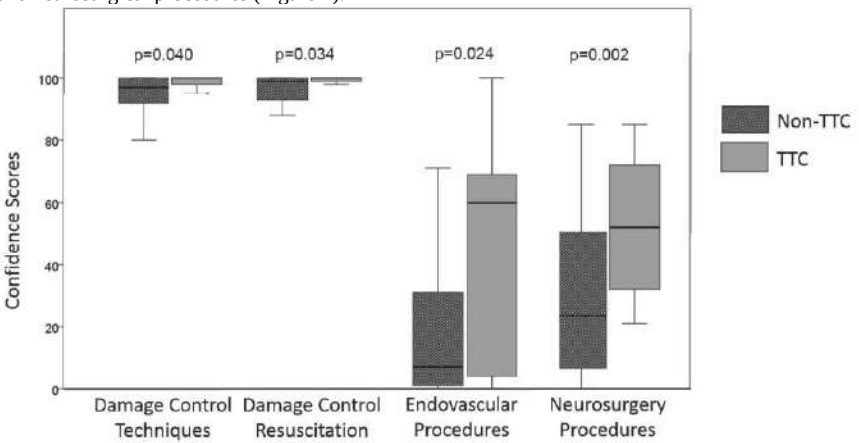
Brian P. Smith MD, MS, Travis Polk MD, D. Joshua Mancini MD, Daniel Grabo MD, Kyle N. Remick MD, Charles W. Schwab* MD, University of Pennsylvania

Invited Discussant: John Fildes, MD

Introduction: Since 2001, all 3 branches of US Armed Forces have offered pre-deployment surgeon training by assignment to a designated group of civilian trauma training centers (TTC). The impact of these programs on surgeon confidence remains largely unknown. We hypothesized that participation in TTC is associated with increased surgeon confidence in various trauma skills.

Methods: We surveyed military affiliated physicians nationwide using a novel instrument piloted and refined by experienced combat surgeons. We analyzed demographics, education, practice patterns, and pre-deployment training preparation. We also measured confidence for battlefield trauma skills validated from previous studies. Surveyors were blinded to participants and surveys were collected electronically using REDCap Database. Data were analyzed with SPSS using Mann Whitney tests and regression models.

Results: Eighty-six of 174 surveys were completed. Army physicians accounted for 50.0% of respondants, followed by navy (23.3%) and Air Force (20.9%). Most of the participants completed a trauma/surgical critical care fellowship (87.2%). Of respondents, 21 (24%) participated in TTC. The distribution of confidence scores for TTC physicians were significantly higher than non-TTC physicians for damage control techniques, damage control resuscitation, endovascular procedures and neurosurgical procedures (Figure 1).



After adjusting for years of practice, average number of monthly non-deployment trauma resuscitations, critical care fellowship training, and experience at role 2 facilities, there remained a significant positive association between TTC training and confidence in damage control techniques (p=0.004), damage control resuscitation (p=0.001), endovascular procedures (0.039) and neurosurgical procedures (p<0.001).

Conclusion: Regardless of prior trauma experience, participation in TTC is associated with increased confidence in battlefield trauma skill sets for military surgeons.

NOTES

Session: XI: Quickshots
Paper QS20: 10:14-10:20

DOES SEX MATTER? GENDER EFFECTS ON VENOUS THROMBOEMBOLISM RISK IN SCREENED TRAUMA PATIENTS

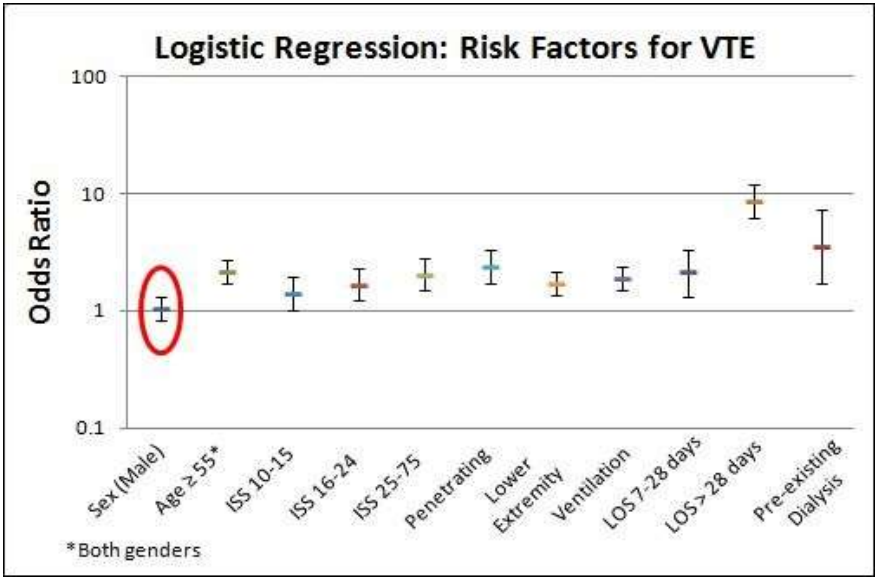
Allison E. Berndtson MD, Todd W. Costantini MD, Alan M. Smith Ph.D., Leslie Kobayashi* MD, Raul Coimbra* MD,Ph.D., University of California, San Diego

Invited Discussant: Jason Sperry, MD, MPH

Introduction: Gender is associated with disparate risk of venous thromboembolism (VTE) in non-trauma patients, with increased risk seen during pregnancy and in women on hormone-containing medications. The effects of gender on the risk of VTE after trauma are unclear. Some studies have demonstrated no gender effect while others have instead shown a higher incidence of VTE among men. We hypothesized that male gender would increase risk of VTE in trauma patients undergoing a standardized duplex screening protocol.

Methods: All admissions to a Level-1 academic trauma center between 2000 and 2013 were reviewed. We excluded patients for age <18 years, pregnancy, pre-admission anticoagulant use and hospital length of stay (LOS) <72 hours. A strict venous duplex screening protocol was followed. Patients were initially screened within 48 hours of admission; a second duplex was performed during the first week of hospitalization, then weekly thereafter. Patients were also studied when symptomatic. Female patients were sub-categorized into pre- and post-menopausal groups based on age (18-44 vs. ≥ 55 years). Univariate analysis and logistic regression were used to identify variables correlating with VTE risk.

Results: 8,731 patients met inclusion criteria. The overall VTE rate was 5.3%. Univariate analysis did not find a difference in VTE risk by gender (4.8% women vs. 5.5% men, p=0.20), or between women and men within age-defined menopausal categories (pre-menopausal women 3.8% vs. men 4.6%, p=0.32; post-menopausal women 5.7% vs. men 7.1%, p=0.18). Logistic regression (see figure) did identify other risk factors for VTE including age ≥ 55 (OR 2.2), increasing ISS (OR 1.4 – 2.0), penetrating mechanism of injury (OR 2.4), lower extremity injuries (OR 1.7), need for mechanical ventilation (OR 1.9), increasing hospital length of stay (LOS 7-28 days, OR 3.6; LOS > 28 days, OR 8.7) and patients on hemodialysis prior to injury (OR 3.5).



Conclusion: There was no difference in VTE rates based on gender, or in female subgroups based on menopausal status. Gender has no effect on VTE risk in trauma patients following injury. Aggressive VTE screening of over 8,700 patients did identify several other patient populations at increased risk of developing VTE. More intensive VTE prophylaxis may be appropriate in these patients.

NOTES

Session: XI: Quickshots

Paper QS21:10:21-10:27

PROSPECTIVE EVALUATION OF NUTRITIONAL ADEQUACY OF VOLUME BASED ENTERAL FEEDING IN A SINGLE CENTER TRAUMA/SURGICAL ICU

Ashley K. McCusker MD, MSc, Martha Betts MS, Brandy M. Msall MS, Heather A. Prentice MPH,Ph.D., Anna N. Bradford Ph.D., LCSW, Jeffrey Wright MPH, Elena Lita BS, Erik J. Teicher MD, FACS Inova Fairfax Hospital

Invited Discussant: Timothy Browder, MD

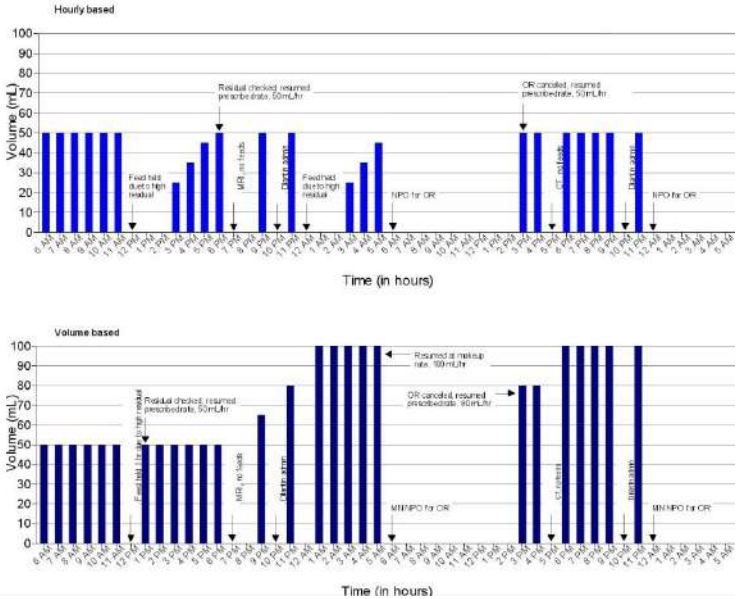
Introduction: The traditional protocol for intensive care unit (ICU) enteral feeding has been based on hourly goals. Numerous studies have demonstrated that, when receiving feeding based on an hourly protocol, ICU patients receive between 50-70 percent of recommended nutritional goals. This can be detrimental while they are in a hypercatabolic state. Volume based feeding has been shown to be a feasible alternative to hourly based feeding in the ICU and improve the delivery of the prescribed nutritional goal. We hypothesized that patients will receive on average at least 80 percent of their prescribed nutritional goals after the implementation of a volume based tube feeding protocol, as compared to a historical hourly feeding protocol.

Methods: A daily volume goal was calculated based on the patient's ideal body weight and daily caloric needs. All patients received a standard bowel regimen and protein supplements. Gastric volume residuals were liberalized to 500cc, with tube feeds held for one hour after a high residual, and promotility agents were initiated with the first feed intolerance. Interruptions in tube feeds were minimized and reasons were documented. Volume delivered was recorded for each morning and night shift to determine the daily volume received. The average percentage of daily volume received over goal volume was calculated for patients and compared to the previous hourly feeding protocol, as well as to published rates of delivery of enteral nutrition in the ICU population..

Results: In a five month period, 85 patients admitted to the trauma/surgical ICU received enteral feeding using a volume based protocol. Patients received on average 82.8 percent of the prescribed nutritional goal using the volume-based protocol. In comparison, only 66 percent of the prescribed nutritional goal was met using hourly feedings ($p < 0.0001$).

Conclusion: Preliminary data shows that a volume based enteral feeding protocol is feasible for a large surgical ICU in a Level I trauma center. The implementation of the volume based protocol improved delivery of the prescribed amount of enteral feeds while also calling attention to avoidable interruptions of enteral feeding.

Figure 1. Sample patient enteral feedings for 48 hours for the hourly-based feeding protocol and volume-based feeding protocol.



NOTES

Session: XI: Quickshots
Paper QS22: 10:28-10:34

CONTINUING TRAUMA: THE UNMET NEEDS OF TRAUMA PATIENTS IN THE POST-ACUTE CARE SETTING

Samir M. Fakhry* MD, Pamela L. L. Ferguson Ph.D., Heidi S. Resnick Ph.D., Jennifer Haughney RN, Jama Olsen MPA, Kenneth J. Ruggiero Ph.D., Medical University of South Carolina

Invited Discussant: Erik Barquist, MD

Introduction: Trauma care and trauma systems have improved substantially over the past 50 years. The majority of this progress has been in the pre-hospital and hospital settings. Significant challenges remain in the post-acute care setting with many patients reporting emotional and psychological distress in the months following injury. We interviewed trauma patients within two months after discharge to assess how they were recovering emotionally and psychologically. **Methods**: 101 patients aged $\geq$ 21 years from our level I trauma center were contacted after discharge, 97% within 2 months, and agreed to participate in a survey from 1/2014 through 12/2014. Most (n = 86) were interviewed by phone, 15 chose to take the survey online. Participants were asked about functional outcomes, modes of communication they used/preferred, hospital course, discharge information, cigarette and substance use, help seeking for emotional issues, and were screened for posttraumatic stress disorder, depression, acute psychological distress (Kessler 6). Descriptive statistics were done, as well as t-tests or Kruskal-Wallis tests to compare continuous and categorical variables, and chi-square to compare categorical variables. **Results**: Survey participants were 64% male, 64% white, aged 21-88 years. Most participants (89%) owned a cellphone and 65% of those with cellphones owned a smartphone. Our sample had a higher percentage with no insurance, a stay in the ICU and discharge to home than the trauma population. Participants who recalled being in the ICU were almost twice as likely (49%) to screen positive for depression than those who were not in the ICU (27%) (p=.0493). One in 5 (19%) reported injury in the context of a crime. 34% were normally not employed and 22% continued to be employed; 45% who had been employed were not employed on a job for pay at the time of the interview. Of the 50 participants scoring positive for PTSD, depression or serious psychological distress, 17 (34%) considered getting professional help for a personal/emotional problem, but only 5 (10%) actually received professional help. The barrier most cited (58%) for not getting help was concern about cost; 42% did not know how or where to get help. Most participants responded "no" or "I don't know" when asked if they had received information in the hospital about how to cope with negative emotions after injury (79%) and how to seek help from a doctor (70%) to address these emotions. 45% of the interviewees had smoked cigarettes since hospital discharge, compared to 22% of adults in SC. 74% of those who screened positive for depression reported smoking, significantly higher (p<.0001) than the 24% who screened negative and smoked. 38% of those who screened positive for depression reported heavy smoking, which was significantly higher (p=.0008) than the 10% who screened negative and smoked heavily. **Conclusion**: A large proportion of trauma inpatients (50%) showed signs of depression, PTSD, or other serious psychological distress 1-2 months after discharge. Both psychological distress and smoking are known to impair physical healing. Many patients consider seeking help but face numerous barriers to receiving services for emotional difficulties in their recovery after trauma. Cost and lack of information are particularly important barriers. Trauma centers should develop novel scalable and sustainable solutions to ensure that patients are provided with resources to enhance resilience and recovery after injury.

NOTES

Session: XI: Quickshots
Paper QS23: 10:35-10:41

NATIONWIDE ABSENCE OF UNIFORM GUIDELINES FOR THE PRE-HOSPITAL USE OF TOURNIQUETS TO CONTROL SEVERE EXTREMITY EXSANGUINATION

Elie P. Ramly MD, Gem Runyan BS, David R. King* MD, Massachusetts General Hospital

Invited Discussant: Laura Moore, MD

Introduction:
Following the Sandy Hook shootings and the resulting Hartford Consensus, as well as the recent Boston Marathon bombing, the need for a uniform, detailed, aggressive, prehospital, extremity exsanguination control protocol became clear. We hypothesized that most states, within the United States, lack a detailed, uniform protocol.

Methods:

We performed a systematic, nationwide assessment of Emergency Medical Services (EMS) prehospital extremity exsanguination control protocols. An online search (updated 02/07/2015) identified state, region, or county-specific EMS protocols in all 50 states. If unavailable online, the protocols were retrieved directly by contacting each state's Department of Public Health (or other appropriate agency). Two investigators independently screened each extremity exsanguination control protocol. Protocols were first grouped into three categories: I – tourniquet not included; II – tourniquet included, without specific guidance; III - tourniquet included, with specific guidance related to type, indications, application technique, and safety concerns. Each protocol was then scored on a 5-points scale, with no points given when tourniquets were absent, one point for mention of each of: the word "tourniquet", tourniquet type, indication, application technique, and safety.

Results:

Forty-two (84%) states had statewide and 14 (28%) had at least one county-specific protocol. Four (8%) states had no statewide protocol available online. One state (Mississippi) had neither state nor county-specific protocols. Of statewide protocols, 4 (9.5%) were in Category I, 23 (54.8%) in Category II, and 15 (35.7%) in Category III. The average score for statewide tourniquets was 2.4/5 (SD 1.25; range 0-5). Fourteen (33%) statewide protocols referred to "commercial" or "approved" tourniquets, with only 3 (7%) recommending a particular commercial device. The average score for the county-specific protocols of states with no statewide protocol was 3.10 (SD 1.56; range 0-5)

Conclusion:
Throughout the United States, there is considerable variability in EMS protocols for the management of extremity exsanguination, with an alarming absence of specific guidance for tourniquet use. Nationwide, most states do not have a uniform, detailed, aggressive, prehospital, extremity exsanguination control protocol. Policy-makers should work with trauma experts to develop appropriate state protocols and training programs for EMS.

NOTES

Session: XI: Quickshots
Paper QS24: 10:42-10:48

NO TIME TO BLEED: THE IMPACT OF TIME FROM INJURY TO THE OPERATING ROOM ON SURVIVAL IN PATIENTS WITH HEMORRHAGE FROM BLUNT ABDOMINAL TRAUMA

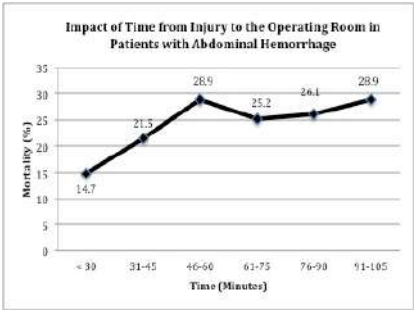
Abdul Alarhayem MD, John Myers* MD, Daniel Dent* MD, Brian Eastridge* MD,
University of Texas Health Science Center at San Antonio

Invited Discussant: Mark Shapiro, MD

Introduction: The concept of a "Golden Hour" after injury has been inculcated into the culture of emergency medical services and surgery with sparse evidence to substantiate it's validity. The most useful measure of the impact of time should optimally reflect the time to effect definitive hemorrhage control relative to the time of the traumatic event. We hypothesized that amongst patients with uncontrolled abdominal hemorrhage, the probability of death would be related to the degree of hypotension and the time from injury to the operating room (INJOR).

Methods: The National Trauma Data Bank Research Data Set 2012 was queried with respect to recorded field SBP, pre-hospital time, emergency department time and mortality. The INJOR metric was derived from the composite of pre-hospital time and time spent in the emergency department for patients with a subsequent operating room destination noted in the registry. Patients with abdominal injury managed non-operatively, severe head injuries (AIS > 3), or any missing data elements were excluded. .

Results: From a total of total of 833,312 records, the NTDB RDS, identified 2,011 adult patients admitted directly to trauma centers from injury scenes with abdominal vascular or solid organ injuries requiring exploratory laparotomy for hemorrhage control. The mortality rate of the study population was 22.8% (460 / 2,011).



The risk of mortality increased proportionally as the time lapse from injury to operative intervention increased such that for the first 60 minutes, every 15 minute interval without operative control of hemorrhage increased the probability of death by ~ 7%. Stratifying the data by degree of hypotension; profound hypotension (SBP<60), moderate hypotension (SBP 60-90 mmHg), and mild hypotension (SBP >90-110 mmHg,) all exhibited similar trends in mortality escalation, most prominent within the first 90 minutes after injury and manifest as mortality increases of 24% to 54%, 23.1% to 32.9%, and 12.5% to 21.0% respectively.

Conclusion: This analysis serves to quantify the impact of time and degree of hypotension in a subset of injured patients with noncompressible torso hemorrhage. In addition, it provides an evidence basis for future clinical practice guidelines to optimize evacuation and expedite hemorrhage control for patients at risk for uncontrolled bleeding.

NOTES

Session: XI: Quickshots
Paper QS25: 10:49-10:55

CARING FOR CRITICALLY INJURED CHILDREN: AN ANALYSIS OF 56 PEDIATRIC DAMAGE CONTROL LAPAROTOMIES

Miguel Villalobos MD, Joshua P. Hazelton DO, Lisa Capano-Wehrle MPH, Krystal Hunter MBA, Steven E. Ross* MD, Mark J. Seamon* MD, Cooper University Hospital

Invited Discussant: Mary Fallat, MD

Introduction: Injury is the leading cause of death in children between the ages of 1-18 years, yet scientific data pertaining to this population is limited. Damage control surgery principles have been extensively studied, applied, and proven in critically injured adults but remain relatively unstudied in children. Our primary study objective was to evaluate the use of damage control laparotomy (DCL) in critically injured children.
Methods: A review (1996-2013) of all patients who underwent trauma laparotomy at an ACS verified Level I trauma center was undertaken. Exclusion criteria included: age >18, laparotomy >2hrs after admission, and laparotomy for secondary compartment syndrome. All study patients were evaluated with respect to demographics, mechanism, physiologic and resuscitation variables, anatomic injuries, surgical procedures, need for DCL, and outcomes. Independent T-Test, Mann-Whitney U Test, and Fisher's Exact Test assessed statistical significance. The primary study endpoint was hospital survival while secondary study endpoint was DCL complications.
Results: Of 371 pediatric patients who underwent trauma laparotomy, the mean age was 14±5 years while most (73%) were male and injured by blunt mechanism (65%). Fifty-six (15%) critically injured patients (mean ISS 32±16, Pediatric Trauma Score 5±4, PATI 29±18) underwent DCL. The DCL patients often had major solid organ (63%), vascular (36%), thoracic (38%), pelvic (36%), and traumatic brain (29%) injuries. Physiologic compromise was evident on arrival (GCS 9±6, SBP 94±33, pH 7.17±0.17, base deficit 11±6, MTP activation 78%) and continued in the operating room (mean temp nadir 94±3ºF, pH 7.11±0.19, abdominal packing 68%) despite intraoperative blood product resuscitation (mean RBCs 11±10 units) during abbreviated (mean duration 118±72 min) laparotomy. Fifty-five percent of children who underwent DCL survived their hospitalization and required a mean of 3±2 laparotomies during 6±6 days until closure (primary fascial 90%, vicryl/STSG 10%). DCL survivors were analyzed for common DCL complications (SSI/organ space infection 18%, dehiscence 2%, ECF 2%, tracheostomy 18%) during their hospitalization (LOS 18±21 days). When the DCL subset was further stratified by age (<15 vs 15-18 years), no difference was detected with respect to arrival GCS, hemodynamics, temperature, pH, ISS, blood product and crystalloid resuscitation, solid organ or major vascular injury, days until closure, LOS, or survival (all $p>0.05$).
Conclusions: In our study of 56 children who underwent DCL, we report that these children have survival rates similar to those reported in large case series and collective reviews in adults, but with markedly better morbidity rates than adult survivors. Substantial closure rates along with lower rates of SSI, dehiscence, ECF, and need for tracheostomy in this age group suggests that DCL is a valid management strategy in critically injured children of any age.

NOTES

41ST WILLIAM T. FITTS, JR., M.D., LECTURE

William T. Fitts, Jr., M.D.
October 6, 1915 - June 17, 1984

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

****

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

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

American Trauma Society:
President, 1972-1973

FRIDAY, SEPTEMBER 11, 2015, 11:15 AM – 12:15 PM

AAST 41ST WILLIAM T. FITTS, JR. LECTURE

LOCATION: LATOUR BALLROOM

"Acute Care Surgery: No Time Yet for a Victory Lap"

L.D. Britt, M.D., M.P.H.
Henry Ford Professor and Edward J. Brickhouse Chairman
Eastern Virginia Medical School
Norfolk, VA

****

PREVIOUS FITTS ORATORS

1. 1975 Curtis P. Artz, M.D.
Charleston, SC

2. 1976 Francis D. Moore, M.D.
Boston, MA

3. 1977 G. Tom Shires, M.D.
New York, NY

4. 1978 Lloyd D. MacLean, M.D.
Montreal, Quebec, Canada

5. 1979 Mr. Peter S. London
Birmingham, England

6. 1980 Carl T. Brighton, M.D.
Philadelphia, PA

7. 1981 John W. Kinney, M.D.
New York, NY

8. 1982 Thomas W. Langfitt, M.D.
Philadelphia, PA

9. 1983 Col. Robert Scott, L/RAMC
London, England

10. 1984 F. William Blaisdell, M.D.
Sacramento, CA

11. 1985 Donald P. Becker, M.D.
Los Angeles, CA

12. 1986 Sheng Chih-Yong, M.D.
Woods Hole, MA

13. 1987 Paul Dudley Hart
Woods Hole, MA

14. 1988 Roderick A. Little, M.D.
Manchester, United Kingdom

15. 1989 Prof. Martin Allgower, M.D.
Switzerland

16. 1990 Philip R. Lee, M.D.
San Francisco, CA

17. 1991 Donald D. Trunkey, M.D.
Portland, OR

18. 1992 Basil A. Pruitt, Jr., M.D.
Fort Sam Houston, TX

19. 1993 John H. Davis, M.D.
Burlington, VT

20. 1994 John R. Border, M.D.
Buffalo, NY

21. 1995 Jonathan E. Rhoads, M.D.
Philadelphia, PA

22. 1996 Susan P. Baker, M.P.H.
Baltimore, MD

23. 1997 George F. Sheldon, M.D.
Chapel Hill, NC

24. 1998 Leonard Evans, Ph.D.
Warren, MI

25. 1999 Barbara Barlow, M.D.
New York, NY

26. 2000 Johannes A. Sturm, M.D.
Hannover, Germany

27. 2001 Janet Reno
Washington, DC
(Cancelled)

28. 2002 C. James Carrico, M.D.
Dallas, TX

29. 2003 Ellen J. MacKenzie, Ph.D.
Baltimore, MD

30. 2004 Colonel John Holcomb, M.D.
Ft Sam Houston, TX

31. 2005 Sylvia D. Campbell, M.D.
Tampa, FL

32. 2006 Sten E.V. Lennquist, M.D., Ph.D.
Linkoping, Sweden

33. 2007 Thomas M. Scalea, M.D.
Baltimore, MD

34. 2008 Charles E. Lucas, M.D.
Detroit, MI

35. 2009 Frederick P. Rivara, M.D., M.P.H.
Seattle, WA

36. 2010 Charles N. Mock, M.D., Ph.D., M.P.H.
Seattle, WA

37. 2011 H. Leon Patcher, M.D.
New York, NY

38. 2012 David B. Hoyt, M.D.
Chicago, IL

39. 2013 Frank R. Lewis, Jr., M.D.
Philadelphia, PA

40. 2014 Ronald G. Tompkins, M.D.
Boston, MA

SESSION XIIIA:

CRITICAL CARE/SHOCK

PAPERS #36 - #45

FRIDAY, SEPTEMBER 11, 2015, 1:30 PM – 4:50 PM

LATOUR BALLROOM

MODERATOR: GREGORY P. VICTORINO, M.D.

RECORDER: EILEEN M. BULGER, M.D.

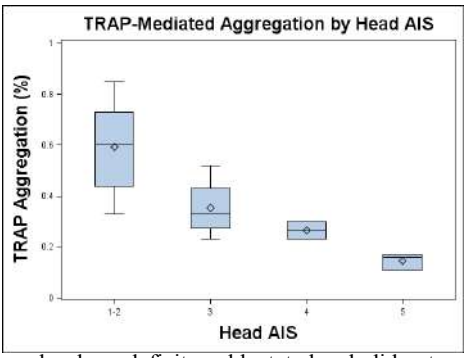
DEGREE OF PLATELET DYSFUNCTION CORRELATES WITH SEVERITY OF TRAUMATIC BRAIN INJURY: A PROSPECTIVE STUDY OF TRAUMA PATIENTS

Matthew T. Ramsey BS, Timothy C. Fabian* MD, Charles P. Shahan MD, John P. Sharpe MD, MS, Scott E. Mabry BS, Jordan A. Weinberg* MD, Martin A. Croce* MD, Lisa K. Jennings Ph.D., University of Tennessee Health Science Center - Memphis

Invited Discussant: Mitchell Cohen, MD

Introduction: Exsanguination associated with acute traumatic coagulopathy (ATC) is a leading cause of death following severe injury. While platelets occupy a pivotal role in clot formation, scant clinical research has been performed due to complexities resulting from the need for rapid handling and complex testing of platelet functions. While the thrombin pathway has been proposed as a mediator of platelet dysfunction in trauma, it has not been systematically investigated. The purpose of this study was to evaluate the thrombin pathway.

Methods: 40 trauma patients and 20 non-injured controls were enrolled in the study at a level one trauma center. Platelet aggregation was tested by light transmission aggregometry (LTA) with two agonists, adenosine diphosphate (ADP) and thrombin receptor agonist peptide (TRAP). Mean fluorescence intensity (MFI) and percent positivity of CD62 on ADP-activated platelets were evaluated using flow cytometry.



Results: Compared to healthy controls, trauma patients had significantly decreased ADP-(74% vs. 64%, p=.0003) and TRAP-mediated (72% vs. 47%, p<.0001) platelet aggregation, and ADP-mediated CD62 expression (65% vs. 43%, p=.0176). Platelet count was not significantly different. In trauma patients, TRAP-mediated aggregation was inversely proportional to Head AIS (figure, p=.0062).GCS was likewise inversely proportional to TRAP-and ADP-mediated aggregation. Measures of shock, including admission blood pressure, pulse, base deficit, and lactate level, did not correlate with any of the measures of platelet dysfunction.

Conclusions: Trauma patients have significantly lower levels of platelet activation and aggregation compared to healthy controls. Severity of head injury was significantly correlated with platelet dysfunction in a step-wise fashion. Our data suggest that the thrombin receptor pathway plays an important role in platelet dysfunction in trauma.

NOTES

Session: XIIIA: Critical Care/Shock Papers 36-45
Paper 37: 1:50-2:10

HISTONE DEACETYLASE GENE EXPRESSION PROFILES ARE ASSOCIATED WITH OUTCOMES IN BLUNT TRAUMA PATIENTS

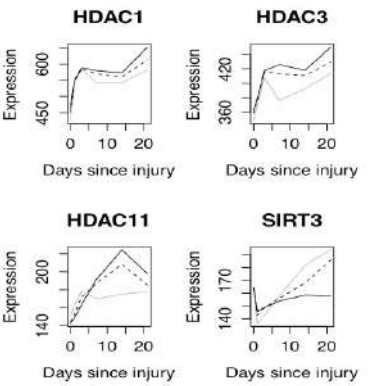
Martin Sillesen MD,Ph.D., Theodore Bambakidis BS, Simone Dekker BS, Rasmus Fabricius MD, Peter Svenningsen MD, Peter J. Bruhn BS, Lars B. Svendsen MD, Jens Hillingsø MD,Ph.D., Hasan Alam* MD, University of Michigan

Invited Discussant: Philip Efron, MD

Introduction: Treatment with histone deacetylase inhibitors (HDACI), such as valproic acid VPA, increases survival in animal models of trauma and sepsis. VPA is a pan-inhibitor that blocks most of the known HDAC isoforms. Targeting individual HDAC isoforms may increase survival and reduce complications, but little is known about the natural history of HDAC gene expression following trauma. We hypothesized that distinct HDAC isoform gene expression patterns would be associated with outcomes following trauma.

Methods: 28 day longitudinal HDAC leucocyte gene expression profiles in 172 blunt trauma patients were extracted from the Inflammation and Host Response to Injury (Glue Grant) dataset. Outcome was classified as complicated (death or no recovery by day 28, n=51) or uncomplicated (n=121). Mixed modeling was used to compare the HDAC expression trajectories between the groups, corrected for age, sex and Injury Severity Score. Weighted gene correlation network analysis (WGCNA) was employed to identify modules of genes with significant co-expression, and HDAC genes were mapped to these modules. Biological function of the modules that contained HDAC's was investigated using the Gene Ontology database.

Results: Elevated longitudinal HDAC expression trajectories were associated with complicated outcomes for HDAC1 ($p=0.02$), HDAC3 ($p<0.01$) and HDAC11 ($p=0.04$). In contrast, suppressed expression of SIRT3 was associated with adverse outcome ($p<0.01$) (figure). WGCNA analysis identified significant co-expression of HDAC and SIRT genes with other genes involved in ribosomal function and downregulation of protein translation in response to stress (HDAC1), T-cell signaling and T-cell selection (HDAC3) as well as coagulation and hemostasis (SIRT3). No co-expression of HDAC11 was identified.



28 day gene HDAC expression profiles of patients with complicated outcomes (solid black) or uncomplicated outcomes (solid grey). Dashed lines represent mean expression values.

Conclusion: This is the first study to describe longitudinal changes in HDAC expression in trauma patients. Expression trajectories of HDAC1, 3, 11 and SIRT3 correlate strongly with outcomes following trauma, and can thus serve as circulating biomarkers. They may also be promising targets for pharmacological intervention. The effects of HDAC and SIRT gene expression in trauma may be mediated through pathways involved in ribosomal and T-cell function as well as coagulation and hemostasis.

NOTES

Session: XIIIA: Critical Care/Shock Papers 36-45
Paper 38: 2:10-2:30

CHARACTERIZING THE GUT MICROBIOME IN TRAUMA: SIGNIFICANT CHANGES IN MICROBIAL DIVERSITY OCCUR EARLY AFTER SEVERE INJURY

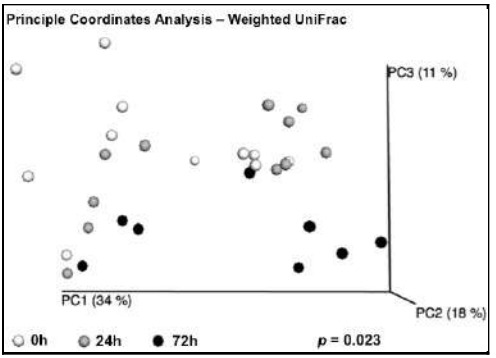
Benjamin M. Howard MD,MPH, Lucy Z. Kornblith MD, Amanda S. Conroy BA, Mary F. Nelson RN, MPA, Eric M. Campion MD, Rachael A. Callcut* MD, MSPH, Carolyn S. Calfee MD, MAS, Brandon J. Lamere MPH, Douglas W. Fadrosh MS, Susan V. Lynch Ph.D., Mitchell J. Cohen* MD, University of California, San Francisco

Invited Discussant: Lawrence Diebel, MD

Introduction: Multiple recent studies have demonstrated the vital influence of commensal microbial communities on human health and disease. The central role of the gut in the response to injury is well-described; however, no prior studies have used culture-independent profiling techniques to characterize the gut microbiome after severe trauma. We hypothesized that in critically injured patients, the gut microbiome would undergo significant compositional changes in the first 72 hours following injury.

Methods: Following IRB approval, trauma patient stool samples were prospectively collected via digital rectal exam at the time of presentation (0h). For injured patients who required admission to the ICU (n=12), additional stool samples were collected at 24h and/or 72h. Patients found to be uninjured served as controls (n=10). DNA was extracted from stool samples and PCR amplification targeting the16S rRNA gene was performed; amplicons were sequenced and binned into operational taxonomic units (OTUs; 97% sequence similarity). Beta-diversity was calculated and analyzed using Principle Coordinates Analyses, and negative binomial regression was used to determine significantly enriched OTUs.

Results: Critically-injured patients had a median Injury Severity Score of 27 and suffered polytrauma. At baseline (0h), there were no detectable differences in gut microbial community diversity between injured and uninjured patients. Injured patients developed changes in gut microbiome composition within 72h, characterized by significant alterations in phylogenetic composition and taxon relative abundance (Weighted UniFrac p=0.023, Figure).



Differences in enriched taxa at 0h vs. 72h showed that the distribution of OTUs changed significantly over time. Members of the bacterial orders Bacteroidales, Fusobacteriales, and Verrucomicrobiales were depleted over 72h, whereas Clostridiales and Enterococcus members enriched significantly.

Conclusion: In this first study of the gut microbiome after trauma, we demonstrate that significant changes in phylogenetic composition and relative abundance occur in the first 72h after injury. This rapid change in intestinal microbiota represents a critical and previously unrecognized phenomenon that may influence clinical course and outcomes following severe trauma. The gut bacterial community is known to modulate inflammation and is related to a range of clinical outcomes. A better understanding of the nature of these post-injury changes may lead to the ability to intervene in otherwise pathological clinical trajectories.

NOTES

Session: XIIIA: Critical Care/Shock Papers 36-45
Paper 39: 2:30-2:50

AN EARLY DECISION MODEL PREDICTS THE NEED FOR UNCROSSED MATCHED BLOOD (UnXRBC) AND MASSIVE TRANSFUSION (MT) FOLLOING TRAUMA

Deborah M. Stein* MD,MPH, Peter F. Hu Ph.D., Colin Mackenzie MD, Shiming Yang Ph.D., Stephen T. Bartlett MD, Thomas M. Scalea* MD, R Adams Cowley Shock Trauma Center
Invited Discussant: Bryan Cotton, MD

Introduction: Hemorrhage is the leading cause of potentially preventable death following injury. Continuous automated vital signs (VS) have been shown to predict outcome and need for intervention better then manually recorded VS. Early blood use is associated with improved outcomes, but recognizing the need for uncrossmatched blood (UnXRBC) or predicting need for massive transfusion (MT) in patients with hemorrhagic shock can be challenging. Manually recorded field or admission VS often underestimate shock. A validated predictive model could accelerate decisions and save lives. We compared mathematical models using field and admission ED VS versus continuously recorded VS collected in the first minutes after admission.
Methods: We modeled data collected on adult trauma patients admitted to a level one trauma centerover a three-year period for 3 outcomes: need for UnXRBC, need for >4 units of blood within 4 hours (MT1) and need for >=10 units within 24 hours (MT2). In addition to field and admission VS (systolic blood pressure SBP and heart rate HR), continuous VS were collected and shock index (SI) were calculated every 2 seconds post admission. VS features including mean, max, min, dose of SBP<90, HR>120 and SI>1 were calculated for 5, 10 and 15 minutes after admission. Five models were then constructed. All models used age, and gender. Model 1 used field VS to predict need for UnXRBC, MT1 and MT2. Model 2 used admission VS. Models 3, 4 and 5 used continuous VS features over 5, 10 and 15 minutes, respectively. Area under receiver operating characteristic curves (AUROC) were used to evaluate predictive power.
Results: 10,636 patients with over 5 million continuous VS data points within 15 minutes of trauma admission were analyzed. Patients were predominantly male (68%) with mean age of 42.9 ±19 years and 23% had Injury Severity Score >=15. Among all patients 4.1%, 2.2% and 1.3% received UnXRBC, MT1 and MT2 respectively. There was no difference in Model 1 or 2's ability to predict UnXRBC (AUROC=0.77, 0.80), MT1 (0.81, 0.82) or MT2 (0.82, 0.83). Predictive ability was significantly improved as duration of VS monitoring increased and was significantly better with continuous VS Model 3 (0.83, 0.85, 0.86), Model 4 (0.86, 0.87, 0.88) and Model 5 (0.87, 0.89, 0.91) to predict UnXRBC, MT1 and MT2, respectively, compared to Models 1 and 2.

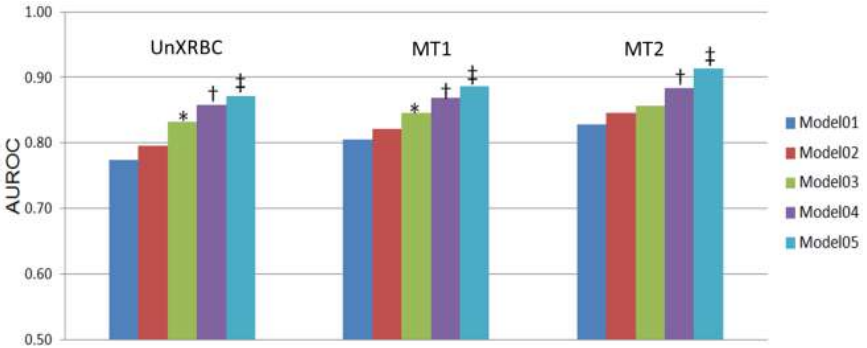


Figure-Continuous VS versus field and ED VS. * Model 3 significantly better than Models 1 and 2.† Model 4 significantly better than Models 1 through 3. ‡ Model 5 significantly better than Models 1 through 4

Conclusion: Models using continuous VS improve prediction for the need for UnXRBC or MT in patients with hemorrhagic shock. Computer generated decision trees generated from automated continuous VS can identify the need for emergency blood use and direct earlier blood product administration, potentially saving lives.

NOTES

Session: XIIIA: Critical Care/Shock Papers 36-45
Paper 40: 2:50-3:10

BMI STRONGLY IMPACTS THE DIAGNOSIS AND INCIDENCE OF HIT IN THE ICU

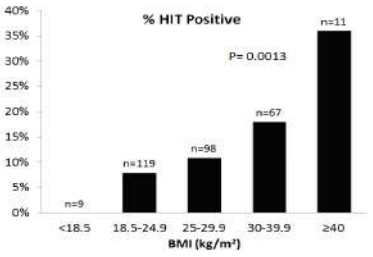
Matthew B. Bloom* MD, Andrea A. Zaw MD, David M. Hoang MD, Tong Li BS, Bansuri Patel BS, Eric J. Ley* MD, Daniel R. Margulies* MD, Cedars-Sinai Medical Center

Invited Discussant: Adrian Maung, MD

Introduction: Obesity has been linked to various immune-mediated conditions, including rheumatoid arthritis, systemic lupus erythematosus, and inflammatory bowel disease. Our objective was to examine the association of body mass index (BMI) with diagnosis of heparin-induced thrombocytopenia (HIT).

Methods: Prospectively collected data on patients in the surgical and cardiac ICU between January 2007 and August 2014 presumed to have HIT by clinical suspicion were reviewed. Patients were categorized into 5 BMI groups as underweight (<18.5), normal (18.5-24.9), overweight (25-29.9), obese (30-39.9), morbidly obese (≥40). Demographic and clinical data including Warkentin 4T scores, anti-platelet factor 4 (PF4 OD), Serotonin Release Assay (SRA), and thromboembolic diseases were recorded. HIT positive patients were defined as having SRA>20%. 2-sided Cochran-Armitage Trend Test was used evaluate an ordered association between BMI and HIT.

Results: A total of 304 patients met inclusion criteria. Mean age was 62.1 ± 16.5 years, 59% were male, and mean BMI was 27 ± 6 kg/m^2. 36 (12%) were positive for HIT. Incidence of HIT increased progressively with BMI [0%, 8%, 11%, 18%, 36%; P = 0.0013] (Figure 1). Compared to patients with normal BMI, patients with BMI 30-39.9 had a 170% increase in the odds for HIT [OR = 2.67, 95% CI = 1.06-6.71, P = 0.037], while patients with BMI ≥40 had a 600% increase [OR = 6.98, 95% CI = 1.72-28.43, P = 0.0067]. Using a logistic regression model, each 1 unit increase in BMI was associated with a 7.7% increase in the odds of HIT (P=0.0034). PF4≥2.0 also increased with BMI (P=0.0003), while PF4≥0.4 and PF4≥0.8 did not reach significance. In-hospital mortality increased significantly with BMI above normal (P = 0.026). Warkentin 4T scores, DVT, PE, and stroke did not correlate with changes in BMI. Male/female ratios were similar across the groups.



Conclusion: Not previously described, increasing BMI appears to be strongly associated with increased rates of HIT in ICU patients. Obesity is an important new clinical variable for estimating the pre-test probability of HIT, and patient "Thickness" may be a 5th "T". Additional biochemical work is indicated to decipher the role of obesity in this immune-mediated condition.

	BMI kg/m^2					
	<18.5 (n=9)	18.5-24.9 (n=119)	25-29.9 (n=98)	30-39.9 (n=67)	≥40 (n=11)	P
PF4>0.4	89%	61%	62%	76%	91%	0.063
PF4>0.8	33%	28%	32%	34%	55%	0.135
PF4>2.0	0	4%	12%	21%	18%	0.0003 *
DVT	22%	40%	38%	36%	36%	0.898
PE	11%	18%	13%	7%	9%	0.062
Stroke	0	3%	1%	0	0	0.196
Mortality	33%	25%	26%	39%	55%	0.026 *

NOTES

LOW INTENSITY EXERCISE IN ACUTE PHASE IMPROVES LIPID METABOLISM AND SURVIVAL OF LPS-INDUCED SEPTIC MICE VIA ACTIVATION OF PGC-1 ALPHA EXPRESSION

Takayuki Irahara MD, Norio Sato* MD,Ph.D., Kosuke Otake MD, Kazuo Inoue Ph.D., Kaoru Koike* MD,Ph.D., Tohru Fushiki Ph.D., Hiroyuki Yokota* MD,Ph.D., Graduate School Of Emergency And Critical Care Medicine, Nippon Medical School

Invited Discussant: Paul Bankey, MD, PhD

Introduction:

Regarding the effect of exercise during critical illness such as sepsis, it is reported to be beneficial to exercise prior to the onset or in late phase for reducing inflammatory response or for rehabilitation. However, the effect of exercise for the pathophysiology of sepsis in acute phase after the onset is unclear. We investigated the alteration of energy substrate metabolism and survival proportions when LPS-induced septic mice were exercised with low intensity in acute phase, and also examined PGC-1 alpha, the important factor of lipid metabolism.

Methods:

C57BL/6 mice were divided into 4 groups. Control (C) group given normal saline, low dose (L) group given LPS 1mg/kgBW, medium dose (M) group given LPS 5mg/kgBW and high dose (H) group given LPS 10mg/kgBW intraperitoneally (n=15-16 per group). Furthermore, each group was divided into sedentary (SED) or exercise (EX) group (n=7-8 per group), and EX groups were exercised on the treadmill (12m/min, 0°, 30min) three times in the first day and twice in the second and third day after LPS administration. Survival proportions and other vital reactions were measured and indirect calorimetry by respiratory gas analysis was performed until 72 hours. Organ weight and lipid levels in plasma and liver were also measured. We further evaluated mRNA and protein expression of PGC-1 alpha by quantitative PCR and western blotting.

Results:

Survival proportions of H-EX were significantly improved compared with H-SED (100% vs 50%, $p<0.05$). Fatty acid oxidation (FAO) was significantly decreased at 16hrs after LPS administration in M, H-SED, and tend to increase in all EX groups. FAO of H-SED survived mice (n=4) and H-EX survived mice (n=8) at 16hrs after LPS administration were almost equal (15.1±2.7mg/kg/min and 15.2±1.5) and they were significantly higher than FAO of H-SED non-survived mice (n=4) (vs 9.0±0.4, $p<0.01$), suggesting FAO is related to survival. Epididymal fat weight was markedly decreased in all EX groups compared with SED, on the other hand, lipid levels in plasma and liver were elevated in all EX groups. These results suggest exercise induces lipid to be carried from endogenous fat into blood and liver as the energy source. The mRNA and protein expression of PGC-1 alpha were decreased in L, M, H-SED compared with C-SED, and significantly increased in all EX groups.

Conclusion:

Our study suggests the mechanism that low intensity exercise in acute phase improves lipid metabolism and survival of LPS-induced septic mice via activation of PGC-1 alpha expression. It's a revolutionary finding that exercise in acute phase after the onset might have the therapeutic effect for the pathophysiology of sepsis.

NOTES

Session: XIIIA: Critical Care/Shock Papers 36-45
Paper 42: 3:30-3:50

EARLY INITIATION OF EXTRACORPOREAL MEMBRANE OXYGENATION IMPROVES SURVIVAL IN ADULT TRAUMA PATIENTS WITH SEVERE ACUTE RESPIRATORY DISTRESS SYNDROME

Patrick L. Bosarge MD, Lauren A. Raff MD, Gerald McGwin Jr., Ph.D., Shannon L. Carroll MD, Enrique Diaz-Guzman MD, Jeffrey D. Kerby* MD,Ph.D., University of Alabama Birmingham

Invited Discussant: Robert Maxwell, MD

Introduction: The use of extracorporeal membrane oxygenation (ECMO) in the trauma population has been reported to have a mortality benefit in patients with severe refractory hypoxic respiratory failure. This study compares the early initiation of ECMO for management of severe Acute Respiratory Distress Syndrome (ARDS) versus a historical control immediately preceding the use of ECMO for trauma patients.

Methods: A retrospective study was conducted at a single high volume American College of Surgeons verified Level I trauma center with a dedicated 28 bed trauma burn intensive care unit. The study population was limited to trauma patients diagnosed with severe ARDS using the Berlin definition (PaO2/FiO2 [P/F] ratio <100). Within this population, two groups of patients were selected: patients managed with either ECMO or conventional ventilation (CONV). The criteria for patients being placed on ECMO were severe ARDS with refractory hypoxia despite maximal mechanical ventilation (limited by ARDSnet standards). The primary outcome of interest was mortality; secondary outcomes included hospital LOS, ICU free days, and ventilator free days.

Results: Fifteen ECMO patients managed from March 2013 to November 2014 were identified as were fourteen CONV patients managed from March 2012 to February 2013 who met the Berlin definition of severe ARDS. Age (ECMO mean [SD], 39.2 [16.9] years; CONV 36.6 [13.7] years; $p = 0.65$) and Injury Severity Scores (ECMO 28.6 [18.2]; CONV 28.4 [9.7]; $p = 0.97$) were similar between the groups. Length of stay (ECMO 61.9 [48.1] days; CONV 40.1 [37.1] days; $p = 0.19$), ICU free days (ECMO 6.9 [9.1] days; CONV 7.7 [14.6] days; $p = 0.86$), and vent free days (ECMO 17.6 [28.9]; CONV 10.1 [17.4] days; $p = 0.41$) were not statistically significant between the groups. Mortality in the ECMO group was significantly reduced compared to the CONV group (ECMO 14.3%; CONV 64%; $p = 0.018$). Timing from the onset of severe ARDS to ECMO intervention occurred at a mean 1.9 [1.4] days; mean days on ECMO was 8.1 [5.2] days.

Conclusion: Patients that were treated with ECMO for severe ARDS had an improved mortality compared to historical controls. ECMO should be considered at the early onset of severe ARDS to improve survival.

NOTES

INHIBITION OF HISTONE DEACETYLASE 6 RESTORES INNATE IMMUNE CELLS IN BONE MARROW IN A LETHAL SEPTIC MODEL

Zhao Ting, MD, Yongqing Li MD,Ph.D., Baoling Liu MD, Ihab Halaweish MD, Hasan Alam* MD, University of Michigan

Invited Discussant: Eileen Bulger, MD

Introduction: We have previously demonstrated that Tubastatin A (Tub A), a selective inhibitor of histone deacetylase (HDAC) 6, improves survival, and increases circulating monocyte count and bacterial clearance in a lethal model of cecal ligation and puncture (CLP) in mice. The aim of the present study was to characterize the effects of inhibition of HDAC6 on the bone marrow cell population.

Methods: C57BL/6J mice were subjected to CLP, and 1 h later given an intraperitoneal injection of either Tub A (70 mg/kg) dissolved in dimethyl sulfoxide (DMSO), or DMSO only (n=9/gr). Sham-operated animals were treated in an identical fashion, without CLP. Forty-eight hours later, bone marrow cells were flushed out from the femurs and tibias. Erythrocytes were lysed, and a single-cell suspension was made for analysis. Cells were washed, blocked with anti-mouse CD16/32, and stained with anti-mouse B220 PE-Cy7, CD3 APC-eFluor® 780, CD11b FITC, Gr-1 PerCP-Cy5.5 and F4/80 Antigen APC, and subjected to flow cytometry. Data was acquired on an LSRII Flow Cytometer (BD Biosciences) and analyzed with FlowJo (Flowjo, LLC).

Results: In comparison to the sham group, CLP animals showed decreased percentage of innate immune cells (CD11b+; 62.1±3.1 vs. 32.9±4.9%, p=0.0025; **Figure 1**) and macrophages (CD11b+ F4/80+; 44.6±3.4 vs. 19.8±2.6%, p=0.0002), and increased percentage of T lymphocytes (CD3+; 1.1±0.2 vs. 3.3±0.4%, p=0.0082) in the bone marrow 48 h after CLP. Treatment with Tub A restored the innate immune cells (32.9±4.9 vs. 54.0±4.1%, p=0.0112; **Figure 1**) and macrophages (19.8±2.6 vs. 47.1±4.6%, p=0.0001), and increased the percentage of neutrophils (CD11b+ Gr-1+; 28.4±3.9 vs. 48.0±4.0%, p=0.0075). The percentages of B (B220+) and T lymphocytes were not significantly altered by Tub A, compared to the vehicle-treated CLP animals.

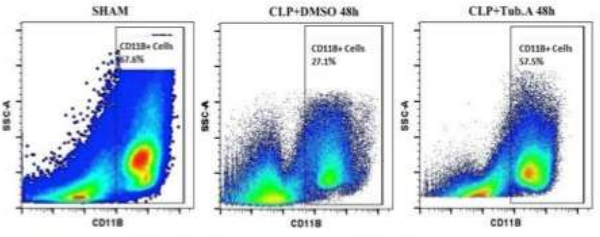


Figure 1. Tubastatin A restores the percentage of innate immune cells in bone marrow after CLP.

Conclusion: Selective inhibition of HDAC6 in this lethal septic model restored the innate immune cell and macrophage populations, and increased the neutrophil composition in the bone marrow. These results may explain the previously reported beneficial effects of Tub A treatment in a septic model.

NOTES

Session: XIIIA: Critical Care/Shock Papers 36-45
Paper 44: 4:10-4:30

MODULATING THE ENDOTHELIOPATHY OF TRAUMA: FACTOR CONCENTRATE VS FRESH FROZEN PLASMA

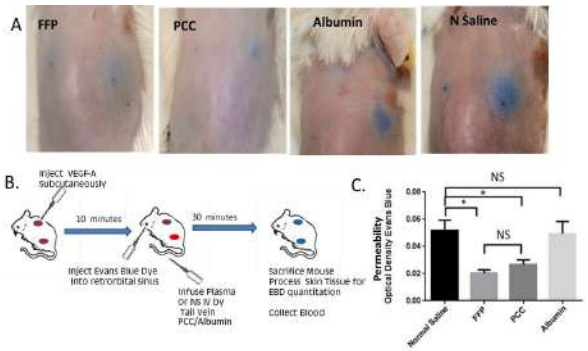
Shibani Pati MD,Ph.D., John B. Holcomb* MD, Martin A. Schreiber* MD, Blood Sytems Research Institute

Invited Discussant: Juan Duchesne, MD

Background: Transfusion of balanced ratios of plasma to platelets and red blood cells has been shown to reduce death from exsanguination in trauma patients. Aside from hemostasis, recent work has shown that plasma reduces vascular endothelial permeability, inflammation and organ edema after hemorrhagic shock, all components of the endotheliopathy of trauma (EOT) that develops soon after hemorrhagic shock and trauma. Plasma complex concentrates (PCCs) have been proposed as a replacement for plasma in trauma patients to stop uncontrolled bleeding. Based on these clinical observations, we hypothesized that PCCs could have protective effects on the EOT compared to plasma. We investigated this possibility using an established and novel in vivo model of vascular endothelial compromise.

Methods:***In vivo*:** A modified Miles assay was used in 8-10 week old NSG mice to study the effects of PCC and FFP on vascular permeability induced by relevant factors such as VEGF-A. (see **Figure B** model). Isoflurane-anesthetized mice were injected with FFP (200 ul), PCC (50 U/kg) or Albumin (6mg/kg- the amount in PCC) by tail vein. Control mice were treated with normal saline (NS). VEGF-A (100 ng) was injected in the dorsal skin of the mice to induce subcutaneous vascular leak of Evan's Blue Dye. 100 µl of a 0.5% Evans blue dye was injected into the retro-orbital sinus. Quantitative and qualitative vascular leak was assessed by the accumulation of Evans blue dye into the injection site for VEGF-A. Quantitation of extracted dye was conducted at 620 nm. Statistical analysis was conducted by paired t- test.

Results: ***In vivo*:** We found that PCC and FFP both significantly inhibited vascular permeability induced by VEGF-A compared to NS. Permeability levels for Control vs. FFP was 0.05 +/- 0.01 vs. 0.018 +/-0.004 $p<0.05$, Control vs. PCC was 0.05 +/- 0.01 vs. 0.020 +/- 0.008, $p<0.05$. PCC vs. Albumin was 0.02 +/- 0.008 vs. 0.05 +/- 0.01, $p<0.05$. FFP vs PCC was not significant. Albumin vs. Control was not significant. (**Figure A&C**)



Conclusion: We found that FFP and PCC equivalently inhibit vascular permeability, whereas albumin did not affect permeability. These beneficial effects of PCC may be due in part to modulation of vascular stability by soluble factors present in factor concentrate rather than the clotting factors. The identity of these factors is currently unknown but warrants further investigation.

NOTES

Session: XIIIA: Critical Care/Shock Papers 36-45
Paper 45: 4:30-4:50

HISTONE-COMPLEXED DNA LEVELS ARE ASSOCIATED WITH COAGULOPATHY, INFLAMMATION AND ENDOTHELIAL DAMAGE EARLY AFTER PEDIATRIC TRAUMA

Sarah C. Christiaans MD, Robert T. Russell MD,MPH, Tate Nice MD, Heather Edenfield RN, Vince Mortellaro MD, Jean-Francois Pittet MD, University of Alabama Birmingham

Invited Discussant: Hasan Alam, MD

Introduction:

The release of damage-associated molecular pattern molecules (DAMPs) after injury has been suggested to activate innate immunity and may form a key link between inflammation and coagulation in trauma. We aimed to study the presence of circulating DAMPs in the form of histone-complexed DNA (hcDNA) in our pediatric trauma population and investigated the association between hcDNA, trauma induced coagulopathy, inflammation and endothelial damage.

Methods: We conducted a prospective cohort study of pediatric trauma patients at a level 1 pediatric trauma hospital. Inclusion: highest level trauma activation and arrival within 6 hours of injury. Exclusion: >18 years of age, burns > 20% TBSA and primary asphyxiation. Blood samples were collected within 20 minutes of arrival, analyzed for hcDNA and linked to biomarkers of hypoperfusion, coagulopathy, fibrinolysis, endothelial glycocalyx shedding, complement and outcome. In addition platelet function was assessed by measuring platelet responsiveness to adenosine diphosphate (ADP) and thrombin receptor-activating peptide (TRAP) using multiple electrode impedance aggregometry.

Results: A total of 120 consecutive patients were enrolled. The mean age was 9.16 ± 10.73 years with 84% sustaining blunt trauma. Mean injury severity (ISS) was 25±20 and overall mortality was 12%. The median hcDNA level at admission was 4.49 AU. HcDNA levels were higher in patients with ISS >25 versus <25 (5.5 AU ± 4.7 vs 3.6 AU ± 3.6 $p<$ 0.0258) and in patients with a base deficit <6 mEq/L versus >6 mEq/L (6.9 AU ±4.7 vs 3.6 AU ±3.4 $p < 0.0001$). The overall incidence of coagulopathy, defined by PT ratio >1.2 was 26%. Coagulopathic patients had higher levels of hcDNA (6.3AU ±4.8 vs 4.1AU ±3.8 $p <0.0143$). Patients with aggregometry levels below normal range for ADP and TRAP had significantly higher levels of hcDNA (ADP 5.3 AU ±4.2 vs 3.7 ±3.6 AU $p < 0.0243$ and TRAP 4.8 AU ±4.0 vs 2.6 AU ±3.0 $p < 0.0003$). HcDNA levels correlated with fibrinolytic marker D-dimer, syndecan-1 and terminal complement complex (sC5b-9) (all $p < 0.0001$). Finally, significantly higher hcDNA levels were seen in non-survivors versus survivors, 7.0 AU ±3.9 and 4.2 AU ±3.7 respectively ($p <$ 0.0105).

Conclusion:

HcDNA levels are elevated in response to injury and correlate with coagulopathy, inflammation and endothelial damage observed early after severe pediatric trauma.

NOTES

SESSION XIIIB:

PAPERS #46 - #55

FRIDAY, SEPTEMBER 11, 2015, 1:30 PM – 4:50 PM

LAFITE BALLROOMS 1, 2 & 3

MODERATOR: ROSEMARY A. KOZAR, M.D., Ph.D.

RECORDER: MICHAEL F. ROTONDO, M.D.

Session: XIIIB: Papers 46-55
Paper 46: 1:30-1:50

GERIATRIC TRAUMA: COGNITIVE IMPAIRMENT AND PHYSICAL FRAILTY PREDICT 6-MONTH OUTCOMES

Cathy A. Maxwell Ph.D., Kaushik Mukherjee* MD, Mary S. Dietrich Ph.D., Addison May* MD, Lorraine C. Mion Ph.D., Ann Minnick Ph.D., Richard S. Miller* MD, Vanderbilt University

Invited Discussant: Anne Mosenthal, MD

Introduction: Frailty and cognitive decline predict poor outcomes of hospitalization but their influence on 6-month outcomes after injury for those surviving to discharge is unreported. We hypothesized that pre-injury physical frailty and cognitive decline would be predictive of functional decline and overall mortality in geriatric trauma patients at 6-month post-hospitalization.

Methods: Design: Prospective cohort study. Sample: Patients ≥ age 65 admitted to a level I trauma center between October 2013 and March 2014 with a primary injury diagnosis. Procedure: Research assistants interviewed surrogates of 188 patients within 48 hours of hospital admission to determine pre-injury cognitive and physical function impairments using previously validated brief screening instruments (i.e., Alzheimer Dementia screen [AD8], Vulnerable Elder Survey [VES-13], Barthel Index [BI]). Additional variables, including demographics, injury severity and co-morbidities were obtained from the medical record. Follow-up phone calls were made at 6-months to determine post-hospitalization status and outcomes. Of those, 34 (19%) died, either in the hospital or within 6-months of discharge: 138 of the remaining 146 completed the cognitive and frailty measures 6-month after discharge. Data Analysis: descriptive statistics, multivariate linear and logistic regression.

Results: Pre-injury (N=180). Mean age: 77.6 (SD 9.0), Median ISS: 10 (IQR 9-17), Mechanism: Falls-124 (69%), MVC-45 (25%), Pre-injury impairments: cognitive impairment (AD8 >/= 2): n=93 (52%), physical frailty (VES-13 /= 3): n=122 (68%). After controlling for pre-injury functional status, univariate predictors of functional status 6-months post-discharge included age (*beta*=-0.19.*p*=0.003), pre-injury cognitive status (AD8: *beta*=-.25,*p*<0.001), and pre-injury frailty (VES-13: *beta*=-0.38.*p*<0.001), but not comorbidities or injury severity (ISS)($p > 0.05$). A multiple regression analysis that included all the prior variables except age (which is included in the VES-13) revealed that pre-injury cognitive impairment appeared to be a stronger predictor of function 6-months post-discharge than did pre-injury frailty status (AD8: *beta=-0.37*, *p*<.001 vs. VES-13: *beta=-0.26*, *p*=0.002). Thirty of 34 (88%) patients who died in the hospital or by 6-months, screened positive for pre-injury frailty (VES-13); and 20 of 34 (59%) screened positive for both pre-injury frailty and cognitive impairment (AD8).Age (OR=1.08,95% CI=1.02-1.13*p*=0.004), injury severity (ISS: OR=1.08,95% CI=1.02-1.14,*p*=0.004),and pre-injury functional status (BI: OR=0.84,95% CI=0.74-0.94,*p*=0.003) were uniquely contributive to the likelihood of mortality by 6-months post-discharge.

Geriatric Trauma 6-Month Mortality (N=34)			
		Physical Frailty (VES-13 >/=3)	
		No	Yes
Cognitive Impairment (AD8 >/=2)	No	3/53 (6%)	10/40 (25%)
	Yes	1/10 (10%)	20/77 (26%)

Conclusion: Pre-injury cognitive impairment and frailty are prevalent in geriatric trauma patients and predict poor outcomes after injury. Screening patients for pre-injury impairments may help to select patients at high risk for poor outcomes.

NOTES

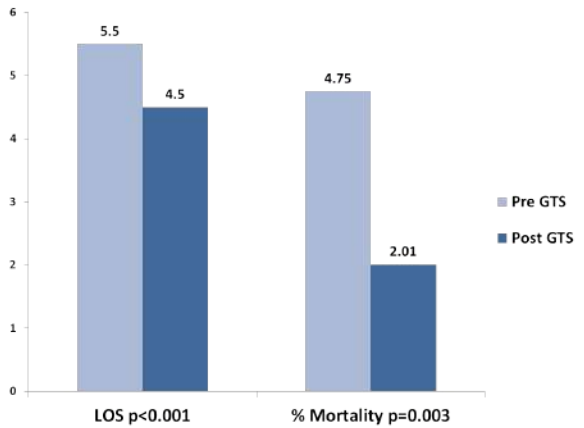
Session: XIIIB: Papers 46-55
Paper 47: 1:50-2:10

CREATION OF A GERIATRIC TRAUMA SERVICE SIGNIFICANTLY DECREASES MORTALITY AND HOSPITAL LENGTH OF STAY

Douglas J.E. Schuerer* MD, Robert Winfield* MD, Julie Nash RN, MSN, Cristina Loomis RN, William Carroll CSTR, Grant Bochicchio* MD, Washington University in St. Louis

Invited Discussant: Jeffrey Young, MD

Introduction: As our elderly population continues to grow, trauma centers must prepare for this influx of older patients with multiple co-morbidities. We identified in our trauma center that the majority of these older patients were admitted to other specialty services which lead to delay in care and potentially a higher morbidity and mortality. The objectives of this study were to determine whether the implementation of a comprehensive Geriatric Trauma Service (GTS) would impact the outcome of these patients. **Methods:** A quasi-experimental time interrupted series design was performed in which prospective data was collected in 2012 on all geriatric trauma patients (Pre GTS) with mild to moderate injury > 55 years of age followed by an implementation period of 9 months. A 15 month post implementation phase (Post GTS) was then evaluated. During the implementation phase, we worked with a multidisciplinary team to develop our GTS. Key elements were: 1) Hire and train nurse practitioners to run the service with trauma attending supervision, 2) Develop a GTS team based (instead of floor based) social work and case management group, 3) Hire more therapy personnel and change shifts to ensure therapy intensity including weekends, 4) Identify appropriate patients and ensure admission to the geriatric trauma service, 5) Develop standard treatment protocols for care, including Beers medication review, 6) Develop protocols with anesthesia for efficient pre-operative work up and expedited time to the OR, and 7) Communicate with PCP before discharge. We compared the outcome of the Post GTS group to the Pre GTS group. **Results**: There were a total of 652 patients in the Pre-GTS group compared to 782 patients in the Post GTS group. There was no significant difference in ISS and gender between the 2 groups, however the post GTS patients were significantly older (78 vs 74.5years, p=0.0001). Most importantly, there was a significant decrease in mortality (p=0.003) and hospital length of stay (LOS) (p<0.001) in the Post GTS group. (Fig). **Conclusion**: The implementation of a comprehensive GTS at our institution significantly decreased mortality and LOS, despite an older population and similar baseline characteristics.



NOTES

Session: XIIIB: Papers 46-55
Paper 48: 2:10-2:30

25 YEARS LATER: MESS (MANGLED EXTREMITY SEVERITY SCORE) REVISITED

Yasaman Kavousi Shahram Aarabi MD,MPH, Jeffrey B. Friedrich MD, Niten Singh MD, Eileen M. Bulger* MD, Harborview Medical Center

Invited Discussant: Mark Midwinter, CBE, QHS, MD

Introduction:

Mangled Extremity Severity Score (MESS) was developed at our institution 25 years ago and has been a widely used scoring system for prediction of lower extremity amputation after trauma. Here we re-evaluate MESS using a contemporary cohort of patients at our institution, in order to evaluate its continued usefulness given the many changes in clinical care over the past three decades. Further, we look the prognostic value of MESS with regards to cost and resource utilization.

Methods:

A retrospective review of all trauma patients >18 years of age admitted to our institution with extremity injury and ischemia requiring revascularization between 2011 and 2014. Data sources included direct chart review, institutional trauma registry, and institutional financial records. Logistic and linear regression analyses were performed to evaluate the correlation of MESS with need for eventual amputation (primary outcome) as well as with length of stay, number of inpatient procedures, hospitalization cost, and discharge status (secondary outcomes). Statistical analyses were performed using JMP 11.0 software (SAS International Inc., Cary NC).

Results:

Between April 2011 and October 2014, a total of 48 trauma patients with lower extremity injury requiring revascularization were identified (mean age 37 years, range 18-87 years). 85% of patients were male and 46% had blunt mechanism of trauma. Of the 48 extremity injuries, 39 (81%) were ultimately salvaged (mean MESS 4.8 ± 1.3) and 9 (19%) required amputation (mean MESS 9.1 ± 1.3). Mean MESS between these groups showed statistically significant difference ($p<0.0001$) and MESS≥8 predicted amputation in 100% of patients. For amputated patients, definitive amputation occurred at a range of 1 to 14 days after injury. Furthermore, MESS was an independent direct predictor of cost of hospitalization ($p=0.0195$), hospitalization length ($p=0.0039$), and number of inpatient procedures performed ($p=0.0020$). Finally, patients with MESS≥8 who did not undergo early amputation, went on to delayed amputation with average 4.4 day longer hospitalization ($p=0.0053$), 4.9 more inpatient procedures performed ($p=0.0065$), and a trend towards increased hospital costs compared with controls.

Conclusion:

MESS remains a clinically reliable yet simple scoring system to assist with early prognosis of trauma patients with serious extremity injuries. Over the past 25 years, mean MESS for salvaged and amputated limbs has not changed. However, the threshold for MESS predicting 100% need for eventual amputation *has* increased, possibly due to improvements in clinical care. Further, we find that MESS is an independent direct predictor of hospitalization cost and resource utilization in our contemporary cohort. Patients with high MESS who do not undergo early amputation, go on to delayed amputation with increased morbidity and cost of care.

NOTES

Session: XIIIB: Papers 46-55
Paper 49: 2:30-2:50

CLASSIFICATION OF SOFT-TISSUE INJURIES IN OPEN FEMUR FRACTURES: RELEVANT FOR SYSTEMIC COMPLICATIONS?

Christian D. Weber MD, Rolf Lefering Ph.D., Thomas Dienstknecht MD, Philipp Kobbe MD, Richard M. Sellei MD, Frank Hildebrand MD,Ph.D., Hans-Christoph Pape* MD, FACS RWTH Aachen University

Invited Discussant: Sharon Henry, MD

Introduction: A broad range of systemic complications has been described to occur in patients with open major fractures. Various causes have been claimed to play a role. We therefore surveyed a nationwide trauma registry to assess risk factors associated with open femur fractures and concomitant soft-tissue injuries.
Methods: Cohort study in a nationwide population-based prospective database.Inclusion criteria for selection from database: individuals with an Injury Severity Score ≥9 points, age ≥16 years, femur fracture and survival until primary admission. Two main groups: closed (CFF) and open femur fracture (OFF). Patient demographics, injury severity, surgical fracture management, length of stay (LOS) and systemic complications (e.g. multiple organ failure (MOF), sepsis, mortality) were collected and statistically analyzed using SPSS statistics. Linear regression analysis was performed to stratify subgroups for the degree of open soft-tissue injury according to Gustilo and Anderson.
Results: Among 32582 documented trauma victims (01/01/2002-31/12/2010), a total of 5761 met the inclusion criteria (mean NISS 30±14 points). Main groups: 4423 CFFs (76.8%) and 1338 OFFs (23.2%). Open fracture subgroups were divided into I° (334, 28.1%), II° (526, 44.3%) and III° (328, 27.6%). Despite lower ISS values (p=0.017), open fractures were associated with an increased risk for pre-hospital hemorrhagic shock (CFF 22.4%, OFF 26.0%, p=0.01), higher resuscitation requirements (p<0.001), MOF (CFF 24.3%, OFF 28.8%, p=0.001) and longer in-hospital (p<0.001) and intensive care stay (p=0.001).While ISS (NISS) values showed a minor increase of +1.3 (+1.8) points per subgroup, the prevalence of MOF, sepsis and mortality multiplied with the degree of open soft-tissue injury.

	OFF I°	OFF II°	OFF III°	Total	Slope coefficent	p-value
Number (n), %	334, 28.1	526, 44.3%	328, 27.6%	1188, 88.8%	-	-
ISS, mean (±SD), median	22.2±12.4, 18	24.9±12.5, 22	24.±14.1, 22	24.1±13, 22	+1.3 points	0.011
Ext. Fixation % (n)	45.8 (153)	58.0 (305)	71.3 (234)	58.2 (692)	+12.8%	<0.001
Prehospital shock %, n	19.5 (59)	27.8 (133)	29.7 (85)	26.0 (277)	+5.1%	0.009
Shock in ER % (n)	12.9 (40)	20.2 (98)	28.3 (86)	20.4 (224)	+7.7%	<0.001
Mass transfusion %(n)	8.4 (28)	13.2 (69)	28.2 (92)	16 (189)	+6.4%	<0.001
Sepsis %, (n)	6.0 (20)	9.5 (50)	16.2 (53)	10.4 (123)	+5.1%	<0.001
MOF %, (n)	22.2 (74)	30.2 (159)	36.0 (118)	29.5 (351)	+6.9%	<0.001
Mortality %, (n)	8.1 (27)	9.9 (52)	17.1 (56)	11.4 (135)	+4.5%	<0.001

Conclusion: Open femur fractures are associated with higher in-hospital complications related to ICU stay, hospital days and incidence of multiple organ failure when compared with closed femur fractures. For prediction of in-hospital complications the degree of soft-tissue injury outweighs the relevance of injury severity scoring.

NOTES

Session: XIIIB: Papers 46-55
Paper 50: 2:50-3:10

LOWER EXTREMITY DUPLEX SURVEILLANCE DOES NOT REDUCE THE INCIDENCE OF PULMONARY EMBOLISM: A PROSPECTIVE STUDY OF TWO CENTERS

Steven Shackford* MD, Mark Cipolle* MD,Ph.D., Jayraan Badiee MPH, Danielle Mosby MPHc, M. Margaret Knudson* MD, Paul Lewis DO, Victoria McDonald MD, Erik Olson MD, Kimberly Thompson MD, Jan-Michael Van Gent DO, Ashley Zander DO, CLOTT Study Group Scripps Mercy Medical Center

Invited Discussant: Elliott Haut, MD, PhD

Introduction: Venous thromboembolism (VTE) remains a significant cause of morbidity and mortality in trauma. Controversy exists regarding the use of lower extremity duplex ultrasound screening and surveillance (LEDUS). Advocates cite earlier diagnosis and treatment of deep venous thrombosis (DVT) to prevent pulmonary embolism (PE), thrombus propagation, and later complications of venous hypertension. Opponents argue that LEDUS identifies more DVT (surveillance bias), but does not prevent nor reduce the incidence of PE. The magnitude of the increase in DVT identified by LEDUS and the effect on PE incidence remain speculative. We sought to describe the magnitude of this surveillance bias and test our hypothesis that LEDUS does not decrease the incidence of PE after injury.

Methods: We compared data from two level 1 trauma centers: Center A using aggressive serial LEDUS and Center B using LEDUS only for symptomatic patients. Beginning in 2014, both centers prospectively collected data on demographics, injury severity, and VTE risk using the same dataset, receptacle (REDCap), and uniform definitions derived from a consensus of 17 trauma centers concurrently studying VTE in trauma. Both centers utilized mechanical prophylaxis (MechPx) and pharmacologic prophylaxis (PharmPx) based on risk assessment.

Results: Centers A and B treated patients with similar injury severity and VTE risk (Table). Center A had a 4-fold greater incidence of lower extremity DVT (LEDVT) than Center B, but used significantly less PharmPx and significantly more MechPx. Of the 80 patients who developed a DVT, PE, or both, 99% received prophylaxis prior to the event. Among those patients who received PharmPx, VTE occurred in 49 at Center A (11.3%) and in 10 (2.9%) at Center B ($p<0.0001$).

	Center A	Center B	p value
Patients (N)	772	454	
ISS (median, IQR)	10 (6-17)	10 (6-17)	0.52
Head AIS > 3 (%)	228 (30%)	106 (34%)	0.27
LEDVT (%)	67 (9%)	8 (2%)	<0.0001
Above knee DVT (%)	12 (1.5%)	2 (0.4%)	<0.0001
Below knee DVT (%)	55 (7.5%)	6 (1.6%)	<0.0001
PE (%)	3 (0.4%)	2 (0.4%)	0.89
PharmPx (%)	439 (57%)	361 (80%)	<0.0001
MechPx (%)	722 (94%)	274 (60%)	<0.0001

Conclusion: LEDUS is associated with a 4-fold increase in the rate of LEDVT, but no reduction in PE. Neither PharmPx nor MechPx are completely effective in preventing VTE in trauma patients. VTE should not be considered a "never event" in this cohort. The earlier detection and treatment of LEDVT in asymptomatic patients does not affect the incidence of PE. The impact on venous hypertension cannot be addressed without long term follow-up.

NOTES

Session: XIIIB: Papers 46-55
Paper 51: 3:10-3:30

EXTENDING THE GOLDEN HOUR: PARTIAL RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA (p-REBOA) IN A HIGHLY LETHAL LIVER INJURY MODEL

Rachel M. Russo MD, Timothy K. Williams MD, Christopher M. Lamb FRCS, Jeremy W. Cannon* MD, Joseph M. Galante* MD, J. Kevin Grayson DVM, Ph.D, Lucas P. Neff MD, Clinical Investigation Facility, Travis AFB

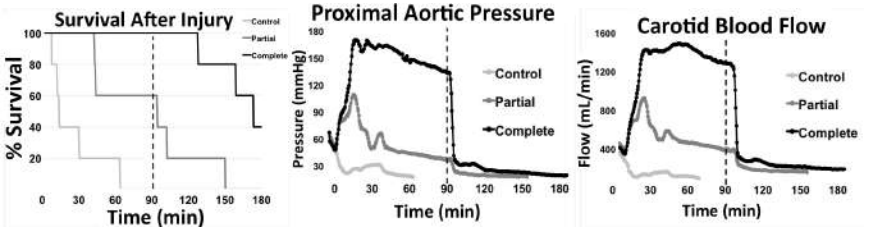
Invited Discussant: Todd Rasmussen, MD

Introduction: Prior proof-of-concept studies with controlled hemorrhage have indicated that partial resuscitative endovascular balloon occlusion of the aorta (p-REBOA) can achieve a 90% aortic luminal occlusion and augment central aortic pressure with less distal ischemia than complete REBOA (c-REBOA). Yet, the ability of p-REBOA to confer benefit during uncontrolled hemorrhage remains unclear. The aim of this study was to evaluate the ability of p-REBOA to extend survival and maintain homeostasis in a highly lethal liver injury model.

Methods: Fifteen Yorkshire-cross swine were anesthetized, instrumented, splenectomized, and subjected to rapid 10% total blood volume loss followed by traumatic amputation of ~30% of the liver. Coagulopathy was created through hemodilution. Swine were randomized to treatment with p-REBOA, c-REBOA, or no intervention. Aortic pressure (proximal and distal to the balloon), carotid blood flow and serum markers of ischemia were recorded. Balloons remained inflated in the p-REBOA and c-REBOA groups for 90 minutes (T90), followed by damage control laparotomy (DCL), limited whole blood resuscitation, and graded balloon deflation. The study ended at 180 minutes after onset of hemorrhage, or death of the animal.

Results: Without intervention, liver injury was rapidly lethal. Mean survival times in the control, p-REBOA, and c-REBOA arms were 25±21, 86±40 and 163±20 minutes, respectively (p<0.001). P-REBOA resulted in maintenance of near-baseline carotid flow and proximal aortic pressure, while c-REBOA generated extreme proximal hypertension and prolonged supraphysiologic carotid flow through T90. Lactate levels through T90 were similar for p-REBOA and c-REBOA. Both experimental groups experienced profound hypotension following balloon deflation at DCL.

Conclusions: In the setting of severe ongoing hemorrhage, p-REBOA increased survival time beyond the golden hour while maintaining global perfusion. A prolonged survival model with aggressive blood resuscitation is needed to determine if p-REBOA reduces the ischemia-reperfusion injury seen in c-REBOA and confers a survival advantage.



NOTES

Session: XIIIB: Papers 46-55
Paper 52: 3:30-3:50

EFFICACY OF A NOVEL FLUOROSCOPY-FREE ENDOVASCULAR BALLOON DEVICE WITH PRESSURE RELEASE CAPABILITIES IN THE SETTING OF UNCONTROLLED JUNCTIONAL HEMORRHAGE

Kyle K. Sokol MD, George Black MD, Robert Shawhan MD, Matthew J. Eckert MD, Nam T. Tran MD, Benjamin W. Starnes MD, Matthew J. Martin* MD, Madigan Army Medical Center
Invited Discussant: Michael Sise, MD

Introduction: Resuscitative endovascular balloon occlusion of the aorta (REBOA) has emerged as a promising alternative to gauze packing in the setting of non-compressible torso hemorrhage (NCTH). Our study objectives are to describe the placement and physiologic impact of a novel REBOA device in treatment of uncontrolled junctional hemorrhage. We hypothesize that this device can be successfully deployed without fluoroscopic guidance, minimize intraaortic barotrauma, and effectively function to increase survival in the setting of profound shock dyshomeostasis.

Methods: Fourteen adult swine (35-50kg) underwent a hemorrhage and ischemia/reperfusion injury protocol to produce shock physiology and dilutional coagulopathy similar to major trauma victims, and then randomized to REBOA (N=8) vs standard gauze packing (GP) (N=6) groups. A complex contra-lateral groin soft tissue and vascular injury was then created, followed by 30 sec of free bleeding and gauze packing for 5 min. Control group received no further intervention and the REBOA group then had the aortic balloon inflated until the pressure release valve opened. Subjects were allowed to survive for 45 minutes post-packing, after which native and balloon-exposed aortae were harvested and assessed for local endothelial injury.

Results: Control and REBOA groups showed similar baseline hemodynamics (HD) (HR 74±7 vs 91±6, p=0.078; MAP 32±6 vs 43±6, p=0.228) levels of coagulopathy (PTT 21±5 vs 22±5, p=0.228; INR 1.3±0.1 vs 1.2±0.2, p=0.476; fibrinogen 108±17 vs 135±67, p=0.747) and hemorrhage/ischemia/reperfusion insult (Hct 16±2 vs 20±5, p=0.118 ; pH 7.3±1 vs 7.4±2, p=0.518 ; lactate 7±3 vs 7±5, p=0.950 ; BD 9±7 vs 5±11, p=0.491). All REBOA devices were successfully deployed into zone III of the distal aorta without fluoroscopic assistance or evidence of gross aortic injury in proximity of the deployed balloon. The REBOA group had significantly decreased residual hemorrhage volumes (0.5±0.2L vs 0.2±0.2, p=0.014) and increased survival times (45±0 min vs 8±4 min, p<0.001), with all REBOA subjects surviving to end of study time.

Conclusion: This study reinforces results found in previous studies that REBOA is an effective measure of generating a temporary window of HD stability and, to the authors knowledge, is the first to confirm that this specific REBOA device can be blindly guided into the appropriate zone of the aorta without generating gross vascular damage during unmeasured balloon inflation. Furthermore, REBOA remains superior to standard GP technique in the setting of non-compressible junctional hemorrhage despite profound HD instability, coagulopathy, hypothermia and acidosis, significantly decreasing volume of hemorrhage and dramatically increasing survival time.

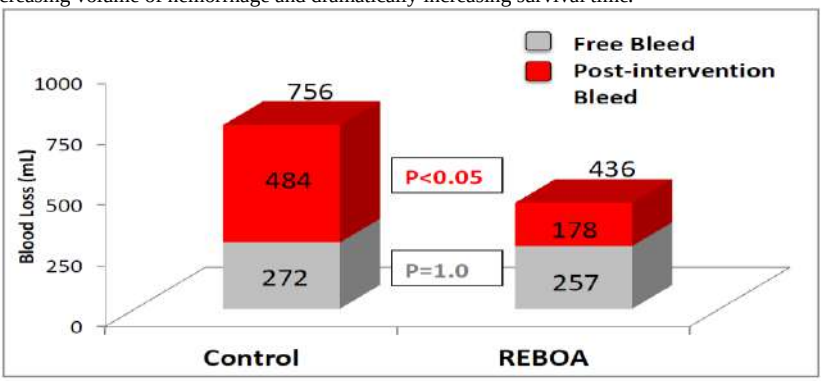


Figure 1. Average total blood loss proportionately represented by 30-second pre-intervention free bleed volume and experimental post-intervention bleed volumes in control and REBOA groups.

NOTES

Session: XIIIB: Papers 46-55
Paper 53: 3:50-4:10

Randomized Controlled Trial Comparing Dynamic Simulation to Static Simulation in Trauma

Anthony J. Carden MD, Edgardo Salcedo* MD, David Leshikar MD, Garth Utter* MD, Machelle Wilson Ph.D., Joseph Galante* MD, University of California, Davis

Invited Discussant: M. Margaret Knudson, MD

Introduction: With the American Board of Surgery requiring only 10 open trauma operations for certification and a trend towards nonoperative management, current general surgery residents have limited exposure to open trauma operative cases. Simulation supplements variable rotation volume and provides experience with critical but rarely performed procedures. Open simulation classically focuses on static models with anatomic accuracy, but lacks practicality when hemorrhage control is the life-saving maneuver. The purpose of this study is to determine whether training on a dynamic simulator is more effective than training on an anatomically accurate, but static cadaver for temporary vascular shunt (TVS) placement.

Methods: We enrolled 54 general surgery residents at all PGY levels in a randomized controlled trial comparing training of TVS placement on a dynamic simulator of original design (n= 28) versus a cadaver arm (n= 26). Our research team developed an inexpensive, reusable simulator with ongoing hemorrhage to duplicate the steps of TVS. After standardized video didactics, trainees practiced on either the simulator or cadaver arm. After trainees achieved competency, as judged by the supervising surgeons based on predetermined criteria, they were recorded placing a TVS in a live swine femoral artery. Two blinded trauma surgeons evaluated the recorded performances using a validated skills assessment modality, Objective Structured Assessment of Technical Skills (OSATS). Additional outcomes included times to hemorrhage control and procedure completion. Outcomes were compared using the Satterthwaite t-test.

Results: The simulator was successfully created from simple parts for $40.00, compared to a cadaver arm ($380.00) or a training swine ($1250.00) cost at our institution. After completing training, all residents in both groups successfully completed the task. Subjects trained on the simulator placed the TVS faster than those trained on a cadaver (584s vs. 751s, p=0.0096), with a trend towards faster time to hemorrhage control (110s vs. 148s, p=0.086). There was no significant difference in OSATs score (3.70 vs. 3.60, p=0.53).

Conclusion: Skills acquisition is at least as effective on the simulator as a cadaver arm, at a fraction of the cost. The addition of dynamic hemorrhage control provides a critical training element required for trauma skills development. Observationally, residents trained on the dynamic simulator were more comfortable in the face of active hemorrhage than those trained on a cadaver. These simulators could also be used for periodic skills maintenance to keep important skills sharp when clinical opportunities may be scarce. Use of dynamic simulation for hemorrhage control operations is an inexpensive and effective way to supplement low operative volume for training in critical open trauma skills.

NOTES

POST-HOSPITALIZATION TREATMENT REGIMEN & RE-ADMISSION FOR C. DIFFICILE COLITIS IN MEDICARE BENEFICIARIES

Charles M. Psoinos MD, Courtney E. Collins MD, Didem Ayturk MS, Julie M. Flahive MS, Frederick A. Anderson Ph.D., Heena P. Santry* MD, MS, FACS University of Massachusetts

Invited Discussant: Sasha Adams, MD

Introduction: Over the last two decades C. difficile (CD) has become a significant cause of morbidity and mortality among elderly Americans. Post-discharge treatment targeting CD may play a role in readmission rates.

Methods: We queried a 5% random sample of Medicare beneficiaries (2009-2011 Part A inpatient and Part D prescription drug claims; n = 864,604) for any hospitalization with the primary or secondary diagnosis of CD. Patients who died during index admission or were transferred to another hospital were excluded. We compared patient demographics, co-morbidities, and CD treatment regimen after index hospitalization discharge (no treatment, oral metronidazole only, oral vancomycin only, or both) between patients who were readmitted with a primary diagnosis of CD colitis within 90 days of index hospitalization discharge and patients who were not readmitted for any reason within 90 days of discharge using univariate tests of association and multivariate models. To measure the impact of post-discharge CD treatment on readmission specifically for recurrent CD, patients who were readmitted within 90 days with any primary diagnosis other than CD were excluded.

Results: During the study period, 945 patients discharged with a diagnosis of CD colitis were readmitted within 90 days with CD while 1953 patients discharged with a diagnosis of CD did not require any hospital readmission for any reason. Age and race distribution were comparable between groups. However, those readmitted had higher baseline comorbidities (average Elixhauser index 5.9 vs. 4.7 [$p<0.0001$]) than those patients not readmitted. Index hospitalization length of stay (LOS) was significantly shorter for those readmitted (9.2 vs. 11.8 days [$p<0.0001$]). In multivariable models patients discharged on either oral metronidazole only or oral vancomycin only had reduced 90 day readmission rates compared to patients discharged without any CD treatment (OR 0.30 [95% CI 0.24, 0.37] and 0.49 [95% CI 0.37, 0.64], respectively). Conversely, patients discharged on both oral vancomycin and metronidazole had increased risk of readmission [OR 1.29 [95% CI 0.99, 1.69]). (Table 1) Readmitted patients had higher all-cause 90-day mortality (17.8% vs. 8.9% [$p<0.0001$]) with 1.77 times increased odds [1.37, 2.27] of dying within 90 days.

Conclusion: More than 10% of patients with CD at the time of discharge are readmitted for CD within 90 days. Patients who presumably completed treatment during index hospitalization (no treatment group) and those prescribed a single drug for ongoing treatment have lower readmission rates than those requiring two drugs on discharge. Elderly patients with ongoing severe CD infections may benefits from continued inpatient treatment rather than discharge on a two drug regimen. Our findings have important implications for reducing readmissions among Medicare beneficiaries with this increasingly frequent disease.

Table 1: Risk of Primary CD Readmission within discharge + 90 days for Medicare Beneficiaries Surviving an Initial Hospitalization for Clostridium difficile 2009-2011 (N =2898)

NOTES

Session: XIIIB: Papers 46-55
Paper 55: 4:30-4:50

DUI Histories in Intoxicated Injured Bicyclists

Steven Maximus MD, Cesar Figueroa MD, Jacqueline Pham BS, Cristobal Barrios MD,
University of California, Irvine - Orange County

Invited Discussant: A. Britton Christmas, MD

When creating your abstract, the only section headers to be used are listed below and they need to be in this format:

Introduction: It has been well documented that the use of alcohol correlates with injury risk, especially in DWI (driving while intoxicated) and DUI (driving under the influence). Consumption of alcohol in patients presenting with bicycle-related injuries is associated with greater injury severity, longer hospitalization, and higher health care costs. We hypothesized that intoxicated patients operating a bicycle with traumatic injuries have previous DUI or DWI convictions and had lost their privilege to drive a motor vehicle, using bicycling as an alternate mode of transportation and had continued alcohol consumption despite negative consequences.
Methods: We retrospectively collected data on injured bicyclists over the age of 18 with positive blood alcohol levels (BAC's) treated from the dates 1/2009 to 6/2014 at a large level 1 urban trauma center. We then matched each patient by name and date of birth and were able to obtain public criminal records through the Superior Court of California for the local of county. Specifically, the search queried for DUI/DWI convictions with suspension of driving privileges. Secondary datapoints such as age, BAC, hospital length of stay, other convictions, race, gender, drug test results, and insurance status were also analyzed.

Results: A total of 149 injured bicyclists with positive blood alcohol levels were identified. Their average BAC was 236.0 mg/dL and their average age was 41 years old. 66 patients (44.2%) had prior DUI/DWI convictions with suspension of driving privileges, with 45 identifying as White (30.2%) and 19 as Hispanic (12.8%). 132 were male and 17 were female. 87 patients were White (58.4%), 51 were Hispanic (34.2%), 7 were Asian (0.05%), 3 (0.02%) were identified as other, and 1 was black (0.006%). 51 patients (34.2%) tested positive for other drugs, with the most common being methamphetamine and THC. 63 patients (42.3%) had other misdemeanor or felony charges, with the most common being public intoxication. There were 95 patients (63.8%) who had no health insurance, including 76.5% of Hispanic patients who did not have health insurance coverage. Intoxicated bicyclists trended towards longer hospital length compared to non-intoxicated bicyclists (4.60 vs. 3.44 p=0.07). Of interest, only 3 out of 149 patients (0.02%) were charged with bicycling while intoxicated.
Conclusion: Intoxicated bicyclists involved in trauma are more likely to have previous DUI/DWI, have other drug use, tend to have longer hospital stays, and are less likely to have insurance. These patients persistently exhibit high risk alcohol behavior patterns, despite previous negative consequences. Bicycle safety education and behavior modification targeting DUI/DWI offenders is warranted. The data also highlights the need to aggressively charge and prosecute intoxicated bicyclists who are injured, as the vast majority of offenders do not get charged for their violation. Furthermore, in order to promote injury prevention, resources to increase awareness of this underestimated public health issue should be promoted.

All images, charts and tables must be placed and uploaded in the body of your abstract exactly as you want them.

NOTES

MILITARY AWARDS

FRIDAY, SEPTEMBER 11, 2015, 4:50 PM - 5:00 PM LATOUR BALLROOM

PRESIDING: THOMAS M. SCALEA, M.D., AAST PRESIDENT

RAYMOND FANG, M.D., CHAIR, MILITARY LIAISON COMMITTEE

AAST ANNUAL BUSINESS MEETING *(FELLOWS ONLY)*

FRIDAY, SEPTEMBER 11, 2015, 5:00 PM – 6:15 PM

LATOUR BALLROOM

AAST BANQUET RECEPTION

FRIDAY, SEPTEMBER 11, 2015, 7:30 PM – 8:00 PM

LATOUR/LAFITE FOYER

AAST BANQUET *(BLACK TIE OPTIONAL)*

FRIDAY, SEPTEMBER 11, 2015, 8:00 PM – 10:00 PM

LAFITE 1-3

PETER C. CANIZARO, M.D.
June 30, 1935 - September 3, 1990

Peter C. Canizaro was born on June 20, 1935, in Vicksburg, Mississippi. He received his B.A. degree from the University of Texas, Austin, in 1956 and his M.D. degree from the University of Texas Southwestern Medical School, Dallas, in 1960. Following an internship at Parkland Memorial Hospital/UTSMS, he spent two years as a Captain in the Surgical Research Unit, Brooke Army Hospital, Fort Sam Houston. Following another year as a NIH Research Fellow, he completed his surgical residency at Parkland/UTSMS from 1964-1968. He remained on staff at Parkland/UTSMS from 1968-1974, and then subsequently served on the faculty at the University of Washington (1974-1976) and Cornell University Medical Center (1976-1981) where he became Professor of Surgery. Dr. Canizaro became Professor and Chairman of the Department of Surgery at the Texas Tech University Health Sciences Center in 1982 and remained there until his untimely death in 1990. Dr. Canizaro was an innovative surgical scientist who made multiple contributions to the field of trauma and resuscitation. Examples of topics covered in his published manuscripts include the following:

1960	Distribution changes in 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

1993 Philip S. Barie, M.D., M.B.A.

1994 Frederick A. Luchette, M.D., M.Sc.

1995 Patrick J. Offner, M.D.

1996 Rodney M. Durham, M.D.

1997 Ronald J. Simon, M.D.

1998 Charles N. Mock, M.D., M.P.H., Ph.D.

1999 David A. Spain, M.D.

2000 John T. Owings, M.D.

2001 Hans-Christoph Pape, M.D.

2002 Karen J. Brasel, M.D., M.P.H.

2003 James Jeng, M.D.

2004 Eileen M. Bulger, M.D.

2005 Carnell Cooper, M.D.

2006 Saman Arbabi, M.D.

2007 Kari Hansen, M.D.

2008 Randall S. Friese, M.D.

2009 Andrew C. Bernard, M.D.

2010 Oscar D. Guillamondegui, M.D.

2011 Jay Manaker, M.D., FACEP

2012 Stephanie Savage, M.D.

2013 Jason Smith, M.D.

2014 Sarah Majercik, M.D., M.B.A.

SESSION XIV:

PAPERS #56 - #67

SATURDAY, SEPTEMBER 12, 2015, 8:00 AM – 12:00 PM

LATOUR BALLROOM

MODERATOR: GRACE S. ROZYCKI, M.D., M.B.A.

RECORDER: KAREN J. BRASEL, M.D., M.P.H.

Session: XIV: Papers 56-67
Paper 56: 8:00-8:20

INTIMATE PARTNER VIOLENCE-IT IS PREVALANT HERE TOO: THE FEASIBILITY OF DETERMINING PREVALENCE AT COMMUNITY HAIR SALONS

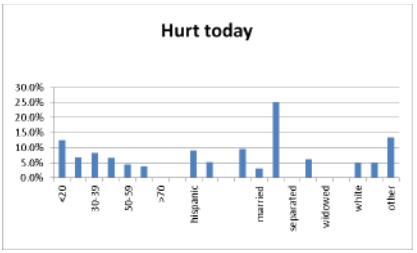
D'Andrea K. Joseph* MD, Susan Divietro Ph.D., Eric Klein MD, Rebecca Beebe Ph.D., Megan Clough BS, Garry Lapidus PA-c Hartford Hospital

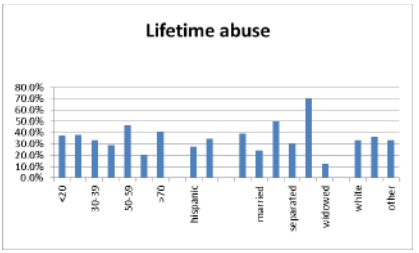
Invited Discussant: Eric Toschlog, MD

Introduction:Intimate partner violence (IPV) is an under recognized cause of detrimental health outcomes. As a result, many health care organizations have recommended routine IPV screening. Implementing health-related screening programs outside of health care facilities is a beneficial public health initiative, but to date, IPV screening outside of healthcare facilities remains negligible. The objective of this study is to determine the prevalence of IPV among women receiving services at hair salons. We hypothesized that women would disclose IPV in this setting and that rates of abuse would reflect national averages.

Methods:We recruited a convenience sample of 6 hair salons in 2014. Hair stylists were trained on how to recognize and refer IPV victims. Self-reported IPV of salon clients was measured by a tablet-based validated screening tool, the Patient Satisfaction and Safety Survey.

Results:Of the participating hair salons, 2 were urban, 2 were suburban, and 2 were rural. Of the 266 women, 45% were <50 years old, 62% were white, 31% were black, and 4% were of Hispanic origin. Half were married, 39% held bachelor's degrees or higher, and 68% reported incomes >$50,000/yr. Overall, reported past year prevalence of physical abuse was 3.6%, past year prevalence of sexual abuse was 2.7%, lifetime prevalence of emotional or physical abuse was 34.2%. Importantly, 5.3% of the sample reported that they had been hurt that day by their current or former partner. Past year physical abuse was more common among women 30-39 years old (9.1%), blacks (9%), and single women (7.5%). Past year sexual abuse was more common among women 20-29 years old (13.8%), other races (6.7%), and single women (5.4%). Lifetime abuse was most common among women 50-59 years old (13.8%), blacks (36.1%), and divorced women (69.7%). The demographics of women who were most commonly hurt the day of the survey were <20 years old (12.5%), other races (13.3%), and women in common law relationships (25%).





Conclusion: Women in our study reported IPV prevalence rates consistent with national data. Documentation of IPV prevalence in hair salons will provide much-needed support for novel interventions such as Cut it Out, a national program designed to train hair stylists on how to recognize and refer IPV victims.

NOTES

Session: XIV: Papers 56-67
Paper 57: 8:20-8:40

AIRWAY MANAGEMENT FOLLOWING REPAIR OF CERVICAL TRACHEAL INJURIES: A RETROSPECTIVE, MULTICENTER STUDY

John A. Harvin MD, Bryan A. Cotton* MD,MPH, Jason Brocker MD, Deborah M. Stein* MD,MPH, Evren Dilektasli MD, Kenji Inaba* MD, Michael A. Vella MD, Oscar Guillamondegui* MD, Lisa M. Kodadek MD, Elliot R. Haut* MD,Ph.D., Cory R. Evans MD, Jordan A. Weinberg* MD, Michael D. Goodman MD, Bryce R. Robinson* MD, John B. Holcomb* MD, University Of Texas Health Science Center At Houston

Invited Discussant: J. Wayne Meredith, MD

Introduction: Optimal airway management following repair of cervical tracheal injuries is unknown. "Protective" tracheostomy had been commonly employed, but recent studies question the practice. This study aims to describe the current airway strategies being used and determine the optimal airway management following cervical tracheal injury repair.
Methods: Patients with cervical tracheal injuries admitted 01/2000-01/2014 at seven U.S. Level I trauma centers were identified. Patients were placed into one of three groups depending on the post-operative airway management: immediate or early extubation (≤24 hours, EXT), prolonged intubation (>24 hours, INT), and immediate tracheostomy (TRACH). Following univariate analysis, a multivariate model was developed to evaluate for surgical site infection (SSI) and ICU-free and ventilator-free days, comparing INT and TRACH to EXT as the reference. Continuous variables presented as median (IQR).
Results: Over the study period, 382,529 patients were admitted to seven Level I trauma centers. 594 (0.16%) had a laryngotracheal injury with 120 (0.03%) cervical tracheal injuries. Ten patients were excluded for incomplete data and seven died within 24 hours of admission, leaving 103 patients included in the study. Patients were grouped based on airway management: 40 (39%) in EXT, 30 (29%) in INT, and 33 (32%) in TRACH. There were no differences in demographics or injury mechanism. The INT and TRACH groups were more severely injured than the EXT group (ISS INT 25 [16, 29] and TRACH 17 [12, 33] vs EXT 16 [10, 17], p<0.01). The INT and TRACH groups had a trend towards higher rates of destructive injuries (INT 20% vs TRACH 34% vs EXT 13%, p=0.08). Despite a higher SSI rate, the TRACH group had a lower mortality and more hospital-, ICU-, and ventilator-free days compared to the INT cohort. On multivariate analysis, tracheostomy was associated with an increased risk in the odds of SSI (OR 9.56, 95% CI 1.35-67.95) compared to both EXT and INT, while INT was associated with fewer ICU-free days (corr. coef. -9.64, 95% CI -12.66 to -6.62) and ventilator-free days (corr. coef. -9.24, 95% CI -12.30 to -6.18) compared to both EXT and TRACH.

	EXT	INT	TRACH	p
Surgical Site Inection	2 (5%)	4 (13%)	7 (21%)	0.11
Pneumonia	0 (0%)	7 (23%)	3 (9%)	<0.01
Hospital-free days	27 (24, 28)	12 (5, 22)	16 (10, 22)	<0.01
ICU-free days	29 (28, 30)	22 (8, 25)	26 (21, 29)	<0.01
Ventilator-free days	30 (29, 30)	25 (12, 27)	28 (28, 30)	<0.01
In-hospital mortality	0 (0%)	4 (13%)	0 (0%)	<0.01

Conclusion: In patients with a cervical tracheal injury, immediate or early extubation was common and safe. However, among those with more severe injuries, immediate tracheostomy versus prolonged intubation presents a risk-benefit decision. While immediate tracheostomy placement is associated with increased risk of SSI, prolonged intubation is associated with higher risk of pneumonia and mortality and fewer ICU-free and ventilator-free days.

NOTES

Session: XIV: Papers 56-67
Paper 58: 8:40-9:00

A STATEWIDE ANALYSIS OF TRAUMA CENTER LEVEL DESIGNATION AND MORTALITY FOR THE MODERATE TO SEVERE HEAD INJURED TRAUMA PATIENT

Daniel Wu DO, FACOS, FACS, Brian W. Gross BS, Frederick B. Rogers* MD, MS, FACS, Nathan McWilliams MPA, RHIA Lancaster General Hospital

Invited Discussant: Ronald Gross, MD

Introduction: We sought to compare rates of neurosurgical intervention and patient outcomes between level I and level II trauma centers in the state of Pennsylvania. It was hypothesized that level I trauma centers would exhibit greater rates of neurosurgical intervention and lower mortality compared to level II trauma centers.

Methods: All 2003-2013 admissions to Pennsylvania-accredited level I and level II trauma centers with moderate to severe head injuries (GCS<13; Head AIS≥3) were extracted from the Pennsylvania Trauma Systems Foundation State Registry. Rates of neurosurgical intervention (craniotomy, craniectomy, ventriculostomy, and intracranial pressure [ICP] monitor placement) were extracted and compared between level I and level II trauma centers. A multivariable logistic regression model controlling for age, admitting systolic blood pressure, admitting temperature, GCS, and neurosurgical intervention was used to asses mortality differences between level I and level II trauma centers. A p-value <0.05 was considered significant.

Results: A total of 22,229 moderate to severe head injured patients were admitted to Pennsylvania's 30 level I and II trauma centers over the 11-year study period. Intervention rates for craniotomy (p=0.926), craniectomy (p=0.244), ICP monitor placement (p=0.875), and ventriculostomy (p=0.808) were statistically indistinguishable between level I and level II trauma centers. Similarly, when controlling for age, admitting systolic blood pressure, admitting temperature, GCS, and neurosurgical intervention, no statistical difference between trauma center level and mortality was observed (p=0.975).

Conclusion: Rates of neurosurgical intervention and patient outcome are statistically indistinguishable between level I and level II trauma centers. These results suggest management of the moderate to severe head injured trauma patient are equally effective at level I and level II centers.

Table 1: Adjusted odds ratios for mortality

Variable	Adjusted Odds Ratio (95% CI)	p-value
Trauma Level	0.99 (0.92-1.08)	0.975
Age	1.04 (1.04-1.05)	<0.001
Systolic BP	0.99 (0.99-0.99)	<0.001
Temperature	1.00 (0.99-1.00)	0.096
GCS	0.78 (0.77-0.79)	<0.001
Intervention	0.99 (0.92-1.08)	0.959
Constant	0.10 (0.05-0.19)	-
N = 22,229		
AUROC: 0.77		

NOTES

Session: XIV: Papers 56-67
Paper 59: 9:00-9:20

CRANIECTOMY FOLLOWING URGENT EVACUATION OF INTRACRANIAL HEMORRHAGE IMPROVES INTRACRANIAL AND CEREBRAL PERFUSION PRESSURES IN SEVERE TRAUMATIC BRAIN INJURED PATIENTS

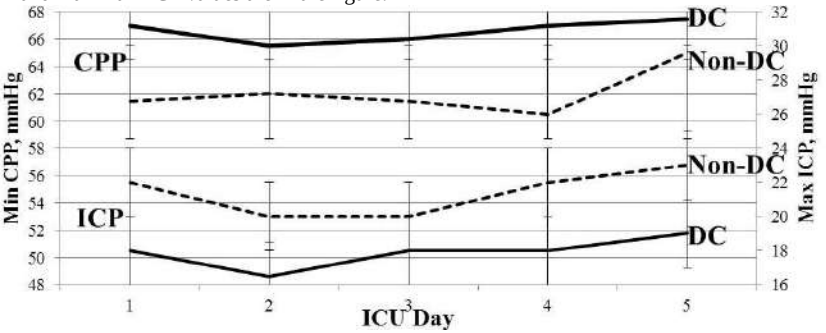
Casey J. Allen MD, Jonathan P. Meizoso MD, Juliet J. Ray MD, Mena Hanna MD, Ronald J. Manning RN, Carl I. Schulman* MD,Ph.D., Nicholas Namias* MD, Malcolm R. Bullock MD, Jonathan R. Jagid MD, Kenneth G. Proctor* Ph.D., University of Miami

Invited Discussant: Travis Polk, MD

Introduction: The use of decompressive craniectomy (DC) is controversial and its benefit following urgent evacuation of intracranial hemorrhage (ICH) is not known. We hypothesize that the use of DC following urgent evacuation of ICH improves intracranial pressure (ICP) and cerebral perfusion pressure (CPP) following severe traumatic brain injury (TBI).

Methods: From 01/2008 to 01/2013, 227 TBI patients requiring invasive ICP monitoring at a single level 1 trauma center were prospectively observed. Patients who underwent DC following ICH evacuation within 24 hours were identified. Propensity scores were assigned to each patient using a logistic regression model for predicting the need for DC which incorporated patient demographics, admission hemodynamic and laboratory data, Glasgow Coma Scale (GCS), injury severity score (ISS), abbreviated injury severity (AIS) of the head, blood transfusion requirements, and the need for vasopressor therapy. Patients who underwent DC were propensity score matched in a 1:1 "nearest neighbor" fashion to non-DC patients. Data is mean ± standard deviation or median (interquartile range). Groups were compared using a Mann Whitney U test or Fisher's exact test with significance at $p \leq 0.05$.

Results: The cohort was age 41±17 years, 82% male, ISS 28±11, GCS 6±4, AIS head 4±1, LOS 32(15) days, and 27% mortality. Excluding early deaths (<48h), 50 DC following ICH evacuation were matched to 50 non-DC patients, effectively achieving similar demographics, hemodynamics, ISS, GCS, AIS head, transfusion requirements, and need for vasopressor therapy between the groups. In comparing DC vs non-DC groups, hours of abnormal ICP (>20mmHg) were 1(10) vs 7.5(16) (p=0.017), hours of abnormal CPP (<60mmHg) were 0(6) vs 4(9) (p=0.008), daily minimum CPP (mmHg) was 67(13) vs 62(17) (p=0.010), daily maximum ICP (mmHg) was 18(9) vs 22(11) (p<0.001), LOS 33(47) vs 25(34) (p=NS), and mortality of 24% vs 30% (p=NS). Daily minimum CPP and maximum ICP values are in the figure.



Conclusion: DC following urgent evacuation of ICH decreases abnormal ICP and CPP time and improves overall ICP and CPP thresholds. These findings give evidence of benefit of early DC in severe TBI patients.

NOTES

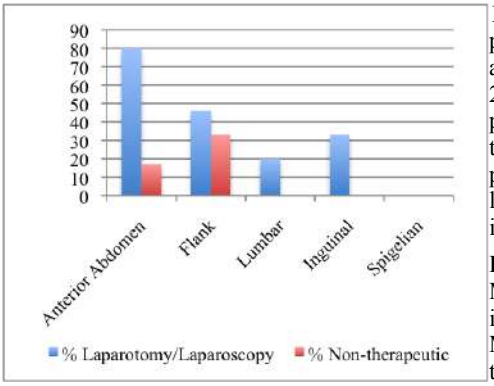
Session: XIV: Papers 56-67
Paper 60: 9:20-9:40

TRAUMATIC ABDOMINAL WALL HERNIAS: LOCATION MATTERS

Jamie J. Coleman MD, Evan Fitz MD, Ben Zarzaur* MD,MPH, Scott Steenburg MD, Brian Brewer MD, David Feliciano* MD, Timothy Pohlman MD, Robert Reed* MD, Grace Rozycki* MD, MBA, Indiana Univesity School of Medicine

Invited Discussant: John Como, MD, MPH

Introduction: Abdominal wall hernias resulting from blunt trauma are uncommon and often have several layers of tissue destruction. They present a unique reconstructive challenge and optimal management is unclear. This study was performed to identify the incidence of associated injuries, the need for urgent operative intervention, and hernia recurrence rates.



Methods: A retrospective review of patients diagnosed with a traumatic abdominal wall hernia from January 2002 to December 2014 was performed. Data were collected from the trauma registry and included patient demographics, length of stay, location and type of hernia, operative interventions, and complications.

Results: Eighty patients (64% Male; Median Age 36; Mean ISS = 22) were identified during the study period. Motor vehicle collision (MVC) was the most frequent mechanism of injury (n= 58). Overall, 36 patients (45%) underwent urgent laparotomy or laparoscopy, and 8 (22%) were non-therapeutic excluding acute hernia repair. Of interest, 19 (53%) required bowel resection. Notably, the need for operative intervention and non-therapeutic rate differed depending upon hernia location (Figure). Twenty-three patients underwent hernia repair, the majority of which (78.3%) were repaired within five days of injury. There were six recurrences, four of which were repaired acutely, with an overall first time hernia recurrence rate of 26.1%.

Conclusion: In the largest series to date, we found traumatic abdominal wall hernias to be associated with a high percentage of intra-abdominal injuries requiring urgent laparotomy or laparoscopy. Rates of therapeutic interventions varied by hernia location with anterior abdominal wall hernias associated with the highest need for a therapeutic operation. Acute repair was associated with the majority of recurrences.

NOTES

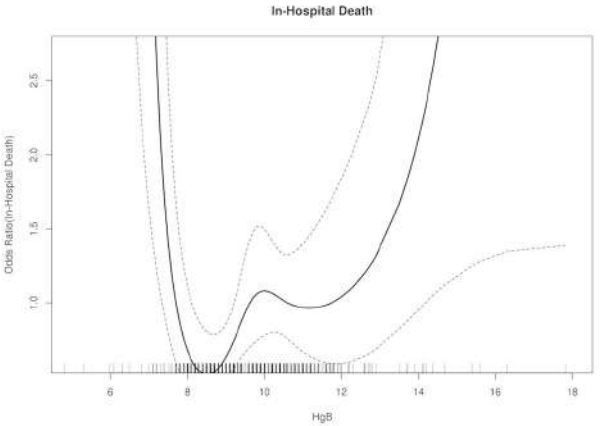
Session: XIV: Papers 56-67
Paper 61: 9:40-10:00

OVER-TRANSFUSION OF PACKED RED BLOOD CELLS IN MASSIVE TRANSFUSION PATIENTS

Martin D. Zielinski* MD, Stephanie F. Polites MD, Pamela M. Johnson BS, Cornelius A. Thiels MD, Michael J. Joyner MD, Deborah J. Del Junco* Ph.D., Donald H. Jenkins* MD, John B. Holcomb* MD, Karla S. Ballman Ph.D., William S. Harmsen MS, Erin E. Fox Ph.D., Charles E. Wade Ph.D., James R. Stubbs MD, Mayo Clinic - Rochester

Invited Discussant: H. Gill Cryer, MD, PhD

Introduction: Over-transfusion (OT) of packed red blood cells (pRBCs) increases the risk of death in stable critically ill patients. With the delineation of minimum transfusion ratios in hemorrhaging patients complete, attention must be turned to the other end of the massive transfusion (MT) spectrum to define the maximum transfusion of pRBCs. We aimed to define OT of pRBCs in hemorrhaging patients hypothesizing that a hemoglobin (Hgb) value greater than 12 mg/dL 24 hours after hemorrhage control would be associated with increased mortality.



Methods: A review of trauma and surgical patients (excluding cardiopulmonary bypass) who underwent MT (≥ 10 units pRBCs w/in 24 hours) was performed from 2010–2013. The hemoglobin (Hgb) 24±6 hours after hemorrhage control stratified patients into under-transfused (UT; <8.0), reference (8.0-11.9), and OT (>12.0 g/dL) groups; patients not surviving to 24 hours were excluded. Data are presented as means±standard deviation with p<.05 considered significant. The critical administration threshold (CAT) was defined as ≥3 units pRBC in 60 minutes. **Results:** We identified 418 patients (351 reference [84%], 38 UT [9%], and 29 OT [7%]) with a mortality of 28%. UT patients had the greatest risk of death (OR 3.8; 95% CI 1.8-8.1) followed by OT patients (OR 2.9; 95% CI 1.2-7.0; **FIGURE**). *OT vs Reference*: OT patients were younger (54.6 vs 60.1 years) with a lower Charlson Comorbidity score (2.9±2.7 vs 4.9±3.2). Transfusion volumes were similar for pRBCs (18±10 vs 21±13 units), plasma (12.7±6.5 vs 10.8±9.4 units), and platelets (3±3 vs 4±4 units). Though pre-transfusion Hgb was similar (9.5±2.2 vs 9.5±2.3 g/dL), OT patients had greater Hgb values during MT (8.3±3.0 vs 6.9±1.4 g/dL) and at hospital dismissal/death (11.4±2.3 vs 9.6±1.1 g/dL). Both groups had similar rates of severe ARDS (38% vs 27%, p=.21) and CAT (88% vs 89%); however, OT patients had a shorter duration of transfusion (14.1±13.6 vs 27.0±18.4 hours). The causes of mortality was most commonly traumatic brain injury (44%) followed by cardiac in the OT group while the most common causes in the reference group were multisystem organ faikure (53%) and exsanguination (20%). **Conclusion:** Despite being younger with fewer comorbidities, OT patients had increased mortality akin to UT patients. Shorter MT durations foster a scenario in which patients are at high risk for OT. While further study is mandatory, a Hgb value 24 hours after MT shows promise as an OT definition.

NOTES

"RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA (REBOA) MIGHT BE DANGEROUS IN PATIENTS WITH SEVERE TORSO TRAUMA — A PROPENSITY SCORE ANALYSIS SAYS —"

Jun-ichi Inoue MD, Atushi Shiraishi MD, Ayako Yoshiyuki MD, Koichi Haruta MD, Yasuhiro Otomo* MD,Ph.D., Department Of Acute Critical Care And Disaster Medicine, Graduate School Of Medical And Dental Sciences,Tokyo Medical And Dental University

Invited Discussant: Thomas Scalea, MD

【Introduction】 Resuscitative endovascular balloon occlusion of the aorta (REBOA) is a device to block aortic blood flow which can provide hemorrhage control and afterload augmentation in hemodynamically unstable torso trauma patients. Despite of these advantages, evidences supporting efficacy of REBOA have largely lacked. The study objective was to estimate the efficacy of REBOA in patients with severe torso trauma who underwent surgery or transcatheter arterial embolization (TAE).

【Methods】 In this retrospective cohort study based on the Japan Trauma Databank (JTDB), we included subjects who underwent an emergency surgery or TAE on chest, abdominal or pelvic region and excluded subjects whose systolic blood pressure of 0 mmHg, heart rate of 0 /minutes or the Abbreviated Injury Scale (AIS) on any region of 6 (unsurvivable injury). Missing values in important variables were multiply (m=25) imputed. A logistic regression analysis estimated a propensity score (PS) to predict use of REBOA from known predictors of mortality which were situations at the scene, prehospital and hospital vital signs, AIS on each region, comorbidities and indications for surgery. A PS matching (PSM) analyses compared ER mortality and in-hospital mortality in matched subjects with or without REBOA.

【Results】 A total of 9687 subjects from 146111 subjects in JTDB matched the selection criteria and PSM selected 374 and 374 subjects with or without REBOA, respectively. Standardized mean difference (SMD) of all the variables to estimate PS did not exceed 0.1, therefore PSM finely balanced baseline characteristics of PSM subjects with or without REBOA such as age (median of 54 versus 57 year old, SMD of 0.100), systolic blood pressure (median of 89 versus 92 mmHg, SMD of 0.040), the Glasgow Coma Scale (median of 12 versus 13, SMD of 0.007) and the Injury Severity Score (median of 34 versus 34, SMD of 0.009), respectively. Observed mortality in the emergency room (ER) was significantly higher in subjects with REBOA (16.3% versus 3.2%, absolute difference of +11.1%, $P<0.001$). Absolute difference of observed in-hospital mortality approximately doubled from those of observed mortality in ER in subjects with REBOA (59.1% versus 38.0%, absolute difference of +21.1%, $P<0.001$).

【Conclusion】 In this less biased PSM analysis, we found that undergoing REBOA might be dangerous in severely injured trauma patients who underwent emergency surgery or TAE. Further observational study to assess whether selected trauma subgroup could benefit from REBOA was expected.

NOTES

Session: XIV: Papers 56-67
Paper 63: 10:20-10:40

Pattern of law enforcement related injuries in the US

David C. Chang MBA,MPH,Ph.D., Mallory Williams* MD,MPH, L.D. Britt* MD,MPH, Selwyn Rogers* MD,MPH, Massachusetts General Hospital

Invited Discussant: Alexander Eastman, MD, MPH

Introduction: The pattern of law-enforcement related injuries in the US is unknown.
Methods: Data were aggregated from FBI, Bureau of Justice Statistics, CDC Web-based Injury Statistics Query and Reporting System (WISQARS), and Nationwide Inpatient Sample (NIS) from 2003-2011. Law-enforcement related injuries in CDC and NIS were identified using E codes 970-976, which are meant to identify "injuries inflicted by the police or other law-enforcing agents, including military on duty, in the course of arresting or attempting to arrest lawbreakers, suppressing disturbances, maintaining order, and other legal action".
Results: A summary of the counts across years from the different data sources is presented in Table. CDC reported a total of 715,118 injuries in this time period, with 230,612 in whites, 252,756 in blacks, and 77,216 in Hispanics. The NIS identified a total of 3958 patients in this time period, ranging from 348 to 572 per year, which extrapolated to 1700 to 2884 nationally. Among them, 1548 (48.0%) were whites, 866 were blacks (26.8%), and 605 were Hispanics (18.8%); and 1011 patients (25.5%) were injured by firearms, 202 (5.1%) by blunt objects, and 2304 (58.2%) from blows or manhandling. Compared to white patients, black patients are significantly more likely to be injured by firearms (28.2% vs 21.8%, $p<0.001$). Similar patterns were seen in Hispanic patients (27.8% vs 21.8%, $p=0.003$). No significant difference in injury severity, lengths of stay, or in-patient mortality was observed.
Conclusion: The majority of law-enforcement related injuries are among whites. However, in contrast to population distributions, these injuries are disproportionately more common in blacks. Blacks and Hispanic patients are significantly more likely to be injured by firearms. Currently, data about these injuries are scattered across multiple data systems. A uniform national system to aggregate these data sources is needed to better understand the scope of the problem, for both law enforcement personnel and civilians.

Year	Arrests Total (FBI)	Police assaulted in line of duty (FBI)	Non-police Injuries (CDC)	Non-police inpatient admissions estimates (NIS)	Arrest Related Deaths (BJS)	Arrest Related Homicides (BJS)	Justifiable Homicide by Law Enforcement (FBI)	Police killed in line of duty (FBI)
2003	9,529,469	57,841	59,371	1946	627	376	373	52
2004	9,940,671	59,373	73,282	2056	673	375	367	57
2005	10,189,691	57,546	68,603	1700	689	377	341	55
2006	10,437,620	58,634	84,383	2121	721	447	376	48
2007	10,656,710	59,201	79,730	2057	455	455	398	57
2008	10,662,206	58,792	78,718	1874	629	404	378	41
2009	10,690,561	57,268	83,565	2336	729	497	414	48
2010	10,177,907	53,469	90,914	2884	n/a	n/a	397	56
2011	9,499,725	54,774	96,552	2508	n/a	n/a	393	72

NOTES

Session: XIV: Papers 56-67
Paper 64: 10:40-11:00

CYTOCHROME C ADMINISTRATION IMPROVES ACIDOSIS AND OXIDATIVE STRESS AND LIMITS ORGAN INJURY IN A RAT MODEL OF HEMORRHAGIC SHOCK

Rebecca D. Powell Ph.D., Donna A. Goodenow BS, Iain H. McKillop Ph.D., Susan L. Evans* MD, Carolinas Medical Center

Invited Discussant: Saman Arbabi, MD, MPH

Introduction: Hemorrhagic shock and reperfusion (HSR) injury leads to a cascade of reactive oxygen species (ROS) production AND mitochondrial dysfunction, which leads to energy failure, cell death and multiple organ dysfunction (MOD). Cytochrome c (cytoc) is the final electron carrier in the mitochondrial electron transport chain, providing the electrochemical force for ATP production. We sought to determine whether exogenous cytoc administration would improve parameters of organ dysfunction and/or mitochondrial stability in a rat model of HSR.
Methods: Male Sprague-Dawley rats (225-275g) were cannulated via the carotid artery and hemorrhaged to a MAP of 33±2.0mmHg for 1-hr prior to resuscitation. Cytoc (40mg/kg) or saline (0.9%) was administered (*iv*) 30-mins prior to resuscitation. Sham animals were cannulated and held under anesthesia for 1-hr prior to recovery. Rats were sacrificed by exsanguination (cardiac puncture) 2-hrs post surgery. Blood was analyzed via iSTAT for clinical parameters (pH, lactate, base excess, AST, ALT, creatinine, PO_2), and ELISA performed on sera for the presence of mitochondrial damage associated molecular patterns (DAMPs). Tissues were collected and assayed for ROS as inidicated by lipid peroxidation (TBARS). Data were analyzed using one way ANOVA with SEM.
Results:HSR increased base deficit compared to sham (-7.2±2.8 *vs* 2.8±1.0mEq/L; $p<0.05$; n=5), but HSR-cytoc maintained base deficit to levels similar to sham (-5.0±2.8 *vs* 2.8±1.0). HSR-cytoc improved lactate clearance from time of administration to cardiac puncture as compared to HSR alone (Δ7.7±0.9 *vs* Δ3.2±3.0mg/dL; $p<0.05$; n=5). HSR increased PO_2 levels compared to sham, but HSR-cytoc restored PO_2 to levels not different from sham (95±17 [HSR] *vs* 31±6.6[sham] *vs* 65±15[HSR-cytoc] mmHg; $p<0.05$; n=5). HSR-cytoc increased creatinine compared to sham (0.95±0.07 *vs* 0.66±0.08mg/dL; $p<0.05$; n=5), but HSR did not. HSR significantly increased both AST and ALT compared to sham (330±80 *vs* 93±25IU/L [AST] 219±51 *vs* 52±4.9IU/L [ALT]; $p<0.05$; n=5) but HSR-cytoc restored both to levels not different from sham. HSR-cytoc decreased lipid peroxidation (TBARS) compared to sham in the liver (11±0.87 *vs* 14±0.82μM MDA; $p<0.05$; n=5), but no other differences were observed. Of interest, levels of the mitochondrial phospholipid cardolipin decreased in serum of HSR animals compared to sham, while HSR-cytoc administration restored cardiolipin to levels similar to sham animals (0.90 ±0.02[HSR] *vs* 1.0±0.03[sham] *vs* 0.94±0.01[HSR-cytoc] *vs* 1.0±0.03; $p<0.05$; n=5.)
Conclusion: These data suggest exogenous cytochrome c administration improves acidosis and oxidative stress in a model of HSR. Further work remains to determine if additional protection can be achieved by altering dose or time of administration.

NOTES

Session: XIV: Papers 56-67
Paper 65: 11:00-11:20

AN ANALYSIS OF NEUROSURGICAL PRACTICE PATTERNS AND OUTCOMES FOR MODERATE TO SEVERE HEAD INJURIES IN A STATEWIDE TRAUMA SYSTEM

Chet Morrison MD, FACS, FCCM, Brian W. Gross BS, Frederick B. Rogers* MD, MS, FACS, Daniel Wu DO, FACOS, FACS, Mathew Edavettal MD,Ph.D., John C. Lee* MD, FACS, Nathan McWilliams MPA, RHIA, William Monacci MD, Lancaster General Hospital

Invited Discussant: Joseph Minei, MD

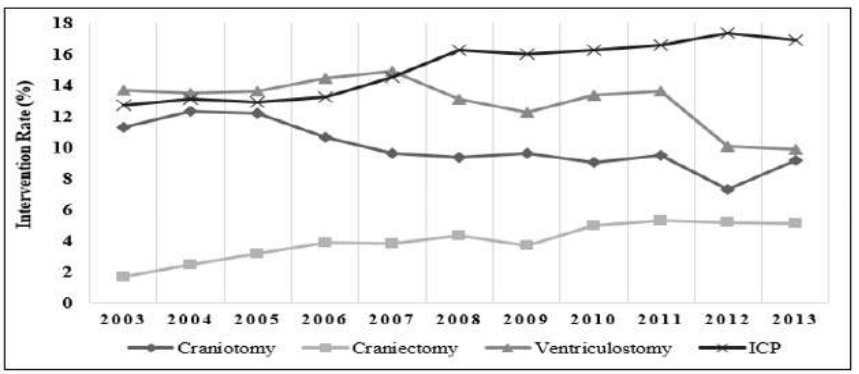
Introduction: We sought to characterize neurosurgical practice patterns from 2003-2013 in a mature, statewide trauma system. It was hypothesized that an increased rate of craniectomy would be observed over the study period with a reduction in overall mortality.

Methods: All 2003-2013 admissions to Pennsylvania-accredited Level I and Level II trauma centers with moderate (MOD; GCS 7-13, Head AIS ≥3) and severe (SEV; GCS≤8, Head AIS≥3) head injuries were extracted from the Pennsylvania Trauma Systems Foundation State Registry. Intervention rates (craniotomy, craniectomy, ventriculostomy, and intracranial pressure monitor [ICP] placement) and outcome measures (intensive care unit LoS, vent days, and mortality) were extracted and compared across the 11-year study period. A p-value <0.05 was considered significant.

Results: A total of 4,434 MOD and 17,795 SEV patients were admitted over the 11-year study period. Within the MOD population, no significant changes in rates of craniotomy or ventriculostomy were observed, however rates of craniectomy (2.18% to 5.33%; p=0.033) and ICP monitor placement (11.2%, to 16.9%; p=0.037) significantly increased. No significant changes in ICU LoS or vent days were observed, however mortality significantly decreased (17.5% to 11.3%; p=0.026) over the study period. Within the SEV population, a significant reduction in rates of craniotomy (11.7% to 9.27%; p=0.026), and ventriculostomy (14.0% to 9.46%; p<0.001) were observed, while rates of craniectomy (1.63 to 5.11; p<0.001) and ICP monitor placement (13.1% to 16.9%; p=0.002) significantly increased. No significant changes in mortality, ICU LoS, or vent days were observed.

Conclusion: General trends for combined MOD and SEV showed a reduction in craniotomies and an increase in craniectomies without an overall increase in survival. However, in MOD, increasing rates of craniectomy and ICP monitor placement were associated with overall improved survival.

Figure 1: Neurosurgical Intervention Rates for Combined MOD and SEV from 2003-2013 in a Mature Trauma System



NOTES

Session: XIV: Papers 56-67
Paper 66: 11:20-11:40

VANISHING NEED FOR EXTRAPERITONEAL PELVIC PACKING ASSOCIATED WITH IMPROVED RESUSCITATION STRATEGIES

Iver Anders Gaski MD, Jeppe Barckman MD,Ph.D., Nils Oddvar Skaga MD,Ph.D., Jan Erik Madsen MD,Ph.D., Paal Aksel Naess* MD,Ph.D., Gunnar Flugsrud MD,Ph.D., Christine Gaarder* MD,Ph.D., Oslo University Hospital

Invited Discussant: Mark Bowyer, MD

Introduction: Extraperitoneal pelvic packing (EPP) was introduced at Oslo University Hospital Ulleval (OUH U) early 90's as an adjunct in the exsanguinating patient due to pelvic injury, where physiology did not allow the time to angiography. EPP is invasive with a high risk of complications. Published studies from other institutions have advocated its application in-lieu of angiography. The optimal treatment protocol remains controversial and depends on available resources and resuscitation. In line with international trends, we have changed over the last decade from damage control surgery to damage control resuscitation with an updated massive transfusion protocol from 2007, potentially reducing the need for EPP. We hypothesized a decreased need for EPP due to the major changes in resuscitation strategies.

Methods: Retrospective analysis of prospectively collected data between 2002 and 2012. All trauma patients diagnosed with a pelvic fracture AIS≥3 and/or who were transfused during initial resuscitation regardless of the grade of pelvic fracture were included. The population was analyzed for trends and differences between 2002-2006 (P1) and 2007-2012 (P2).

Results: The study population consisted of 648 patients; 67% were men, median age was 40 years (IQR 25, 55).

Characteristics	**Period 1 (n=297)**	**Period 2 (n=351)**	***p***
ISS, median (IQR)	29 (19,43)	30 (19,43)	
Pelvic AIS, median (IQR)	3 (3,4)	3(3,4)	
BD, mean	4.5 (5.8)	5.3 (5.2)	<0.01
RTS, mean	6.7 (1.9)	6.7 (1.7)	0.24
Transfusion, n (%)	117 (39)	144 (41)	0.78
PRBCs, mean (SD)	12 (12)	10 (12)	<0.01
EPP, n (%)	50 (17)	35 (10)	<0.01
Angiography, n (%)	45 (15)	34 (9)	0.04
30 day mortality n (%)	50 (17)	47 (13)	0.23
W statistics (CI)	6.24 (3.11; 9.36)	10.95 (8.02; 13.88)	

The EPP rate decreases gradually from 2008, with only one procedure performed in 2012. Reduction is also seen in angiographyrate, without an increase in mortality. W-statistics to show a trend towards increased survival. Simultaneously, while transfusing as many and on average sicker patients, the transfusion requirements per patient decreased.

Conclusion: EPP and angiography for exsanguinating pelvic injuries have become very infrequently needed and seem to be associated with improved resuscitation strategies, reduced transfusion requirements and with no increase in mortality.

NOTES

Session: XIV: Papers 56-67
Paper 67: 11:40-12:00

TIME AND PLACE OF DEATH FROM AUTOMOBILE CRASHES: RESEARCH ENDPOINT IMPLICATIONS

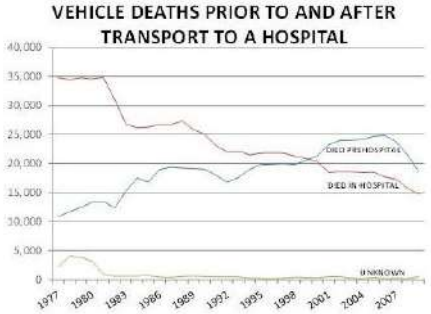
Howard R. Champion* MD, Louis V. Lombardo Uniformed Services University Of The Health Sciences

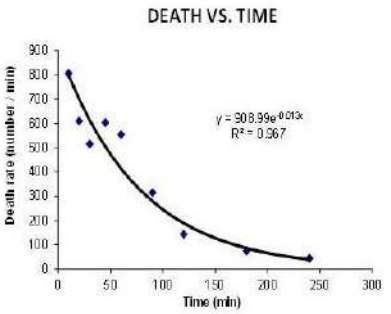
Invited Discussant: Karen Brasel, MD, MPH

Introduction: Vehicle crashes are a leading cause of injury and death in the United States. Early death and its predominant causes — hemorrhage and head injury — over time following injury, have almost entirely been studied in patients admitted to hospitals. New approaches to resuscitation will increasingly move into the prehospital arena. The US Department of Transportation Fatality Analysis Reporting System (FARS) is a close-to-census database that includes information from police, EMS, and hospital reports on incidents involving at least one road traffic death in the United States. Thus, it captures both prehospital and in-hospital mortality and allows for benchmarking risk of death in the early continuum of care.

Methods: FARS location and time of death were reviewed from 1977 through 2009. Patients in the database (n=55,537) from 2003 through 2005 were reviewed to analyze for risk of death over time.

Results: Since trauma centers and systems were introduced 30 years ago, there have been 1,436,178 vehicle-associated deaths, and there has been an overall decrease in deaths per 100 million vehicle miles travelled from 3.26 to 1.13. Although hospital deaths decreased by 57% (35,000/year to 15,000/year); prehospital deaths increased by 58% (12,000/year to 19,000/year). Excluding immediate deaths (within 5 minutes), the curve Y=908.99e – 0.013x establishes the relationship between time following injury and death in 55,537 deaths. Early hospital deaths from injury occur at a defined rate with a risk of 0.4%/minute for the first 30 minutes, 1%/minute for the next 60 minutes and 0.2%/minute and plateauing thereafter.





Conclusion: Many factors in EMS systems, vehicle design, seatbelt laws, and trauma care have resulted in reducing deaths by a third (approximately 45,000/year to 30,000/year) over 30 years. Risk of death over time should help define EMS, trauma system, and resuscitation goals. Deaths after 4 hours should not be a primary resuscitation research endpoint. Resuscitation research needs to focus on prehospital and early (<4 hours) endpoints, rather than arbitrary 24-hour or 30-day time periods, which add cost and confound analyses, detracting from therapeutic and system improvements.

NOTES

Poster # 1

ANASTOMOTIC LEAKS IN TRAUMA VS EMERGENCY GENERAL SURGERY: WHAT MAKES A DIFFERENCE?

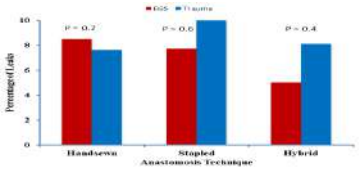
Elizabeth Windell DO, Peter Rhee* MD, MPH, Mazhar Khalil* MD, Narong Kulvatunyou* MD, Andrew Tang* MD, Bellal Joseph* MD, Gary Vercruysse* MD, Randall Friese* MD, Terence O'Keeffe* MD, University of Arizona - Tucson

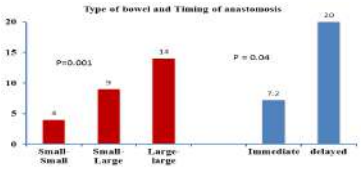
Introduction: Anastomotic leak is one of the surgeons' greatest fears following a bowel resection. Many peri-operative risk factors have been evaluated, but it is unclear if operations done acutely in trauma patients and for emergency general surgery (EGS) patients have different leak rates. Our hypothesis was that differences exist in anastomotic leak rates between EGS and trauma patients, and that peri-operative risk factors can be identified.

Methods: A 7 year retrospective analysis of all trauma and EGS patients admitted to a Level 1 trauma center was performed. We included all patients who underwent a bowel resection with primary anastomosis. Patients who died within 48 hours of operation or who presented with enterocutaneous fistula were excluded. Our primary outcome measure was differences in leak rates by type of patient (trauma vs EGS). Secondary outcomes included type of anastomosis, timing of anastomosis, and operating surgeon. Anastomosis type was defined as handsewn vs stapled vs hybrid (combination of both) and timing was defined as immediate and delayed (performed after initially leaving bowel in discontinuity).

Results: A total of 520 bowel resections with primary anastomosis were identified. The overall leak rate was 7.6% (40/520). There was no difference between leak rates in Trauma and EGS patients (8.3% vs 7.2%, P=0.7). There was also no difference in leak rates when stratified by operative technique; stapled (10% vs 7.6%, p=0.6), hybrid (8% vs 5%, p=0.3), handsewn (7.6% vs 8.5%, p=0.7) (**Fig. 1**); or orientation of anastomosis: end-end (p=0.40), end-side (p=0.9), side-side (p=0.1). The leak rate by operating surgeon varied widely from 0% to 24%, however this was not statistically significant (p=0.2), nor did this correlate with surgeon experience. Large bowel anastomoses (p=0.001) and delayed anastomoses (p=0.04) were more likely to leak. (**Fig. 2**).

Conclusion: There was no difference between trauma and EGS patients with regards to leak rates after bowel anastomosis. Type of anastomosis, individual surgeon, and surgeon experience did not affect the leak rates. Colocolonic anastomoses and delaying anastomosis till another operation were the only risk factors predictive of increased leak rates. Performing anastomosis at the first operation was associated with reduced leak rates and further analysis is required to determine if delaying anastomosis is a safe alternative.





Poster # 2

CT SCAN TRUMPS PHYSICAL EXAM? AN ANALYSIS OF 1000 ABDOMINAL CT SCANS FOR BLUNT TRAUMA

Elizabeth Benjamin MD,Ph.D., Tobias Haltmeier MD, Stefano Siboni MD, Ali Salim* MD, Kenji Inaba* MD, Demetrios Demtriades* MD,Ph.D., LAC+USC Medical Center

Introduction:Indications for abdominal CT scan in blunt trauma patients are not clearly defined thus resulting in a wide discrepancy of practice across institutions. Minimizing CT imaging could potentially decrease radiation burden and hospital cost. The safety of omitting an abdominal CT scan in the stable, evaluable blunt trauma patient remains uncertain.

Methods:Patients admitted with blunt trauma that underwent CT AP (abdomen, pelvis) from 6/2013 – 12/2013 were analyzed. Demographic and admission data, imaging results, and laboratory data were collected. Physical exam findings including hematoma or wound location were analyzed. Injuries on CT scan that did not correlate with examination findings were defined as occult injuries. Pelvic fractures were not considered occult injuries given variability in pre-CT scan imaging practice. Outcomes included presence of occult injury, operative or clinical intervention, and hospital LOS.

Results:During the study period, 1000 patients with CT AP for blunt trauma were identified. Overall, 172 patients had injury identified on abdominal CT with 23 classified as occult injury. In this population, 43 abdominal CT scans were performed to detect each occult injury. The sensitivity and specificity of the pre-CT scan examination for detecting abdominal injury was 86.6% and 65.2%, respectively. In stable, evaluable patients (GCS 15, SBP>90, age >13, n=590), occult abdominal injuries were identified in 11 patients (1.9%), including five patients with grade II or III solid organ injuries, two patients with grade I injury, two with mesenteric hematoma, and one patient each with signs concerning for bowel injury and hemoperitoneum. One patient underwent non-therapeutic exploratory laparotomy and one had pelvic embolization for associated pelvic fracture. Of the 11 patients with occult injury, nine presented with rapid deceleration injury. In stable, evaluable patients, 54 CT scans were performed to identify each occult injury and the sensitivity and specificity of the pre-CT examination was 89.4% and 59.5%, respectively.

Conclusion:The initial trauma assessment, even in the stable, evaluable patient, is insufficient to reliably rule out intra-abdominal injury. Although significant radiation exposure is incurred, a small percentage of solid organ injuries will be missed without liberal use of abdominal CT scan. A more reliable screening technique is needed to identify in which patients abdominal CT can be omitted after blunt trauma.

Poster # 3

A MYTH BUSTERS CASE: SHORTER OR TIMES ARE OF THE ESSENCE IN DAMAGE CONTOL LAPAROTOMY

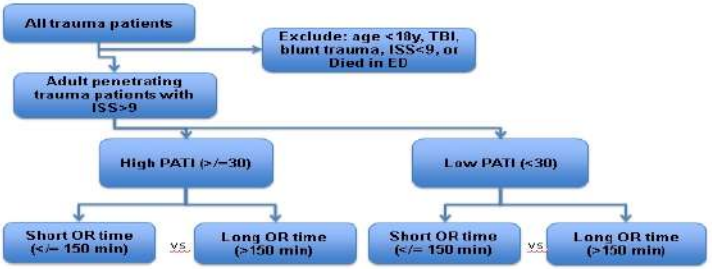
Juan Duchesne* MD, Jiselle B. Heaney MD,MPH, Jordan Wlodarczyk BS, Aaron Mack MD, Jennifer Turney MD, Peter Meade MD,MPH, Norman McSwain* Jr., MD, Rebecca Schroll MD, Tulane School of Medicine

Introduction: Damage Control Laparotomy (DCL) management for severe penetrating abdominal trauma has traditionally included limiting time spent in the Operating Room (OR) to only the time necessary to control hemorrhage and contamination with normalization of physiologic derangements subsequently in the ICU. However, there is very little evidence to show survival benefits with short OR times for DCL. We hypothesize that in patients managed with DCL, longer OR times provides for more effective resuscitation than in patients with shorter OR times.

Methods: A 5-year retrospective review was conducted for all patients who underwent DCL for penetrating abdominal trauma. Patients who were under 18 years of age, who died in the OR and who sustained blunt trauma or traumatic brain injury were excluded. Penetrating abdominal trauma index (PATI) scores were calculated and patients were divided into two groups based on severity of injury: High PATI >/= 30 and Low PATI <30. OR times were analyzed for their impact on outcomes (Short OR time <150 minutes and Long OR >/=150 minutes). Outcomes measured were pre- and post-op shock index (SI), base deficit (BD), INR, and core body temperature, as well as hospital length of stay (HLOS) and mortality

Results: A total of 124 patients met inclusion criteria. Of these, 34 were excluded due to missing data. The High PATI group included 49 patients and Low PATI group included 41 patients. Although there were no differences within the High PATI group in regards to pre-op BD, SI, or body temperature the pre-op INR was significantly higher in the Long OR time when compared to Short OR time (1.3 vs 1.1, p=0.03). There was no difference in mortality, HLOS, post-op SI, or body temperature between the Long and Short OR time groups. The Long OR time patients had significantly lower post-op BD than the Short OR time patients (-3.4 vs -8.8, p = 0.001). In the Low PATI group, there were no significant differences in pre-op values or outcomes between the Long and Short OR groups.

Conclusion: In patients with penetrating abdominal trauma undergoing DCL, a shorter OR time was not associated with improved short-term resuscitation endpoints or long-term outcomes, including hospital LOS and mortality. In severely injured patients, effective resuscitation with longer OR times was not inferior to shorter OR times as evidenced by the improved acid-base status in this group. Damage control practices should focus on early surgical hemorrhage control in combination with effective intra-op resuscitation efforts and not on the amount of time it takes to accomplish these goals.



Poster # 4

THE DIAGNOSTIC YIELD OF COMMONLY USED INVESTIGATIONS IN PELVIC GUNSHOT WOUNDS

Morgan Schellenberg MD,MPH, Kenji Inaba* MD, Erika M. Priestley BS, Joseph Durso BS, Monica Wong MS, Lydia Lam* MD, Elizabeth Benjamin MD,Ph.D., Demetrios Demetriades* MD,Ph.D., LAC+USC Medical Center

Introduction: Patients who sustain pelvic gunshot wounds (GSWs) are at significant risk for injury due to the high density of visceral structures within the bony pelvis. Currently, the optimal work-up for pelvic GSWs is unclear. The aim of this study was to determine the diagnostic yield of tests commonly used in the investigation of pelvic GSWs.

Methods: After obtaining Institutional Review Board approval, all patients ≥ 15 years old (01/2008 – 01/2015) who sustained one or more GSWs that placed the pelvic contents at risk for injury were retrospectively identified. Patients who expired in the emergency department, were pregnant, or were transferred from an outside hospital were excluded. Patient demographics, clinical assessment, investigations, operative procedures, and outcomes were abstracted. The diagnostic yield of CT scan, cystogram, angiography, endoscopy (anoscopy and proctosigmoidoscopy), digital rectal exam (DRE), and urinalysis for clinically significant injuries to the pelvic contents was calculated.

Results: Of 1917 patients presenting with GSWs during the study period, 361 (18.8%) were at risk for pelvic injury and included in the analysis, with mean age 27.0 ± 10.4 years (15-73 years), 95.3% male, and mean ISS 12.8 ± 10.4 (1-50). Of these patients, 170 (47.1%) sustained a clinically significant pelvic injury. Patients with peritonitis, hemodynamic instability, evisceration, or who were unevaluable (n=135, 37.4%) were taken directly to the operating room for laparotomy. The remaining 226 patients (62.6%) underwent CT scan and further investigations. The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of CT scan for pelvic injury were 0.82, 0.97, 0.71, and 0.99. Angiography had a sensitivity, specificity, PPV, and NPV of 1.00 in detecting pelvic vascular injuries. For bladder injuries, gross hematuria alone had a sensitivity, specificity, PPV, and NPV of 0.86, 0.98, 0.75, and 0.99. Microscopic or gross hematuria had a sensitivity, specificity, PPV, and NPV of 1.00, 0.65, 0.20, and 1.00. Cystogram had a sensitivity, specificity, PPV, and NPV of 0.75, 1.00, 1.00, and 0.91. For the detection of rectal injuries, DRE had a sensitivity, specificity, PPV, and NPV of 0.58, 0.98, 0.58, and 0.98, while the values for endoscopy were 0.82, 0.88, 0.75, and 0.92.

Conclusion: Pelvic gunshot wounds result in a high rate of clinically significant injuries to the small bowel, pelvic vasculature, sigmoid colon, bladder, and rectum. Patients who do not require emergent operation should undergo CT scan as the first diagnostic imaging test, as CT scan assesses for all pelvic injuries with a single imaging modality with high sensitivity and specificity. If CT scan is positive for a pelvic injury requiring operative management, the patient should be taken directly to the operating room without further investigations. If CT scan is negative, no additional imaging is necessary to rule out injury and the patient should be admitted for a period of observation. If CT scan is equivocal for vascular or rectal injury, patients should undergo angiography or endoscopy, respectively, as these tests are highly specific and well suited for confirmatory testing. If CT scan is equivocal for bladder injury, the patient should be examined for macroscopic hematuria. If absent, the patient does not require cystogram to rule out bladder injury. If present, the patient should undergo cystogram. Microscopic hematuria and digital rectal exam, in turn, have low positive predictive values for bladder and rectal injuries. Therefore, they should not be used to screen patients for pelvic injury after gunshot wounds.

Poster # 5

A COMPARATIVE STUDY OF LAPAROTOMY VERSUS TRANSARTERIAL EMBOLIZATION FOR SPLENIC INJURY ON MODERATE TO SEVERE TRAUMATIC BRAIN INJURY: A PROPENSITY SCORE-MATCHED ANALYSIS

Takashi Fujita* MD,Ph.D., Shinji Nakahara MD, Taichiro Tsunoyama MD, Yasuyuki Uchida MD, Maki Kitamura MD, Kahoko Nakazawa MD,MPH, Hideki Ishikawa MD, Tetsuya Sakamoto MD,Ph.D., Teikyo University School of Medicine

Introduction:
Splenectomy has been recommended for splenic injury of patients with moderate to severe traumatic brain injury (TBI). However, the effect of trans-arterial embolization (TAE) has not been studied in patients with TBI. The purpose of this study was to compare the outcomes of laparotomy to those of TAE.

Methods:
We used the complete datasets from the Japan Trauma Data Bank (JTDB) 2004-2014. Our analyses included the blunt trauma patients with head injuries of abbreviated injury scale (AIS) severity score of 3 or more who underwent laparotomy or TAE for splenic injury contributing the maximum AIS on abdomen. The patients under 15 y/o were excluded in this study. Comparisons between the laparotomy group (LP) and TAE group (TAE) were performed using unmatched and propensity score (PS) matched analyses. The following outcomes were compared: the survival on discharge, the survival on 30 days, length of stay and the patients' demographic data.

Results:
In unmatched analysis, the survival rates on discharge (30days) were 54.9% (55.9%) in LP (n=102) and 78.9% (76.8%) in TAE (n=95), respectively. From each group, 70 patients were extracted by the matching of PS. In the matched comparison, the survival rate on 30days in LP was lower than that of TAE (57.1% vs 78.6%, p=0.006). The survival rates on discharge were 55.7% in LP and 75.7% in TAE (p=0.012). The two matched groups did not differ in the median length of stay, the mean age and the median injury severity score (ISS).

Conclusion:
This study suggested that the TAE might be an alternative therapeutic option for splenic injury on TBI. Further investigation needs regarding the functional and neurological outcomes on TBI with splenic injury.

Propensity matched analysis

	Laparotomy	TAE	p
	n=70	n=70	
Age (year,mean)	44	44	
Female (n, %)	23 (32.8%)	21 (30.0%)	
Injury Severity Score (median, IQR)	39.5 (34-50)	41 (33.75-50)	
GCS≦8 (n, %)	32(45.7%)	29(45.7%)	
Systolic Blood Pressure≦90mmHg (n,%)	48(68.6%)	49(70.0%)	
Length of Stay (median,IQR)	22 (2-46)	36.5 (12-55.5)	
Survival rate on Hosp. Day30 (n,%)	40(57.1%)	55(78.6%)	**0.006**
Survival on Discharge (n,%)	39(55.7%)	53(75.7%)	**0.012**

Poster # 6

SEAT BELT SIGN ON COMPUTED TOMOGRAPHY IS ASSOCIATED WITH INTRA-ABDOMINAL ORGAN INJURY IN HEAD-ON COLLISION

Yo Hattori MD, Tomokazu Motomura MD, Nobuyuki Saito MD, Takanori Yagi MD, Yoshiaki Hara MD, Hisashi Matsumoto Ph.D., Shigeru Tominaga Ph.D., Tetsuya Nishimoto Ph.D., Chiba Hokusoh Hospital, Nippon Medical School

Introduction: Intra-abdominal injury in association with seat belt wearing is well known, but a direct causal relation and whether the trace of the seat belt is associated with specific injuries are difficult to prove. In this study, we aimed to clarify the relationship between the seat belt sign on computed tomography (SBS-CT) and organ injuries sustained in head-on automobile collisions by utilizing original in-depth accident investigations data.
Methods: This retrospective study was conducted from September 2009 to August 2014. Of 3728 trauma patients admitted to our facility during the study period, 261 patients had in-depth accident investigations. Of these, 107 patients were eligible: they had been involved in a head-on collision while wearing a seat belt and undergone thoraco-abdominal CT. We compared two groups depending on the presence of intra-abdominal organ injury (group I: n=29) or not (group N: n=78). In this study, we defined SBS-CT that showed a subcutaneous high-density area on abdominal CT.
Results: Median age was 49 (interquartile range: 30-68) years and median injury severity score was 9 (4-17). SBS-CT was observed in 54 patients (50.4%). There were no differences in vehicle type or riding position between the two groups. SBS-CT in group I was significantly higher than that in group N (93.1% vs 34.6%, $P<0.01$) and equivalent barrier speed, which indicates velocity change over time, was also higher in group I (37.5 km/h vs 30 km/h, respectively, $P=0.02$). In addition, patients who had SBS-CT above the anterior superior iliac spine (ASIS) level had a significantly higher rate of intra-abdominal organ injury than those who had SBS-CT below the ASIS level (63.3% vs 33.3%, $P=0.028$).
Conclusion: SBS-CT was associated with intra-abdominal organ injury in head-on collision. In particular, the location of SBS-CT above the ASIS level may facilitate the diagnosis of such injury.

Poster # 7

MANAGEMENT AND OUTCOMES OF RECTAL TRAUMA: A TEN YEAR RETROSPECTIVE REVIEW IN A LEVEL ONE TRAUMA CENTER

Erika Bisgaard BS, Adel Barkat MD, Lance E. Stuke* MD, Jennifer Mooney MD, Aran Toshav MD, Patrick Greiffenstein MD, LSU Department of Surgery

Introduction: Management of rectal trauma continues to be a clinical challenge. Prognostic factors are poorly defined and there is a general lack of consensus on management pathways of some types of rectal injury, specifically with regard to the use of presacral drainage (PSD). The purpose of this study is to examine the 10 year experience at our trauma center to identify prognostic factors and outcomes of the different treatment modalities.

Methods: A retrospective review was conducted using the trauma registry of an urban Level 1 trauma center. -Trauma patients with suspected rectal injury between 2004 and 2014 were included in the analysis. Subjects were categorized as blunt versus penetrating and diagnostic and treatment methodology was examined. Short and long term outcomes and complications were noted and data were analyzed using chi-square analysis and student's t-test (Graphpad Prism).

Results: A total of 80 subjects were identified as having suspicion of rectal injury based on mechanism of injury or clinical findings. Five subjects were ruled out for rectal injury on proctoscopy, whereas 3 patients were noted to have rectal injuries missed initially on clinical exam. Two subjects were excluded from analysis due to incomplete records, and two more patients were excluded from final analysis due to death from multisystem trauma within 24 hours of arrival. Of the remaining 68 patients, 59 (87%) suffered penetrating injuries while 9 (13%) suffered blunt trauma. The majority of subjects suffered extraperitoneal injuries (53, 72%) and 12 (20.8%) patients overall suffered pelvic complications (PC) defined as pelvic sepsis or pelvic abscess. Two subjects died of complications of pelvic sepsis (overall attributable mortality 2.8%). Operative management varied between providers, with approximately 1/3 of patients receiving PSD and 64 (94%) undergoing fecal diversion (FD) with or without repair of injury. Five patients (7%) underwent primary repair of rectal injury (2 intra- and 3 extra-peritoneal) without FD and without PC. Of those patients with extraperitoneal injuries, the use of PSD appeared to prevent PC but this did not reach statistical significance ($p=0.05$, 95% CI 0.64-1.08). Blunt injury had a higher mean Injury Severity Score (2.1 vs. 2.4, $p=0.01$), was associated with greater risk of pelvic complications ($p=0.02$, RR=3.3, 95% CI 1.4-7.4) and attributable mortality (18% vs. 1%) compared to penetrating trauma.

Conclusion: Rectal injuries remain a therapeutic challenge in many instances. Although quite rare, blunt rectal injuries have a higher severity and were associated with greater morbidity and mortality when compared with the more common penetrating injuries. The use of PSD for extraperitoneal injuries was frequently used, was not associated with any complications, and may prevent pelvic complications, although this did not reach statistical significance in our cohort. The majority of surgeons performed FD to treat both intra- and extra-peritoneal rectal injuries. In a few instances, direct repair of rectal injuries was possible without significant complications.

Poster # 8

USE OF A NOVEL SALINE/BIPOLAR RADIOFREQUENCY ABLATION ENERGY INSTRUMENT FOR ARRESTING ONGOING SOLID ORGAN SURFACE AND LACERATION BLEEDING IN CRITICALLY INJURED PATIENTS.

Chad G. Ball* BS,MD,MPH, MSC, Andre Campbell* MD, Sean Grondin MD, Elijah Dixon MD,MPH, Joe DuBose* MD, Paul McBeth MD, University of Calgary

Introduction: Solid organ (liver, spleen and kidney) hemorrhage is often life threatening and can be difficult to stop in critically ill patients. Traditional techniques for arresting this ongoing bleeding include coagulation by high voltage cautery (Bovie), topical hemostatic application, and the delivery of ignited argon gas. The goal of this study was to evaluate the efficacy of a new energy device for arresting ongoing solid organ bleeding.

Methods: A novel instrument utilizing bipolar radiofrequency (RFA) energy which acts to ignite/boil dripping saline from a small, easy to manipulate hand piece was employed to arrest ongoing hemorrhage from solid organ injuries at 2 high volume, level 1 trauma centers. This instrument is ubiquitous in elective hepatic resections. Standard statistical and cost methodology was employed ($p<0.05$ = significant).

Results: From January 2013 to January 2015, 33 severely injured patients (mean injury severity score = 28; blunt mechanism = 31/33 (94%)) underwent use of this new saline/RFA energy instrument to arrest ongoing hemorrhage from the liver (26), spleen (5) and kidney (2). Of these patients, 23 received instrument use during an initial laparotomy, while 10 patients underwent use following removal of sponges during a return laparotomy after an initial damage control procedure. Success in arresting ongoing hemorrhage was 97% (32/33). The surgeons reported an ‘ease of use’ score of 4.8 out of 5. No postoperative complications (including delayed hemorrhage) were noted as a direct result of the energy instrument. When compared to matched historical controls, blood loss and the number of repeat laparotomies were less ($p<0.05$), but no difference in perioperative transfusion requirements, morbidity or mortality were noted ($p>0.05$).

Conclusion: This novel saline/RFA energy instrument has the potential to arrest ongoing solid organ surface/capsular bleeding, as well as moderate hemorrhage associated with deep lacerations. It is simple to use and cost effective.

Poster # 9

MICROARRAY ANALYSIS OF GENE EXPRESSION PROFILES IN OBESE PATIENTS FOLLOWING SEVERE TRAUMA

Matthew J. Delano MD,Ph.D., Cecilia Lopez BS, Henry Baker Ph.D., Ronald V. Maier* MD, Grant O'Keefe* MD, Lyle L. Moldawer Ph.D., Joseph Cuschieri* MD, Robert Winfield MD, University of Michigan

Introduction: Obesity alters a number of acute and chronic medical conditions. The effect of obesity on severely injured trauma patients remains incompletely defined. We sought to unravel potential genomic alterations induced by obesity in severely injured blunt trauma patients. A retrospective review of genomic information contained in the Inflammation and the Host Response to Injury ^{TM} multicenter trauma-related database examining the relationship between body mass index (BMI) and genomic response from peripheral blood neutrophils following severe blunt trauma was performed.

Methods: Two hundred twenty two severely injured trauma patients were categorized using the National Institutes of Health/World Health Organization BMI classification system into four groups with BMI (kg/m^2) of 18.5–24.9 normal weight, 25–29.9 overweight, 30–39.9 obese and greater than 40 morbidly or extremely obese. Blood leukocytes were separated into neutrophils, monocytes and lymphocytes. Neutrophil genomic analysis was completed using Affymetrix Glue Grant Human Transcriptome (GG-H) Arrays™ obtained at seven standardized time points.

Results: Hierarchic clustering analysis demonstrated 645 genes that varied significantly between BMI groups (FDR 0.001). Time series analysis revealed 9407 genes that varied significantly between BMI groups (FDR 0.001). Examining the impact of BMI group and time revealed 553 genes that varied significantly with BMI classification over a 30 day period. Interesting the morbidly obese group (BMI>40) genomic alterations failed to return to baseline unlike the three lesser BMI classifications. Pathway analysis revealed that the significantly altered gene transcripts that varied with time and class represented interferon signaling, cell cycle proliferation, cell signaling, cytokine/chemokine signaling, cellular adhesion molecular signaling, interleukin 8 signaling, purine metabolism and reactive oxygen species production.

Conclusion:In this study we demonstrated that peripheral blood neutrophil genomic signatures vary significantly with BMI class in severely injured trauma patients. Pathway analysis revealed that the genomic alterations represent immune function and interferon signaling pathways consistent with neutrophil function. Moreover, the most morbidly obese cohort demonstrated a genomic signature that did not return to baseline over time. These findings indicate that an underlying contribution of body mass to genomic alterations in severe trauma exist and may account for the protective effect of obesity seen in severe trauma patient populations.

Poster # 10

DEFINING RATES AND RISK FACTORS FOR READMISSIONS FOLLOWING EMERGENCY GENERAL SURGERY

Joaquim M. Havens MD, Olubode A. Olufajo MD,MPH, Zara R. Cooper* MD, MSc, Adil H. Haider* MD,MPH, Adil A. Shah MD, Ali Salim* MD, Brigham and Womens Hospital

Introduction: Emergency general surgery (EGS) patients are at increased risk for postoperative complications. Studies have shown that postoperative complications are closely linked to hospital readmission. However, there are few data on readmissions after Emergency General Surgery (EGS) procedures. We sought to define readmission rates and identify risk factors for readmission after the most common EGS procedures. Our hypothesis was that surgical complications as well as demographic factors will contribute to the rates of readmission in the EGS population.

Methods: The California State Inpatient Database (2007-2011) was queried for EGS patients as defined by the American Association for the Surgery of Trauma (AAST). Patients (age ≥18 years) with emergency department admissions, undergoing general surgery procedures the day of admission were included. We identified the 5 most commonly performed EGS procedures in each of 11 EGS diagnosis groups defined by the AAST. Patient demographics (sex, age, race, insurance type) as well as Charlson score, length of stay, complications and discharge disposition were collected. The primary endpoint was 30-day readmission. Secondary endpoints were location and reason for readmission. Factors associated with readmission were determined using multivariate logistic regression models.

Results: Among 177,511 patients meeting inclusion criteria, 57% were white, 49% were privately insured, and most were ≥45 years old (51%). Laparoscopic appendectomy (35%) and laparoscopic cholecystectomy (19%) were the most common procedures. The overall 30-day readmission rate was 5.8%. Based on diagnosis groups, readmission rates ranged from 4.1% (Upper Gastrointestinal) to 16.8% (Cardiothoracic). Of the patients who were readmitted at 30 days, 17% were readmitted at a different hospital. Predictors of readmission included Charlson score ≥2 [adjusted odds ratio: 2.26 (95% Confidence Interval: 2.14-2.39)], leaving against medical advice [2.24 (1.89-2.66)], and public insurance [1.55 (1.47-1.64)]. Major predictors of readmission at a different hospital were leaving against medical advice [1.99 (1.40-2.85)] and paying out-of-pocket [1.67 (1.33-2.11)]. The most common reasons for readmission were surgical site infections (17%), gastrointestinal complications (11%), and pulmonary complications (4%).

Conclusion: Readmission after EGS procedures is common and varies widely depending on patient factors and initial diagnoses. One in five readmitted patients will go to a different hospital, potentially obscuring the utility of readmission as a quality metric. Assisting socially vulnerable patients, reducing post-operative complications and infections are targets to reduce readmissions.

Poster # 11

THROMBOELASTOGRAPHY DOES NOT DETECT PRE-INJURY ANTICOAGULATION THERAPY IN ACUTE TRAUMA PATIENTS

Jawad T. Ali MD, Mitchell Daley Nina Vadiei BS, Joseph Nguyen BS, Zach Enright BS, Sadia Ali MPH, Jayson D. Aydelotte MD, Thomas B. Coopwood MD, Carlos V. Brown* MD, University Of Texas At Austin - Dell Medical School

Introduction:The aging trauma population presents with a higher incidence of pre-existing medical conditions, including the use of anticoagulation (AC) therapy. Viscoelastic methods, such as thromboelastography (TEG), have been recommended to characterize post-traumatic coagulopathy, yet no study has evaluated the impact of pre-injury AC on TEG. We hypothesized that patients on pre-injury AC would have a greater incidence of coagulopathy on TEG.

Methods:This retrospective chart review evaluated all trauma patients admitted to an urban, level one trauma center from February 2011 to September 2014 who received a TEG within the first 24 hours of admission. Propensity score 1:1 matching for age, gender and injury severity score was used to ensure similarity of the two groups. Patients were classified as pre-injury AC if their documented medications prior to admission included warfarin, dabigatran, or anti-Xa (aXa) inhibitors (apixaban or rivaroxaban). Patients were excluded if they received a hemostatic medication (n=11) or blood product (n=28) prior to the TEG, lacked a matched pair (n=198), or had missing data (n=4). To assess the clinical application, the presence of coagulopathy on kaolin TEG and conventional laboratory was defined by exceeding local laboratory reference standards, including reaction time (R) greater than 10 min, angle less than 53 degrees, maximal amplitude less than 50 mm, international normalized ratio (INR) greater than 1.4 and activated partial thromboplastin time (aPTT) greater than 36.5 seconds.

Results:A total of 54 patients were included (AC, n=27 [warfarin n=13, dabigatran n=6, aXa inhibitor n=8] vs. no AC, n=27). The time from admission to TEG was similar (AC 164 ± 315 min vs. no AC 220 ± 247 min, p=0.47). TEG coagulation markers differed, including the R value (AC 6.5 min ± 4.4 vs. no AC 4.3 min ± 1.1; p=0.01) and MA (AC 66.8 mm ± 5.02 vs. no AC 62.6 mm ± 6.8; p=0.01). The prolonged R value was driven by warfarin (R 5.5 ± 2.1 min vs. no AC 4.3 ± 1.1 min; p=0.03) and dabigatran (R 10.8 ± 7.6 min vs. 4.3 ± 1.1 min; p<0.01), not aXa inhibitors (R 4±1.7 min vs. no AC 4.3 ± 1.1 min; p=0.16). However, there was no significant difference in the number of patients determined to have coagulopathy on TEG by exceeding references ranges (AC 11.1% vs. no AC 3.7%; p=0.3). Traditional coagulation markers, including INR (AC 1.8 ± 0.84 vs. no AC 1.1 ± 0.14; p<0.01) and aPTT (AC 41.9 ± 20.5 sec vs. no AC 30 ± 5.1 sec; p=0.01), were prolonged in the pre-injury AC group. The INR was prolonged by all individual AC subgroups, including warfarin (2.1 ± 0.95 vs. 1.1± 0.14; P<0.01), dabigatran (1.4 ± 0.59 vs. 1.1 ± 0.14; p=0.01) and aXa inhibitors (1.6 ± 0.74 vs. 1.1 ± 0.14; p<0.01). The aPTT was prolonged in warfarin (41.3 ± 23.2 sec vs. 30.1 ± 0.03 sec; p=0.03) and dabigatran (52.7 ± 19.1 sec vs. 30.1 ± 0.03 sec; p<0.01), but not aXa inhibitors. Conventional tests identified coagulopathy in a high proportion of anti-coagulated patients (AC 74% vs. no AC 15%; p<0.01).

Conclusion:Warfarin and dabigatran prolonged the R value on TEG in a matched cohort, however; prolonged R values remained within normal laboratory reference ranges. Therefore, the TEG has limited clinical utility to evaluate the presence of pre-injury AC and traditional markers of drug induced coagulopathy (PT and PTT) remain standard of care to evaluate for pre-injury AC and guide reversal decisions.

Poster # 12

APPENDECTOMY SHORT STAY PROTOCOL DECREASES LENGTH OF STAY

Alexander L. Colonna MD, Christopher C. Sampson BS, Raminder Nirula* MD,MPH, University of Utah

Introduction: Previous research has shown that uncomplicated appendectomy can be treated as an outpatient procedure. We wanted to determine if a short stay protocol improved value driven outcomes through shortening length of stay without compromising quality.
Methods: All patients undergoing appendectomy for acute, uncomplicated appendicitis at our tertiary academic medical center from October 1st 2012 to October 1st 2013 were compared to a control group from the prior year. Patients were divided into pre-protocol and post-protocol groups. Gathered data included demographic information, complications, readmission in 30 days, complications, time from admission to OR, OR time, OR to discharge time and total length of stay.
Results: Total stay was reduced by 8.3hrs (p=0.017), admission to OR was reduced by 1.9hrs (p=0.003), OR to Discharge reduced by 6.5hrs (p=0.049), OR times were similar. Age, admission WBC, gender, post-op complications, 30-day readmission, and complications were equivalent between the two groups.
Conclusion: Protocolized delivery of care for acute, uncomplicated appendicitis delivers improves value driven outcomes through improved care efficiency without compromising patient safety.

Table 1: Demographics

	Pre-Protocol	Protocol	P value
Appendicitis, n,(%)	161(49)	169(51)	
Gender, n, (%)			
Male	88(55)	88(52)	
Female	73(45)	81(48)	0.222
Age (SD)	34.5(15.4)	34.3(14.3)	0.876
Admission WBC (SD)	12.2(3.9)	12.9(3.9)	0.123

Table 2: Outcomes

	Pre-Protocol	Protocol	Difference	P value
Total Stay	34 hrs	26.6 hrs	8.3hrs	0.017
Admission to OR	9.2 hrs	7.3 hrs	1.9hrs	0.003
Total OR	49.4 min	53.2 min	3.8 min	0.206
OR to Discharge	24.8 hrs	18.3 hrs	6.5 hrs	0.049
Complications, % (admission)	16(10%)	12(7%)		0.431
Readmissions, %	21(13%)	20(11%)		0.74
Complications, %(clinic)	15(9%)	10(6%)		0.33

Poster # 13

DATA DICTIONARIES TO MEASURE DISEASE SEVERITY FOR 16 EMERGENCY GENERAL SURGERY ILLNESSES

Gail T. Tominaga* MD, Shahid Shafi* MD,MPH, Kevin Schuster* MD, Stephanie Savage* MD, Steven Ross* MD, Preston Miller*, MD, Peter Muskat* MD, Nate Mowery* MD, Mitchell Cohen* MD, David Ciesla* MD, Kenji Inaba* MD, Carlos Brown* MD, Suresh Agarwal* MD, Michael Aboutanos* MD, Marie Crandall* MD, MPH, AAST Patient Assessment Committee

Introduction: The American Association for the Surgery of Trauma (AAST) recently developed a new grading system for measuring anatomic severity of Emergency General Surgery (EGS) diseases. However, its utility is hampered by a lack of uniform definitions. The goal of this study was to develop clear, concise, and explicit descriptions for each grade of EGS disease.

Methods: The AAST Patient Assessment Committee developed definitions for 16 EGS diseases. For each grade of each disease, we developed definitions based upon clinical, imaging, endoscopic, operative, and pathologic criteria. All definitions were reviewed and approved by the committee members by consensus.

Results: Data dictionaries were created for acute appendicitis, breast infections, acute cholecystitis, acute diverticulitis of the colon (provided as example in the Table), esophageal perforation, hernias (internal or abdominal wall), infectious colitis, intestinal obstruction, arterial ischemic bowel, acute pancreatitis, pelvic inflammatory disease, perirectal abscess, perforated peptic ulcer disease, pleural space infection, soft tissue infections, and surgical site infections. The committee recommends reporting a grade based on each of these criteria, and then assigning the highest grade to the patient.

Grade	Description	Clinical Criteria	CT Findings	Operative Findings	Pathologic Findings
I	Colonic inflammation	Pain, elevated WBC, minimal or no tenderness	Mesenteric stranding, colon wall thickening	NA	NA
II	Colonic microperforation	Local tenderness; no peritonitis	Pericolic phlegmon; foci of air, no abscess	Pericolic phlegmon, no abscess	Inflamed colon with microscopic perforation
III	Localized pericolic abscess	Localized peritonitis	Pericolic abscess	Pericolic abscess	Perforation
IV	Distant &/or multiple abscesses	Localized peritonitis at multiple sites	Abscess or phlegmon away from colon	Abscess or phlegmon away from colon	Perforation
V	Free colonic perforation with generalized peritonitis	Generalized peritonitis	Free air & free fluid	Perforated with generalized fecal purulent contamination	Perforation

Conclusion: We have developed uniform definitions for grading sixteen EGS diseases. These definitions may be used to train data abstractors for emerging EGS registries.

Poster # 14

PROLONGED PREOPERATIVE LENGTH OF STAY AS A RISK FACTOR FOR PROLONGED URGENT LAPAROSCOPIC CHOLECYSTECTOMY

Misha Bhandari BA, Chad Wilson* MD,MPH, Kenneth Rifkind MD, Patricia Ayoung-Chee MD,MPH, New York University Langone Medical Center

Introduction: The standard of care for acute cholecystitis is laparoscopic cholecystectomy (LC). Previous studies have reported that performing an urgent same-day LC is superior to delayed elective cholecystectomy. While this practice is ideal, it requires significant hospital resources. We sought to determine whether prolonged preoperative length of stay (LOS) was associated with worse outcomes.

Methods: This analysis involved a retrospective chart review of patients treated for symptomatic gallstone disease at a large municipal hospital between September 2012 and November 2013. Inclusion criteria were age ≥18 yrs who underwent cholecystectomy and had a diagnosis of cholecystitis on pathology. Medical records were reviewed and relevant data points were collected. Univariate linear and multivariate logistics regressions were performed to assess the correlation between time to operation and the 3 primary outcomes (operative time, postoperative length of stay, and total length of stay). Separate analyses were performed using preoperative LOS as a continuous and ordinal categorical (<36 hrs or ≥36 hrs) variable.

Results: 88 patients met all criteria for inclusion. For urgent LC, the mean (SD) preoperative LOS was 75.5 (±48.9) hrs, the mean operative time was 2.3 (±1.1) hrs and the mean postoperative LOS was 59.4 (±6.38) hrs. The average total LOS was 137.2 (±81.0) hrs. Using univariate linear regression, operative time increased by 3.2 minutes for every 10-hr increase in preoperative LOS ($p=0.007$). Total LOS increased 1.1 hours for every 1hr increase in preoperative LOS ($p<0.001$). These findings remained significant when adjusted for age and sex. There was no difference in operative time (2.04 hrs vs 2.4 hrs) ($p=0.2257$) or postoperative LOS (57.9 hrs vs 60.8 hrs) ($p=0.8528$) between patients receiving LC before or after 36 hrs, respectively. There was no significant association between preoperative LOS and conversion to open procedure.

Conclusion: This analysis reveals that increased preoperative LOS is associated with increased operative time and overall LOS. While same-day urgent LC requires the hospital to commit resources, the average hospital stay costs $1,600/day and the average OR time costs $62/min. Further analysis is needed to explore the potential cost savings.

Poster # 15

ACUTE CARE SURGEON'S ROLE IN OBSTETRICAL/GYNECOLOGIC EMERGENCIES (THE OBCAT ALERT)

Seong K. Lee MD, Eddy Carrillo* MD, Andrew Rosenthal* MD, Rafael Sanchez MD, Chauniqua Kiffin MD, Dafney Lubin MD, Memorial Regional Hospital

Introduction:

Overwhelming hemorrhage or other intra-abdominal complications may develop during or following obstetrical or gynecologic procedures and may require the expertise and surgical training of an acute care surgeon. The OB Critical Assessment Team (OBCAT Alert) was developed to facilitate the multiple resources at our institution to prevent morbidity and mortality related to complications during these procedures. We sought to review and characterize the Trauma surgeon's role in obstetrical and gynecologic emergencies.

Methods

We conducted a retrospective review of all OBCAT (OB Critical Assessment Team) alerts or emergency general surgery consults during an obstetrical case at our institution from 2008 to 2015. Similar to the county Trauma Alert system, an OB CAT Alert is a hospital based alert system designed to immediately notify OB, Anesthesiology, Trauma, the ICU, and Blood bank of a potential hemorrhagic catastrophe or other emergency during an OB case. This coordinated system was developed in response to a series of complicated OB cases in the years prior to this review.

Results

Since 2009, there has been 7 ± 3 OBCAT alerts/year. 15 patients required Trauma surgical intervention for overwhelming hemorrhage; of which 12 requiring damage control packing which was typically required following an emergency hysterectomy for continued post partum hemorrhage. There was an average of 21.1 ± 10 units of PRBC transfused in these cases. There were 21 other instances of emergent surgical intervention required during a primary obstetrical/gynecologic case not related to hemorrhage. 8 of these cases were related to adhesions or intestinal injury and there were 4 severe bladder injuries requiring repair. There were 7 additional cases of OB/GYN patients requiring surgical treatment by Trauma services post routine OB/GYN procedure. The most common reason was for severe wound complications. There were a total of 3 deaths (7% total mortality) during this time; 2 were from hemorrhage and intra-operative cardiac arrest.

Conclusions:

Emergency Obstetrical cases can be associated with high morbidity and mortality and may require damage control or other surgical techniques in cases of overwhelming hemorrhage. Acute Care Surgeons have a key role in the early critical assessment of these complicated cases and may provide skills and experience in managing a variety of surgical emergencies in non hemorrhagic cases as well.

Poster # 16

Risk Factors for Anastomotic Leak after Delayed Colonic Anastomosis after Damage Control Laparotomy in Emergency General Surgery Patients

Bruce Chung MD, Christine Velazquez MD, Mena Isnassuos MD, Ashley T. Badger MD, Preston Miller* MD, Wake Forest University School of Medicine

Introduction: Damage control laparotomies have become a standard part of practice in the trauma population. In the setting of hypothermia, coagulopathy, and acidosis, leaving patients in intestinal discontinuity has been proven to be a safe and effective temporizing measure until such physiologic derangements can be corrected. Surgeons experienced in DCL have extended this approach to emergency general surgery (EGS) patients, although, traditional approaches for colonic catastrophes usually include the use of colostomy or ileostomies over high risk anastomosis. Here we report our experience of colonic anastomosis after DCL and aim to identify risk factors for colonic anastomotic leak after colon resection.

Methods: A retrospective review was performed through a prospective database for all EGS patients receiving colonic resection at a single institution, academic center for the years 2009-2014. Patients were identified that underwent DCL that had delayed primary colonic anastomosis (DA), immediate colostomy or ileostomy placement (IO), or delayed ostomy placement (DO). Data were collected on patient demographics, preoperative and intraoperative laboratory values, morbidity, and mortality.

Results: Ninety-six EGS patients were identified that underwent DCL. 56 of these patients either underwent subtotal colectomy with an end ileostomy, or had a catastrophic insult and did not survive for a second operation and were excluded from the study. Of the 40 remaining patients, 42% (17 patients) underwent DA, 10% (4 patients) underwent IO, and 48% (19 patients) underwent DO. Overall mortality is high among EGS patients undergoing DCL at 35%. However, mortality was not significantly different among the groups with 35% in the DA group, 50% in the IO group, and 32% in the DO group ($p=0.49$). Of the patients that underwent DA, only 18% (3 patients) had any evidence of anastomotic leak. On univariate analysis, preoperative factors including transfusions, markers of shock (pH, lactate, use of pressors), markers of inflammation (WBC, temperature, tachycardia, hyperglycemia) were not predictive of anastomotic leak. Chronic steroid use approached significance ($p=0.2$) and comorbidities (diabetes, renal failure, and cirrhosis) were associated with anastomotic leak ($p=0.03$). Only comorbidities ($p=0.02$) predicted anastomotic leak on multivariate analysis.

Conclusion: DCL surgery has improved the morbidity and mortality in the trauma population, but remains controversial in the EGS patient. Although the use of colostomy or ileostomy placement is widely used, there is no difference in survival in patients that undergo DCL and delayed colonic anastomosis versus an ostomy placement. In the appropriate patient, delayed colonic anastomosis can be a safe option. However, patients with comorbidities, including diabetes, renal failure, and cirrhosis, are at risk for wound healing issues and remain at high risk for anastomotic leak after DCL.

Poster # 17

SMALL BOWEL OBSTRUCTION: TO OPERATE OR OBSERVE?

Lindsay C. Bridges MD, James D. Washburn Kenji L. Leonard MD, Gregory M. Borst MD, Brian J. Zeithaml MD, Nathaniel R. Poulin MD, Brett H. Waibel* MD, Eric A. Toschlog* MD, Brody School of Medicine at East Carolina University

Introduction: Small bowel obstruction (SBO) is a common and challenging problem for acute care surgeons. A clear challenge relates to the timing and need for surgery. Accordingly, the purpose of our study was to identify preoperative predictors of need for surgery after admission for SBO.

Methods: Our institutional acute care surgery database was queried for SBO for a seven-year period (2006-12). Thirty-seven variables, including demographics, past surgical history, physical examination findings, admission laboratories and vitals, as well as CT scan findings were abstracted from SBO charts. The SBO cohort was divided into operative and non-operative groups. The groups were compared across variables using appropriate univariate statistics, with a multivariate logistic regression model created for the operative cohort, identifying predictors of need for surgery.

Results: Of 419 SBO during the study period, 169 (40%) were operative. Univariate and multivariate analyses are displayed in tables 1 and 2.

Table 1. Univariate Analysis

Variable	No-Op (250)	Operative (169)	*p*
#PAS[1]	2.5±1.8	1.8±1.5	<0.001
WBC[2]	11.5±4.9	12.1±6.1	0.049
Glucose[3]	130±48	136±42	0.003
Prior SBO	42.4%	18.9%	<0.001
Prior SBO Op	18.0%	9.5%	0.016

[1]#PAS=Number of Prior Abdominal Surgeries, [2]WBC= White Blood Cell Count (k/uL), [3]Glucose (mg/dL)

Table 2. Multivariate Analysis

Variable		AOR[1]	95% CI[2] for AOR	*p*
#PAS		0.78	0.68-0.91	0.001
WBC[3] (Ref 4-12)	**<4,000**	7.1	1.2-40	0.027
	≥12,000	1.9	1.2-3.0	0.006
Prior SBO		0.36	022-0.59	<0.001
Emesis		1.8	1.1-3.0	0.032

[1]AOR=Adjusted Odds Ratio, [2]CI=Confidence Interval, [3]WBC= White Blood Cell Count (k/uL)

Conclusion: A significant number of SBO admissions will require surgery. The strongest admission predictor of need for surgery for SBO is leukopenia. Interestingly, prior abdominal surgery and prior surgery for SBO are protective; need for surgery is inversely related to the number of prior surgeries. No admission CT scan findings were predictive of need for surgery. We hope that our findings will assist in operative decision making for SBO and will contribute to the design of prospective studies of SBO.

Poster # 18

Importance of experts in acute interventional radiology techniques in an area of acute care surgery and medicine.

Itsurou Akamine MD, Junya Tsurukiri MD,Ph.D., Shiro MIshima MD,Ph.D., Yoshimi Usui Jun Oda* MD,Ph.D., Tetsuo Yukioka* MD,Ph.D., Tokyo Medical University

Introduction: In the acute care setting, not only surgical techniques but also a variety of modalities is required to comprehensively treat a patient. Since acute interventional radiology (IR) techniques are becoming increasingly popular, acute in-house care experts in IR techniques could further improve the on-site acute care. It is hypothesized that the immediate availability of experts on acute care with IR techniques is a significant advantage for acute on-site care.
Methods: Acute care experts (with Japanese Association of Acute Medicine's Board certification) in IR techniques completed at least 1 year of training as a member of the endovascular team in the Radiology Department of another university hospital. It was arranged in such a way that at any time one of them was available to come to the hospital and perform IR within 1 h after the decision to perform IR was taken. After obtaining appropriate approval, a prospective study of daily referrals and procedures performed by trained acute care experts, including those performed out of hours, was undertaken.
Results: We performed an emergency therapeutic IR for 101 cases in 79 patients during past 2.5 years. The median patient age was 69 years and 57% of the patients were male. Of the 101 cases, 94% of the procedures were vascular IR and only 6 cases were non-vascular IR. Further, 50% of the procedures were performed in out-of-hours referrals. Main emergency IR procedures were arterial embolization (AE) for hemorrhage (59%). In cases of AE, 52% of the cases were that of trauma; others such as upper gastrointestinal bleeding comprised the remaining 48%. Three cases (3%) were performed AE with an interventional radiologist in the Radiology Department in daytime. The overall mortality rate was 22%, and the main causes of death were coagulopathy (8%) and brain death (8%). (Table)
Conclusion: Immediate availability of trained acute care experts to perform diagnostic and therapeutic IR in acute care setting seems to be of considerable benefit. A standard training program for acute care experts should be established to make it universally accepted tactical regimen.

Clinical characteristics			
Age (yr) -median (IQR)	69 (50–76)	**IR procedures** -n (%)	
Male -n (%)	45 (57)	Arterial embolization	60 (59)
Daytime -n (%)	51 (50)	Thrombus treatment	19 (19)
Out-of-hours -n (%)	50 (50)	Aneurysm treatment	16 (16)
Vascular IR -n (%)	95 (94)	Drainage	6 (6)
Non-vascular IR -n (%)	6 (6)	**Mortality** -n (%)	
Type of acute care -n (%)		Coagulopathy	6 (8)
Trauma	32 (32)	Brain death	6 (8)
Non-trauma	36 (36)	Pneumonia/ Sepsis	3 (4)
Neuro	33 (33)	Others	2 (3)

Poster # 19

Diagnostic value of intestinal fatty binding protein (I-FABP) for pneumatosis intestinalis

Shokei Matsumoto* MD, Mitsuhide Kitano MD, Saiseikai Yokohamashi Tobu Hospital

Background: Pneumatosis intestinalis (PI) is known as a sign of a life-threatening bowel ischemia. Nearly half cases of PI are considered benign. The usefulness of lactate as a biomarker has been reported. We aimed to evaluate the utility of intestinal fatty binding protein (I-FABP) in the diagnosis of pathologic PI.

Methods: All consecutive patients who presented to our emergency department with PI were prospectively enrolled from January 2009 to December 2014. The diagnostic performance of I-FABP for pathologic PI was compared with that of other traditional biomarkers and various parameters.

Results: Seventy patients with PI were enrolled. Pathologic PI was diagnosed in 27 patients (39%). The levels of most biomarkers were significantly higher in patients with pathologic PI than those with non-pathologic PI ($p < 0.05$). ROC analysis revealed that the area under the curve (AUC) was highest for I-FABP (AUC = 0.82) in the diagnosis of pathologic PI. Among other parameters, age, history of heart failure, rate of hypotension, tachycardia and portal venous gas was significantly higher in patients with pathologic PI ($p < 0.05$). In multivariate analysis, the presence of hypotension (adjusted OR, 23.2; $p = 0.004$), and I-FABP of 9.7 or greater (adjusted OR, 22.8; $p < 0.001$) retained statistical significance as predictors of pathologic PI.

Conclusion: We demonstrated that high I-FABP value, in combination with hypotension, was clinically useful for pathologic PI. However, our study has a small number of samples, so there is a need for a multicenter large trial to confirm this result.

Biomarkers	Pathologic PI (n = 27)	Non-pathologic PI (n = 43)	*p*
Specific bowel marker			
I-FABP (ng/mL)	15.5 (5.3-52.9)	3.2 (1.7-6.7)	< 0.001
Inflammatory markers			
WBC (× 10^3/L)	10.0 (6.1-15.9)	8.1 (6.2-13.2)	0.473
CRP (mg/L)	11.8 (2.6 – 19.0)	2.0 (0.4-6.8)	0.003
Tissue ischemic markers			
BD (mEq/L)	1.4 (-1.2-7.7)	0.3 (-1.8-0.9)	0.018
Lactate (mg/dL)	40 (17.0 – 70.5)	19.0 (13.0 – 21.0)	0.001
Non-specific bowel markers			
AMY (U/L)	126.0 (62.0-269.0)	63.5 (48.0-97.0)	0.005
LDH (U/L)	330.0 (234.0 – 498.0)	228.0 (191.0 – 280.0)	0.002
AST (U/L)	35.0 (25.0 – 82.0)	25.0 (18.0 – 31.0)	0.003
CK (U/L)	99.0 (42.5 – 448.0)	79.0 (42.0 – 125.0)	0.66
Coagulation activity marker			
D-dimer (ug/mL)	5.5 (3.4-13.4)	3.4 (1.5-6.0)	0.012
Renal function markers			
BUN (mg/dl)	38.7 (29.2-58.7)	18.2 (12.4-33.9)	< 0.001
Cr (mg/dl)	1.5 (1.0-3.2)	0.9 (0.56-1.42)	0.003

Poster # 20

EVIDENCE FOR ROLE OF EPITHELIAL CYTOKINES IN INJURY-INDUCED PERSISTENT CRITICAL ILLNESS IN BLUNT TRAUMA PATIENTS

Jesse Guardado MD, Othman Abdul-Malak MD, Brian Zuckerbraun MD, Andrew Peitzman* MD, Jason Sperry MD,MPH, Yoram Vodovotz Ph.D., Rami Namas MD, Timothy Billiar* MD, University of Pittsburgh

Introduction: Immune dysregulation following trauma can lead to injury-induced persistent critical illness (IPCI). IPCI is observed clinically by prolonged ICU stays, multiple organ dysfunction (MODS), and increased susceptibility to nosocomial infection (NI). Epithelial barrier dysfunction is thought to contribute to both MODS and NI. Recent discoveries suggest that cytokines released from stressed epithelium (IL-25 and IL-33) can drive the activation of underlying immune cells in end organs which can lead to aberrant immune responses if excessive. We hypothesized that IPCI with NI would be associated with evidence of epithelial stress measured by increased levels of epithelial cytokines in severely injured trauma patients.

Methods: Using a clinical data base and biobank from 472 blunt trauma survivors, we performed a retrospective case–control study where 44 trauma patients with IPCI (ICU LOS >12 days)+NI were compared to 44 patients with an uncomplicated clinical course (ICU LOS < 7 days) and, no NI. The two cohorts were matched for demographics, injury severity (average ISS=26 for both sub-groups), and similar mechanism of injury (blunt trauma). Plasma was sampled 3 times within the first 24h and then from D1 to D7 post-injury, and assayed for IL-25 and IL-33. MODS score (Marshall score) was calculated daily from day 1 and up to day 7 post-injury. Two-way analysis of variance (ANOVA) and Area under the Curve (AUC) were used to determine statistical significance ($p<0.05$) and fold change respectively between the two sub-groups. Spearman Correlation Coefficient (cc) was performed to determine the association between epithelial cytokines and MODS score as well as levels of cytokine markers of the systemic inflammatory response (IL-6, IL-23, and MCP1).

Results: Patients with IPCI+NI had a significantly longer ICU length of stay (LOS), and days on mechanical ventilation when compared to patients with uncomplicated clinical course. In addition, patients with IPCI exhibited a higher degree of organ dysfunction suggested by a higher Marshall MODS score persistently elevated across D1 through D7. Circulating levels of IL-25, and IL-33 were significantly elevated upon admission and remained elevated in patients with IPCI+NI. In addition, MODS correlated positively with levels IL-25 (cc: 0.3, $p= 0.0003$) and IL-33 (cc: 0.31, $p= 0.0002$) in IPCI+NI patients as compared to patients with resolution. IL-25 and IL-33 levels correlated with IL-6, IL-23, and MCP1 levels calculated by AUC analysis over the first 24 hrs.

Conclusion: These data demonstrate that cytokines derived from stressed epithelial cells post-trauma in humans are elevated early and over time in critically ill trauma patients. The correlation between epithelial cytokines and markers of SIRS suggest that these recently described cytokines contribute to the early immune response to severe injury. Further studies are warranted to discern mechanistic insights of dysregulated inflammatory pathways to better understand the role of epithelial cytokines and their effect on immune cells.

Poster # 21

EARLY PROPRANOLOL AFTER TRAUMATIC BRAIN INJURY IS ASSOCIATED WITH LOWER MORTALITY

Jason Murry MD, Ara Ko MD, Andrea A. Zaw MD, Beatrice Sun BS, Tong Li BS, Devorah Mehrzadi BA, Galinos Barmparas MD, Daniel R. Margulies* MD, Matthew Bloom* MD, Eric J. Ley* MD, Cedars-Sinai Medical Center

Introduction:Beta adrenergic receptor blockers (BB) administered early after trauma blunts the cascade of immune and inflammatory changes associated with injury. BB are associated with improved outcomes after traumatic brain injury (TBI). Propranolol may be an ideal BB due to nonselective inhibition and its ability to cross the blood brain barrier. We determined if administration of propranolol early after TBI is associated with lower mortality.
Methods:A retrospective review of prospectively collected data was performed for all TBI patients from January 1 2013 to January 31, 2015. Patients with mild TBI, defined as head AIS <3, were excluded. Administration of early propranolol was at attending discretion. Dosing began within 24 hours after admission at 1 mg IV every 6 hours. Patients who received early propranolol after TBI (EPAT) were then compared to those that did not. Demographics and outcomes data including intensive care unit (ICU) length of stay (LOS), hospital LOS, complications during admission and mortality were compared. Multivariable regression analysis was performed to determine independent risk factors for mortality.
Results:Over the 2-year period 537 patients presented with moderate to severe TBI. Early propranolol was administered in 17% (92/537) of patients compared to 83% (445/537) who did not receive the drug. Similarities were noted in ISS≥16, GCS≤8, and admission SBP<90mmHg. Outcomes such as hospital length of stay (12.6 v 9.3 days, p= 0.07), ICU length of stay ≥ 5 days (21% v. 25%, p=0.41) and mortality (7% v 12%, p = 0.11) were also similar between both groups. On regression analysis controlling for age, GCS, SBP <90mmHg and ISS≥16, early propranolol predicted lower mortality (AOR 0.35; CI 0.13, 0.99; p=0.05).
Conclusion: After adjusting for predictors of mortality, early administration of propranolol after TBI was associated with improved survival. No adverse events were associated with propranolol administration. Future studies are needed to identify additional benefits as well as optimal dosing regimens.

	Total (n=537)	Propranolol (n=92)	No Propranolol (n=445)	*p*-value
Age (years)	56 ± 23.2	50 ± 20.5	57 ± 23.5	*0.004*
SBP < 90 (mmHg)	25 (5%)	4 (4%)	21 (5%)	*0.88*
GCS	13 ± 4.1	12 ± 4.2	13 ± 4.0	*0.11*
GCS ≤ 8	91 (17%)	19 (21%)	72 (16%)	*0.30*
ISS	20 ± 9.8	21 ± 8.9	19 ± 9.9	*0.05*
ISS ≥ 16	358 (67%)	66 (72%)	292 (66%)	*0.26*
Hosp LOS (days)	10.6 ± 12.8	12.6 ± 15.5	9.3 ± 10.6	*0.08*
ICU LOS (days)	4.1 ± 7.0	6.7 ± 9.3	3.6 ± 6.3	*0.003*
ICU LOS ≥ 5	129 (24%)	19 (21%)	110 (25%)	*0.41*
Mortality	61 (11%)	6 (7%)	55 (12%)	*0.11*

Risk Factor	Adjusted Odds Ratio (95% CI)	Adjusted p-value
Age > 65 (years)	4.54 (1.99, 10.36)	*< 0.001*
GCS ≤ 8	29.86 (13.00, 68.57)	*< 0.001*
SBP < 90	4.35 (1.48, 12.80)	*0.008*
ISS ≥ 16	4.65 (1.43, 15.09)	*0.010*
Propranolol	**0.35 (0.13, 0.99)**	***0.050***

Poster # 22

MURINE SEPSIS MODELS RECAPITULATE HUMAN GENERATION OF HUMAN MYELOID DERIVED SUPPRESSOR CELLS (MDSCs) WITH CHRONIC CRITICAL ILLNESS

Philip A. Efron* MD, Benjamin Szpila MD, Amber Delmas BS, Brittany Mathias MD, Alicia Mohr* MD, Scott Brakenridge MD, Dina Nacionales MD, Ricardo Ungaro BS, Jennifer Lanz ARNP, Victoria Klink RN, Ruth Davis RN, Christiaan Leeuwenbrugh Ph.D., Henry Baker Ph.D., Lyle Moldawer Ph.D., Frederick Moore* MD, University of Florida - Gainesville

Introduction:We have postulated that generation of MDSCs after sepsis contributes to the development of Persistent Inflammation Immunosuppresion Catabolism Syndrome (PICS) after chronic critical illness. Recent publications (Seok et al, *PNAS*, 2013) debate the efficacy of animal research models; however, the FDA requires animal testing prior to the study of human subjects. Since human and murine myelopoiesis and MDSC phenotypic cell markers differ, we hypothesized whether isolated MDSCs after murine cecal ligation and puncture (CLP) were similar to human MDSCs after sepsis at a functional and genomic level.

Methods:Blood was obtained from 12 severe sepsis/septic shock and 11 healthy control subjects for phenotyping, functional analysis and genotyping of enriched MDSC ($CD33^{+}CD11b^{+}HLA\text{-}DR^{-/low}$) populations. Blood samples were drawn at seven and 14 days after sepsis. Cecal ligation and puncture (CLP) or sham B6 mice underwent splenic MDSC ($GR1^{+}$) isolation seven days after procedure. Human/murine MDSC RNA was extracted and genome-wide expression analysis was performed ($p<0.001$ f-test). Ingenuity Pathway Analysis (IPA) was performed. T-cell suppression assays by MDCSs were also conducted. Also, we identified the genes that were significant in the human model and in the mouse model and calculated the correlation on the fold changes of the common genes.

Results:Similar to our previous reporting of human post-sepsis $CD33^{+}CD11b^{+}HLA\text{-}DR^{-/low}$ cells, murine MDSCs seven days after CLP induce >90% suppression of both CD4+ and CD8+ T cells (4:1 MDSC:T cells). Transcriptomic analysis revealed commonalities in the two species: both had significant upregulation (HP and CYBB) and downregulation (MHCII/HLA and CCR3) of MDSC associated immunity genes. Canonical pathway analysis revealed both species had predicated alterations (towards immunosuppression) in antigen presentation, B cell development, dendritic cell maturation and IL4 signaling. Both species were predicted to have a decrease in cytoxicity of lymphocytes (z-score<-2). Pearson's correlation of the MDSCs post-sepsis between human and murine transcriptome analogues with significant alterations was R=0.69.

Conclusion:Although not a perfect analogue, human and murine MDSCs after sepsis are appropriate for comparison for immunotherapy. Both human and murine MDSCs become a significant leukocyte population chronically after sepsis and have similar function and similar, but not identical, transcriptomic expression patterns. Translational research regarding this leukocyte holds significant promise for future immunotherapy after sepsis to prevent PICS.

Poster # 23

A HIGH-VOLUME TRAUMA INTENSIVE CARE UNIT CAN BE SUCCESSFULLY STAFFED BY ADVANCED PRACTITIONERS AT NIGHT

Kazuhide Matsushima MD, Kenji Inaba* MD, Dimitra Skiada MD, Michael Esparza MD, Aaron Strumwasser MD, Gregory Magee MD, Daniel Grabo MD, Elizabeth Benjamin MD,Ph.D., Lydia Lam* MD, Demetriades Demetrios* MD,Ph.D., LAC+USC Medical Center

Introduction: Advanced practitioners (APs) have played an increasing role in the management of trauma patients. However, it remains unknown whether critically ill trauma patients can be successfully managed by APs. The purpose of this study was to examine the impact of night coverage by APs in a high-volume Trauma Intensive Care Unit (TICU) on patient outcomes and care processes.

Methods: After IRB approval, our institutional trauma registry was used to identify trauma patients admitted to the TICU during the night shift. During our study period, the TICU was staffed by APs during the night shift (7pm-7am) from Sunday to Wednesday and by resident physicians from Thursday to Saturday. On-call trauma fellows and attending surgeons in house supervised both APs and resident physicians. Patient outcomes and care processes by APs (AP group) was compared with those admitted by resident physicians (RP group) using univariate and multivariate analyses.

Results: A total of 289 patients were identified between 7/2013 and 2/2014; median age 40, 77.9% male, 22.8% penetrating mechanism, 30.4% ISS≥25, 20.1% admission GCS<9. Median lactate clearance rate within 24 hours of admission were similar between two groups (10.0% vs. 9.1%, p=0.39). APs and resident physicians transfused patients requiring massive transfusion with a similar blood product ratio (PRBC:FFP) (2.1:1 vs. 1.7:1, p=0.32). After clinically important covariates were adjusted in multiple logistic regression analysis, APs coverage was not associated with any clinical outcome differences including in-hospital mortality, length of hospital stay, ICU stay and ventilation days.

APs (vs. RP)	Mortality	HLOS ≥14 days	ICU LOS ≥4 days	Ventilation days ≥7 days
OR (95%CI)	0.36 (0.11-1.16)	0.94 (0.51-1.73)	1.43 (0.76-2.63)	1.34 (0.60-3.00)
p value	0.08	0.84	0.25	0.47

Conclusion: Our data suggest that a high-volume TICU can be staffed by APs during the night shift with adequate supervision. In the era of resident work-hour restrictions, further examination of the outcomes associated with integration APs into the care of trauma patients is warranted.

Poster # 24

NIL PER OS: TO BE OR NOT TO BE?

Adam Perez MS, Bonnie L. Cass RD, CNSC, CDN, Weidun Alan Guo* MD,Ph.D.,
FACS State University Of New York

Introduction: Although recent guidelines have recommended a shift in fasting policy from the standard ' *nil by mouth* (NPO) from midnight' approach to more relaxed policies, NPO is frequently ordered in mechanically ventilated patients for extra-abdominal procedures. Thus far, less information is available regarding the effects of enteral nutrition interruption due to NPO in the critically ill and intubated trauma patients. We hypothesize that the frequency of NPO worsens the nutritional status and has a negative impact on the clinical outcomes after trauma.

Methods:We retrospectively reviewed all 311adult trauma patients over a period of 4 years. These patients were intubated, admitted to the ICU for more than 14 days at our Level I trauma center, and underwent different surgical procedures. The patient's demographics, number of NPO from midnight for procedures, and other clinical data were extracted from the electronic and paper medical records.

Results:The majority of the patients (92%) had a blunt mechanism in injury. The median age was 50 (IQR 34). The median ISS was 27 (IRQ 14). The male to female ratio was 2.7:1. Among 1,211 total procedures performed on these patients, only 267 procedures (22%) were abdominal related, and a total of 887 NPOs were ordered. As shown in Table 1, the frequency of NPO was significantly correlated with the percent decrease of serum albumin, %lymphocytes and BMI. Multivariate regression analysis showed that the frequency of NPO was a predictor of ICU LOS, hospital LOS and ventilator days (Table 2), but not the hospital mortality.

Conclusion:There is a significant association between the frequency of NPO and nutritional deterioration and clinical in the critical ill and mechanically ventilated trauma patients. The majority of these enteral nutrition interruptions were most likely avoidable, since no GI surgery was involved and these patients had been intubated, unnecessary for airway manipulation. Further multicenter randomized prospective study is needed to further establish strategies to reduce NPO in order to improve the nutrition status and clinical outcomes of our critically injured trauma patients.

Table 1. Association between #NPO and variables (Spearman correlation coefficient and 95% CI using Fisher's Z transformation)

% Decrease	n	R	95% CI	*p* value
Albumin	267	0.266	0.151,0.374	<0.001
Pre-albumin	166	-0.038	-0.189,0.115	0.626
% Lymph	274	0.177	0.060,0.290	0.003
BMI*	190	0.202	0.061,0.335	0.005

Table 2. Multiple regression model predicting clinical outcomes

	R	95% CI	*p* value
ICU LOS			
#NPO	9.180	5.090,13.270	<0.001
#Procedures	-2.730	-5.070,-0.390	0.023
Age (yr)	0.015	-0.176,0.206	0.878
ISS	0.188	-0.183,0.559	0.320
Male	1.960	-6.850,10.770	0.661
Hosp LOS			
#NPO	11.160	6.530, 15.780	<0.001
#Procedures	-2.860	-5.500, -0.210	0.034
Age (yr)	0.054	-0.161, 0.270	0.621
ISS	0.196	-0.223, 0.616	0.358
Male	1.840	-8.120, 11.790	0.717
Vent days			
#NPO	5.370	2.540, 8.200	<0.001
#Procedures	-1.640	-3.249, -0.031	0.046
Age (yr)	0.071	-0.070, 0.212	0.321
ISS	0.284	0.019, 0.550	0.036
Male	1.950	-4.440, 8.340	0.549

Poster # 25

LACTATE CLEARANCE, AGE OF BLOOD AND SURVIVAL IN MASSIVELY TRANSFUSED TRAUMA PATIENTS: MAYBE FASTER AND YOUNGER IS BETTER

Andrea Lubitz MD, Kathryn Hollenbach Ph.D., Thomas Santora* MD, Elaine Chan MD, Elizabeth Dauer MD, Lars Sjoholm MD, Abijit Pathak* MD, Amy Goldberg* MD, Joseph Rappold* MD, Temple University School Of Medicine

Introduction: The development of lactic acidosis in critically injured trauma patients is a marker for oxygen debt and hypoperfusion. The relationship between clearance of lactate and the development of complications and survival is not well understood. Additionally, the age of blood utilized in massive transfusion protocol (MTP) patients may also contribute to the rate with which lactate is cleared. The clinical significance of these relationships remains poorly understood.

Methods: A retrospective cohort study of all MTP patients, treated between 2008 and 2012, at an urban level 1trauma center was undertaken. Data were abstracted from blood bank, trauma registry and patient medical records and included standard demographic information, injury severity score (ISS), mechanism of injury, amount and age of packed red blood cells received, lactate levels upon admission and at 12/24/48 hours post admission. Data were analyzed using STATA 13.1. Initial comparisons were made using Fisher's exact and Wilcoxon rank sum tests for categorical and continuous data, respectively. Logistic regression was used to examine the association between age of blood and lactate clearance while controlling for confounding effects.

Results: A total of 133 MTP patients were identified between 2008 and 2012. Excluded were 17 patients who did not survive 12 hours or who did not have an admission and 12 hour lactate level measured. One hundred sixteen MTP patients comprised the study population. One hundred percent of patients who cleared their lactate by 12 hours (n = 8) survived as compared to 58.1% (n = 18) of patients with abnormal 12 hour lactate values (Fisher's exact test; p = 0.03). The median percent of blood$\leq$ 14 days of age was 38.6% (0%, 86.2%) among 12 hour lactate clearance patients as compared to 2.6% (0%, 30.7%) among non-12 hour clearance patients. After adjusting for the confounding effect of infectious complication, patients who received $\geq$ 50% of transfused blood that was $\leq$ 14 days of age were 10.8 time more likely to clear lactate accumulation at 12 hours than patients who received < 50% of transfused blood$\leq$14 days of age (95% CI = 1.03, 113.62).

Conclusion: In this small observational study, MTP patients who cleared their lactate accumulation by 12 hours demonstrated significantly improved survival, and were more likely to have received at least 50% of transfused blood that was$\leq$14 days of age when compared to MTP patients who did not clear lactate accumulation by 12 hours. Further studies are warranted to examine these potential associations.

Poster # 26

DO PROCALCITONIN LEVELS RELIABLY DISTINGUISH PNEUMONIA FROM SYSTEMIC INFLAMMATORY RESPONSE SYNDROME PRIOR TO AVAILABILITY OF BRONCHOALVEOLAR LAVAGE RESULTS IN TRAUMA PATIENTS

Ashley Mooney MD, Elizabeth Palavecino MD, Jason Hoth* MD, Michael Chang* MD, Amy Hildreth* MD, Nathan Mowery* MD, Shayn Martin* MD, Jessica Gross MD, James Holmes* MD, Jeffery Carter Preston Miller* III, MD, Wake Forest University Department Of Surgery

Introduction: Procalcitonin (PCT) has been extensively studied as a biomarker in septic patients and has been touted as a tool which may distinguish systemic inflammatory response syndrome (SIRS) from sepsis. This distinction is difficult when considering the diagnosis of pneumonia (PN) in ventilated trauma patients, and bronchoalveolar lavage (BAL) is commonly used for this purpose. Antibiotics are stopped if the BAL is negative, indicating SIRS rather than pneumonia. Appropriate antibiotic therapy reduces mortality in PN, but excess antibiotic use is linked to worsening resistance patterns in nosocomial bacteria. While cultures take 24 to 96 hours to provide actionable results, PCT levels are available in a matter of hours. Our goal was to determine if PCT levels could reliably predict a negative BAL, thus allowing antibiotics to be safely stopped sooner.

Methods: This is a retrospective study of ventilated trauma patients suspected of pneumonia in our intensive care unit. All BAL results were reviewed and correlated with PCT levels drawn at the time of BAL (PCT1) as well as 12 hours after BAL (PCT12). A positive BAL was defined as growth of $>10^5$ CFU/mL. ROC curves were constructed and sensitivity, specificity, positive and negative predictive values were calculated using a cutoff of 0.20 ng/mL.

Results: From 11/13 – 8/14, 51 intubated trauma patients underwent BAL because of suspicion for PN due to SIRS. Sixty-nine percent (35) were found to have PN based on positive BAL. Area under ROC curves for PCT 1, PCT12, and Δ PCT for distinguishing PN from SIRS were 0.64, 0.83, and 0.58 respectively. Sensitivity and positive predictive value for PCT12 (best area under ROC curve) using a cutoff of 0.20 ng/mL were 80% and 91% respectively while specificity and negative predictive value were only 60% and 38%. Specificity and negative predictive value worsened at lower cutoffs of 0.15 ng/mL and 0.10 ng/mL.

Conclusion: Based on ROC curve analysis, PN in ventilated trauma patients is best predicted by PCT12. However, the poor specificity and negative predictive value of the biomarker in this setting do not allow for the safe discontinuation of antibiotics prior to final BAL results.

Poster #27

QUANTITATIVE POLYMERASE CHAIN REACTION (qPCR) OF CLOSTRIDIUM DIFFICILE TOXIN GENE SEQUENCES FROM SYSTEMIC SOURCES: A FEASIBILITY STUDY TO INDEX DISEASE SEVERITY

Lawrence N. Diebel* MD, David M. Liberati MS, Hossein Salimnia Ph.D., Charles Lucas* MD, Anna Ledgerwood* MD, Erin Paulson medical technologist Wayne State University

Introduction: Risk scoring systems to identify patients at risk for fulminant *Clostridium difficile* infection (CDI) have been developed but may not predict patients at risk for medical failure or need for surgical intervention. Rapid diagnosis of CDI has improved with the availability of a real time qualitative PCR assay to detect *C. difficile* toxin gene in the stool. Recent animal models have demonstrated a strong correlation between severe CDI and *C. difficile* toxin detection in systemic blood. We postulated that a qPCR assay for *C. difficile* toxin gene product isolated from "systemic" sources would provide an accurate index of CDI severity. This was studied in an *in vitro* model.
Methods: HT29 colonic intestinal epithelial cell (IEC) monolayers were established in a two chamber system and apical media inoculated with live *C. difficile* bacteria. Monolayer integrity was indexed by permeability to FITC-dextran probe and basal media IL-1β and IL-8 as markers of inflammation. Basal chamber supernatants (non-luminal or "systemic" source) were also analyzed for tox A and tox B (ELISA) and *C. difficile* toxin gene products determined by qPCR. Cycle threeshold (Ct) and copies of toxin DNA/reaction were used to index qPCR.
Results: (mean ± SD; N = 4 for each group)

	Perm. (μmol/cm^2/hr)	IL-1 β (pg/ml)	IL-8 (pg/ml)	Tox A (ng/ml)	Tox B (ng/ml)	Ct value	Toxin DNA/ reaction
HT29 control	0.34±0.03	37.2±2.1	29.8±2.8	-----	-----	-----	-----
HT29+102 *C. diff.*	0.95±0.06*	111.4±4.0*	51.7±3.7*	12.4±2.8	16.1±3.5	27.9	1.6x103
HT29+104 *C. diff.*	1.16±0.11*	278.6±6.6*	79.3±4.1*	16.6±3.5	21.2±3.9	25.9#	2.4x104
HT29+106 *C. diff.*	1.28±0.10*	418.0±6.3*	95.3±4.6*	38.5±4.1#$	46.6±3.7#$	24.7#	6.3x104$

*p<0.001 vs. HT29 control, #p<0.001 vs. HT29 + 102 and 104 *C. diff.,* $Pearson r ≥ 0.9991 and 0.9989 for HT29 + 106 *C. diff.* and tox
A and B respectively. Ct value ≤ 29 is a strong positive reaction indicative of abundant target nucleic acid in the sample.
Conclusion: *C. difficile* toxin gene product qPCR indexed IEC barrier failure and "systemic" *C. difficile* toxin levels. This may be a useful biomarker to guide response to medical/surgical treatment and may have a role in prognostication.

Poster # 28

Elevated Serum neutorphil gelatinase-associated lipocalin (NGAL) is an early marker of acute kidney injury and associated with mortality in critically ill major trauma patients

Sung Jeep Kim MD, College Of Medicine, The Catholic University Of Korea

When creating your abstract, the only section headers to be used are listed below and they need to be in this format:

Introduction:
The main causes of late mortality in major trauma patients are sepsis and multi-organ failure. Acute kidney injury (AKI) is a one of important factors that effect on survival of major trauma patients. So, effective early diagnosis of AKI is important to management of critically ill major trauma patients. NGAL has been known as an early, sensitive, non-invasive biomarker for AKI. The aim of this study was to evaluate elevated serum NGAL levels as a predict of a early AKI and prognostic factor in major trauma patients

Methods:
We studied 65 major trauma patients (injury severity score>15) admitted to the intensive care unit of a trauma hospital retrospectively. NGAL was measured using an ELISA technique upon 24 hours after injuries. Presence of AKI during within5 days after trauma was defined by the risk injury failure loss and end-stage kidney classification (RIFLE) criteria.

Results:
A total of 65 patients (41 male, 24 female) were studied and mean ISS was 28.6 (16-53). A cut-off point of serum NGAL was larger than 153 ng/ml. 43 patients had elevated serum NGAL level and mean NGAL level was 314 ng/ml. patients with early AKI development was 37 and mean duration of development of AKI was 3.6 days. Elevated serum NGAL levels are associated with AKI (p=0.001), shock (p=0.022), ISS (p=0.031), age (p=0.008), baseline serum creatinine (p=0.23) and mortality (p=0.41). Multivariated analysis showed that lactic acid (p=0.017), base deficit (p=0.021) and shock (p=0.008) were statistically associated with mortality of major trauma patients.

Conclusion:
Serum NGAL from 24 hours of major trauma can be used as a reliable predictor of AKI and associated with mortality in major trauma patients

All images, charts and tables must be placed and uploaded in the body of your abstract exactly as you want them.

Poster # 29

CLINICAL UTILITY OF HTEE IN THE POST-RESUSCITATION PHASE OF TRAUMA PATIENTS RECEIVING MASSIVE TRANSFUSION PROTOCOL

Amy B. Christie MD, Brett Howard MD, Dudley B. Christie III, MD, Dennis W. Ashley* MD, Medical Center of Central Georgia/Mercer University School of Medicine

Introduction: Despite advances in trauma management and resuscitation, mortality still remains high for trauma patients with blunt or penetrating injuries presenting with massive hemorrhagic shock. At our institution, hemodynamic transesophageal echocardiography (hTEE) is being utilized as a hemodynamic monitoring tool to assess fluid responsiveness and ongoing resuscitation needs in patients who have received MTP. The purpose of this study was to demonstrate that in spite of receiving MTP, the majority of trauma patients when evaluated with continuous, real-time hTEE monitoring are initially under resuscitated (UR).

Methods: This is a retrospective study of trauma patients who received MTP and subsequent hemodynamic monitoring with Imacor hTEE (ZuraEVOZT1000) from January 2013 to December 2014. Demographics, volume status of the patient at time of hTEE probe placement, and time period to achieve optimization of the patient's resuscitation goals were analyzed. hTEE parameters that classified patients as fluid responders or under resuscitated (UR) were a superior vena cava (SVC) index >36% and a Left Ventricular End Diastolic Area (LVEDA) <10.

Results: 11 trauma patients were identified to have received both MTP and subsequent hemodynamic monitoring with an hTEE probe. The average Injury Severity Score (ISS) was 34. 7 of these patients had an Assessment of Blood Consumption Score (ABC) ≥ 2. Prior to hTEE probe placement, all 11 patients underwent some form of intervention to control homeostasis, 8 surgical and 3 arteriograms. The average time from initiation of MTP to hTEE probe placement was 14 hours. The average blood products transfused during MTP were 18 U RBCs, 14 U Plasma, 3U Platelets, and 3U Cryoprecipitate. Despite MTP resuscitation, 9 of 11 patients (88%) on initial hTEE assessment were classified as fluid responders (UR) by demonstrating an SVC index >36% and or LVEDA < 10. Only 2 of 11 patients (18%) demonstrated adequate resuscitation and were classified as fluid non-responders (euvolemic). No patient was determined to be volume overloaded. The time period from initiating hTEE monitoring and achieving a euvolemic state was broken down into three groups: 0 to 24 hours (h), 24-48 h, and 48-72 h. In the 9 of 11 patients initially identified as fluid responsive (UR): 2 obtained euvolemia in 0 to 24 h, 3 in 24-48 h, and 4 in 48-72 h. The longer it took for a patient to become adequately resuscitated seemed most related to the severity of the patient's injuries and the need for additional interventions. Also, an initial hTEE classification as a fluid non-responder did not translate into a patient remaining in that category. Of the two patients who were initially identified as euvolemic, one patient became volume overloaded in 24-48 h and the other patient transitioned back to a fluid responder (UR) in 0 to 24 h.

Conclusion: In patients having undergone MTP, initial hTEE assessment demonstrated that 88% of our patients classified as fluid responders (UR), despite high volume resuscitation. hTEE is beneficial in MTP as it allows for quick identification of patients in need of ongoing resuscitation as well as early recognition of patients that could benefit from a more restrictive resuscitation approach. Moving forward, incorporation of hTEE monitoring upon initiation of MTP rather than upon its completion would be beneficial to examine if hTEE influences the blood component requirements and MTP outcomes.

Poster # 30

THE ASSOCIATION BETWEEN METHAMPHETAMINE USE AND INTRA-OPERATIVE CARDIOVASCULAR EVENTS ("ICE") DURING EMERGENCY TRAUMA LAPAROTOMY

Meghan Kelly BA, Dennis Kim MD, Scott Bricker MD, Frederic Bongard* MD, Harbor-UCLA Medical Center

Introduction: The association of Methamphetamine (meth) use and cardiovascular performance with general anesthesia and emergency surgery is not well understood. The objective of this study was to determine if a meth positive toxicology screen is associated with intraoperative cardiovascular events (ICE) during emergency trauma laparotomy.
Methods: Registry data of patients who received a toxicology screen and underwent trauma laparotomy from January 1st, 2011 to December 31st, 2014 were retrospectively reviewed. Demographic, injury, admission physiologic, intra-operative and toxicology screen data were examined. ICE was defined as an arrest with or without intra operative death, an arrhythmia requiring specific intervention or the need for vasopressor support. In hospital mortality data was also examined.
Results: There were 239 patients meeting inclusion criteria where 13.4% (32) were in the meth (+) group. Overall mortality was 9.6% (23). There was at least one ICE in 26.8% (64) and intraoperative death in 0.8% (2) of patients. There was no significant difference in the incidence of ICE between meth (+) versus meth (-) patients [28.1% (9) versus 26.6% (55), p=0.817]. Additionally, there was no difference in overall mortality [6.2% (2) versus 10.1% (21), p=0.487] nor was there a difference in mortality in the ICE (+) group [22.2% (2) versus 20.0% (11), p = 0.878]. Adjusting for demographics, severity of injury, mechanism and intra-operative blood loss, a meth (+) screen was not associated with ICE or overall mortality.
Conclusions: Meth (+) trauma patients undergoing emergency laparotomy are no more likely to experience unfavorable intra-operative cardiovascular events than their meth (-) counterparts. Anesthetic concerns and preparation involving urgent surgical patients should be approached similarly, based upon disease or injury severity, regardless of meth toxicology screen results

Variables Associated with Intra-Operative Cardiac Events (ICE) During Emergency Trauma Laparotomy

Variable	P value	OR	95% CI
Severe injury (ISS $\geq$ 16)	0.020	2.141	1.126 - 4.071
Methamphetamine (+) screen	0.879	0.935	0.395 - 2.213

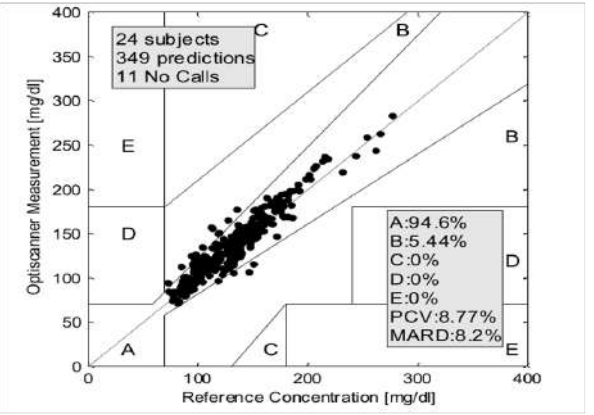
other variables: age, gender, mechanism, obesity, history of coronary artery or pulmonary disease, admission hypotension, intra-operative blood loss $\geq$ 500 ml

Poster # 31

RESULTS OF A NEAR CONTINUOUS GLUCOSE MONITORING TECHNOLOGY IN THE TRAUMA POPULATION

Grant V. Bochicchio* MD,MPH, Sara Buckman MD, PharmD, Eden Nohra MD, Stacey Reese RN, MS, Corinne Merrill RN, Jean Bundren RN, Douglas Schuerer* MD, Kelly Bochicchio RN, MS Washington University in St. Louis

Introduction: Numerous studies have shown that hyperglycemia is associated with worse outcome in critically injured trauma patients. Due to concerns related to hypoglycemia, targeted ranges of serum glucose have moved upwards due to the challenge of keeping patients in the desired range of 80-120 mg/dl. Increased glucose measurement frequency would increase Time in Range (TIR), avoid hypoglycemia and decrease the labor needed to obtain samples. Thus, we investigated the world's first usage of a near continuous glucose monitor in trauma patients. **Methods:** 24 critically ill trauma patients were enrolled at a Level 1 Trauma Center in which 319 samples were compared between the OptiScanner 5000 and the gold standard Yellow Springs Instrument (YSI) measuring glucose samples. The OptiScanner 5000 withdraws 0.13 ml of blood every 15 minutes from a central venous line, centrifuges the sample, and uses Mid Infrared spectroscopy to measure glucose. We assessed the data by plotting the Clarke Error Grid, Mean Average Relative Deviation (MARD) technique (to analyze the trend accuracy) and the population coefficient of variance (PCV), which is a traditional coefficient of variance, with the addition that it includes the effect of any bias. **Results:** A total of 94.6% of the data points were in the clinically useful "A" zone of the Clarke Error Grid. All 5.4% of the data points were in the clinically benign "B" zone, where it is presumed that no patient would be harmed. The MARD was below the 10% (8.2%), in line with literature suggesting likely prevention of hypoglycemia in ICU patients compared to manual methods. In addition the PCV was also less than 10 % (8.7%), also in line with literature suggesting that this method would be better than either every 2 hour or 1 hour measurements if achieved every 15 minutes for avoiding hypoglycemia, achieving a higher TIR and avoiding hyperglycemia and glucose variability. **Conclusion:** Our data suggests that the OptiScanner 5000 is accurate for usage in critically ill trauma patients, offering the promise of increased TIR, with the associated benefits of lower rates of hypoglycemia, hyperglycemia, and glucose variablity.



Poster # 32

BURN TRAUMA ACUTLEY INCREASES HEPATIC MITOCHONDRIAL O2 CONSUMPTION IN VIVO AND IN VITRO

Fredrick J. Bohanon MD, Xiaofu Wang BS, David N. Herndon* MD, Nisha Bhattarai BS, Tracy E. Toliver-Kinsky Ph.D., Labros S. Sidossis Ph.D., Craig Porter Ph.D., Ravi S. Radhakrishnan MD, University of Texas Medical Branch - Galveston

Introduction: The liver plays a significant role in the hypermetabolic stress response to burns due to its metabolic, inflammatory, and immune functions. In humans, cutaneous burn increases hepatic O_2 consumption. Here we examine the impact of burn trauma on mitochondrial O_2 consumption in the liver of burned mice and in cultured hepatocytes treated with scalded rodent serum (SRS).

Methods: Male BALB/c mice (8-10 wk old) had a 30% total body surface area scald burn created. Serum and liver samples were collected from six sham and five burn treated mice (24-hr post-treatment). HepG2 cells were grown and treated with SRS, control rodent serum (CRS) and normal growth medium (control) for 24-hr. Mitochondrial respiratory capacity was determined in fresh tissue and cells by high-resolution respirometry.

Results: *In vivo*, mitochondrial respiratory capacity was 79% greater in the liver of burned animals 1 day post injury when compared to sham treated animals (165.5±26.0 vs. 92.3±10.8 pmols/sec/mg; $P<0.05$). Similarly, *in vitro*, mitochondrial respiratory capacity was 92% greater in cultured hepatocytes treated with SRC compared to cells treated with CRS (43.1±1.2 vs. 22.5±1.2 pmols/sec/10^6 cells; $P<0.05$).

Conclusion: Cutaneous burn results in an acute increase in mitochondrial respiratory capacity in the liver, similar to the increased liver O_2 consumption seen in burn patients. These findings suggest that treatment of cultured hepatocytes with SRS offers an appropriate model to interrogate the impact of burn trauma on liver energetics *in vitro*.

Poster # 33

IMPACT OF HAPTOGLOBIN ON THE ASSOCIATION BETWEEN INFLAMMATION AND COAGULATION IN A RAT BURN MODEL

Hiroyuki Koami MD, Yuichiro Sakamoto MD,Ph.D., Ryo Noguchi MD, Norio Sato MD,Ph.D., Taku Miyasho Ph.D., DVM, Satoshi Inoue MD,Ph.D., Saga University Hospital

Introduction: Severe burn injury characterized by systemic inflammation is often associated with multiple organ failure and ultimately a poor prognosis. Although haptoglobin (Hpt) known as hemoglobin (Hb) scavenger prevents renal impairment induced by massive hemolysis, little is known about organ protective effect other renal protection. We hypothesize Hpt might have a protective effect in other organs as well as due to its association with inflammation and coagulation.

Methods: Isoflurane-anesthetized rats of six-weeks of age (n=30) received a 30-40% full-thickness scald burn on the dorsal skin surface using the Walker-Mason model. All rats were injected with either haptoglobin or normal saline (NS) intraperitoneally immediately before the thermal stress. They were then divided into three groups: 1) control group (NS 20mL/kg), 2) L-Hpt group (Hpt 4mL (80U)/kg + NS 16mL/kg, 3) H-Hpt group (Hpt 20mL (400U)/kg). While under anesthesia, the rats of each group were euthanized by exsanguination at 6 hours (N=5) and 24 hours (N=5) respectively. Organ protective effects on kidney, lung and liver were then confirmed by pathological examination. Inflammatory and anti-inflammatory cytokines were measured and whole blood viscoelastic test were performed to evaluate coagulation status by thromboelastometry (ROTEM ®). All variables were statistically analyzed using SPSS® for Windows ver. 19.

Results: The Hpt significantly reduced free Hb (L-Hpt and H-Hpt, P=0.008) after 24 hours of the injury. Moreover, improvement of hematuria was confirmed in the H-Hpt group (P=0.027). There was no difference in the subject of thrombin-antithrombin complex (TAT). According to the analysis of inflammation related cytokines, the Hpt significantly decreased interferon (INF)-gamma (L-Hpt, P=0.043; H-Hpt, P=0.023). ROTEM findings of the L-Hpt group showed significantly higher clot firmness (A10, P=0.031; A20, P=0.023) and shorter time to maximum clot formation velocity (MAXVt, P=0.030) than the control group. However, the pathological analysis did not show any protective effect on the kidneys, lungs or liver. All animals survived in this study with the exception of one animal in the NS group, who died after 30 min of burn injury.

Conclusion: Haptoglobin reduced INF-gamma, may improve wound healing, and accelerate the stronger clot formation.

Poster # 34

OBESE MICE HAVE INCREASED INFLAMMATION AND MELANIN-CONCENTRATING HORMONE RECEPTOR EXPRESSION IN THE BRAIN AFTER TBI

Joshua W. Gatson Ph.D., Ming-Mei Liu BS, Hunt Batjer MD, Steven E. Wolf* MD, Joseph P. Minei* MD, University of Texas Southwestern Medical Center at Dallas

Introduction: Following a traumatic brain injury (TBI) event, the secondary brain injury that persists consists of heightened inflammation, neuronal cell death, and cognitive/mood disorders. Previously, obese patients that experienced a TBI had more complications and a higher mortality rate. To date, very little data exists that defines the relationship between obesity and neurological outcomes in TBI survivors. Here, we hypothesized that obese mice have increased inflammation and expression of an anxiogenic mediator, melanin-concentrating hormone receptor 1 (MCH1), in the brain after TBI.

Methods: In this study, diet-induced obese (DIO; 60 kcal% fat diet for 20 weeks) and control mice (10 kcal% fat diet) were injured using the controlled cortical impact (CCI) device. In brief, a midline incision was made to access the skull and the impactor tip was aligned directly on the skull on the sagittal suture midway between the bregma (-2.12 mm) and lambda sutures. The mice were injured at a depth of 1.25 mm, velocity of 3 m/sec, and a delay time of 100 msec to administer a mild-to-moderate TBI. At the indicated time-point, the animals were intra-cardially perfused with formalin and the brain was processed. The brain regions near the injury zone were stained for activated astrocytes (GFAP) and expression of the anxiogenic mediator, MCH1. **Results:** Compared to non-injured controls and injured mice fed the normal fat diet, the obese mice had a significant increase in the number of activated astrocytes within the cerebral cortex ($p < 0.01$) and hippocampus ($p<0.05$) at day 30 after TBI. In addition, on days 3 and 30 after TBI we found that the MCH1 levels were also elevated within the cerebral cortex (Day 3, $p<0.03$; Day 30, $p<0.01$) and hippocampus (Day 3, $p<0.001$; Day 30, $p<0.01$).

Conclusion: Increased expression of MCH1 after TBI may be a key pathway in the development of chronic secondary injuries such as prolonged neuro-inflammation and anxiety in obese TBI survivors. As a therapeutic strategy, antagonism of MCH1 after TBI may prove to be useful in improving neurological outcomes.

Poster # 35

ASSESSMENT OF THE PROGNOSTIC IMPLICATIONS OF SEVERE INFLAMMATORY RESPONSE SYNDROME (SIRS) IN TRAUMATIC BRAIN INJURY

Tomas Jacome* Jr., MD, FACS, Danielle Tatum Ph.D., Our Lady of the Lake Regional Medical Center

Introduction: A key component of traumatic brain injury (TBI) is the inflammatory response evoked by trauma. The systemic inflammatory response syndrome (SIRS) can lead to neuroinflammation and systemic tissue damage which can self-propagate into a detrimental cycle of hyperinflammation and increased damage. Here we aim to investigate the prognostic implications of SIRS in the TBI patient population of our Level II trauma center.

Methods: Adults (≥18 years) with isolated TBI admitted between 2009-2014 were identified in the trauma registry. Associations between SIRS and selected variables were analyzed using the X^2 test. The prognostic value of SIRS and each SIRS criterion were examined by logistic regression analyses.

Results: Of the 330 patients identified, 45 (13.6%) met SIRS criteria. Variables significantly related to SIRS were age (P<0.007), Glasgow Coma Score (GCS) (P<0.001), Injury Severity Score (ISS) (P<0.014), while sex and glucose (P<0.815 and P<0.114, respectively) were not. SIRS and each SIRS criterion were examined in relation to poor outcome (persistent vegetative state, severe disability, or death). The strongest predictors of poor outcome were presence of SIRS, body temperature, and white blood cell count at admission.

Table. Multivariate logistic regression of prognostic variables in relation to poor outcome

	OR	95% CI	P
SIRS	3.54	1.679-7.464	0.001
BT (<36°C or >38°C)	5.788	1.594-21.017	0.008
HR > 90	1.967	1.018-3.804	0.44
RR >20	2.572	1.098-6.026	0.3
WBC < 4000 mm^3 or >12000 mm^3)	2.073	1.092-3.937	0.026
Age > 60 years	0.352	0.161-0.768	0.009
Glucose at admit > 200 mg/dL	0.847	0.293-2.451	0.759

BT = body temperature; HR = heart rate; RR = respiratory rate; WBC = white blood cell count

Conclusion: Our data suggests that SIRS after acute TBI is a strong predictor of poor outcome. Future prospective studies aimed at therapeutic interventions to control or reverse SIRS in TBI patients are warranted.

Poster # 36

REPEATED DOSES OF METHYLENE BLUE AFTER TRAUMATIC BRAIN INJURY IMPROVES MOTOR COORDINATION AND REDUCES NEUROINFLAMMATION

Daniel Eiferman MD, Ashley Fenn Ph.D., John Skendelas BS, Daniel Moussa Megan Muccigrosso BS, John Godbout Ph.D., Ohio State University

Introduction: Traumatic brain injury (TBI) is associated with immediate neuroinflammation that contributes to impaired functional recovery and long-lasting deficits. Unfortunately, there are no effective pro-active treatment strategies for TBI. Methylene blue (MB) is a blood brain barrier permeable antioxidant used clinically for septic shock and ischemia. Our lab has demonstrated that a single injection of MB after TBI decreased neuroinflammation and ameliorated depressive-like behavior, but had no effect on functional recovery. Thus, we hypothesized that multiple injections of MB would further decrease TBI-induced inflammation and improve functional recovery compared to vehicle controls.

Methods: Adult mice received a sham operation or moderate TBI using a fluid percussion injury model. Mice then received an intravenous (i.v.) injection of vehicle or MB (2 mg/kg) via the tail vein 15 min, 12 h, and 24 h post-injury. Twenty-four hours after injury the proportion of inflammatory cells in circulation and inflammatory gene expression in the brain and microglia were measured. Functi

Results: Multiple doses of MB decreased neuroinflammation after TBI compared to sham controls, but were not significantly different from a single dose of MB. Nonetheless, multiple doses of MB improved functional recovery whereas a single dose of MB was ineffective. Specifically, multiple doses of MB significantly increased motor coordination during the first week after injury compared to TBI mice treated with vehicle.

Conclusion: MB continues to show promise as the first pro-active treatment for moderate TBI to reduce neuroinflammation and improve functional outcomes. Moreover, repeated injection of MB was safe and more effective in improving functional recovery compared to a single injection.

Poster # 37

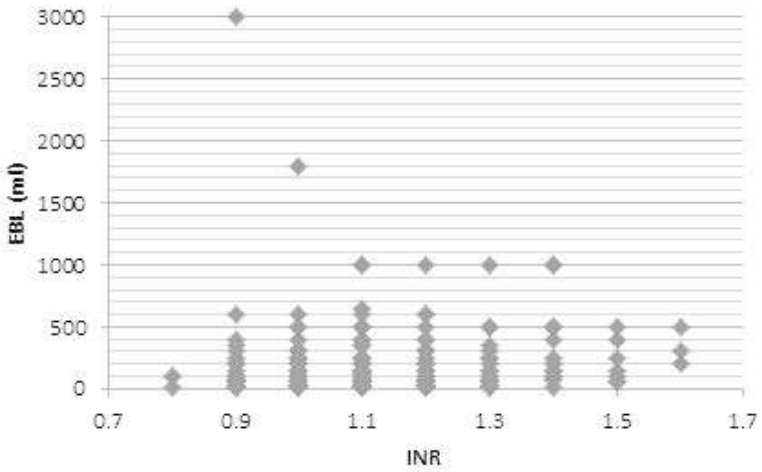
ABNORMAL INR AND MAJOR NEUROSURGICAL PROCEDURES FOR TRAUMA: WHEN IS IT CLINICALLY SIGNIFICANT COAGULOPATHY?

Jennifer L. Hubbard MD, Rachel C. Dirks Ph.D., Erinn N. Kim MD, James W. Davis* MD, UCSF Fresno

Introduction: Elevated international normalized ratio (INR) is frequently treated with fresh frozen plasma (FFP) or prothrombin complex concentrate (PCC) prior to neurosurgical procedures. The level at which elevated INR constitutes coagulopathy has not been established in prior reports. We hypothesized that in patients with an INR < 1.7, INR would not correlate with increased risk of bleeding, as determined by estimated blood loss (EBL) during surgery, FFP or PCC administration intraoperatively, progression of intracranial hemorrhage (ICH), or need for repeat intervention.

Methods: A retrospective review of patients undergoing craniotomy, craniectomy, or cranioplasty was performed at a Level I Trauma Center from 2012 to 2014. Patients were stratified by INR and data were analyzed using Chi square and Pearson correlation coefficient.

Results: 270 total patients were included in the study: 190 with craniotomy, 73 with craniectomy, and 7 with cranioplasty. Baseline demographics were similar between groups. In patients with INR < 1.7 (n=261), there was no correlation between INR and EBL ($r = 0.094$, $p = 0.13$) Compared to patients with an INR <1.4 (n=235), patients with INR 1.4-1.6 (n=26) received more FFP or PCC intraoperatively (9% vs 42%, $p < 0.001$), but there was no increased risk of progression of ICH (21% vs 23%, $p = 0.58$) or need for repeat intervention due to bleeding (8% vs 0%, $p = 0.13$).



Conclusion: In patients with an INR < 1.7, there is no correlation between INR and EBL. Urgent neurosurgical intervention should not be delayed for "correction" of an INR < 1.7.

Poster # 38

THERAPEUTIC ANTICOAGULATION AFTER TRAUMATIC INTRACRANIAL HEMORRHAGE

Michael G. Mount DO, Melanie Bobbs David Milia* MD, Thomas Carver* MD, Medical College of Wisconsin

Introduction: Traumatic Brain Injury (TBI) is a well described risk factor for Venous Thromboembolism (VTE). VTE rates after TBI without prophylaxis are as high as 58%. Many studies have demonstrated the safety of prophylactic anticoagulation after TBI, but progression of hemorrhagic TBI after initiation of VTE prophylaxis with LMWH was 14.5% in a Western Trauma Association study. Additionally, there is little in the literature regarding the safety of therapeutic anticoagulation following a TBI. This study was performed to determine if there was a difference in patients with or without hemorrhagic progression of TBI following the institution of therapeutic anticoagulation.

Methods: All Patients >18 years of age admitted to a level 1 trauma center from 6/2009 to 8/2014 with a diagnosis of TBI were screened for the development of VTE using a trauma registry. Patients without intracranial hemorrhage (ICH) on initial head CT were excluded. Basic demographic information was collected. All subsequent head CT reports were reviewed for progression of ICH. Data regarding anticoagulation type, dosing, and day of anticoagulation at time of progression were collected from the electronic medical record. Fisher's exact and Wilcoxon rank-sum test were used for statistical analysis.

Results: Of 139 patients admitted with a TBI and a VTE during initial hospitalization only 46 patients had ICH on initial head CT. After VTE diagnosis, 10 patients did not receive therapeutic anticoagulation due to presence of External Ventricular Drain or decision to withdraw life sustaining measures. Two patients had ICH progression with prophylactic anticoagulation. Thirty-three patients received therapeutic anticoagulation and progression occurred in 3/33 (9.1%). ICH progression occurred on median day 7 (IQR 2-17.5). Between patients with and without ICH progression, there were no significant differences in their hospital courses and no mortality difference.

(See table 1)

Table 1

	Progression, median (IQR)	No Progression, median (IQR)	p-value
Age	55 +/- 20	47 +/- 18	0.51
Mortality	0 (0%)	5 (16.6%)	0.44
ICU Length of Stay	18 (5 – 26)	12 (5.7 – 17)	0.51
Length of Stay	35 (25.6 – 42.7)	21 (14.3 – 31.5)	0.06
Ventilator days	11 (4 – 23)	8 (1 – 13.25)	0.43
Hospital Day Prophylaxis	7 (3 – 7)	5 (4 – 7)	0.96
Hospital Day VTE	14 (7.5 – 22)	9 (5.75 – 13)	0.14
Hospital Day Anticoagulation	15 (2 – 17)	10 (5.75 – 14)	0.70

Conclusion: This study noted no difference in patient demographics, timing of anticoagulation initiation, or difference in outcome. The small number of patients with progression of ICH suggests that even therapeutic anticoagulation is safe in patients with ICH but prospective studies are necessary to determine the earliest day that anticoagulation can be started. Until future studies are performed the decision to initiate therapeutic anticoagulation remains individualized and multifactorial, based on physician judgment. A prospective multicenter study is needed to accurately determine the earliest post trauma day at which anticoagulation can be safely initiated in patients with intracranial hemorrhage.

Poster # 39

DOES COMPLIANCE WITH THE SURGICAL MANAGEMENT OF TRAUMATIC BRAIN INJURY GUIDELINES RESULT IN IMPROVED OUTCOMES?

Dennis Y. Kim MD, Eric Tamrazian MD, Allen Rodriguez BA, Angela Neville* MD, Brant Putnam* MD, David S. Plurad* MD, Harbor-UCLA Medical Center

Introduction: There are limited data regarding the impact of compliance with the Brain Trauma Foundation (BTF) surgical management guidelines on outcomes following traumatic brain injury (TBI). We hypothesized that compliance with the BTF guidelines for the evacuation of posttraumatic mass lesions would be associated with improved survival following TBI.

Methods: We performed a 2-year retrospective analysis of adult patients directly admitted to our level 1 trauma center with an admission diagnosis of TBI. Patients with devastating brain injuries and those with an isolated subarachnoid hemorrhage were excluded. Compliance was defined according to whether or not patients with acute subdural, epidural, and traumatic parenchymal lesions were managed according to the guidelines. Medical records and CT scans were reviewed for relevant serial clinical and radiographic data including Glasgow Coma Scale (GCS) scores, pupillary size and reactivity, midline shift, hematoma thickness, and volume. The primary outcome measure was survival to hospital discharge. Multiple logistic regression analysis was performed to identify independent predictors of survival.

Results: Of 231 patients, 180 (77.9%) were managed according to the surgical management guidelines. These patients were younger (53 vs. 62 years, p=0.01), had a lower incidence of subdural hematomas (63% vs. 78%, p=0.04), and were more likely to present with parenchymal lesions (32% vs. 16%, p=0.02). Intracranial pressure monitoring did not differ between groups (13.3% vs. 11.8%, p=0.77). Patients in the compliant group underwent surgical evacuation more frequently (21.7% vs. 2.0%, p=0.001). Unadjusted analysis demonstrated improved survival among patients in the compliant group (95.0% vs. 84.3%, p=0.01). On subset analysis, after excluding patients who never met an indication for surgical intervention (n=145), there was no difference in survival between groups (82.9% vs. 84.3%, p=0.86). On multivariate analysis, after adjusting for age, injury severity, and type of lesion, compliance was not associated with improved survival to discharge (OR=2.92, 95% C.I.=0.89-9.60, p=0.77).

Conclusion: Compliance with the BTF surgical management guidelines was not associated with improved survival in this single-institutional retrospective analysis. Larger, adequately powered, multi-institutional studies are required to determine the effect of compliance with these guidelines on meaningful patient outcomes including mortality and neurologic functional recovery.

Poster # 40

USEFUL OR USELESS? PLATLET FUNCTION TESTING AFTER TRAUMATIC INTRACRANIAL HEMORRHAGE

Marko Bukur* MD, Quoc Dang DO, Joseph Catino MD, Lloyd Zucker MD, Sharron Evans RN, ARNP, Ivan Puente MD, Fahim Habib MD,MPH, Delray Medical Center

Introduction: As the elderly population continues to increase anti platelet therapy (APT) has become increasingly common. The impact of routine platelet transfusion in patients on APT after Traumatic Intracranial Hemorrhage (tICH) is a questionable practice. Recently platelet function testing (PFA) has become widely available. We sought to examine the impact of PFA-100 testing on admission platelet utilization and clinical outcomes after tICH.

Methods: This was a retrospective review of patients admitted to a Level I trauma center with a documented blunt tICH and available PFA-100 data over the past 3 years. Demographic, physiologic, and outcomes data were collected and stratified according to PFA-100 results. The discriminatory ability of an abnormal PFA (aPFA) to predict worsening tICH (interval radiographic change in tICH) was calculated using sensitivity and specificity. Logistic Regression modeling was used to determine adjusted odds ratios (AOR) for platelet transfusion based on aPFA. AOR for worsening tICH, craniotomy, decrease in discharge Glasgow Coma Score (GCS), and in-hospital mortality based upon admission PFA were also calculated.

Results: During the 3 year study period 712 patients were analyzed with 29% having aPFA. Patients with aPFA were more likely to be older, suffer from falls, have a higher Charlson score, and pre-existing APT than those with normal PFA. Median head AIS (3) was similar while those with normal PFA having a slightly decreased admission GCS (14 vs. 15,p <0.001). Isolated Head Injuries were more common in the aPFA (82% vs 67%,p <0.001) injury burden was greater in those with normal PFA (ISS>25,19% vs. 9%,p=0.001). aPFA was 28% sensitive and 70% specific in predicting worsening tICH. aPFA was associated with increased platelet transfusion (62% vs. 13%,AOR 9.4p <0.001). Despite the increased platelet utilization in those with aPFA, the incidence of worsening tICH (59% vs. 61%, p=0.166),decrease in discharge GCS (17% vs 16%,p =0.133), and in-hospital mortality (5% vs 7%,p =0.971) were not significantly different. Need for craniotomy was lower in aPFA (14% vs. 17%,AOR 0.45 p=0.015)

Conclusion: aPFA is common after tICH and is a poor discriminator in determining evolution of tICH. aPFA is associated with liberal admission platelet transfusion without improved outcomes. Transfusion of platelets based solely on aPFA should be carefully considered while further prospective analysis examining the utility of PFA testing after tICH is undertaken.

Poster # 41

THE RISK OF NEUROSURGERY AND MORTALITY IN A POPULATION WITH MILD TRAUMATIC BRAIN INJURY AND INTRACRANIAL HEMORRHAGE: A THREE-YEAR MULTI-CENTER RETROSPECTIVE OBSERVATIONAL STUDY

Alessandro Orlando MPH, Andrew S. Levy MD, Matthew M. Carrick* MD, Denetta S. Slone* MD, Charles W. Mains MD, David Bar-Or MD, St. Anthony Hospital

Introduction: In recent years, it has been proposed to re-evaluate which patients with mild traumatic brain injuries (mTBI, GCS 13-15) and intracranial hemorrhage (ICH) should be transferred from a hospital without neurosurgical coverage, to a hospital with neurosurgical coverage. The purpose of this study was to describe in detail the neurosurgical intervention and mortality rates associated with mTBI and ICH with the hopes of identifying which patients should be considered to forgo inter-hospital transfer. **Methods**: This was a three-year, retrospective, multicenter observational cohort study at two Level I, and one Level II Trauma Centers. All consecutively admitted adult (≥18 years) trauma patients with mTBI and ICH were included in the study (GCS 13-15 and ICD9 851.0–853.19). Patients with skull fractures were excluded; ICH type cannot be determined from skull fracture-related ICD9 codes (n=484); "unspecified" hemorrhage types were also excluded (n=54). The primary outcome measure was neurosurgery (craniotomy, burr holes, ICP placement, shunt, ventriculostomy, subdural hemorrhage evacuation), and the secondary outcome was in-hospital mortality. **Results**: There were a total of 1,527 patients included in our study. A majority of the injuries resulted from falls (66%), 39% had a severe head injury according to a head AIS (4-6), and a majority had an isolated head injury (78%) with one hemorrhage (68%). The top three most common ICH types were isolated subdural hematoma (iSDH) (32%), isolated traumatic subarachnoid hemorrhage (itSAH) (27%) and multiple ICHs (32%).There were significant differences in the neurosurgical intervention and mortality rates between ICH types (Table 1). **Conclusion**: A large majority (74%) of all neurosurgeries in this population were in patients with iSDH. iEDHs had the second highest neurosurgical rate and the highest mortality rate. More importantly, the extremely rare requirement of neurosurgical intervention in patients with mild itSAH (1 in 400) should give clinicians a moment of pause before deciding to transfer these types of patients to a higher-level Trauma Center.

Table 1. Comparing Primary and Secondary Outcomes Between ICH Types

ICH Type	Neurosurgery Events (N_1/N_0)	Neurosurgery Rate[1]	Mortality Events (N_1/N_0)	Mortality Rate[2]
Isolated Subdural	80/403	16.6%	14/469	2.9%
Isolated Epidural	1/10	9.1%	1/10	9.1%
Multiple Hemorrhages	24/465	4.9%	22/467	4.5%
Isolated Contusion	2/126	1.6%	0/128	0.0%
Isolated Subarachnoid	1/415	0.2%	5/411	1.2%

[1] $p<0.001$ between ICH types; [2] $p=0.01$ between ICH types

Poster # 42

DEXMEDETOMIDINE IS A SAFE AND EFFECTIVE ADJUNCTIVE AGENT FOR SEDATION IN PATIENTS WITH TRAUMATIC BRAIN INJURY

Mehrnaz Pajoumand PharmD, Sandeep Devabhakthuni PharmD, Brandon Bonds MD, Joseph Kufera MS, Sharon Boswell RN, MS, CRNP, Thomas M. Scalea* MD, Deborah M. Stein* MD,MPH, R Adams Cowley Shock Trauma Center

Introduction: In patients with traumatic brain injury (TBI), optimizing sedation is challenging since maintaining a clinical exam is of paramount importance in being able to detect neurological deterioration. Additionally, optimizing intracranial pressure (ICP) and cerebral perfusion pressure (CPP) is crucial in TBI. Propofol is frequently used as a sedative in TBI since it has been shown to reduce the cerebral metabolic rate, but may lead to propofol-related infusion syndrome and hemodynamic compromise. Dexmedetomidine is a sedative that produces minimal respiratory depression and has opioid-sparing effects. We hypothesized that use of dexmedetomidine (DEX) would be a useful and safe adjunct for sedation of critically ill patients with TBI.

Methods: This prospective observational single-center study was conducted from December 2011 through June 2013. Inclusion criteria were: TBI with a head abbreviated injury scale (AIS) score > 2, mechanical ventilation > 24 hours, and continuous infusions of propofol (PROP) and/or dexmedetomidine (DEX). Sedative agents were titrated using the Richmond Agitation Sedation Scale (RASS) while maintaining ICP < 20 mm Hg and CPP > 60 mm Hg. Mean daily number of hours in target RASS (0-alert and calm to -2-light sedation) were analyzed stratified by sedation agent using adjusted mixed regression models to account for variability of measurements in patients and control for baseline injury characteristics.

Results: One hundred ninety-eight patients were enrolled. Mean age was 40.6 ± 18.0 while median values (with interquartile ranges) for head AIS were 4 (4-5), admission GCS 7 (3-11), and ISS 34 (25-43). The mortality rate was 6.7%. Patients had a median hospital length of stay (LOS) of 16 (12-23) days with the majority of their stay spent in the ICU (14 days [9-21]). Patient-days (1028 in total) were stratified into 4 groups: DEX Only (n = 222), DEX + PROP (n = 148), PROP Only (n = 599), and Neither (n = 59). ICP control was no different among the 4 groups. Regression analyses indicated a significant difference in target RASS between sedation agents ($p<0.001$). The DEX Only group had the highest mean daily estimate of 17.7 hours. Pairwise comparisons between sedative agents demonstrated that the DEX Only group spent more time in target RASS than DEX + PROP (15.7 hours, $p=0.046$), PROP Only (12.3, $p<0.001$) and Neither (12.9, $p=0.002$). In a subset of patients for whom complication data was available, the occurrence rates of complications such as hypertension, hypotension, bradycardia, and tachycardia were not significantly different between the sedation groups (DEX, PROP, DEX + PROP).

Conclusion: Administration of sedatives is integral in optimizing patient comfort and minimizing distress in critically ill patients. In patients with TBI, this is particularly important to minimize secondary insults while maintaining the ability to monitor the patients' neurological exam. Dexmedetomidine is a safe and useful sedative in patients with TBI allowing for effective sedation while minimizing secondary injury.

Poster # 43

COMORBIDITIES AND OUTCOMES AT SIX MONTHS FOLLOWING A TRAUMATIC INJURY

Rebecca J. Weddle MD, Ann Marie Warren Ph.D., Evan E. Rainey MS, Stephanie Agtarap BS, Grace Viere BS, Michael L. Foreman* MD, Baylor University Medical Center

Introduction: The impact of comorbidity on the functional and psychological outcomes of patients exposed to traumatic injury has not been fully investigated. Increasingly, negative psychological consequences of trauma are being recognized and measures put in place to identify patients most at risk. Determining if pre-injury comorbidity contributes to longitudinal outcomes is an important step in this process.

Methods: This cohort is part of a larger prospective longitudinal study consisting of individuals ≥18 years of age admitted to the trauma service of a Level I trauma center for ≥ 24 hours. Outcomes were measured at baseline (hospitalization) and at 6 months post-injury and included: depression, posttraumatic stress disorder (PTSD), health related quality of life, and pain level. Depression was measured using the Patient Health Questionnaire (PHQ-8), PTSD with the Primary Care PTSD Screen (PC-PTSD), health related quality of life with the Veterans RAND 12-item Health Survey (VR-12), and pain level with the Numeric Rating Scale (NRS). Demographics, comorbidities, and injury-related variables were collected from the trauma registry. Pearson correlations and linear regression models were performed for analysis.

Results: 261 patients were included in this analysis. Number of comorbidities (≥3) was significantly correlated to poor physical health quality of life ($p = 0.001$), poor mental health quality of life ($p = 0.021$), depression ($p < 0.001$), PTSD symptoms ($p = 0.018$), and higher pain levels ($p = 0.002$) at 6 months. Smoking was significantly correlated to poor physical health quality of life ($p = 0.032$), poor mental health quality of life ($p=0.036$), depression ($p = 0.010$), and PTSD ($p < 0.001$) at 6 months. Diabetes was significantly correlated to poor physical health quality of life ($p = 0.016$), depression ($p = 0.012$), and higher pain levels ($p = 0.004$). Injury Severity Score (ISS) was not correlated with any outcomes at 6 months post injury.

Conclusions: Having three or more medical comorbidities present upon admission has a substantial negative impact on both psychological and functional outcomes in the six months following injury. Additionally, smoking and diabetes emerged as having important associations with later outcome. Interestingly, these findings appear to be independent of Injury Severity Score, suggesting that pre-existing comorbidities may have an important contribution when considering long term outcome in the trauma population.

Poster # 44

REPEAT HEAD COMPUTED TOMOGRAPHY IS NOT NECESSARY FOR PATIENTS ON ANTICOAGULATION OR ANTIPLATELET THERAPY WHO SUFFER LOW ALTITUDE FALLS

Zachary M. Bauman DO, MHA, John M. Ruggero DO, Sunny Squindo RN, Chris McEachin MBA,RN, Michelle Jaskot RN, William Ngo DO, Scott Barnes DO, Peter P. Lopez* MD, Henry Ford Macomb Hospital

Introduction: Anticoagulation and antiplatelet (ACAP) medications are frequently prescribed to elderly patients who are at high risk for falls. Many trauma centers have developed protocols for obtaining repeat head computed tomography (HCT) for patients with low impact falls on ACAP therapy. We hypothesize that obtaining a routine scheduled repeat HCT after an initial negative HCT for ACAP therapy patients after low altitude falls is not necessary.

Methods: Retrospective review of all low altitude fall (< 6 feet) patients on ACAP therapy evaluated at a Level II, community hospital from 2013 - 2014. All patients who suffered a low altitude fall with visible or suspected head trauma had an initial HCT (HCT1). Patients were then admitted and a repeat HCT (HCT2) was obtained 12 hours from HCT1, or earlier if there was acute neurologic decline. Exclusion criteria included all patients < 18 years old and those who did not undergo a HCT2. Chi-square, Fischer exact, t-test and Wilcoxon rank-sum tests were used for our analysis. Statistical significance is set at $p<0.05$.

Results: Total of 1503 patients were enrolled with a low altitude fall and HCT1. 1382 (92%) were negative for intracranial hemorrhage (ICH) and 121 (8%) patients had a positive HCT1. Average age was 79.9±11.4 years, 61% were female and 85% had visible head trauma on initial presentation. 199 were excluded because they did not receive a HCT2 based on established protocols. Of the patients with positive HCT1 patients, only 11 (1%) required surgical intervention. Of the 1304 patients with a negative HCT1 who underwent HCT2, 11 (1%) had delayed ICH at the repeat HCT. None of these 11 patients required surgery, required major changes in their clinical management or suffered mortality. 70% of the patients were taking low or high strength aspirin (ASA), 19% were taking Coumadin, 17% were taking Plavix, 3% were on Xarelto, and 2% were on other anticoagulants. 73% of patients with a positive HCT1 were taking ASA, ($p=0.33$). Patients on Coumadin accounted for 27% of positive HCT1, ($p=0.016$). 93% of all positive HCTs were among patients >65 years of age, however, 88% of all negative HCT's were also in this same age group therefore this was not statistically significant ($p=0.096$).

Conclusion: Repeat HCT for patients on any ACAP therapy after a low altitude fall with a negative initial HCT is not necessary and only adds cost, radiation exposure and additional anxiety for the patient. Because our incidence of delayed bleeds was so low and did not affect overall outcomes, we feel thorough neurologic examination and close monitoring is as effective as obtaining a repeat HCT.

Poster # 45

IMPROVING LIFE EXPECTANCY: "A BROKEN NECK" DOESN'T HAVE TO BE A TERMINAL DIAGNOSIS FOR THE ELDERLY

Laura N. Godat MD, Leslie Kobayashi* MD, David C. Chang MBA,MPH,Ph.D., Raul Coimbra* MD,Ph.D., University of California, San Diego

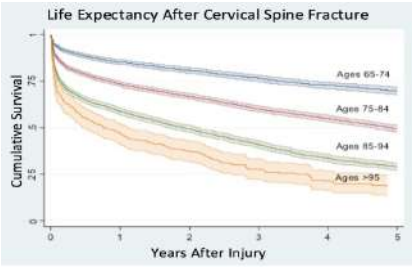
Introduction: Optimal treatment for elderly patients with cervical spine fractures is critical for preserving quality of life. Many elderly patients are kept in a cervical collar or halo, which may significantly limit mobility, exacerbate dysphagia and contribute to airway compromise; potentially increasing morbidity and mortality. This investigation intends to describe the life expectancy after such an event, and evaluate the impact of surgical intervention on post injury mortality.

Methods: Patients 65 years or older with traumatic cervical spine fracture ICD-9 codes were identified in the California Office of Statewide Health and Planning database for the years 1995-2009. Patients with cervical spinal cord injury were excluded. Interventions analyzed were halo use and surgical spine fixation. Patient factors studied included demographics, Charlson comorbidity, Survival Risk Ratio, mechanism of injury, associated injuries, complications (pneumonia, venous thromboembolism and myocardial infarction) and trauma center admission. Primary outcome was death, studied at the initial admission, 30 days, 1 year, and at any time during the study period. Analyses included univariate, bivariate, logistic and cox regressions, and Kaplan-Meier survival curves.

Results: 10,938 patients were identified. Mortality rate was 10% during the initial admission, 28% at 1 year and 50% over the entire study period. A halo was placed in 14% of patients and 12% underwent surgical fixation. During the initial admission, patients without an intervention had a mortality rate of 11%, with halo placement 7% and 6% with surgical fixation; at 1 year mortality rates increased to 30%, 26% and 19%, respectively. A complication occurred during the initial admission in 19% of patients with an associated mortality rate of 22%.

On multivariate analysis cervical spine fixation, female gender and admission to a trauma center were independent predictors of a lower risk of death at 1 year (OR 0.59, 0.68 $p<0.001$, and OR 0.89, $p=0.02$ respectively). Having a complication, fall mechanism, presence of traumatic brain injury (OR 1.84, 1.33, 1.37 $p<0.001$ respectively), and increasing age (Figure) were independent predictors of a higher risk of death at 1 year. Halo use had no impact on death at 1 year (OR 0.98,$p=0.768$).

Conclusions: Mortality rate after cervical spine fracture in the elderly is high. At one-year post injury more than 1 in 4 patients over the age of 75 will die. Surgical spine fixation is associated with a significant improvement in the odds of survival following cervical spine fracture. This remained true after adjusting for age, comorbidities, and complications; suggesting that surgical fixation may improve outcomes in the elderly.



Poster # 46

INTERPRETING THE TQIP "WITHDRAWAL OF CARE" BENCHMARK: WHERE DO WE REALLY STAND?

David G. Jacobs* MD, Elizabeth Freeman RN, BSN, Rachel B. Seymour Ph.D.,
Carolinas Medical Center

Background: ACS-TQIP provides an opportunity for participating trauma centers to benchmark various outcomes against national averages. According to the September 2014 TQIP Benchmark Report, a much higher percentage of our institution's trauma deaths resulted from withdrawal of care, compared to the national average (53.5 vs 37.1%). We reviewed our TQIP deaths to determine the reasons for, and appropriateness of, the decision to withdraw care in our trauma patient population.

Methods: Retrospective chart review of all TQIP trauma deaths occurring at our institution between January 2013 and March 2014, with a specific focus on process improvement (PI) data contained within our trauma registry. Outcomes were classified according to standard ACS-PI criteria for opportunities for improvement (OFI), and overall quality of care. Standard statistical analyses were applied with statistical significance established at $p \leq 0.05$.

Results: 172 TQIP trauma deaths occurred during the period studied, 92 of which followed withdrawal of care (53.5%). Rationale provided for withdrawal included "non-survivable injuries" in 52.4% of patients, and "futility" in 47.6%. Mean ISS for withdrawal patients was 26.7, and 57.6% had a Head-AIS = 5. Compared to "non-withdrawal" deaths, withdrawal patients were older (61.2 years vs 50.7 years; $p = 0.007$) and white (72.3% vs 50.6%; $p = 0.022$). Care was withdrawn at a median of 2.5 days following admission, but overall hospital LOS did not differ between withdrawal and non-withdrawal patients. 80 patients (87%) had complete OFI and quality of care judgments recorded in the trauma registry. Opportunities for improvement in care were identified in only 16 patients (20%), including 2 patients where resuscitative efforts were judged to have been prolonged in the face of futility. None of the other 14 OFI's were felt to have contributed to the patient's death. Overall quality of care was judged to be "acceptable" in 71 patients (88.8%), "acceptable with reservations" in 8 patients (10%), and "unacceptable" in only 1 patient (1.25%). 13 withdrawal death patients (15.1%) subsequently became organ donors.

Conclusion: Although admittedly subjective, decision-making regarding withdrawal of care in our severely injured trauma patients appears to have been appropriate, based upon rigorous PI review. Although retrospective, our data suggest that institutions with higher withdrawal rates, as opposed to "giving up too early", may be better at recognizing futility at an earlier stage, leading to earlier termination of costly resuscitation, while still preserving opportunities for organ donation.

Poster # 47

THORACIC PAIN MANAGEMENT PROTOCOL AND RESPIRATORY THERAPIST SPECIALIZATION: IMPROVING PATIENT OUTCOMES THROUGH STANDARDIZED PULMONARY PRACTICES

A. Britton Christmas* MD, Alyssa Smith BS, Wesley J. Halseth BS, Peter E. Fischer MD, Bradley W. Thomas MD, Ronald F. Sing* DO, Carolinas Medical Center

Introduction: We previously showed that trauma ICU readmission (RA) most often occurs due to respiratory compromise and undertook this study to prospectively assess ICU RA and outcomes following modification of trauma service pulmonary hygiene practices at our Level I Trauma Center.
Methods: We performed a retrospective chart review of trauma service ICU RA from 2004-2008 (PRE). Upon discovering that most ICU RA occurred as the result of pulmonary compromise, a thoracic pain management protocol and unit specialization of respiratory therapists were implemented. Prospective assessment of ICU RA from 2009-2013 (POST) was then conducted. Demographics, injuries and injury severity, reason for transfer, LOS, interventions, and outcomes data were collected.
Results: Overall, there were 5698 PRE and 6582 POST ICU admissions with initial ICU admission mortality rates of 13.5% and 9.8%, respectively. Of patients discharged from the ICU, RA rates were 3.2% PRE and 4.7% POST. Pulmonary reasons for ICU RA decreased from 48.1% PRE to 39.4% POST while neurological reasons for readmission increased from 12.7% PRE to 19.5% POST. Of note, ICU LOS, HLOS, and mortality all significantly decreased following modification of pulmonary practices (table).

PRE vs. POST Pulmonary Interventions (*p<0.05)

	1st ICU LOS	Floor Days Prior to ICU RA	2nd ICU LOS	HLOS	ICULOS	Mortality
PRE	6.6 ±8.0	5.7 ±6.3	8.0 ±8.5	32.3 ±25.9	13.8 ±11.9	14.0%
POST	5.9 ±6.8*	4.7 ±7.0*	4.9 ±5.6*	27.0 ±22.1*	11.5 ±9.2*	11.9%

Conclusion: While the overall rate of ICU RA increased, the implementation of a thoracic pain management guideline and respiratory therapy specialization decreased pulmonary ICU RA and ultimately yielded improved patient outcomes with significantly decreased ICU LOS, HLOS, and mortality.

Poster # 48

WHERE WE FAIL: THE LOCATION OF FAILURE TO RESCUE IN TRAUMA PATIENTS

Jennifer Chung MD, Emily Earl-Royal BS, Mucio K. Delgado MD, Patrick M. Reilly* MD, Carrie A. Sims* MD, MS, Jose L. Pascual* MD,Ph.D., Dougl Wiebe Daniel Holena
University Of Pennsylvania

Introduction:

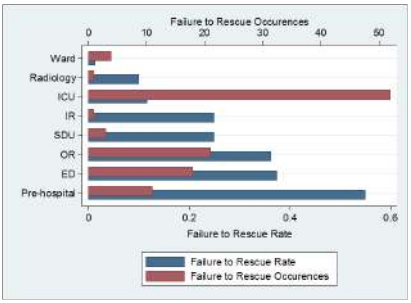
Failure to Rescue (FTR) is an outcome metric which reflects a center's ability to prevent mortality once a major complication has occurred. Efforts to reduce FTR rates should be informed by the timing and location of FTR occurrences, but these have not been described in previous FTR studies in the trauma population. We sought to characterize the timing and location of FTR occurrences at our center with the hypothesis that FTR rates would be highest early after injury and in settings of lower intensity of care.

Methods:

Prospectively collected data from 2009-2013 from a single institution were used. Patients age >16 years with minimum Abbreviated Injury Score ≥ 2 were included; outside hospital transfers were excluded. Baseline patient data, location and timing of the first major complication (defined according to Pennsylvania Trauma Systems Foundation definitions and including adult respiratory distress syndrome, acute respiratory failure, aspiration pneumonia, atelectasis, myocardial infarction, pneumonia, pulmonary embolism, deep venous thrombosis, arrhythmia, coagulopathy, pleural effusion, hypothermia, postoperative hemorrhage, cardiopulmonary arrest, adverse drug reaction, acute kidney injury, hepatic failure, stroke, empyema, sepsis, septicemia, esophageal intubation, gastrointestinal bleeding, organ/nerve/vessel injury, decubitus ulcer, urinary tract infection, or wound infection) were abstracted. Major complications, mortality, and FTR rates were calculated and examined by location (Pre-hospital, Emergency Department, Operating Room, Step Down Unit, Interventional Radiology, Intensive Care Unit, Radiology, or Ward) and by day post admission. Kruskal-Wallis and chi squared tests were used to compare variables with statistical significance set at p =0.05).

Results:

Major complications occurred in 899/6150 (14.6%) of included patients (median age 42 (IQR 25-57), 56% African American, 73% male, 76% blunt, median ISS 10(IQR5-17)). Death occurred in 111/899, for an FTR rate of 12.4%. Compared to non-FTR cases, FTR cases had earlier major complications (median day 1 (IQR0-4) vs. 5 (IQR2-8), p<0.001). FTR rates were highest in the pre-hospital (55%), the ED (38%), and the OR (36%) settings (Figure), but the greatest number of FTR cases occurred as a result of a major complication in the ICU (52/111, 47%).



Conclusions: Failure to rescue rates are highest early after injury, but the majority of cases occur in the ICU. Efforts to reduce institutional FTR rates should focus on major complications that occur in the ICU setting.

Poster # 49

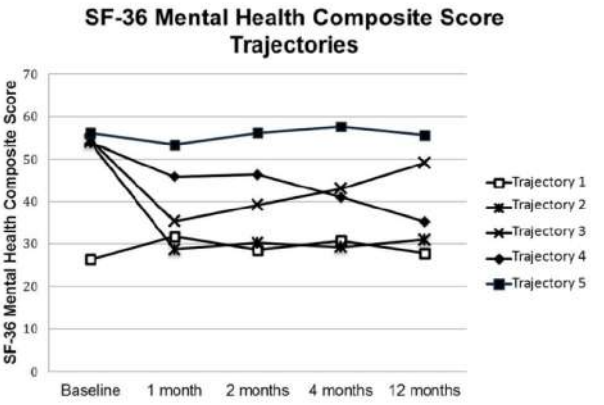
RESILIENCY AND QUALITY OF LIFE TRAJECTORIES AFTER INJURY

Ben L. Zarzaur* MD,MPH, Teresa M. Bell Ph.D., Stephen A. Zanskas Ph.D., Indiana Univesity School of Medicine

Introduction: Traumatic injury has been shown to greatly impact patients' long-term quality of life. Resilience refers to an individual's ability to positively adapt after facing stress or trauma. The objective of this study was to examine the relationship between pre-injury resiliency scores and quality of life after injury.

Methods: 225 adults admitted with an Injury Severity Score > 10 but without neurological injury were included in the study. A quality of life survey (SF-36) was administered at the time of admission and repeated at 1, 2, 4 and 12 months after injury. The Connor-Davidson Resilience Scale survey was also completed by patients at admission and scores were categorized into low, average, or high resiliency. Group based trajectory modeling (GBTM) was used to identify distinct recovery trajectories for physical component scores (PCS) and mental component scores (MCS) of the SF-36. Multinomial logistic regression was used to determine whether baseline resiliency scores were predictive of PCS and MCS recovery trajectories.

Results: There were 3 PCS and 5 MCS trajectories identified by GBTM (Figure).



Relative to the high resiliency group, patients in the low resiliency group were more likely to belong in trajectories with the lowest (trajectory 1= 10.7%) and second lowest (trajectory 2 = 14.7%) mental health scores over the course of recovery (OR 13.32 [CI 1.70-104.36] and OR 7.07 [CI 1.34-37.22], respectively). Patients with average resilience scores were also more likely than patients with high resilience scores to belong to the trajectory with the lowest mental health scores (OR 6.22 [1.51-25.54]). Resiliency scores did not significantly predict recovery trajectories of physical health.

Conclusion: Patient resiliency predicts quality of life after injury in regards to mental health with over 25% of patients suffering poor mental health outcome trajectories. However, there is no association between resiliancy and physical recovery trajectories. Efforts to teach resiliency skills to injured patients could improve long-term mental health for injured patients. Trauma centers are well positioned to carry out such interventions.

Poster # 50

CLOT AMPLITUDE MEASUREMENT AT 10 MINUTES PREDICTS MASSIVE TRANSFUSION AND 24H MORTALITY

Precilla V. Veigas Ph.D., PhD (C), Jeannie Callum Sr., MD, St. Michael's Hospital, Toronto

Introduction:Coagulopathy occurs in ¼ of all severely injured patients, and significantly reduces survival. Hemorrhage is the most preventable cause of traumatic death, which occurs early. The use of viscoelastic assays (ROTEM) is increasing to diagnose coagulation defects and guide their treatment. However, to have a role in the resuscitation of bleeding coagulopathic patients, the assay must provide early and clinically useful results. We hypothesize that the ROTEM clot amplitude measured at 10 minutes of initiating the test (A10 EXTEM) is a predictor of both the need for massive transfusion (MT) and 24h mortality and may have a role in resuscitation of bleeding coagulopathic patients.

Methods:Retrospective analysis of all adult trauma patients (blunt and penetrating but excluding burns, drowning and hanging) admitted to a Level I trauma center between Aug 2011 and Mar 2013. Important clinical, laboratory and ROTEM variables available at admission were analysed. Univariate and multivariable logistic regression analyses were used to identify independent predictors of MT (≥10U red blood cells in 24h) and 24h mortality. Model performance was assessed.

Results:1146 patients were included, 22 (2%) received MT and 29 (3%) died within 24h. Median age was 41 (IQR 26-58) and 73% were men. MT and 24h mortality patients had more severe injuries, abnormal laboratory and ROTEM assays ($p<0.05$ for all variables) compared to non-MT and patients surviving over 24h. Unadjusted univariate analysis reported all variables ($p<0.2$) except gender (MT: $p=0.874$; 24h mortality: $p= 0.433$) as predictors of MT and 24h mortality. Variables independently associated with MT in multivariable logistic regression were: age (OR 0.966 95% CI: 0.939-0.994 $p=0.0163$); ISS (OR 1.062 95% CI: 1.024-1.101 $p=0.001$); SBP (OR 0.974 95% CI: 0.960-0.988 $p=0.0005$); HG (OR 0.973 95% CI: 0.950-0.995 $p=0.019$); and A10 EXTEM (OR 0.942 95% CI: 0.906-0.980 $p=0.003$). The C statistic for the model was 0.965 and Hosmer-Lemeshow-goodness-of-fit was 0.927. Variables independently associated with 24h mortality in multivariable logistic regression were: age (OR 1.022, 95% CI 1.002-1.042, $p=0.030$); ISS (OR 1.063, 95% CI: 1.029-1.099, $p=0.0003$); and A10 EXTEM (OR 0.896, 95% CI 0.859–0.935, $p<0.0001$). The C statistic was 0.846 and Hosmer-Lemeshow-goodness-of-fit was 0.115.

Conclusion:In 10 minutes from starting the test (ROTEM), the measurement of the clot amplitude (A10 EXTEM) is capable of predicting both the need for massive transfusion and mortality. While these findings require prospective validation, they indicate that an abnormal A10 EXTEM result may be clinically relevant and useful to the clinical decision-making process during early resuscitation.

Poster # 51

REDUCING ACUTE KIDNEY INJURY DUE TO VANCOMYCIN IN TRAUMA PATIENTS

Andrea A. Zaw MD, Ara Ko MD, Jason Murry MD, David Hoang MD, Beatrice Sun BS, Jessica Jay BS, Tong Li BS, Bansuri Patel BS, Russell Mason pharm D, Eric J. Ley* MD, Cedars-Sinai Medical Center

Introduction: Supratherapeutic vancomycin trough levels are common after trauma and associated with both increased acute kidney injury (AKI) and mortality. We sought to limit the adverse effects of vancomycin in trauma patients through more frequent trough monitoring.

Methods: Starting January 2011 trauma patients had daily vancomycin trough levels until steady-state was reached. Trauma patients admitted January 2006 to December 2010 (PRE) were compared to those admitted from January 2011 to August 2014 (POST). Inclusion criteria required administration of intravenous vancomycin, admission serum creatinine, and serum creatinine measured within 72 hours of the highest vancomycin trough. AKI was defined as an increase in serum creatinine of at least 0.5 mg/dL or 50% from admission to post-vancomycin administration.

Results: 263 patients met inclusion criteria in PRE, compared to 206 in POST. There were no statistically significant differences between the two groups for age, gender, admission SBP, ISS, GCS and ICU LOS. Rate of vancomycin trough > 20 trended higher in the PRE cohort compared to POST (35% v. 27%, p=0.06). Overall, AKI rate was higher during PRE compared to POST (37% v. 17%, p<0.01). High rates of AKI were noted in both cohorts with vancomycin trough > 20 although a reduction was observed during POST (56% v. 36%, p=0.02). Mortality was similar between two groups (10% PRE v. 10% POST, p=0.83).

Conclusion: A reduction in AKI was observed in trauma patients with daily vancomycin trough levels until steady-state. Increased awareness regarding vancomycin dosing and closer surveillance of serum creatinine levels in trauma patients may limit the incidence of related kidney injury.

Demographic data	PRE n=263	POST n=206	P value
Age, y (mean ± SD)	50 ± 22.6	48 ± 20.8	0.52
Male (%)	212 (81%)	157 (76%)	0.22
Admission SBP, mmHg (mean ± SD)	136.7 ± 35.6	134.8 ± 30.6	0.59
Admission GCS (mean ± SD)	11.0 ± 4.6	11.0 ± 4.6	1.00
ISS (mean ± SD)	20.2 ± 12.7	21.8 ± 13.1	0.16
Head AIS (mean ± SD)	2.3 ± 2.0	2.4 ± 2.0	0.59
ICU LOS (mean ± SD)	13.6 ± 11.5	11.8 ± 11.1	0.19
VT (mean ± SD)	17.5 ± 9.2	16.6 ± 11.2	0.34
Vanco trough > 20	91 (35%)	55 (27%)	0.06
pre-dose Cr (mean ± SD)	0.8 ± 0.5	0.8 ± 0.3	1.00
post-dose Cr (mean ± SD)	1.2 ± 1.3	1.0 ± 0.6	0.046
AKI (%)	97 (37%)	36 (17%)	<0.0001
AKI vanco trough > 20 (%)	51 (56%)	20 (36%)	0.02
Mortality	25 (10%)	21 (10%)	0.83

Poster # 52

GERIATRIC TRAUMA: MULTIDISCIPLINARY APPROACH TO IMPROVE MORTALITY AND DISPOSITION

Stephanie Markle DO,MPH, Laurence Solberg MD, Janeen Jordan MD, Scott Brakenridge MD, Chasen Croft MD, Winston Richards MD, David Mozingo MD, Linda Atteberry MD, Frederick Moore* MD, Alicia Mohr* MD, University of Florida - Gainesville

BACKGROUND: Advanced age is a well-recognized risk factor for adverse outcome after trauma. The etiology of this outcome difference is debated but may be due preexisting conditions or decrease physiologic reserve. Due to the increasing life expectancy there is an increase in the number of older more mobile individuals. Compared with younger cohorts, elderly trauma patients have higher admission rates, increased HLOS, long-term morbidity and mortality rates despite lower ISS. This results in a disproportionate higher percentage of resources expended on the care of the injured elder patient. Our objective is to determine whether incorporation of a geriatric consult (GC) had a beneficial effect in reducing in hospital mortality and expedient disposition.

METHODS: Retrospective data from an integrated data repository was queried 1.7 years prior and 1.3 years following the start of a GC. Consults were obtained for patients age ≥ 65 with multiple comorbidities admitted to the trauma service. Primary outcomes included HLOS, in hospital mortality and disposition (home, home with healthcare (HH), skilled nursing facility (SNF), and rehab unit). Secondary outcome examined follow-up after discharge.

	Pre	Post	p-value
LOS (d)	8.2	9.6	0.0479
Mortality (%)	13	6	<0.001
Home (%)	44	33	<0.001
HH (%)	11	18	<0.001
SNF (%)	30	43	<0.001

RESULTS: Over 3 years, 1059 patients age ≥ 65 were admitted to the trauma service. In hospital mortality was reduced (13.3 to 5.87, $p<0.001$). Patients were less likely to be discharged home, although there was an increased use of home health care (44.4 to 33.7%, $p<0.001$, 11.8 to 17.7%, $p<0.001$). An increase in those continuing to intermediate care facilities was also noted (30.5 to 42.9%, $p<0.001$). A 7-fold increase was noted in follow-up appointments. There were no significant differences in gender, age between groups or HLOS.

DISCUSSION: Major benefits derived from a specialized geriatric assessment following trauma include a striking reduction in mortality by approximately half. Additionally more patients returned home with HH after the GC. There was an expected increase in discharges to SNF and rehab facilities. This data suggests implementing a GC improves the outcome of trauma geriatric patients, with overall better utilization of healthcare.

Poster # 53

THE RELATIONSHIP BETWEEN PROCESSES AND OUTCOMES FOR INJURED OLDER ADULTS: A STUDY OF A STATEWIDE TRAUMA SYSTEM

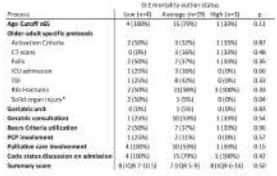
Noelle N. Saillant* MD, Emily Earl-Royal BS, Jose L. Pascual* MD,Ph.D., Steven R. Allen* MD, Patrick K. Kim* MD, M K. Delgado MD, MS, Brendan G Carr G. Carr MD, MSPH, Doug Weibe Ph.D., Daniel N. Holena* MD, University of Pennsylvania

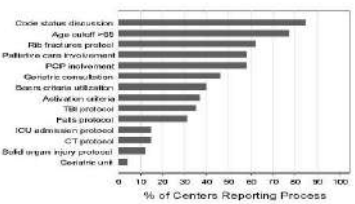
Introduction: Age is an independent risk factor for death, adverse outcomes, and disproportionate health care use following traumatic injury. Literature has suggested that system based modifications may improve geriatric trauma outcomes. The American College of Surgeons' Trauma Quality Improvement Program (TQIP) has published evidence on "best practices" of geriatric trauma care, but adoption of these guidelines is unknown.We sought to determine which evidence-based geriatric protocols, including TQIP guidelines, were correlated with decreased mortality in Pennsylvania's trauma centers.

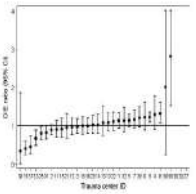
Methods:We surveyed Pennsylvania's level I and II trauma centers to assess adoption of evidence-based geriatric protocols. Survey data was merged with risk-adjusted mortality data for patients ≥ 65 years from a statewide database, the Pennsylvania Trauma Systems Foundation (PTSF), to ascertain associations between mortality outlier status and processes of care. The exposures of interest were the center-specific processes of care, as identified via survey. The outcome of interest was PTSF mortality outlier status (low, average, or high).

Results:26 of the 27 eligible trauma centers participated. There was wide variation in processes of care. Four trauma centers were low outliers and three centers were high outliers for risk-adjusted mortality rates in adults ≥ 65. Results remained consistent when accounting for center volume. The only process associated with mortality outlier status was age-specific solid organ injury protocols (p=0.04). There was no cumulative effect of multiple evidence-based processes on mortality rate (p=0.50).

Conclusion:We did not see a link between adoption of geriatric best-practices trauma guidelines and reduced mortality at PA trauma centers. The increased susceptibility of elderly to adverse consequences of injury combined with the rapid growth rate of the elderly population emphasizes the importance of identifying interventions to improve care quality and distribution to this population.







Poster # 54

D-DIMER AS A SCREENING TOOL FOR DEEP VENOUS THROMBOSIS IN THE TRAUMA PATIENT

Gail T. Tominaga* MD, Imad S. Dandan* MD, Fady S. Nasrallah MD, Kathryn B. Schaffer MPH, Jess Kraus Ph.D., Anthony R. Chiatello BSN, James G. Schwendig MD, Marc Sedwitz MD, Scripps Memorial Hospital La Jolla

Introduction: Routine venous duplex ultrasound (VDUS) screening for deep venous thrombosis (DVT) has been proposed, although no standards have been established. A study of VDUS screening practices in trauma centers (TC) found wide differences in practices. To decrease the use of routine VDUS screening in all hospitalized trauma patients (pts), we proposed the use of D-dimer on admission to determine whether VDUS could be avoided.

Methods: All trauma pts admitted to one level II TC had a D-dimer performed on admission. All pts had VDUS performed unless hospitalized less than 48 hours. Weekly VDUS were performed in those pts with below knee thrombus or high-risk patients. We reviewed our experience to see if D-dimer values could be used to identify a subset of trauma pts who did not need routine VDUS. Pts admitted from 8/2013 through 12/2014 were included. The trauma surgeon assessed the risk for DVT. High risk characteristics are pelvic, femur or vertebral body fractures, spinal cord injury, head AIS $\geq$ 4, hypercoagulable state, family history of venous thromboembolism, pregnancy, hormone therapy or birth control use. Hamilton scores were calculated on admission. Admission risk assessment was classified as high risk in pts with any high risk characteristics and/or Hamilton score > 2; moderate risk in pts with Hamilton score of 2 and/or obese pts; low risk in pts with no high risk characteristics and Hamilton score of 1 or less. D-dimers levels greater than 551 were classified as abnormal. Hospital charge for D-dimer assay is $88.90 and for VDUS $1006. Trauma registry and medical records were reviewed for demographic data, D-dimer values, DVT, and mortality.

Results: 2336 trauma pts were evaluated with 1912 pts meeting study criteria. There were 67% males with mean age 50.2 yrs, mean ISS 9.8, mean length of stay 4.8 days, and 58 deaths (3%). Pts were stratified by risk and D-dimer results (see Table).

RISK	Low		Moderate/High		Total
	DVT	No. of pts	DVT	No. of pts	DVT/Total pts
D-dimer normal	1	297	3	84	4/381 (1.05%)
D-dimer abnormal	13	738	28	793	41/1531 (2.68%)
DVT/Total pts	14/1035	(1.35%)	31/877	(3.53%)	

The negative predictive value for D-dimer was 99.0% and for our risk stratification was 98.6%. If all pts with normal D-dimers did not undergo VDUS, we could have avoided $949,198.50 in charges.

Conclusion: Admission D-dimer may be a cost effective way to avoid unnecessary VDUS in trauma pts with negative assay results who are admitted to the hospital. If all trauma pts with normal D-dimers did not undergo VDUS, we could have avoided $949,198.50 in charges. Observed risk assessment performed after initial resuscitation phase was inconsistent as some disease processes and injuries were determined later during the hospital course. Future protocols should include risk assessment after a tertiary survey has been completed.

Poster # 55

TOWARD A DEEPER UNDERSTANDING OF SURGICAL MORTALITY

Larry C. C. Martin* MD, Thomas Helling* MD, Magdeline Martin RN, William Cauthen MD, Marc Mitchell MD, University of Mississippi Medical Center

Introduction:Surgical mortality traditionally includes patients undergoing an operation with others excluded and may not be included in performance improvement activities.

Methods: Hospital mortalities for 1 year were evaluated for any surgical involvement (SI). The type of surgical contact, whether SI contributed to the mortality, and preventability were determined.

Results: Of the 734 mortalities, 247 met the inclusion criteria. Overall, 108 patients (43.7%), were admitted to Medicine (MS). While 111 patients (45%) underwent an operation, 136 (55%) never did.

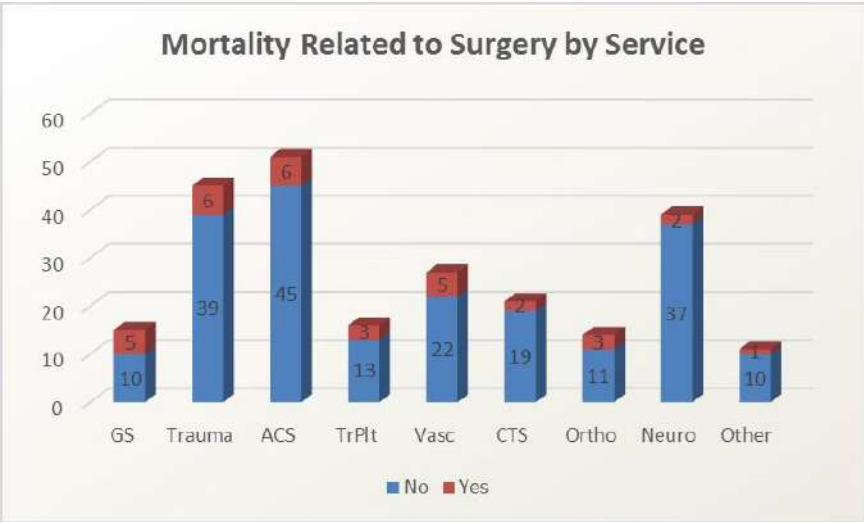


Chart 1. Cases that the surgical interaction contributed to the mortality

The majority of deaths (235, 95%) occurred in patients transferred or emergency admissions. The SI directly contributed to the mortality in 33 patients (13.4%), (Chart 1). In some cases this was related to a delay in primary operation in 8 (3.2%), delay in subsequent operation in 2 (0.8%), inappropriate operation in 2 (0.8%), failure to operate in 7 (2.8%), and unindicated operation in 3 (1.2 %). There were 8 (3.2%) preventable and 33 (13.4%) possibly preventable mortalities.

Conclusion: Hospital mortality directly related to surgery is uncommon, with emergency patients most likely involved. Most mortalities occur in patients not undergoing an operation, but with some SI. These patients may escape the usual surgical mortality review process, unless a robust quality review system which evalutes the care of all surgical patients is implemented. This is especially the case for trauma and acute care surgery as they tend to have the greater number of mortalities. Also, this type of review can determine issues involving consultation and care, as well as identifying patients for educational and corrective actions.

Poster # 56

Validation of a Trauma Outcome Model Including Age and an American Society of Anesthesiologists Physical Status Classification Based Score Utilizing National Trauma Data Bank Comorbidity Data

Hee Soo Jung MD, Douglas B. Stewart BS, Christopher Janowak MD, Ann P. O'Rourke MD,MPH, Amy E. Liepert MD, Lee D. Faucher* MD, Suresh K. Agarwal* Jr., MD,
University Of Wisconsin

Introduction: Pre-injury American Society of Anesthesiologists Physical Status Classification (ASA-PS) predicts trauma mortality. However, ASA-PS suffers from issues related to precision, inter-rater reliability, influence of injury, and documentation error. To overcome these inherent difficulties, an ASA-PS based model utilizing available National Trauma Data Bank (NTDB) comorbidity data was previously developed and correlated with trauma mortality. The purpose of this study was to externally validate the predictive performance of a trauma outcome model including age, ASA-PS based comorbidity score, and Injury Severity Score (ISS).

Methods: An internally validated database of admitted adult trauma patients consistent with NTDB and American College of Surgeons standards was examined. Our initial cohort, used to develop the ASA-PS based comorbidity score, consisted of 9,036 patients from 2009-2013. A second cohort was developed with a prospective sample of 2,494 patients from 2014. Patients were excluded from this group on the basis of incomplete ISS or comorbidity data for a total of 2,470 patients. ASA-PS based comorbidity scores utilizing NTDB-defined comorbidities were derived. Logistic regression analysis of the initial cohort was performed to develop predictive models of mortality utilizing age, ASA-PS based comorbidity score, and ISS as covariates. The performance of the model was studied using the second cohort.

Results: The two patient cohorts had similar age (48.6 yr vs. 52.4 yr), gender (M: 65.7% vs. 60.5%), mechanism of injury (blunt: 87.8% vs. 90.5%), ISS (9.99 vs. 9.42), length of stay (5.02 d vs. 4.78 d), hospital mortality (3.5% vs. 2.7%), major complication rate (16.5% vs. 10.7%), and discharge home (67.3% vs. 64.3%).

A logistic regression analysis model was developed utilizing the initial cohort:

Predicted probability of mortality = (e^(-7.291+0.029*AGE+0.249*CCM+0.112*ISS)) / (1+e^(-7.291+0.029*AGE+0.249*CCM+0.112*ISS)).

The coefficients were statistically significant (<0.005 to 0.002). The Cox & Snell and Nagelkerke R square values were 0.077 and 0.294, respectively. The Hosmer and Lemeshow Chi-square value was 19.56 (p=0.012).

The model was tested using the second cohort. When comparing the study model to a model with ISS only, discrimination (AUROC: 0.893 vs. 0.797) and calibration was improved (Brier Score: 0.024 vs 0.025).

Conclusion: A logistic regression model predictive of mortality, utilizing age, ISS and an ASA-PS based comorbidity score, was developed and externally validated. Age and comorbidity data should be included in future predictive models of trauma mortality.

Poster # 57

FACTORS WHICH PROLONG THE INTERVAL TIME BETWEEN CLINICAL BRAIN DEATH EXAMS AND POTENTIALLY DECREASE ORGAN DONOR CONVERSION RATE

Tabassum Khan BA, Anuradha Subramanian* MD, Emory University

Introduction: Timely declaration of brain death (BD) is important to organ donation. Our urban level I trauma center's BD policy calls for two clinical exams at least six hours apart. We reviewed factors that prolonged interval time between BD exams in order to understand the effect a delay in determination of BD had on subsequent conversion to organ donation.

Methods: A review of all patients determined clinically brain dead between October 31, 2010 and December 31, 2013 was performed. Times of required clinical brain death exams, admitting service, presence of ancillary tests, consent to organ donation, organ donor eligibility, and final organ donor status were recorded. Once testing for normality in outcome variable distribution using a Kolmogorov-Smirnov statistic ($D = 0.23$; $p < 0.01$), means were compared using two-sample Student's T-tests. Organ donor conversion rate (ODCR) and consent rate were calculated and compared using two-sample Z-tests. Only patients who had at least 6 hours between brain death exams were included in analysis. Outliers (n=2) were defined as subjects whose time between exams was further than three standard deviations from the mean; these subjects were removed from analysis.

Results: 78 patients met inclusion criteria.

	Total (n=78)	Trauma (n=52)	Non-trauma (n=26)	p-value
Age (years)	39.9 ± 18	34.4 ± 16	50.9 ± 14	$p < 0.05$
% Male	70.5%	80.8%	50.0%	$p < 0.05$
ODCR	70.7%	82.2%	45.0%	$p < 0.05$
Consent rate	72.7%	82.3%	53.9%	$p < 0.05$
Time between exams (hours)	10.3 ± 4.4	10.2 ± 5	10.6 ± 4	p = NS

Time between exams was prolonged in patients who received ancillary tests compared to those who did not receive ancillary tests (15.8 ± 12.2 vs. 10.1 ± 4.3; $p < 0.05$). ODCR for those who did not receive ancillary tests was 73.0%, and ODCR for those who did receive ancillary tests was 61.5% (p = NS). Eligible organ donors had a shorter interval between exams than ineligible donors (10.3 ± 5 vs. 14.9 ± 12; $p < 0.05$).

Conclusion: Trauma patients have a higher ODCR than non-trauma patients. However, increased interval time between BD suspicion and confirmatory testing adversely affects these rates. Efforts should be made to expedite and streamline BD testing, perhaps through the implementation of a policy using a single BD exam.

Poster # 58

IS IT SAFE TO ADMIT PATIENTS WITH ACUTE INJURIES TO NON-SURGICAL SERVICES?

Alyssa M. Tutunjian MPH, MS, Janice L. Breeze MPH, Sandra S. Arabian CSTR, Reuven Rabinovici* MD, Tufts Medical Center

Introduction: Patients with acute injuries are occasionally admitted to non-surgical services. Since there may be a theoretical safety risk for this practice, the American College of Surgeons mandates all trauma centers to review and determine appropriateness of each such admission. Surprisingly, although this has been a long-standing concept, there is no data to support it. The present study aimed to shed light on this issue by characterizing this group of patients and by determining their outcome.

Methods: This retrospective study reviewed adult (≥16-years) trauma patients admitted to an urban Level 1 trauma center in 2012- 2014. Demographics, co-morbidities, injury patterns, injury severity score (ISS), lengths of stay (LOS), morbidities and mortality were compared (Chi-square analysis and t-tests, as appropriate) between non-surgical admitted (NSA) and surgical admitted (SA) patients. A multivariate logistic regression model was used to identify predictors of mortality.

Results: There were 2,426 admissions, of which 415 (17%) were NSA. Compared with SA patients, NSA patients were older (73 ± 17 vs. 55 ± 23 years, $p \leq 0.001$), had more females (59% vs. 41%, $p<0.001$) and more co-morbidities/patient (1.55 ± 1.13 vs. 0.89 ± 1.05, $p<0.001$). Hypertension and diabetes were the two most prevalent co-morbidities in both groups, but were more frequent in the NSA group (58% vs. 32%, $p<0.0001$, 22% vs. 10%, $p<0.0001$, respectively). Falls were the most common mechanism of injury (90% in NSA vs. 60% in SA, $p<0.0001$), and mostly the lower extremities were injured (51% in NSA vs. 39% in SA, $p<0.0001$). NSA patients had a lower mean ISS (7.2 ±4.5 vs. 13.0 ± 9.3, $p<0.001$), and the two groups did not differ in complication rate (2.9% in NSA vs. 3.5% in SA, $p=0.514$) or median LOS (3 days in each group, $p=0.11$). However, mortality was lower in the NSA group (1% vs. 3%, $p=002$), with all 4 deaths due to respiratory failure unrelated to the injuries per se. Multivariate logistic regression analysis, controlled for age, gender, ISS, and co-morbidities, identified increased age (odds ratio (OR): 1.03, 95% confidence interval (CI): 1.02, 1.05, $p \leq 0.001$), increased ISS (OR: 1.13, 95% CI: 1.10, 1.15, $p \leq 0.001$), as predictors of mortality.

Conclusion: Although NSA patients had less severe injuries, their hospital LOS, complication rate and mortality were similar to SA patients. This is likely due to the higher age and higher comorbidity rate in the NSA group. As mortality in NSA patients resulted from respiratory failure unrelated to the traumatic injuries, admission of selected patients to non-surgical services may be safe.

Poster # 59

LONG-TERM EFFICACY OF AN INFERIOR VENA CAVA FILTER RETRIEVAL PROTOCOL

Mason G. Fisher MD, Andrew J. Borgert Ph.D., Kara J. Kallies MS, Shannon P. Brozak PA-C
Gundersen Health System

Introduction: Inferior vena cava (IVC) interruption remains controversial in trauma patients due to variability in venous thromboembolism prophylaxis among patients with significant traumatic brain injury, spinal cord/column injuries, and/or complex orthopedic trauma. Despite the use of retrievable IVC filters in trauma patients, actual "retrieval" rates vary significantly. The objective of this study was to evaluate the long-term efficacy of a retrieval protocol.

Methods: A retrospective review of a prospective database was completed for all patients who underwent IVC filter placement. A retrieval protocol was implemented in January 2005. Retrieval rates during the pre-protocol period (January 2003–February 2005) were compared to those post-protocol (March 2005–December 2013). Early and late post-protocol periods (March 2005–March 2009 vs. April 2009–December 2013) were evaluated for long-term protocol compliance. Statistical analysis included Fisher's exact and Wilcoxon rank sum tests.

Results: There were 221 patients included; the mean age was 44 years and 75% were male. The median ISS was 29 (4-75). The most common indication for IVC filter placement was neurologic injury (78%). The retrieval protocol resulted in significant improvement in IVC filter retrieval rates, from 53% pre-protocol to 86% post-protocol (Table). In the post-protocol period, successful retrieval rates were maintained in the early and late periods (88% vs. 84%, respectively).

Variable	Overall	Pre-Protocol	Post-Protocol	P value
N	221	40	181	
Death <30 days or lost to follow-up, n (%)	44 (20)	6 (15)	38 (21)	
Retrievable, n (%)	177 (80)	34 (85)	143 (79)	
IVC filter outcome				<0.001
Retrieved successfully	141 (80)	18 (53)	123 (86)	
Unsuccessful attempt or non-retrievable	12 (7)	4 (12)	8 (6)	
No attempt at retrieval	24 (14)	12 (35)	12 (7)	
Filter clot, n (%)	9 (4)	1 (3)	8 (4)	0.99
Tilted filter, n (%)	10 (5)	1 (3)	9 (5)	0.69
Median filter indwelling time, days	70 (8-739)	93 (11-739)	69 (8-436)	0.19

Conclusions: A structured, protocol-driven approach to IVC filter retrieval resulted in significant and sustained improvement in retrieval rates and indwelling filter duration.

Poster # 60

GOAL DIRECTED ENOXAPARIN DOSING PROVIDES SUPERIOR CHEMOPROPHYLAXIS AGAINST DEEP VEIN THROMBOSIS IN TRAUMA PATIENTS

Tammy Kopelman* MD, Jarvis Walters DO, Usmaan Basharat BS, Paola G. Pieri* MD, Jeffrey P. Salomone* MD, Karole M. Davis MD, James N. Bogert MD, Asia N. Quan Pharm.D, Melissa A. Pressman Ph.D., Maricopa Medical Center

introduction: Optimal enoxaparin dosing for deep venous thrombosis (DVT) prophylaxis remains elusive. Prior research demonstrated that trauma patients at increased risk for DVT based upon Greenfield's risk assessment profile (RAP) have DVT rates of 10.8% despite mechanical and pharmacologic prophylaxis. The aim of this study was to determine if goal directed prophylactic enoxaparin dosing to achieve anti-Xa levels of 0.3-0.5 IU/ml would decrease DVT rates without increased complications.

Methods: Retrospective review of patients admitted over a 24-month period at a Level 1 trauma center having received prophylactic enoxaparin and appropriately timed anti-Xa levels was performed. Dosage was adjusted to maintain an anti-Xa level of 0.3-0.5 IU/ml. RAP was determined on each patient and a score of $\geq$5 was considered high risk for DVT. Sub-analysis was performed on patients who received duplex examinations subsequent to initiation of enoxaparin therapy to determine the incidence of DVT. The presence of a proximal lower extremity DVT was considered a positive evaluation.

Results: 306 patients met inclusion criteria with mean demographic data as follows: age 40 years (range, 15-92), ISS 27 (range, 2-75), and length of stay 15 days (range, 3-88). Goal anti-Xa levels were met initially in only 46% of patients despite dosing of $\geq$ 40 mg twice daily in 81% of patients; however, with titration, goal anti-Xa levels were achieved in an additional 109 patients (36%). An average enoxaparin dosage of 0.55mg/kg twice daily was required for adequacy. Bleeding complications were identified in five patients (1.6%) with three requiring intervention. Aspirin and/or warfarin were being administered in 67% of patients at the time bleeding occurred. There were no documented episodes of HIT. Subsequent duplex data was available in 197 patients with 90% having a RAP score $\geq$5. Overall, five DVTs (2.5%) were identified and all occurred in the high-risk group. Among them, enoxaparin therapy was initiated on average hospital day 3 (range, 1-5) and mean time from admission to diagnosis of DVT was 13 days (range, 8-18). All patients were asymptomatic at the time of diagnosis.

Conclusion: An increased anti-Xa range of 0.3-0.5 IU/ml was attainable but frequently required titration of enoxaparin dosage. This produced a lower rate of DVT without increased complications.

Poster # 61

ANTICOAGULANT USE CONTRIBUTES TO INCREASING MORTALITY AFTER GROUND-LEVEL FALL

Eric J. Charles MD, Nicholas J. Napoli MS, Carrie A. Foster BS, Deirdre A. Goode BA, Trevor B. Parker BA, Eleanor A. Sharp BS, Laura Barnes Ph.D., Jeffrey S. Young* MBA, MD, University of Virginia

Introduction: Injury from ground-level falls is the most common mechanism of injury found in the American College of Surgeons National Trauma Data Bank. With the population of those aged 65 or older expected to double over the next 40 years, the impact of falls on healthcare systems will continue to increase. The objective of this study was to identify how patients sustaining falls and their outcomes have evolved over the past 10 years. We hypothesized that although more patients would be on anticoagulant medication at the time of a ground-level fall compared with 10 years ago, mortality rates would not be significantly different due to improvements in trauma and geriatric care.

Methods: Retrospective data on patients sustaining a ground-level fall over two separate time periods (1998-2003 and 2008-2013) at a Level 1 trauma center was collected. Patient demographics, injury severity scores, outcomes, and costs were analyzed and compared between time periods using Student's t-tests and Wilcoxon rank sum tests. Primary outcome to assess evolution of ground-level falls was mortality. Data on anticoagulant use and comorbidities was gathered by a retrospective chart review of all patients treated during 2003 and 2013. Alpha level for statistical significance was 0.05.

Results: There were 7,006 patients treated for ground-level fall, with a 14.3% increase in number of patients in the more recent five years. The percentages of patients over the age of 65 and over the age of 80 increased significantly. There was a statistically significant increase in mean injury severity score, percentage of patients admitted to an intensive care unit (ICU), total cost of care, and mortality rate (Table 1). The percentage of patients on anticoagulant medications at the time of injury between 2003 and 2013 increased significantly (10.5% [57/542] compared with 16.5% [86/522], respectively, $p = 0.005$), and is associated with an increased risk of in-hospital mortality following ground-level fall (OR 3.2, 95% CI: 1.76, 5.90). There was not a significant difference in the mean number of major comorbidities per patient between the two time periods.

Conclusion: Anticoagulant use is associated with increasing mortality among ground-level fall patients. Compared with 10 years ago, ground-level fall patients are more frequently on anticoagulant medications, have more severe injuries, higher ICU admission rates, higher treatment costs, and increased mortality. Addressing the specialized needs of these patients is imperative in order to obtain better outcomes in a cost-conscious healthcare environment. Further understanding of how different classes of anticoagulants impact mortality after ground-level falls is warranted.

Table 1: Differences seen between ground-level fall patients during two distinct time periods

	1998-2003 (n=3270)	2008-2013 (n=3736)	P-value
Age > 65, %(n)	44.3 (1449)	50.6 (1892)	< 0.001
Age > 80, %(n)	22.0 (721)	27.9 (1044)	< 0.001
Injury Severity Score (Mean ± SE)	8.63 ± 0.11	9.49 ± 0.10	< 0.001
ICU Admission Rate, %(n)	16.2 (530)	33.9 (1267)	< 0.001
Total Normalized Cost (Median [IQR])	$8,480 ($4,553-$14,545)	$11,443 ($5,467-$19,894)	< 0.001
Mortality Rate, %(n)	3.06 (100)	4.47 (167)	0.002

Poster # 62

SIGNIFICANCE OF TROPONIN ELEVATION AFTER TRAUMATIC INJURY

Nina E. Glass MD, Clay C. Burlew* MD, Candice R. Preslaski PharmD, Gregory J. Jurkovich* MD, Charles J. Fox MD, Fredric M. Pieracci* MD,MPH, Jeffrey L. Johnson* MD, Ernest E. Moore* MD, Denver Health Medical Center

Introduction: Elevated troponin, even in the absence of acute coronary syndrome, has been associated with frailty, poor outcomes, and increased mortality. An association between elevated troponin and physiologic stress in trauma patients has been suggested. “Classic” therapy for elevated troponin levels includes aspirin, beta blockers, and statins. We hypothesize that increased troponin reflects poor patient outcomes after trauma and medical therapy may mitigate this effect.

Methods: We reviewed charts of all injured patients admitted to a Level 1 trauma center between January 1, 2009 and June 30, 2014 who had a troponin level checked during their hospital stay. We compared those patients with normal troponin to those with elevated troponin levels (>0.02 ng/mL). For patients with elevated troponins, we evaluated the use of "classic” therapy with maximal medical management with aspirin, beta blockers, and statins, or with any medical therapy with any one of those medications at three different time points: pre-hospital, within 72 hours of admission, and at discharge.

Results: A total of 907 patients met our inclusion criteria, 413 with elevated troponin and 494 with normal troponins. Patients with elevated vs. normal troponin levels were more likely to die (22% vs 6%, $p<0.001$). These groups had similar gender distributions (69% vs. 70% male, $p=0.632$) and pre-hospital medical therapy with aspirin, beta blockers, or statins (36% vs 30%, $p=0.0875$). However, those with elevated troponins were older (mean age 58 vs 55, $p=0.046$) with higher rates of coronary artery disease (25% vs 15%, $p<0.001$) and higher injury severity score (ISS 22 vs 18, $p<0.001$). Mortality among those treated with “classic” therapy (70/413) was half that of patients with elevated troponins who did not receive maximal medical therapy (10% vs. 24%, $p=0.010$) but they were also less severely injured (mean ISS 16 vs 23, $p<0.001$). Patients given any medical therapy after admission (249/413) were older (63 vs 51 yrs, $p<0.001$) and had lower ISS (20 vs 24, $p=0.0012$) than those who received no aspirin, beta blockers, or statins; yet they had significantly lower mortality (10% vs. 40%, $p<0.001$). Only 39 patients died in the first 2 days, 5 of whom had received medical therapy. Excluding patients who died within the first 48 hours, an association between medical management and improved survival is confirmed controlling for age, sex, ISS, and length of stay (odds of survival with any medical management 2.8, $p=0.004$).

Conclusion: This large cohort of trauma patients confirms an association between elevated troponin, severity of injury, and mortality. Patients with an elevated troponin who received medical therapy had decreased mortality even when controlling for many possible confounders. The retrospective nature of this study introduces survivor bias and differences between cohorts including injury patterns that may have precluded medical therapy. Prospective studies evaluating the use of medical therapy in trauma patients with elevated troponins may support this protective effect.

Poster # 63

TIME IS ON OUR SIDE: PRE-HOSPITAL RESUSCITATION INTERVENTIONS AND OUTCOMES IN SEVERELY INJURED PATIENTS

Rebecca Schroll MD, Jiselle Heaney MD,MPH, Martin Carney BS, Linley Diao BA, Jennifer Turney MD, Norman McSwain* MD, Juan Duchesne* MD, Tulane School of Medicine

Introduction: Effective and timely Pre-hospital intervention remains a vital component of Damage Control Resuscitation (DCR), helping stabilize severely injured patients prior to emergency department (ED) arrival. Availability of Emergency Medical Services (EMS) as well as adequate fluids and airway support are key components in effective transport of traumatic patients. We hypothesize improved survival in severely injured patients with the shortest transfer times.

Methods: This is a 1-year retrospective review of all adult patients with an ISS > 15 who were transferred to an urban Level 1 trauma center from by EMS from October 2013-2014. Age, sex, mechanism of injury (MOI), race, Injury Severity Score (ISS), lowest, highest, and average systolic blood pressure (SBP), heart rate (HR), Shock Index (SI), first and last Glasgow Coma Score (GCS), volume of infused normal saline and lactated ringers, airway type (AT) were analyzed in relation to mortality outcome. True Transfer Time (TTT), defined as time in transit from the scene to trauma center, and Total Pre-hospital Time (TPT), defined as time from the call received by EMS to arrival at trauma center were analyzed for impact on mortality. Analysis was performed using t-tests, chi-squared, and multiple logistic regression. Statistical analysis was completed using SAS 9.3.

Results: Of the 174 patients who met inclusion criteria, 146 had complete data for analysis. Twelve patients were excluded that had transfer SBPs of zero and died on arrival to the ED. Analysis was completed for 134 patients. Forty-two patients died (31%) and 92 patients lived (69%). When comparing patients that died versus lived, significant difference were found for: mean ISS (27.7 vs 21.3, p=<0.001); first and last GCS (mean first GCS: 8.3 vs 13.0, p=<0.001, and mean last GCS: 7.7 vs 13.2, p=<0.001); number of patients intubated 19% vs 2%, p=0.002 and average lowest HR recorded (79.4 vs 92.3, p=0.03) respectively. No differences were found for the rest of the variables including no difference between TTT or TPT when analyzed for mortality. On multivariate logistic regression significant predictors for mortality included: age, ISS, and lowest transfer SI (1.1). Risk of death was significantly increased with age (OR=1.1, 95% CI=1.0-1.1), ISS (OR=1.3, 95% CI=1.1-1.4), and lowest transfer SI (OR=20.3, 95% CI=1.6-254.6).

Conclusion: Mortality outcomes in an urban setting are increased with older age, higher ISS, and increased lowest transfer SI, but not with transfer times, resuscitation with crystalloid or intubation. SI does not take into account cardiopulmonary resuscitation during transfer, and therefore may not be a useful pre-hospital predictor of mortality. Further investigations into which pre-hospital interventions impact survival are warranted.

Table 1: Predictors of Mortality

Effect	Odds Ratio	95% Confidence Interval
Age	1.07*	1.028-1.121
Female vs. Male Sex	2.03	0.36-11.44
Blunt vs. Penetrating Injury	0.30	0.06-1.57
Black vs. White	0.90	0.16-5.24
Asian vs. White	0.88	0.00-407.56
Other Race vs. White	5.35	0.35-81.49
ISS	1.26*	1.12-1.41
Lowest SBP, ≤90 vs. >90	0.30	0.03-2.77
Highest SBP, ≤90 vs. >90	0.27	0.00-16.82
Average SBP, ≤90 vs. >90	4.52	0.05-391.86
Lowest HR, ≤100 vs. >100	0.82	0.05-12.58
Highest HR, ≤100 vs. >100	0.38	0.03-4.56
Average HR, ≤100 vs. >100	0.35	0.01-10.39
Lowest Shock Index, ≤1.1 vs >1.1	20.26*	1.61-254.61
Highest Shock Index, ≤1.1 vs >1.1	0.78	0.03-18.02
Average Shock Index, ≤1.1 vs >1.1	0.94	0.03-30.65
Not Intubated vs. Intubated	4.55	0.32-64.41
First GCS, ≤8 vs. >8	0.00	0.00-999.99
Last GCS, ≤8 vs. >8	999.99	0.00-999.99
Crystalloid Requirements, <500mL vs. ≥500mL	1.10	0.29-4.20
True Transfer Time in minutes	1.06	0.92-1.22
Total Prehospital Time in minutes	0.96	0.86-1.08

* Denotes significance with p < 0.05. ISS: Injury severity score, SBP: systolic blood pressure in mmHg, HR: heart rate in beats per minute, GCS: Glasgow coma score

Poster # 64

A POPULATION-WIDE ASSESSMENT OF FACTORS ASSOCIATED WITH NON-OPERATIVE MANAGEMENT OF PEDIATRIC SPLENIC INJURY

Ibrahim S. Hakim BBA, Christopher Newton* MD, Elizabeth A. Pirrotta MS, Nancy E. Wang MD, Stanford University

Introduction: Nonoperative management of pediatric splenic injury is an established benchmark of quality pediatric trauma care. Studies demonstrate that splenectomy rates are lower at pediatric trauma centers compared to adult trauma centers. However almost 30% of children with trauma are cared for in non-trauma centers where there is minimal information regarding splenectomy rates. We evaluate variation in care for the entire population of US children with splenic injuries at non-trauma, adult trauma, and pediatric trauma centers.

Methods: We used the National Inpatient Sample (NIS), the largest publicly available all-payer inpatient US database (2001-2010), with data from more than 7 million unweighted hospitalizations, estimating more than 36 million hospitalizations per year. Patients 1-17 years with splenic injuries (ICD-9 CM 865.00-.19) were identified. We linked the NIS data with the American Hospital Association (AHA) 2008 survey to identify hospital capabilities and characteristics. An adult trauma center was defined as a Level I or Level II trauma center; because pediatric trauma centers are not explicitly identified in the AHA survey, a pediatric trauma center was defined as a trauma center with a pediatric ICU. We analyzed demographic: age, gender, race/ethnicity, payment source; clinical: Injury Severity Score (ISS), hemodynamic stability; and facility: hospital region, rural/urban status and size, variables. The primary outcome was splenectomy. The relationship between splenectomy and pediatric and trauma expertise of the treating hospital was analyzed, controlling for year, demographic, and clinical variables. Our study design and analyses account for the complex sampling design inherent in the NIS.

Results: Over the study period, we identified 37,441 patients with splenic injury; 26.5% at non-trauma, 16.3% at adult trauma, and 57.2% at pediatric trauma centers. 4,684 (12.5%) patients underwent splenectomy: 15.4% at non-trauma, 19.4% at adult, and 9.2% at pediatric trauma centers. Multivariable regression analysis demonstrated that patients had decreased odds of splenectomy at pediatric trauma centers ($OR = 0.45$, $p < .001$) when compared to adult and non-trauma centers. Children 14-17 years ($OR = 2.7$), an ISS > 14 ($OR = 5.3$), open cavity wound ($OR = 2.8$), and hemodynamic instability ($OR = 6.1$) (all $p < .001$), were at increased odds of undergoing splenectomy. When the analysis was restricted to children 1-13 years of age, results were qualitatively similar although confidence intervals increased due to a decrease in the study population to 16,725 patients.

Conclusion: In this nation-wide sample, children treated at non-trauma centers had a significantly higher rate of splenectomy despite a significantly less severely injured patient population, compared to children treated at pediatric trauma centers. We believe these trends reflect differences in the commitment to splenic salvage as well as comfort with the hemodynamics of seriously injured children in pediatric specific vs. non-trauma hospitals.

Poster # 65

DISPARITIES IN ACCESS TO INPATIENT REHABILITATION SERVICES AMONG PEDIATRIC TRAUMA PATIENTS

Christopher Newton* MD, Elizabeth A. Pirrotta MS, Huong T. Nguyen BA, Christine Aguilar MD, N Ewen Wang MD, Children's Hospital Oakland

Introduction: Although intensive rehabilitation services are known to improve functional outcome for trauma, pediatric inpatient rehabilitation units are scarce. California, home to approximately 9 million US children, has 10 pediatric specific inpatient rehabilitation programs with a total of approximately 225 beds. While there is evidence that there are nonclinical disparities in access to rehabilitation services in adults with traumatic brain injury, to the authors' knowledge, there are no studies of pediatric access to rehabilitation services. In this study, we hypothesized that racial/ethnic and socio-economic disparities influence access to pediatric inpatient rehabilitation services after serious trauma.

Methods: Children (ages 0-18 years), admitted for trauma to our free-standing children's hospital, a level I pediatric trauma center with an inpatient rehabilitation program, were identified from our trauma registry (2004-2014). We analyzed demographic: age, gender, race/ethnicity, payer source, county of residence and distance from residence to hospital; clinical: injury mechanism, body area injured, Injury Severity Score (ISS), and Abbreviated Injury Scores (AIS). The primary outcome variable was disposition (rehabilitation vs. home). Seriously injured children (ISS>9) who were admitted to our inpatient rehabilitation unit (cases) were matched with children discharged home (controls) by age category, gender, body region of injury and maximum AIS. A 1:N matching was performed to increase the precision of our study, resulting in a matched cohort of 382 records. A total of 87 cases were matched to 191 controls. 37 (40.2%) cases were matched to 1 control; 52 (59.8%) cases were matched to 3 controls. Eleven cases were unable to be matched due to controls lacking similar matched characteristics. ISS indicated clinical similarity between the two groups with median (IQR) of 19 (16-25) for children admitted to rehab and 16(16-25) for children discharged home. Multivariate logistic regression was used to identify factors associated with rehabilitation services, controlling for multiple injury, distance from home to rehab center, year of service, and hospital length of stay and clinically relevant interactions.

Results: Of 4,252 patients, 1,139 (26.8%) were seriously injured with an ISS of >9. Among 1,139 seriously injured children, 98 (8.6%) were admitted to inpatient rehabilitation, 968 (85.0%) were discharged home, 48 (4.2%) died and 25 (2.2%) had an "other" disposition. The median age (IQR) of the 98 patients admitted to rehabilitation was 5.0 years (3-12) compared to 7.0 (3-12) for the 968 discharged home. Multivariable regression analysis demonstrated that black and "other" race/ethnicity patients had increased odds of going to rehabilitation compared to white patients (OR 5.0, $p<.001$ and OR 1.2, $p=.01$, respectively), and patients with private compared to public insurance had increased odds of rehabilitation (OR 2.2, $p=.006$).

Conclusion: Inpatient pediatric rehabilitation beds are a scarce resource which should be available to those in most clinical need. While our findings of race/ethnicity disparities, despite careful adjustment could be secondary to the primary population of our inner-city trauma center and analyses should be repeated in a larger population, the disparities secondary to payer status warrant careful consideration in this era of initiatives to reform public payer programs for children.

Poster # 66

IMROVING EVALUATION OF COMPLICATIONS IN CRITICALLY INJURED CHILDREN THROUGH A NOVEL DATABASE

Katherine T. Flynn-O'Brien MD, Mary E. Fallat* MD, Tom B. Rice MD, Christine M. Gall Ph.D., RN, MS, Frederick P. Rivara MD,MPH, Harborview Medical Center

Introduction: Efforts to improve pediatric trauma outcomes depend on the availability of detailed data to assess processes of care, optimally collected at the lowest cost. Trauma registries have been developed primarily to direct quality improvement. We developed the Pediatric Trauma Assessment and Management (PTAM) database by merging two independent data systems at five Pediatric Trauma Centers (PTCs) to assess quality of care provided to critically injured children throughout their hospitalization.

Methods: Trauma registry (TR) and pediatric intensive care unit (Virtual PICU Systems, VPS) data were merged for all children < 18 years old discharged from the PICU with ICD-9 codes 800-859.9, indicating a traumatic injury, between January 1 and December 31, 2013. Additional variables abstracted from the medical record targeted imaging, resuscitation, and ICU management practices.

Results: A total of 692 children were included in the merged database. TR data captured 83 complications in 57 children. Among the four complication types captured by both databases, the TR captured 13 total complications and the VPS captured 47; TR thus missed 72% of serious complications. For history of cardiac arrest, the TR captured four cases and VPS identified 37, a 9.3-fold increase. For unplanned return to the PICU, the TR captured three cases, while VPS captured 14, a 4.7-fold increase. Data capture for catheter-related blood stream infections (1 vs. 2.2-fold increase) showed similar findings. The TR data indicated a total of 192 children were mechanically ventilated at some point during their PICU stay, whereas the VPS data identified 226 children who were ventilated, a 17.7% increase. While no unplanned intubations were captured in the TR, VPS data identified at least 20 children requiring re-intubation, and four children requiring a third intubation. Pneumonia was the only complication captured with equal frequency (5 vs. 5). Complication ascertainment from the TR varied by site and by type of complication. For cardiac arrest, only one site's TR captured events; however it only accounted for about one-third of the cases identified by VPS at that site.

Conclusion: In a time when mandates require detailed complication reporting and when fiscal constraints require innovative approaches to data capture and evaluation, the merging of two existing databases successfully augments identification of complications, increasing accuracy and accountability, and offering more accurate data for quality improvement. Reliance on TR data alone appears inadequate.

Poster # 67

DON'T WASTE YOUR TIME: STRAIGHT TO MRI FOR PEDIATRIC BURNERS AND STINGERS

Richard Sola Jr., MD, A B. Christmas* MD, Bradley W. Thomas MD, Peter E. Fischer MD, MS, Grayson C. Eubanks BS, Nora E. Raynor RN, Ronald F. Sing* DO, Carolinas Medical Center

Introduction: Burner or Stinger syndrome (BSS) also known as transient brachial plexopathy is commonly seen with contact sports. There is no consensus on clinical management and radiographic evaluation of pediatric patients with sports related BSS. This study aims to assess the feasibility of clinical observation without extensive radiologic workup in pediatric patients with BSS given the low likelihood of permanent neurologic injury.

Methods: A retrospective, observational study of patients under the age of 18, evaluated at a Level 1 Trauma Center was conducted. Patients included had a concern for BSS after a contact sport injury. Over a 24 month period beginning in January 2012, data was collected from our institutional trauma registry and electronic medical record. Patient demographics, physical complaints, physical exam findings, imaging, and outcome data, were analyzed.

Results: Thirty patients were evaluated for BSS during the study period. Average age was 14.3 ± 2.3 years with a mean ISS of 2.7 ± 2.7. Football tackle was the most common mechanism of injury (56.7%). All patients had subjective motor and/or sensory deficits upon arrival. Patients were grouped by physical exam findings: 14 with motor deficits (MD), 2 with sensory deficits (SD) and 14 asymptomatic (AS). Twenty-six of thirty patients underwent CT cervical spine and only 1 AS patient (3.9%) had a positive finding. All patients with MD and SD had negative CT cervical spine. No positive findings were found in those who underwent CT thoracic or lumbar spine. Eight patients with MD underwent MRI cervical spine with two positive findings; no surgical interventions were required. On discharge, 28.8% had improvement and 71.4% had resolution of their motor symptoms. SD patients had negative MRI imaging and complete resolution of symptoms on discharge. Seven patients with AS underwent MRI cervical spine; two had ligamentous injury which required a cervical collar for management. On discharge, 71.4% had resolution of symptoms and 21.4% had improved symptoms. Total cost of CT scans incurred were approximately $89,944.

Conclusion: Children presenting with BSS experience temporary symptoms that resolve without surgical intervention. Assessment by CT scans is an insensitive imaging test compared to MRI. It exposes pediatric patients to unnecessary radiation and increases hospital costs. Therefore, the preferred management for BSS should include observation, serial neurologic exams and MRI evaluation as appropriate, but CT scans should be avoided.

Poster # 68

Penetrating Neck Trauma In Children: An Uncommon Entity Described Using The National Trauma Data Bank (NTDB)

Melvin E. Stone Jr., MD, MS, Benjamin Farber MD, Olorunfemi Odunayo MBBS, Anand Dayama MD, James Meltzer MD, Edward Chao MD, Srinivas H. Reddy MD, John McNelis MD, Sheldon Teperman* MD, Jacobi Medical Center

Introduction: Penetrating neck trauma is uncommon in children; consequently, data describing epidemiology, injury pattern and management is sparse—limited to small single-center studies. The aim of this study was to use the NTDB, a large national database, to describe pediatric penetrating neck trauma.
Methods: All NTDB patients less than 15 years old with penetrating neck trauma admitted in 2008 to 2012 were identified. Univariate and multivariate analyis was used to described the total group and stratified age groups 0-5, 6-10, and 11-14.
Results: Of 434,788 patients, 1238 (2.8%) were admitted for penetrating neck trauma. Mean age was 7.87 years and most were male (70.6%). The most common mechanisms were stabbing (44.1%) and firearm (32.1%). On admission, 8.2% were hypotensive and 7.2% were intubated. Only 8% of patients were imaged with CT scan. The most common injury types was aero-digestive (23.7%) and vascular (18.3%). Aero-digestive injuries were most frequent in the 0-5 age group (40.0%). Twenty-three percent of patients were taken directly to the operating room (OR) from the emergency department (ED). Overall, mortality and complications were 2.9% and 2.3%, respectively. After adjusting for age, ISS, and GCS, only hypotension and direct admission from ED to OR were significant predictors of mortality (OR 2.69 [CI 1.06 -6.84], OR 3.31 [CI 1.23-8.90], respectively)—injury type was not a predictor of mortality.

Characteristics	0-5 years old	6-10 years old	11-14 years old	P values
Stab Injury	258 (56.3%)	132 (43.9)	156 (32.6%)	<0.001
Gunshot/Firearm Injury	49(10.7%)	73(24.35)	179(37.4%)	<0.001
Mean Injury Severity Score (SD)	8.99 (11.96)	7.09 (10.15)	8.38 (10.70)	0.064
Vascular Injury	78 (17.0%)	51 (16.9%)	97 (20.3%)	0.353
Neurological Injury	6 (1.3%)	8 (2.7%)	21 (4.4%)	0.017
Cervical Vertebrae Injury	26 (5.7%)	22 (7.3%)	75 (15.7%)	<0.001
Aero-digestive injury	182 (39.7%)	58 (19.3%)	53 (11.1%)	<0.001
Operative Neck Procedures	65 (14.2%)	37 (12.3%)	73 (15.2%)	0.516
Mortality	15 (3.3%)	9(3.0%)	12(2.5%)	.778

Conclusion: Based on the NTDB, penetrating neck trauma in children is indeed an uncommon occurrence with a relatively low mortality and complication rate. Although injury type differs with age, it is not predictive of mortality. The majority of patients are managed non-operatively.

Poster # 69

EVALUATING IN-HOSPITAL TRIAGE: IS ISS OF 15 AN APPROPRIATE DEFINITION OF MAJOR TRAUMA?

Nicole C. Toscano MD, Ayodele T. Sangosanya* MD, Nicole A. Stassen* MD, Paul E. Bankey* MD, Ph.D., Mark L. Gestring* MD, Julius D. Cheng* MD, MPH, University of Rochester

Introduction:

Defining appropriate in-hospital triage of trauma patients continues to be a challenge. Currently, methods such as the Cribari grid utilize retrospectively assigned injury severity scores (ISS) with a cut-off point of 15, defining patients requiring full trauma activation, to determine rates of under- and overtriage. This study aims to determine if an ISS of 15 is an appropriate cut-off point to assess under- and overtriage in the Cribari grid methodology.

Methods:

This study is a retrospective chart review of the trauma registry at an ACS-Verified Level One trauma center over a 13-month period. Data collected included age, level of trauma activation, disposition, time to operating room, length of stay (LOS), and ISS which was retrospectively assigned as part of the trauma registry.

Results:

1863 patients were included for study analysis. 291 underwent full trauma activation, 334 partial activation, 753 consults, and 485 were not assessed by the trauma service. Of those patients with full activation, 28.2% underwent immediate surgical intervention while 36.8% were admitted to the ICU. All 18 patients that died underwent full activation. 53.8% of patients that received trauma consults were admitted to the floor. A subgroup analysis revealed patients with an ISS $>$ 25 compared to those with an ISS $<$ 24 had a shorter time to the OR (1.8 vs. 3.6 hours, Figure 1), shorter ED LOS (5.3 vs. 8.7 hours, $p < 0.001$), and longer ICU LOS (7.9 vs. 4.1 days, $p < 0.001$). Patients with an ISS $>$ 25 had a higher mortality compared to patients with an ISS $<$ 24 (22.8% vs. 2.2%, $p < 0.001$, Figure 2). Given an ISS of 25 represented a clinically significant inflection point in patient mortality this was used as a new cut-off point in the Cribari grid. According to the traditional Cribari grid utilizing an ISS cut-off of 15, our institutions under- and overtriage rate was 35.50% and 50.17%, respectively. Utilizing our proposed ISS cut-off of 25, revealed an under- and overtriage rate of 11.51% and 64.26%, respectively.

Conclusion:

Post-hoc review of under- and overtriage rates using the Cribari grid methodology with an ISS cut-off of 15 does not appear to accurately reflect clinical acuity. Utilizing a higher ISS cut-off of 25 may better correlate with clinically appropriate trauma center under- at the expense of higher overtriage.

Figure 1

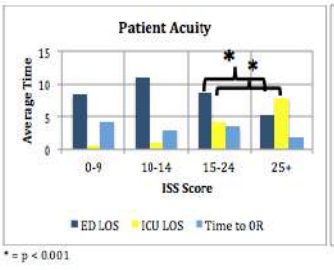
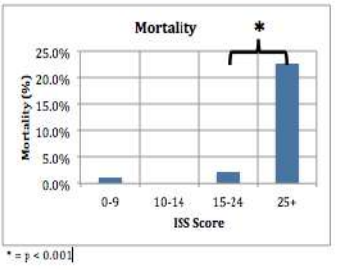


Figure 2



Poster # 70

UNDERGOING SURGERY FOR TORSO TRAUMA BEFORE CT SCAN MAY IMPROVE IN-HOSPITAL MORTALITY IN HYPOTENSIVE OR COMATOSE PATIENTS

Atsushi Shiraishi MD, Ph.D., Keita Nakatsutsumi MD, Yasuhiro Otomo* MD, Ph.D., Tokyo Medical And Dental University

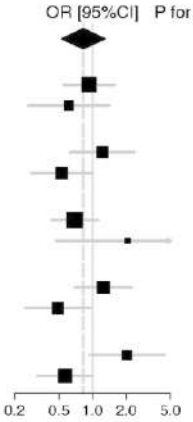
Introduction: CT scan before emergency trauma surgery enables surgeons to achieve early detection of critical injuries and is widely implemented in the early trauma care, however, concerns for risk of undergoing CT scan in unstable trauma patients still remains unsolved. This study purpose is to test a hypothesis that undergoing emergency truncal surgery before CT scan might benefit trauma patients with unstable vital signs.

Methods: In this case control study based on the Japan Trauma Databank (JTDB), we selected directly transferred trauma subjects which underwent any surgery on chest, abdominal or pelvic region within 120 minutes from the hospital arrival. Subjects without records of exact time of undergoing surgery and CT scan were excluded. Missing values in important variables were multiply (m=25) imputed. We defined the study intervention and the study outcome as surgery before CT scan and in-hospital mortality, respectively. Logistic regression analyses adjusted for the Trauma Injury Severity Score (TRISS) in overall subjects and subjects dichotomized by baseline characteristics to predict in hospital mortality estimated relative risk of surgery before CT scan (FIGURE). A propensity score matching analysis compared in-hospital mortality in subjects with or without surgery before CT scan.

Results: A total of 959 subjects was selected from 146111 trauma subjects registered in JTDB and 183 and 776 subjects underwent surgery before CT scan and CT scan before surgery, respectively. Predicted mortality based on TRISS method (41% versus 17%, P<0.001) and observed in-hospital mortality (45% versus 24%, P<0.001) were both higher in subjects underwent surgery before CT scan in comparison of subjects underwent CT scan before surgery. FIGURE1 showed association of surgery before CT scan and in-hospital mortality in overall subjects and dichotomized subgroups after adjustment for TRISS. Adjusted risk for in-hospital mortality in overall subjects with or without surgery before CT scan was similar (OR 0.83, 95%CI [0.52-1.30], P=0.398). Significant interactions were observed in subgrourps dichotomized as the subjects with systolic blood pressure <100 mmHg or ≥100mmHg (OR 0.57 versus 2.04, P for OR interaction=0.009) and with the Glasgow Coma Scale of 3-8 or 9-15 (OR 0.49 versus 1.25, P for OR interaction=0.037).

FIGURE 1. Association of Surgery before CT Scan and In-Hospital mortality

Subgroups	N	OR [95%CI]	P	OR [95%CI]	P for OR interaction
Overall subjects	**959**	**0.83 [0.52–1.30]**	**0.409**		
Gender					
Male	695	0.93 [0.55–1.58]	0.796		0.398
Female	264	0.61 [0.27–1.42]	0.252		
Age					
≥50 y.o	439	1.22 [0.63–2.38]	0.554		0.071
<50 y.o	520	0.53 [0.28–1.00]	0.050		
Type of trauma					
Blunt injury	621	0.70 [0.43–1.13]	0.139		0.170
Penetrating injury	338	2.06 [0.47–8.99]	0.336		
Glasgow Coma Scale					
9–15	727	1.25 [0.70–2.25]	0.453		0.037
3–8	232	0.49 [0.25–0.95]	0.035		
Systolic blood pressure					
≥100mmHg	496	2.04 [0.94–4.42]	0.071		0.009
<100mmHg	463	0.57 [0.32–1.00]	0.049		



A propensity score matching analysis selected 135 and 135 subjects with surgery before CT scan and CT scan before surgery, respectively. Standardized difference of all the variables which were included for the propensity score estimation did not exceed 0.1, therefore those groups were considered to be well balanced. Intergroup comparison in propensity score matched groups showed shorter door to surgery time in subjects with surgery before CT scan (mean of 52 minutes versus 84 minutes, P<0.001) and similar in-hospital mortality (39% versus 39%, OR 1.00, 95%CI 0.61-1.65, P=0.988).

Conclusion: Overall benefit in surgery before CT scan still remained uncertain in trauma patients requiring early truncal surgery within 120 minutes from the hospital arrival, however, surgery before CT scan significantly related to improved in-hospital mortality in hypotensive or comatose trauma patients. Limitation of our study result was retrospective nature of the study design and possible
presense of unmesurable confounders to select surgery before CT scan. Prospective and hypothesis driven cohort study is needed to demonstrate benefits of surgery before CT scan in hypotensive or comatose trauma patients who needs emergency truncal surgery.

Poster # 71

OUTSIDE HOSPITAL IMAGING: A WEB-BASED PLATFORM FOR IMAGING SHARING ONLY FIXES PART OF THE PROBLEM

Timothy P. Plackett DO, Lucinda Guerra BS, Gregory M. Day MD, Harold H. Bach MD, Casey J. Thomas DO, Richard P. Gonzalez* MD, Anthony J. Baldea MD, Loyola University Medical Center

Introduction: Repeat imaging following transfer of a trauma patient to a regional trauma center is a common occurrence. Whereas in the past repeat imaging was often required due to disparate systems at the sending and receiving hospital, newer web-based software has sought to eliminate this problem. Recent reports have demonstrated its efficacy at eliminating the problem of software incompatibility, however they had not examined whether this was the core problem necessitating repeat imaging.

Methods: All trauma patients transferred to a single level I trauma center from an outside hospital (OSH) during May 2010- April 2011 (PRE; prior to file sharing software) and August 2014 - February 2015 (POST; after file sharing software) were prospectively entered into a database. Information collected included patient demographics, mechanism of injury, imaging performed at the OSH and any performed at the receiving hospital within 6 hours of admission (or prior to surgery), and indication for the additional images. Financial charges were calculated for imaging studies based upon the actual charges for each study in February 201.

Results: 153 PRE and 104 POST patients were entered into the study. 5 PRE and 5 POST had no imaging performed at the OSH and were excluded from further analysis. Patients were not significantly different between the two time points with regards to age (34.4 ± 25.3 vs 40.6 ± 26.6 years), gender (72% vs 67% male), and mechanism of injury (93% vs 91% blunt). During the PRE phase 94% of patients arrived with OSH imaging on a disc, 3% had hard copies, and 3% arrived without copies of their imaging studies. During the POST phase 92% of patients arrived with OSH imaging on a disc, 3% had hard copies, and 5% arrived without copies of their imaging studies. Repeating imaging secondary to a failure to be able to view the images decreased from 14% PRE to 1% POST ($p<0.001$). There was a trend towards less repeat imaging due to inadequate or incomplete OSH imaging over time (32% PRE vs 22% POST; $p=0.079$), but this was not statistically significant. Imaging obtained after transfer incurred a mean of $5,588.95 ± 6,089.51 in charges per patient with potentially preventable imaging accounting for 20% of the charges during the POST time period.

Conclusion: Transferring trauma patients remains associated with a high rate of repeat imaging on arrival at the receiving hospital. This occurs at a significant financial burden. A web-based platform near completely eliminates software incompatibility problems, however this eliminated less than half of all repeat images.

Poster # 72

Trauma Exsanguination Protocols Are Feasible at Regional Level 3 and 4 Trauma Centers

Brittney Dudley MD, Levi Procter MD, Andrew Bernard* MD, University of Kentucky

Introduction: Early Initiation of plasma-based trauma exsanguination protocols (TEPs) lowers mortality by approximately 2/3. We hypothesized that it is feasible to implement a plasma-based TEP at level 3 and 4 trauma centers without delaying transport.

Methods: We queried the state Trauma Registry for patients meeting positive screening criteria for TEP (positive ABC score) at all state level 3 and 4 trauma centers in 2013. We also surveyed all state level 3 and 4 centers to determine availability of blood bank plasma resources.

Results: In 2013, 2,069 trauma patients presented to a level 3 or 4 trauma center. 824 (39.8%) were transferred to a higher level trauma center. We identified 39 patients, in 13 of the 15 level 3/4 centers, who were ABC+ at initial presentation to the ER, thus meeting criteria for MTP. Eight of 13 level 4 centers responded to our survey and 2 of 3 level 3 centers responded. 75% of level 4's and both level 3's have FFP available. Mean thaw time was 29 minutes at all centers (range 15-45 minutes). Median total length of stay from registration to ER discharge for ABC positive patients was 1.78 hours, mean of 2.1 hours and range of 0.5-5 hours.

Conclusion: A significant number of patients at regional level 3 and 4 centers meet criteria for TEP, even in a rural state. Most level 3 and 4 trauma centers have FFP available and thaw times are such that its administration would not delay transport to a higher level of care. Since feasible, the authors recommend systematic implementation of TEPs at regional centers to reduce hemorrhage-associated mortality.

Poster # 73

TIMING & INCIDENCE OF MAJOR COMPLICATION FROM THE PRAGMATIC RANDOMIZED OPTIMAL PLATELET AND PLASMA RATIOS (PROPPR) TRIAL

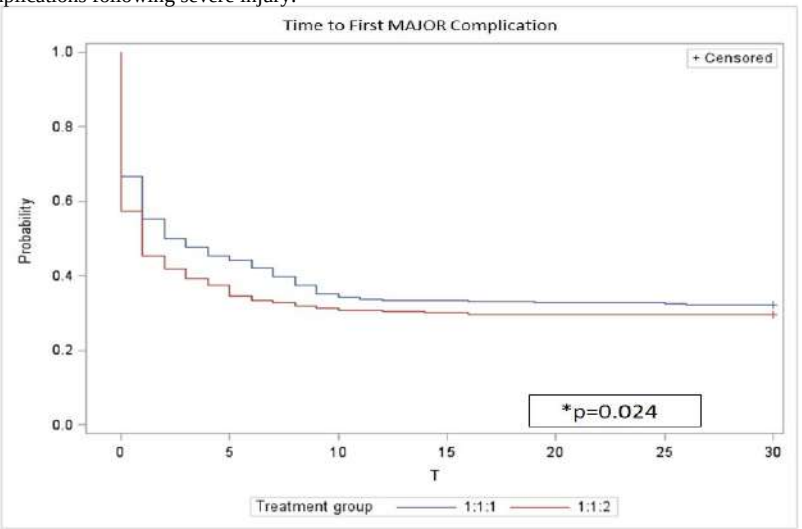
Rachael A. Callcut MD, MSPH, Jordan A. Weinberg MD, John B. Holcomb* MD, Mitchell J. Cohen* MD, Barbara C. Tilley Ph.D., Hongjian Zhu Ph.D., Bryce B. Robinson MD, Peter Muskat* MD, Bryan Cotton* Martin A. Schreiber* MD, Deb Stein* MD,RN, Karen Brasel* MD, Kit Simpson Ph.D., Erin E. Fox Ph.D., Timothy Fabian* MD, University of California, San Francisco

Introduction: Complications following major trauma are believed to be common, however, granular data regarding the timing and frequency have been widely variable in the literature. The discrepancies reflect bias of institutional registries and retrospective data. As part of the PROPPR trial, complications were predefined and prospectively documented following randomization to either a resuscitation ratio of 1:1:1 (plasma:platelets:RBC) or 1:1:2 in trauma patients predicted to require a massive transfusion (MT). This study investigates the impact of resuscitation ratio on the timing and incidence of major complications.

Methods: PROPPR was a randomized, multi-center trial at 12 Level 1 trauma centers with an enrollment of 680 patients predicted to require MT. Patients were followed prospectively and assessed daily for development of complications. 23 complications were pre-defined prior to the start of the trial and grouped into minor and major categories. Time to complications was compared.

Results: 470 patients (69%) experienced a major complication including death and there was no difference in the number of patients having a major complication between groups (229 pts vs 241 pts; 67.8% vs. 70.5%, p=0.44). Although the mean number of major complications per patient was equivalent (mean 1.8 vs. 1.9, p=0.75), the timing to the first major complication was later in the 1:1:1 group (p=0.024, FIGURE). Excluding deaths in the first 24 hours, the mean number of major complications remained equivalent (1.9 vs. 2.0, p=0.61) and the difference in timing remained significant. Most complications occurred early with pulmonary and renal the most frequent (<72 hours) whereas infectious complications peaked after 5 days. There were no differences in frequency of pulmonary complications. Among survivors to discharge, 59% in the 1:1:1 group and 60% in the 1:1:2 group experienced >=1 major complications. 40 survivors in the 1:1:1 group and 32 in the 1:1:2 group experienced no major or minor complications. Complications were common in patients who died with 61% and 58% in each group having a major complication prior to death. For those with pre-existing co-morbidities, no treatment effect was found for the number of major complications (p>0.20).

Conclusion: Major complications tend to occur early following severe trauma and are extremely frequent events. Balanced resuscitation appears to decrease the frequency of early major complications following severe injury.



Note: Major complications include deaths if death occurred before other major complications.

Poster # 74

THE RISK OF MISSING HYPERFIBRINOLYSIS USING VISCOELASTIC GUIDED TRANEXAMIC ACID ADMINISTRATION

Michael W. Cripps MD, Alexander L. Eastman* MD, MPH, Brian H. Williams MD, Christian T. Minshall* MD,Ph.D., Steven E. Wolf* MD, Joseph P. Minei* MD, UT Southwestern/Parkland

Introduction:Injury induced hyperfibrinolysis is associated with high mortality; this is decreased with tranexamic acid (TXA) treatment within 3 hours of injury. Viscoelastic analysis identifies hyperfibrinolysis, making it possible to provide directed TXA treatment. Although many viscoelastic transfusion algorithms have decision points within 20 minutes, recent data has shown hyperfibrinolysis can occur later and might be missed with this strategy. Identification through alternative analysis of early results might predict these later events. We sought to find whether early clot strength results on the initial viscoelastic analysis can predict late hyperfibrinolysis.

Methods:Data was collected on patients with highest trauma team activation at an urban, Level 1 trauma center from February to October of 2014. Rotational Thromboelastometry (ROTEM) analysis was performed on arrival and standard demographic data collected. Clot strength was measured in millimeters (mm) of amplitude at 10 minutes (A10) in the EXTEM analysis. Early clot weakness was defined as an EXTEM A10 < 40mm. Early and late hyperfibrinolysis were defined as maximum lysis >15% in < 20 minutes and >21 minutes, respectively. Results are median [IQR] with Mann-Whitney analysis.

Results:141 patients with 21.3% penetrating injuries (n=30) were evaluated; 118 (83.7%) patients had no evidence of clot weakness on initial analysis (52.5mm, [47, 56]). However, 2 of these patients developed late hyperfibrinolysis (1.7%). 23 patients had evidence of initial clot weakness (30mm, [25.5, 35]), of which 10 (43.4%) developed hyperfibrinolysis. Of these, 5 (50%) developed late fibrinolysis. In those patients with EXTEM A10 < 40 mm, clot strength was significantly weaker in those patients with early hyperfibrinolysis compared to those patients with no fibrinolysis (17mm, [1, 26] vs 33mm, [30, 36])($p<0.01$). Conversely, there was no difference in EXTEM A10 values in those with late hyperfibrinolysis (28mm, [25, 35] vs 33mm, [30,36]). All patients with hyperfibrinolysis died (100% mortality). The odds ratio of developing hyperfibrinolysis with initial clot weakness (A10 < 40 mm) was 44.6 (95% CI 8.8 to 226.1)$p<0.001$.

Conclusion:Patients with early clot weakness are at high risk for hyperfibrinolysis. However, hyperfibrinolysis develops at different rates and patients who develop late hyperfibrinolysis cannot be predicted by early clot weakness alone. Further, a small percentage of patients can develop late hyperfibrinolysis with normal early clot strength. Algorithms that aim to administer tranexamic acid based on viscoelastic results should monitor the initial analysis until completion to ensure optimization of treatment for all patients.

Poster # 75

TRANEXAMIC ACID ADMINSTRATION PROTECTS AGAINST ACUTE LUNG INJURY FOLLOWING SHOCK CONDITIONS: AN IN VITRO MODEL

Mark E. Diebel MD, David M. Liberati MS, Lawrence N. Diebel* MD, Wayne State University

Introduction: Non-microbial factors released from the stressed gut after trauma/hemorrhagic shock (T/HS) result in a systemic inflammatory response and acute lung injury (ALI). Both ischemia/reperfusion (H/R) injury and intestinal luminal pancreatic proteases such as trypsin contribute to intestinal barrier injury in this setting. We have previously demonstrated that tranexamic acid (TA) in clinically relevant concentrations protect both the mucus and epithelial components of the intestinal barrier following exposure to H/R + trypsin in an in vitro model. We postulate that the protective effects noted on gut barrier function would mitigate ALI and remote organ injury following H/R in this model.

Methods: Caco-2/HT29-MTX intestinal cells were co cultured and cell monolayers were established in a two chamber culture system. Trypsin (5 μM) was added to the apical chamber media and co cultures subjected to 90 minutes of hypoxia followed by reoxygenation. In some experiments, TA at 6.3 or 24 μg/ml was added to the basal ("systemic") chamber immediately following hypoxia. Human pulmonary microvascular endothelial cells (HMVEC) were then incubated with basal media supernatants obtained from the Caco-2/HT29-MTX groups. HMVEC apoptosis, permeability to FITC-albumin, ICAM-1 surface expression and syndecan shedding were measured. HMVEC were directly incubated with TA in other experimental subgroups.

Results: (mean ± SD, N = 4 for each group)

	%apoptosis	Perm (nmol/cm^2/hr)	ICAM-1 (MFI)	Syndecan (ng/ml)
Caco-2/HT29-MTX sup.	4.4±0.5	0.32±0.02	9.9±1.1	26.2±0.5
Caco-2/HT29-MTX+tryp+H/R sup.	48.5±3.9*	2.10±0.08*	56.6±4.9*	98.9±8.2*
Caco-2/MTX+tryp+H/R sup.+TA direct(24 μg/ml)	41.7±4.1*	1.85±0.07*	50.7±4.5*	68.9±7.2*
Caco-2/MTX+tryp+H/R+TA(6.3 μg/ml)	10.8±1.6*#	0.60±0.04*#	20.1±1.9*#	48.7±3.5*#
Caco-2/MTX+tryp+H/R+TA(24 μg/ml)	9.6±1.3*#	0.52±0.05*#	18.2±2.2*#	30.6±3.8#

*p<0.001 vs. Caco-2/HT29-MTX sup., #p<0.001 vs. same group no TA and same group direct TA

Conclusion: Lung injury following exposure to non-bacterial factors associated with intestinal cell H/R was abrogated by treatment with TA. This was an "indirect" effect as it was associated with TA administration at only the intestinal cell level. A therapeutic window for TA administration following intestinal hypoxia was demonstrated in our study. These results support the concept that TA may have a protective anti-inflammatory effect following T/HS.

Poster # 76

THE PROGRESSION TOWARDS TIMELY AND COMPLETE HEMOSTATIC RESUSCITATION IN PENETRATING TRAUMA PATIENTS

Maria P. Garcia-Garcia MD, Carlos A. Ordonez* MD, Michael W. Parra MD, Marisol Badiel MD, Monica Morales Statistician, Johanna C. Rojas-Marquez MD, Linda Klimavicius Medical Student, Andres F. Dominguez MD, Juan P. Herrera-Escobar MD, Alvaro I. Sanchez MD,Ph.D., Boris Sanchez MD, Marcela Granados MD, Juan C. Puyana* MD, Fundacion Valle del Lili

Introduction: Hemostatic resuscitation (HR) has been associated with improved outcomes in severe hemorrhage. Optimal implementation of HR in a comprehensive and timely manner (within the golden hour) requires an accurate identification of high-risk patients and a learning curve of the entire hospital team, in order to obtain the best possible results. We evaluated the effectiveness of achieving complete and timely HR over an 11-year period (2002-13) in penetrating trauma patients (PTP) at a level I trauma center.

Methods: PTP (≥16 years) who underwent damage control resuscitation were included. Patients were divided into four groups according to blood products transfused and time from admission to transfusion (TT) initiation.

Results: A total of 201 patients were included, mean age was 29 years (SD 10.38). Median systolic blood pressure was 90 [66.5 to 117.25], and base excess was -10.3 [-15 to -8]. Massive blood transfusion was required in 74 (36.8%) PTP. TT was 62 min [36-104] in complete HR (RBCs +Plasma+ PTL) group vs. 102 [55.2-164.7] in the other 3 groups ($p<.01$). When evaluating institutional practices before and after 2006, total 24/h crystalloids was 9782cc [5621-15563] vs. 5500cc [3793-8067 ($p<.01$)], complete HR was delivered in 16/52 (31%) vs.83/149 (56%) patients ($p=.003$), and mortality was 19/52 (36.5%) vs. 26/149 [17.4% ($p=0.008$)].

	RBCs+Plasma+PTL 1:1:1 n=99 (49.3%)	RBCs n=60 (29.9%)	RBCs+Plasma n=31 (15.4%)	RBCs+PTL n=11 (5.5%)
	Median [IQR]	Median [IQR]	Median [IQR]	Median [IQR]
RBCs	6 [4 : 9]	2 [2 : 4]	4 [4 : 5.5]	5 [3 : 8]
TT RBCs	62 [36 : 104]	117 [66.5 :155.7]	64 [40 : 166.5]	80 [48.5 : 158.5]
Plasma	6 [4 : 8]	...	4 [3 : 4.5]	...
TT Plasma	92 [64 : 145]	...	124 [70.5 : 192.5]	...
PTL	6 [6 : 8.5]	...	...	6 [6 : 9]
TT PTL	95 [64.5 : 156]	...	...	95 [65.5 : 168.5]
TA	73 (73.7%)	21 (35%)	15 (48.4%)	7 (63.6%)
ISS	25 [20 : 34]	25 [16 : 29]	25 [16 : 34]	20 [17 : 25]
NISS	50 [34 : 50]	33 [23 : 41.2]	34 [25.5 : 50]	34 [26 : 44]
Mortality	28 (28.3%)*	11 (18.3%)*	4 (12.9%)*	2 (18.2%)*

RBCs: red blood cells, PTL: platelets, TT: time from admission to transfusion given in minutes, TA: tranexamic acid, *p=0.2618

Conclusion: Timely and complete HR was delivered to the most severe PTP (NISS≥50), with a mortality rate lower than similar matched NISS historical controls. Furthermore, this data showed that maturation in implementing HR is characterized by timely and efficient blood product delivery, decreasing crystalloid requirements and significantly improving outcomes in penetrating trauma at our institution.

Poster # 77

PREHOSPITAL PLASMA AND RED BLOOD CELLS TRANSFUSION IN TRAUMA PATIENTS

Yaser M. Baghdadi MD, Cornelius A. Thiels DO,MBA, Asad J. Choudhry MD, Mohammad A. Khasawneh MBBS, Stephanie F. Polites MD, Maile E. Parker MD, Donald H. Jenkins* MD, James R. Stubbs MD, Scott P. Zietlow* MD, Kathleen S. Berns APRN, CNS, M.S., Martin D. Zielinski* MD, Mayo Clinic, Division Of Trauma, Critical Care, And General Surgery

Introduction: The evolution of remote damage control resuscitation for injured patients now allows for hemostatic resuscitation with packed red blood cells (RBC) and plasma in the prehospital environment at select trauma centers. We hypothesize that hemorrhaging trauma patients transfused in the prehospital environment with RBCs alone would have a greater mortality than combined plasma and RBC resuscitation.

Methods: IRB approval was obtained to study trauma patients' ≥18 years of age who had prehospital blood product resuscitation between 2002 and 2014. Prehospital plasma transfusion was implemented at the beginning of 2009. As appropriate, data is presented as means ± standard deviation, medians (interquartile range), or percentages with univariate analyses performed. A p-value <0.05 was considered significant.

Results: A total of 160 patients were identified of whom 86 (54%) received plasma and RBC transfusions and 74 (46%) received RBCs alone (mean age 47 ± 23 years; 64% male). Patients had 2.6 ± 1.1 units for plasma/RBC versus 1.2 ± 0.5 units for RBCs alone (p<0.0001). Patients were transfused with median of 7 (4-14) total blood product units in the plasma/RBC group compared to 3.5 (1-10.3) units in the RBC along group (p=0.0005). There was no difference between plasma/RBC versus RBCs alone in terms of Injury Severity Score (ISS; 23 ± 13 vs. 26 ± 14, p=0.1) or Glasgow Coma Scale (GCS; 9 ± 6 vs. 10 ± 6, p=0.6). Patients who received plasma/RBCs had shorter durations of hospital (10 ± 9 vs. 21 ± 31 days, p = 0.0005) and intensive care unit stays (4 ± 5 vs. 11 ± 15 days, p = 0.0001) but ventilator days were similar (5 ± 5 days vs. 6 ± 5 days, p=0.6). In-hospital mortality rates were comparable (16% vs. 9%, p=0.2). Further univariate analyses demonstrated that age, platelet count, blood pressure, ISS, and GCS were associated with in-hospital mortality but the use of plasma did not confer a mortality benefit **(Table)**.

Conclusion: The use of plasma for remote damage control purposes did not affect mortality. Ongoing prospective studies are warranted in the use of blood products for remote damage control resuscitation.

Table: Univariate analyses for variables associated with in-hospital mortality.

Variable	Odds Ratio (95% CI)
Age*	1.03 (1.01 to 1.05)
Female compared to male	1.42 (0.55 to 3.60)
Each calender year for admission (2002 to 2014)	1.11 (0.96 to 1.33)
Hemoglobin at admission (each g/dL unit increase)	0.90 (0.72 to 1.15)
Platelet at admission (each unit x 10^9/L increase)*	0.99 (0.98 to 0.99)
Systolic Blood Pressure*	0.97 (0.96 to 0.99)
Heart Rate	0.99 (0.97 to 1.00)
Injury Severity Score*	1.07 (1.03 to 1.11)
Glasgow Coma Scale*	0.83 (0.73 to 0.91)
Plasma use	1.86 (0.73 to 5.17)
Per unit transfused in a prehospital setting	1.30 (0.87 to 1.79)
*indicates a statistical significance at a p-value <0.05	

Poster # 78

OBESITY-RELATED ADIPOSOPATHY CONTRIBUTES TO A HYPERCOAGULABLE STATE FOLLOWING TRAUMA

Robert D. Winfield MD, Isaiah R. Turnbull MD,Ph.D., Anja Fuchs Ph.D., Sarbani Ghosh MS, Christopher Davis BS, Grant V. Bochicchio* MD,MPH, Washington University School of Medicine

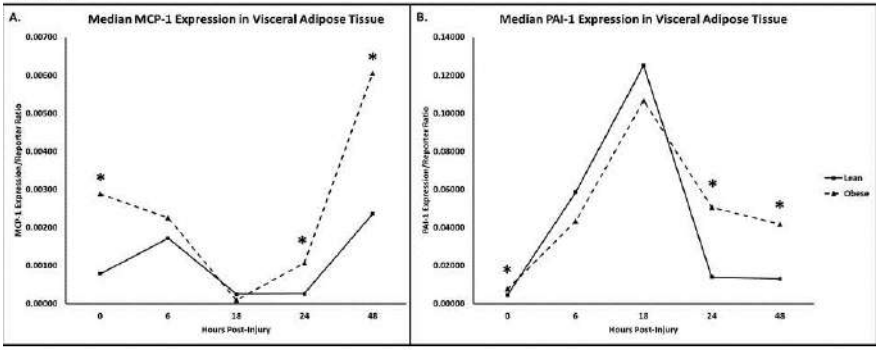
Introduction: In animal models and in retrospective human series, obesity has been found to correlate with diminished coagulopathy following trauma and greater rates of postinjury thromboembolic events. Obesity is associated with dysfunctional changes in adipose tissue known broadly as adiposopathy, which includes increased expression of the pro-inflammatory, procoagulant factors MCP-1 and PAI-1. We hypothesized that obesity-related adiposopathy would contribute to a hypercoagulable state following polytrauma insult.

Methods: Cohorts of male C57Bl/6J mice (n=6-18) were raised to 20-22 weeks of age. Obesity was induced utilizing a diet consisting of 60% kcal fat while control animals were raised on a diet with 10% kcal fat. Upon reaching appropriate age, animals were subjected to polytrauma (hepatic laceration, pseudofracture (proximal hindleg soft tissue crush injury followed by injection of isogenic bone homogenate), and 15% hemorrhage). At a series of time points pre- and post-injury, adipose tissue and blood were collected from animals for assessment of subcutaneous and visceral adipose tissue expression of procoagulant factors (PAI-1 and MCP-1) measured by RT-qPCR as well as these same factors measured in plasma via ELISA or multiplex assay.

Results: Obese animals were significantly heavier than controls (39 vs 29 gm, $p<0.001$). In subcutaneous adipose tissue, obese animals were noted to have elevated baseline expression of PAI-1 followed by persistently elevated PAI-1 expression at 24 hours and beyond (not shown). MCP-1 expression in subcutaneous adipose did not differ between cohorts . In visceral adipose, obese animals showed significantly elevated levels of both MCP-1 and PAI-1 at baseline followed by persistent and significant elevations in expression of these mediators at 24 hours and beyond (Figure 1). There were no significant differences seen between groups in plasma levels of PAI-1 or MCP-1 across the time period studied.

Conclusions: Obese animals display greater adipose tissue expression of MCP-1 and PAI-1 at baseline and persistently elevated expression of these procoagulant mediators following trauma. These data suggest that obesity-related adiposopathy contributes to a hypercoagulable state which is protective in the early post-injury period but which leads to venous thromboembolism in the long term. The absence of a differential increase in procoagulant factors in circulation indicates that hypercoagulability in obesity following trauma may be mediated through local interactions between adipose tissue and the vasculature.

Figure 1.



Poster # 79

FIELD INTUBATIONS OF CIVILIAN PATIENTS WITH HEMORRHAGIC SHOCK IS ASSOCIATED WITH HIGHER MORTALITY

Daisy Chou MD, Megan Harada BA, Galinos Barmparas MD, Eric Ley* MD, Daniel Margulies* MD, Rodrigo Alban* MD, Cedars-Sinai Medical Center

Introduction: Field intubation (FI) by Emergency Medical Services personnel on severely injured trauma patients remains a contentious practice. Clinical studies suggest an association between FI and adverse outcomes in patients with traumatic brain injury (TBI) and military tactical emergency casualty care recommends deferring intubation and providing supplemental oxygenation. Animal models with penetrating hemorrhagic shock demonstrate increased acidosis with intubation prior to resuscitation. The purpose of this study was to evaluate the impact of FI on outcomes in trauma patients with hemorrhagic shock requiring massive transfusion.

Methods: The Los Angeles County Trauma System Database was retrospectively queried for all trauma patients ≥ 16 years of age with hemorrhagic shock requiring massive transfusion (≥ 6 units PRBCs in the first 24 hours) between 2012 and 2014. Demographics, clinical and transfusion data, and outcomes were compared between patients who received FI and those who did not (NO-FI). Multivariate regression analysis was utilized to identify independent predictors of mortality.

Results: Of 552 trauma patients meeting inclusion criteria, 63 (11%) received FI and the remaining 489 (89%) were NO-FI. Mean age, gender, and blunt trauma were similar between FI and NO-FI. FI patients had a lower mean GCS (4 v. 10, $p<0.001$), a lower mean SBP (76 v. 104 mmHg, $p=0.001$), and a higher mean ISS (41 v. 31, $p<0.001$). Mortality was higher in FI patients (83% v. 43%, $p<0.001$). Transfusion patterns and scene time were similar in both groups. Multivariate analysis identified FI as a predictor of higher mortality (AOR: 3.7, CI 95% 1.7-8.0, p<0.001).

Conclusion: Field intubation is associated with higher mortality in trauma patients with hemorrhagic shock requiring massive transfusion. Less invasive airway interventions and rapid transport should be encouraged in this population.

	Field Intubation n=63	No Field Intubation n=489	*p*-value
Age (years)	35.1 ± 16.6	39.2 ± 18.2	0.090
Age ≥ 65 (years)	4.8%	10.2%	0.166
SBP ≤ 90 (mmHg)	51.7%	34.7%	**0.011**
ISS ≥ 16	95.2%	87.5%	0.072
MTP Activation	87.3%	71.4%	**0.021**
PRBCs in 24h (units)*	18.0 ± 13.6	17.6 ± 27.7	0.917
FFPs in 24h (units)*	7.6 ± 7.6	7.4 ± 8.2	0.898
Platelets in 24h (units)*	1.4 ± 1.8	1.5 ± 1.8	0.549
Cryo in 24h (units)*	0.5 ± 1.2	0.3 ± 0.6	0.254
Total Blood Products in 24h (units)*	23.7 ± 18.4	25.0 ± 21.5	0.641
Hospital LOS (days)	7.1 ± 12.6	18.1 ± 23.4	**<0.001**
ICU LOS (days)	10.1 ± 12.3	11.0 ± 13.6	0.721
Scene Time (min)	10.0 ± 7.5	10.6 ± 6.5	0.351
Mortality	82.5%	43.1%	**<0.001**

*1 unit = 350 mL

Poster # 80

REBOA Responder (IABO Responder) with Traumatic Hemorrhagic Shock who failed Fluid Resuscitation (Fluid Non-responder) could be Possible to Rescue

Tomohiko Orita MD, Shokei Matsumoto* MD, Tomohiro Funabiki MD,Ph.D., Yukitoshi Toyoda MD, Motoyasu Yamazaki MD, Masayuki Shimizu MD, Tomohiro Sato MD, Yousuke Kobayashi MD, Nao Hiroe MD, Taku Kazamaki MD, Yoshimi Nakamichi MD, Mitsuhide Kitano MD,Ph.D., Saiseikai Yokohamashi Tobu Hospital

Introduction: Fluid resuscitation and massive transfusion protocol (MTP) are important and effective strategy as initial resuscitation for traumatic hemorrhagic shock. But sometimes those who were not preferable response to them (Fluid Non-responder) are difficult to rescue. In such cases, resuscitative open aortic cross clamping or resuscitative endovascular balloon occlusion of the aorta (REBOA) would be performed as a temporary hemostasis treatment. But it is still unclear what cases is more effective and can rescue with REBOA. So we studied the relationship between the responsiveness to fluid resuscitation and REBOA.

Methods: Of 27209 trauma patients transported to our emergency and trauma center for last seven years, consecutive 42 patients underwent REBOA as a first-line resuscitation were included. All included patients were in traumatic hemorrhagic shock and focused assessment with sonography for trauma (FAST) were positive. 10Fr or 7Fr intra-aortic balloon occlusion (IABO) catheter kits were inserted at the supraphrenic level with Seldinger technique and ultrasonography guided method. And all of them were underwent fundamental hemostasis by operative management (OM) or transcatheter arterial embolization (TAE). They were sorted into responded group or non-responded group for REBOA. The primary end point was a survival rate in 30th days. Secondary end points were the complications with REBOA or IABO devices.

Results: 10 transient-responded patients for fluid resuscitation and 12 fluid non-responded patients were responded for REBOA (REBOA Responder group). 20 non-responded patients for fluid were not responded for REBOA (REBOA Non-responder group). There were no significant differences between age (REBOA Responder vs. Non-responder : 41.8 vs 49.2), rate of blunt trauma (19/22 (86%) vs. 18/20 (90%)), ISS (45.8+/-13.8 vs. 56.5+/- 21.8), amount of total fluid therapy (9225+/-7285ml vs. 7898+/-3590ml), rate of OM (17/22 (77%) vs. 17/20 (85%)), rate of TAE (10/22 (45%) vs. 5/20 (25%)) and total occlusion time by IABO device (53.6+/-31.2min vs. 72.8+/-26.8min). There were significant difference in the changes of systolic blood pressure before and after of REBOA (62.5+/-31.2mmHg vs. 28.3+/-33.9, $p=0.03$) and in the mortality (4/22 (18%) vs. 20/20 (100%), $p<0.01$). There were two complications (leg ischemia and aortic dissection) in REBOA Responder group but were not lethal.

Conclusion: The traumatic hemorrhagic shock patients with Fluid Non-responder, but Responder for REBOA could be possible to rescue.

Poster # 81

CLINICAL INDICATORS OF HEMORRHAGIC SHOCK DURING PREGNANCY

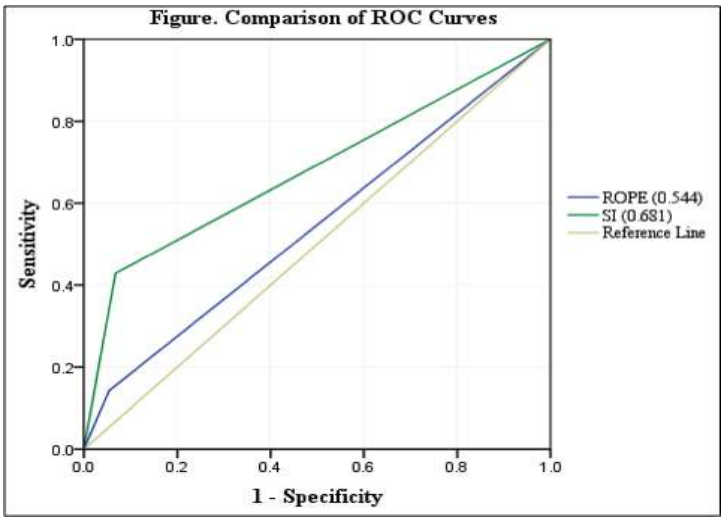
Peter C. Jenkins MD, Samantha Stokes BS, Jamie Coleman MD, Teresa Bell Ph.D., Ben Zarzaur* MD, IU Health Methodist Hospital

Background: During pregnancy, normal physiologic changes occur that often make it difficult for the clinician to recognize hemorrhagic shock. Several hemodynamic parameters have been promoted to help establish the diagnosis in trauma patients, but none have been validated in the pregnant population. The objective of this study was to compare the abilities of three different measures of shock to predict blood transfusion requirements among pregnant trauma patients.

Methods: This study included 81 pregnant trauma patients admitted to a high-volume trauma center (2010-2015). In separate logistic regression models, we tested the relationship between exposure variables – initial Systolic Blood Pressure (SBP), Shock Index (SI), and Rate Over Pulse Evaluation (ROPE) – and the outcome of transfusion of blood products within 24-hours of admission. To demonstrate the ability of each measure to predict the outcome, we compared dichotomous exposure variables (with cutoff points: SBP ≤ 90, SI > 1, and ROPE > 3) using Receiver Operating Characteristic (ROC) curves.

Results: A total of 10% of patients received blood products in the patient cohort.No patients had an initial SBP < 90, so that measure was excluded from analysis. We found that patients with SI > 1 were significantlymore likely to receive blood transfusions compare with patients with SI < 1 (OR = 10.35, CI 95% 1.80 – 59.62), whereas ROPE > 3 had no significant association with blood transfusion compared with ROPE < 3 (OR = 2.92, CI 95% 0.28 – 30.42). Furthermore, comparison of area under the ROC curve for SI (0.68) and ROPE (0.54) suggested that SI was more predictive than ROPE of blood transfusion.

Conclusion: Our findings demonstrated that SI detected hemorrhagic shock more effectively than both SBP and ROPE in pregnant patients. These results should prompt further research to validate our findings in a larger patient population.



Poster # 82

FORCED-CHOICE BLOOD TRANSFUSION ORDERS REDUCE TRANSFUSIONS IN CRITICALLY INJURED PATIENTS

Christopher P. Michetti* MD, Jeffrey Wright MPH, Heather A. Prentice MPH,Ph.D., Edmond Ng* MD, Elena Lita BS, Anna N. Bradford Ph.D., LCSW Inova Fairfax Hospital

Introduction: We examined the effect on blood usage of a new order set requiring selection of specific criteria for each red blood cell (RBC) unit (U), plasma (FFP), & platelet (P) transfusion (TX). **Methods:** TX data prospectively collected on Trauma ICU patients (pts), & compared for 12 mos. before (Pre) and 8 mos. after (Post) the order set started in April 2014. Criteria for RBC TX: 1U only for hemoglobin (Hgb) <7mg/dl in stable patients or <8 with angina, MI, cardiogenic shock; 2U if Hgb <5; multiple U if shock, hypotension, bleeding. Massive TX pts were excluded. Differences in demographics & outcomes Pre and Post were assessed with Student's *t* test, Wilcoxon-Mann Whitney test (continuous) and χ^2 test (categorical). The % pts with TX over time was compared with trend tests. Severity of illness (SOI) was graded from 1 (minor) to 4 (extreme). **Results:** Of 1,076 TICU pts (604 Pre, 472 Post), 244(23%) had a TX. Mean SOI was similar for TX pts (Pre 3.5±0.7 v. Post 3.4 ± 0.8, p=0.267).The percentage of pts getting TX (Fig.) decreased for all TX, RBC, & FFP. RBC TX overall, and RBC U per patient dropped by almost 50%. Pre & Post mortality (17% v.15%, p=0.44), and % blunt trauma (91 v. 93, p=0.32) were the same. Infections were lower in the Post group (3.3% v. 1.5, p=0.057). **Conclusions:** A significant reduction in RBC TX & incidence of TX was seen with forced-choice orders and strict selection criteria

TRANSFUSIONS	**PRE** n(mean ±SD)	**POST** n(mean ±SD)	**p-value**
% All patients TX'd	***162 (26.8%)***	***82 (17.4%)***	***<0.001***
% transfused FFP	***68 (11.3%)***	***32 (6.8%)***	***0.012***
% transfused platelets	47 (7.8%)	29 (6.1%)	0.298
% transfused RBC	***130 (21.5%)***	***53 (11.2%)***	***<0.001***
All units TX'd	100.8 ± 54.5	61.9 ± 47.0	0.117
FFP	28.2 ± 19.7	20.4 ± 22.7	0.425
Platelets	6.0 ± 4.6	5.4 ± 3.2	0.744
RBC	***66.6 ± 32.9***	***36.1 ± 22.9***	***0.036***
All U TX'd per patient	***2.0 ± 6.4***	***1.0 ± 5.0***	***0.006***
FFP	0.6 ± 2.3	0.4 ± 2.1	0.114
Platelets	0.1 ± 0.5	0.1 ± 0.5	0.350
RBC	***1.3 ± 4.1***	***0.6 ± 2.8***	***0.001***
U per patient getting TX	7.5 ± 10.6	6.0 ± 10.7	0.323
FFP U per pt TX'd	5.0 ± 5.2	5.1 ± 6.5	0.919
Platelet U per pt TX'd	1.5 ± 1.0	1.5 ± 1.4	0.866
RBC U per pt TX'd	6.2 ± 6.9	5.5 ± 6.5	0.532

Poster # 83

MODULATING THE BIOLOGIC ACTIVITY OF MESENTERIC LYMPH AFTER TRAUMATIC SHOCK DECREASES SYSTEMIC INFLAMMATION AND END ORGAN INJURY

Simone M. Langness MD, Todd W. Costantini MD, Koji Morishita MD,Ph.D., Brian P. Eliceiri Ph.D., Raul Coimbra* MD,Ph.D., University of California, San Diego

Introduction: Trauma/hemorrhagic shock (T/HS) causes the release of gut-derived pro-inflammatory mediators into the mesenteric lymph (ML) triggering a systemic inflammatory response and acute lung injury (ALI). We have previously shown that both electric and pharmacologic vagal nerve stimulation prevent gut barrier failure and alter the biologic activity of the ML after injury. We hypothesized that treatment with a pharmacologic vagal agonist after T/HS would attenuate the biologic activity of ML and prevent ALI.

Methods: Male Sprague-Dawley Rats underwent cannulation of the mesenteric lymph duct prior to T/HS or trauma-sham shock (T/SS). A separate cohort of animals was treated with the pharmacologic vagal agonist CPSI-121 (1mg/kg) during resuscitation with shed blood and normal saline. ML samples from each experimental group were injected into naïve mice to assess biologic activity. Pre- and post-infusion blood samples were analyzed for changes in STAT3 phosphorylation (pSTAT). Lung injury was characterized by histology and permeability. Changes in immune cell recruitment to the lung after the injection of ML were characterized using flow cytometry.

Results: T/HS lymph injected in naïve mice caused a systemic inflammatory response characterized by hypotension and increased monocyte pSTAT. Injection of T/HS lymph caused ALI confirmed by histology and increased lung permeability. Mice injected with T/HS + CPSI-121 lymph had stable hemodynamics and monocyte pSTAT levels similar to the animals injected with lymph from the T/SS group. CPSI-121 attenuated T/HS lymph-induced ALI based on histology and lung permeability data, which were similar to T/SS. There was an increase in the recruitment of pulmonary macrophages to the lung after injection of lymph from T/HS animals, which was attenuated in mice injected with lymph from animals treated with CPSI-121 after T/HS.

Conclusion: Treatment with CPSI-121 after T/HS attenuated the biologic activity of the ML and decreased acute lung injury. Given the superior clinical feasibility of utilizing a pharmacologic approach to vagal nerve stimulation, CPSI-121 is a potential treatment strategy to limit end organ dysfunction after injury.

Poster # 84

COMPARISONS OF FFP AND PRBC RESUSCITATION ON OXYGEN METABOLISM AND COAGULATION FOLLOWING FEMUR INJURY AND SEVERE HEMORRHAGE IN PIGS

Wenjun Z. Martini Ph.D., Kevin K. Chung MD, Andrew P. Cap MD, Charles E. Wade* Ph.D., Michael A. Dubick* Ph.D., John B. Holcomb* MD, US Army Institute of Surgical Research

Introduction: Damage control resuscitation strategy reducing crystalloid use and higher plasma to red blood cell ratios has been increasingly accepted and implemented in US trauma centers, but the metabolic responses of these resuscitation approaches remain unclear. This study compared resuscitation effects of LR, FFP alone, or PRBC+FFP on oxygen metabolism and coagulation in pigs with traumatic injury and hemorrhagic shock.

Methods: Femur fracture was induced in 21 pigs (40±1kg) using the captive bolt stunner at midshaft of the left legs of the pigs, followed by a hemorrhage of 60% estimated total blood volume (42 ml/kg). Pigs were then randomized to be resuscitated with either FFP (1x bled volume, n=7, FFP group), 1:1 ratio of FFP (21 ml/kg) and PRBC (21 ml/kg, n=7, PRBC+FFP group), or LR (3x bled volume, n=7, LR group). FFP and PRBC were made from matching donor pigs on the day prior to the study day. Pigs were monitored for 6h. Arterial and venous blood samples were taken at baseline (BL), 15 min, and 6h after the completion of resuscitation for measurements of oxygen metabolism and coagulation.

Results: BL measurements were not different between the groups. MAP has decreased to 50% of BL by the 60% hemorrhage but recovered close to BL and HR has increased but recovered close to BL after resuscitation in all groups. Compared to FFP alone, resuscitation with PRBC+FFP resulted in higher Hct, platelet count, oxygen delivery (DO_2); lower oxygen demand ($DemO_2$); and higher ratio of $DO_2/DemO_2$ (all $p<0.05$, see table), with no differences in fibrinogen levels, BE, or oxygen consumption. Clot strength (TEG-MA) was maintained by FFP alone or with PRBC (BL 71±1mm), but no recovery shown in LR until at 6h ($p<0.05$, see table). There were no differences in other TEG parameters.

Conclusions: Compared to LR, resuscitation with FFP alone or with PRBC (1:1) maintains coagulation. But similar to LR, FFP does not provide the benefit of correcting oxygen debt of PRBC+FFP. These data suggest that 1:1 ratio of FFP:PRBC sustains oxygen metabolism further than FFP or LR alone in early resuscitation for severe hemorrhage.

	MA (mm)		Lactate (mM)		Cardiac Output (L/min)		$DO_2/DemO_2$	
	15 min	6h	15 min	6h	15 min	6h	15 min	6h
LR	64±2	69±2	10±1	6±1	4.6±0.4	3.1±0.2	0.6±0.1	0.7±0.1
FFP	74±1	76±1	9±1	3±0	6.5±0.2	4.5±0.2	0.8±0.0	0.9±0.1
PRBC+FFP	70±1	72±2	8±1	1±0	4.4±0.5	2.7±0.2	1.3±0.1	1.5±0.1

Poster # 85

CAN IT GET EASIER THAN ABC?: A SEE "SI" FILE

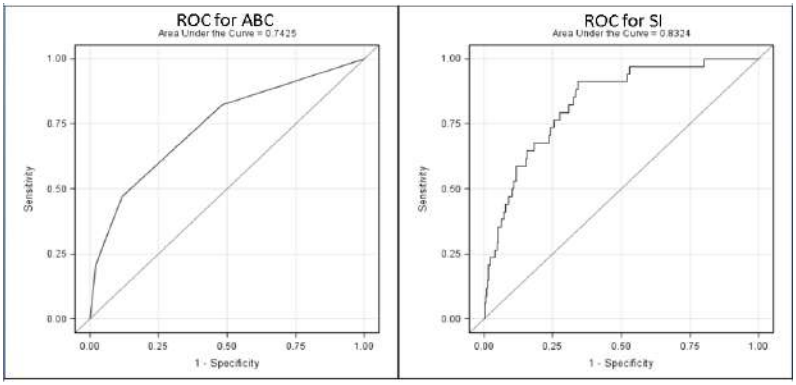
Jiselle B. Heaney MD,MPH, Rebecca Schroll MD, David Swift BS, Stuart Couch BA, Marquinn Duke MD, Norman McSwain* Jr., MD, Juan Duchesne* MD, Tulane School of Medicine

Introduction: Various scoring systems have been developed to predict need for massive transfusion in traumatically injured patients. Assessments of Blood Consumption (ABC) score and Shock Index (SI) have been shown to be reliable predictors for massive transfusion, defined as transfusion of >10 units packed red blood cells (PRBC). However, no study has compared these two scoring systems to determine which is a better predictor for massive transfusion. Primary objective was to determine if ABC or SI better predicts the need for massive transfusion in trauma patients.

Methods: Retrospective cohort design included all injured patients who required trauma activation between January 1, 2009 and December 31, 2013 at an urban level 1 trauma center. Patients <18 years old or with traumatic brain injury (TBI) were excluded. ABC and SI were calculated for each patient and compared. Ability to predict need for >10 units PRBC transfusion within the first day was calculated. Sensitivity, specificity, and area under the receiver operating characteristic curve (AUROC) were used to evaluate scoring systems.

Results: There were 645 patients that had complete data for analysis. Shock Index ≥1 had sensitivity of 67.7% and specificity of 81.3% for predicting transfusion of >10 units PRBC and ABC score ≥2 had sensitivity of 44.3% and specificity of 92.3%. AUROC analyses showed the strongest predictive value was SI followed by ABC score with area under the curve values of 0.83, and 0.74 respectively. SI had a significantly greater sensitivity (P=0.035), but a significantly weaker specificity (P<0.001) compared to ABC score.

Conclusion: ABC score and Shock Index can both be used to predict need for massive transfusion in trauma patients, however SI is a more accurate predictor and also requires less technical skill than ABC score.



Poster # 86

EXSANGUINATION SHOCK IN THE COMBAT ZONE

Michelle F. Buehner MD, Ramon F. Cestero* MD, Elizabeth A. Mannsalinas Ph.D.,RN, Jonathan B. Lundy MD, Michael S. Clemens MD, Kevin K. Chung MD, Lorne H. Blackbourne* MD, United States Army Institute for Surgical Research

Introduction: Although significant research has been dedicated to combat casualty care and improvement in mortality, little data exist on the cohort of combat casualties presenting with severe hemorrhagic shock. The goal of this study was to prospectively evaluate combat casualties with initial systolic blood pressures (SBP) ≤90 in order to delineate the differences in patients able to be successfully resuscitated with those who died from exsanguination.

Methods: All traumatically injured combat casualties arriving to a role 3 Combat Support Hospital (CSH) with initial SBP ≤90 from Jan 2012 –June 2014 were enrolled in this multicenter prospective observational study. Data was prospectively collected by on-site research staff including patient demographics, pre-hospital interventions, vital signs, laboratory values, surgical procedures, blood transfusions, and outcomes. Standard descriptive statistical methods were used; any categorical variables were compared via Chi-Squared and Fisher's exact test while continuous variables were compared via Student's t-test or Wilcoxon test as appropriate.

Results: 104 patients arrived to a level 3 CSH with SBP ≤90 and 30-day mortality was 33%. Those who died were more likely to have required cardiopulmonary resuscitation (CPR) and/or an emergency department thoracotomy (EDT) (74% and 44%, respectively; $p<0.001$). Hypotensive casualties who survived had a higher relative SBP, heart rate, hematocrit, pH, and a lower base deficit ($p<0.0001$). Blood products transfused in both survivors and non-survivors were similar with a majority receiving balanced hemostatic resuscitations. The most common etiology of death per physicians was exsanguination (66%), head injury (20%), and cardiac failure (6%). The median time of death was approximately 8 hours with 40% of all deaths occurring in the first 24 hours.

Conclusion: Hypotensive combat casualties receiving CPR on arrival were more likely to die (96%) as were patients requiring an EDT ($p<0.0001$). The temporal distribution of deaths showed that if a patient survives the first 24 hours of admission, they have a greater than 90% survival rate. Combat casualties arriving hypotensive and/or pulseless to surgical facilities have a significant expected mortality. While trauma care has largely improved in the combat setting, these data show we still need improvement in pre-hospital care and targeting ways to increase survival in those presenting with exsanguination shock.

Poster # 87

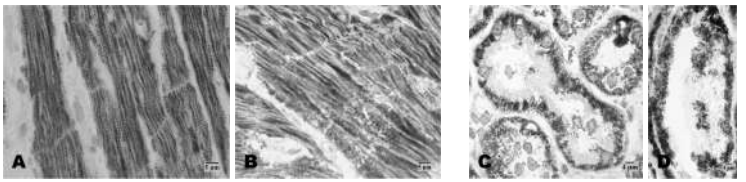
CAN OPTICAL MICROSCOPY DETECT MITOCHONDRIAL CHANGES FOLLOWING CRYSTALLOID RESUSCITATION OF HEMORRHAGIC SHOCK?

Alexandros N. Flaris MD, MSc, Audrey Passaret MSc, Catherine Vogt DVM, Dip LAS, Nicolas J. Prat MD,Ph.D., Peter W. Lundberg MD, Floran A. Reynard MS, Aphrodite D. Konstantinidou MD,Ph.D., Eric J. Voiglio* MD,Ph.D., FACS, FRCS Centre Hospitalier Lyon-Sud, UMR T9405, Université Lyon 1

Introduction: During hemorrhagic shock, mitochondria swell and their enzymatic activity diminishes. These changes have already been documented with the use of electron microscopy. However, for large volumes of specimens, a faster and less expensive method such as optical microscopy (OM) is desirable. To date, the literature on mitochondrial changes during shock, as observed under the OM, is scarce. Furthermore, there is a lack of studies on the *in situ* activity of Cytochrome C Oxidase (COX), an enzyme that exists only within mitochondria. The aim of this study was to fill in these two gaps; we tried to use optical microscopy to determine the histological changes of COX-stained rat tissues following hemorrhagic shock treated with fluid replacement.

Methods: 17 male Wistar rats were allocated to three groups: sham (n = 2), control (only surgery, n = 4) and normal saline (NS) group (bleeding, treated with NS, n = 11). Hemorrhagic shock was established by exsanguination to a mean arterial systolic blood pressure of 40 mm Hg for 60 minutes. After shock, the rats received NS, (twice the volume of blood removed). Rats were sacrificed 24 hours later and snap frozen tissue biopsies from heart and kidney were obtained, stained for COX, and examined via OM.

Results: **Heart: Normal** (Fig. A)**:** Three mitochondrial populations can be identified: perinuclear, sub-sarcolemmal and interfibrillary (IF) mitochondria; a regular striation pattern can be noted. **Control:** minimal inter- and intra-cellular edema and rare contraction bands. **Shock** (Fig. B)**:** Inter- and intra-cellular edema is more pronounced and depends on the volume of NS infused. Dissolution of the perinuclear mitochondria, accentuation of sub-sarcolemmal mitochondria, and loss of striations. **Kidney: Normal** (Fig. C)**:** Densely packed oblong mitochondria in the infranuclear part of the tubular cells can be observed; different tubules can be identified according to COX activity patterns. **Control:** Minimal to no edema. **Shock** (Fig. D)**:** Swollen mitochondria, acute tubular necrosis and extracellular edema. Inter- and intra-cellular variability in COX activity was minimal in all **normal cells** and increased in all **cells in shock**.



Conclusion: Crystalloid resuscitation of hemorrhagic shock in rats precipitates mitochondrial changes in cardiac myocytes and renal tubular cells that can be observed with OM. The severity of these changes depends on the volume of crystalloid infusion. Although the diagnosis of shock does not depend on microscopic analysis, the method outlined herein is simple and can be used to quickly and inexpensively analyze the severity of shock at the cellular level; this method can also be used to evaluate the histologic effects of experimental treatments.

Poster # 88

A CLOSER LOOK AT TXA: EXAMINING UTILIZATION AND OUTCOMES

Margaret M. Moore MD, Rebecca W. Schroll MD, Amy E. Lawrence BS, Alan B. Marr* MD, John P. Hunt* MD, Patrick S. Greiffenstein MD, LSU Department of Surgery

Introduction: Several studies have shown an increased survival benefit in trauma patients at risk of significant hemorrhage who receive TXA. Administration of TXA, however, is ultimately dependent on the trauma team leader's clinical discretion and may therefore be underutilized. We hypothesized that use of a visual prompt (VP) would improve the utilization of TXA and that TXA use would result in a decreased mortality.

Methods: All trauma activations in a regional Level 1 trauma center over a 29 month period ending in September, 2014 were reviewed. TXA was administered to all patients at risk of significant hemorrhage at surgeon discretion. A VP in the form of a sticker placed on the blood bank cooler was implemented 13 months after the introduction of TXA at our center. Data were analyzed using student's t-test, Chi square analysis and multivariate logistic regression.

Results: There were 3744 trauma activations during the study period. Seven hundred fifty six patients met criteria for administration of TXA based on need for blood transfusion in the ED and/or SBP <90. Of this population, the average age was 37, 78% were male, 44% were penetrating trauma, with an average ISS of 20.2 (SD +/- 11.6) and an overall mortality 22%. Immediate operative intervention was performed in 45% and 92% had a transfusion requirement while in the ED. Of the patients who met criteria for TXA, 89 (12%) received it and only 12 patients received both doses. Implementation of the VP increased utilization of TXA from 9% to14% ($p = 0.026$, OR 1.7, 95% CI 1.085-2.702). There was no statistically significant difference in the development of VTE in the patients who received TXA versus those who did not. The group who received TXA had significantly higher ISS scores (25 vs 20, $p<0.0001$) and significantly higher overall mortality (32% vs 20%, $p=0.013$, 95% CI 1.160-2.624) but there was no difference in 24 hour mortality. However, multivariate analysis showed TXA had no association with increased mortality ($p=.421$, 95% CI 0.644-2.870).

Conclusion: TXA utilization is a challenge in our trauma population. Implementation of a VP improved utilization of TXA but had no effect on administration of the second dose. Patients who did receive TXA had a significantly higher mortality rate but also a significantly higher ISS. Further analysis demonstrated that this was not attributable to TXA but rather due to selection bias for more severely injured patients. The high acuity in our patient population, as evidenced by the high ISS, mortality rate and use of blood transfusions, also suggests significant underutilization of TXA in a population that meets clinical criteria.

Poster # 89

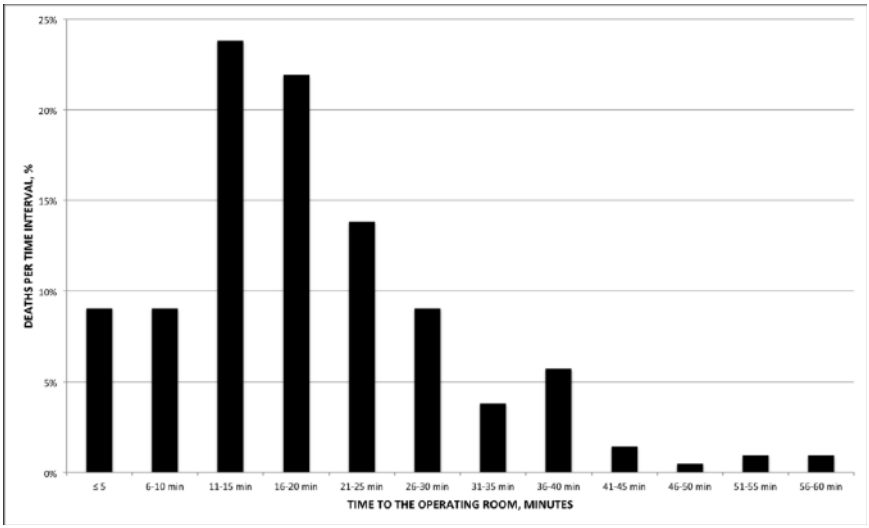
EFFECT OF TIME TO OPERATION FOR GSW AFFECTS MORTALITY: THE GOLDEN 10 MINUTES

Jonathan P. Meizoso MD, Juliet J. Ray MD, Casey J. Allen MD, Tanya L. Zakrison MD,MPH, FACS, Gerd D. Pust* MD, FACS, Enrique Ginzburg* MD, FACS, Louis R. Pizano* MD, MBA, FACS, Carl I. Schulman* MD,Ph.D., MSPH, FACS, Alan S. Livingstone MD, FACS, Kenneth G. Proctor Ph.D., Nicholas Namias* MD, MBA, FACS, FCCM University of Miami

Introduction: Optimal timing from ED arrival to operation for GSW is not established. Hemorrhagic shock leads to early death from bleeding or late death from MSOF. We hypothesized that time spent in the ED increases all cause mortality in GSW.

Methods: Registry review at a level 1 TC. Patients ≥18 years with GSW requiring operation directly from ED to OR from 01/2004-09/2013 were included; exclusions were TBI, transfer from outside institution, & >1 hour to OR.

Results: 975 patients were included (age 31.2±11.9 years, 92% male, ISS 22±15, HR 95±36, SBP 109±46, GCS 13±4, & BD -6±8 mEq/L). Mean time to OR was 20±13 min. Overall mortality was 22%. Patients were divided into 5-minute intervals up to one hour from arrival to the ED. Mortality increased with time to OR up to 10-15min, then decreased. The ≤15min group and >15min group were similar in age, HCT, HR, SBP, GCS, and ISS. A more severe base deficit (BD) was seen in the >15min group (6 vs. 5, p=0.04). The dose of time leading to a 50% cumulative mortality (L T50) was 17 minutes.



Conclusion: Patients with GSWs that require operative intervention should be taken to the OR expeditiously (LT50=17min). The >15min group appears to have decreasing mortality due to a survival bias, despite worse BD. Protocols should be designed to shorten ED time.

Poster # 90

PROGNOSIS OF PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY WITH GLASGOW COMA SCALE OF 3 IS PREDICTED BY SIMPLE CRITERIA KNOWN ON ED ARRIVAL

Matthew M. Carrick* MD, Kristin Salottolo MPH, Charles W. Mains MD, Denetta S. Slone* MD, David BarOr MD, The Medical Center Of Plano

Introduction: Severe traumatic brain injury (TBI), commonly defined as a Glasgow coma scale (GCS) score of 3-8, accounts for approximately 9% of TBI injuries. Prognosis in the most severe patients presenting with GCS 3 is grim, with mortality in some series approaching 100%. Difficulties in prognosis lie in the population heterogeneity; prior studies are largely represented by transportation-related TBI, whereas now several cohorts of TBI have emerged, including elderly falls from low height. Our purpose was to examine the prognosis of patients with TBI and GCS 3 across the following injury cohorts: vehicular, fall, sporting, assault, gunshot wound (GSW), and other injuries (blast, crush, explosion, suicide attempt).

Methods: We identified patients with TBI (ICD-9-CM diagnosis of 851.0-854.2) presenting to the ED with a GCS 3 between 2009-2013 using trauma registry data at three trauma centers (2 L1, 1 L2); there were no exclusions. We used chi-square and multivariate stepwise logistic regression analyses to compare injury cohorts for the following outcomes: in-hospital mortality, favorable disposition defined as discharge to home or rehabilitation, and development of a complication.

Results: There were 663 patients with severe TBI presenting with a GCS 3: vehicular accidents (46%), falls (31%) and sporting injuries (12%) were most common. Outcomes were as follows: 41% mortality, of which 8% were DOA and 10% died in the ED; 45% favorable disposition to home or rehabilitation (75% favorable among survivors); 42% developed a complication. Mortality was significantly different by injury cause, and was greatest in GSW reaching 100% (table). Favorable disposition was also significantly different by injury cause, and was greatest in sporting and assault injuries, where two-thirds were discharged home or to rehabilitation (table). Complications were significantly lower in GSW injuries likely due to survival bias; otherwise complications were similar in all other injury groups (p=0.50). Independent predictors of survival included concussion (OR: 17.2 (4.0-74.9), younger age < 65 (OR: 4.8 (2.1 – 11.0), and normal ED vital signs (OR: 3.4 (1.9-6.2), p <0.001 for all. However, only in vehicular injuries did mortality differ in those with normal vs. abnormal ED vital signs (26% vs. 49% mortality, p < 0.001); in all other causes of injury ED vital signs were not prognostic.

Conclusion: Despite being classified as severe TBI using GCS 3 criteria, there was high survival as well as favorable disposition to home or rehabilitation among survivors in certain injury cohorts. Thus, suspicion (and confirmation) of TBI and presentation with GCS 3 are not universally indicative of poor prognosis. Clinicians may be able to use limited information upon ED arrival, such as age, vital signs and cause of injury, to help determine likelihood of survival to discharge and favorable discharge disposition.

Table. Characteristics of the TBI population with GCS 3, by cause of injury

Covariate / Outcome %	Vehicular (n=311)	Fall (n=195)	Sporting* (n=81)	Other** (n=28)	Assault (n=27)	GSW (n=21)	P value
Age ≥ 65	14%	43%	16%	7%	7%	5%	**<.001**
Concussion as only TBI	17%	5%	21%	0%	33%	0%	**<.001**
Abnormal vital sign in ED	58%	41%	53%	61%	41%	76%	**0.001**
In-hospital mortality	39%	46%	19%	57%	22%	100%	**<.001**
Development of a complication	45%	37%	43%	36%	41%	10%	**0.03**
Disposition: home or rehabilitation	48%	34%	67%	29%	67%	0%	**<.001**

*Ski, snowboard, snowmobile, ATV, horse, bike, boating injuries; **Blast, crush, explosion, suicide attempt

Poster # 91

Conscious status is associated with the likelihood of trauma center care and mortality in patients with moderate to severe TBI

Hatim A. Alsulaim MD,MPH, Anthony O. Asemota MD,MPH, Blair J. Smart BS, Joseph K. Canner MHS, Aslam Ejaz MD,MPH, R S. Haring MPH, David T. Efron* MD, Catherine G. Velopulos* MD, MHS, Elliott R. Haut* MD,Ph.D., Eric Schneider Ph.D., Johns Hopkins School of Medicine

Background: Studies of patients with traumatic brain injury (TBI) conducted using administrative data frequently detect greater mortality among individuals treated in trauma center (TC) vs. non-trauma center (NTC) hospitals, even after controlling for anatomical injury severity. Most such studies have not accounted for patient consciousness. We investigated whether patient conscious status as derived from ICD-9-CM diagnosis codes in a large administrative dataset, was differentially associated with treatment at a TC vs. NTC as well as with in-hospital mortality among patients with moderate-to-severe TBI.

Methods: The Nationwide Emergency Department Sample (NEDS) from 2006-2011 was queried and all patients meeting CDC criteria for TBI were identified. Body region-specific Abbreviated Injury Scale (AIS) scores and loss of consciousness (LOC) (dichotomized as no/brief vs. extended > one hour) were computed for each patient from ICD-9-CM classifications and modifiers. Patients with isolated head/neck AIS scores ≥3 were included and those with undefined/unidentified LOC status were excluded. Level 1 and 2 trauma centers were classified as TC and non-trauma center hospitals as NTC, patients at level 3 trauma centers or in collapsed categories that included level 3 centers were excluded. Primary outcomes examined included likelihood of TC vs. NTC treatment and in-hospital mortality. In analyses stratified by age (<65 vs. ≥65 years), multivariable logistic regression (MLR) models controlling for gender, age, mechanism of injury, Charlson comorbidity index, insurance status and AIS were compared with identical models that also included LOC.

Results: A total of 66,636 patients with isolated TBI were identified, of whom 15,761 (23.6%) were excluded for missing LOC status. Among the remaining 50,875 patients, 59.0% were male, 54.0% were ≥65 years old and 56.7% were treated in a TC. Overall, 27.3% of patients had extended LOC. Patients with extended LOC were proportionally more likely to be treated in a TC vs. those with no/brief LOC (71.1% vs. 51.4%, p<0.001). As anticipated, treatment at a TC vs. NTC was associated with increased odds of mortality among younger patients [OR 1.91 (unadjusted) vs. 1.84 (MLR)], however accounting for LOC significantly mitigated this relationship [OR 1.25 (MLR adjusted for LOC)]. Similar between-model differences were also observed among older patients; however the TC vs. NTC effect size was reduced.

Conclusion: Patients with extended LOC were more likely to be treated at TCs and more likely to die than similarly injured individuals at NTCs after accounting for injury-related and patient-level factors. Accounting for patient LOC reduced the observed difference in odds of mortality between TC and NTC facilities by 70%. These findings suggest that measures of consciousness should be included when assessing TBI outcomes using administrative databases.

Odds of mortality comparing TC vs. NTC, stratified by age group

	Unadjusted [1]			Adjusted, excluding LOC [2]			Adjusted, including LOC [3]		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
Young adult (18-64)	1.91	1.74 , 2.08	<0.001	1.84	1.64 , 2.08	<0.001	1.25	1.11 , 1.43	<0.001
Old adult (65+)	1.55	1.44 , 1.66	<0.001	1.43	1.32 , 1.55	<0.001	1.22	1.13 , 1.33	<0.001

1; crude odd ratio
2; adjusted for age, gender, AIS, mechanism of injury, Charlson Index, insurance status
3; adjusted for age, gender, AIS, mechanism of injury, Charlson Index, insurance status + LOC

Poster # 92

BAD DEBT AND GOOD BILLING: FINANCIAL BURDEN RISKS AND RELIEF

Ricard N. Townsend* MD, Stephen C. Hafertepen MD, Kirellos R. Zamary MD, Rachel C. Dirks Ph.D., Amy M. Kwok MD, Nicholas R. Thiessen MD, UCSF Fresno

Introduction: An unexpected financial burden is part of the cost of trauma care. Insurance and grant programs have been designed to help alleviate this burden, but many patients are not aware of financial assistance options. The burden resulting from patient bills and multiple billing cycles has not been studied. We hypothesized that uninsured patients bear the greatest financial burden and are at greatest risk for bad debt. Secondary hypotheses included a higher likelihood of bad debt among patients with greater injury severity, higher total charges, or a penetrating mechanism of injury.

Methods: A retrospective review of all trauma patients from 1/11-12/11 was performed at a non-profit, safety net hospital with a level 1 trauma center. Data points included patient demographics, injury related information, and financial information. Patients were stratified by insurance type to evaluate the likelihood of having bad debt. Additional analysis was performed based on the following: ISS ($< \text{or} \geq 15$), mechanism of injury (blunt or penetrating), and total charges ($< \text{or} \geq \$100{,}000$). Hospital revenue from trauma (HRT) was calculated as the sum of patient and insurance payments and disproportionate share hospital (DSH) funding allocated to accounts. Hospital charges (not costs), adjusted bills, and payments were reviewed and analyzed using Chi square and logistic regression.

Results: 3360 patients were analyzed and had an average total charge of $81,256. 17.7% of all patients were sent for bad debt to non-hospital billing services. Type of insurance ($p<0.001$), total charge $< \$100{,}000$ ($p<0.001$), penetrating injury ($p<0.001$), and ISS ≤ 15 ($p=0.01$) were significant independent variables associated with bad debt. After controlling for confounding variables, patients without insurance (OR=12.7, CI=9.7-16.1, $p<0.001$), patients with private insurance (OR=8.0, CI=5.9-10.8, $p<0.001$), and patients with total charges $< \$100{,}000$ (OR=1.6, CI=1.2-2.2, $p=0.004$) were more likely to have bad debt. Although patients with no insurance or private insurance were most likely to have bad debt, the groups differed greatly. Private insurance patients accounted for 59% of HRT despite being only 18% of the trauma population while uninsured patients accounted for 30% of the trauma population and only 7% of HRT.

Conclusion: Uninsured patients and patients with private insurance, especially those with charges $<\$100{,}000$, are at the greatest risk of bad debt. Strategies such as assisting in the application for insurance and proactively negotiating billing should be implemented prior to discharge in the patients identified as high risk for financial burden.

Poster # 93

IMPACT OF THE AFFORDABLE CARE ACT ON TRAUMA CENTER FINANCIALS

Thomas G. Cheslik BS, Chaitanya Bukkapatnam BS, Charles H. Dabbs MD, A P. Ekeh MD, Mary C. McCarthy* MD, Wright State University

Introduction: Hospital financial pressures and inadequate reimbursement contribute to the closure of trauma centers. Uninsured patients contribute significantly to the burden of trauma center costs. The Affordable Care Act was implemented in April 2014 to provide health care coverage for all Americans. This study analyzes the impact of the recent health care changes on trauma center financials.

Methods: We conducted an analysis of trauma charges at an Ohio Level 1 trauma center. A three-year trauma patient cohort (2012-2014) was selected and grouped by reimbursement source (Medicare, Medicaid, other government, commercial, and self-pay/charity). Data was collected and analyzed with the Transition Systems Inc. accounting system.

Results: Self-pay/charity charges decreased substantially (9.5% to 4% of total charges) Medicaid increased (21.4% to 25.9% of total charges) (see Table 1). Table 2 shows the number of trauma patients and net revenue for 2012-2014.

	2014		2013		2012	
	Charges ($)	%	Charges ($)	%	Charges ($)	%
Commercial	72,553,784	34.5	74,704,875	36	86,891,198	36.7
Medicare	62,872,208	29.9	61,996,197	29.9	62,647,700	26.4
Medicaid	54,314,109	25.9	37,272,540	18.2	50,690,091	21.4
Other Gov.	11,796,195	5.6	12,312,719	5.9	14,300,437	6
Self-Pay/ Charity	8,597,187	4	21,039,155	10.1	22,455,235	9.5
Total	210,106,483	100	207,328,486	100	236,984,661	100

TABLE 1: Trauma center charges by reimbursement type for 2012-2014.

	Number of Patients (N)	Net Revenue ($)	[Net Rev ($)]/N
2014	3,245	58,832,047	18,130
2013	3,276	51,323,791	15,667
2012	3,134	58,101,318	18,539
Total	9,655	168,257,156	17,427

TABLE 2: Total number of patients (N) and net revenue for 2012-2014.

Conclusions: In the first year following the implementation of the Affordable Care Act, self-pay/charity charges have decreased and Medicaid charges have increased. Although more data collection and analysis need to be done, this is an initial step toward evaluating the beneficial effects of the Affordable Care Act on trauma centers.

Poster # 94

LOST TO FOLLOW-UP: FACTORS ASSOCIATED WITH PATIENT DROPOUT IN RESEARCH INVOLVING TRAUMA PATIENTS

Elizabeth Benjamin MD,Ph.D., Cesar Perez BS, Duke Yamashita DDS, Jenny Brook MS, Theodore Robles Ph.D., David Elashoff Ph.D., Vivek Shetty DDS University of California, Los Angeles

Introduction: Loss to follow-up is common problem in research studies involving vulnerable (socioeconomically and racially marginalized) populations, especially those who have sustained major trauma. High attrition rates can compromise achievement of the study goals, introduce bias and threaten the validity as well as the generalizability of the research findings. A better understanding of factors associated with the high drop-out rates seen in trauma populations are essential to the development of appropriate recruitment and retention strategies.

Methods: We evaluated factors associated with loss to follow-up in a cohort of 158 trauma patients enrolled in a prospective study of traumatic stress biomarkers. The subjects were recruited from the pool of patients seeking care for traumatic injury at a large urban Level 1 Trauma Center. Information on a detailed set of sociodemographic and psychological variables was collected at the time of hospital admission and approximately 1 month post-injury (FU1). Univariate and multivariate analyses were used to determine factors associated with non-completers that missed follow-up appointments.

Results: Most enrolled subjects were young (34.4 years ± 13), single (73.4%), Hispanic (65.2 %), males (76 %) with high school or less education (60.2%). A total of 53 subjects (34%) did not return for the scheduled FU1 visit. In a univariate logistic regression analysis, pain was significantly (OR=3.64, p=0.009) related to the probability of being a non-completer. For the multivariate analysis, using stepwise multiple logistic regression, non-completers were more likely to be African-American (OR=2.83, p=0.09), married or living with a partner (OR=2.54, p=0.05), be age 30 or younger (OR=2.11, p=0.10). Non-completers were also less likely to manifest pain (OR=0.33,p=0.06).

Conclusion: Loss to follow-up is a major problem with research studies involving vulnerable populations with traumatic injury. Individuals lost to follow-up are a clinically and demographically different patient population from those who return for scheduled visits. Intervention strategies include culturally-competent research staff and care coordinators, the use of incentives, and well articulated and intensive patient tracking systems.

Poster # 95

MASSACHUSETTS HEALTH CARE REFORM REDUCES INTER-FACILITY TRANSFER

Wenjun Li Ph.D., Holly Hackman MD, Selwyn Rogers* Jr., MD, Sylvia Hobbs* MPH, Turner Osler* MD, University of Massachusetts

Introduction: Inter-facility transfer affects medical outcomes and costs of trauma care. The goals of the 2006 Massachusetts Health Care Reform include expanding insurance coverage and reducing total care cost. The impact of HCR on inter-facility transfer is unknown.

Methods: We analyzed live discharge dispositions of 429,810 trauma patients of age 18 to 64 years in the State Inpatient Data from Massachusetts (MA) and New York (NY) for the pre-HCR period (2002-2006) and the post-HCR period (2008-2012). NY served as the non-HCR control. Using a difference-in-difference approach, we compared pre-post changes in inter-facility transfer, stratified by race/ethnicity and payer type.

Results: As shown in Table 1, inter-facility transfers occurred more frequent in MA than NY, among privately insured patients, and among patient of white race. Among privately insured patients, inter-facility transfers decreased in MA but increased in NY during the post-HCR period. Among Medicaid recipients, post-HCR reductions were larger in MA than in NY, for all three racial/ethnic groups.

Table 1 Percent of inter-facility transfers (* p<0.05)

		MA			NY			Diff. in Diff.
	Total N	Pre	Post	Diff.	Pre	Post	Diff.	
Privately insured patients, age 18-64 years								
Overall	286,175	16.2	13.8	**-2.4***	11.4	12.4	**1.0***	**-3.4***
White	236,744	16.5	14.1	**-2.4***	11.9	13.0	**1.1***	**-3.6***
Black	29,282	15.5	13.7	-1.9	10.4	10.8	0.4	**-2.3***
Hispanic	20,149	10.4	9.8	-0.5	7.0	8.5	**1.6***	**-2.1***
Medicaid recipients, age 18-64 years								
Overall	143,635	21.6	16.4	**-5.2***	13.1	12.4	**-0.7***	**-4.5***
White	76,789	22.6	17.8	**-4.8***	15.7	14.8	**-1.0***	**-3.9***
Black	39,957	20.8	13.3	**-7.6***	11.8	10.8	**-1.0***	**-6.6***
Hispanic	26,889	16.6	13.2	**-3.4***	8.3	8.5	0.2	**-3.6***

Conclusions: MA HCR reduced the extent as well as racial disparities in inter-facility transfers. However, Hispanic-white disparities persisted after HCR. Future studies should investigate the underlying mechanisms and impact on medical outcomes to improve transfer policy and practice.

Poster # 96

MASSACHUSETTS HEALTH CARE REFORM INCREASES DISCHARGES TO HOME HEALTH CARE

Wenjun Li Ph.D., Turner Osler* MD, Holly Hackman MD, Hyung-joo Kang MS, Sylvia Hobbs MPH, Selwyn O. Rogers* Jr., MD, University of Massachusetts

Introduction: Post-hospitalization care is important to restore function and improve quality of life among trauma patients. The goals of the 2006 Massachusetts Health Care Reform (HCR) include expanding insurance coverage and reducing health care cost. The impact of HCR upon disposition of trauma patients is unknown.

Methods: We analyzed live discharge dispositions of 429,810 trauma patients of age 18 to 64 years in the State Inpatient Data from Massachusetts (MA) and New York (NY) for the pre-HCR period (2002-2006) and the post-HCR period (2008-2012). NY served as the non-HCR control. A difference-in-difference approach compared pre-post changes in discharges to home health care, stratified by race and payer type.

Results: Discharges to home health care were nearly twice more frequent in MA than NY, and less likely among black and Hispanic patients with a private insurance. Among privately insured patients, post-HCR increases in discharge to home health care were significantly larger in MA than NY.

Table 1 Percent of discharges to home health care (* p<0.05)

	MA			NY			Diff. in Diff.
	Pre	Post	Diff.	Pre	Post	Diff.	
Privately insured patients, age 18-64 years							
Overall	15.8	19.2	**3.4***	8.9	11.1	**2.2***	**1.2***
White	16.1	19.4	**3.4***	9.4	11.6	**2.3***	**1.1***
Black	13.9	16.7	**2.8***	6.8	9.3	**2.5***	0.3
Hispanic	13.0	17.3	**4.3***	7.1	8.9	**1.8***	**2.5***
Medicaid recipients, age 18-64 years							
Overall	13.0	14.1	**1.1***	5.5	7.5	**2.1***	**-1.0***
White	13.4	14.3	0.9	6.2	8.1	**1.9***	**-1.0***
Black	10.1	12.0	1.9	4.6	6.5	**1.8***	0.1
Hispanic	14.0	14.9	1.0	4.9	7.7	**2.8***	-1.8

Conclusions: MA HCR increased the discharges to home health care among privately insured patients of age 18-64 years, but not Medicaid recipients. Reasons for and consequences of the increases should be investigated.

Poster # 97

ECONOMIC ASSESSMENT OF ORTHOPEDIC TRAUMA PROCEDURES AT A LEVEL I TRAUMA CENTER AND FINANCIAL FEASIBILITY OF FUNDING A DEDICATED ORTHOPEDIC TRAUMATOLOGY PRACTICE

Ashley B. Hink MD,MPH, Michael Bard MD, Eric Toschlog* MD, Brett Waibel MD,
Brody School of Medicine at East Carolina University

Background: Orthopedic injuries are the most frequently encountered injuries requiring operative management on inpatient trauma services. Private orthopedic surgeons perform most orthopedic traumatology services, however fewer are practicing traumatology, often citing poor payer mix and reimbursement concerns as deterrents although little published data are available to support this. The purpose of this study is to assess the financial impact of orthopedic trauma at a Level I trauma center and to determine if an integrated orthopedic traumatology service within the department of acute care surgery could be financially sustainable.

Methods: This is a retrospective analysis of inpatient, non-spine orthopedic trauma surgical procedures performed over 2 years at a Level I trauma center that contracts trauma orthopedic services with private orthopedic surgeons. The NTRACS database was queried for patient demographics, payer sources and orthopedic procedures. The total physician fee reimbursement and hospital-supported call pay were used to determine the annual financial support to fund orthopedic traumatology. The Medical Group Management Association (MGMA) annual report and institutional human resources data were used to determine orthopedic surgeon and advanced level practitioner (ALP) salaries and annual expenses.

Results: A total of 3083 trauma orthopedic surgical procedures were performed on 1448 patients over 2 years. Reimbursement was provided by 10 unique payers; Medicare, private insurers and self-pay patients were the primary payers for 33% (n=471), 23.4% (n=338) and 18.9% (n=274) of patients and 22.5% (n=693), 25% (n=777) and 23% (n=711) of the procedures, respectively. Medicare patients had the fewest procedures per patient performed at 1.5 procedures, however they had the highest average reimbursement per procedure out of all payers at $815. The total physician fee reimbursement for the 2-year study period was approximately $2,055,600. Annual hospital-supported call pay is $547,500, bringing the total potential annual funding for orthopedic traumatology to $1,575,300. Expenses required to annually fund an academic vs. private orthopedic surgeon at the national average is $668,700 and $786,400, respectively, and $124,600 to fund an ALP. In order to provide adequate coverage for 1500-1600 orthopedic trauma surgical procedures per year, we predict the need for 3 orthopedic surgeons and 1 ALP at an expense of $2,130,700 annually for academic surgeons salaried at the national average, leaving a funding deficit of $555,400. A smaller annual deficit of $64,700 would exist if reimbursing academic surgeons at the 25 th percentile.

Conclusions: This financial analysis of orthopedic trauma reveals that physician fees and hospital supported call pay are inadequate to fund a dedicated, academic or private orthopedic trauma service at this institution and likely others with a similar payer mix and practice profile. Feasibility for funding improves with a more favorable patient payer mix such as Medicare and private insurers. Growing evidence that dedicated orthopedic traumatology may reduce complications, improve clinical outcomes and reduce hospital days may financially incentivize hospitals to support orthopedic traumatology.

Poster # 98

TRAINING THE FORWARD DEPLOYED SURGEON: IS ACS FELLOWSHIP THE ANSWER?

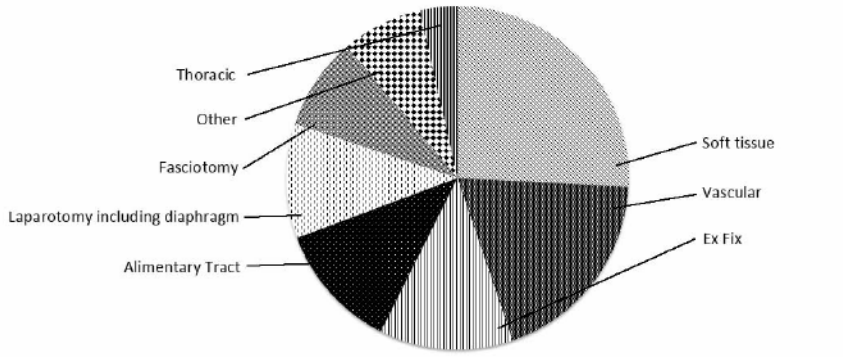
William H. Scott DO, Nichole K. Ingalls MD,MPH, Paul J. Chestovich MD, Timothy D. Browder* MD, Vilas Saldanha MD, John J. Fildes* MD, University of Nevada School of Medicine

Introduction: Frontline wartime surgeons need varied skills. Multiple authors have shown that injured combatants receive comparable care at forward surgical units compared to combat support hospitals where more surgical specialists are available. Military doctrine dictates that forward surgical units are staffed with general surgeons and an orthopedic surgeon. The skill set of the general surgeon must encompass a broad spectrum of surgical specialties that the typical military surgeon might not possess. We investigated whether training in an acute care surgery (ACS) fellowship provides the case experience needed to prepare forward deployed surgeons.

Methods: After obtaining IRB approval, the Joint Trauma Theater Registry was queried for procedures performed at forward surgical units from 2002-2012. These procedures were then organized by type and compared to the revised 2014 ACS fellowship case requirements.

Results: Over this ten-year period, 34,411 procedures were performed on 9,362 patients. Mean age of patients was 25.9 years. 80.6% of injuries were battle related; 59.2% were penetrating and 38.1% were blunt. Median ISS of these patients was 10 (IQR 5-17). The 34,411 procedures were grouped into categories by the authors. The 6,972 non-operative but critical procedures included: 2,279 FAST exams, 1,735 splint/casting, and 1,040 tube thoracostomies. The operative procedures (n=8,887) were grouped into categories and 99.7% of these procedures are part of the ACS fellowship curriculum (Figure 1). There were only 27 operative cases not included in the fellowship curriculum and that included 3 gynecologic operations and 24 burns/grafting. There were also 2,157 cases that are primarily orthopedic including 758 amputations and 501 definitive internal fixation. The external fixation, fasciotomies, and other basic orthopedic procedures included in the ACS curriculum are reflected in the 99.7% concurrence of deployed operations and curriculum. In addition, 1,918 ICU patients were managed which is a standard part of the ACS fellowship curriculum.

Figure 1. Operative procedures performed at forward surgical units. [Other includes: urologic, neck procedures, hepatobiliary including pancreas, eye procedures, neurosurgical, and spleen.]



Conclusion: The ACS fellowship is a viable model for training forward deployed military surgeons. Surgeons should be encouraged to pursue a fellowship in acute care surgery or participate in a military currency training program that mirrors the ACS fellowship curriculum.

Poster # 99

SENSITIVITY AND SPECIFICITY AT DETECTING FREE INTRA-ABDOMINAL FLUID BY MEDICAL STUDENTS AFTER AN ABBREVIATED FOCUSSED ASSESSMENT WITH SONOGRAPHY (FAST) COURSE. A NOVEL STUDY USING DIAGNOSTIC PERITONEAL LAVAGE (DPL) TO QUANTIFY AND EVALUATE THE PERFORMANCE OF THE NOVICE ULTRASONOGRAPHER.

Matt J. Kaminsky MD, Elizabeth Gwinn MD, Kim Joseph* MD, Dorion Wiley MD, Andy Dennis DO, Starr Fred MD, Faran Bokhari* MD, Kim Nagy* MD, Cook County Hospital

I**ntroduction:** Non-radiologist certification in focussed assessment with sonography in trauma (FAST) and point of care ultrasound has evolved overtime. In general, there has been a trend to fewer minimum certification cases and for formal ultrasound courses being increasingly available to more junior house staff and medical students. Many studies have documented good knowledge acquisition and retention before and after ultrasound courses, however, the performance curve of the novice ultrasonographer in practice can further be explored. We hypothesize that medical students, with directed ultrasound training, would be able to generate proper images of the hepato-renal and spleno-renal fossa components of FAST, as well as the ability to detect a well defined and clinically relevant volume of free intra-abdominal fluid.

Methods: A prospective blinded study was performed at a high volume urban trauma center investigating the performance of 3rd and 4th year medical students with an abbreviated 1 hour video and 1 hour hands on ultrasound course. Novel to this study is the use of patients requiring a diagnostic peritoneal lavage (DPL), for the work up of traumatic injuries, in order to **quantify** the intra-abdominal volume of fluid. At the time of the DPL procedure, students were assessed for image acquisition of the hepato-renal and spleno-renal, as well as the ability to detect 0, 200, 400, 600, 800 and 1000cc of DPL fluid. Image interpretation was evaluated by an individual certified in FAST to establish the sensitivity and specificity of novice performed FAST.

Results: Between June 2013 and August 2014 over 90 medical students rotating in the trauma department underwent the directed training course. 20 patients requiring DPL were paired with a medical student for assessment of ultrasound skill acquisition. Students evaluated were able to generate an adequate image of the hepato-renal fossa at a rate of 90% with performance rate dropping to 67% for the spleno-renal fossa. The mean volume of DPL fluid to correctly generate an initial positive interpretation by the medical student was 625cc (SD 205cc) for the hepato-renal fossa and a mean volume of 833cc (SD 197cc) for the spleno-renal fossa. A sensitivity of 86.5% (CI 74.2% to 94.4%) and specificity of 93.1% (CI 83.3% to 98.1%) was determined for the hepato-renal fossa. For the spleno-renal fossa the students achieved a sensitivity of 61.1% (CI 35.8% to 82.6%) and specificity of 91.9% (CI 82.2% to 97.3%).

Conclusion: After a limited but directed FAST ultrasound training course, students were able to generate adequate images of the hepato-renal and spleno-renal fossa, with good sensitivity and specificity at detecting free fluid, particularly for the hepato-renal fossa. Short directed training courses in ultrasound are feasible, practical and well received by students with clinically relevant performance achievable. Selective training of the hepato-renal view of FAST should further be investigated for practitioners in forward triage scenarios.

Poster # 100

A NOVEL EDUCATIONAL PROGRAM ON END OF LIFE CONVERSATIONS IMPROVES RESIDENT PREPAREDNESS

Jeanette Zhang MD, Senthil N. Jayarajan MD, Sharven Taghavi MD,MPH, Gweneth D. O'Shaughnessy BS, Andrea Reynolds AFA, Richard Milner BS, John Gaughan Ph.D., Howard M. Nathan BS, CPTC, Sharon West Elizabeth Lowry Amy J. Goldberg* MD, Temple University Hospital

Introduction: Standardized education programs on conducting end of life conversations with patient's families in a competent and compassionate manner are lacking in surgical residency programs. The goal of this study was to determine the efficacy of a surgical resident educational program focused on communication of brain death and organ donation.

Methods: A total of 228 surgical residents at 5 academic medical centers completed a didactic program followed by a simulation on communicating brain death. The main outcomes were resident level of comfort and knowledge after this education program.

Results: While 85.5% of residents had been introduced to the concept of brain death during medical school, only 28% had received training in discussing brain death. Of these, 48.6% felt uncomfortable when discussing end of life issues with families. After the educational program, residents better understood when to initiate the conversation regarding organ donation (49.6% vs. 98.6%; $p<0.001$). The educational program improved comfort level (30.7% vs. 83.4%; $p<0.001$) and confidence (34.7% vs. 88.2%; $p<0.001$) in communicating brain death to families. The trauma ICU rates of timely notification to the Organ Procurement Organization improved (82.3% vs. 72.7%; $p = 0.003$) when compared to other units that did not receive training. Organ donation rates in trauma ICUs also improved compared to non-trauma ICUs (54.2% vs. 47.0%; $p = 0.049$) that did not receive training.

Training Program's Effect on Resident Knowledge and Confidence about Brain Death and Organ Transplantation

Question	Correct Response	Pre-training (%)	Post-training (%)	p value
Is brain death synonymous with death?	Yes	49.6	98.6	<0.001
The discussion about organ donation should ideally take place after brain death pronouncement and after a family understands brain death as death.	Agree + Strongly Agree	55.3	97.6	<0.001
In general, families understand brain death.	Disagree + Strongly Disagree	59.7	78.7	<0.001
It is, or should be, a standard protocol to make a referral to Gift of Life of a neurologically injured patient before brain death testing.	Agree + Strongly Agree	57.5	92.4	<0.001
I am confident in my ability to speak with families about brain death.	Agree + Strongly Agree	2.94	4.06	<0.001
I feel comfortable in discussing brain death with families.	Agree + Strongly Agree	2.83	3.94	<0.001

Conclusion: This educational program improved resident knowledge, comfort and confidence while discussing brain death. A standardized educational program makes residents better equipped to have end of life conversations with families of potential organ donors and could increase organ donation rates.

Poster # 101

IS ALCOHOL SCREENING ENOUGH?

Greg E. Hambright MD, Joseph D. Amos MD, Vanessa K. Shifflette MD, Janna Fagan RN, Ernest L. Dunn* MD, Methodist Hospital of Dallas

Background: The prevalence of alcohol abuse in the trauma population, its impact on injury, and trauma readmissions has been well documented. Similarly, the role for alcohol screening with SBIRT programs (screening, brief intervention, and referral to treatment) has been entrenched. The literature regarding toxicology screening is less well established. There is little to no literature concerning the impact of and screening for synthetic substances that are not included in standard screening profiles. We sought to investigate rates of screening, alcohol, and substance abuse in our trauma population, to include synthetic substance abuse where possible.

Methods: A retrospective analysis was performed using our trauma registry after institutional review board approval. We looked at the incidence of alcohol and drug intoxication in trauma patients who were admitted after MVC or MCC from January 1, 2014 – December 31, 2014. For selected patients where the clinical index of suspicion was high for synthetic substance abuse, clinical screening was performed, and in some cases, laboratory screening. We eliminated all positive toxicology screens receiving narcotics in the field or emergency room. All screening of individual patients were performed at the discretion of the attending physician.

Results: We admitted 697 patients after motor vehicle collision (MVC) or motorcycle collision (MCC). The average age of these patients was 34.7 with a mean ISS of 7.4. Alcohol testing was done in 495 patients, and 182 patients tested positive (36.8%). Toxicology screening was performed in 405 patients, and 212 of these patients tested positive (52.3%). We identified 15 patients whose clinical behavior was highly suggestive of substance abuse but whose alcohol and toxicology screenings were negative. All 15 of these patients admitted to synthetic drug use, in particular synthetic cannabinoid receptor agonists. In 4 of these 15 patients, laboratory analysis for synthetic cannabinoid receptor agonists was performed. All 4 samples were positive.

Conclusions: At our institution, the proportion of patients with positive toxicology screens was higher than the proportion screening positive for alcohol. This stands in contrast to the relative focus given to alcohol screening and intervention nationally. Not only are patients increasingly using illicit substances, but there is a trend towards abuse of synthetic substances which are not screened for. Toxicology screening with substance abuse intervention should be emphasized as this issue may affect an increasing portion of the trauma population. The inclusion of screening for synthetic substances is a topic that warrants additional research.

Poster # 102

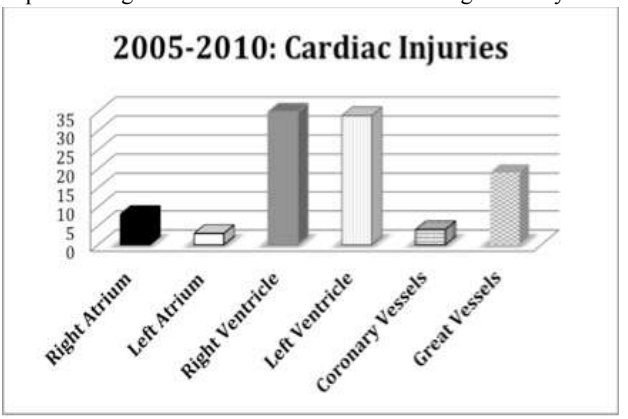
THINKING OUTSIDE THE BOX: REEVALUATING THE NEED FOR CARDIOPULMONARY BYPASS IN PENETRATING CARDIAC INJURIES

Ethan W. Stranch MD, Ben L. Zarzaur* MD,MPH, Elena Paulus MD, MS, Stephanie A. Savage* MD, MS University of Tennessee Health Science Center - Memphis

Introduction: The availability of cardiopulmonary bypass and cardiothoracic surgery is required by the American College of Surgeons Committee on Trauma (ACS-COT) for Level I verification, as well as by states that have their own trauma center designation criteria. Maintenance of cardiac bypass capability, including the personnel and equipment, is labor intensive and expensive. The purpose of this study was to review a trauma surgeon-driven experience with penetrating cardiac trauma at a Level 1 trauma center with a high percentage of penetrating injury. The goal was to determine if it is feasible to care for patients with cardiac injuries without cardiac bypass.

Methods: **:** All patients requiring sternotomy or thoracotomy following penetrating thoracic trauma were identified from 2005-2010. Demographic and injury related data were obtained. The types and location of cardiac injury, as well as patient outcomes, were determined from operative reports.

Results: 1,701 patients with penetrating chest trauma were admitted during the study period. 260 patients met criteria for the review. 37 had an emergency department thoracotomy, with a survival rate of 8%. Overall, 76 patients (29%) suffered a cardiac injury. 69 patients underwent sternotomy, in which 50 cardiac injuries were identified. 71% of these patients had a preoperative FAST exam, which had a positive predictive value of 56.5%. 78% underwent a pericardial window, which had a positive predictive value of 81.4%. The types of cardiac injury are shown in the table. 38% (n=29) of the patients with a cardiac injury died while the overall death rate in this cohort was 21%. No patients in the cohort required cardiopulmonary bypass for emergent repair of cardiac injury and trauma surgeons, without cardiothoracic consultation, performed all cases.



Conclusion: Cardiac injuries are not uncommon in patients with penetrating injury to the thorax. These injuries are clearly survivable if access to operative repair is rapid. In this cohort, FAST was equivocal while pericardial window was fairly sensitive. Injuries to the ventricles were most common overall. Despite the high acuity of the injuries, none required immediate cardiothoracic consultation or cardiopulmonary bypass for repair. Based on this review, cardiopulmonary bypass is rarely necessary. The ACS-COT Level 1 trauma center requirement for bypass capability is outdated and should be abandoned.

Poster # 103

IMPLEMENTATION OF A MULTIDISCIPLINARY RIB FRACTURE MANAGEMENT PROTOCOL INCLUDING SELECTIVE OPEN REDUCTION AND INTERNAL FIXATION: SAFETY AND IMPACT ON INPATIENT OUTCOMES.

Martin Rosenthal MD, Scott Brakenridge MD, Chasen Croft* MD, Jianyi Zhang Ph.D., Janeen Jordan MD, Alicia Mohr* MD, Andre Boezaart MD, Frederick Moore* MD, Lawrence Lottenberg* MD, University Of Floirda

Introduction: Rib fractures remain a significant cause of morbidity and mortality after blunt thoracic trauma. In this large, single center series, we evaluated the implementation of a multi-disciplinary rib fracture management protocol and the effect of selective open reduction and internal fixation (ORIF) on inpatient outcomes.

Methods: Our Level I trauma center implemented a multi-disciplinary traumatic rib fracture management protocol, consisting of acute pain management with adjunctive neuraxial analgesia, pulmonary therapy, ventilator support as needed, and selective ORIF. Indications for ORIF include anatomic disruption, flail chest and refractory pain limiting productive cough and inspiratory capacity. A retrospective, propensity matched and adjusted analysis was performed to compare ORIF and non-operative inpatient outcomes under this management protocol.

Results: Between January 2007 and May 2014, our center managed 5,262 trauma patients with ≥2 rib fractures. Of these patients, 81 (1.5%) underwent ORIF. ORIF patients were more severely injured (ISS 28 vs 20, $p<0.001$) and older (mean 51 vs 46 yrs, $p<0.003$) than the non-operative cohort. The ORIF cohort had median numbers of 7 ribs fractured and 4 ribs fixated. Wound complication rate for patients undergoing ORIF was 2.4%. Ventilator days (6.3 vs 3.1 days), ICU (8.8 vs 3.6 days) and hospital LOS (14.8 vs 7.9 days) were significantly longer in the ORIF cohort ($p<0.001$). Unadjusted mortality was lower in the fixation group than the non-operative cohort (1.2% vs. 8.6%, $p<0.02$). However, both propensity matched and adjusted modeling to account for injury severity, age, gender, comorbidities, number of rib fractures, and flail segment revealed no significant differences in these outcomes between ORIF and non-operative management. Among ORIF cases, the high propensity cohort (median 0.88, IQR 0.83-0.96) included patients with higher number of rib fractures (median 8 vs. 6, $p<0.004$), and flail segment (58 vs 21%, $p<0.001$) than the lower propensity cohort (median 0.44, IQR 0.29-0.59), and had no difference in inpatient outcomes.

Conclusion: Operative rib fixation as part of a multidisciplinary management protocol, while safe, demonstrates no differences in inpatient outcomes, including pneumonia, ventilator days, ICU and hospital length of stay, and mortality. Surgeon indication bias appears based primarily on number of rib fractures and anatomic disruption. Future prospective investigations should utilize algorithm-based management, attempt to discern which patient sub-populations may benefit most from ORIF, and focus on outpatient functional outcomes including assessments of pain, physical function, quality of life, and return to work.

Poster # 104

MORE THAN MEETS THE EYE: BLUNT DIAPHRAGMATIC INJURIES POORLY IDENTIFIED WITH COMPUTED TOMOGRAPHY

Andrew H. Miller MD, Andrew C. Reifsnyder MD, Michael G. Gunlock MD, John E. Manning MD, Ian D. McLoughlin MD, John A. Williamson MD, Martin C. Tom BA, Sadia Ali MPH, Jayson D. Aydelotte MD, Thomas B. Coopwood* Jr., MD, Carlos V. Brown* MD, University Of Texas At Austin Dell Medical School

Introduction: Each year, 2.3 million people are admitted to the hospital across the country as a result of trauma. For many of these patients, we rely on imaging to help diagnose and confirm suspected injuries. Computed tomography (CT) is a major adjunct in the workup of these patients. In our experience, traumatic diaphragmatic injury (TDI) in the setting of blunt trauma is an area with which CT scanners continue to prove inadequate despite improvements in resolution. Missing such an injury can have long-term implications including delayed presentation, incarceration, strangulation, and need for emergent repair. This study aimed to determine the sensitivity and accuracy of CT for evaluation of traumatic diaphragmatic injury (TDI) in blunt trauma patients at our institution, and we hypothesized that both would be poor.

Methods: We performed an IRB approved retrospective review of all adult blunt trauma patients admitted to our Level 1 trauma center between 2003 and 2013. Patient variables were collected from the trauma registry. Inclusion criteria included those blunt trauma patients who had pre-operative CT findings suggesting chest trauma (pulmonary contusion, pneumothorax/hemothorax, or rib fractures), *and* intra-abdominal solid organ injury; *and* underwent an exploratory laparotomy. The study group consisted of those patients with a diaphragm injury confirmed via exploratory laparotomy. The control group had no operative evidence of diaphragm injury. Four blinded, board certified radiologists reviewed all 82 CT studies knowing only a history of blunt trauma. Primary outcome was identification of diaphragm injury on pre-operative CT imaging.

Results: A total of 82 patients met the inclusion criteria, equally divided into study and control groups of 41 patients each. Average injury severity scores were comparatively equal (33 ± 11 vs 34 ± 14, $p=0.79$). Overall sensitivity was 57% (95%CI: 49.1-64.1) and specificity was 91% (95%CI: 85.4-94.5). For the individual radiologists, sensitivities ranged from 32% to 81% with corresponding specificities ranging from 98% to 78%. Only 12 (30%) of the studies from patients with established diaphragmatic injury were read as positive by all four radiologists; four (10%) were read as negative by all four radiologists. The overall accuracy of diagnostic CT for TDI was 71%. Overall false positive and false negative rates were 11% and 44%, respectively.

Conclusion: This study demonstrates that, despite a high specificity, CT imaging remains inadequate for diagnosis of blunt diaphragmatic injury as evidenced by poor sensitivity and wide variability amongst reviewing radiologists.

Poster # 105

MAGNITUDE OF RIB FRACTURE DISPLACEMENT PREDICTS OPIOID REQUIREMENT.

Nikolay Bugaev MD, Janis L. Breeze MPH, Majid Alhazmi MD, Hassan S. Anbari MD, Sandra S. Arabian Sharon Holewinski RN, Stanley A. Nasraway MD, Reuven Rabinovici* MD, Tufts Medical Center

Introduction:The presence and number of rib fractures (RF) in patients with blunt thoracic trauma correlate with clinical outcomes including pain medication requirement, days on mechanical ventilation (DMV), intensive care unit and hospital length of stay (iLOS and hLOS, respectively), discharge disposition and mortality. However, the effect of the magnitude of RF displacement on these outcomes is still obscure.
Methods:A retrospective review of adult patients with acute blunt RF and available chest computed tomography (CT) treated at an urban Level I trauma center between 2007-2012. Characteristics and outcomes of patients with at least one displaced RF (DRF) were compared to those with no DRF (NDRF) using univariate analysis. Regression analysis was utilized to 1) examine associations between maximal DRF displacement (determined in 3D using axial, sagittal and coronal CT sections) and outcome parameters, and 2) determine whether the total magnitude of RF displacement (sum of the magnitude of all displaced RF in each patient) predicts total (sum of all doses given) opioids requirement (expressed in morphine equianalgesic doses), use of epidural and patient controlled (PCA) analgesia, iLOS, hLOS, DMV, and disposition.
Results:There were 245 patients with 1127 RF. When compared to NDRF patients (n=77, 621 NDRF), DRF patients (n=168, 506 DRF) were older (61.0 vs. 54 years, p=0.008), had a higher Injury Severity Score (17.4 vs. 14.4, p=0.03), a longer hLOS (median 5 vs. 3 days, p=0.032), exclusively used epidural analgesia (9%), required more opioids (median dose 135.8 mg vs. 66.7 mg, p=0.0175) and PCA (27.1% vs. 10.4%, p=0.0033), and were more often discharged to rehab (60.3% vs.45.3%, p=0.03). Admission to ICU, DMV, iLOS and mortality did not differ between two groups. Lastly, the magnitude of RF displacement (expressed as the sum of all displaced RF in each patient) was associated with (R square 0.124) and predicted the total opioids dose ($p<0.0001$), but not hLOS or disposition to rehab. Prediction of epidural and PCA analgesia could not have been determined due to the small number of patients in these groups.

Conclusion: DRF patients had worse outcomes than NDRF patients and the magnitude of RF displacement predicted opioids requirements. This information may assist in managing advanced pain control. Given the association of DRF with opioids requirements, hLOS and discharge to rehab, DRF may be considered as an indication for surgical rib fracture fixation, but further studies are needed to support this notion.

Poster # 106

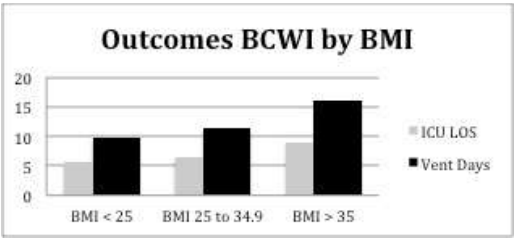
DELETERIOUS IMPACT OF INCREASING BODY MASS INDEX ON PATIENTS WITH BLUNT CHEST WALL INJURY

Raman Babayeuski MD, Douglas Mayeux BS, John Myers* MD, Grant O'Keefe* MD, MPH, Callie Thompson MD, Daniel Dent* MD, Ramon Cestero MD, Lily Liao* MD, Brian Eastridge* MD, University of Texas Health Science Center at San Antonio

Introduction: The Centers for Disease Control estimates that 69% of the US adult population is overweight defined by a body mass index (BMI) $\geq$ 25. Many of these individuals have significant medical comorbidity, including pulmonary disease. The potential impact of excess body weight upon patients with chest trauma has not been thoroughly evaluated. Blunt chest wall injury (BCWI) manifest as rib fractures is present in 10% of all trauma patients and is associated with substantial pulmonary morbidity and mortality. We hypothesized that excess body weight would manifest a deleterious influence on clinical outcomes of patients with BCWI.

Methods: We performed a retrospective analysis of all adult trauma patients admitted to a level I trauma center with BCWI from 1/1/2006 to 01/01/2013. Collected data included patient demographics, mechanism of injury, radiographic data, clinical outcomes, ICU length of stay (ICU LOS) and mortality. Patients with penetrating injury to the chest and those who expired in the emergency department prior to thoracic diagnostic imaging were excluded.

Results: The analysis identified 818 patients with BCWI. The mortality rate of the composite study population was 4.4% (36/818). The study population was 72.5% male and injured by blunt mechanism: motor vehicle crash 48%, motorcycle crash 17%, fall 17.5%, motor pedestrian 9.5%, and other 7.8%. Of the BCWI patients, 28.2% (n=231) had 1-3 rib fractures, 30.8% (n=-252) had 4-6 rib fractures, 21.1% (n=173) had 7-9 rib fractures, 19.9% (n=162) had $\geq$ 10 rib fractures. For the BMI analysis, 30.6% (n=25) were BMI<25, 55.6% (n=455) were BMI 25 to 34.9, and 13.8% (113) were BMI $\geq$ 35.



BMI $\geq$35 was associated with increased mortality in patients with 7 or more rib fractures (18%) compared to 4% mortality in patients with fewer rib fractures (p = 0.008). Kaplan Meier analysis demonstrated BMI $\geq$ 35 to be associated with a prolongation of ICU LOS in patients with moderate to severe BCWI which was most apparent in patients with $\geq$ 4 rib fractures with a mean ICU LOS of 10 days compared 5 days for patients with $\leq$ 3 rib fractures.

Conclusion: Deleterious outcomes in patients with BCWI are exacerbated with increasing BMI, especially those $\geq$ 35 making care of these patients care more prolonged and complicated. Further definition and prospective validation may enhance the development of evidence based clinical pathways to optimize the management of this population.

Poster # 107

BLUNT CHEST WALL TRAUMA: MANAGEMENT OF HEMOTHORAX

Jeffrey Wild MD, David Martin BS, Kenneth Widom MD, Megan Rapp MD, Dianne Leonard* MD, Susan Baro DO, James Dove BA, Denise Torres MD, Geisinger Health System

Introduction: Blunt chest wall trauma causes significant morbidity and mortality amongst trauma patients. With the CT era in trauma care, more patients are undergoing diagnosis of small hemothoraces. Hemothorax can be associated with respiratory failure, fibrothorax, empyema and prolonged hospitalization. Recently, several small studies have concluded that occult hemothorax can be managed without chest tube if less than 1.5 cm in axial dimension on CT scan. The purpose of this study was to evaluate outcomes in management of blunt chest wall trauma with hemothorax.

Methods: This was a retrospective cohort study over a 5 year period of all patients admitted with blunt chest wall trauma to a level one trauma center. All patients with hemothorax found on chest CT were included. Previously described methods of measuring hemothorax using the greatest lamellar fluid stripe in the dependant pleural gutter on transverse axial cuts were utilized. Patients that required chest tube placement after 24 hours of admission (delayed) were compared to patients that were managed with observation alone in regards to size of hemothorax and outcomes. Lastly, outcomes of patients with delayed and immediate chest tubes were evaluated.

Results: During a 5 year period, 2,324 patients were admitted with blunt chest wall trauma. Of which, 271 patients had evidence of hemothorax on chest CT. Eight-nine patients had a chest tube placed within 24 hours of admission, 29 patients had a chest tube placed after 24 hours of admission, and 153 patients had no chest tube placed during their hospitalization. The delayed group average age was 56.4 years versus 61.6 in the no chest tube group. Twenty (69%) patients in the delayed chest tube group had associated pneumothorax compared to 74 (48.4%) patients within the no chest tube group. Patients who did not have an immediate chest tube placed on admission had an odds ratio of 6.78 of requiring delayed chest tube if hemothorax was > 1.5 cm in axial cuts on chest CT. On comparison of delayed versus immediate chest tube groups, the groups were similar in respects to age, associated pneumothorax, ISS and comorbidities. Patients in the delayed chest tube group had increased length of stay compared to the immediate group, 14 versus 11 days respectively ($p = 0.014$). Other outcomes including ventilator days, pneumonia and mortality were similar between the two chest tube groups.

Conclusion: A greater number of small hemothoraces are diagnosed with increased use of chest CT. Currently there are no formal guidelines on management strategy of small hemothoraces. Patients with hemothorax > 1.5 cm in axial dimensions on CT were 6 times more likely to require a chest tube during their hospitalization. Delayed chest tube placement prolonged hospitalization by 3 days in similar matched groups. Measurement of hemothorax on axial CT cuts is easy, reproducible and can provide guidance on which hemothoraces require drainage.

Poster # 108

DOWN BUT NOT OUT: RIB FRACTURES IN THE SUPER-ELDERLY

Alisa Cross MD, Frances H. Philp MS, Elan Jeremitsky MD, David A. Guel MD, Michael F. Ditillo MD, Allan S. Philp* MD, Allegheny General Hospital

Introduction: Elderly trauma patients (age ≥65) with rib fractures have increased morbidity and mortality as compared to their younger counterparts. However, there is a paucity of research dedicated to outcomes in the super-elderly (age ≥80) trauma patient. We sought to clearly characterize the outcomes of the super-elderly as a distinct portion of our overall elderly rib fracture population.

Methods: A retrospective review of 542 elderly trauma patients with rib fractures at a Level 1 trauma center between January 2011 and June 2014 was performed. These patients were further subdivided into two cohorts based on age. There were 275 patients in the elderly group (age 65-79 years) and 267 patients in the super-elderly group (age ≥80 years). Outcomes included intensive care unit and hospital lengths of stay (ICU LOS and HLOS, respectively), ventilator days, pulmonary complications, disposition, and mortality.

Results: The two groups had similar mean number of rib fractures (4.5 elderly vs. 4.4 super-elderly; p=0.72), mean thorax Abbreviated Injury Score (2.6 vs. 2.5; p=0.15), and ICU utilization (61.1% vs. 61.4%; p=1.0). The elderly group had less falls (45.6% vs. 70.2%; p<0.0001) and a higher Injury Severity Score (15.8 vs. 14.3; p<0.04) as compared to the super-elderly. Although mean ventilator days were similar (7.3 vs. 5.8 days; p=0.22) for both groups, the elderly population was more likely to be intubated (28% vs. 20%; p<0.046), and have acute respiratory failure (22% vs. 12.7%; p< 0.005). Mean ICU LOS (6.7 vs. 5.2 days; p<0.03) and HLOS (9.1 vs. 7.6 days; p<0.01) were increased for the elderly. Both populations had similar occurrence of pneumonia (6.2% vs. 4.5%; p=0.45), pulmonary embolism (2.9% vs. 2.6%; p=1.0) and in-hospital mortality was equivalent (11.6% vs. 13.5%; p= 0.5). Notably, by 48 hours over 50% of mortality in the super-elderly group had occurred; whereas the elderly group did not reach this threshold until 7 days. The elderly population was more likely to be discharged home (41.1% vs. 26.1%; p < 0.02) and less likely to be discharged to a skilled nursing facility (27.6% vs. 37.2%; p<0.02).

Conclusion: Rib fractures in the geriatric trauma population remain a significant source of morbidity and mortality. Compared to the elderly cohort, the super-elderly with equivalent number of rib fractures show similar morbidity and mortality while utilizing fewer hospital resources, potentially secondary to earlier mortality or variances in goals of care. Based on our findings, further research into the pre-injury physiologic status and potential variances in treatment patterns of the super-elderly are warranted in attempts to understand injury and optimize outcomes in this expanding population.

Poster # 109

TRAUMATIC PULMONARY PSEUDOCYSTS AFTER BLUNT CHEST TRAUMA: PREVALENCE, MECHANISMS OF INJURY, AND COMPUTED TOMOGRAPHY FINDINGS

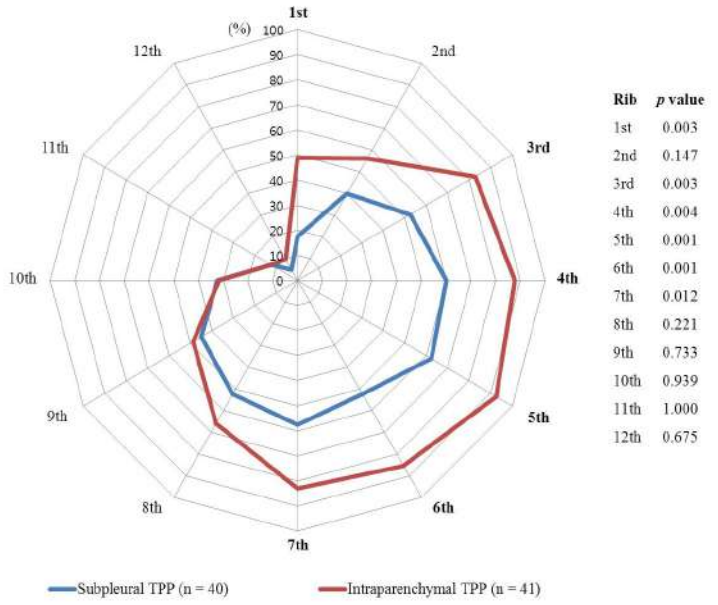
HYUN JIN CHO MD, DAE SUNG MA MD, Chungnam National University

Introduction: Traumatic pulmonary pseudocyst (TPP) is a rare complication of blunt chest trauma and closely related with severe injury. However, it has been poorly documented. The authors present a retrospective review of TPP cases treated at their hospital.

Methods: The medical records and chest computed tomography scans of patients with traumatic pulmonary pseudocyst treated from January 2010 to December 2013 were retrospectively studied.

Results: 978 patients underwent chest CT for blunt chest trauma during the study period, and 81 (8.3%) had a total of 150 TPPs. The most common mechanism of injury was being struck by a motorized vehicle (n = 25, 30.9%). Mean injury severity score of the 81 patients was 33.2 ± 11.4. The prevalence of TPP was higher in younger patients (p = 0.011) but the total number of fractured ribs was significantly lower (p = 0.001). In subgroup analysis performed according to pseudocyst location, the intraparenchymal group had more severe injuries than the subpleural group (injury severity score: 23.3 vs. 32.4, p < 0.001; chest abbreviated injury score: 3.4 vs. 4.0, p < 0.001; number of associated injuries: 2.9 vs. 4.0, p = 0.001). By multivariate analysis, injury severity score, age, and number of associated injuries were significantly different in these two groups (p = 0.038, p = 0.006, and p = 0.045, respectively).

Rate of fracture by rib number in subpleural and intraparenchymal TPP group



Rib	*p* value
1st	0.003
2nd	0.147
3rd	0.003
4th	0.004
5th	0.001
6th	0.001
7th	0.012
8th	0.221
9th	0.733
10th	0.939
11th	1.000
12th	0.675

Conclusion: The prevalence of TPP among cases of blunt chest trauma was 8.3% and was higher in those struck by a vehicle and younger patients. Intraparenchymal pseudocyst was found to be related to more severe injuries.

Poster # 110

NATIONAL TRAUMA DATABASE MANAGEMENT OF RIB FRACTURES: WHICH IS BETTER, PARAVERTEBRAL OR EPIDURAL CATHETERS

Jeffrey Wild MD, Luiz Foernges MD, Ammar Hashmi MD, Kenneth Widom MD, Megan Rapp MD, Dianne Leonard* MD, Sue Baro DO, James Dove BA, Denise Torres MD, Geisinger Health System

Introduction: Several studies have shown superior outcomes of epidural analgesia in patients with severe chest wall trauma. In other studies, the number of rib fractures correlated with mortality. Often, trauma patients are not candidates for epidural analgesia secondary to other injuries including thoracic vertebral fractures, spinal cord injuries, severe head injury, unstable pelvis, and coagulopathy. Paravertebral blocks do not have the same contraindications as epidural catheters but it is unclear if these blocks provide similar analgesia and outcomes.

Methods: This was a retrospective review of the National Trauma Database over a two year period, 2011-2012. All patients admitted with rib fractures were reviewed. Overall outcomes of patient's who received paraveterbal blocks were compared to epidural analgesia. Propensity score matching was then performed and outcomes were compared between the two groups. Lastly, propensity score matching was performed for patients in either treatment group compared to patients who received neither treatment and outcomes were compared.

Results: During the two year study period, the epidural analgesia group included 1,073 patients, the paravertebral block group included 1,110 patients and 192, 583 patients with rib fractures had neither procedure. Overall, patients who received paravertebral blocks were younger (54.5 vs 58 years) and had lower ISS (14 vs 17) compared to the epidural group. The two groups had similar Glasgow Coma Scores and mean abbreviated chest injury score of 3. The epidural group were more likely to have pulmonary contusions (38% vs 34%), pneumothorax (53% vs 48%) and hemothorax (28% vs 21%) compared to the paravertebral block group. Overall outcomes found no difference in length of stay (LOS), ventilator days, pneumonia, or mortality between the two groups. Propensity score matching between the two groups was performed and no differences in the above outcomes were found in matched groups. Propensity score matching was performed between patients who had either procedure performed versus no procedure . In similarly matched cohorts, patients who received either procedure had increased LOS (8 vs 6 days), shorter ventilator days (4 vs 6 days) and lower mortality (1.8% vs 4%) compared to patients managed without epidural or paravertebral blocks.

Conclusion: Epidural analgesia has been shown to improve outcomes in trauma patients with blunt chest wall injury and is the preferred management option for patients with multiple rib fractures per EAST guidelines. However, epidural catheters have several contraindications often found in severely injured trauma patients. Paravertebral blocks provide similar outcomes to epidural analgesia and have less contraindications to placement. Patients who received neither form of analgesia had longer ventilator days and increased mortality. Patients with significant chest wall injury should receive epidural or paravertebral analgesia.

Poster # 111

EFAST: Useful or Not?

Steven Maximus MD, Cesar Figueroa MD, Matthew Whealon MD, Jacqueline Pham BS, Cristobal Barrios MD, University of California, Irvine - Orange County

Introduction:
The FAST Exam (Focused Assessment with Sonography for Trauma) has become the standard of care for the rapid evaluation of the trauma patient. FAST exam is currently used during the primary survey of the trauma patient to examine the abdomen, pelvis, and pericardial space for free fluid that could represent life threatening hemorrhage. Another common life threatening emergency in the trauma patient is the presence of pneumothorax. Extended FAST (EFAST) is the more recent use of ultrasonography for the detection of pneumothorax, which is fairly new compared to other uses of ultrasound in trauma. The exact sensitivity and specificity of EFAST in detecting traumatic pneumothorax has yet to be investigated.

Methods:
This is a retrospective review of all trauma patients with a diagnosis of pneumothorax who were treated at a large level 1 urban trauma center from March 2013 through July 2014. Charts were reviewed for results of imaging, which included EFAST, chest X-ray, and CT scan. Requirement of tube thoracostomy and mechanism of injury were also analyzed.

Results:
A total of 369 patients with a diagnosis of pneumothorax were identified. 69 patients were excluded as EFAST was either not performed or not documented, leaving 300 patients identified with pneumothorax. 46 patients (15.3%) had penetrating trauma causing pneumothorax, and 254 (84.6%) were due to blunt trauma. 113 patients had clinically significant pneumothorax (37.6%), requiring immediate tube thoracostomy placement. EFAST yielded a positive diagnosis of pneumothorax in 19 patients (16.8%), and all were clinically significant requiring tube thoracostomy. Chest X-ray detected clinically significant pneumothorax in 105 patients (92.9%). Of the patients with an EFAST positive for pneumothorax, 7 were from blunt trauma and 12 were from penetrating trauma. All patients who had a positive EFAST required tube thoracostomy.

Conclusion:
There is little literature on the utility of EFAST for pneumothorax in trauma. The reports on its effectiveness are variable. Our data shows that although specific for clinically significant traumatic pneumothorax, it has poor sensitivity. We maintain that while CT remains the gold standard, chest X-ray is still more sensitive than EFAST for clinically significant pneumothorax. We conclude that the role for EFAST remains limited at this time. Further evaluation is warranted.

Poster # 112

Complete and Sustainable Injury Surveillance at an African Trauma Centre

EIMAN ZARGARAN MD, MHSC, Richard Spence MD, Andrew Nicol MD,Ph.D., Pradeep Navsaria MD, Juan Carlos Puyana* MD, Damon Ramsey MD, Morad Hameed MD,MPH, University Of British Columbia

INTRODUCTION: Injury surveillance, an essential aspect of modern trauma systems, has been difficult to implement and sustain in low and middle income countries because of cost, limited work force and complexity. In response, we designed a practical, user friendly, mobile electronic Trauma Health Record (eTHR), for point of care data collection by front-line clinicians. eTHR was designed to populate standard clinical reports, while wirelessly populating a deep electronic trauma registry in real time, with standardized data. We hypothesized that this mHealth strategy, when integrated with standard workflow, would for the first time ever, bring sustainable, detailed and high quality injury surveillance to a busy trauma center. **METHODS**: Trauma physicians at a level 1 trauma center in Cape Town were asked to replace standard clinical documentation on paper with documentation on iPads equipped with eTHR. Data were entered along the continuum of trauma care in 3 modules: Trauma Admission Record, Operative Note, and Discharge Summary. Standardized data were used to populate printed clinical notes, and were also transmitted to a real-time electronic trauma registry. After 1 year of continuous use, the registry was evaluated for completeness. eTHR's real time injury scoring accuracy was evaluated with the Revised Trauma Score, Injury Severity Score, and the Kampala Trauma Score. Simple epidemiological and spatial analyses were performed with geographic information systems (GIS). The applicability of eTHR's data to improve trauma center performance, allow epidemiology studies, and drive injury prevention programs was assessed with comparisions to fields outlined by the WHO's Guidelines for Essential Trauma Care (ETC) and the ACS Trauma Quality Improvement Program (TQIP). **RESULTS**: Over 10,000 trauma presentations were accurately documented and promptly analyzed in real-time by the new, clinically integrated electronic injury surveillance system. eTHR approached 100% completeness for essential data elements. eTHR successfully captured all performance improvement data fields recommended by the WHO ETC and TQIP. Epidemiological analyses confirmed a very heavy burden of violence related injury and road traffic injuries and GIS analyses demonstrated clusters of injuries originating mainly from vulnerable and low-income neighborhoods. Analyses of operative data revealed a high proportion and broad spectrum of operative trauma. Delays in operative care were prevalent. Hospital complications were accurately captured and graded. Minor pitfalls with implementation were related to wireless connectivity and in establishing conventions regarding data security and stewardship. Morbidity and mortality reporting and corresponding action proved to be challenging and required close observation of workflow and ongoing coordination with all clinical teams. **CONCLUSIONS**:The accurate capture and simultaneous analysis and reporting of consecutive patients in a busy and under-resourced trauma setting is feasible. Challenges associated with the tremendous volume of trauma seen at this center and the inherent pressures of trauma care, combined with the limited resources available for injury surveillance, have been overcome through the integration of surveillance into clinical work flow, the elimination of duplicated effort, and the instantaneous analysis of electronic data. eTHR, an example of the application of mobile health technologies to the study of key issues in global public health, has the potential to become a sustainable trauma registry for low resource environments.

Poster # 113

AVAILABILITY OF POST-DISCHARGE NURSING FACILITIES: IMPACT ON DISCHARGE DISPOSITION AND LOCATION OF DEATH IN ELDERLY TRAUMA PATIENTS

Kathleen O'Connell MD, Todd Neideen* MD, Kristan Staudenmayer* MD, MS, Karen Brasel* MD, MPH, Medical College of Wisconsin

Introduction: The majority of the deaths in elderly trauma patients occur after hospital discharge, thus discharge disposition is integral to the overall management of these patients. We hypothesized that discharge disposition was dependent on the availability of post-discharge nursing facilities to hospitals, and that this would affect mortality for this vulnerable population.

Methods: This is a retrospective cohort study of elderly patients sixty-five years and older, who died after traumatic injury from 2006 to 2012. Three publicly available databases were queried for state-level information. The Health Resources and Services Administration's Area Health Resource Files (AHRF) were searched for annual population estimates and healthcare facility information, including number of nursing facility beds in each state. Healthcare Cost and Utilization Project (H-CUPnet) and Centers for Disease Control and Prevention (CDC) Wonder databases were queried for location of discharge and location of death, respectively. Statistical analysis was performed using linear regression models with SPSS software.

Results: Comprehensive data were available for 37 states, in which people over the age of sixty-five made up 13% of the population. H-CUPnet captured 3,566,850 hospital discharges and CDC Wonder captured 385,054 deaths after traumatic injury in the elderly population. Geriatric patients accounted for 47% (range, 37-55%) of all trauma-related discharges, with an upward trend from 2006 (45%) to 2012 (49%). Discharge disposition included nursing or rehabilitation facility (66%), home (31%), and another short-term hospital (3%). Place of death included the hospital (55%), nursing or rehabilitation facility (23%), decendent's home (17%), and hospice facility (5%). States with more nursing facility beds per elderly person had a higher percentage of patients that were discharged to a nursing facility (R^2 =0.248, p= 0.002), and lower percentage of patients that were discharged to home (R^2=-0.300, p=<0.001). Additionally, these states also had a higher percentage of deaths occur in nursing facilities (R^2=0.172, p=0.01) and fewer deaths in the decendent's home (R^2=0.350, p=<0.001). Neither the percentage of inpatient deaths or overall mortality rates were associated with the number of nursing facility beds within each state.

Conclusion: Availability of nursing facilities in each state may affect discharge disposition and place of death in the aging trauma population. Lack of nursing facility availability may shift the responsibility of providing end-of-life care to families, along with the associated social and financial burdens. Efforts to improve quality of care of geriatric trauma patients should extend beyond hospital admission, as these patients remain at high risk of mortality regardless of discharge disposition.

Poster # 114

THE OLDER THEY ARE THE HARDER THEY FALL: INJURY PATTERNS AND OUTCOMES BY AGE AFTER GROUND LEVEL FALLS

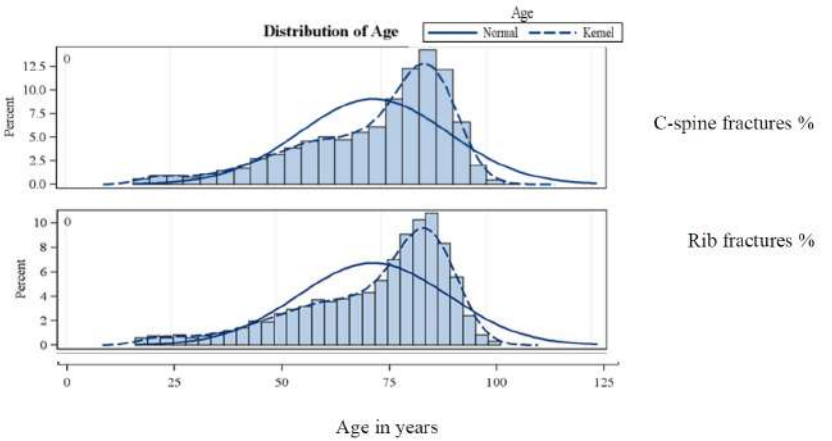
Bishwajit Bhattacharya MD, Adrian Maung MD, Kevin Schuster MD, Kimberly Davis* MD, MBA,
Yale School of Medicine

Introduction: As the US population ages, trauma centers are seeing an increasing number of geriatric patients that are more susceptible to injuries even from relatively minor insults such as a ground level fall (GLF). However, as life expectancy increases, people are living in the geriatric age bracket for decades and often using anticoagulation agents for a host of comorbidities. We hypothesize that this patient population is not a homogenous group and we investigated the injury patterns and outcomes after GLF as a function of age and anticoagulation use. We also sought to identify injury patterns in general from this common trauma mechanism.

Methods: A retrospective review of a Level I trauma center's database identified all adult (age $\geq$18) trauma patients admitted after GLFs between 1/2003 and 12/2013. Demographics, injury patterns, anticoagulation use (aspirin, clopidogrel, warfarin, enoxaparin, rivaroxaban) and outcomes were abstracted.

Results: 5088 patients were admitted after GLF over the 10 year period. 4003 patients were 60 years and older and overall 38.2% were male. With each decade, although the ISS did not considerably change (range 7.0-8.6), mortality increased (0.9% at$\leq$ 60yrs vs. 5.5% at $\geq$ 90yrs) and the likelihood of home discharge decreased drastically (73.7% at $\leq$60yrs vs. 18.2% at $\geq$90yrs). Overall, abdominal solid organ injuries were a rare occurrence (0.8%). Age as a continuous variable was associated with an increase incidence of rib and cervical spine fractures. On univariate analysis, aspirin (p= 0.0004) was the only antiplatelet or anticoagulant significantly associated with intracranial bleed. Univariate analysis demonstrated aspirin (p=.0491) or warfarin (p<.0001) use was associated with increased overall mortality.

Conclusion: The geriatric trauma population is not a homogenous group. Certain injury patterns change with increasing age. In our series aspirin use was associated with intracranial bleeds, whereas other agents were not. A seemingly minor mechanism of trauma, GLF is associated with significant morbidity and mortality that increases dramatically with increasing age. The use of certain anticoagulation agents is associated with increased mortality. These patient differences have implications for their evaluation and management.



Poster # 115

CHARACTERISTICS OF PEDIATRIC ASSAULT PATIENTS: A STATEWIDE ASSESSMENT

Allison Ertl MS, Jonathan I. Groner* MD, Laura D. Cassidy Ph.D., MS Medical College of Wisconsin

Introduction: More than 750,000 pediatric patients are treated in emergency departments for assault every year. In order to improve prevention strategies, a comprehensive understanding of assault against children is needed. Therefore, this study analyzed statewide data from the Ohio Trauma Registry (OTR) from 2007-2012 to describe risk factors for assault in the pediatric population.

Methods: Of 16,938 pediatric trauma patients under 16 years old, assault was identified in 758 patients. Data were compared between patients with assault injuries and non-assault injuries using chi-square tests. Logistic regression evaluated associations between assault and mortality, adjusting for injury severity score (ISS).

Results: The highest proportion (43%) of assault victims was children under 1 year old and 61% were less than 3 years old. By contrast, children under 1 year old accounted for only 7% of non-assault injuries ($p<0.0001$). The majority (68%) of assaults against children occurred in the home compared to 44% of non-assault injuries. Assault victims were more likely to suffer a head injury than children with non-assault injuries (39% vs 23%, $p<0.0001$). Assaulted children were more likely to receive Medicaid (61% vs 31.5%, $p<.0001$), to have a penetrating injury (21% vs. 9%, $p<.0001$), and to receive initial care at a Pediatric Trauma Center (PTC) (62% vs. 25%, $p<0.0001$). Medicaid children were 2.7 times more likely to be assaulted as compared to children with commercial insurance ($p<0.0001$). Black children had 2.3 times the risk of an assault compared to white children ($p<.0001$). Children under 1 year old had 6.4 times the odds of suffering an assault as compared to children aged 14 to 15 years old ($p<.0001$). Assault was more likely to be fatal compared to non-assault trauma after adjusting for ISS (OR=2.4, 95% CI 1.4-4.0). Days between injury and arrival were significantly longer for victims of assault ($p<.0001$).

Conclusion: Pediatric assault victims are more likely to be young (< 3 years old), be injured in the home, receive care at a Pediatric Trauma Center, and die compared to children injured by other means. Although violence prevention strategies for adolescents (gangs, bullying) are important, this younger age group is in dire need of prevention efforts.

Poster # 116

ANTI-TEXTING LAWS DO NOT AFFECT DISTRACTED DRIVING CRASHES

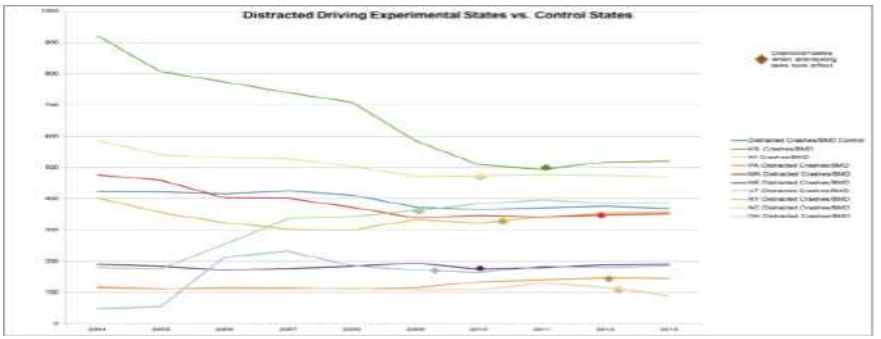
Samuel E. Long III, MD, Jayson Aydelotte MD, Thomas Coopwood Jr., MD, Susan Stafford BS, Joel Michalek Ph.D., Carlos Brown* MD, Alexander Ochoa BS, The University Of Texas At Austin Dell Medical School

Introduction: Texting while driving is believed to be a significant contributor to distracted driving crashes and deaths in the United States. Forty-four states have passed legislation over the past decade that prohibits texting while driving. But the impact these laws have made on crashes/deaths from distracted driving is unknown.

Methods: We accessed traffic records either by an open records request or through internet-based, publicly available data from the Departments of Transportation for all 50 US states over a ten year time period (2004-2013). We used data from states that included total crashes, fatalities, as well as specific descriptors that could indicate a distracted driving crash (distraction in vehicle, driver inattention, mobile/cell phone use). States without complete data sets for the study time period were excluded. Changes in crashes and deaths before and after anti-texting laws were passed were compared to changes in states where no law was passed during that time frame. Statistical analysis was done with SAS (version 9.3).

Results: 14 states were included in the study (AZ, KS, MI, MN, NE, NY, NC, OH, OK, PA, SD, TX, UT, and VA). Within all states, total miles driven went from 1317 billion miles driven (BMD) to 1298 BMD (p=.001). Total annual text messages sent rose from 56 billion in 2004 to 2.19 trillion in 2012 (p=.001). Total crashes in all 14 states fell from 1815/BMD to 1588/BMD (p=.001). Total fatalities fell from 15.29/BMD to 11.51/BMD (p=.001), and distracted driving crashes fell from 314.7/BMD to 294.3/BMD(p=.001). Deaths attributed to distracted driving fell from 2.52/BMD to 1.62/BMD (p=.001). Of the 14 states, 5 did not have any sort of statewide anti-texting law implemented during the study period (control states). Control States had an average decrease in distracted driving crash rates from 422.5/BMD to 368.9/BMD (p=.001), and an average decrease in distracted driving deaths from 2.90/BMD to 2.51/BMD (p=.001). 9 of the 14 states had anti-texting laws passed during the study period (KS, MI, PA, MN, NE, UT, NY, NC, OH). Distracted driving crashes did not decrease after laws were passed for any state except Ohio (116.4/BMD to 89.9/BMD, p=.001) (figure 1).

Conclusion: There is a general decline in both total crashes and distracted driving crashes in all 14 study states during the study period. Anti-texting and driving laws were not associated with any decrease in distracted driving crashes in 8 of the 9 states.



Poster # 117

BEHAVIORAL PREDICTORS OF SEATBELT USE: RESULTS OF THE WORLD'S LARGEST BEHAVIORAL SURVEY

Isadora C. Botwinick MD, Sheldon H. Teperman* MD, Melvin E. Stone Jr., MD, Jacobi Medical Center

Introduction: Seatbelt use saves lives, reducing the morbidity and mortality of motor vehicle accidents. Unfortunately, studies show up to 20% of adults *still* do not use seatbelts regularly. Seatbelt laws appear to increase rates of seatbelt use, but ultimately seatbelt use is a personal decision which may be affected by multiple social and demographic factors. In this study, we use the Center for Disease Control's Behavioral Risk Factor Surveillance System (BRFSS) to investigate seatbelt utilization. The BRFSS is the world's largest telephone survey with over 500,000 respondents in 2011. To our knowledge, no prior study of this magnitude has investigated behavioral predictors of seatbelt use. We hypothesized that low education level, and other high-risk behaviors such as smoking and alcohol consumption would be associated with decreased seatbelt use.

Methods: To investigate our hypothesis, we queried 506,467 records from the Center for Disease Control's Behavioral Risk Factor Surveillance System (BRFSS). We defined our outcome as respondents who reported they always, or nearly always wear seatbelts. Multivariate logistic regression was performed to analyze which independent variables were associated with higher rates of seatbelt use. Significance was set at $p< 0.05$.

Results: The results of our analysis are shown in Table 1. Data revealed that male sex, young age and high-risk behaviors such as smoking and drinking were associated with not using a seatbelt. Higher levels of education, marital status and access to health care were independent predictors of frequent seatbelt use.

Conclusion: Multiple independent variables are associated with seatbelt use, including education, marital status, access to health care, smoking and drinking habits, gender and age. This is the largest study to date addressing this important public health concern. The results from this study could help target interventions toward the subgroups of patients who are least likely to use seatbelts, and thus would most benefit from further outreach.

Table 1.

Variable	Sample Size	P-value	Odds ratio	95% CI
Not a Heavy Drinker	433,133	<0.0001	1.59	(1.45 - 1.73)
Did not graduate high school	40,475	<0.0001	0.41	(0.37 - 0.45)
High school graduate	134,141	<0.0001	0.46	(0.43 - 0.50)
Attended college or technical school	124,658	<0.0001	0.62	(0.57 - 0.67)
Male	179,703	<0.0001	0.52	(0.49 - 0.55)
Married/Member of unmarried couple	258,566	<0.0001	1.49	(1.37 - 1.62)
Divorced/Widowed/Separated	137,913	0.0131	1.12	(1.02 - 1.22)
Age 18 to 24	20,096	<0.0001	0.7	(0.63 - 0.79)
Age 25 to 44	104,775	<0.0001	0.81	(0.75 - 0.87)
Any health care coverage	407,970	0.0029	1.12	(1.04 - 1.20)
Former smoker or never smoked	383,217	<0.0001	1.66	(1.56 - 1.77)

Poster # 118

TYPE 1 DIABETES INCREASES ODDS OF VENOUS THROMBOEMBOLISM FOLLOWING TRAUMATIC INJURY

Jan Leonard MSPH, Lisa M. Caputo MA, Matthew M. Carrick* MD, Denetta S. Slone* MD, Charles W. Mains MD, David Bar-Or MD, Swedish Medical Center

Introduction: Incidence of venous thromboembolisms (VTE) is relatively low in trauma populations, due to widely accepted screening and prophylaxis protocols. However, VTE remains responsible for substantial mortality and morbidity. Diabetes mellitus (DM) is associated with endothelial dysfunction, altered platelet activation, increased coagulability, and decreased fibrinolysis, promoting the formation of thrombi. Studies examining the relationship between DM and VTE have been limited to non-trauma populations, with varying results. We sought to determine if DM was an independent risk factor of VTE among trauma patients. **Methods**:The registries of two metropolitan Level I trauma centers were retrospectively reviewed for consecutively admitted trauma patients over a 5 year period. Demographics, comorbidities including risk factors for VTE, injury region and severity, and incidence of VTE were compared between DM and non-DM populations using univariate analysis. Covariates were included in a stepwise logistic regression (entry, exit criteria: $p<0.2$, 0.07) to identify independent predictors of VTE. Results were stratified by age (<65, ≥65) and DM type (Type 1, Type 2). **Results**: Of 19511 total patients, 10% (1962) reported pre-injury DM (34% Type 1; 66% Type 2). Incidence of VTE varied by age and DM type (**Table 1**). Overall incidence of VTE was 2.43%, compared with 3.26% in the DM population. Among patients of all ages, Type 1 DM trended towards being independently associated with increased VTE ($p=0.07$); Type 2 DM was not predictive of VTE ($p=0.40$). In patients <65 years, however, Type 1 DM was predictive of VTE (Adjusted Odds Ratio, 2.19; 95% CI, 1.19-4.02); additional predictors are listed in **Table 2**. Type 2 DM was not associated with VTE in patients <65 years. In patients ≥65 years, neither type of DM was predictive of VTE; however, covariates found to be significant included sex, obesity, injury severity, coagulopathy, multiple traumas, receipt of a surgical procedure, and placement of a central line.

Conclusion: Type 1 DM carried an increased risk for VTE, although apparent in younger trauma patients only. In addition to Type 1 DM, our analysis reestablished known risk factors of VTE. This finding suggests Type 1 DM should be included as a risk factor in trauma protocols, necessitating the administration of VTE prophylaxis.

Table 1: Incidence of VTE

	All Ages (n=19511)	Age <65 (n=11973)	Age ≥65 (n=7538)
Overall	2.43%	2.33%	2.60%
Any diabetes	3.26%	3.69%	3.02%
Type 1 DM	3.89%	4.59%	3.38%
Type 2 DM	2.94%	3.08%	2.87%

Table 2: Predictors of VTE in trauma patients under the age of 65

Covariates	AOR	95% CI	P
Type 1 Diabetes	2.19	1.19-4.02	0.01
Male	1.50	1.11-2.03	0.008
Obesity	2.61	1.75-3.89	<0.0001
Injury Severity Score ≥ 16	2.71	2.01-3.66	<0.0001
Limb Injury	1.76	1.34-2.33	<0.0001
Receipt of a Surgical Procedure	3.63	2.60-5.07	<0.0001
Placement of a Central Line	2.74	2.00-3.76	<0.0001

AOR, Adjusted Odds Ratio; CI, Confidence Intervals

Poster # 119

MOTORCYCLES AND ORGAN DONATION: DO HELMET LAWS IMPACT ORGAN AVAILABILITY?

Dylan Nieman MD,Ph.D., Mollie Freedman-Weiss BS, Mark Gestring* MD, Nicole Stassen* MD, University of Rochester

Introduction: Motorcycles (MC) have been referred to as "donor-cycles" due to the increased risk of severe TBI following MC crashes. MC helmet use has been shown to reduce the overall death rate and the incidence of lethal and non-lethal head injuries after MC crashes. A recent study has suggested a correlation between mandatory MC helmet laws and the death rate of those on transplant waiting lists secondary to decreasing the available cadaveric donors and thereby increasing wait times. The objective of this study was to examine the impact of MC helmet laws on the process metrics of solid organ transplantation.

Methods: UNOS wait list data for patients awaiting kidney (CRTx) or liver (OLTx) transplantation as well as data for those receiving deceased donor transplants in 2013 were collected. This was collated with state specific data from the Insurance Institute for Highway Safety comparing the existence of universal helmet laws (UHL), population, land area, average yearly precipitation, climate zone, state speed limit, number of registered motorcyclists, total mileage driven and number of fatal motorcycle accidents. Univariate analysis of organ wait times greater than two years and deceased donor transplants with respect to UHL was performed for CRTx and OLTx. Multivariate linear regression models were constructed predicting time on the wait list and number of deceased donor transplants performed based on the state specific factors listed above.

Results: As of February 2015, there were 125,545 patients awaiting CRTx or OLTx with UNOS. 48.5% and 42.3% of patients awaiting CRTx and OLTx respectively have been listed for greater than 2 years. Overall, the number of registered MC riders per population correlates with the number of deceased donor transplants performed. There are significantly more MC deaths as a function of the overall state population (1.5/100k vs. 1.1/100k; $p<0.005$) in states without UHL. When evaluated based on registered motorcyclists alone, however, there is no significant difference between MC deaths in states without and with a UHL (55.9/100k vs. 73.7/100k; $p=0.25$). On univariate analysis, a UHL was associated with a significantly higher frequency of wait time greater than 2 years for both CRTx and OLTx. However, UHL were not associated with fewer deceased donor transplants per population or per listed patient. On multivariate linear regression modeling, a UHL was a small but significant predictor of wait longer than 2 years for kidney transplant, but not for liver. For both models, population density, registered motorcyclists per population, and average yearly precipitation were all stronger predictors of wait time then UHL.

Conclusions: Although helmet laws are associated with longer waiting times for CRTx and OLTx, state variation in wait list times is explained by factors beyond just the presence or absence of a UHL. UHL are not associated with fewer deceased donor transplants per capita. Motorcyclists do contribute disproportionately to the pool of transplant organs, but at this time there is no evidence to suggest that helmet laws independently are responsible for increased wait time.

Poster # 120

TRAUMA SEVERITY AND NOT THE SOCIO-ECONOMIC VARIABLES DETERMINES THE SURVIVAL AFTER PENETRATING TRAUMA IN A MEDIUM-INCOME COUNTRY

ALBERTO F. GARCIA MD, JUAN SANJUAN MD, ALVARO I. SANCHEZ MD, MARIA I. GUTIERREZ MD,Ph.D., JUAN CARLOS PUYANA* MD, UNIVERSIDAD ICESI

Introduction: Survival after severe trauma is lower in low- and middle-income countries. Poor quality of pre-hospital care, lack of insurance, and differential access to high quality care are possible explanations. The aim of this study was to evaluate the effect of lack of insurance, the pre-hospital times and the nature of the hospital (public or private), in survival after violent penetrating trauma in a middle-income country.

Methods: Information was collected prospectively. Patients aged 17 years or older, taken directly from the scene during the first six hours after the trauma were included. Deaths on admission were excluded. Logistic regressions (LMR) were used to control for confounders.

Results: A total of 320 penetrating trauma patients were treated; 201 in a private hospital and 119 in a public hospital from June to December 2012. There were 305 (95.3%) males. Median age was 26 years (IQR 21-35). Medians and IQR of RTS, ISS and PS were 7.55 (5.97-7.84), 18 (16-25), and 0.96 (0.85-0.99) respectively. A total of 64 (20.0%) subjects were uninsured. Median of pre-hospital time was 56 min (IQR 32-96). Death occurred in 69 cases (21.6%). Univariable analyses demonstrated that mortality did not differ significantly between hospitals (OR 1.14, IC95% 0.65-1.99), Mortality trended to be higher in the uninsured patients (OR 1.75, IC95% 0.94-3.23), and diminished as the pre-hospital time was longer (0.75 IC95% 0.58-0.95). After adjusting for age, ISS and TRISS, these associations disappeared, and only the severity indexes remained as significant predictors (Table).

VARIABLE	OR (95%CI)	P
Public hospital	1.13 (0.52-2.45)	0.75
Uninsured	1.41 (0.60-3.33)	0.43
Pre-hospital time (quartiles)	0.83 (0.61-1.14)	0.25
Age in years	1.00 (0.97-1.04)	0.80
ISS	1.09 (1.04-1.12)	0.00
TRISS	0.49 (0.40-0.60)	0.00

Conclusions: In a middle-income country with well-established intra-hospital care, mortality in penetrating trauma was determined by the severity of the trauma. Type of hospital, lack of insurance and pre-hospital time affected it only marginally.

Poster #121

VICTIMS AND INJURY PATTERNS IN GERIATRIC ASSAULT: ANALYSIS USING THE NATIONAL TRAUMA DATABANK

Tony Rosen MD,MPH, Sunday Clark MPH, ScD, Elizabeth M. Bloemen MPH, Mary R. Mulcare MD, Michael E. Stern MD, Neal E. Flomenbaum MD, Mark S. Lachs MD,MPH, Soumitra Eachempati* MD, Weill Medical College of Cornell University

Introduction: Non-accidental injuries in geriatric patients, including physical elder abuse, are common and can result in severe traumatic injury. Unfortunately, it is under-recognized by health care providers, often due to challenges in differentiating between assault and accidental injury, made more difficult by the normal physiologic changes that occur with aging. Currently, no national description of injury patterns in severe non-accidental geriatric injury exists. Improved understanding of injury patterns that distinguish between geriatric assault and accidental injury is critically needed. To comprehensively describe injury patterns, treatment, and outcomes of geriatric assault victims treated at US trauma centers.

Methods: We conducted a retrospective analysis of the 2006-2012 National Trauma Data Bank. We identified cases of non-accidental injury admitted to trauma centers in patients aged ≥60 using ICD9 codes 962-968, 995 and E-codes V15.41, V15.42, V71.81.

Results: 526 victims of non-accidental injury were identified among 47,962 total trauma admissions of patients aged ≥60. 83% of assault victims were male, in comparison with 48% of non-assault trauma patients. Assault victims had a mean age of 66±6 years compared to a mean age of 74±9 years among non-assault patients. Among assault victims, 21% had ≥3 co-morbidities, with only 2% of patients having reported dementia. 33% reportedly had recent alcohol or drug use when assaulted. The median injury severity score (ISS) was 9 (4-16), and the incidence of severe trauma (ISS≥16) was 35%. Median length of stay was 5 days (IQR 3-7), 42% required ICU care, and in-hospital mortality was 6%. Injuries were most commonly on the head (24%) and lower extremities (20%). 50% had injuries on ≥3 body regions.

Conclusion: Geriatric assault victims admitted to trauma centers are much more commonly men and are typically younger than other trauma patients, with frequent recent alcohol/drug use. Very few assault victims have dementia or are older women suggesting that severe assault injuries to these patients may currently be poorly recognized or that these patients may not be admitted to trauma services for treatment. Severe geriatric assault-related injuries are most commonly to the head and lower extremities, with many patients having injuries on multiple body regions.

Poster # 122

URBAN PRIVATE VEHICLE TRANSPORT IS INDEPENDENTLY ASSOCIATED WITH HIGHER SURVIVAL FOR VICTIMS OF PENETRATING TRAUMA

Michael W. Wandling MD, Haris P. Subacius MA, Michael B. Shapiro* MD, Avery B. Nathens* MD,MPH,Ph.D., Elliott R. Haut* MD,Ph.D., Northwestern University Feinberg School Of Medicine

Introduction:

The role of pre-hospital trauma care of injured patients remains a topic of considerable debate. Previous studies have evaluated the impact of mode of transport, transport times, and the intensity of pre-hospital procedures on morbidity and mortality following trauma. However, these studies are primarily from either a single center or the entire country, including all geographic regions (urban, suburban, rural) equally. These previous results are inconsistent and local pre-hospital systems continue to have varying protocols. We aimed to identify the optimal mode of transport for individuals suffering penetrating injury within urban trauma systems.

Methods:

Using the American College of Surgeons National Trauma Databank (NTDB), we identified all adult (age ≧ 16) gunshot wound and stab wound patients presenting to level 1 and level 2 trauma centers from 2010 to 2012. Cases were limited to those occurring in the 100 most populous US metropolitan areas using unblinded facility identification and hospital zip code information. Patients were included if they were transported directly to the trauma center by ground emergency medical services (EMS), police, or private transportation and had complete records with regard to the primary outcome of mortality. Mortality rates for pre-hospital mode of transport were calculated and the odds ratio of risk-adjusted mortality for each transport mode were derived.

Results:

Of 108,582 patients, 88,826 (81.8%) were EMS, 17,284 (15.9%) were private, and 2,472 (2.3%) were police. The overall mortality rate was 10.2%. After adjusting for age, gender, race, injury severity, presenting systolic blood pressure, presenting heart rate, Glasgow Coma Scale Motor score, year of admission, and insurance status, private vehicle patients were significantly less likely to die when compared to EMS patients (OR=0.48, 95% CI: 0.40-0.58). There was no mortality difference between EMS and police transported patients (OR=0.94, 95% CI: 0.66-1.34).

Conclusion:

By using facility identifier and hospital zip code data in the NTDB, we demonstrate that in urban settings, private transport is associated with higher survival compared to EMS transport for victims of penetrating trauma. Although similar findings have been previously reported, this is the first time the data have been restricted to the urban setting. By limiting these analyses to large metropolitan areas, the results can stimulate the evaluation and optimization of pre-hospital care within urban trauma systems nationwide.

Poster # 123

AUDITING THE AUDITORS: DO AUDIT FILTERS HAVE VALUE IN A MATURE TRAUMA PROGRAM?

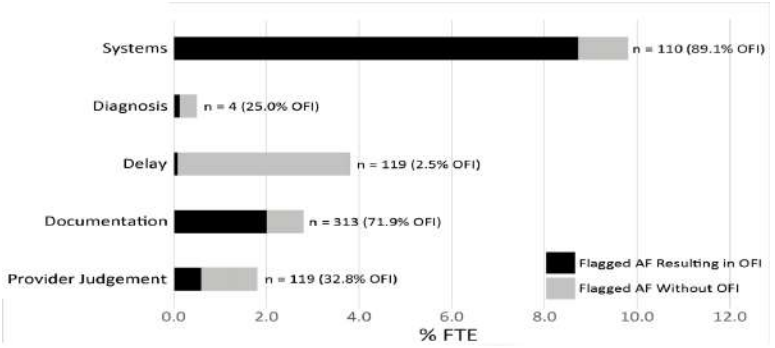
Kimberly A. Thompson MD, Jayraan Badiee MPH, Richard Y. Calvo Ph.D., Victoria S. McDonald MD, Paul Lewis DO, Brian K. McCord RN, C. Beth Sise RN, JD, Michael J. Sise* MD, Steven R. Shackford* MD, Scripps Mercy Hospital Trauma Service

Introduction: Trauma audit filters (AF) are used to ensure compliance with processes of care and are thought to improve outcomes and reduce adverse events. AF are based on expert consensus, rather than evidence. The resources required to document a trauma program's compliance with AF are substantial. No study has validated the use of AF as a means of improving processes of care or clinical outcomes. We sought to examine the value of AF within a mature, Level I trauma program.

Methods: We performed a retrospective descriptive study of all trauma patients admitted to a Level I trauma center from 7/2012-6/2014. Of 5244 patients, 532 (10%) were selected for review based on noncompliance with at least one of 18 AF from a total of 108 system-required AF. Three trauma surgeons and the trauma nurse director estimated the utility and feasibility of 108 AF. AF with the highest and lowest predicted value (utility divided by feasibility) were reviewed and categorized as documentation, delay, diagnosis, provider judgment, or systems-related. The primary outcome was the presence of an AF-identified opportunity for improvement (OFI). The secondary outcome was the presence of an AF-identified complication. Value was defined as the number of OFI or complications per AF divided by the time in hours required to identify and adjudicate noncompliance. Cost was converted to a full-time equivalent (FTE) of a trauma registrar.

Results: A total of 665 events of AF noncompliance occurred in 532 patients over the study period. Of these, 365 (55%) resulted in OFI. Administrative AF identified 68% of OFI (250/365). Noncompliance with an AF identified a complication only 1% of the time (7/665). No mortalities were identified by an AF. The estimated cost required to identify and adjudicate the selected 18 AF was 0.67 FTE. Noncompliance with one of the systems filters (nursing issues) had the highest FTE (0.25) and identified 63 (88%) OFI and 4 (5%) complications. Noncompliance with the delay in orthopedic treatment AF had the second-highest FTE (0.13) but identified only 1 OFI (1%) and no complications.

Conclusion: Routine identification and adjudication of the selected 18 AF at a mature Level I program was costly (0.67 registrar FTE). Low-value AF related to delay or administrative issues warrant either elimination or only periodic review. Further study is required to determine the value and cost savings of these options.



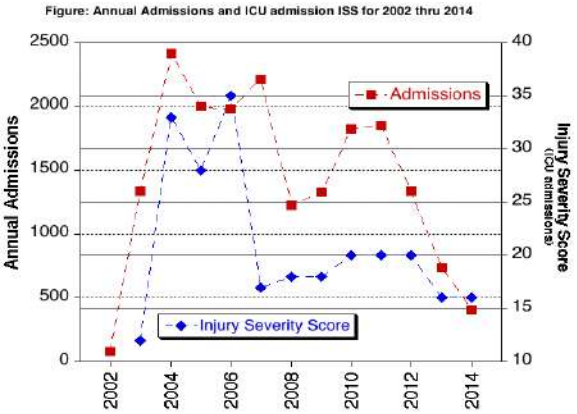
Poster # 124

TWELVE YEARS OF WAR: EXPERIENCE WITH 18,752 ADMISSIONS AT A MILITARY LEVEL IV FACILITY

Greg J. Beilman* MD, Connie Johnson RN, Kathleen Martin RN, Warren Dorlac* MD, John S. Oh MD, Raymond Fang* MD, David Zonies* MD, Donald Trunkey* MD, University of Minnesota Dept of Surgery

Introduction: Twelve years of conflict have been associated with significant evolution in care of injured service members driven by improved field, surgical and critical care techniques, and rapid global aeromedical and critical care transport. Essential to care in this paradigm is a comprehensive military Level IV facility (milLIV) allowing further stabilization of the wounded prior to subsequent transport to the United States. We describe the experience of a milLIV in caring for over 18,000 admissions over more than a decade of conflict.

Methods: Data from patient experience at our milLIV facility was obtained from both local and theater trauma registries from Jan 2002- Dec 2014. Information collected included mechanism of injury, injury severity, and injury patterns. In-hospital information reported included number and type of procedures, length of stay in the intensive care unit (ICU) and hospital, and mortality.



Results: A total of 18,752 trauma patients were admitted to our milLIV from Jan 2002-Dec 2014, with overall milLIV mortality of 0.66%. Casualty source included Iraq (56%), Afghanistan (37%), and other (6%). The top 3 causes of injury were blast (51%), gunshot wound (17%), and motor vehicle crash (9%). Amputation affected 7% of patients, and 6% of patients suffered perineal injuries. Twnety-nine percent of patients were admitted to the intensive care unit. Injury Severity Scores (ISS) were ≥ 25 in 11%,16-24 in 11%, 10-15 in 22%,with the remainder presenting with ISS <10. Fifty-five percent of patients underwent at least one operation at the milLIV facility. Average time from injury to arrival at milLIV was 2.7 days, and average length of stay at the milLIV was 3.5 days. The last 3 years have seen decreased total admissions and decreased severity of injury.

Conclusion: A military Level IV facility is a critical component of the military trauma system, allowing delivery of outstanding care to severely injured combat casualties. A major difference between milLIV and civilian trauma facilities is the transient nature of patients admitted to milLIV.

Poster # 125

DIFFERENCES IN HOSPITAL OUTCOMES FOLLOWING TRAUMATIC INJURY FOR PATIENTS EXPERIENCING IMMEDIATE TRANSFER TO A LEVEL I TRAUMA FACILITY VERSUS RESUSCITATION AT A CRITICAL ACCESS HOSPITAL (CAH)

Jered Windorski MD, Jared Reyes MS, Jeanette G. Ward MSCR, Stephen D. Helmer Ph.D., James M. Haan* MD, University Of Kansas School Of Medicine - Wichita

Introduction: Effective and timely treatment of rural trauma patients is an important component in a statewide trauma system. Critical access hospitals (CAH) serve a key role in providing medical care to these rural patients. The purpose of this study was to assess effectiveness of CAHs in initial care of trauma patients.

Methods: A 5-year retrospective chart review was conducted of all trauma patients ≥18 years of age who sustained a traumatic injury and were subsequently either sent transported directly to a level I trauma facility, or to a CAH and subsequently transferred to a level I trauma facility after initial resuscitation. Data collected included demographics, injury severity score (ISS), transportation mode, initial vital signs and GCS, life-saving procedures performed (chest tube, needle decompression, intubation). Outcomes were evaluate for patients who were or were not seen initially at a CAH.

Results: Of the 1478 trauma patients studied, 1084 were transferred from a CAH while 394 transported directly to the level I facility. Sixty-seven point three percent of patients had an ISS score 1-15, 18.4% had an ISS score of 16-24, and 14.3% had an ISS score ≥25. Patients transported directly to the level I hospital were younger, more severely injured, were ventilated longer and had longer ICU and hospital length of stays. Overall mortality was 7.3%; 59% of those who died were transferred while 41% of those who died were brought directly from the scene (p=0.001). Logistic regression analysis identified that older age, higher ISS, and lower GCS were all associated with a higher odds ratio of death, while transfer from CAH was not. Further, multiple regression analyses were conducted to analyze the effect of transfer from CAH on total hospital days, ICU days, and ventilator days while adjusting for the effects of shock, GCS, and ISS. Transfer from CAH was associated with a decreased length of hospital stay and was not associated with increased ICU days or ventilator days.

Table	CAH Transfer (mean)	Direct Transport (mean)	P-Value
Age, years	52.4	42.2	<0.001
ISS	11.4	16.3	<0.001
ICU Days	2.9	5.3	<0.001
Ventilator Days	2.0	4.7	<0.001
Hospital Days	4.8	7.3	<0.001

Conclusion: Following regression analyses, patients initially transferred to a CAH to undergo assessment and resuscitation prior to transfer to a level I trauma facility did not have increased mortality, hospital stay, ICU days, and ventilator days. This contradicts prior studies indicating increased mortality in patients treated at nontrauma centers initially.

Poster # 126

DEVELOPMENT OF A MEDICAL INFORMATION TRANSMISSION SYSTEM USING SMARTPHONES TO HASTEN HEMOSTATIC TREATMENT

Tomokazu Motomura MD, Kazuki Mashiko MD, Hiroaki Iida MD, Takanori Yagi MD, Nobuyuki Saito MD, Yoshiaki Hara MD, Hisashi Matsumoto Ph.D., Kunihiro Mashiko* Ph.D., Hiroyuki Yokota Ph.D., Haruka Chiba Kento Yagi Kuko Fuke Yasuhiro Toyonaga
Chiba Hokusoh Hospital, Nippon Medical School

Introduction: It is still challenging to shorten the time from injury to medical intervention for severe trauma. Severe trauma patients with hemorrhagic shock require hemostatic surgery or transcatheter arterial embolization (TAE) as quickly as possible. Meanwhile, the hospital trauma team needs exact medical information to prepare treatment. To resolve this matter, we have established the physician on-boarding HEMS system and developed the Real-Time Movie Transmission for EMS system using smartphones (REMOTE) with NTT Docomo Inc. The trauma team can monitor the dispatched physician's activity through REMOTE. This study aimed to evaluate the effect of transmission of patients' information between the dispatched physician and trauma team through REMOTE on shortening the time from injury to hemostatic procedure.
Patients and Methods: HEMS aviation and medical records were investigated retrospectively. Both "Reducing time of sending medical information" and "Shortened time of starting hemostasis" were compared between the previous period (PP) group without REMOTE (July 2012 to June 2013) and the late period (LP) group with REMOTE (July 2013 to June 2014).
Results: In this study, 633 cases in the PP group and 562 cases in the LP group were eligible for analysis. The time between HEMS request and sharing medical information were 31.6 min and 16.1 min in the PP and LP groups ($p<0.001$), respectively. Hemostatic procedures including emergency transfusion, thoracotomies, laparotomies, TAE, or pelvic external fixation were carried out in 29 cases in the PP group and in 38 cases in the LP group. The time between hospital arrival and TAE in the LP group was significantly shorter than that in the PP group (89 min vs. 58 min, $p=0.040$).
Discussion: This study revealed that REMOTE can immediately provide detailed medical information from the scene to the hospital trauma team including patients' severity, vital signs, and necessity of hemostasis treatment on hospital arrival. This system can also contribute to timely preparation of a massive transfusion protocol and operating room stand-by, and will be expected to improve the survival rate of severe trauma patients.

Poster # 127

HETEROGENEITY IN TRAUMA REGISTRY DATA QUALITY: IMPLICATIONS FOR REGIONAL AND NATIONAL PERFORMANCE IMPROVEMENT IN TRAUMA

Christopher J. Dente* MD, Dennis W. Ashley* MD, James R. Dunne* MD, Vernon Henderson* MD, Colville Ferdinand MD, Barry Renz MD, Romeo Massoud MD, John Adamski MD, Thomas Hawke MD, Mark Gravlee MD, John Cascone MD, Steve Paynter MD, Regina Medeiros Elizabeth Atkins RN, Jeffrey M. Nicholas* MD, Emory University

Introduction: Performance improvement (PI) is an important goal in the current practice environment. Led by TQIP, efforts are underway to expand PI efforts beyond the individual center to regional and national levels. The foundation for effective PI is quality data capture and resultant data homogeneity. The National Trauma Database has five standardized audit filters (AF) designed to identify patient records with potential erroneous data. Three AF are focused on complications, one on comorbidities and one on unexpected mortality. To build a foundation for statewide PI, the Georgia Committee on Trauma (COT) instituted standardized AF analysis in all Level I and II centers in the state to ascertain data quality and homogeneity.

Methods:Level I and II trauma centers in the state of Georgia performed AF reports monthly from July 2013 - Sept 2014. Identified patient records were reviewed to determine whether there was erroneous data abstraction and the nature of any error identified. Percent yield was defined as number of errors divided by number of charts captured. Data was collated by the COT and analyzed at a monthly and quarterly level. No organized educational activity directed at registry personnel or front line providers was performed.

Results:5 Level I and 7 Level II trauma centers submitted complete data sets. Over 15 months, 21,115 patient records were subjected to AF analysis. AF captured 2901 (14%) records and individual review yielded 549 (2.5%) records with erroneous data. Individual AF performance is listed in the table. AF 1 had the highest number of records identified and AF 3 had the highest percent yield. Individual center error rates ranged from 0.4% to 7.2%. Comparing quarters 1 and 2 (July 2013-Dec 2014) to quarters 4 and 5 (April 2014-Sept 2014), 8 of 12 centers had statistically significant decrease in error rates (Range 3-7% decreased to 0.1 to 1%, $p<.0001$). . The three AFs that focused on complications yielded the most errors in 1, 6, and 0 and the highest percentage yield in 0, 3 and 2 centers respectively. The AF focused on comorbidity yielded the most errors in 3 and the highest percentage yield in 5 centers. The AF focused on mortality yielded the most errors and highest percentage yield each in 2 centers. The most common missed complications were pneumonia, urinary tract infection and surgical site infection. The most common missed comorbidities were hypertension, diabetes and alcoholism.

Audit Filter (Focus)	Records (%)	Errors (%)	Percent Yield
1 (Complications)	865 (4%)	119 (0.5%)	13.7%
2 (Complications)	778 (4%)	165 (0.7%)	21.2%
3 (Comorbidities)	573 (3%)	138 (0.6%)	24.1%
4 (Complications)	437 (2%)	104 (0.4%)	23.8%
5 (Unexpected Mortality)	248 (1%)	23 (0.1%)	9.2%
Totals	2901 (14%)	549 (2.5%)	18.9%

Conclusions: 1. In the state of Georgia, the type and rate of erroneous data in trauma registries varies between centers, leading to heterogeneity in data quality and suggests that targeted educational opportunities exist at the institutional level. 2. In and of itself, standardized AF assessment significantly improved data quality in the majority of participating centers.

Poster # 128

COMPARING THE INCIDENCE OF INJURY COMPLICATIONS ACROSS TRAUMA SYSTEMS: A RETROSPECTIVE COHORT STUDY

Lynne Moore Ph.D., Henry T. Stelfox MD,Ph.D., Natalie Yanchar MD,MPH, Morad Hameed MD,MPH, John Kortbeek* MD, Richard Simons MD, David Evans MD, Gilles Bourgeois MD, Julien Clément MD, François Lauzier MD, MSc-epi, Alexis Turgeon MD, MSc-epi, Avery Nathens* MD, Ph.D., MPH, Laval University

Background: Complications of patient care represent a major burden in terms of mortality, morbidity, and resource use and have a negative impact on long-term functional capacity and quality of life. The positive influence of trauma systems on patient mortality has been widely documented but their impact on patient complications is less clear. Currently, there is significant variation in the level of integration of trauma systems across Canada. This context provides a unique opportunity to compare injury outcomes across health care jurisdictions with varying commitment to trauma care. The objective of this study was to evaluate inter and intra-provincial variations in the incidence of complications across Canada for major trauma admissions.

Methods: We conducted a retrospective cohort study using the Canadian *National Trauma Registry*. Patients admitted for major injury (Injury Severity Score >12) to any level I or II trauma center in Canada between 2006 and 2012 was included. Multilevel logistic regression models were used to estimate the incidence of major complications adjusted for age, injury mechanism, anatomical injury severity and physiological parameters. Analyses were performed for all trauma and then stratified by type of injury (traumatic brain injury, thoracoabdominal, spine). Extensive sensitivity analyses were performed.

Results: The study population included 76,949 patients of whom 9917 (12.9%) had at least one major hospital complication including 6.8% with pneumonia, 1.1% with renal failure, 1.3% with DVT, 1% with PE, 1.1% with sepsis, 1.4% with ARDS, and 0.3% with a stroke. Crude incidence of at least one complication varied from 7.2% to 19.3% across trauma centers and 7.2% to 19.3% across provinces. After adjustment for case mix, the incidence of complications varied between 8.1% and 18.1% across trauma centers and between 9.1% and 16.1% across Canadian provinces.

Conclusion: The incidence of major complications varies significantly across Canadian trauma centers and Canadian provinces, even after adjustment for patient case mix. Variations may in part be due to heterogeneity in reporting complications but we anticipate that this potential bias was largely avoided by restricting analysis to major complications. Information on systematic differences in structures and processes of care is needed to elucidate the reasons behind observed variations. This information could be used to inform quality of care improvements and improve injury outcomes in Canada.

Poster # 129

FALL FROM STANDING OR FALL FROM GRACE: A CRITICAL ANALYSIS OF 24 YEARS OF LOW LEVEL FALLS IN GERIATRIC TRAUMA PATIENTS AT A LEVEL I TRAUMA CENTER

Mark E. Hamill MD, Christopher R. Reed BS, Katie M. Love MD, Eric H. Bradburn* DO, Bryan R. Collier* DO, Carol M. Gilbert* MD, Christopher C. Baker* MD, Carilion Clinic / Virginia Tech - Carilion School Of Medicine

Introduction: Geriatric patients (age 65 and older) are comprising a progressively larger proportion of the patients admitted for traumatic injuries. Many of these are due to low level falls. Our goal was to define the characteristics of this group and identify opportunities for improvement in their care and outcomes.

Methods: The trauma registry of our level I trauma center was queried for all patients admitted over the 24 years of its existence. Patient parameters including age, gender, mechanism, ISS, mortality, comorbidities (2008-2013), and outcomes were analyzed. Wilcoxon u-tests and chi-square were used to identify differences between groups.

Results: A total of 29,151 trauma patients were treated between January 1989 and December 2013. Of these, 28,583 (98.1%) had complete records and were included in subsequent analysis. There were 5,214 geriatric patients (18.2%). Overall, low level falls accounted for 2,495 (47.9%) of this group; increasing from 22/282 (7.8%) from 1989-1994 to 1,867/2,995 (62.3%) from 2008-2013 ($p<0.0001$) (Figure 1). Compared to geriatric patients with other forms of blunt trauma, patients with low level falls tended to be older, female, with a higher ISS, more comorbidities, and more dependent upon hospital discharge (Table 1).

Conclusion: Geriatric patients with low level falls represent a unique subset of trauma patients. As this patient group is more medically complex, they may benefit from early aggressive multimodality care including geriatric medicine and palliative care.

Figure 1 - Etiology of Geriatric Trauma Over Time

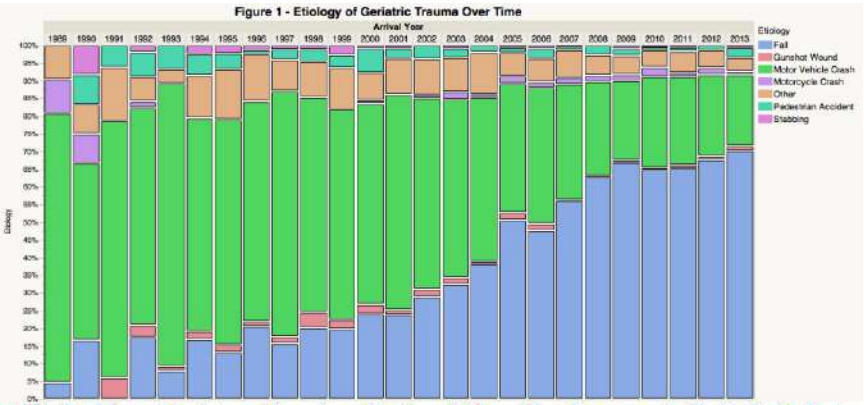


Table 1 - Characteristics of Low Level Falls vs Other Blunt Trauma in Geriatric Patients

	Low Level Falls	Other Blunt Trauma	p-value
Total Patients	2495 (47.9%)	2548 (52.1%)	
Median Age	81	73	<0.0001
Male Gender	975 (39.1%)	1517 (59.5%)	<0.0001
Median ISS	12	9	<0.0001
Mortality	287 (11.5%)	268 (10.5%)	0.26
Neurologic Comorbidities (2008-2013)	588/1867 (31.5%)	91/1048 (8.7%)	<0.0001
Cardiac Comorbidities (2008-2013)	695/1867 (37.2%)	278/1048 (26.5%)	<0.0001
>2 Comorbidities (2008-2013)	760/1967 (40.7%)	262/1048 (25.0%)	<0.0001
Discharged to Home Without Assistance	798 (32.0%)	1281 (50.3%)	<0.0001
Discharged to Skilled Nursing Facility	995 (39.9%)	471 (18.5%)	<0.0001

Poster # 130

FINANCIAL IMPACT OF MINOR INJURY TRANSFERS ON A LEVEL I TRAUMA CENTER

Nikolas S. Kappy MD, Joshua P. Hazelton DO, Lisa Capano-Wehrle MPH, Steven E. Ross* MD, Cooper University Hospital

Introduction: Trauma centers receive transfers from other hospitals for a higher level of care. We hypothesized that patients transferred from outside institutions with minor trauma would impart a negative financial impact on the receiving trauma center.

Methods: We performed a retrospective review of all trauma patients admitted to our urban Level I trauma center from Oct 1, 2011 through Sept 30, 2013. Patients were categorized as minor trauma (MT) if they did not require operation within 24 hours of arrival, did not require ICU admission, did not die, and had a hospital LOS < 24 hours. Transferred patients (Tx) and non-transfers (NTx) (those received directly from the field) were compared with respect to insurance status and hospital margin. Student's t-test and z-test for proportions were performed for data analysis.

Results: A total of 6,951 trauma patients were identified (Tx n=2228, NTx n=4724). MT-Tx (n=440, 19.7%) was compared to MT-NTx (n=689, 14.6%). Hospital margins of MT-Tx patients and MT-NTx patients were $2,227 and $2,569 respectively ($p$=0.22). Percentages of uninsured/underinsured (charity care or self pay) for MT-Tx and MT-NTx were 27.3% and 36.1% respectively (p=0.002).

Conclusion: By our criteria, 19.7% of transfers and 14.6% of non-transfers can be categorized as minor trauma. Such transfer patients are associated with a positive hospital margin for the trauma center that is similar to that of the non-transfer group. The data also demonstrate a lower percentage of uninsured/underinsured in the transferred group. However, the data also suggest that a significant proportion of transfers (1 in 5) are being sent to Trauma centers with minor traumatic injuries that might be managed at the referring institution, potentially leading to a diversion of finite resources from seriously injured patients at the trauma center.

Poster # 131

THE PRECIPITOUS DECLINE OF INFERIOR VENA CAVA FILTER USE IN A MATURE TRAUMA SYSTEM

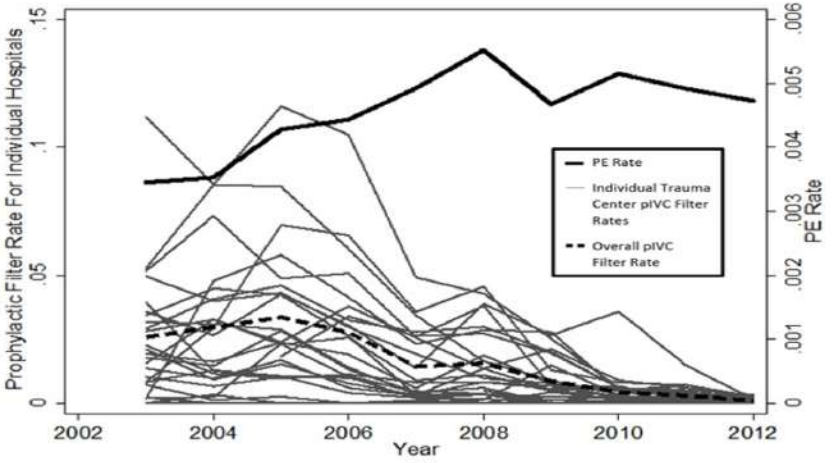
Frederick B. Rogers* MD, MS, FACS, Brian W. Gross BS, Turner Osler MD, Amelia Rogers BS, Nathan McWilliams MPH, RHIA Lancaster General Hospital

Introduction: Prophylactic inferior vena cava (pIVC) filter placement for pulmonary embolism (PE) prevention is a controversial practice within the trauma community. Previous population-based studies have noted a marked increase in IVC filter use over the past 20 years. We sought to determine the practice pattern and outcomes of pIVC filter placement in a mature, statewide trauma system.

Methods: All 2003-2012 admissions to Pennsylvania Trauma Systems Foundation-accredited trauma centers were extracted. Pulmonary embolism (PE) was defined as ICD-9 415.01, and IVC filter as ICD-9 38.7. An IVC filter placed prior to or without an impending PE was considered a prophylactic IVC (pIVC) filter. An IVC filter placed following a PE was classified as a therapeutic IVC (tIVC) filter. Rates of IVC filter placement, PE, and mortality were analyzed.

Results: Over the 10-year study period, 337,103 trauma patients were admitted, 5,044 IVC filters were placed, and 1,558 PEs were identified. Of patients with PEs, only 20.0% (N=312) received a filter; 86.2% of which were therapeutic filters (N=269). The majority of filters placed were prophylactic (N=4,775; 94.7%). IVC filter placement peaked between the years 2004-2006 in the majority of trauma centers in PA. Subsequently, IVC filter use has dropped significantly throughout the state while the rate of PE has remained relatively constant (Fig. 1). Overall mortality rate was 5.07%. PE was significantly associated with a higher rate of mortality (8.47%, $p<0.001$), although patients with PEs were more severely injured on average than those who did not develop a PE.

Conclusion: While the use of pIVC filters is on the decline in Pennsylvania's trauma system, the rate of PE is remaining relatively constant. Taking this association into consideration, it appears pIVC filters have limited value in preventing PE development, while imposing a significant economic burden on the healthcare system.



Poster # 132

SIDE OF PELVIC FRACTURE PREDICTS LATERALITY OF PELVIC HEMORRHAGE: IMPLICATIONS FOR RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION

Sundeep Guliani MD, Michael Amendola MD, Ajai Malhotra* MD, Mark Levy MD,
Virginia Commonwealth University

Introduction: Pelvic fracture hemorrhage significantly impacts the morbidity in the injured patient. Definitive hemorrhage control may require arterial embolization, a procedure not often immediately available. The purpose of this study was to: 1) determine if pelvic fracture pattern on initial pelvic imaging could predict the laterality of angiographic-demonstrated pelvic hemorrhage; and 2) to examine common iliac artery diameters in these bleeding patients to determine if smaller endovascular occlusion balloons could be used instead of large diameter aortic balloons for temporizing pelvic hemorrhage.

Methods: A retrospective review of an imaging registry identified all patients at a Level 1 trauma center over a 10 year period (January 2004- October 2014) who underwent arterial embolization for pelvic hemorrhage control after injury. Pelvic fractures on initial plain films were categorized according to laterality (right, left, bilateral). Laterality of bleeding source (right, left, bilateral) as demonstrated during pelvic arterial embolization was also recorded. Angiogram and CT imaging were reviewed to determine the diameter of the distal aorta and the common iliac artery on the side of hemorrhage. The success of CT imaging in determining the laterality of pelvic hemorrhage in patients with bilateral pelvic fractures was also investigated. Exclusion criteria included prophylactic pelvic embolization or the absence of a pre-embolization pelvic plain film.

Results: One hundred and three patients were retrospectively reviewed of which 85 met inclusion criteria. Mean patient age was 44.8. Concomitant abdominal and head injuries were present in 32% and 23% of patients respectively. Thirty-two of the 38 patients (84%) with unilateral pelvic fractures on plain film had a source of hemorrhage identified on the same side of fracture during angioembolization (20 unilateral and 12 bilateral bleeds). Of the 47 patients with bilateral fractures, 17 (36%) had bilateral hemorrhage, 15 (32%) left sided hemorrhage, and 15 (32%) right sided hemorrhage. Of these 47 patients, 26 received CT imaging prior to pelvic embolization. CT imaging was successful in identifying the laterality of pelvic bleeding in 21 of the 26 patients (81%). The 25 th, 50th, 75th, and 90th percentile common iliac artery diameter on the side of hemorrhage in the study population was 8.1, 9.1, 10.0, and 12.0 mm, respectively. The 25th, 50th, 75th, and 90th percentile terminal aortic diameter on the side of hemorrhage was 14.0, 15.0, 17.0, 20.0 mm, respectively.

Conclusion: In patients with angiographic-demonstrated pelvic hemorrhage, unilateral fractures on initial X-ray imaging have a moderately high sensitivity in predicting the laterality of pelvic arterial hemorrhage. In patients with bilateral pelvic fractures, CT imaging has a moderately high sensitivity in predicting the laterality of arterial pelvic bleeding. The majority of patients with pelvic arterial bleeding have common iliac artery diameters that are amendable to utilizing endovascular balloons that fit within small (5 or 6 French) sheaths used for subsequent arterial embolizations. This may facilitate the use of endovascular balloon occlusion techniques as an initial temporizing bridge to pelvic arterial embolization in the hemorrhaging trauma patient.

Poster # 133

VASCULAR SURGICAL EXPERTISE AT LEVEL I TRAUMA CENTERS: CAUSE FOR CONCERN

Micahel J. Sise* MD, Jayraan Badiee MPH, C. Beth Sise RN, JD, Steven R. Shackford* MD, Scripps Mercy Hospital Trauma Service

Introduction: Fewer open vascular cases in residency and fellowship training and the retirement of experienced surgeons portend a shortage of open vascular surgical expertise. We examined the extent to which these trends are impacting Level I trauma centers.

Methods: Trauma medical directors at ACS COT-verified and state-designated Level I trauma centers completed an online survey in 2015 of vascular injury volume, vascular trauma call panels, trauma surgeon vascular experience, and vascular certification. Management of extremity vascular injury and blunt popliteal artery injury were assessed as were concerns regarding the capabilities of vascular surgeons and the future availability of vascular expertise.

Results: Completed surveys were obtained from trauma medical directors representing 96 (51.3%) of 187 Level I trauma centers. Mean annual center patient volume was 2,520 with a mean rate of 0.5% for non-thoracic aortic vascular repairs. Isolated extremity vascular injury was managed with covered stents in 32% of centers and 24% noted attempted endovascular management of popliteal artery occlusion. Both resulted in complications including amputation. Concern regarding a vascular surgery colleague's expertise was reported in 16%. Ninety-one percent of respondents expressed concern regarding future availability of vascular expertise.

Conclusion: Decreasing open vascular expertise impacts a significant number of Level I trauma centers. Recruiting more surgeons with open vascular expertise to deal with this problem is unlikely to succeed. A more realistic solution is providing trauma surgeons with training opportunities in vascular exposures and techniques.

Trauma Surgeons at Level I Trauma Centers
50% perform vascular repairs
3% board-certified in vascular surgery
15% centers $\geq$ 1 trauma surgeon with vascular boards
88% centers with vascular trauma call panel

Trauma Medical Directors' Recommendations	
Recruit surgeons with vascular experience	(**43%**)
Send colleague to vascular surgery fellowship	(**5%**)
Additional training in vascular techniques	(**28%**)

Poster # 134

TRAUMA PATIENT ACCESS TO VASCULAR SURGERY CAPABLE HOSPITALS MAY BE A LOOMING PROBLEM.

Gary M. Weissenfluh DO, Thomas Weiser MD,MPH, Paul Maggio* MD, Timothy Browder* MD, Lakshika Tennakoon, David Spain* MD, Kristen Staudenmeyer* MD, Department Of Surgery, Stanford University

Introduction: General surgery residents currently receive very little in the way of vascular operative experience. However, practicing general surgeons and trauma surgeons may still be tasked with the urgent care of vascular injuries in trauma patients. We sought to determine how frequently vascular surgical procedures are performed at U.S. trauma centers to quantify the need for vascular surgical expertise. We hypothesized that urgent vascular surgical cases represent a large proportion of trauma cases, and that this would hold true across all regions and American College of Surgeon (ACS) verified trauma center levels.

Methods: We conducted a retrospective analysis of the National Trauma Data Base for the year 2012. Patients with general surgical and vascular procedures were identified using the International Classification of Diseases, 9th Revision (ICD-9) procedure codes. We included only cases performed in the first 24 hours after emergency department arrival to isolate the need for urgent intervention. We also limited the analysis to patients >18 years of age and patients with severe injuries defined by an injury severity score (ISS) of 15. Selected analyses were compared to similarly constructed 2002 NTDB data.

Results: The total number of patients that met criteria for the analysis was 177,228. Of these 15,316 (9%) underwent a general surgery procedure, 7,775 (4%) had a vascular procedure, and 6,081 (3%) had both a general surgery and vascular procedure. The average age of the population undergoing surgery was 50.2, and 31% were female.

A majority of the cohort received treatment at Level I/II trauma centers vs. Level III/IV centers (96% vs. 4%). Furthermore, vascular surgical procedures were performed more frequently on patients at Level I/II centers (8.2% vs. 1.4%, $p<0.001$). This was compared to the year 2002, when there was no difference in the rate of vascular procedures between Level I/II and Level III/IV centers (6.4% vs. 7.6% respectively, $p=0.142$).

Vascular surgery was frequently performed in community trauma centers (4,868 cases, 7.9% of patients) , but was still lower when compared to University hospitals (7,682 cases, 8.5% of patients, $p<0.001$). There was no difference in the rate of vascular surgery cases by U.S. census region.

Conclusion: : Vascular surgery remains a common need for injured patients. This is true for community and university settings, and across US regions. Compared to 2002, fewer patients received vascular surgery procedures at Level III/IV centers, suggesting a concentration of vascular skill sets at Level I/II centers. Future workforce needs will need to address the reduction in vascular skill sets to support the needs of the injured population.

Poster # 135

ASSOCIATION BETWEEN BLOOD TRANSFUSION AND RISK OF VTE IN PATIENTS WITH ISOLATED ORTHOPEDIC TRAUMA

Kevin J. McGurk BA, Bryan R. Collier* DO, Eric H. Bradburn* DO, Katie L. Love MD, Christopher C. Baker* MD, Mark E. Hamill MD, Carilion Clinic / Virginia Tech - Carilion School Of Medicine

Introduction: Venous thromboembolism (VTE) is a significant cause of morbidity and mortality in orthopedic trauma patients. Growing evidence suggests risks linked to transfusion, and restrictive transfusion practice to a hemoglobin ≥ 7.0 is well established. This study seeks to examine whether orthopedic trauma patients receiving packed red blood cells (pRBC) are at increased risk of VTE formation compared to those who are not transfused.

Methods: The institution's trauma registry was queried for all patients admitted between January 1, 2008 and December 31, 2013 with isolated orthopedic injuries as defined by area injury scores in non-extremities ≤2. Variables considered included age, gender, obesity, injury severity score (ISS), transfusion status and timing (intra-,peri- or non-operative), surgical status,hemoglobin prior to transfusion, hospital length of stay (HLOS) and documented VTE. Patients were then stratified by transfusion status. Because of differences between cohorts as measured by T test(Table 1) a logistic regression was used to measure the independent effect of each variable on VTE formation.

Results: A total of 311 patients were admitted with isolated orthopedic injuries during this period and included for analysis. Excluding patients with intraoperative transfusion or symptomatic anemia, 44 patients were transfused and analyzed, including 22 with Hg ≥ 7.0. Of the 44 transfused, 12 had VTE documented (27.3%) as compared to 12 of the 255 (4.7%) patients in the non-transfusion group with VTE for an unadjusted odds-ratio of 7.59 (Table 1). Logistic regression showed a statistically significant odds ratio of 5.70 (p = .0011) for transfusion status as an independent predictor of VTE incidence (Table 2).

Conclusion: Transfusion in orthopedic trauma patients is an independent risk factor for VTE formation. This risk should be strongly considered in treatment decisions and the practice of transfusing patients with Hg ≥ 7.0 should be reevaluated. Prospective study and further investigation into potential causal mechanisms are warranted.

Table 1 - Group Demographics

	Not transfused	Transfused	P value
N	255	44	
ISS	8.1	9.7	.0058*
Age	42.4	47.8	0.0679
% Female	62.5	45.5	.0335*
% Obese	28.6	31.8	0.6682
% Surgery	64.7	88.6	.0021*
HLOS	6.9	14	<.0001*
% VTE	4.7	27.3	<.0001*

Table 2 – Logistic Regression Summary

Variable	Likelihood Ratio Chi Square	P value
Age	1.43	.233
ISS	3.98	.0461*
Obesity	1.79	.181
Male Gender	4.92	.0265*
Surgery	0.001	.974
HLOS	12.34	.0004*
T status	10.60	.0011*

Poster # 136

IDENTIFICATION OF RISK FACTORS FOR THE DEVELOPMENT OF DECUBITUS ULCERS DESPITE STANDARD SCREENING METHODOLOGY AND PROPHYLAXIS IN TRAUMA PATIENTS

Lauren A. Raff MD, Shannon L. Carroll MD, Holly Waller MPH,RN, Russell L. Griffin Ph.D., Loring W. Rue* III, MD, Patrick L. Bosarge MD, University of Alabama Birmingham

Introduction: Pressure ulceration prevention has been emphasized over the past several years in inpatient hospital settings with subsequent decreases in development of decubitus ulcers (DU). However, there remains a subset of trauma and burn patients that develop DU despite standard screening methodology and prophylaxis to include skin care, nutrition, support devices, and frequent repositioning. The goal of this study is to identify the population that subsequently develops DU despite routine care.

Methods: Demographic and DU data were collected over a 5-year period from June 2008 to May 2013. Patients diagnosed with DU upon arrival in the trauma bay were excluded from analysis. An ordinal logistic regression of DU stage was used to estimate odds ratios (ORs) and associated 95% confidence intervals (CIs) for the association between characteristics of interest and odds of DU. A backwards selection process was used to select the most parsimonious model.

Results: During the study period, 14,616 trauma patients were admitted and had available data. A total of 124 patients (0.85%) that did not have any sign of pressure ulceration upon presentation went onto develop DU during the course of their hospitalization despite routine screening and prophylaxis. Factors associated with development of DU included spine AIS >3 (OR 5.72, CI 3.63-9.01), mechanical ventilation (OR 1.95, CI 1.23-3.10) and age 40-64 (OR 2.09, CI 1.24-3.52) and increased further with age ≥ 65 (OR 4.48, CI 2.52-7.95). Interestingly, head injury AIS >3 was protective from development of DU (OR 0.56, CI 0.32-0.96). Hypotension and shock defined as systolic BP <90 mmHg and base deficit less than -6 were not associated with development of DU. Additionally, BMI was not associated with DU development.

Conclusion: Spinal injuries, age ≥40, and mechanical ventilation predict development of DU for a subset of patients despite conventional prophylaxis and screening. Advanced prevention methods such as low air loss mattresses for these patient subgroups should be considered immediately upon identification of these risk factors during the hospital course.

Poster # 137

FACIAL TRAUMA AND SIX MONTH PSYCHOLOGICAL OUTCOMES

Ann Marie Warren Ph.D., Likith Reddy MD, DDS, Rebecca J. Weddle MD, Evan E. Rainey MS, Monica Bennett Ph.D., Pamela Holtz MS, Michael L. Foreman* MD, Baylor University Medical Center

Introduction: The face plays a critical role in one's sense of self and body image, and as such acquired facial trauma likely has a substantial psychological response. Abundant research demonstrates an association between acquired facial trauma and anxiety, depression, acute stress, and posttraumatic stress disorder. Acquired facial trauma has also been associated with lower life satisfaction, lower health-related quality of life, and a more negative self-perception of body image. The primary objective of this study is to examine the psychological outcomes of patients with facial trauma six months after acute hospitalization from a traumatic injury.

Methods: This cohort consisted of patients from a larger prospective longitudinal study consisting of individuals ≥18 years of age admitted to the trauma service of a Level I trauma center for ≥ 24 hours. Demographic and injury-related variables were collected from the trauma registry. Facial injury was determined by ICD-9 codes and divided into facial fracture and soft tissue injury. Outcomes, measured at baseline (hospitalization) and at 6 months, included depression, posttraumatic stress disorder (PTSD), and health related quality of life. Depression was measured using the Patient Health Questionnaire (PHQ-8), PTSD using the Primary Care PTSD Screen (PC-PTSD) and PTSD Checklist-Civilian Version (PCL-C), and health related quality of life using both the Physical Health Component measure and the Mental Health Component measure of the Veterans RAND 12-item Health Survey (VR-12). Paired t-tests and McNemar's change tests were used for analysis.

Results: 57 patients were included in this analysis. Of these, 32 had at least 1 fracture and 25 had only soft tissue injuries. The average injury severity score (ISS) was 15.1. Eighteen percent (N=10) of the injuries were caused by aggravated assault or gunshot wound, 21% (N=12) were caused by fall, 44% (N=25) by motor vehicle or motorcycle collision, and 18% (N=10) were caused by other means. Of the entire sample, 30% were positive for depression at baseline and 42% were positive at six months post injury. For PTSD symptoms, 35% of the sample endorsed symptoms at baseline and 28% endorsed symptoms at six months. A significant increase in the rate of depressive symptoms for patients with soft tissue injuries was found ($p = 0.0047$), however this trend did not hold true for those with facial fractures ($p = 0.7$). PTSD and pain were not significantly correlated with either type of facial injury at 6 months. Physical health quality of life decreased significantly for both groups ($p < 0.001$), yet mental health quality of life only decreased significantly for patients with soft tissue injury ($p=0.0012$).

Conclusions: In our study, sustaining a facial trauma was associated with considerable rates of both depression and PTSD symptoms at the time of hospital admission as well as six months post trauma. Differences emerged, however, in rates of depression and mental health quality in life in those with only soft tissue injuries, suggesting that these injuries produce more of a psychological impact than a facial fracture without soft tissue injury. Given the high rates of mental health consequences following facial trauma, individuals with these injuries should be screened for both depression and PTSD symptoms early after injury and provided with resources for treatment.

Keywords: Traumatic Injury, Facial Trauma, Depression, Posttraumatic Stress Disorder

Poster # 138

VENOUS THROMBOEMBOLIC RISK AFTER VENOUS INJURY: IMPACT OF LIGATION VERSUS REPAIR

Jayun Cho MD, Kenji Inaba* MD, Kazuhide Matsushima MD, Tobias Haltmeier MD, Elizabeth Benjamin MD,Ph.D., Lydia Lam* MD, Daniel Grabo MD, Demetrios Demetriades* MD,Ph.D., LAC+USC Medical Center

Introduction: Venous injury in trauma patients is a significant risk factor for venous thromboembolism (VTE: deep venous thrombosis and pulmonary embolism). However, it remains unclear whether the type of surgical management (ligation or repair) impacts the incidence of VTE. The aim of this study was to compare VTE occurrence after venous injury managed by ligation compared to repair.

Methods: After IRB approval, the National Trauma Data Bank was queried for patients undergoing a surgical intervention for venous injury (1/2007-12/2012). Data abstracted included demographics, injury data, and outcomes. The incidence of DVT, PE and VTE was compared between the ligation and repair groups.

Results: A total of 6,295 patients met inclusion criteria (ligation: 3,257, repair: 3,038). Mean age 35.1 years, 82.3% male, 73.6% penetrating mechanism, 39.0% ISS>15, and 60.4% sustained a peripheral venous injury. Patients in the ligation group developed DVT (8.9% vs 5.0%, $p<0.001$), PE (1.7% vs 1.0%, $p=0.021$) and VTE (9.9% vs 5.9%, $p<0.001$) more frequently than the repair group. After adjustment using multivariate analysis, ligation was associated with a significantly higher incidence of DVT (OR=1.80, 95% CI: 1.43-2.26, $p<0.001$) and VTE (OR=1.69, 95% CI: 1.36-2.09, $p<0.001$) when compared to repair.

Conclusion: Patients who underwent venous ligation for injury are at a higher risk of VTE compared to those who underwent repair. Prospective validation of these findings is warranted.

Poster # 139

SIMPLIFIED APPROACH FOR DIAGNOSIS OF PERSISTENT INFLAMMATION, IMMUNOSUPPRESSION, AND CATABOLISM SYNDROME IN SEVERE TRAUMA PATIENTS AND ITS CLINICAL OUTCOME

Kazuhiro Okada MD, Nobuyuki Saito MD, Hisashi Matsumoto MD,Ph.D., Takanori Yagi MD, Yoshiaki Hara MD, Kunihiro Mashiko* MD,Ph.D., Hiroyuki Yokota MD,Ph.D., Chiba Hokusoh Hospital, Nippon Medical School

Introduction: Persistent inflammation, immunosuppression, and catabolism syndrome (PICS) is a recently proposed concept describing the complicated clinical course of severe trauma patients. However, the diagnostic criteria of PICS are not fully established and research of its clinical outcome is limited.

Methods: We retrospectively reviewed trauma patients who stayed in the ICU for more than 10 days between 2010 and 2014. Patients were divided into PICS and non-PICs groups based on the following simplified criteria: C-reactive protein (CRP) level greater than 10 mg/dl on day 10, albumin level less than 3.0 g/dl on day 10, and evidence of infection within the first 10 days in the ICU. We compared clinical characteristics and outcomes between the two groups.

Results: Of 93 enrolled patients, 41 were diagnosed with PICS (44.1%). Victims of blunt trauma accounted for 97.8% (91/93) of the enrolled patients. Median age of the patients was 60 [IQR: 42.5–71.5] years old, and the median injury severity score (ISS) was 35 [29–43]. There were no differences in patient characteristics between the two groups. Univariate analyses revealed that the in-hospital mortality (PICS group: 12.2% vs. non-PICS group: 1.9%, $p = 0.045$), duration on mechanical ventilation (median; 18 vs. 15 days, $p = 0.019$) and length of stay in the hospital (75 vs. 59 days, $p = 0.01$) was significantly higher in the PICS group than the non-PICS group. However, there was no difference in 30-day mortality (4.9% vs.1.9%, $p = 0.423$) between the two groups. On multivariate analysis, the PICS group was significantly associated with recurrent infection after day 10 (odds ratio 2.83, 95% confidence interval, 1.09 to 7.39, $p = 0.033$).
Conclusion: Severe trauma patients who experience a prolonged ICU stay, high CRP level and low albumin level on day 10, and episodes of infection within the first 10 days are likely to have more complicated hospital course and poor long-term outcomes, which are characteristic of PICS. This streamlined diagnostic model will help identify patients with PICS early and accurately.

Poster # 140

ELECTRONIC MUSCLE STIMULATION INCREASES BLOOD FLOW VELOCITY OF THE POPLITEAL AND FEMORAL VEINS IN INTENSIVE CARE

Masahiro Ojima MD, Ryosuke Takegawa MD, Youhei Nakamura MD, Tomoya Hirose MD, Mitsuo Ohnishi MD,Ph.D., Tadahiko Shiozaki MD,Ph.D., Takeshi Shimazu MD,Ph.D., Osaka University Graduate School of Medicine

Introduction: Deep vein thrombosis (DVT) is a major complication in critical care. In cases of major trauma, patients are forced to be on long-term bed rest and are at high risk for DVT. Guidelines recommend early administration of prophylactic agents to prevent DVT in such high-risk patients. However, this involves risk of hemorrhage. An electronic muscle stimulation (EMS) device is recently being used for rehabilitation of immobilized people. Rhythmic change of blood flow may have a prophylactic effect for DVT. The purpose of this study was to evaluate the effects of the EMS on blood flow of the lower limbs.

Methods:This prospective observational study included patients with traumatic brain injury, spinal cord injury, pelvic fracture, stroke, and sepsis on mechanical ventilation for more than 3 days (EMS group). In each patient, the EMS device was attached to the posterior calf and anterior thigh. The stimulation strength was set for the ankle to move grossly in planter flexion. We checked maximum blood flow velocities of the popliteal and femoral veins before and during EMS as well as in patients not undergoing EMS as a control group.

Results:We enrolled 31 patients (62 legs) (EMS group n=11, control group n=20) with a mean age of 62.9±19.94 years. The median APACHE2 score was 19.0 [11.0-24.0, n=31] and ISS score was 25.0 [17.0-36.0, n=13]. The median velocity of the popliteal vein during EMS was 23.8 [13.8-38.0] cm/s and at rest as 12.6 [9.7-18.2] cm/s ($p<0.001$). The median velocity of the femoral vein during EMS was 25.0 [18.3-32.7] cm/s and at rest was 19.6 [14.2-27.6] cm/s ($p<0.001$). There was no major complication related to EMS.

	EMS	Rest	p value
The velocity of Pop.V	23.8 (13.8-38.0)	12.6 (9.7-18.2)	<0.001
The velocity of CFV	25.0 (18.3-32.7)	19.6 (14.2-27.6)	<0.001

Conclusion:EMS was safe and significantly increased blood flow in the popliteal and femoral veins. Prevention of blood stasis with EMS may have the prophylactic potential for DVT without risk of hemorrhage in critical care.

RESEARCH SCHOLARSHIP RECIPIENTS
AMERICAN ASSOCIATION
FOR THE SURGERY OF TRAUMA
1988 – 2015

WINTHROP

1988 – 1989	Stephen E. Morris, M.D.

AAST/SHERWOOD DAVIS & GECK

1988 – 1989	Sandra Beale, M.D.
1989 – 1990	Christine Cocanour, M.D.
1989 – 1990	Daniel J. Johnson, M.D.
1991 – 1992	Eric J. DeMaria, M.D.
1991 – 1992	Scott A. Dulchavsky, M.D., Ph.D.
1991 – 1992	Lena Napolitano, M.D.
1992 – 1993	Mark D. Cipolle, M.D., Ph.D.
1992 – 1993	William J. Mileski, M.D.
1993 – 1994	David A. Spain, M.D.
1993 – 1994	James R. Wallace, M.D., Ph.D.
1994 – 1995	Carnell Cooper, M.D.
1994 – 1995	David A. Spain, M.D.
1995 – 1996	Robert N. Cooney, M.D.
1995 – 1996	Charles N. Mock, M.D., M.P.H., Ph.D.
1996 – 1997	J. Perren Cobb, M.D.
1996 – 1997	Chong-Jeh Lo, M.D.
1997 – 1998	Kimberly A. Davis, M.D., M.B.A.
1997 – 1998	Joseph T. Murphy, M.D.
1998 – 1999	Kenneth H. Sartorelli, M.D.
1998 – 1999	Joseph T. Murphy, M.D.

AAST/WYETH-AYERST SCHOLARSHIP AWARD

1999 – 2000	Grant O'Keefe, M.D., M.P.H.
2000 – 2001	James C. Jeng, M.D.
2001 – 2002	Eileen M. Bulger, M.D.

AAST/JOHN B. DAVIS RESEARCH SCHOLARSHIP AWARD

1994 – 1995	Paul E. Bankey, M.D., Ph.D.
1995 – 1996	Chong-Jeh Lo, M.D.
1996 – 1997	Robert N. Cooney, M.D.
1997 – 1998	Charles N. Mock, M.D., M.P.H., Ph.D.
1998 – 1999	Jeffrey S. Young, M.D.
1999 – 2000	Glen A. Franklin, M.D.
2000 – 2001	Glen A. Franklin, M.D.
2001 – 2002	Alan D. Murdock, M.D.
2002 – 2003	Eileen M. Bulger, M.D.

2003 – 2004	Toan T. Huynh, M.D.
2004 – 2005	Louis J. Magnotti, M.D.
2005 – 2006	Gregory P. Victorino, M.D.
2006 – 2007	Carrie A. Sims, M.D.
2007 – 2008	Vishal Bansal, M.D.

AAST/RESEARCH & EDUCATION SCHOLARSHIP AWARD

2002 – 2003	Gregory P. Victorino, M.D.
2003 – 2004	Saman Arbabi, M.D., M.P.H.
2004 – 2005	Saman Arbabi, M.D., M.P.H.
2006 – 2007	Mark R. Hemmila, M.D.
2007 – 2008	Suresh Agarwal, Jr., M.D.

AAST/RESEARCH & EDUCATION FOUNDATION SCHOLARSHIP AWARD

1999 – 2000	Kenneth H. Sartorelli, M.D.
2000 – 2001	Andrew J. Michaels, M.D., M.P.H.
2001 – 2002	Kimberly A. Davis, M.D.
2001 – 2002	James A. Murray, M.D.
2002 – 2003	Susan I. Brundage, M.D., M.P.H.
2002 – 2003	Colleen E. Jaffray, M.D
2003 – 2004	Raminder Nirula, M.D., M.P.H.
2003 – 2004	Kathryn M. Tchorz, M.S., M.D.
2004 – 2005	Jason J. Hoth, M.D.
2004 – 2005	Obeid Ilahi, M.D.
2005 – 2006	Carlos V.R. Brown, M.D.
2005 – 2006	Rochelle A. Dicker, M.D.
2005 – 2006	Ajai K. Malhotra, M.D.
2006 – 2007	Michel Aboutanos, M.D., M.P.H.
2007 – 2008	Barbara A. Gaines, M.D.
2008 – 2009	Timothy Browder, M.D.
2008 – 2009	Tam Pham, M.D.
2009 – 2010	Eric Ley, M.D.
2009 – 2010	Tam Pham, M.D.
2010 – 2011	Jared M. Huston, M.D.
2010 – 2011	Eric Ley, M.D.
2011 – 2012	David A. Machado-Aranda, M.D.
2011 – 2012	Susan Rowell, M.D.
2012 – 2013	Todd Costantini, M.D.
2012 – 2013	Steven Schwulst, M.D.
2013 – 2014	Susan Evans, MD
2013 – 2014	Robert David Winfield, MD
2014 – 2015	Jacob Glaser, M.D
2014 – 2015	Angela Ingraham, M.D.
2014 – 2015	Jon Simmons, M.D.
2015 – 2016	Matthew Delano, M.D.
2015 – 2016	Benjamin Levi, M.D.
2015 – 2016	Matthew D. Neal, M.D.

AAST/NOVO NORDISK RESEARCH AWARD IN HEMOSTASIS AND RESUSCITATION

2006 – 2007	Mitchell Jay Cohen, M.D.
2008 – 2009	Mitchell Jay Cohen, M.D.
2009 – 2011	Matthew Rosengart, M.D., M.P.H.

THE ACS, AAST AND NIGMS JOINTLY SPONSORED MENTORED CLINICAL SCIENTIST DEVELOPMENT AWARD (K08/K23)

2006 – 2011	Mark R. Hemmila, M.D.
2007 – 2012	Alicia Mohr, M.D.
2008 – 2013	Mitchell Jay Cohen, M.D.
2009 – 2013	Jason J. Hoth, M.D.
2010 – 2013	Jason Sperry, M.D.
2011 – 2013	Carrie Sims, M.D.

AAST/ETHICON RESEARCH GRANT IN LOCAL WOUND HAEMOSTATICS AND HEMORRHAGE CONTROL

2007– 2008	Kenji Inaba, M.D.
2008 –2009	Jose Pascual, M.D.
2009 –2010	Jennifer Watters, M.D.
2010 – 2011	Jeffrey S. Ustin, M.D.

AAST/KCI RESEARCH GRANT IN WOUND CARE

2007 – 2008	Therese M. Duane, M.D.
2008 – 2009	Michael Corneille, M.D.
2009 – 2010	Ziad C. Sifri, M.D.
2010 – 2011	Lydia Lam, M.D.
2011 – 2012	Laurie Punch, M.D.

AAST/CIMIT RESEARCH FELLOWSHIP IN THE FIELD OF TECHNOLOGY IN TRAUMA AND CRITICAL CARE

2009 – 2010	Jeffrey Ustin, M.D.
2010 – 2011	David King, M.D.
2011 – 2012	Suresh Agarwal, Jr., M.D.

2014 AAST RESEARCH AND EDUCATION FOUNDATION DONOR LEVELS:

(Donations received January 1, 2014 -December 31, 2014)

Legacy Donor $10,000-$24,999

**Dr. L.D. Britt*
**Dr. Martin A. Croce*
Dr. Thomas M. Scalea
**Dr. Michael J. Sise*

Platinum Supporter $5,000-$9,999

Dr. James W. Davis
**Dr. Timothy C. Fabian*
Dr. Pardon Kenney
**Dr. J. Wayne & Gayle Meredith*
**Dr. Andrew & Debra Peitzman*
**Dr. Grace S. Rozycki*
& Dr. David V. Feliciano
**Dr. David & Jill Spain*
(In Memory of Dr. Erwin Thal)
** Dr. Ronald M. Stewart*
**Dr. Dennis Vane*

Gold Supporter $1,000-$4,999

Dr. Suresh Agarwal, Jr.
Dr. Susan M. Briggs
Dr. William G. Cioffi
Dr. Raul Coimbra
Dr. Kimberly A. Davis
**Ms. Sharon Gautschy*
Dr. Cleon Goodwin
Dr. Amy J. Goldberg
Dr. Kirby Gross
Dr. Sharon Henry
Dr. David B. Hoyt
Dr. Jennifer Hubbard
Dr. Rosemary Kozar
Dr. Anna Ledgerwood
Dr. Charles Lucas

Gold Supporter $1,000-$4,999 (continued)

Dr. Robert C. Mackersie
Dr. Ronald V. Maier
***Dr. Mark Malangoni*
Dr. Anthony Meyer
Dr. David Mulder
Dr. Lean Napolitano
Dr. C. William Schwab
Dr. Thomas Velky

Silver Supporter $500-$999

Dr. Juan Asensio
Dr. Erik Barquist
Dr. James Betts
Dr. Mark D. Cipolle
Dr. Henry Ford
Dr. Fernando Garcia
Dr. Amy J. Goldberg
Dr. Cleon W. Goodwin
Dr. Jonathan I. Groner
Dr. John Holcomb
Dr. Stephen Kaminski
Dr. Andrew Kerwin
Dr. Manuel Lorenzo
Dr. Lawrence Lottenberg
Dr. Linda Maerz
Dr. Joseph Minei
Dr. John T. Owings
Dr. Donald D. Trunkey
Dr. Raymond Wedderburn
Dr. Leonard J. Weireter, Jr.
Dr. Alison Wilson
Dr. Mihae Yu

*Donation is cumulative over five years
** Donation is cumulative over three years

2014 AAST RESEARCH AND EDUCATION FOUNDATION DONOR LEVELS

(Donations received January 1, 2014 -December 31, 2014)

Bronze Supporter $100-$499

Dr. Michael Aboutonos
Dr. Roxie M. Albrecht
Dr. Scott Armen
Dr. John S. Armstrong
Dr. Richard Bagdonas
Dr. Jeffrey Bailey
Dr. Philip S. Barie
Dr. Bruce Bennett
Dr. Andrew C. Bernard
Dr. James Betts
Dr. Karen Butler
Dr. David P. Blake
Dr. Carlos V.R. Brown
Dr. Eric Bradburn
Dr. Eileen Bulger
Dr. Marko Bukur
Dr. Mark D. Cipolle
Dr. Thomas V. Clancy
Dr. John R. Clarke
Dr. Christine A. Cocanour
Dr. Charles Cook
Dr. Michael L. Craun
Dr. Michael Cripps
Dr. Rolando Dela Cruz
Dr. Brian Daley
Dr. Imad Dandan
Dr. Christopher Dente
Dr. Rafael Diaz
Dr. Therese M. Duane
Dr. Juan Duchesne
Dr. Kevin Dwyer
Dr. Soumitra Eachempati
Dr. Robert Falcone
Dr. Mary Fallat
Dr. Richard Fantus
Dr. John Fildes
Dr. Steven Flaherty
Dr. David R. Gens
Dr. Steven Glorsky
Dr. Richard Gonzalez
Dr. J. Carel Goslings
Dr. Wendy Green
Dr. Scott Hannay
Dr. Brain harbrecht
Dr. H. Mathilda Horst
Dr. Robert Hurd
Dr. Donald Jenkins
Dr. D'Andrea K. Joseph
Dr. Kimberly Joseph
Dr. Christopher Kaufmann
Dr. Krista L. Kaups
Dr. Frank Kennedy
Dr. Andrew Kerwin
Dr. Orland Kirton
Dr. Stanley Klein
Dr. Donald Klotz, Jr.
Dr. Seth Krosner
Dr. Joanne Lee
Dr. Brian Leininger
Dr. Eric Ley
Dr. David Livingston
Dr. Stephen S. Luk
Dr. Ajai Malhotra
Dr. Kenneth L. Mattox
Dr. Michelle McNutt
Dr. Nathaniel McQuay
Dr. Norman McSwain, Jr.
Dr. Michael H. Metzler
Dr. Christopher Michetti

2014 AAST RESEARCH AND EDUCATION FOUNDATION DONOR LEVELS

(Donations received January 1, 2014 -December 31, 2014)

Bronze Supporter $100-$499

Dr. Richard Miller
Dr. Laura Moore
Dr. Pal Naess
Dr. Alexander Ng
Dr. Scott H. Morwood
Dr. Kathleen P. O'Hara
Dr. Turner M. Osler
Dr. Pauline K. Park
Dr. Basil A. Pruitt, Jr.
Dr. Peter Rhee
Dr. Steven & Carolyn Ross
(In Memory of Dr. Erwin Thal)
Dr. Douglas Schuerer
Dr. Steven Shackford
Dr. Cael Schulman
Dr. Mark Shapiro
Dr. Cory Siffring
Dr. Iqbal Singh
Dr. Nicole A. Stassen
Dr. Steven M. Steinberg
Dr. Errington Thompson
Dr. Gregory A. Timberlake
Dr. S. Rob Todd
Dr. Bartholomew Tortella
Dr. Pascal Udekwu
Dr. Jeffrey Upperman
Dr. Jay A. Yelon

Friends of the Foundation $1-$99

Dr. Louis Alarcon
Dr. Richard Bagdonas
Dr. Jeffrey Bednarski
Dr. Kenneth Boffard
Dr. Mary-Margaret Brandt

Friends of the Foundation $1-$99

Dr. Randall Burd
Dr. Jeremy Cannon
Dr. Mitchell Jay Cohen
Dr. John Como
Dr. Tejveer Dhillon
Dr. Jose Diaz
Ms. Christine Eme
Dr. Joseph Galante
Dr. David Giles
Dr. Mark Jones
Dr. Jerry Jurkovich
Dr. M. Margaret Knudson
Dr. Peter Lopez
Dr. Alejandro Luis
Dr. George Maish, III
Dr. William Marx
Dr. Adrian Maung
Dr. Kimberly Nagy
Dr. George Neira
Dr. Jun Oda
Ms. Jane Pariseault
Dr. Tyler Putnam
Dr. Norman M. Rich
Dr. Steven Ross
Dr. Bradley Roth
Dr. Susan Rowell
Dr. Henry Schiller
Dr. Brian Shapiro
Dr. Susan Steinemann
Dr. Melvin Stone
Dr. Sheldon Teperman
Dr. Burke Thompson
Dr. Eric Voiglio
Dr. Dany Westerband

2015 AAST RESEARCH AND EDUCATION FOUNDATION DONOR LEVELS:

(Donations received January 1, 2015 -August 1, 2015)

Legacy Donor $10,000-$24,999

**Dr. L.D. Britt*
**Dr. Martin A. Croce*
**Dr. Grace S. Rozycki*
& Dr. David V. Feliciano
Dr. Thomas M. Scalea
**Dr. Michael J. Sise*

Platinum Supporter $5,000-$9,999

Dr. James W. Davis
**Dr. Timothy C. Fabian*
Dr. Pardon Kenney
**Dr. J. Wayne & Gayle Meredith*
**Dr. Andrew & Debra Peitzman*
**Dr. Dennis Vane*

Gold Supporter $1,000-$4,999

Dr. Susan M. Briggs
Dr. Kimberly A. Davis
**Ms. Sharon Gautschy*
Dr. Cleon Goodwin
Dr. Kirby Gross
Dr. David B. Hoyt
***Dr. Mark Malangoni*
Dr. Anthony Meyer
Dr. David Mulder
Dr. C. William Schwab

Silver Supporter $500-$999

Dr. Erik Barquist
Dr. Mark D. Cipolle
Dr. Amy J. Goldberg
Dr. Cleon W. Goodwin
Dr. Andrew Kerwin
Dr. Manuel Lorenzo
Dr. Linda Maerz
Dr. Joseph Minei
Dr. Erik Barquist
Dr. Mark D. Cipolle
Dr. Amy J. Goldberg
Dr. Cleon W. Goodwin
Dr. Andrew Kerwin
Dr. Manuel Lorenzo
Dr. Linda Maerz
Dr. Ernest E. Moore
Dr. Raymond Wedderburn
Dr. Mihae Yu
Dr. Donald D. Trunkey
Dr. Erwin R. Thal

Bronze Supporter $100-$499

Dr. Hasan Alam
Dr. Stephen S. Luk
Dr. Gregory Timberlake
Dr. H. Scott Bjerke
Dr. Donald Sturtz

*Donation is cumulative over five years
** Donation is cumulative over three years

2013 - 2014 AAST RESEARCH AND EDUCATION FOUNDATION 20*forTwenty* DONORS

(Donations received September 18, 2013 - August 1, 2014)

Dr. Louis Alarcon
Dr. Scott B. Armen
Dr. Erik Barquist
Dr. Robert Barraco
Dr. Andrew Bernard
Dr. James Betts
Dr. David P. Blake
Dr. Kenneth Boffard
Dr. Mary Margaret Brandt
Dr. Brian Brewer
Dr. Eileen M. Bulger
Dr. Jeremy Cannon
Dr. Howard Champion
Dr. Jeff Claridge
Dr. John R. Clarke
Dr. Mitchell Jay Cohen
Dr. Jamie Coleman
Dr. John Como
Dr. Arthur Cooper
Dr. Ron Cooper
Dr. Martin A. Croce
Dr. Imad Dandan
Dr. Alan Dimick
Dr. Warren Dorlac
Dr. Jay Doucet
Dr. Russell Dumire
Dr. David T. Efron
Dr. Timothy C. Fabian
Dr. Richard Fantus
Dr. Anthony Falvo
Dr. David V. Feliciano
Dr. John Fildes
Dr. Takashi Fujita
Dr. Barbara A. Gaines
Ms. Sharon Gautschy
Dr. Mark Gestring
Dr. Amy J. Goldberg
Dr. Vicente Gracias
Dr. Wendy Greene
Dr. Ronald Gross
Dr. Elliott R. Haut
Dr. Sharon Henry
Dr. Matthew Indeck
Dr. Donald H. Jenkins
Ms. Tamara Jenkins
Dr. Jerry Jurkovich
Dr. Pardon R. Kenney
Dr. Reza Kermani
Dr. Andrew J. Kerwin
Dr. Orlando Kirton
Dr. M. Margaret Knudson
Dr. Rosemary A. Kozar
Dr. Deborah Kuhls
Dr. David Livingston
Dr. Fred Luchette
Dr. Robert C. Mackersie
Dr. Ronald V. Maier
Dr. Darren Malinoski
Dr. William Marx
Dr. Konrad Messmer
Dr. Michael H. Metzler
Dr. Richard S. Miller
Dr. Christian T. Minshall
Dr. Ernest E. Moore
Dr. Farid F. Muakkassa
Dr. Yoshinori Murao
Dr. Kimberly Nagy
Dr. Lena Napolitano
Dr. Raminder Nirula
Dr. Scott Norwood
Dr. Terence O'Keeffe
Dr. Patricia O'Neill
Dr. Patrick O'Neill
Dr. Yasuhiro Otomo
Dr. John Owings
Dr. Pauline Park
Dr. Lisa A. Patterson
Dr. Andrew B. Peitzman
Dr. Basil A. Pruitt, Jr.
Mrs. Nanette Redmond
Dr. Patrick M. Reilly
Dr. Jason Rigoni
Dr. Daniel Roesler
Dr. Steven E. Ross
Drs. Susan Rowell &
Ron Barbosa
Dr. Grace S. Rozycki
Dr. Rafael E. Sanchez
Dr. John Santaniello
Dr. Thomas M. Scalea
Dr. Douglas Schuerer
Dr. Steven R. Shackford
Dr. John Sherck
Dr. Michael J. Sise
Ms. Jermica M. Smith
Dr. R. Stephen Smith
Dr. David Spain
Dr. Anil K. Srivastava
Dr. Nicole Anne Stassen
Dr. John Steele
Dr. Erwin R. Thal
Dr. Gregory A. Timberlake
Dr. Glen Tinkoff
Dr. Eric Toschlog
Dr. Dennis Vane
Dr. Wendy L. Wahl
Dr. Mbaga S. Walusimbi
Dr. Raymond Wedderburn
Dr. Michaela A. West
Dr. Alison Wilson
Dr. Mihae Yu

2014 - 2015 AAST RESEARCH AND EDUCATION FOUNDATION 20*forTwenty* DONORS

(Donations received August 1, 2014 - August 1, 2015)

Dr. Charles Adams
Dr. Suresh Agarwal, Jr.
Dr. Luis Alarcon
Dr. Jim Bardes
Dr. Erik Barquist
Dr. Bruce Bennett
Dr. Kenneth Boffard
Dr. Randall Burd
Dr. Eileen M. Bulger
Dr. Andre Campbell
Dr. Jeremy Cannon
Dr. William G. Cioffi
Dr. Raul Coimbra
Dr. Christine Cocanour
Dr. Charles Cook
Dr. Michael Cripps
Dr. Martin A. Croce
Dr. Daniel Dent
Dr. Jose Diaz
Dr. Rafael Diaz
Dr. Robert Driscol
Dr. Juan Duchesne
Ms. Christine Eme
Dr. Peter Ekeh
Dr Michael Fahr
Dr. David V. Feliciano
Dr. John Fildes
Dr. Joseph Galante
Ms. Sharon Gautschy
Dr. Dean Gubler
Dr. Sharon Henry
Dr. Mark Jones
Dr. Gregory Jurkovich
Dr. Krista L. Kaups
Dr. Andrew J. Kerwin
Dr. Orlando C. Kirton
Dr. Seth Krosner
Dr. Rosemary A. Kozar
Dr. Eric Kuncir
Dr. Chen Lee
Dr. David Livingston
Dr. Lawrence Lottenberg Dr. Alejandro J. Luis
Dr. William Marx
Dr. Laura Moore
Dr. Rick Miller
Dr. Lena Napolitano
Dr. Terence O'Keefe
Ms. Jane Parisault
Dr. Jose L. Pascual-Lopez
Dr. Peter Rhee
Dr. Grace S. Rozycki
Dr. Thomas M. Scalea
Dr. Henry Scherer
Dr. Douglas Schuerer
Dr. John P. Sherck
Dr. Cory W. Siffring
Dr. Michael J. Sise
Dr. Steven Smith
Dr. Carl Soderstrom
Dr. David A. Spain
Dr. Nicole Stassen
Dr. M. Stone
Dr. Sheldon Teperman
Dr. Gail Tominaga
Dr. Dennis Vane
Dr. Wendy Wahl
Dr. Leonard Weireter
Dr. Charles Wiles
Dr. Alison Wilson

2014 AAST #GIVINGTUESDAY DONORS
(Donations received on December 2, 2014)

Dr. Suresh Agarwal, Jr.
Dr. Robert Barraco
Dr. L.D. Britt
Dr. Marko Bukur
Dr. William G. Cioffi
Dr. Raul Coimbra
Dr. Edward E. Cornwell, III
Dr. Martin A. Croce
Dr. Heather Dolman
Dr. Therese M. Duane
Dr. Blaine L. Enderson
Dr. Timothy C. Fabian
Dr. Barbara Gaines
Ms. Sharon Gautschy
Ms. Tamara Jenkins
Dr. Jerry Jurkovich
Dr. Orlando C. Kirton
Dr. Rosemary Kozar
Dr. Charles E. Lucas
Dr. Mark Malangoni
Dr. J. Wayne Meredith
Dr. E. Ernest Moore
Dr. Andrew Peitzman
Dr. Grace S. Rozycki &
Dr. David V. Feliciano
Dr. Thomas Scalea
Dr. C. William Schwab
Dr. Michael J. Sise
Ms. Jermica M. Smith
Dr. David A. Spain
Dr. Thomas Velky, Jr.

2015 Donation Form

FULL NAME

ADDRESS

CITY **STATE** **POSTAL CODE**

EMAIL **PHONE**

Fund	Dollars	Duration	Total
20*forTwenty*			
General Fund			
Multi-Year			
			Total

CREDIT CARD NUMBER **SEC #** **EXPIRATION**

SIGNATURE **DATE**

PAYMENT TYPE: ☐ CASH ☐ AMEX ☐ MC ☐ VISA ☐ DISCOVER ☐ CHECK

Please return the completed form to the
AAST Research and Education Foundation info table at the 74th Annual Meeting of AAST
Every $100.00 donated garners an entry to the AAST Foundation 2015 Donor Drawing. Every $20.00 Donation to the 20*forTwenty* Campaign garners an entry to the 20*forTwenty* Drawing.
See reverse for drawing details →

Or send to:
AAST Central Office: 633 N. Saint Clair St. Suite 2600, Chicago, Il 60611 Fax: (312) 202-5064.

Contributions to the AAST Research and Education are tax deductible.

The Foundation Tax ID Number is 56-1918296

2015 Donor Drawing Information

Each $100 Donation to the AAST Research and Education Foundation's General Fund received between January 1, 2015 and noon September 11, 2015 equals one entry for the 2015 Donor Raffle. Prizes include:

$500 American Express Gift Card

Apple Watch

AAST Logo Rolling Duffle Bag

20forTwenty Drawing Information

Donate to the AAST Research and Education Foundation's *20forTwenty* Campaign between September 13, 2014 and noon September 11, 2015 for a chance to win:

$200 American Express Gift Card (2)

AAST Logo Apparel Item (Winners Choice) (2)

IN MEMORY

Franklin L. Mitchell, M.D.
Columbia, Missouri
(1930—2014)
Member Since: 1984

Erwin R. Thal, M.D.
Dallas, Texas
(1936—2014)
Member Since: 1977

Norman McSwain, Jr., M.D.
New Orleans, Louisiana
(1937—2015)
Member Since: 1976

John D. States, M.D.
Rochester, New York
(1925—2015)
Member Since: 1970

John M. Templeton, Jr., M.D.
Bryn Mawr, Pennsylvania
(1940—2015)
Member Since: 1988

Robert C. Waltz, M.D.
Rocky River, Ohio
(1921—2015)
Member Since: 1971

Barbara S. Latenser, M.D.
Iowa City, Iowa
(1952—2015)
Member Since: 1997

AAST WAS NOTIFIED IN 2015
THAT THE FOLLOWING MEMBERS ARE DECEASED.

Mohammad Atik, M.D.
Idyllwild, California
(1920—2014)
Member Since: 1966

John F. Burke, M.D.
Lexington, Massachusetts
(1922—2011)
Member Since: 1966

Charles E. Copeland, M.D.
Pittsburgh, Pennsylvania
(1931—2012)
Member Since: 1984

Michael E. DeBakey, M.D
Houston, Texas
(1938—2008)
Member Since: 1955

Manucher Fallahnejad, M.D.
Stratford, New Jersey
(1935—2013)
Member Since: 1981

Eric Lazaro, M.D.
Jersey City, New Jersey
(1921—2009)
Member Since: 1984

Joseph A. Moylan, Jr., M.D.
Durham, North Carolina
(1938—2013)
Member Since: 1974

John H. Siegel, M.D.
Englewood, New Jersey
(1932—2014)
Member Since: 1970

Kenneth G. Swan, M.D.
South Orange, New Jersey
(1934—2014)
Member Since: 1979

FRANKLIN L. MITCHELL, M.D.

Franklin L. Mitchell Jr. was born June 18, 1930, in Kansas City, the son of Jessie Florene and Dr. Franklin L. Mitchell Sr. He grew up in Excelsior Springs, Missouri. He met his future wife, Marilyn (Lynn) Miller, in 1950. At the time they met, Dr. Mitchell was an undergraduate student at MU, and Lynn was a student at Stephens College. They were married on August 8, 1953.

He received a Bachelor of Arts degree in biological sciences from MU in 1951 and was selected for membership in Phi Beta Kappa, the nation's oldest academic honor society. He was also a member of Phi Delta Theta fraternity at MU. He graduated from the MU School of Medicine in 1953 with a B.S.M. degree and received an M.D. degree from the Johns Hopkins University School of Medicine in 1955. Dr. Mitchell was board-certified in general surgery and thoracic surgery.

As chair of the American College of Surgeons' Trauma Verification Review Committee from 1987 to 1996, Dr. Mitchell led a national campaign to standardize the quality of care for injured patients. Through his leadership, a process was established to ensure hospitals throughout the nation met rigorous national standards for trauma care that Dr. Mitchell helped develop.

From 1977 to 1999 — the longest tenure in the history of the plan — Dr. Mitchell served as chair of University Physicians, the group practice plan for MU School of Medicine faculty who practice at MU Health Care hospitals and clinics. Today, more than 500 physicians in over 70 subspecialties are members of University Physicians.

Dr. Mitchell began his 40-year career at University Hospital as a resident physician in 1959, following two years as a surgeon in a U.S. Army hospital in Germany. He had been drafted into the Army during his residency at Vanderbilt University in Nashville, Tennessee, after completing his four-year medical degree at Johns Hopkins University School of Medicine in Baltimore.

As an Army surgeon, Capt. Mitchell treated soldiers injured in auto accidents and tank-crew training accidents, and he became familiar with Army medical evacuation helicopters — lessons that would be put to good use when he returned to civilian life.

Early on, Dr. Mitchell helped define what is now called "the golden hour" — that period of a few precious minutes when medical intervention can mean the difference between life and death.

In 1968, at a time when many ambulances were operated by funeral homes, Dr. Mitchell secured a grant to train hospital ambulance drivers and attendants. He worked with the MU College of Engineering to design University Hospital's first ambulance, which was equipped with lights, a siren, medical equipment and space in the back for a patient and paramedic. His ambulance became a model for ambulances built throughout the United States. He also introduced a radio system so hospital staff could know and prepare in advance when a trauma patient was en route to the hospital.

After the introduction of more ambulances in Missouri, Dr. Mitchell recognized that if emergency responders had more consistent, specialized training, they could provide better care in the field and en route to the hospital. In 1974, he began the state's first paramedic training course. It grew in popularity, and in 1978 Dr. Mitchell began training instructors who traveled throughout Missouri to teach more paramedics.

Always focused on improving the quality of patient care, Dr. Mitchell initiated a study in 1980 showing that 40 percent of trauma victims who died from serious injuries might have lived had they received rapid medical intervention. This study led to the development of University Hospital's helicopter service in 1982.

Dr. Mitchell held leadership positions in a number of professional societies including the Boone County Medical Society, the Missouri State Medical Association, the Missouri State Surgical Society, the American Association of Medical Colleges, the American Association for the Surgery of Trauma and the American College of Surgeons.

In an interview in 2009, Dr. Mitchell explained why he had always worked to ensure University Hospital was at the forefront of trauma care.

In 2002, MU Health Care named the Level 1 trauma program at University Hospital in honor of Dr. Mitchell. Since 2009, University Hospital has borne his name as home to the Frank L. Mitchell Jr., MD, Trauma Center.

Today, the Frank L. Mitchell Jr., MD, Trauma Center at University Hospital is one of only three adult Level 1 trauma centers in Missouri verified by the Committee on Trauma of the American College of Surgeons.

ERWIN R. THAL, M.D.

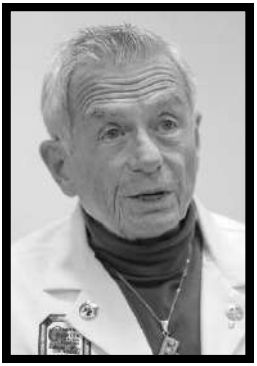
Dr. Erwin Thal, 78, of Dallas passed away on Saturday, December 13, 2014 at William P. Clements Jr. University Hospital UT-Southwestern in Dallas. He will be remembered as a loving husband, father, grandfather and friend to all that knew and loved him. He was generous, kindhearted, sharp-witted, and had a huge heart. Erwin tenaciously rose above every adversity and challenge. He will be remembered for his practical jokes, sense of humor, unbridled energy and passion for teaching.

Erwin was born in Columbus, Ohio, on August 31, 1936, to Miriam and Nelson Thal. He was a proud graduate of The Ohio State University, receiving his undergraduate degree in 1958 and his doctor of medicine degree in 1962. As an undergraduate, he was the manager of the baseball, basketball, and two national championship football teams. Erwin completed his general surgery residency at Parkland Hospital in 1969, interrupted by two years of service in the United States Air Force as a flight medical officer. Prior to discharge, he was awarded the United States Air Force Commendation Medal for Meritorious Service. Upon completing his residency, Erwin joined the faculty at University of Texas Southwestern Medical School as an instructor of surgery. He was promoted to professor in 1982. From 1970 to 1994, he was in charge of the Surgical Emergency Room. In 1995, he was appointed medical director of the Day Surgery Unit at Parkland.

Beginning in 1998, and lasting until his death, Erwin served as the director of the Willed Body Program at the UT Southwestern Medical School. Throughout his time at UT Southwestern, Erwin was honored with many appointments and recognitions for his long list of accomplishments. Standouts among these include an honorary fire chief appointment in 1985, chairman of the American College of Surgeons committee on trauma from 1986-1990, an honorary fellowship in the Royal Australasian College of Surgeons, a place on the Giants of Parkland Surgery wall, and an Alumni Achievement Award from the Ohio State University College of Medicine, the 2000 Minnie Stevens Piper Professor award, and numerous Excellence in Teaching Awards from Southwestern Medical School.

Survivors include his son James Gordon Thal and his wife Rhonda Zamora Thal; daughter Barbara Thal Potts and her husband Steven William Potts; daughter in law Kathy Duran Thal; grandchildren Gordon Thal, J.R. and A.J. Thal, William and Carolyn Potts, Camille, Stephen and Alex Duran. His wife Carolyn Gordon Thal of 37 years and his son Jeffrey Lawrence Thal of 53 years precede him in death.

NORMAN MCSWAIN, JR., M.D.



Dr. Norman McSwain, a New Orleans physician revered for establishing New Orleans' emergency medical services system, died Tuesday (July 28), according to the New Orleans Police Department. He was 78. He had been hospitalized in critical condition at Tulane University Medical Center after suffering a "cerebral bleed" July 17, according to a report in the Journal of Emergency Medical Services.

McSwain's life will be remembered for the impact he made on emergency trauma care. As a member of the American College of Surgeons' Committee on Trauma, he helped develop the Advanced Trauma Life Support and the Pre-Hospital Trauma Life Support programs. His methods are widely regarded as the standard for trauma care outside hospitals.

His practices have been taught to more than 500,000 people in 45 countries. He was also the only physician in the American College of Surgeons' history to achieve all five major trauma awards. McSwain served as director of trauma for the Spirit of Charity Trauma Center at the Interim LSU Hospital was a surgery professor at Tulane's School of Medicine. He also served as a consulting medical director for the New Orleans Jazz and Heritage Festival for almost 30 years.

Originally from Alabama, McSwain is credited for the creation of emergency medical service programs in New Orleans and Kansas.

His programs emphasized immediate medical services to treat victims of traffic crashes, gunshots, stabbings and other life-threatening injuries before arriving at a hospital.

McSwain earned his medical degree from the University of Alabama before joining the faculty at the University of Kansas, according his biography on Tulane's website.

He was later drawn to New Orleans because he believed Charity Hospital to be "one of the three most important trauma centers in the United States."

McSwain spent his time in New Orleans as he did in Kansas—he helped lift Interim LSU Hospital to become a Level I trauma center and started training police in basic emergency medical and paramedic procedures.

He made a point to care for severely injured police officers in his last 30 years.

McSwain additionally wrote or revised 25 textbooks and made more than 800 presentations of emergency trauma care in all 50 states, all Canadian provinces and most of Europe and South America.

JOHN D. STATES, M.D.

John Dunham States (16 June 1925 – 26 March 2015) was an orthopedic surgeon who dedicated his career to improving automotive safety. Born in Rochester, New York, he was a graduate of the University of Rochester, and received his M.D. from Harvard Medical School. He was a Professor of Orthopedic Surgery at the University of Rochester from 1976 to 1990.

His interest in automotive safety began when he served as race physician for the Watkins Glen International Speedway. As race physician, he learned the risks to the driver of being thrown from the car and the protection afforded by seat belts.

In 1966, he developed the first set of automobile safety standards.in 1970, he developed an improved shoulder harness to restrain the upper body and prevent injuries that occur when the occupant hits the dashboard or windshield.

States drafted the New York State seat belt law in 1983, the first such law in the US. Similar laws have now been adopted in 49 states, and the National Highway Traffic Safety Administration credits these laws with dramatically increasing seat belt use and decreasing injuries and fatalities from traffic accidents.

States received the Distinguished Career Award from the Injury Control and Emergency Health Services Section of the American Public Health Association in 2000, the Excalibur Award from the National Motor Vehicle Safety Advisory Council and was cited for his work on public safety by Governor Mario Cuomo. He is a Fellow of the American College of Surgeons. He served as a member of the National Motor Vehicle Safety Advisory Council and chaired the New York State Department of Motor Vehicles Medical Advisory Board. He was also a Visiting Scientist at the Centers for Disease Control.

He was the author of 83 scientific publications and held a patent for an improved seat belt latch. He died in Rochester in 2015, aged 89.

JOHN M. TEMPLETON, JR., M.D.

John M. Templeton, Jr., M.D., the president and chairman of the John Templeton Foundation and formerly a pediatric surgeon and director of the trauma program at the Children's Hospital of Philadelphia, died on Saturday, May 16 at his home in Bryn Mawr, Pennsylvania. He was 75 years old.

The cause was cancer, according to his daughter, Heather Templeton Dill. Out of respect for Dr. Templeton, the family withheld the formal announcement until after a ceremony for the Templeton Prize, sponsored by the foundation, which was held on May 18 at the church of the St. Martin-in-the-Fields in London.

Templeton, known as "Jack," retired from his medical practice in 1995 to manage the foundation created in 1987 by his father, Sir John Templeton, the pioneer global investor and philanthropist who created the Templeton Fund in 1954. The elder Templeton sold the family of Templeton Funds to the Franklin Group in 1992and devoted his fortune to the foundation, based in West Conshohocken, Pennsylvania.

John Marks Templeton, Jr. was born on February 19, 1940 in New York City, the eldest of three children of John Marks Templeton and the former Judith Dudley Folk, an advertising executive who died in 1951. He was raised in Englewood, New Jersey, where his family lived, and spent many summers in Winchester, Tennessee, the birthplace of his father and where most of his extended family still lives.

Templeton attended Englewood public schools, the George School, a Quaker institution in Newtown, Pennsylvania, and received a BA in History from Yale University in 1962. He began considering a career in medicine during a summer internship in 1960 at a Presbyterian medical mission in Cameroon. He received his MD from Harvard Medical School in 1968 and completed his internship and residency in surgery at the Medical College of Virginia in Richmond in 1973.

During his time at the Medical College of Virginia he met the former Josephine Gargiulo, known as Pina, who was training as a pediatric anesthesiologist. They were married in 1970.
He subsequently trained in pediatric surgery at the Children's Hospital of Philadelphia from 1973 to 1975 under the hospital's surgeon-in-chief, Dr. C. Everett Koop, who later became U.S. Surgeon General from 1982 to 1989. After two years as a physician in the U.S. Navy stationed in Portsmouth, Virginia, he returned to Children's Hospital in 1977 where he served as pediatric surgeon, director of the trauma program, and, later, as professor of pediatric surgery at the University of Pennsylvania. After retiring in 1995 he continued to serve as an adjunct professor at the University of Pennsylvania School of Medicine.

During his time at Children's Hospital it gained an international reputation for the evaluation and management of patients with conjoined twinning. Throughout his career Templeton performed numerous surgeries on conjoined twins under the direction of Koop, and his successor, Dr. James A. O'Neill, Jr. Many of those surgeries were undertaken with his wife Pina as lead anesthesiologist.

After the collapse of Communism in Eastern Europe in 1989, Templeton and Children's Hospital, in conjunction with the organization HOPE International, established training programs in emergency care and trauma management of children in a number of former Eastern Bloc countries including Poland, Bulgaria and Romania.

Templeton was board certified in pediatric surgery and surgical critical care and was a fellow of the American College of Surgeons, served as Vice Chairman of the American Trauma Society and was a president of its Pennsylvania division. He served on various boards including the Becket Fund for Religious Liberty, Foreign Policy Research Institute, American Trauma Society, National Bible Association, and Templeton Growth Fund, Ltd. He published dozens of papers in medical and professional journals, in addition to two books, Thrift and Generosity: The Joy of Giving (2004), and an autobiography, John M. Templeton, Jr.: Physician, Philanthropist, Seeker(2008).

He was the recipient of numerous awards including the National Courage of Belief Award from the American Jewish Committee in2010, the Heroes of Liberty Award (jointly with his wife) from the National Liberty Museum in 2006, and honorary doctorate degrees from Buena Vista University, Virginia Commonwealth University, and Alvernia College. He was a member of Proclamation Presbyterian Church in Bryn Mawr since its founding in 1989.
"Jack loved medicine for many reasons, but one is that it teaches us to look for what is absolutely essential, and to separate the essential from the trivial," notes Dr. John Schott, a medical school classmate and former trustee of the foundation. "Jack never lost his compassion, never objectified the patient. You have to make life and death decisions within a short period of time and often without enough information. That's why medicine is a calling, and not just a job. And Jack's seeking nature, his interest in purpose, his grappling with the big questions – all made him a superb doctor and made him the best possible head of the foundation."

Templeton is survived by his wife, Pina, who retired from Children's Hospital in 1999,their daughters Heather Dill and Jennifer Simpson, sons-in-law Jeff Dill and Scott Simpson, six grandchildren, a brother, Christopher, and a brother-in-law, Gail Zimmerman. His sister, Anne Zimmerman, died in 2004.

ROBERT C. WALTZ, M.D.

DR. ROBERT CLAUDE WALTZ passed away peacefully on Feb. 28, 2015 in Naples, Florida at the age of 93. He was preced-ed in death by his loving wife of 50 years, Frances Elaine (Woosley). He is survived by his children Dr. Gary Waltz, Jack Waltz, and Patti Waltz, and his devoted close companion, Ellen K. Coy. Dr. Waltz was a vascular and general surgeon in Cleveland, Ohio. He was a prominent member of the staffs of Euclid General and Hillcrest Hospitals. He advanced to become Chief of Staff and Director of Surgery at Euclid General Hospital and a member of the Board of Trustees. He was also a former Chairman of the Ohio Committee on Trauma. One of his proudest accomplishments was securing generous grants from the government and the Robert Wood Johnson foundation to upgrade Cleveland's ineffective station wagon ambulance service, replacing it with a state-of-the-art paramedic system.

During the Korean War, he served in the army and was Director and Chief of Surgery for our soldiers at an Army hospital in Hokkaido, Japan. Bob and Fran gained a great appreciation and love for the Japanese people and when they moved back to the States they were a dedicated host family for Japanese visitors under the auspices of the Council on World Affairs. Dr. Waltz had a lifelong passion for photography. He received prestigious awards for his work, including, but not limited to, the May Show at the Cleveland Museum of Art, and the Jewish Community Center Show which was juried by nationally acclaimed artists. Bob and Fran were honored to be invited by the Director of Cultural Affairs in Cairo to exhibit the photographs they had taken of Egypt at the Cairo Opera House. For the benefit of immobilized patients in the ICU and CCU areas at Euclid General, Dr. Waltz attached photographs to the ceilings above beds so that patients had something beautiful to view during recovery. Fifty portraits of past chiefs of staff were also taken by Dr. Waltz and displayed at Euclid and two other Cleveland hospitals.

In 2000, Dr. Waltz donated over 200 of their photographs for permanent exhibition at Euclid General Hospital. And in 2014, he incorporated some of his fabulous photography into a book he wrote and published, entitled *"Know vs. No"* reflecting his interest in spiritual conflict and cultural evolution. Dr. Waltz attended Washington and Jefferson College where he was a member of Beta Theta Pi and went to the Medical School at the University of Maryland. At Washington and Jefferson he was a leader of a barbershop chorus and belonged to a barbershop quartet that won several championships. The ripple effect of Dr. Waltz's kindness and generosity reached far beyond what words can say. To quote Aesop, "No act of kindness, no matter how small, is ever wasted.

Published in The Plain Dealer on Mar. 8, 2015

BARBARA A. LATENSER, M.D.

Barbara Alice Hope Latenser, MD, FACS, transitioned peace-fully on June 15, 2015 after a 2 ½ year battle with brain can-cer. She is preceded in death by her mother and father, Frances Haynes Hope and William Clarkson Hope. She is survived by her sister, Margaret Hope of Overland Park, KS, stepmother Barbara Hope, brother Eric Hope and nephew Jonah Hope, all of Fort Collins, CO. Her father was a military pilot and the family moved often. This instilled in her a love of travel which would follow her all her life. Barbara graduated from Fairview High School, Boulder Co in 1970, and the University Of Colo-rado School Of Nursing in 1976.

In 1977 Barbara married an Air Force pilot and once again began the cycle of moving. The couple finally settled in Las Vegas, NV. While her husband was overseas, she completed medical school at the University of Nevada, graduating in 1985, and completed a 5 -year surgery residency in Las Vegas. The couple divorced in 1986. Barbara accepted a trauma fellowship at the hospital of University of Pennsylvania in Philadelphia. After her fellowship she became the Medical Director of PENNSTAR, the hospital's helicopter team. From 1992-1998, she worked in Pittsburg, PA as a trauma and burn surgeon. She bought a turn of the century home in the historic Shadyside area and spent the next five years restoring the home to its original grandeur. This also would become a passion throughout her life. It was during this time that Barbara volunteered for Doctors Without Borders and went to Bosnia during the war. It was also during this time that she had the joy of meeting her soul mate Jim, whom she knows she will see in future lifetimes. They became involved in Operation Safety Net, providing medical care to the homeless at the street level. In 1998, Barbara became a Burn Center Director at Cook County Hospital in Chicago. She transformed the burn unit into a fully verified burn center and supervised the relocation of the entire center into the new hospital in 2002.

In 2004, Dr. Latenser accepted a position as Burn Center Director at the University of Iowa. She purchased the historic Milton Rumley house and completely restored the mansion to its original splendor. She was appointed the Clara L. Smith Professor of Burn Treatment. During her tenure, she received numerous research grants, resulting in over eighty peer-reviewed publications.

Dr. Latenser's dedication to international burn care and prevention took her to over ninety countries including Bangledesh, the Australian outback and Katete Zambia. She was responsible for getting a burn unit built in the mission hospital there and worked with the local people teaching burn safety, care and prevention. She also co-founded the International Outreach Committee of the American Burn Association.

Published in the Press-Citizen on June 20, 2015

MOHAMMAD ATIK, M.D.

Mohammad Atik, of Hemet, passed away Thursday, June 5, 2014.

No obituary available.

JOHN F. BURKE, M.D.

In 1969, Dr. Burke, a Harvard Medical School professor and a surgeon at Massachusetts General Hospital in Boston, took those specifications to Dr. Ioannis V. Yannas, a professor of fibers and polymers in M.I.T.'s department of mechanical engineering. Eleven years later, a team led by the two men developed a material — an amalgam of plastics, cow tissue and shark cartilage — that became the first commercially reproducible, synthetic human skin. It would save the lives of innumerable severely burned people worldwide.

Dr. Burke died of pancreatic cancer on Wednesday in Lexington, Mass., said his wife, Agnes. He was 89.

The Yannas-Burke team announced its first successful experiments with the skin in 1981, having used it on 10 severely burned patients, including a woman who had been burned over more than 50 percent of her body. Dr. Burke told The New York Times at the time that neither Harvard professors of surgery nor M.I.T. mechanical engineers could have solved the puzzle on their own. The project, he said, required a command of two different spheres of knowledge: the biology of the skin, and the engineering of polymers.

Dr. Burke was noted for several innovations before his collaboration in developing artificial skin. He pioneered a system of infection control in hospitals by establishing dedicated bacterial-control nursing units, now widely adopted. His research showed that giving antibiotics to certain patients before surgery lowered the risk of post-operative infections, another practice now in wide use.

During his years of collaboration with Dr. Yannas, Dr. Burke was chief of staff at the Shriners Burns Institute of Massachusetts General. From 1980 to 1990, he was chief of trauma services at the hospital. He was a professor of surgery at Harvard from 1966 to 1996.

Besides his wife, he is survived by two sons, John S. Burke and Dr. Peter A. Burke; a daughter, Ann Campbell Burke; and eight grandchildren. A third son, Andrew T. Burke, died 1987.

CHARLES E. COPELAND, M.D

Charles E. Copeland, a surgeon and teacher for five decades who founded the Mercy Hospital burn center, the first of its kind in Pennsylvania, died Tuesday of liver cancer. The Forest Hills man was 80. Burn victims stay patients for life. The horribly painful injuries require precise care and long rehabilitation, and patients often return for years to the UPMC Mercy campus in Uptown. Like them, Dr. Copeland was a constant presence at the hospital and remained one in spirit after his death, with the flags outside the hilltop center left at half-staff in his memory this week. Decades after being cared for by the doctor, former patients have still called Mercy nurses inquiring about Dr. Copeland, said Michelle Fontana, who began as a nurse there in 1983. "He was such a gentleman and a scholar," said the program manager of Mercy's trauma and burn services. "There are people who 20 years ago Dr. Copeland took care of, who call and ask if Dr. Copeland is there and want to talk to him." He had a similar influence and calming hand with other doctors, particularly through teaching.

The general, vascular and trauma surgeon and clinical professor of surgery at Pitt medical school was among the first local doctors trained in advanced trauma life support in the 1960s and continued teaching it to residents at Mercy until several months ago. He recruited Harry Sell, the chairman of Mercy's Division of General Surgery, to the hospital in 1979.

"He embodies the word equanimity. He was one of those guys who are just so dependable and honest, and was an integral role model for hundreds of surgeons who came through his training program," said the doctor, who followed Dr. Copeland as surgery chair.

"That kind of person doesn't come along too often. Surgeons are known for being tough. Arrogant. He had a tremendous amount of accomplishments here and you couldn't tell. He was humble about it," he said.

Chuck Copeland and his two brothers were raised in Jeannette by their mother Florence, a homemaker, and Charles Sr., a union local president at the Westinghouse East Pittsburgh plant. After leading Local 601 of the Union of Electrical Workers through a 1946 Westinghouse strike, his father was called before the new House Committee on Un-American Activities to testify about Communists in the union.

After graduating from Jeannette High School in 1949, he graduated in 1954 from the University of Pittsburgh and then its medical school in 1958. He married his wife, Margaret, a nurse at the former Columbia Hospital in Wilkinsburg, in 1957.

In addition to his wife, Dr. Copeland is survived by sons Charles III of Dunkirk, Md., and Scott of Braddock Hills; daughter Melissa Parrucci of Gibsonia; brother Richard of Orlando, Fla.; and three grandchildren.

MICHAEL E. DEBAKEY, M.D.

Dr. Michael DeBakey, the world-famous cardiovascular surgeon who pioneered such now-common procedures as bypass surgery and invented a host of devices to help heart patients, has died. He was 99.
DeBakey died Friday night at The Methodist Hospital in Houston from "natural causes," according to a statement issued early Saturday by Baylor College of Medicine and The Methodist Hospital. DeBakey counted world leaders among his patients and helped turn Baylor from a provincial school into one of the nation's great medical institutions.

While still in medical school in 1932, he invented the roller pump, which became the major component of the heart-lung machine, beginning the era of open-heart surgery. The machine takes over the function of the heart and lungs during surgery. It was the start of a lifetime of innovation. The surgical procedures that DeBakey developed once were the wonders of the medical world. Today, they are commonplace procedures in most hospitals. He also was a pioneer in the effort to develop artificial hearts and heart pumps to assist patients waiting for transplants, and helped create more than 70 surgical instruments.

DeBakey was the first to perform replacement of arterial aneurysms and obstructive lesions in the mid-1950s. He later developed bypass pumps and connections to replace excised segments of diseased arteries. A tireless worker and a stern taskmaster, DeBakey literally had scores of patients under his care at any one time. He performed more than 60,000 heart surgeries during his 70-year career, The Methodist Hospital said.

His patients ranged from penniless peasants to such famous figures as the Duke of Windsor, the Shah of Iran, King Hussein of Jordan, Turkish President Turgut Ozal, Nicaraguan Leader Violetta Chamorro and presidents Kennedy, Johnson and Nixon. DeBakey served as chairman of the President's Commission on Heart Disease, Cancer and Stroke during Johnson's administration and helped establish the National Library of Medicine. He was author of more than 1,000 medical reports, papers, chapters and books on surgery, medicine and related topics.

In 1962, DeBakey received a $2.5 million grant to work on an artificial heart that could be implanted without being linked to an exterior console. In 1966, he was the first to successfully use a partial artificial heart — a left ventricular bypass pump.
His work as an inventor continued. In the late 1990s, DeBakey brought out a ventricular assist device touted as one-tenth the size of current heart pumps that helped ease suffering for patients waiting for heart transplants.

In the late 1990s, he took an active role in creating the Michael E. DeBakey Heart Institute at Hays Medical Center in Hays, Kan.

DeBakey's first wife, Diana Cooper DeBakey, died of a heart attack in 1972. He is survived by his second wife, Katrin Fehlhaber, their daughter, and two of his four sons from his first marriage

MANUCHER FALLAHNEJAD, M.D.

FALLAHNEJAD, M.D. MANUCHER, JULY 30, 2013- of Gladwyne, PA. Beloved husband of Anne Fallahnejad (nee Cusack). Devoted father of Fatema "Tema" Burkey (Adam) and Robert Fallahnejad. Loving grandfather of Jasper, Silas, Wyatt and Townes. Also survived by 2 brothers and 1 sister.

ERIC LAZARO, M.D.

A Mass of Christian burial was offered July 6 at St. Aloysius R.C. Church, Jersey City, for Eric Joseph Alley Lazaro, M.D. He passed away July 1 in Bedford, N.Y., at the age of 87. Eric was born in Muttra, India, coming to the United States in 1950 to study at Georgetown University and later to Jersey City in 1962. Dr. Lazaro was a Professor of Surgery at UMDNJ in Newark since the early 1960s. He grew up in Chennai, India, where he attended St Bede's High School, Presidency College and Madras Medical College. He was an active parishioner and member of the choir at St. Aloysius RC Church. Eric is survived by his wife, Josephine "Babs" (nee Gillard) Lazaro; three children, Erica Lazaro, L.A., Peter Joseph Lazaro, his wife, Marie and Thomas Martin Lazaro and his wife, Alida; a step-brother, David Lazaro; and five grandchildren, Elvy, Nicholas, Andrew, Victoria and Eric, Jr. Services arranged by the Evergreen Funeral Home, Jersey City.

JOSEPH A. MOYLAN, JR., M.D.

DURHAM: Joseph Anthony Moylan, Jr., M.D., 74, died Thursday. He was born July 14, 1938 in Hartford, CT to the late Joseph A. and Sabina O'Connor Moylan. Dr. Moylan graduated from Fairfield University as class Valedictorian. He received his medical degree from Boston University, after which he completed training in surgery at the Universi-ty of Washington, Seattle. Dr. Moylan served as a Major in the U.S. Army, Institute of Surgical Research from 1969-72 at Fort Sam Houston, San Antonio, TX. He was Chief of the burn unit at the University of Wisconsin in Madison prior to joining Duke Uni-versity's Dept. of Surgery, where he was Chief of the Trauma Service and Pro-fessor of Surgery from 1975-94. Dr. Moylan was instrumental in the formation of Duke Hospital's Life Flight program. From 1994-97, he was Lucille & DeWitt Daughtry Professor and Chairman of the Dept. of Surgery at the Univer-sity of Miami. He returned to Durham and resumed practice as Professor of Sur-gery at Duke. After retirement from Duke in 2007, Dr. Moylan continued in medicine as an attending surgeon at the V.A. Medical Center in Durham.

A man who was motivated by his deep faith and commitment to community, Dr. Moylan, with his wife, Ann Carole, founded the Durham Nativity School in 2001. This tuition-free middle school for inner city, under-served boys spans an 11-year program from 6th grade through college, with the goal of returning young men to the Triangle area to give back to the community.
Dr. Moylan was a parishioner of Immaculate Conception Catholic Church for 38 years.

Surviving are his wife of 51 years, Ann Carole McGurkin Moylan; his children, Sean P. Cara Moylan, of West Hartford, CT, Michael F. Morgan Moylan of Hillsborough, Brendan J. Cindy Moylan of Durham, Maura M. Sullivan of Durham, Kiernan P. Krissy Moylan of Vero Beach, FL and Katie M. Darin Lit-tle of Hillsborough; grandchildren, Declan, Mairin, Eamon, Maeve & Quinlan Moylan; Finn, Donovan, Rory & Maisie Moylan; Beckett and Fergus Moylan; Nick, Maddy, Owen & Bridget Sullivan; Liam, Seamus & Sloane Moylan; and Lucas & Shelby Little; and a sister, Sally McGurkin of Bolton, CT.

JOHN SIEGEL, M.D.

SIEGEL--John H., MD., of Englewood, NJ, retired Wesley J. Howe Professor of Trauma Surgery, retired Chairman Department of Anatomy, Cell Biology and Injury Science, and Emeritus Professor of Cell Biology and Molecular Medicine at New Jersey Medical School, passed away March 3, 2014. A loving husband, father and grandfather, he leaves behind his wife, Carol, three children, Wendy, Gillian, Tom, their spouses, and grandchildren, Nick and Nina Limbeck, Emily Peters-Limbeck, Mikaela, Alexa and Ethan Gillman, Riley and Henry Siegel. We will always remember him.

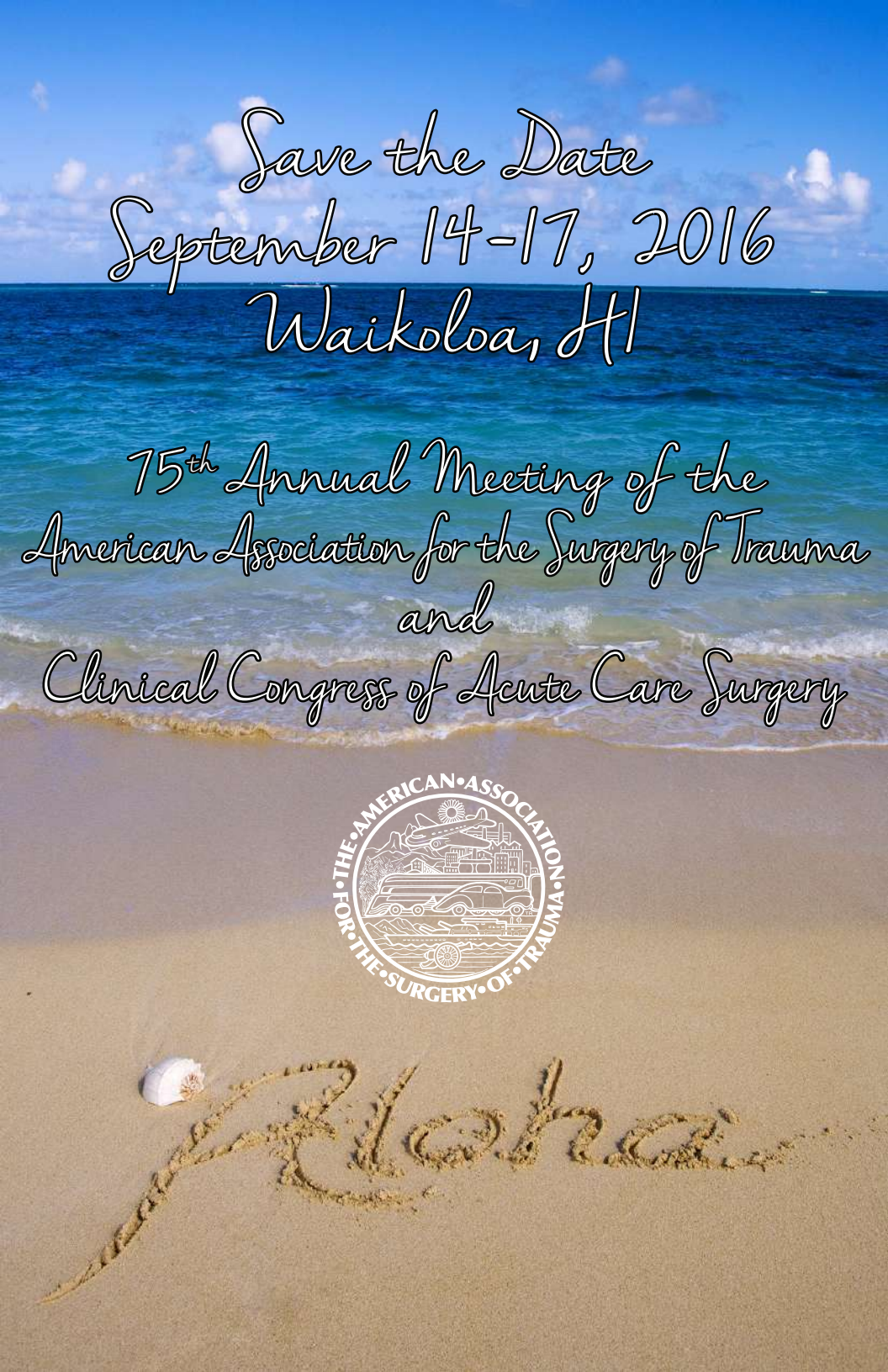
KENNETH G. SWAN, M.D

Dr Swan had a long and distinguished career as a surgeon, scientist, and educator for over forty years at New Jersey Medical School. He held a national reputation as a trauma, thoracic and vascular surgeon. Revered by all as a gentleman, scholar, and talented surgeon, he is perhaps most remembered for his devotion to teaching and mentoring the future generations of physicians at New Jersey Medical School.

Dr. Swan joined the faculty of New Jersey Medical School in 1973. He earned his undergraduate degree in 1956 from Harvard University and his medical degree in 1960 from Cornell University. He went on to complete an internship and residency in General Surgery at Cornell, a Fellowship at UCLA, and returned to Cornell for further training in General and Thoracic Surgery.

Following his training, Dr. Swan served in active duty with the US Army Medical Corps in Vietnam, and was awarded the Bronze Star 1st Oak Leaf Cluster, Air Medal, Combat Medical Badge in 1969, and Airborne Wings in 1970. In 1991, Dr. Swan was awarded the Bronze Star, 2nd Oak Leaf Cluster for his service in the Persian Gulf. In 1998, Dr. Swan was awarded the Legion of Merit, a military award of the United States Armed Forces, given for exceptionally meritorious conduct in the performance of outstanding services and achievements.

Throughout his years at New Jersey Medical School, Dr. Swan contributed to the School in so many ways, including serving as Chief of the Section of General Surgery for more than two decades, Director of Surgery, first at Martland Medical Center and then at University Hospital, and Director of the Surgical Residency Program for 16 years. At the time of his passing, Dr. Swan served as the Director of the Surgery Clerkship, a position he held for the past several years. A day before his passing, Dr. Swan participated in the NJMS Match Day celebration, one of the most memorable moments in a medical student's life. Dr. Swan exhibited a dedication and a passion for our students that is rarely witnessed, and those who encountered Dr. Swan were indeed enriched by knowing and working with him. He was loved by the faculty, students and staff at New Jersey Medical School. Many expressed shock of the news of his passing, having participated the day before in our Match Day festivities.


Save the Date
September 14-17, 2016
Waikoloa, HI
75th Annual Meeting of the
American Association for the Surgery of Trauma
and
Clinical Congress of Acute Care Surgery
THE AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA
Aloha

74th Annual Meeting of AAST and Clinical Congress of Acute Care Surgery
Las Vegas, NV September 9-12, 2015

TUE. 9/8/2015	FUNCTION	ROOM
3:00 PM – 7:00 PM	Registration	Registration Desk 2
WED. 9/9/2015	**FUNCTION**	**ROOM**
6:30 AM – 5:00 PM	Registration	Registration Desk 2
7:00 AM – 11:30 AM	Optional Session: ACS-MOC	Lafite Ballroom 8
7:00 AM – 11:30 AM	Optional Session: Military Symposium	Lafleur 1
7:00 AM – 11:30 AM	Optional Session: 2015 Trauma Prevention Coalition Symposium and Summit	Lafite 6
7:00 AM – 11:30 AM	Optional Session: Pediatric Trauma Update 2015	Lafleur 2
10:30 AM – 12:15 PM	Optional Session: TCAA Luncheon (Invitation Only)	Alsace 1
12:30 PM – 1:00 PM	Welcome	Latour Ballroom
1:00 PM – 3:40 PM	Session I: Plenary Papers 1-8	Latour Ballroom
3:40 PM – 4:10 PM	Session II: Master Surgeon Lecture: Lena M. Napolitano, MD	Latour Ballroom
4:10 PM – 5:25 PM	Session III: Panel I: Trauma Care in 2025 and Beyond	Latour Ballroom
5:30 PM – 7:30 PM	Session IV: Poster Session & Exhibit Hall Opening	Lafite Ballroom 4, 5, 7 & 9
6:30 PM – 8:30 PM	*Journal of Trauma & Acute Care Surgery* Editorial Meeting	Lafleur 2
THURS. 9/10/2015	**FUNCTION**	**ROOM**
6:15 AM – 7:30 AM	Resident, Medical Student & In-Training Fellow Breakfast (Ticketed)	Lafite 8
6:15 AM – 7:30 AM	Acute Case Surgery Committee Meeting	Lafite 6
6:15 AM – 7:30 AM	Critical Care Committee Meeting	Chambertin 2
6:15 AM – 7:30 AM	Disaster Ad Hoc Committee Meeting	LaFleur 2
6:15 AM – 7:30 AM	International Relations Committee Meeting	Chambertin 1
6:15 AM – 7:30 AM	Multi-Institutional Trials Committee Meeting	Lafleur 1
7:00 AM – 4:00 PM	Registration	Registration Desk 2
7:00 AM – 9:00 AM	Continental Breakfast	Lafite Ballroom 4, 5, 7 & 9
7:00 AM – 3:00 PM	Exhibits and Posters	Lafite Ballroom 4, 5, 7 & 9
7:30 AM – 9:10 AM	Session V: Acute Care Surgery Papers 9-13	Latour Ballroom
9:10 AM – 9:40 AM	Session VI: Scholarship Presentations	Latour Ballroom
9:40 AM – 10:00 AM	Break	Lafite Ballroom 4, 5, 7 & 9
10:00 AM – 11:20 AM	Session VII: Shock Transfusions Papers 14-17	Latour Ballroom
11:30 AM – 12:30 PM	Session VIII: Presidential Address, Thomas M. Scalea, MD	Latour Ballroom
12:30 PM – 1:45 PM	Lunch Sessions	Various Locations TBA
1:45 PM – 2:00 PM	Break	Lafite Ballroom 4, 5, 7 & 9
2:00 PM – 5:00 PM	Session IXA: Papers 18-26	Latour Ballroom
2:00 PM – 5:00 PM	Session IXB: Papers 27-35	Lafite Ballroom 1, 2 & 3
FRI. 9/11/2015	**FUNCTION**	**ROOM**
6:15 AM – 7:30 AM	ACS Program Directors Meeting	Lafleur 2
6:15 AM – 7:30 AM	Education/CME Committee Meeting	Alsace 2
6:15 AM – 7:30 AM	Geriatric Trauma Committee Meeting	Chambertin 2
6:15 AM – 7:30 AM	Military Liaison Committee Meeting	Lafite 8
6:15 AM – 7:30 AM	Patient Assessment Committee Meeting	Lafite 6
6:15 AM – 7:30 AM	Pediatric Committee Meeting	Alsace 1
6:15 AM – 7:30 AM	Publications and Communications Committee Meeting	Chambertin 1
6:15 AM – 7:30 AM	International Attendees Breakfast (Ticketed)	Lafleur 1
7:00 AM – 9:00 AM	Continental Breakfast	Lafite Ballroom 4, 5, 7 & 9
7:00 AM – 2:00 PM	Exhibits and Posters	Lafite Ballroom 4, 5, 7 & 9
7:00 AM – 3:00 PM	Registration	Registration Desk 2
7:30 AM – 8:00 AM	Session X: Featured Speaker: David B. Hoyt	Latour Ballroom
8:00 AM – 10:55 AM	Session XI: Quickshots	Latour Ballroom
10:55 AM – 11:15 AM	Break	Lafite Ballroom 4, 5, 7 & 9
11:15 AM – 12:15 PM	Session XII: Fitts Lecture: L.D. Britt, MD, MPH	Latour Ballroom
12:15 PM – 1:30 PM	Lunch Sessions	Various Locations TBA
1:15 PM – 1:30 PM	Break	Lafite Ballroom 4, 5, 7 & 9
1:30 PM – 4:50 PM	Session XIIIA: Critical Care/Shock Papers 36-45	Latour Ballroom
1:30 PM – 4:50 PM	Session XIIIB: Papers 46-55	Lafite 1, 2 & 3
4:50 PM – 5:00 PM	Military Awards	Latour Ballroom
5:00 PM – 6:15 PM	AAST Annual Business Meeting	Latour Ballroom
7:30 PM – 8:00 PM	Reception (Ticketed)	Lafite and Latour Foyers
8:00 PM – 10:00 PM	Banquet (*Black Tie*) (Ticketed)	Lafite 1, 2 & 3
SAT. 9/12/2015	**FUNCTION**	**ROOM**
7:00 AM – 8:00 AM	New Fellows Breakfast (Ticketed)	Chambertin 2
7:00 AM – 10:00 AM	Registration	Registration Desk 2
7:30 AM – 9:00 AM	Continental Breakfast	Lafite 1, 2 & 3
8:00 AM – 12:00 PM	Session XIV: Papers 56-67	Latour Ballroom

SPEAKER READY ROOM: La Tache 2
Tuesday, September 8th – 3:00 PM – 7:00 PM
Wednesday, September 9th – 6:30 AM – 5:00 PM
Thursday, September 10th – 6:30 AM – 5:00 PM
Friday, September 11th – 7:00 AM – 5:00 PM
Saturday, September 12th – 7:00 AM – 11:00 AM