28TH ANNUAL

SCIENTIFIC ASSEMBLY

JANUARY 13-17, 2015

east

EASTERN ASSOCIATION
FOR THE SURGERY
OF TRAUMA

DISNEY'S CONTEMPORARY RESORT
LAKE BUENA VISTA, FLORIDA

Further Information & Questions

For post conference-specific or CME/CE questions/requests, please contact:

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Eastern Association for the Surgery of Trauma
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Chicago, IL 60611
Main: 312-202-5508
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www.east.org

For EAST business/membership questions/requests, please contact:

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www.east.org

Digital Recording Policy
Portions of the EAST Annual Scientific Assembly are going to be electronically recorded by EAST. By participating in the discussions, EAST registrants agree that EAST may electronically copy or audio tape their attendance at and involvement in any program. No individual or entity may electronically record any portion of the EAST Annual Scientific Assembly without prior written consent.

Photos
Photographs of the EAST Annual Scientific Assembly and the events will be taken throughout the program. By attending the events, EAST registrants agree that their photograph may be used in EAST member communications and promotional materials.

Eastern Association for the Surgery of Trauma
(EAST)

Annual Scientific Assembly
Learning Objectives

- Examine and implement injury prevention techniques which may lessen the burden of injury
- Articulate methods to optimize outcomes for the injured patient in austere/military environments
- Develop leadership skills to enhance his/her ability to work within a multidisciplinary team.
- Foster a multidisciplinary approach to the care of the injured patient
- Interpret the presentation of scientific research in the treatment of the injured patient
- Evaluate and implement the organization and management of an institution's trauma system of care, including the appropriate use of advanced practitioners as part of the trauma team

Accreditation Statement
This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education through the joint providership of the American College of Surgeons and the Eastern 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 32.0 *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 21 credits meet the requirements for Self-Assessment.

American College of Surgeons
Division of Education

STATEMENT OF ATTENDANCE FORM
THE EASTERN ASSOCIATION FOR THE SURGERY OF TRAUMA
28th Annual Scientific Assembly
Disney's Contemporary Resort, Lake Buena Vista, Florida – January 13-17, 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 January 17, 2015 all registered participants will receive an email with instructions for claiming credit. **No paper forms will be accepted. The boxes below are for record-keeping purposes only.**

WORKSHOPS/COURSES

TUESDAY, JANUARY 13, 2015 (total for day 7.5, including 7.5 self-assessment credits)
____ Leadership Development Wkshp Part III (7.5)

THURSDAY, JANUARY 15, 2015 (total for day 6.5, including 6.5 self-assessment credits)**. You may only select one.**
____EAST Engage the Masters Course (2.5)
____Advanced Practitioners in Trauma (4.0)

SATURDAY, JANUARY 17, 2015 (total for day 4.0, including 4.0 self-assessment credits)
____ Basic Endovascular Skills for Trauma (4.0)

WEDNESDAY, JANUARY 14, 2015 (total for day 7.0, including 1.0 self-assessment credits)

_____ Sunrise Sessions 1-5: (1.0)
_____ Scientific Program
- Scientific Session I: Papers 1-5 (1.75)
- Scientific Session II: Papers 6-10 (1.75)
- Plenary Session: Elephant in the Room (1.0)
- Parallel Plenary 1: Scientific Papers* (1.5)
- Parallel Plenary 2: The Patient Safety Taxonomy* (1.5)

** These sessions run concurrently. Claim only one.*
□ *Check here if you attended one of the five sunrise*

THURSDAY, JANUARY 15, 2015 (total for day 9.5, including 1.0 self-assessment credits)

_____ Sunrise Sessions 6-10: (1.0)
_____ Scientific Program
- Scientific Session III-*A: Papers 11-15 (1.75)
- Scientific Session III-B*: Papers 16-20 (1.75)
- Scott B. Frame, MD Lecture (1.0)
- No Suit, Not Problem…Building Careers (1.5)
- Oriens (1.0)**
- Practice Mgmt Guidelines Session (2.0)**
- Scientific Poster Rounds (1.25)**

** These sessions run concurrently. Claim only one.*
*** If you attended the Advanced Practitioners Workshop or the Engage the Masters Course you cannot claim credit for these sessions.*

□ *Check here if you attended one of the five sunrise*

FRIDAY, JANUARY 16, 2015 (total for day 4.0, including 1.0 self-assessment credits)

_____ Sunrise Sessions 11-15: (1.0)
_____ Scientific Program
- Scientific Session IV-*A: Papers 21-26 (2.0)
- Scientific Session IV-B*: Papers 27-32 (2.0)
- EAST Multicenter Study Recruitment Proposals (1.0)

** You can only check Scientific Session III-A or III-B, you cannot check both.*
□ *Check here if you attended one of the five sunrise*

Total Primary Meeting hours available: 20.5
Includes Sunrise Sessions. Workshops and special courses are excluded.

TOTAL CME HRS CLAIMED: ____

TOTAL SELF-ASSESSMENT HRS CLAIMED:_____

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 28th EAST Annual Scientific Assembly, please read the instructions below. All CME forms must be completed within 30 days after the meeting (by February 17, 2015). *To be eligible for self-assessment credit you MUST take AND pass the self-assessment test within ten (10) business days of the session (January 30, 2015).*

An email with information for claiming your CME for the 28th Annual Scientific Assembly will be sent to all meeting registrants (does not include Guests). **NOTE:** The email will be sent to the email address you provided with your meeting registration information.

Disclosure Information

EAST 28th Annual Scientific Assembly

January 13-17, 2015

Lake Buena Vista, Florida

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 our joint sponsorship 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.

SPEAKERS/MODERATORS/CHAIRS/ DISCUSSANTS	NOTHING TO DISCLOSE	DISCLOSURE (As it pertains to the content of the presentation)
Louis Alarcon	X	
Steven Allen	X	
Sandra Arabian	X	
Kathi Ayers	X	
Yaser Baghdadi	X	
James Bardes	X	
Alec Beekley	X	
Andrew Bernard	X	
Letitia Bible	X	
Brandon Bonds	X	
Stephanie Bonne	X	
Patrick Bosarge	X	
Seda Bourikian	X	
Megan Brenner		Stockholder, Pryor Medical Inc. Member, Clinical Advisory Board, Pryor Medical Inc.
James Byrne	X	
Jeremy Cannon	X	
Jeffrey Carter	X	
Thomas Carver	X	
Neeta Chaudhary	X	
Peter Chen	X	
Rachel Choron		Project support received from Z-Medica. Support provided to Trauma Department not individual authors.
A. Britton Christmas	X	
Mark Cipolle	X	

SPEAKERS/MODERATORS/CHAIRS/ DISCUSSANTS	NOTHING TO DISCLOSE	DISCLOSURE (As it pertains to the content of the presentation)
Jeffrey Claridge	X	
John Como	X	
Jeffrey Coughenour	X	
Marie Crandall	X	
Bruce Crookes	X	
Lisa Dagostino	X	
Michael Dalton	X	
Kimberly Davis	X	
Bradley Dennis	X	
Christopher Dente	X	
Jose Diaz	X	
Lawrence Diebel	X	
Linda Ding	X	
Linda Ding	X	
Therese Duane	X	
Joseph DuBose	X	
Alexander Eastman	X	
Brian Eastridge	X	
Brian Edlow	X	
Timothy Fabian	X	
Samir Fakhry	X	
Richard Falcone, Jr.	X	
David Feliciano	X	
Robert Ferguson	X	
Paula Ferrada	X	
Raquel Forsythe	X	
Carl Freeman	X	
Lisa Fryman	X	
Samuel Galvagno	X	
Stephanie Goldberg	X	
Michael Goodman	X	
Amy Gore	X	
Vicente Gracias	X	
Shea Gregg	X	
Kirby Gross	X	
Oscar Guillamondegui	X	
Sundeep Guliani	X	
Oliver Gunter	X	
Roseanna Guzman-Curtis	X	
Elizabeth Habermann	X	
Adil Haider	X	
David Hampton	X	
Elliott Haut	X	
Joshua Hazelton	X	
Vanessa Ho	X	
Melanie Hoehn	X	
Brett Howard	X	
Carol Immermann	X	
Randy Janczyk	X	
Donald Jenkins		Decision Medical - Medical Advisory Board 3M - Medical Advisory Board
Peter Jernigan	X	
Elliot Jessie	X	
Carol Jones	X	

SPEAKERS/MODERATORS/CHAIRS/ DISCUSSANTS	NOTHING TO DISCLOSE	DISCLOSURE (As it pertains to the content of the presentation)
Bellal Joseph	X	
Haytham Kaafarani	X	
George Kasotakis	X	
Michael Kelly	X	
Andrew Kerwin	X	
Mazhar Khalil	X	
Abid Khan	X	
Dennis Kim	X	
Michael Kim	X	
David King	X	
David King	X	
Jorie Klein	X	
Amy Koestner	X	
Anirudh Kohli	X	
Laura Kreiner	X	
Stanley Kurek	X	
Alessandra Landmann	X	
Luis Llerena	X	
Joseph Lopez	X	
Joseph Love	X	
Fred Luchette	X	
Ellen MacKenzie	X	
John Madore	X	
Zoë Maher	X	
Amy Makley	X	
Jimmi Mangla	X	
Joshua Marks	X	
Gary Marshall	X	
Niels Martin	X	
Kimball Maull	X	
Sean McCully	X	
Elizabeth McDonald	X	
Norman McSwain	X	
Laura Moore	X	
Nathan Mowery	X	
Sriveena Naganathar	X	
Kimberly Nagy	X	
Mayur Narayan	X	
Julie Nash	X	
Timothy Nunez	X	
Terence O'Keeffe	X	
Myung Park	X	
Dan Parrish	X	
Jason Pasley	X	
Mae Ann Pasquale	X	
Mayur Patel	X	
Andrew Peitzman	X	
Joan Pirrung	X	
Stephanie Polites	X	
Travis Polk	X	
Alicia Privette	X	
A. Tyler Putnam	X	
Todd Rasmussen	X	

SPEAKERS/MODERATORS/CHAIRS/ DISCUSSANTS	NOTHING TO DISCLOSE	DISCLOSURE (As it pertains to the content of the presentation)
Thomas Resch		3M Corporation - Stock holder
Bryce Robinson	X	
Carlos Rodriguez	X	
Thomas Rohs, Jr.	X	
Samuel Wade Ross	X	
Jack Rostas	X	
Michael Rotondo	X	
Gabriel Ryb	X	
Arash Safavi	X	
Scott Sagraves	X	
Heena Santry	X	
Babak Sarani	X	
Chethan Sathya	X	
Thomas Scalea	X	
Gary "Doug" Schmitz	X	
Martin Schreiber	X	
William Schreiber-Stainthorp	X	
Rebecca Schroll	X	
Douglas Schuerer	X	
Kevin Schuster	X	
Diane Schwartz	X	
Jonathan Scott	X	
Elizabeth Seislove	X	
Stacy Shackelford	X	
Stacy Shackelford	X	
Adil Shah	X	
Joshua Simon	X	
Ronald Sing	X	
Sherry Sixta	X	
David Skarupa	X	
Ruby Skinner		TEI Biosciences - Speaker/Consulting - Honorarium
Jason Smith	X	
Robert Smith	X	
Robert Southard	X	
Jason Sperry	X	
Nicole Stassen	X	
Deborah Stein	X	
Dirk Stengel	X	
Melvin Stone, Jr.	X	
James Stowe		PI Grant received from State Farm Insurance Company
Erik Streib	X	
Nicholas Studer	X	
Spencer Studwell	X	
Matthew Tadlock	X	
Paul Taheri	X	
William Teeter	X	
John Templeton	X	
Shawn Terry	X	
Ronald Tesoriero	X	
Bartholomew Tortella		Employee, Pfizer, Inc. Employee
Nathan Unger		Research Support from Forest Research Institute
Tarsicio Ureibe-Leitz	X	
Brian Van Ness	X	

SPEAKERS/MODERATORS/CHAIRS/ DISCUSSANTS	NOTHING TO DISCLOSE	DISCLOSURE (As it pertains to the content of the presentation)
Catherine Velopulos	X	
Christopher Walker	X	
Alison Wilson	X	
Robert Winfield	X	
Cassandra Winter	X	
Steven Wolf	X	
Daniel Yeh	X	
Tanya Zakrison	X	
Ben Zarzaur	X	
Tiahuna Zhou	X	
Martin Zielinski		Investor, Xcede Technologies
PLANNING COMMITTEE	**NOTHING TO DISCLOSE**	**DISCLOSURE (As it pertains to the content of the presentation)**
Andrew Bernard		Strategic Health Management, Speaker - Honorarium Haemonetics, Speaker - Honorarium
Carla Carusone	X	
A. Britton Christmas		C.R. Bard, Physician Training - Honorarium Cook Medical - Physician Training - Honorarium UpToDate, Author - Book Royalties
Jeffrey Claridge	X	
Janice Delgiorno	X	
Christopher Dente	X	
Jose Diaz		Acute Innovations, Consultant - Honorarium KCI, Consultant - Honorarium Synthes, Consultant - Honorarium
Karen Doyle	X	
Alexander Eastman	X	
Richard Falcone, Jr.	X	
Diane Hochstuhl	X	
David King	X	
Amy Koestner	X	
Amber Kyle	X	
Rebecca Lofthouse	X	
Nathan Mowery	X	
Joan Pirrung	X	
A. Tyler Putnam	X	
Thomas Rohs, Jr.	X	
Karen Santucci	X	
Kevin Schuster	X	
Elizabeth Seislove	X	
Nicole Stassen	X	
Deborah Stein	X	
Robert Winfield	X	
Ben Zarzaur		Merk, Advisory Board - Honorarium
Martin Zielinski		Investor, Xcede Technologies

On behalf of the Board of Directors, our Executive Director Christine Eme, the EAST Administrative Staff, and the EAST Foundation Board of Trustees, welcome back to Disney and the 28th Scientific Assembly of the Eastern Association for the Surgery of Trauma (EAST).

Dr. Andrew Bernard and the Program Committee have chosen a variety of interesting scientific abstracts for your enjoyment and edification, while Dr. Nicole Stassen and the Careers in Trauma Committee have updated and modified the workshops. We continue to offer a broad array of Sunrise Sessions to get you energized in the mornings. All in all, it has the makings of a great program!

As always, the EAST Foundation is supporting the Raymond H. Alexander, MD Resident Paper Competition and the Cox-Templeton Injury Prevention Paper Competition. Our Oriens Award Keynote lecture will be delivered by my mentor and friend, Past President Timothy C. Fabian. The Scott B. Frame lecturer, Dr. Paul Taheri, will discuss "Physician Leadership: The Trauma Surgeon's Role in the New Age of Healthcare", a timely topic in this period of relative uncertainty.

As in past years, we welcome our collaborating organizations, the Society of Trauma Nurses and the Pediatric Trauma Society. Both organizations have contributed significantly to the breadth and depth of our program and our organization. I would also like to acknowledge and thank all of the members of the EAST Board of Directors, who have worked tirelessly to steer the organization and position us well for the future. Finally, please make an effort to visit with our vendors. Without their generous support, our meeting would not be as it is.

In addition to the scientific program, and in the spirit of collaboration and friendship, we invite you to participate in the Opening Reception. The EAST Foundation will again sponsor the Dodgeball Tournament, which will be immediately followed by the Barbeque. Hopefully the weather will be favorable, and all events can be held outdoors.

I would be remiss if I did not acknowledge the hard work of my colleague and friend, Dr. Fred Luchette, as the outgoing President of the Foundation. Under his stewardship, the corpus of the Foundation has grown significantly. He and the Foundation continue to support the mission and vision of EAST and for that we are grateful.

As I finish my year as your President, I would like to thank you for the opportunity to serve. EAST continues to be an organization of vibrant young trauma surgeons and professionals who have dedicated their lives to the care of the critically ill and injured. It has been an honor and a pleasure to lead this organization, and I look forward to the efforts of those who follow. I have no doubt that EAST will continue to flourish.

As Walt Disney once said, "The way to get started is to quit talking and begin doing." With that I will close, and we will get on with the program. Enjoy the meeting!

Most sincerely,

Kimberly A. Davis MD, MBA, FACS, FCCM
President, Eastern Association for the Surgery of Trauma

EAST Mission Statement

EAST is a scientific organization providing leadership and development for young surgeons active in the care of the injured patient through interdisciplinary collaboration, scholarship, and fellowship.

EAST Vision Statement

EAST seeks to improve care of the injured by providing a forum for the exchange of knowledge in the practice of trauma surgery; to promote trauma prevention, research, and improved trauma systems design; to encourage investigation and teaching of the methods of preventing and treating trauma; and to stimulate future generations of surgeons to meet the challenge.

Future Meetings

29th Annual Scientific Assembly
January 12-16, 2016
JW Marriott San Antonio
San Antonio, Texas

30th Annual Scientific Assembly
January 10-14, 2017
Diplomat Resort
Hollywood, Florida

31st Annual Scientific Assembly
January 9-13, 2018
Disney's Contemporary Resort
Lake Buena Vista, Florida

32nd Annual Scientific Assembly
January 15-19, 2019
Location TBD

Board of Directors 2014-2015

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Kevin Schuster, Director
Nicole Stassen, Director

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Raquel Forsythe
Matthew Martin
Mayur Patel
Carlos Rodriguez
Stacy Shackelford
Martin Zielinski

Representative to the Board of Governors of the American College of Surgeons

Joseph Minei

Exhibitors

(as of December 8, 2014)

ACell, Inc.
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American Hernia Society
Applied Medical Technology, Inc. (AMT)
Aspen Medical Products
Bard Davol, Inc.
Beeken Biomedical
CSL Behring
DAXOR Corporation
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EAST Foundation, Inc.
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Hutchinson Technology Inc.
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Innovative Trauma Care
Mayo Clinic Trauma Centers
MedXpert North America, LLC
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National Trauma Institute
Össur Americas
Pediatric Trauma Society
RTI Surgical, Inc.
Society of Trauma Nurses (STN)
St. Joseph Physicians Associates
Starsurgical, Inc.
T6 Health Systems
TEI Biosciences
TEM Systems, Inc.
Teleflex, Inc.
Trauma Center Association of America (TCAA)
Z-Medica

COMMERCIAL SUPPORT

(as of December 8, 2014)

In-Kind Support

In-kind donations, equipment loans, supplies, materials, etc. have been provided by the following:

Mentice

Mentice VIST-C Endovascular Simulators for the Basic Endovascular Skills for Trauma© Workshop on Saturday, January 17, 2015

SCHEDULE

Eastern Association for the Surgery of Trauma (EAST)
28th Annual Scientific Assembly
OVERALL SCHEDULE

TUESDAY, JANUARY 13, 2015

6:45 am-7:00 pm	Registration	**West Registration**
6:45 am-5:00 pm	Speaker Preparation Room	**Pastoral 1**
5:45 am-2:30 pm	EAST Community Outreach 5:45 am-6:15 am - Volunteer Breakfast - West Rotunda 6:15 am - Board Bus - West Side Bus Pick-Up 6:30 am - Bus Departs for Windermere Preparatory School 8:30 am-2:30 pm - EAST Community Outreach Event	**Windermere Preparatory School Windermere, Florida**

Workshops – Ticketed session, additional fees apply. Pre-registration required.

7:00 am-5:00 pm	Trauma Outcomes & Performance Improvement Course (TOPIC) *Presented by the Society of Trauma Nurses*	**Fantasia M-N**
8:30 am-5:00 pm	EAST Leadership Development Workshop Part III: A Formula for Success as a Leader in Trauma *Presented by the EAST Careers in Trauma Committee*	**Fantasia E-F**
12:00 pm-4:00 pm	Publications Committee Meeting	**Pastoral 3**
12:00 pm-5:00 pm	Exhibit Set-up	**Fantasia Ballroom G**
1:00 pm-7:00 pm	Scientific Posters Set-up	**Nutcracker 1-2**
2:00 pm-4:00 pm	EAST Foundation Board of Trustees Meeting	**Pastoral 2**
4:00 pm-8:30 pm	EAST Executive Committee & Board of Directors Meetings 4:00 pm-4:30 pm Executive Committee 4:30 pm-8:30 pm Board of Directors	**Nutcracker 3**

Industry Education Symposia

6:00 pm-10:00 pm	DePuy Synthes (Lecture)	**Fantasia C-D**

WEDNESDAY, JANUARY 14, 2015

6:00 am-6:00 pm	Registration	**West Registration**
6:00 am-5:00 pm	Speaker Preparation Room	**Pastoral 1**

Sunrise Sessions 1-5 – Ticketed session, additional fees apply. Pre-registration required.

7:00 am-7:55 am	SS 1-The Bleeding Stops Here! New Advances in Early Hemorrhage Control	**Fantasia A-B**
7:00 am-7:55 am	SS 2-National Data Sources for Acute Care Surgery: Pearls and Pitfalls for Researchers and Readers	**Fantasia C-D**
7:00 am-7:55 am	SS 3-Improving Patient Expectations and Satisfaction Using a Self-Education and Peer Support Process	**Fantasia L**
7:00 am-7:55 am	SS 4-Don't Have Time for Pediatric Injury Prevention? Now You Do! Packaged Prevention Programs That Work	**Fantasia K**
7:00 am-7:55 am	SS 5-Emergent Reversal of Bleeding Associated with Novel Anticoagulants	**Fantasia E-F**
7:30 am-8:30 am	Continental Breakfast provided in the Exhibit Hall	**Fantasia Ballroom G**
8:00 am-5:00 pm	Exhibits	**Fantasia Ballroom G**
8:00 am-5:00 pm	View Scientific Posters	**Nutcracker 1-2**

WEDNESDAY, JANUARY 14, 2015 (continued)

8:00 am-8:45 am	Opening Ceremony - Flag Ceremony and Opening Remarks	**Fantasia Ballroom J**
8:50 am-10:30am	Scientific Session I: Raymond H. Alexander, MD Resident Paper Competition of the EAST Foundation *(Papers 1-5)* Moderators: Kimberly Davis, MD, MBA & Andrew Bernard, MD	**Fantasia Ballroom J**
10:30 am-10:50 am	Break - Refreshments provided in the Exhibit Hall	**Fantasia Ballroom G**
10:50 am-12:30 pm	Scientific Session II: Raymond H. Alexander, MD Resident Paper Competition of the EAST Foundation *(Papers 6-10)* Moderators: Stanley Kurek, Jr., DO & David Hampton, MD, MEng	**Fantasia Ballroom J**
12:30 pm-1:30 pm	Visit the Exhibit Hall Specialty Priced - Grab and Gab Lunch Options	**Fantasia Ballroom G**

EAST Committee & Ad Hoc Committee Meetings

12:30 pm -1:30 pm	Advanced Practitioners Ad Hoc Committee	**Fantasia A-B**
12:30 pm -1:30 pm	Careers in Trauma Committee	**Fantasia K**
12:30 pm -1:30 pm	Injury Control & Violence Prevention Committee	**Fantasia E-F**
12:30 pm -1:30 pm	Membership-Bylaws Committee	**Fantasia C-D**
12:30 pm -1:30 pm	Online Education Ad Hoc Committee	**Pastoral 3 (Cancelled)**
12:30 pm -1:30 pm	Research-Scholarship Committee	**Fantasia L**
12:30 pm -1:30 pm	Seniors Committee	**Pastoral 2**

1:30 pm-2:30 pm	Plenary Session Elephant in the Room-Optimizing Our Own Physical & Emotional Health *Presented by the EAST Careers in Trauma Committee*	**Fantasia Ballroom J**
2:30 pm-4:00 pm	***EAST Annual Business Meeting - Open to All EAST Members***	**Fantasia Ballroom J**
4:00 pm-5:30 pm	Parallel Plenary Session Scientific Papers That Should Have Changed Your Practice Part V *Presented by the EAST Publications Committee*	**Fantasia Ballroom J**
4:00 pm-5:30 pm	Parallel Plenary Session The Patient Safety Taxonomy - Even Goofy Can Do It *Presented by the Society of Trauma Nurses*	**Fantasia Ballroom H**

EAST Receptions & Special Events

5:45 pm-7:00 pm	EAST Foundation Donor & Exhibitor Appreciation Reception *(By invitation only)*	**Nutcracker 3 &** **Nutcracker Courtyard**
6:30 pm-8:30 pm	Opening Reception - Ticketed Event *(RSVP required)*	**Porte Cochere &** **Fantasia Ballroom Lobby**

THURSDAY, JANUARY 15, 2015

6:00 am-4:30 pm	Registration	**West Registration**
6:00 am-5:00 pm	Speaker Preparation Room	**Pastoral 1**

Sunrise Sessions 6-10 – Ticketed session, additional fees apply. Pre-registration required.

7:00 am-7:55 am	SS 6-Management of Mild TBI - Military Lessons and the Public Health Crisis in America	**Fantasia A-B**
7:00 am-7:55 am	SS 7-Complex Ventral Hernia Surgery for the Acute Care Surgeon	**Fantasia C-D**
7:00 am-7:55 am	SS 8-Mentoring Tomorrow's Trauma and Acute Care Surgeons	**Fantasia E-F**
7:00 am-7:55 am	SS 9-The Other Side of What We Do…Providing a Good Death	**Fantasia K**
7:00 am-7:55 am	SS 10- Competent Rural Trauma Care: What You Need to Know to be Successful in an Ever Changing Health Care Environment	**Fantasia L**

THURSDAY, JANUARY 15, 2015 (continued)

7:30 am-8:30 am	Continental Breakfast provided in the Exhibit Hall	**Fantasia Ballroom G**
8:00 am-1:00 pm	Exhibits	**Fantasia Ballroom G**
8:00 am-4:30 pm	View Scientific Posters	**Nutcracker 1-2**
8:00 am-9:40 am	Scientific Session III-A: Clinical Science *(Papers 11-15)* Moderators: Bruce Crookes, MD & Scott Sagraves, MD	**Fantasia Ballroom J**
8:00 am-9:40 am	Scientific Session III-B: Cox-Templeton Injury Prevention Paper Competition of the EAST Foundation *(Papers 16-20)* Moderators: John Templeton, Jr., MD & A. Britton Christmas, MD	**Fantasia Ballroom H**
9:40 am-10:00 am	Break - Refreshments provided in the Exhibit Hall	**Fantasia Ballroom G**
10:00 am-11:00 am	**Scott B. Frame, MD Memorial Lecture of the EAST Foundation** ***Physician Leadership: The Trauma Surgeon's Role in the New Age of Healthcare*** **Paul A. Taheri, MD, MBA**	**Fantasia Ballroom J**
11:00 am-12:30 pm	No Suit, No Problem: Fostering Relationships & Building Careers EAST New Member Recognition *(Light refreshments will be provided)*	**Ballroom of the Americas B**

EAST Committee & Ad Hoc Committee Meetings

12:30 pm - 1:30 pm	Acute Care Surgery Ad Hoc Committee	**Fantasia L**
12:30 pm - 1:30 pm	Guidelines Committee	**Fantasia A-B**
12:30 pm - 1:30 pm	Information Management & Technology Committee	**Pastoral 2**
12:30 pm - 1:30 pm	Mentoring Ad Hoc Committee	**Nutcracker 3**
12:30 pm - 1:30 pm	Military Ad Hoc Committee	**Fantasia C-D**
12:30 pm - 1:30 pm	Pediatric Trauma Ad Hoc Committee	**Pastoral 3**
12:30 pm - 1:30 pm	Program Committee	**Fantasia K**
1:00 pm - 5:00 pm	EAST Traumacast/Careercasts Interview Room	**Fantasia M**

Workshop – Ticketed session, additional fees apply. Pre-registration required.

1:30 pm-5:30 pm	Advanced Practitioners in Trauma Workshop - Hospital Complications in Trauma and Acute Care Surgery *Presented by the EAST Advanced Practitioners Ad Hoc Committee*	**Fantasia E-F**

1:30 pm - 2:30 pm	EAST Annual Oriens Presentations 1:30 pm-2:15 pm Keynote Address Timothy C. Fabian, MD, FACS *Invisible Predecessors of Trauma Care:* *African American Medical Contributions to the American Civil War* 2:15 pm-2:30 pm 2015 EAST Oriens Essay Presentations Fellow Winner – Gerard A. Baltazar, DO & Resident Winner – T. Shane Hester, DO	**Fantasia Ballroom J**
2:00 pm - 4:30 pm	Practice Management Guidelines Plenary Session *Presented by the EAST Guidelines Committee*	**Fantasia Ballroom H**

PMGs scheduled to be presented (*subject to change*):

- Acute Cholecystitis - Douglas J.E. Schuerer, MD
- All-Terrain Vehicle (ATV) Safety - Terence O'Keefe, MD, MSPH
- Appendicitis - Mayur Narayan, MD, MPH, MBA
- Diagnosis and Treatment of Injury in Pregnancy - Stephanie R. Goldberg, MD
- Treatment of Pancreatic Trauma - Vanessa Ho, MD, MPH
- Diaphragm Injury - Louis H. Alarcon, MD
- Duodenal Injury - Neeta Chaudhary, MD, PhD
- Family Presence during Trauma Resuscitation – Mae Ann Pasquale, PhD, RN
- Gun Violence Injury Prevention - Marie L. Crandall, MD, MPH
- Large Bowel (Colon) Obstruction - Paula Ferrada, MD
- Pain Management in Blunt Thoracic Trauma - Samuel M. Galvagno, DO, PhD
- Rectal Injury - Patrick L. Bosarge, MD
- Surgical Management of Rib Fractures - George Kasotakis, MD, MPH

THURSDAY, JANUARY 15, 2015 (continued)

Workshop – Ticketed session, additional fees apply. Pre-registration required.

3:00 pm-5:30 pm — EAST Engage the Masters Course — **Fantasia Ballroom J**

Presented by the EAST Careers in Trauma Committee

Masters

Timothy Fabian, MD — Vicente Gracias, MD
Martin Schreiber, MD — Deborah Stein, MD, MPH

Cases Presented

- Injury to the Surgical Soul: Management of Bad to Worse
  Linda Ding, MD, University of Rochester
- Necrotizing Pancreatitis: When VARD is Hard and Infection is Present
  Thomas Resch, MD, University of Maryland
- Trauma Pneumonectomy: How to Cope with "Failure"
  Alessandra Landmann, MD, University of Oklahoma Health Sciences Center
- Scapulothoracic Dissociation and Associated Complications
  Daniel Dante Yeh, MD, Massachusetts General Hospital
- A Pain in the Neck
  Abid Khan, MD, Cook County Hospital

4:30 pm -5:45 pm — Scientific Poster Rounds — **Nutcracker 1-2**

Poster Professors

Group I (Posters 1-5) - Bryce Robinson, MD & Kevin Schuster, MD
Group II (Posters 6-11) - A. Britton Christmas, MD & Martin Zielinski, MD
Group III (Posters 12-17) - Oscar Guillamondegui, MD, MPH & Thomas Rohs, Jr., MD
Group IV (Posters 18-21) - A. Tyler Putnam, MD & Carlos Rodriguez, DO, MBA
Group V (Posters 22-26) - David King, MD & Robert Winfield, MD
Group VI (Posters 27-32) - Jeffrey Claridge, MD & Alexander Eastman, MD, MPH
Group VII (Posters 33-38) - Christopher Dente, MD & Ben Zarzaur, MD, MPH

EAST Receptions & Special Events

5:30 pm-6:45 pm — Society of Trauma Nurses Networking Reception *(By invitation only)* — **Nutcracker 3 & Nutcracker Courtyard**

6:00 pm-10:30 pm — Kids Klub Party - Pre-Registration Required! — **Ballroom of the Americas B**

7:00 pm-9:30 pm — EAST President's Reception & Dinner *(By invitation only)* — **Epcot, Great Hall of China**
Buses Depart Contemporary Convention Center at 6:30 pm — **West Side Bus Pick-Up**

Industry Education Symposium

6:00 pm-9:00 pm — Bard Davol, Inc. (Lecture) — **Fantasia K-L**

FRIDAY, JANUARY 16, 2015

6:00 am-1:30 pm — Registration — **West Registration**
6:00 am-12:30 pm — Speaker Preparation Room — **Pastoral 1**

Sunrise Sessions 11-15 – Ticketed session, additional fee apply. Pre-registration required.

7:00 am-7:55 am — SS 11-Preparing for the Next War: Pivotal Military-Civilian Relationships — **Fantasia A-B**
7:00 am-7:55 am — SS 12-Disease Grading Systems in Emergency General Surgery — **Fantasia C-D**
7:00 am-7:55 am — SS 13-Career Transitions for Trauma Surgeons: Just Another Step Along the Way or a Chance to Reinvent Yourself? — **Fantasia E-F**
7:00 am-7:55 am — SS 14-The International Collaboration in Trauma & Acute Care Surgery: How to Get Involved — **Fantasia K**
7:00 am-7:55 am — SS 15-Breaking Down Cultural Walls Preventing Effective Emergency Department and Hospital Throughput — **Fantasia L**

7:30 am-8:30 am — Continental Breakfast provided in the Exhibit Hall — **Fantasia Ballroom G**

FRIDAY, JANUARY 16, 2015 (continued)

8:00 am-11:30 am	Exhibits	**Fantasia Ballroom G**
8:00 am-12:00 pm	View the Scientific Posters	**Nutcracker 1-2**
8:00 am-10:00 am	Scientific Session IV-A: Basic Science & Education *(Papers 21-26)* Moderators: Mayur Patel, MD, MPH & Nicole Stassen, MD	**Fantasia Ballroom J**
8:00 am-10:00 am	Scientific Session IV-B: Performance Improvement *(Papers 27-32)* Moderators: Elliott Haut, MD, PhD & Robert Winfield, MD	**Fantasia Ballroom H**
10:00 am-11:00 am	**Presidential Address** ***Look Both Ways*** **Kimberly A. Davis, MD, MBA, FACS, FCCM**	**Fantasia Ballroom J**
11:00 am-11:15 am	Gavel Exchange	**Fantasia Ballroom J**
11:15 am-11:20 am	Informational Presentation: The American Hernia Society Quality Collaborative	**Fantasia Ballroom J**
11:20 am-12:00 pm	**EAST & EAST Foundation Awards Ceremony** • *Raymond H. Alexander, MD Resident Paper Competition of the EAST Foundation* • *Best Manuscript Award* • *EAST Oriens Award* • *John P. Pryor, MD Distinguished Service in Military Casualty Care Award* • *Cox-Templeton Injury Prevention Paper Award of the EAST Foundation* • *John M. Templeton, Jr., MD Injury Prevention Research Scholarship of the EAST Foundation* • *Trauma Research Scholarship of the EAST Foundation* • *2014 Health Policy and Management Scholarship Recipient of the EAST Foundation* • *2015 Leadership Development Workshop Scholars Recognition* • *2015 Society of Trauma Nurses/EAST Foundation Nurse Fellow Recipient*	**Fantasia Ballroom J**
12:00 pm-1:00 pm	EAST Multicenter Study Recruitment Proposals *Presented by the EAST Research-Scholarship Committee*	**Fantasia Ballroom J**

EAST Receptions & Special Events

2:00 pm-5:00 pm	Annual EAST Foundation Dodgeball Tournament	**Nutcracker 1-3**
5:00 pm-7:00 pm	Family Reception/Barbeque - Ticketed Event *(RSVP required)*	**Fantasia Ballroom H**

SATURDAY, JANUARY 17, 2015

8:00 am-10:30 am	EAST Board of Directors Meeting (by invitation)	**CR Boardroom, 2nd Floor**

Workshop – Ticketed session, additional fees apply. Pre-registration required.

8:00 am-12:00 pm	Basic Endovascular Skills for Trauma© Workshop	**Fantasia E-F**
1:00 pm-5:00 pm	Basic Endovascular Skills for Trauma© Workshop *This is a repeat of the 8am-12pm workshop*	**Fantasia E-F**

ABSTRACTS

Scientific Session I - Raymond H. Alexander, MD Resident Paper Competition

January 14, 2015
Paper 1
8:50 am

ADVERSE CARDIAC EVENTS IN TRAUMA IS ASSOCIATED WITH EARLY ELEVATIONS IN PLASMA CATECHOLAMINES

Sriveena Naganathar, BMedSci MBBS, Henry De'Ath, Simon Glasgow, Sirat Khan, Claire Rourke, Johanna Wall, Imran Raza, Zane Perkins, Karim Brohi
Queen Mary University of London

Presenter: Sriveena Naganathar, BMedSci MBBS

Discussant: Steven E. Wolf, MD, University of Texas – Southwestern Medical Center

Objectives: Trauma patients are at risk of trauma induced secondary cardiac injury (TISCI). TISCI was demonstrated through adverse cardiac events (ACEs) and rises in cardiac biomarkers. In sepsis, cardiac dysfunction is associated with elevated circulating catecholamines and overstimulation of the myocardium. This study aims to establish the relationship between catecholamines and TISCI.

Methods: Injured patients who met study criteria were prospectively enrolled from 2010 to 2012 at a major British trauma centre. Serum catecholamines (adrenaline(AD), noradrenaline(NA), dopamine(DOPA)) and cardiac biomarkers (heart-related fatty acid binding protein(HFABP), brain natriuretic peptide(BNP), troponin I(TnI)) were assayed on admission. Patients were assessed daily for ACEs. Length of stay (LOS) and 28-day mortality were measured.

Results: 38(13%) of 300 patients recruited had an ACE. Mortality (18% vs. 6%, *p=0.002)* and ICU LOS *(12.5days, p<0.0001)* were higher in the ACE cohort. HFABP (median: 10.3 vs 64.9 ng/ml, *p<0.001*) was raised in the ACE group, however, there was no difference noted in BNP and TnI levels. ACEs were associated with higher AD and NA levels (AD 859.0 vs. 191.7 ng/ml p= 0.0005, NA 2026 vs 678.6 ng/ml p<0.0001, respectively). This was not associated with traumatic brain injuries. Patients with high catecholamine levels had elevated serum but not BNP or TnI. Increased levels of AD was related to higher mortality rates (AD: 11% >200pg/ml group, 0% in 100-200 pg/ml, 7% in <100 pg/ml). There was no clear link between NA and DOPA levels and mortality.

Conclusions: On admission, serum catecholamine levels are higher in patients who develop ACEs. Patients with higher catecholamine levels have raised serum HFABP. Increased dopamine and adrenaline levels were associated with higher mortality.

Notes

Scientific Session I - Raymond H. Alexander, MD Resident Paper Competition

January 14, 2015
Paper 2
9:10 am

PORTABLE MECHANICAL VENTILATION WITH CLOSED-LOOP CONTROL OF INSPIRED FRACTION OF OXYGEN MAINTAINS OXYGENATION IN THE SETTING OF HEMORRHAGE AND LUNG INJURY

Peter L. Jernigan, MD, Richard Hoehn, Chris Blakeman, Judy Heyl,
Bryce R.H. Robinson, MD*, Timothy A. Pritts, MD, PhD*, Richard Branson, MSc RRT
University of Cincinnati

Presenter: Peter L. Jernigan, MD

Discussant: Stacy A. Shackelford, MD, University of Maryland

Objectives: Closed-loop controllers (CLC) embedded within portable mechanical ventilators may allow for autonomous weaning. The ability of CLCs to maintain adequate oxygenation in the setting of hemorrhage and lung injury is unknown. We hypothesized that a portable ventilator with a CLC for inspired fraction of oxygen (FiO2) could provide oxygenation in a porcine model of hemorrhage and lung injury.

Methods: Female pigs randomized to the study group (n=6) underwent a pressure-controlled bleed (mean arterial pressure [MAP]=40 mmHg for 30 minutes). Acute lung injury was induced by saline lung lavage followed by intentional infliction of volutrauma/atelectrauma. Sham pigs (n=6) underwent placement of monitoring devices without hemorrhage or lung injury. All pigs were then placed on a portable ventilator modified with a CLC algorithm which uses feedback from pulse oximetry (SpO2) and FiO2 trends to adjust FiO2 and maintain a target SpO2 of 94% +/- 2%. The initial FiO2 was set at 0.60. Tidal volume, PEEP, rate, and I/E time were constant unless changes were required clinically.

Results: Study pigs had lower MAPs than shams at all time points except baseline (Fig 1). PaO2/FiO2 ratios were <300 and significantly lower than both baseline values and corresponding sham values at all time points. The CLC weaned the FiO2 at a reduced rate in study pigs relative to shams with a final mean FiO2 of 0.54 and 0.29 in study and sham pigs, respectively ($p<0.05$). There was a significant divergence in the study and sham FiO2 curves but no significant difference in oxygen saturation or hypoxemia (Fig. 2).

Conclusions: Adequate oxygenation can be maintained in the setting of hemorrhage and lung injury using a portable ventilator embedded with a CLC of FiO2 based on pulse oximetry. These devices may be valuable for providing advanced medical care in resource-limited environments.

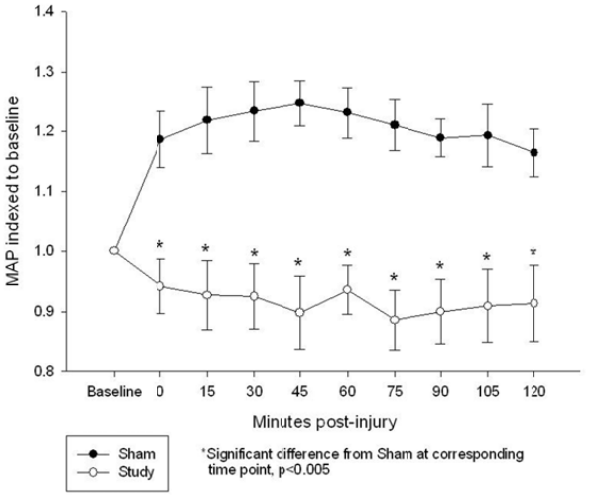


Figure 1. Mean arterial pressure [MAP] is shown (indexed to baseline) for sham and study animals during the observation period of the study. MAPs were significantly reduced in study animals at all time points after undergoing pressure-controlled hemorrhage and saline lavage lung injury.

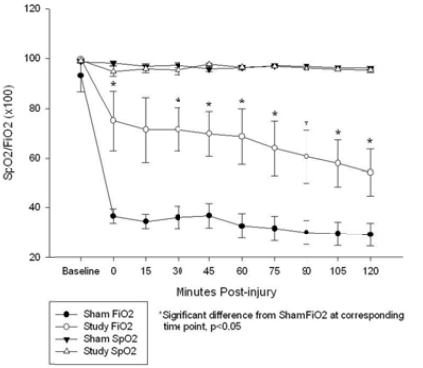


Figure 2. SpO2 and FiO2 (x100) are shown for sham and study pigs at baseline and during the weaning period, after study animals underwent hemorrhage and lung injury. The CLC weaned the study pigs at a significantly reduced rate relative to shams, but there was no significant difference between groups in oxygen saturation or hypoxemia.

Scientific Session I - Raymond H. Alexander, MD Resident Paper Competition

January 14, 2015
Paper 3
9:30 am

FUNCTIONAL AND LONG-TERM OUTCOMES IN SEVERE TRAUMATIC BRAIN INJURY FOLLOWING REGIONALIZATION OF A TRAUMA SYSTEM

Michael L. Kelly, MD, Mary Roach, Aman Banerjee, MD, Michael Steinmetz, MD
MetroHealth Medical Center

Presenter: Michael L. Kelly, MD

Discussant: Jeffrey Coughenour, MD, University of Missouri Health Care

Objectives: We previously demonstrated that regionalization of trauma (RT) significantly reduced in-hospital mortality from 19% to 14% in patients with severe traumatic brain injury (sTBI). However, functional and long-term outcomes had not been assessed. We hypothesized that RT would be associated with improved functional and long-term outcomes in sTBI patients.

Methods: All TBI patients >14 years with a Head Abbreviated Injury Scale ≥3 were identified from the RT database and matched to the state death index and the regional TBI rehabilitation (TBIr) database. Data from 2008 through 2012 were analyzed before and after RT in 2010. For patients discharged to the TBIr unit, overall Functional Independence Measure (FIM) scores and FIM score gains were compared pre- and post-RT.

Results: 3,496 patients with sTBI were identified in the RT database; 1,359 pre-RT and 2,137 post-RT. Table 1 shows decreased post-RT mortality at 30-days and 6-months. Multivariable logistic regression demonstrated RT to be an independent predictor against mortality at 30-days (OR: 0.74; 95% CI: 0.60-0.91, C-stat=0.84) and 6-months (OR: 0.82; 95% CI: 0.67-0.99, C-stat=0.82). Discharges to the TBIr unit increased from 117 (9%) pre- to 297 (14%) post-RT ($p<0.0001$), while discharges to home and non-TBIr units remained similar. Injury Severity Scale (ISS) and Glasgow Coma Scale (GCS) scores for all discharged patients remained similar. FIM admission scores were similar pre- (median: 54; interquartile range: 30,65) and post-RT (48;31,61) ($p=0.2$) and remained similar at discharge pre- (92;75,102) and post-RT (89;73,100) ($p=0.1$). TBIr patients showed similar FIM score gains pre- (37;26,46) and post-RT (36;24,49) ($p=0.6$).

Conclusions: Regionalization of trauma was associated with reduced long-term mortality, increased TBIr admissions, and similar FIM score improvements for patients with sTBI.

Table 1. Mortality for severe TBI patients

	Pre-RT (n=1359)	Post-RT (n=2137)	P value
In-hospital	262 (19%)	302 (14%)	<0.0001*
30-day	285 (21%)	343 (16%)	<0.0001*
6-month	320 (24%)	417 (20%)	0.004*

RT = Regionalization of trauma; TBI = Traumatic brain injury

*Statistically significant

Scientific Session I - Raymond H. Alexander, MD Resident Paper Competition

January 14, 2015
Paper 4
9:50 am

EFFECT OF ASCORBIC ACID CONCENTRATIONS ON HEMODYNAMICS AND INFLAMMATION FOLLOWING LYOPHILIZED PLASMA TRANSFUSION

Sean P. McCully, MD, MS, David T. Martin, Mackenzie R. Cook, Nicole T. Gordon, Belinda H. McCully, PhD, Tim H. Lee, MD MS, Rondi Dean, BS, CVT, Elizabeth A. Rick, Alexis M. Moren, Kelly A. Fair, Vicente JU Perl, Kate Watson, Martin A. Schreiber, MD, FACS*
Oregon Health and Science University

Presenter: Sean P. McCully, MD, MS

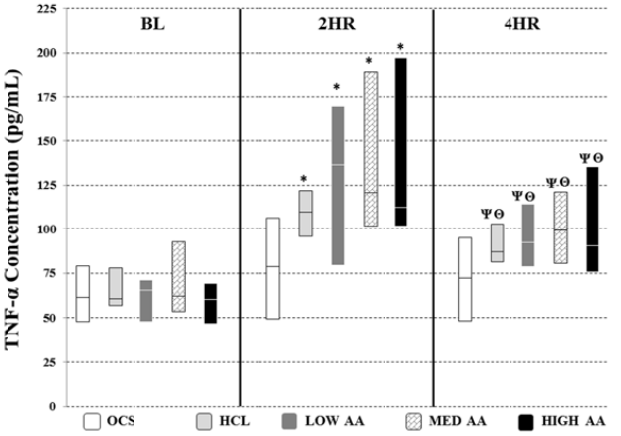
Discussant: Bryce RH Robinson, MD, FACS, University of Cincinnati

Objectives: Determine the range of ascorbic acid (AA) concentrations that are safe and maintain hemodynamic function, pro-coagulant activity and attenuation of systemic inflammation after transfusion of lyophilized plasma (LP) following polytraumatic injury.

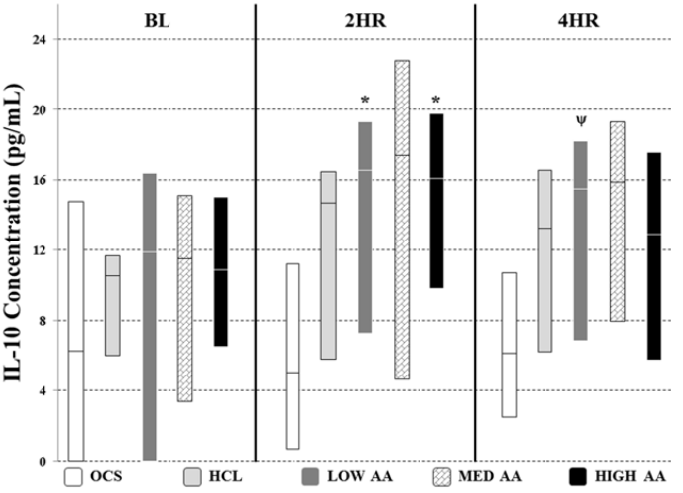
Methods: This was a prospective, randomized, blinded animal study. Forty-six female swine were subjected to a validated polytrauma model and resuscitated with LP. Five groups: operative control sham (n=6), high AA (n=10), medium AA (n=10), low AA (n=10) and a hydrochloric acid comtrol (HCL: n=10) were randomized. Hemodynamic monitoring, thrombelastography (TEG), blood chemistries and blood loss were assessed. Inflammatory cytokines (TNF-α, IL-6, C-reactive protein, IL-10) and a biomarker of DNA damage (8-Hydroxy-2-Deoxyguanosine) were measured by ELISA at baseline, 2- and 4-hours post liver injury. Significance was $p<0.05$ with a Bonferroni correction for multiple comparisons.

Results: Hemodynamics, shock and blood loss were similar between groups. All animals had robust pro-coagulant activity 2-hours following liver injury. Inflammatory markers were similar between groups at baseline, and treatment groups remained similar to HCL following liver injury. IL-6 and TNF-α were increased at 2- and 4-hours compared to baseline within all groups ($p<0.02$). DNA damage increased at 2-hours compared to baseline in all groups ($p<0.02$) and further increased at 4-hours compared to baseline in HCL, low and high AA groups ($p<0.02$). CRP was not different between or within groups. IL-10 increased at 2-hours compared to baseline in both low and high AA groups and remained elevated at 4-hours compared to baseline only in the low AA group (all, $p<0.02$).

Conclusions: Concentrations of AA were well tolerated physiologically and did not diminish the pro-coagulant activity of LP. Within our tested range of concentrations, AA can safely be used to buffer LP.



Median plasma TNF-α concentration at baseline (BL), 2- and 4-hours post liver injury. Operative control sham (OCS) provided for reference. Significant difference between baseline-2 hours (*), baseline-4 hours (**Ψ**) and 2- to 4- hours (**Θ**); all $p<0.02$. Ascorbic acid (AA) groups were similar to hydrochloric acid control (HCL) at all-time points ($p>0.05$).



Median plasma IL-10 concentration at baseline (BL), 2- and 4-hours post liver injury. Operative control sham (OCS) provided for reference. Significant difference between baseline-2 hours (*) and baseline-4 hours (**Ψ**). Ascorbic acid (AA) groups were similar to hydrochloric acid control (HCL) at all-time points ($p>0.05$).

Scientific Session I - Raymond H. Alexander, MD Resident Paper Competition

January 14, 2015
Paper 5
10:10 am

CERTIFIED ACUTE CARE SURGERY PROGRAMS IMPROVE OUTCOMES IN PATIENTS UNDERGOING EMERGENCY SURGERY: A NATIONWIDE ANALYSIS

Mazhar Khalil, MD, Peter Rhee, MD, MPH*, Viraj Pandit, MD, Narong Kulvatunyou, MD*, Bardiya Zangbar, MD, Terence O'Keeffe, MD, MSPH*, Andrew L. Tang, MD*, Gary A. Vercruysse, MD*, Rifat Latifi, MD*, Randall S. Friese, MD*, Bellal Joseph, MD*
The University of Arizona

Presenter: Mazhar Khalil, MD

Discussant: Jose J. Diaz, Jr., MD, CNS, University of Maryland School of Medicine

Objectives: Differences in outcomes among trauma centers (TC) and non-trauma centers (NTC) in patients undergoing emergency general surgery (EGS) are well established. However; the impact of development of certified acute care surgery (ACS) program on patient outcomes remains unknown. The aim of this study was to evaluate outcomes in patients undergoing EGS across TC, NTC, and trauma center with ACS (ACS-TC).

Methods: National estimates for EGS procedures were abstracted from the National Inpatient Sample (NIS) database. Patients undergoing emergent procedures (appendectomy, cholecystectomy, hernia repair, small and large bowel resections) were included. TCs were identified based on American College of Surgeons verification. ACS-TC programs were recorded from the American Association for the Surgery of Trauma. Outcome measures were: hospital length of stay (LOS), complications, and mortality. Regression analysis was performed after adjusting for age, gender, race, Charlson co-morbidity index, and type of procedure.

Results: 131,410 patients undergoing EGS were analyzed. Patients managed in ACS-TC had shorter hospital LOS ($p=0.045$) and lower complication rate ($p=0.041$) compared to patients managed in both TC and NTC. There was no difference in mortality in patients managed across the groups, however there was a trend towards lower mortality in patients managed in ACS-TC in comparison to TC ($p=0.064$) and NTC ($p=0.089$). The overall hospital costs were lower for patients managed in ACS-TC compared to TC ($p=0.036$).

Conclusions: Trauma centers with ACS program have improved outcomes in emergency general surgery procedures compared to both trauma centers and non-trauma centers. ACS training with the associated infrastructure standards may contribute to these improved outcomes.

Table 1. Outcomes

	NTC * (n=75,930)	TC (n=47,753)	ACS-TC (n=7,727)
Hospital LOS	RF	**1.18 [1.11-1.82]**	**0.91 [0.82-0.97]**
Complications	RF	**1.1 [1.02-1.9]**	**0.95 [0.89-0.98]**
Mortality	RF	1.07 [0.8-1.2]	0.98 [0.92-1.5]

*RF: Reference

Scientific Session II - Raymond H. Alexander, MD Resident Paper Competition

January 14, 2015
Paper 6
10:50 am

MESENCHYMAL STEM CELLS INCREASE T-REGULATORY CELLS AND IMPROVE HEALING SEVEN DAYS FOLLOWING TRAUMA AND HEMORRHAGIC SHOCK

Amy V. Gore, MD, Letitia E. Bible, MD, Walter Alzate, MS, Alicia M. Mohr, MD*,
David H. Livingston, MD*, Ziad C. Sifri, MD*
Rutgers-New Jersey Medical School

Presenter: Amy V. Gore, MD

Discussant: Robert Southard, MD, Baylor College of Medicine

Objectives: Rat lungs undergo full histologic recovery within one week following unilateral lung contusion (LC), however, when LC is followed by hemorrhagic shock (HS) wound healing is impaired. We hypothesize that the addition of mesenchymal stem cells (MSC) to animals undergoing combined LCHS will improve wound healing.

Methods: Male Sprague-Dawley rats (n=5-6/group) were subjected to LCHS with or without the injection of a single iv dose of 5×10^6 MSCs following return of shed blood after HS. Rats were sacrificed seven days following injury. Flow cytometry was used to determine the T regulatory (Treg) cell population in peripheral blood (PB). Lung histology was graded using a well-established lung injury score (LIS). Components of the LIS include average inflammatory cells/high power field (hpf) over 30 fields, interstitial edema, pulmonary edema, and alveolar integrity with total scores ranging from 0-11. Data analyzed by ANOVA followed by Tukey's multiple comparison test, expressed as mean ± SD. $p<0.05$ considered significant.

Results: Seven days following isolated LC, as previously shown, LIS is 0.8 ± 0.4, unchanged from naive. The addition of HS results in a persistently elevated LIS score, whereas addition of MSC to LCHS decreased the LIS score to naïve. The change in LIS was driven by a significant decrease in edema scores. In rats undergoing LC alone, 6.0±1.5% of CD4+ cells were Tregs. The addition of HS caused no significant change in Treg population at 9.3±0.7%, whereas LCHS+MSC increased the population to 18.2±6.8% in PB ($p<0.05$ vs LCHS).

Conclusions: Impaired wound healing following trauma and hemorrhagic shock is improved by a single dose of MSCs given at the time of injury. This enhanced healing is associated with an increase in the T regulatory cell population and a decrease in lung edema score. Further study into the role of Tregs in MSC-mediated wound healing is warranted.

LIS Total and Subgroup Score Seven Days Following Injury					
Group	**Inflammatory cells/hpf**	**Interstitial Edema**	**Pulmonary Edema**	**Alveolar Integrity**	**Total LIS**
LC	0 ± 0	0.75 ± 0.5	0 ± 0	0 ± 0	0.8 ± 0.4
LCHS	0.4 ± 0.5*	2.0 ± 0*	1.0 ± 0.7*	0.4 ± 0.5	**3.7 ± 0.81***
LCHS +MSC	1.0 ± 0 **	0.4 ± 0.5**	0 ± 0**	0.2 ± 0.4	**1.6 ± 0.6****

Table 1: LIS Total and Subgroup Score Seven Days Following Injury. LC= lung contusion, LCHS= lung contusion hemorrhagic shock, MSC= mesenchymal stem cells. Data presented as mean score ± standard deviation; * p<0.05 vs LC **p<0.05 vs LCHS

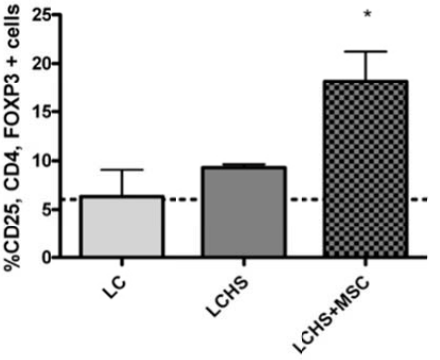


Figure 1: T-Regulatory Cell Population Seven Days Following Injury. Dotted line represents naïve. LC= lung contusion, LCHS= lung contusion hemorrhagic shock, MSC= mesenchymal stem cells. Data presented as mean score Â± standard deviation; *p<0.05 vs LCHS.

Scientific Session II - Raymond H. Alexander, MD Resident Paper Competition

January 14, 2015
Paper 7
11:10 am

QUANTIFYING THE EFFECT OF CRYSTALLOID RESUSCITATION ON LACTATE AND BASE DEFICIT IN A HUMAN MODEL FOR CLASS I HEMORRHAGE

Samuel Wade Ross, MD, MPH, A. Britton Christmas, MD, FACS*, Peter E. Fischer, MD, MS*, Haley Holway, Rachel Seymour, Michael Gibbs, MD*, B. Todd Heniford, Ronald F. Sing, DO*
Carolinas Medical Center

Presenter: Samuel Wade Ross, MD, MPH

Discussant: Jeffrey A. Clardige, MD, MS, MetroHealth Medical Center

Objectives: Resuscitation after hemorrhage with crystalloid solutions can lead to marked acidosis and iatrogenically worsen the lethal triad. The effect of differing solutions on base deficit and lactate has been sparsely prospectively studied in humans. We sought to quantify the effect of normal saline (NS) and lactated ringers(LR) resuscitation in voluntary blood donors as a model for Class I hemorrhage.

Methods: A prospective randomized control trial was conducted in conjunction with blood drives. Donors were randomized to receive no IV fluid (noIVF), 2L NS or 2L LR after blood donation of 500 ml. Lactate and base deficit were measured before and after fluid administration using an iSTAT. Donor height and weight were collected and total blood volume (TBV) was calculated using Nadler's formula. The mean lab values were compared between groups using the Wilcoxon Rank Sum and Kruskal Wallis tests.

Results: 157 patients completed the study. Average age was 39.2 ± 12.7 and 65.0% were female. Average TBV, lactate and base deficit values are reported in the Table. Patients in each group lost similar amounts of TBV, and a similar amount was replaced in the crystalloid group ($p>0.05$). Donors had similar increases in lactate and base deficit after donation regardless of the group ($p>0.05$). After resuscitation with 2L crystalloid, the lactate level increased higher in the LR group than in the NS or the noIVF group ($p<0.001$). Additionally, the resuscitation base deficit was more negative in the NS group than in the LR or noIVF group ($p<0.001$).

Conclusions: This study is one of the first to prospectively demonstrate quantifiable differences in base deficit and lactate by type of crystalloid resuscitation. LR resuscitation elevated lactate levels, and NS increased the base deficit. These findings are critical to interpretation of trauma patient resuscitation with crystalloid solutions.

Table. Results by Crystalloid Group

Average†	No Fluid n=52	Normal Saline* n=51	Lactated Ringers* n=54	P Value
TBV (L)	4.8	4.7	4.9	NS
% TBV Loss	10.9	11.0	10.6	NS
% TBV Replacement	0	44.1	42.6	<0.0001
Post-Donation Lactate	1.10	1.12	1.05	NS
Post-Resuscitation Lactate	1.36	1.00	1.54	<0.001
Post-Donation Base Deficit	0.04	-0.24	0.33	NS
Post-Resuscitation Base Deficit	-0.65	-3.06	-0.34	<0.001

* 2 L IV fluid; TBV: Total Blood Volume

Scientific Session II - Raymond H. Alexander, MD Resident Paper Competition

January 14, 2015
Paper 8
11:30 am

CHRONIC RESTRAINT STRESS AFTER INJURY AND SHOCK IS ASSOCIATED WITH PERSISTENT ANEMIA DESPITE PROLONGED ELEVATION IN ERYTHROPOIETIN LEVELS

Letitia E. Bible, MD, Latha Pasupuleti, MD, Amy V. Gore, MD, Ziad C. Sifri, MD*,
Kolenkode Kannan, Alicia M. Mohr, MD*
Rutgers-New Jersey Medical School

Presenter: Letitia E. Bible, MD

Discussant: Jason J. Sperry, MD, MPH, University of Pittsburgh

Objectives: After severe traumatic injury, critically ill patients have prolonged catecholamine elevation associated with bone marrow (BM) dysfunction and persistent anemia. However, anemia in current animal models of injury and shock is transient. Daily restraint stress (CS) increases catecholamines. We hypothesize that adding CS after injury or injury and shock in rats will prolong the hypercatecholaminemia and anemia, despite elevated erythropoietin (EPO) levels.

Methods: Male Sprague-Dawley rats (N=6-9/group) were randomly allocated into 1 of 5 groups: naïve, lung contusion (LC), LC+CS, LC with hemorrhagic shock (LCHS), or LCHS+CS. CS consisted of a daily 2hr restraint period interrupted by repositioning and alarms every 30min to prevent habituation. At 7days, urine was assessed for norepinephrine (NE), blood for EPO and hemoglobin (Hgb), and BM for erythroid progenitor growth.

Results: LC or LCHS animals predictably recovered by day 7; NE, EPO, and Hgb levels were normal. LC animals exposed to CS had significant elevation of NE on day 6 (Figure). LC+CS had significantly lower Hgb levels, suppressed BM erythroid progenitor cell growth despite elevated EPO (Table). Adding CS to LCHS led to significant, persistent NE elevation (Figure). LCHS+CS had persistent anemia despite significantly elevated EPO which was associated with suppressed BM erythroid progenitor cell growth (Table).

Conclusions: Injured animals exposed to CS results in prolonged elevation of norepinephrine and erythropoietin associated with worsening BM erythroid function and persistent anemia. Chronic restraint stress after injury and shock provides a clinically relevant model to further evaluate persistent injury-associated anemia seen in critically ill trauma patients. Moreover, alleviating chronic stress after severe injury is a potential therapeutic target to improve BM dysfunction and anemia.

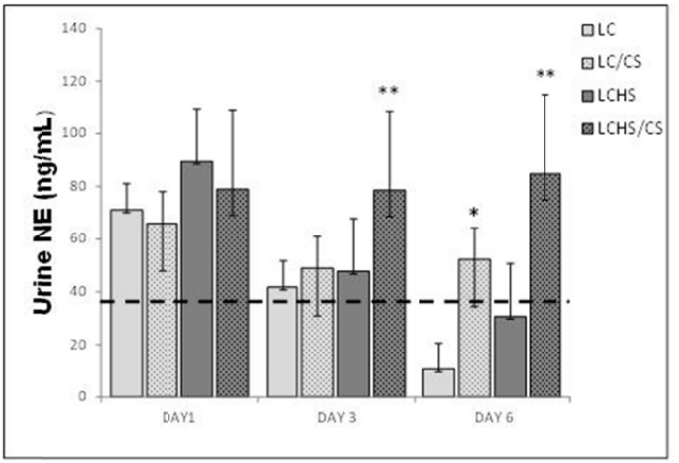


Figure 1: Urinary Norepinephrine levels increase with chronic restraint stress. LC- lung contusion LC/CS- lung contusion and chronic restraint stress, LCHS- lung contusion with hemorrhagic shock, LCHS/CS lung contusion with hemorrhagic shock and chronic restraint stress. *p<0.05 vs. LC and **p<0.05 vs. LCHS by ANOVA and Tukey Kramer

	Seven Days After Initial Injury				
	Erythropoietin (pg/mL)	**Hgb** (g/dL)	**CFU-GEMM** (colonies/plate)	**BFU-E** (colonies/plate)	**CFU-E** (colonies/plate)
Naive	16±6	13.6 ± 1	35±0.6	65±2	75±2
LC	19±10	14.1±0.2	34±0.5	66±1	75±4
LC/CS	**46±55**	**12.9±0.3***	**22±5***	**49±3***	**57±5***
LCHS	34±22	13.1±1	28±2	50±3	58±1
LCHS/CS	**72±66****	**10.8±1****	**16±1****	**36±1****	**47±1****

Table 1: Chronic stress following injury increases epo but worsens bone marrow erythroid progenitor growth and prolongs anemia. LC- lung contusion LC/CS- lung contusion and chronic restraint stress, LCHS- lung contusion with hemorrhagic shock, LCHS/CS lung contusion with hemorrhagic shock and chronic restraint stress. *p<0.05 vs. LC and **p<0.05 vs. LCHS ANOVA and Tukey Kramer

Scientific Session II - Raymond H. Alexander, MD Resident Paper Competition

January 14, 2015
Paper 9
11:50 am

PREDICTING SECONDARY INSULTS AFTER SEVERE TRAUMATIC BRAIN INJURY

Brandon Bonds, MD, Shiming Yang, PhD, Peter Hu, PhD, Kostas Kalpakis, Lynn Stansbury, Thomas M. Scalea, MD, FACS, FCCM*, Deborah M. Stein, MD, MPH, FACS, FCCM*
R Adams Cowley Shock Trauma Center, University of Maryland School of Medicine

Presenter: Brandon Bonds, MD

Discussant: John J. Como, MD, MPH, MetroHealth Medical Center

Objectives: Secondary insults such as hypotension, hypoxia, cerebral hypoperfusion, and intracranial hypertension (ICH) are associated with poor outcome following severe traumatic brain injury (TBI). Preventing and minimizing the effect of secondary insults are essential in management of severe TBI. At present, clinicians have no way to predict the development of these events, limiting their ability to plan appropriate timing of interventions. We hypothesized that processing continuous vital signs (VS) data using machine learning methods could predict the development of future ICH.

Methods: Continuous VS including intracranial pressure (ICP), heart rate, systolic blood pressure, and mean arterial pressure data were collected from adult patients admitted to a level one trauma center requiring an ICP monitor. We tested the ability of Nearest Neighbor Regression (NNR) to predict changes in ICP changes in advance of the observed rise in ICP by algorithmically learning from the patients' past physiology.

Results: Continuous VS were collected on 50 adult patients over a minimum of 10 hours per patient (904 hours total; 10,853 data points). The ability to predict ICP changes using this methodology is depicted in the FIGURE. Bland-Altman plots show that NNR provides good agreement in predicting actual ICP with a bias of 0.02 (±2 standard deviations [SD]=4mmHg) for the subsequent 5 minutes and -0.02 (±2SD=10mmHg) for the subsequent 2 hours.

Conclusions: We have demonstrated that using physiological data, it is possible to predict with reasonable accuracy impending secondary insults following severe TBI. NNR predicts ICP changes in clinically useful timeframes. This ability to predict events may allow clinicians to make better decisions about the timing of necessary interventions and this method could support the future development of minimally-invasive ICP monitoring systems which may lead to better overall clinical outcomes after severe TBI.

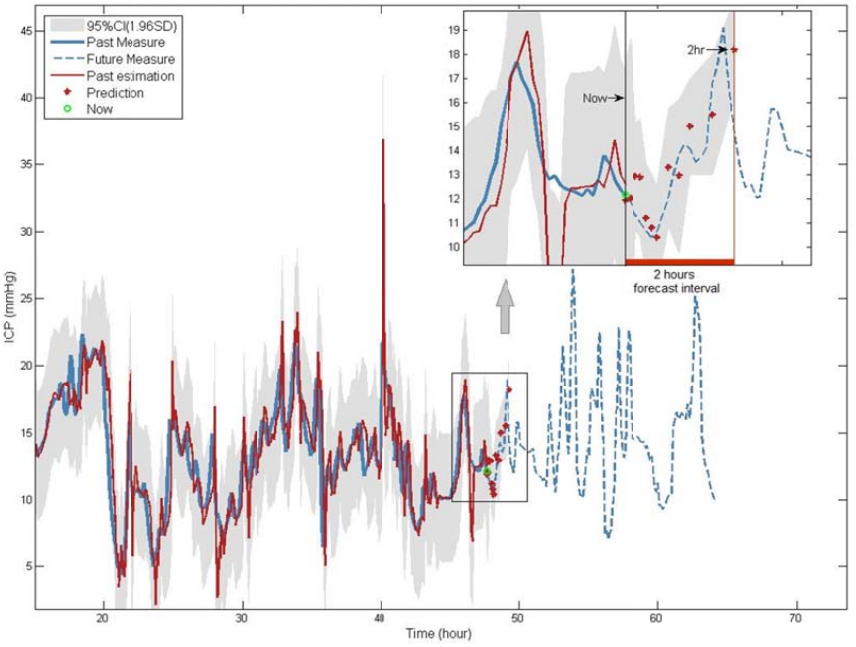


Illustration of using the NNR method to dynamically build regression models by 'borrowing' data (especially the ICP) from other patients. A 2-hour prediction window on the top-right corner displays a trend for ICP, under the assumption that if this patient will receive standard treatment

Scientific Session II - Raymond H. Alexander, MD Resident Paper Competition

January 14, 2015
Paper 10
12:10 pm

CELL IMPERMEANTS IMPROVE OUTCOMES IN LOW VOLUME RESUSCITATION FOR HEMORRHAGIC SHOCK

Dan W. Parrish, MD, Susanne Lindell, Heather Muir, Martin J. Mangino, PhD*
Virginia Commonwealth University

Presenter: Dan W. Parrish, MD

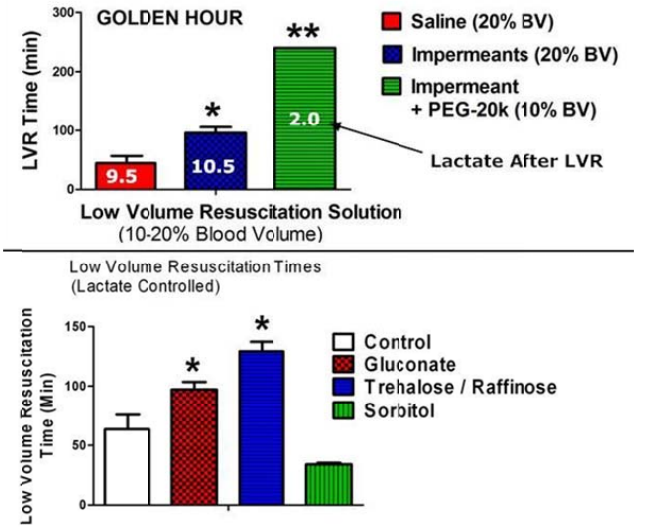
Discussant: Jason W. Smith, MD, PhD, University of Louisville

Objectives: Lethal cell swelling associated with altered cellular energetics during shock leads to loss of organ function, systems failure, and death. Preventing cell swelling with cell impermeant infusion could significantly improve outcomes at resuscitation. Our objective was to determine if the use of simple cell impermeants in low volume resuscitation (LVR) solutions would prevent lethal cell swelling and improve resuscitation outcomes.

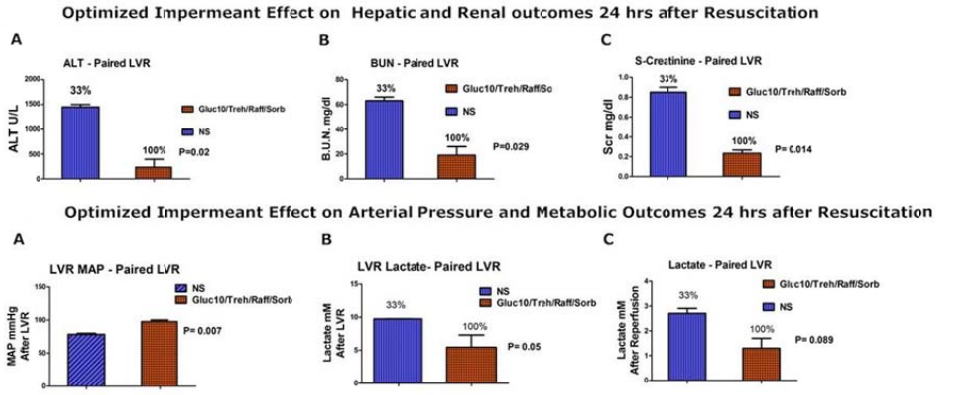
Methods: Rats were hemorrhaged to a mean arterial pressure of 30-35 mm Hg until arterial lactate reached 9 mg/dl. Then, LVR (10% or 20% blood volume) containing 0.9% Sodium Chloride, one of the studied cell impermeants, or polyethylene glycol (PEG-20k, a colloid) was started followed by full resuscitation when the lactate value again reached 9 mg/dl. The animals were then recovered for 24 hrs. Paired and unpaired experiments were performed. Cardiovascular, metabolic, and organ function, and survival were observed.

Results: Impermeants added to the LVR solution significantly increased the amount of time the animals could tolerate the low volume state and improved metabolic and organ function after full resuscitation. When PEG-20k was added to the impermeant solution, the LVR time increased 5 fold, relative to saline with significantly higher MAP and a lower resuscitation volume (10%).

Conclusions: Cell impermeants prevent lethal cell swelling caused by shock and increase the time that the animals can remain in the low volume state. The effect was dramatically potentiated when PEG-20k was added to the solution. These agents are deliverable in LVR solutions in the field, are stable, economical, non-toxic, and may significantly prolong the golden hour and survival.



The low volume resuscitation times are shown for saline, impermeants, and impermeant + PEG-20K in the top window. Low volume resuscitation times for individual impermeants are displayed in the bottom window.



The significant differences in metabolic and organ (liver and kidney) function were best demonstrated in the paired experiments as seen in the top row of graphs. Differences in MAP and lactate measurements following LVR and full resuscitation are shown in the second row of graphs.

Scientific Session III-A - Clinical Science

January 15, 2015
Paper 11
8:00 am

CENTRAL AORTIC WIRE CONFIRMATION FOR REBOA DEPLOYMENT: AS FAST AS THE FAST

Sundeep Guliani, MD*, Michael Amendola, Mack Hendrix, Adam McLaurin, DO,
Gordon Morano, Brian Strife, Jeffrey Elbich, Francisco Albuquerque,
Daniel Komorowski, Malcolm Sydnor, Mark Levy
Virginia Commonwealth University

Presenter: Sundeep Guliani, MD

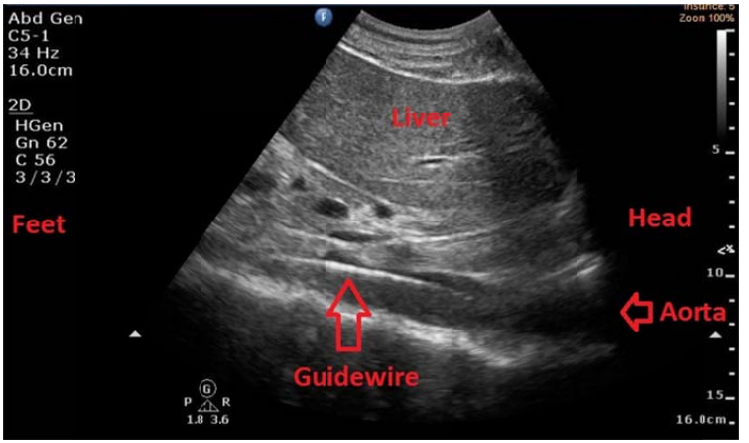
Discussant: Joseph D. Love, DO, University of Texas at Houston

Objectives: There has been recent reappraisal of aortic balloon occlusion in the setting of uncontrolled hemorrhage in trauma. Challenges currently limiting the use of Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) include safe and rapid balloon placement. Following arterial access, deployment requires fluoroscopic confirmation of an intra-aortic guidewire, atop which an occlusion balloon is advanced. We postulated that using a modified subxiphoid FAST view, both the aorta and an intra-aortic guidewire could be reliably identified.

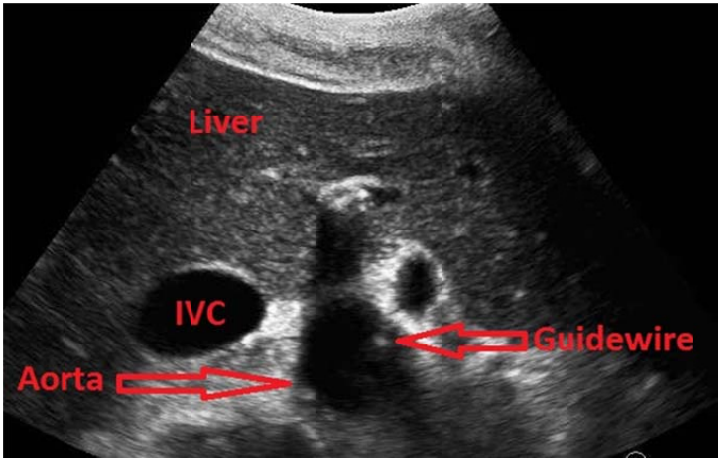
Methods: Thirty consecutive angiography patients underwent femoral arterial cannulation and initial guidewire advancement to the supraceliac aorta. Via a subxiphoid FAST view, the aorta was identified in both sagittal and transverse planes. Intra-aortic wire identification was subsequently recorded. The rate of central aortic wire location from unaided guidewire advancement was also observed.

Results: The mean patient age was 63.9 and the mean BMI was 27.2. 50% were male. 53.3% of patients had prior abdominal surgeries. 87% of studies were performed using portable point of care ultrasound machines. Identification of the aorta via the subxiphoid FAST was successful in 29 of 30 patients (97%) in sagittal and 28 of 30 patients (93%) in the transverse orientation. Among visualized aortas, an intra-aortic wire was identifiable in 28 of 29 patients (97%) in sagittal and 26 of 28 patients (93%) in transverse orientation. Unaided wire advancement achieved preferential central aortic positioning in 28 of 30 patients (93%).

Conclusions: The subxiphoid FAST view can rapidly and consistently identify a central aortic guidewire in both transverse and sagittal orientations. This finding obviates the need for fluoroscopy for this important initial maneuver in REBOA deployment. In addition, unaided guidewire advancement has a high likelihood of preferential central aortic positioning.



Sagittal FAST View of Aorta



Transverse FAST view of Aorta

Scientific Session III-A - Clinical Science

January 15, 2015
Paper 12
8:20 am

BOTULINUM TOXIN A INDUCED FLACCID PARALYSIS OF THE LATERAL ABDOMINAL WALL MUSCULATURE AFTER DAMAGE CONTROL LAPAROTOMY: A MULTIINSTITUTIONAL, PROSPECTIVE, RANDOMIZED, PLACEBO CONTROLLED, DOUBLE-BLINDED CLINICAL TRIAL

Martin D. Zielinski, MD, FACS*, Melissa Kuntz, Xiaoming Zhang, Henry J. Schiller, MD*, Myung Park, MD*, Mohammad A. Khasawneh, MBBS, Benjamin Zendejas, Abigail Zagar, Michael Ferrara, Stephanie F Polites, William Harmsen, MS, Karla V Ballman, PhD, David J. Dries, MD*, Donald H. Jenkins, MD*
Mayo Clinic

Presenter: Martin D. Zielinski, MD, FACS

Discussant: Michael F. Rotondo, MD, FACS, University of Rochester School of Medicine

Objectives: Damage control laparotomy (DCL) is a life-saving operation used in critically ill patients; however, interval primary fascial closure remains a challenge. We hypothesized that flaccid paralysis of the lateral abdominal wall musculature induced by Botulinum Toxin A (BTX), would improve of rates of primary fascial closure, decrease duration of hospital stay (LOS), and enhance pain control.

Methods: Consenting adults who had undergone a DCL at two institutions were prospectively randomized to receive ultrasound-guided injections of their external oblique, internal oblique, and transversus abdominus muscles with either BTX (150cc, 2units/cc) or placebo (150cc 0.9%NaCl). Patients were excluded if they had a BMI>50, remained unstable or coagulopathic, were home O_2 dependent or had an existing neuromuscular disorder. Outcomes were assessed in a double-blinded manner. Univariate and Kaplan Meier estimates of cumulative probability of abdominal closure were performed.

Results: We randomized 46 patients (24 BTX, 22 placebo). There were no significant differences in demographics, comorbidities, and physiological status. Injections were performed on average 1.8 ± 2.8 days after DCL (range 0-14). The 10-day cumulative probability of primary fascial closure was similar between groups: 96% for BTX (95% CI 72%-99%) and 93% for placebo (95% CI 61%-99%); HR =1.0 (95% CI 0.5-1.8). No difference between BTX and placebo groups was observed for LOS (37 vs 26 days, p=0.30) or intensive care unit stay (17 vs 11 days, p=0.27). There was no difference in median morphine equivalents following DCL (**TABLE**). The overall complication rate was similar (63% vs 68%, p=0.69), with 2 deaths in the placebo group and 0 in the BTX group. No BTX or injection procedure complications were observed.

Conclusions: Use of BTX after DCL was safe but did not appear to affect primary fascial closure, LOS, or pain modulation after DCL.

Day	BTX (MSO4 mg)	Placebo (MSO4 mg)	P
1	120.0	81.8	.27
2	99.4	86.5	.60
3	91.3	93.0	.64
4	69.6	54.0	.61
5	57.3	49.0	.47

Morphine Equivalents (MSO4) per randomized group over the first 5 days after Damage Control Laparotomy

Scientific Session III-A - Clinical Science

January 15, 2015
Paper 13
8:40 am

DOES TXA MATTER? REFINING INDICATIONS FOR ITS USE IN COMBAT CASUALTIES

Zsolt T. Stockinger, MD, FACS*, Kirby R. Gross, MD*,
Frank K. Butler, MD*, Jeffrey Bailey, MD, US
Army Institute of Surgical Research

Presenter: Kirby R. Gross, MD – *presenting on behalf of Dr. Stockinger who is deployed*

Discussant: Laura Kreiner, MD, MetroHealth Medical Center

Objectives: Because the CRASH-2 civilian trial and the MATTERs military study demonstrated that the antifibrinolytic agent tranexamic acid (TXA) reduces mortality in trauma patients, the use of TXA was embraced by the US military, to include in the prehospital setting.
A performance improvement monitoring program was initiated to monitor that its use is within guidelines and that its efficacy can be verified in this patient population.

Methods: Retrospective PI review of the DoD Trauma Registry for all patients admitted to Role 3 hospitals in Afghanistan from January 2009 through September 2013 who received at least one unit of blood. All records were reviewed for documentation of TXA use at any point during their care (TXA vs. non-TXA.) Records were then analysed by patient demographics, Injury Severity Score (ISS), transfusion requirements, deep venous thrombosis (DVT), pulmonary embolism (PE), and mortality.

Results: 1413 transfused patients were identified, 454 TXA and 959 non-TXA. The TXA vs non-TXA group was more seriously injured (mean ISS 28.0 vs 22.3, $p<.0001$), with no difference in mortality (8.8 vs 6.9%, $p=.282$) but an increased incidence of pulmonary embolism (PE, 15.6 vs 6.7%, $p <.0001$.) When cohorted by need for massive transfusion (MT), TXA MT patients had similar mean ISS, mortality, and DVT/PE rates to non-TXA MT patients. Non-MT patients also had similar mean ISS, DVT rate and mortality but a higher PE rate (11.4 vs 4.7%, $p=.0078$) in TXA vs. non-TXA patients. Patients sustaining traumatic amputation and/or pelvic fracture had no difference in ISS, PE, DVT or mortality between TXA and non-TXA.

Conclusions: In this, the largest military review to date on TXA use, no mortality benefit has yet to be demonstrated in combat casualties. Further analysis is required, but consideration is being given to refining recommendations for TXA use in combat casualties to those with identified risk factors for massive transfusion.

Notes

Scientific Session III-A - Clinical Science

January 15, 2015
Paper 14
9:00 am

MILITARY TO CIVILIAN EXPERIENCE- A PRELIMINARY MULTI-INSTITUTIONAL ANALYSIS OF PRE-HOSPITAL TOURNIQUET USE

Rebecca W Schroll, MD*, Norman E. McSwain, Jr., MD, FACS, NREMT-P*, Alison Smith, John Myers, MD, Kristin Rocchi, Kenji Inaba, MD, Stefano Siboni, Gary A. Vercruysse, MD*, Irada Ibrahim-zada, MD, PhD, Jason L. Sperry, MD, MPH*, Christian Martin-Gill, Jeremy W. Cannon, MD, SM, FACS*, Seth R. Holland, Martin A. Schreiber, MD, FACS*, Diane Lape, Alexander L. Eastman, MD, MPH, FACS*, Cari S. Stebbins, Paula Ferrada, MD*, Jinfeng Han, RN, Williams Randy, Peter Meade, MD, MPH*, Juan C. Duchesne, MD, FACS, FCCP, FCCM*
Tulane University School of Medicine

Presenter: Rebecca W. Schroll, MD

Discussant: Elliot M. Jessie, MD, MBA, Walter Reed National Military Medical Center

Objectives: Tourniquets have seen resurgence in use for extremity injuries, especially in the military. Recent military studies demonstrated an association between pre-hospital tourniquet use and increased survival. Adaptation and benefits of this pre-hospital intervention in a civilian population remains unclear. The aim of our study was to compare mortality outcomes from Military to Civilian Experience (M2CE).

Methods: This is a preliminary Multi-Institutional Analysis of Pre-Hospital Tourniquet use (MIA-T). Retrospective chart review of patients with pre-hospital tourniquets admitted to 9 urban Level 1 trauma centers from January 2010–December 2013 was conducted. Patient demographics and mortality from a previous military experience by Kragh et al (Ann Surg, 2009 249:1-7) were compared to our MIA-T. Patients less than 18 years of age or with non-traumatic bleeding requiring tourniquet application were excluded. Data was analyzed using a two-tailed unpaired Student's t test with $p<0.05$ significant.

Results: A total of 197 patients were included in this study. The average ISS for MIA-T vs military was 14 ±10 vs. 11 ± 12 ($p=0.02$). The overall mortality rate for the MIA-T group was significantly lower than the military population 6/197 (3%) vs 22/194 (11%), ($p = 0.0015$). This finding was maintained in both subsets of patients with shock (2.7% vs 83.0%, $p = 0.0001$) and without shock (2.2% vs 9.0%, $p = 0.0036$) (Table I). Of patients in the civilian group, there were 25 whose vitals were unknown at the time of tourniquet application; this subset had a mortality rate similar to the military patients at 12%.

Conclusions: Our M2CE is the first adaptation evaluation of pre-hospital tourniquet use in a civilian population. We found evidence of lower mortality than has been previously seen in the military setting. Adaptation of this pre-hospital intervention may convey a survival benefit in the civilian population.

Table I. Comparative outcomes for pre-hospital tourniquet use

	Military	Civilian	p
Overall Mortality	22/194(11.3%)	6/197 (3%)	0.0015
Shock	5/6 (83.3%)	1/37 (2.7%)	0.0001
No Shock	17/188(9.0%)	2/135 (2.2%)	0.0036

Scientific Session III-A - Clinical Science

January 15, 2015
Paper 15
9:20 am

SELF-EXPANDING FOAM FOR SEVERE ABDOMINAL HEMORRHAGE: A MULTI-CENTER DOSE TRANSLATION STUDY IN RECENTLY DECEASED HUMANS

David King, MD*, Adam P. Rago, MS, Tomaz Mesar, Mackenzie R. Cook,
Andreas Larentzakis, Jeanette M. Podbielski, RN BSN, Ryan A. Lawless, MD*,
Samantha Underwood, MS, Martin A. Schreiber, MD, FACS*,
John B. Holcomb, MD*, Upma Sharma, PhD
Massachusetts General Hospital

Presenter: David King, MD

Discussant: Jeremy Cannon, MD, SM, San Antonio Military Medical Center

Objectives: Severe noncompressible abdominal bleeding results in 50% mortality in both military and civilian populations. There is an emergent need for a temporary intervention whenever surgical care is not immediately available. We previously described a self-expanding polyurethane foam for treatment of exsanguinating abdominal hemorrhage. The objective of this study was to translate a safe and effective swine dose into an appropriate human dose through foam administration in recently deceased humans with representative tissue compliance.

Methods: With IRB oversight and informed consent at three centers, patients imminently expected to die were identified. Within 3 hours of death, the abdomen was accessed and fluid was added to simulate hemorrhage. Foam was administered using a prototype delivery system. A foam dose of 45 mL was selected based on biostatistical models comparing swine and humans. Intraabdominal pressure (IAP) was monitored for 15 minutes, then foam was removed to assess abdominal tissue contact (0=no contact, 1=some contact, 2=full contact).

Results: N=5 subjects, ranging in age (29-87 yr) and body habitus (BMI 24-35 kg/m^2), were enrolled at the 45 mL dose. ΔIAP and semi-quantitative organ contact were used as surrogates to compare findings between humans and swine. 45mL foam resulted in a peak pressure of 27±7.7 mmHg, within the acceptable range defined by swine studies. Organ contact was variable, but less than that observed in swine at key sites (*e.g.* liver 0.5±0.8 *vs* 1.2±0.9 in swine). Foam material properties were consistent between models (expansion: 37±3.9x *vs* 36±5.8x).

Conclusions: The use of recently deceased humans demonstrates a novel and unusual approach to device evaluation in representative human anatomy, particularly when tissue compliance is critical. Testing of other doses may identify an acceptable pressure with enhanced organ contact, and testing is ongoing at 100mL. This study is critical to the translation of promising foam findings in swine to clinical benefit.

Figure 1: ΔIAP as a function of time following foam deployment. Minimum and maximum acceptable IAP in swine are shown for reference. Mean ± standard error.

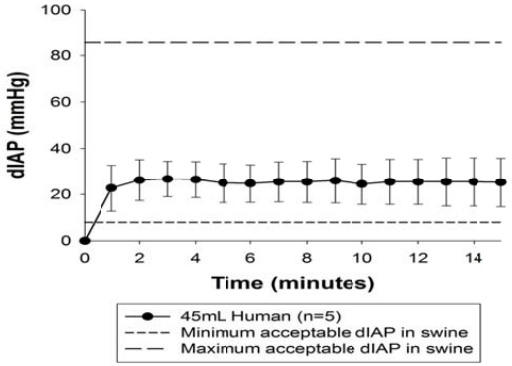


Figure 2: Semi-quantitative contact with abdominal tissues following 45mL dose administration in humans; organ contact for a 100mL dose in swine (optimal swine dose based on pre-clinical studies) shown for reference. Mean ± standard deviation.

Tissue	45 mL dose in humans (n=5)	100mL dose in swine (n=11)
Paracolic Gutters	1.0 ± 0.9	1.2 ± 0.7
Diaphragm	0.50 ± 0.5	0.60 ± 0.7
Bladder	0.4 ± 0.9	1.3 ± 0.8
Small Bowel	1.2 ± 0.8	1.3 ± 0.8
Large Bowel	0.80 ± 0.7	1.7 ± 0.5
Liver	0.43 ± 0.8	1.2 ± 0.9
Stomach	0.53 ± 0.7	0.93 ± 0.8
Spleen	0 ± 0	1.4 ± 0.5
Omentum	1.6 ± 0.5	1.5 ± 0.5

Scientific Session III-B - Cox-Templeton Injury Prevention Paper Competition

January 15, 2015
Paper 16
8:00 am

UNSTEADI: IMPLEMENTATION OF THE CDC FALL PREVENTION PROGRAM DOES NOT PREVENT IN-HOSPITAL FALLS OR REDUCE FALL RECIDIVISM RATES

Alexander L. Eastman, MD, MPH, FACS*, Courtney Edwards, Michael Cripps, MD, Garrett Hall, Christian T. Minshall, MD, PhD*, Kareem R AbdelFattah, MD, Brian H. Williams, MD, FACS*, Herb A. Phelan III, MD, FACS*, Steven E. Wolf, MD*, Joseph P. Minei, MD, FACS*
University of Texas Southwestern Medical Center

Presenter: Alexander L. Eastman, MD, MPH, FACS

Discussant: Stephanie Bonne, MD, Washington University School of Medicine

Objectives: Despite an aging population and an increased incidence of unintentional fall, few studies have addressed in-hospital and fall recidivism rates in the elderly. Additionally, prevention programs for unintentional fall are outpatient-focused and not well studied in the trauma patient population. We wondered whether introduction of a hospital-based fall prevention program reduces both overall in-house fall rate and fall recidivism rate in the elderly.

Methods: A multidisciplinary team at an urban, Level I trauma center was established to adapt the CDC STEADI fall prevention program for inpatient, trauma center use. STEADI integrates fall prevention into daily clinical practice using a fall prevention checklist. Those over age 65 admitted for fall were enrolled in a modified STEADI (mSTEADI) program, studied prospectively for one year (July 2012-June 2013) and compared with sequential controls from the same period a year prior (FALL). Mann-Whitney U was used for comparison where appropriate.

Results: During the study period, 218 patients were admitted into the mSTEADI group; 194 were identified in the FALL group. mSTEADI and FALL groups were not different with respect to median age, ISS, AIS Head, AIS Face, AIS Chest and AIS Abdomen. We found no differences in the in-house fall rate (4.1% in both groups) nor the rate of fall recidivism between groups (2.8% v. 2.1%, p=NS). mSTEADI patients had more severe extremity injuries (mean AIS Extremity 2.69 v. 2.51, p=.01), yet shorter median [IQR] LOS (6.0 [7.0] days v. 5.0 [6.0] days (p<.01), a higher proportion of discharges home (54.5% v. 46.8%, p<.01), and lower mean hospital charges ($60,585 v. $45,538, p=.02).

Conclusions: mSTEADI had no effect on in-hospital fall or fall recidivism rates after introduction at a level one trauma center. These results question whether resources to maintain an mSTEADI program are justified.

Notes

Scientific Session III-B - Cox-Templeton Injury Prevention Paper Competition

January 15, 2015
Paper 17
8:20 am

IMPACT OF GRADUATED DRIVER'S LICENSE LAW ON CRASHES INVOLVING YOUNG PASSENGERS IN NEW YORK STATE

Linda Ding, MD*, Julius D. Cheng, MD, MPH*, Nicole A. Stassen, MD, FACS, FCCM*, Mark L. Gestring, MD, FACS*, Ayodele T. Sangosanya, MD*, Paul E. Bankey, MD, PhD*
University of Rochester School of Medicine and Dentistry

Presenter: Linda Ding, MD

Discussant: Richard A. Falcone, Jr., MD, MPH, Cincinnati Children's Hospital

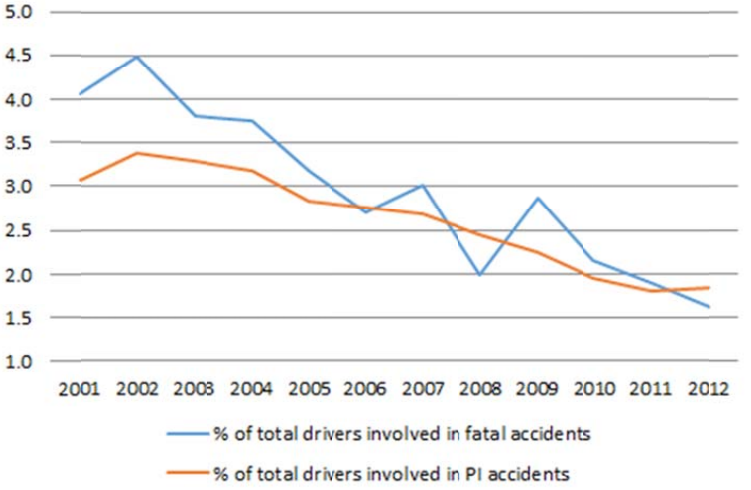
Objectives: To investigate the impact of strengthened graduated driver's license (GDL) laws on injury rates of passengers under 17 years of age in New York State.

Methods: A retrospective review of New York State DMV databases from 2001 to 2012 was performed. A state-wide GDL requirement was implemented in 2003 and restrictions strengthened in 2010 to include passenger restrictions. Database review included all reported crashes to the New York State Department of Motor Vehicles by cause and driver age. Injury rates for drivers under 18 and injury rates of passengers under the age of 17 were analyzed.

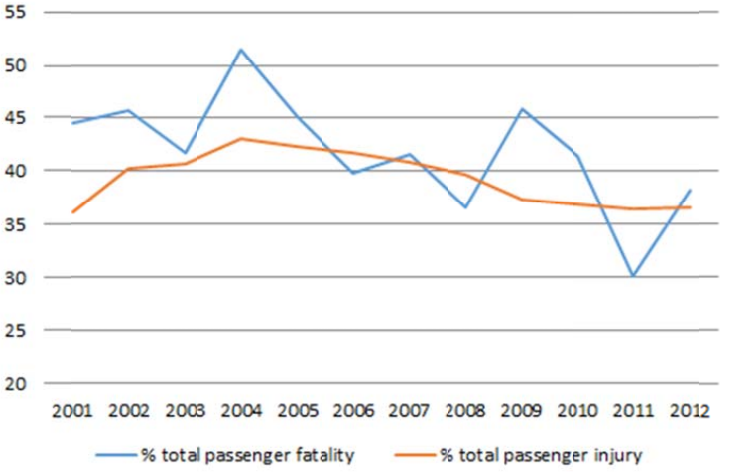
Results: From 2001-2003, prior to the institution of a GDL law in New York State, the number of fatal crashes involving drivers younger than 18 years old comprised of 4.2% of all fatal crashes during that time. Personal injury crashes involving young drivers constituted 3.3% of all personal injury crashes. Over the next 6 years, after the first GDLs were passed, from 2004-2009, the proportion of fatal crashes for this age group compared to all age groups dropped to 2.9%, and proportion of personal injury crashes for the under-18 driver were 2.7% of all PI crashes. In 2010, the GDLs added restrictions on number of youth passengers allowed, and this was associated with a reduced fatality rate for passengers under age 17 compared to all passengers killed during the period 2010-2012, from 43.4% to 36.6%, approaching statistical significance ($p=0.058$). Personal injury rates for these youth passengers also decreased during this time from 40.9% to 36.7% of all passenger injuries ($p=0.002$). The fatality and injury rates associated with drivers under age 18 were also reduced after the strengthening of the GDL in 2010.

Conclusions: In addition to reducing teenage driver injury, the strengthening of a GDL law in New York State has shown a decrease in the number of fatalities and injuries of passengers under the age of 17.

Proportion of Drivers <18



Proportion of Passengers <17



Scientific Session III-B - Cox-Templeton Injury Prevention Paper Competition

January 15, 2015
Paper 18
8:40 am

CRASH INJURY PREVENTION: A RANDOMIZED TRIAL OF TRANSITIONING HIGH-RISK ELDERS FROM DRIVING

James D. Stowe, MS, Teresa Cooney, Thomas Meuser, Marla Berg-Weger,
Nicholas Schmidt, Colter Snethen
University of Missouri

Presenter: James D. Stowe, MS

Discussant: Marie Crandall, MD, MPH, Northwestern University Feinberg School of Medicine

Objectives: Older drivers with medical conditions that impair function are at risk for experiencing a Motor Vehicle Crash (MVC). This study used scientifically-rigorous methods to test an intervention to reduce crash-related risk among older hospital patients.

Methods: A randomized, controlled, experimental design study was used to test the efficacy of counseling on driving retirement, traffic-related behavior, and health outcomes among older patients with vision, cognitive, or psychomotor impairment. 39 currently driving patients were enrolled (26 intervention; 13 control) at a research and referral hospital through inpatient and outpatient settings. The intervention consisted of two sessions of facilitated planning in which the patients' health, transportation alternatives, attitudes/emotions regarding a change in mobility, and actions to ensure continued safe mobility were discussed. Moreover, all patients received supportive phone calls during the 6 month intervention period.

Results: Repeated measures analyses revealed that the intervention group was more likely to report riskier driving behavior ($p = .051$) and increased scores on cognition ($p = .088$) than the control group. The intervention group avoided thinking about mobility less than the control group ($p = .075$), and mean trends suggest increased readiness to retire from driving.

Qualitative data confirmed that increased planning for driving retirement occurred in the intervention group only. One third of the intervention group was unwilling to engage in planning for driving retirement (labeled as "non-compliant").

Conclusions: Facilitated planning may increase readiness to retire from driving among high-risk patients. Greater sample sizes and study duration are needed to confirm these effects and to measure direct crash and injury outcomes. A significant proportion of high-risk patients do not plan for driving retirement, yet remain at-risk for crashes.

Notes

Scientific Session III-B - Cox-Templeton Injury Prevention Paper Competition

January 15, 2015
Paper 19
9:00 am

TEENAGE MOTOR VEHICLE CRASH FATALITIES IN CONNECTICUT, 2008-2013: A CRITICAL APPRAISAL AFTER THE PASSAGE OF A STRONGER GRADUATED DRIVER LICENSING LAW

William Schreiber-Stainthorp, William Seymour, MPA, Shefali Thaker, MPH
Kevin Borrup, JD, MPA, Garry Lapidus, PA-C, Brendan Campbell, MD, MPH*
Connecticut Children's Medical Center

Presenter: William Schreiber-Stainthorp

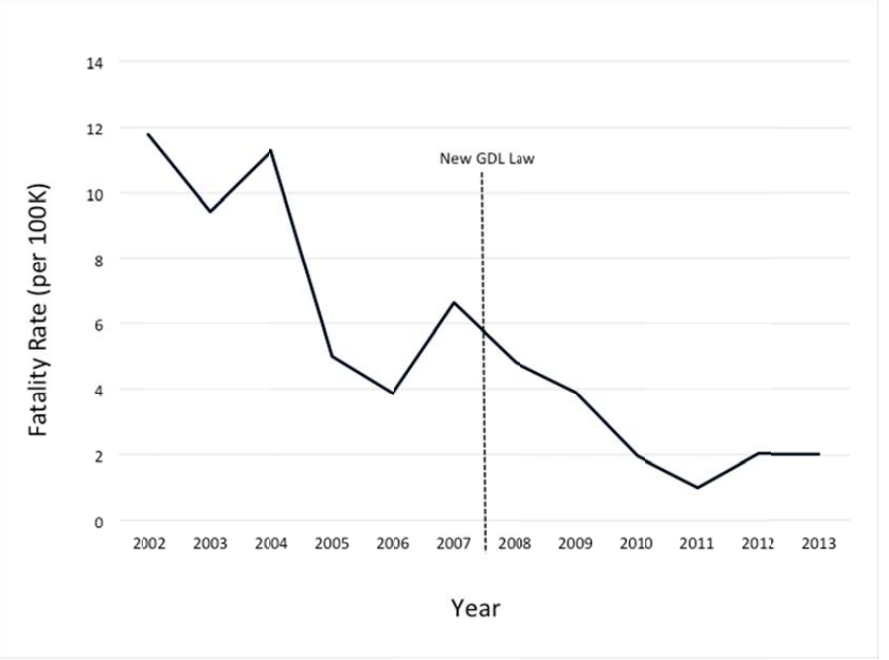
Discussant: Luis Llerena, MD, USF Health, CAMLS

Objectives: Graduated driver licensing (GDL) laws have been shown to lower crash risk for novice teen drivers. The purpose of this study was to evaluate motor vehicle crash (MVC) characteristics and compliance with GDL requirements for all fatal crashes involving novice teen drivers after a law with stricter GDL provisions was passed.

Methods: Comprehensive crash data for all fatal MVCs involving a teenage driver from August 2008 through December 2013 were reviewed. Data sources included Department of Transportation crash files and Department of Motor Vehicles licensing data. Annualized crash rates for drivers ages 16 and 17 years were compared between the 5 years before and after the new GDL law was passed.

Results: During the 5 year period following the passage of a stricter GDL law there were 26 fatal MVCs involving a novice teen driver (15, 16 or 17 years). Thirty individuals were killed in these crashes: 11 (37%) were drivers (15-17 years), 8 (27%) were passengers of those drivers, 5 (17%) were drivers or passengers of other vehicles, and 6 (20%) were pedestrians. In the five years since Connecticut passed stronger GDLs, the 5-year annualized fatality rate for crashes involving 16-17 year old drivers decreased from 6.3 (2003-2008) to 2.2 (2009-20013) per 100,000 population. In half of fatal crashes (n=13, 50%) a novice teen driver was violating the new GDL law: passenger violation (n=20, 77%), curfew violation (n=4, 15%), and multiple (n=2, 8%).

Conclusions: Strengthening Connecticut's GDL law was associated with a significant decrease in fatalities among novice teen drivers. Importantly, half of fatal crashes occurred when a novice teen driver was in violation of the new GDL law. Developing programs directed toward parents and law enforcement that increase compliance with GDL laws are an opportunity to lower fatal crash risk for novice teen drivers.



Annual rate for drivers ages 16 or 17 years involved in fatal crashes, 2002-2013

Scientific Session III-B - Cox-Templeton Injury Prevention Paper Competition

January 15, 2015
Paper 20
9:20 am

EVALUATING THREE METHODS TO ENCOURAGE MENTALLY COMPETENT OLDER ADULTS TO ASSESS THEIR DRIVING BEHAVIOR

Tarsicio Uribe-Leitz, MD, MSCN, MPH, Jonathan Howland, Vonne Lee,
Peter Burke, MD, FACS*, Lisa Allee Barmak, MSW, LICSW*
Boston Medical Center

Presenter: Tarsicio Uribe-Leitz, MD, MSCN, MPH

Discussant: Andy Kerwin, MD, University of Florida, College of Medicine-Jacksonville

Objectives: Thirteen percent (41.4 million) of the population in the United States was 65 and older in 2011. This population is projected to reach 20 % (88.5 million) by 2050. Older adults accounted for 17% of all traffic fatalities and 16% of all vehicle occupant fatalities, in 2011. We explored the efficacy of three interventions to help older adults assess their current driving behaviors at a level 1 trauma center.

Methods: 1216 in-patients ≥70 years old admitted for surgical and medical services, were assessed for eligibility, 120 screened and enrolled during 2010 to 2012. First, enrolled patients completed a driving assessment questionnaire and pre-intervention questionnaire. Second, patients were randomized to one of the following interventions: 1) brief negotiated interventions (BNI) plus document developed by the American Automobile Association (AAA) about older driving, 2) AAA document and online referral sheet, 3) referral sheet only. Third, a 3 month follow up post-intervention questionnaire was conducted over the phone. Univariate and multivariate analyses were performed in SAS 9.3 (SAS Institute, Cary NC).

Results: A total of 113 randomized patients were included in the analysis. Mean age was 76.8 (SD 5.23), most patients were white (64%), followed by black African American (33%), 51% males and 49% females. 34% were randomized to BNI, 32% to AAA package and 35% to online resources. Multiple linear regression analysis showed an association in driving knowledge, awareness and beliefs post intervention (R^2 0.329, $p<.0001$). Furthermore, there was an association in older adults who had positively changed their driving behaviors and/or intentions (R^2 0.264, $p<.0001$) compared to baseline.

Conclusions: Older driver safety is a growing public health concern. Our pilot study suggests that older adults are likely to make changes in their driving behavior after eliciting related conversations.

Notes

Scientific Session IV-A - Basic Science and Education

January 16, 2015
Paper 21
8:00 am

VARIABILITY IN INTER-HOSPITALTRAUMA DATA ABSTRACTION: A CHALLENGE TO THE ACCURACY OF TRAUMA REGISTRIES

Sandra Strack Arabian, CSTR, CAISS, Janis Breeze, Michael Marcus, Michelle Pomphrey, Kevin Captain, Jennefer Wolfe, Nikolay Bugaev
Tufts Medical Center

Presenter: Sandra Strack Arabian, CSTR, CAISS

Discussant: Haytham Kaafarani, MD, MPH, Massachusetts General Hospital

Objectives: Analyses of data aggregated in state and national trauma registries provide the platform for clinical, research, development, and quality improvement efforts in trauma systems. However, the inter-hospital variability in data abstraction and coding, a significant determinant of accuracy, has not yet been evaluated.

Methods: This is a multi-institutional, web-based, anonymous study examining variability in data abstraction, coding and scoring by registrars. 85 ACS/State-verified trauma centers nationwide were invited to determine diagnostic, procedure, and Abbreviated Injury Scale (AIS) coding as well as selected NTDB definitions for the same fictitious case. Variability in all data entries was assessed by the maximal percent agreement among the registrars for each of the abstraction items, and 95% confidence intervals were computed to compare this level of agreement to the ideal value of 100%. Comparisons based on Trauma Quality Improvement Program (TQIP) membership, level of trauma center, ACS accreditation, and registrar's certifications were made using chi-square tests.

Results: 50 registrars completed the survey (Table 1). Variability was noted in many entries (Table 2) including pre-hospital vital signs, ED procedures, ICD-9 diagnosis, external cause codes, and length of stay. No differences were noted among the various group comparisons, with the exception of pre-hospital GCS, where TQIP respondents agreed more than non-TQIP centers ($p=0.004$). The presence and type of registrars' certification affected variability.

Conclusions: There is wide variability in inter-hospital data abstraction and coding of injury information, which may cast doubt on the validity of registry data used in all aspects of trauma care and injury surveillance.

	N, (%)
Level of TC	
I	28 (53%)
II	22 (41%)
TQIP	36 (68%)
TC Accreditation	
State	21 (42%)
ACS	11 (22%)
Both	17 (34%)
Registrar years' of experience:	
1 - 3	7 (14%)
>3 - 5	11 (22%)
>5 years	31 (62%)
Registrar certification:	
CSTR	23 (43%)
CAISS	9 (18%)
None/other	18 (41%)
State:	
Florida	30 (60%)
Other	20 (40%)

Table 1: Trauma Center/Registrar Profile. TQIP, Trauma Quality Improvement Program; ACS, American College of Surgeons; CSTR, Certified Specialist in Trauma Registry; CAISS, Certified Abbreviated Injury Scale Specialist.

Data Element	Overall (n=50)	TQIP (n=36)	Level 1 (n=28)	Level 2 (n=22)	ACS (n=28)	CSTR (n=23)	CAISS (n=9)
Pre Hospital GCS	34* (68%)	26* (72%)	20* (71%)	14* (63%)	21* (75%)	14* (61%)	6* (67%)
Pre Hospital vitals	18* (36%)	11* 36%	15*(35%)	8* (36%)	9* (32%)	9* (39%)	6* (67%)
Emergency Department Procedures	30* (60%)	21* 58%	19* (54%)	15* (68%)	15*(57%)	16* (70%)	6* (67%)
AIS Coding for Heart injury	28* (56%)	23* 64%	24* (68%)	9* (41%)	18* (64%)	14* (61%)	6* (67%)
AIS Coding for Lower Extremity	43* (86%)	31* 86%	24* (86%)	19 (86%)	23* (82%)	21 (91%)	8(86%)
Length of Stay (LOS)	26* (52%)	21* 58%	14* (50%)	21* (58%)	13* (46%)	13* (53%)	6* (67%)
External Cause Code	30* (60%)	22* 61%	16* (57%)	14* (63%)	15* (57%)	11* (48%)	6* (67%)
Place of Occurrence Code	48 (96%)	35 (97%)	25 (93%)	22 (100%)	26 (93%)	23 (100%)	9 (100%)
Mean maximal agreement	N=65%	N=66%	N=64%	N=66%	N=63%	N=65%	N=74%

Table 2: Data element variability expressed as the number of registrars agreeing on the most common answer. *, maximum percent agreement less than 100% ($p<0.05$); TQIP, Trauma Quality Improvement Program; ACS, American College of Surgeons; CSTR, Certified Specialist in Trauma Registry; CAISS, Certified Abbreviated Injury Scale Specialist; GCS, Glasgow Coma Scale; AIS, Abbreviated Injury Scale.

Scientific Session IV-A - Basic Science and Education

January 16, 2015
Paper 22
8:20 am

RACIAL AND REGIONAL DISPARITIES IN THE EFFECT OF THE ACA DEPENDENT COVERAGE PROVISION ON YOUNG ADULT TRAUMA PATIENTS

Jonathan W. Scott, MD, Ali Salim, MD*, Benjamin Sommers,
Thomas Tsai, Kirstin Scott, Zirui Song
Harvard Medical School

Presenter: Jonathan W. Scott, MD

Discussant: Catherine Velopulos, MD, MHS, Johns Hopkins School of Medicine

Objectives: Prior studies have shown disparities in outcomes for trauma patients based on insurance and race. The 2010 dependent coverage provision (DCP) of the Affordable Care Act (ACA) let young adults remain on their parent's health insurance plans until age 26, resulting in over 3 million young adults gaining insurance in the first year. We investigated the impact of the reduction in the uninsured attributable to DCP on racial disparities in trauma.

Methods: Using a difference-in-differences design and the National Trauma Databank (2007-2012), we compared changes in rates of uninsurance among 19-25 yos to a control group of 26-34 yos not eligible for the DCP. Subgroup analyses were conducted by race and by census region. We also examined outcomes such as mortality, intensive care unit length of stay (ICU LOS) and discharge to a rehab facility. Models were adjusted for patient and injury characteristics.

Results: The DCP led to a 3.7 percentage-point reduction in the uninsured among 19-25 year-old trauma patients ($p<0.001$). Whites had a significantly greater reduction in insurance (-5.0%, Ref) than Blacks (-3.3%, $p=0.01$) and Hispanics (-1.7%, $p<0.001$). Such disparities were greatest in the South and Southwest regions. Subgroups with the smallest reductions included minorities, assault intent, gunshot wound, motor vehicle collision, greater injury severity, and those going to safety-net facilities. No significant changes in in-hospital mortality, ICU LOS, or discharge to rehab were identified between racial subgroups.

Conclusions: The DCP significantly reduced uninsurance for young adult trauma patients. This impact was heterogeneous with the lowest reductions in uninsured status occurring among minorities, those with worse injuries, and those already relying on safety-net facilities. Understanding the differential impact of such policies is critical for future trauma disparities research.

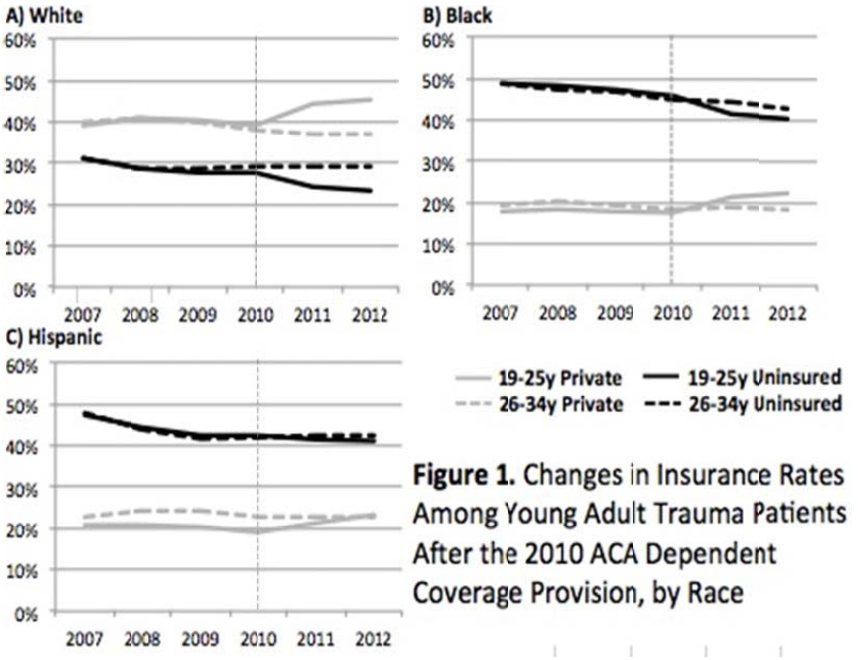


Figure 1. Changes in Insurance Rates Among Young Adult Trauma Patients After the 2010 ACA Dependent Coverage Provision, by Race

Source: NTDB 2007-2013, n=782,670; Solid lines: policy-eligible group (19-25 yo); Dashed lines: policy-ineligible control group (26-34 yo); Black lines: rates of uninsured; Grey lines: rates of private insurance; vertical dashed line: implementation of ACA DCP (Sept. 2010)

Scientific Session IV-A - Basic Science and Education

January 16, 2015
Paper 23
8:40 am

DOES PROXIMITY TO VIOLENCE NEGATIVELY INFLUENCE ATTITUDES TOWARD EXCEPTION FROM INFORMED CONSENT IN EMERGENCY RESEARCH?

Zoë Maher, MD*, Elena Grill, Brian P. Smith, MD*, Carrie A. Sims, MD*
Hospital of the University of Pennsylvania

Presenter: Zoë Maher, MD

Discussant: Sherry L. Sixta, MD, Christiana Care Health System

Objectives: Trauma research has been limited by perceived patient reluctance to participate in exception from informed consent (EFIC) studies. We hypothesized that race, socioeconomic status and proximity to violence influence willingness to participate in, and perception of, EFIC research among at risk populations.

Methods: Trauma patients, families and community members ranked statements regarding EFIC and willingness to participate in emergency research using a 5-point Likert scale during an EFIC community consultation. Higher total scores reflected a more positive attitude regarding EFIC (range 6-30; neutral = 18) and willingness (range 23-115, neutral = 69). Subject zip code was used to calculate median income, as an estimate for socioeconomic status, and proximity to the 5 most violent city zip codes. Linear regression, Pearson correlation and omnibus tests ($p<0.05$) were used to evaluate relationships between estimated socioeconomic status, race, mechanism of injury, proximity to violence, and attitudes toward EFIC.

Results: 179 subjects participated including trauma patients (n=99), families (n=33) and community members (n=47). Overall, participants were supportive of EFIC and reported high willingness to participate scores (median 24, IQR 13-30 and median 89, IQR 52-115). Estimated median income and race did not correlate with perception of, or willingness to participate in, EFIC. Proximity to violence did correlate with violent mechanism of injury ($p=0.021$), but was not associated with perception of EFIC or willingness to participate in emergency research.

Conclusions: Based on our data, there is no correlation between either proximity to violence or estimated socioeconomic status and willingness to participate in EFIC research. Given this lack of correlation, researchers should partner with at risk communities to conduct EFIC studies without concern for limited participation.

Notes

January 16, 2015
Paper 24
9:00 am

ENOXAPARIN AMELIORATES POST-TBI EDEMA BY BLUNTING LEUKOCYTE ENDOTHELIAL INTERACTIONS AND VESSEL PERMEABILITY IN THE CEREBRAL CIRCULATION

Shengjie Li, Shengjie Li, Joshua A. Marks, MD, Rachel Eisenstadt, Kenichiro Kumasaka, Davoud Samadi, Victoria Johnson, Daniel N. Holena, MD*, Steven Allen, MD*, Kevin Browne, Jianning Zhang, Douglas Smith, Jose L. Pascual Lopez, MD, PhD, FRCS(C), FACS*
Hospital of the University of Pennsylvania

Presenter: Joshua A. Marks, MD

Discussant: Oscar D. Guillamondegui, MD, MPH, Vanderbilt University Medical Center

Objectives: Traumatic brain injury (TBI) confers a high risk of venous thrombosis but early prevention with heparinoids is often withheld fearing hematoma expansion. Yet, animal studies not only have shown heparinoids to be safe but also to limit brain edema and lesion size after TBI. Human TBI data also suggests faster neurological recovery with earlier heparinoid administration. We hypothesized that enoxaparin (ENX) blunts in vivo leukocyte (LEU) mobilization to injured brain, reduces cerebral edema and improves neurological recovery without increasing the size of the hemorrhagic contusion.

Methods: 26 CD1 mice underwent either severe TBI by controlled cortical impact (CCI: 1mm depth, 6m/sec) or sham craniotomy. ENX (1mg/kg) or vehicle (VEH - 30µl 0.9% saline) was administered 2, 8, 14, 23 & 32h after TBI. At 48 hours, intravital microscopy of the pial microcirculation visualized LEU interacting with endothelium and vascular leakage of FITC-albumin (50mg/kg). Neurological function (Neurological severity score - NSS), contusion size and wet-to-dry (WTD) ratios were also evaluated. ANOVA with Bonferroni correction was used for statistical comparisons.

Results: Compared to VEH, ENX reduced in vivo LEU rolling and cerebrovascular albumin leakage significantly (Fig1). Ipsilateral cerebral hemisphere WTD ratios were increased by CCI but ENX reduced ratios to near control levels (Fig2). Compared to VEH, ENX improved NSS at 24h (14.5±0.5 vs 16.2±0.4, $p<0.01$) and 48h (15.1±0.4 vs 16.7 ±0.5, $p<0.01$). There were no significant differences in hemorrhagic contusion size between groups.

Conclusions: Enoxaparin reduces LEU recruitment to injured brain, diminishing cerebrovascular permeability and brain edema. ENX may also hasten neurologic recovery without increasing contusion size. Further study in humans is necessary to determine safety and efficacy of enoxaparin early after TBI.

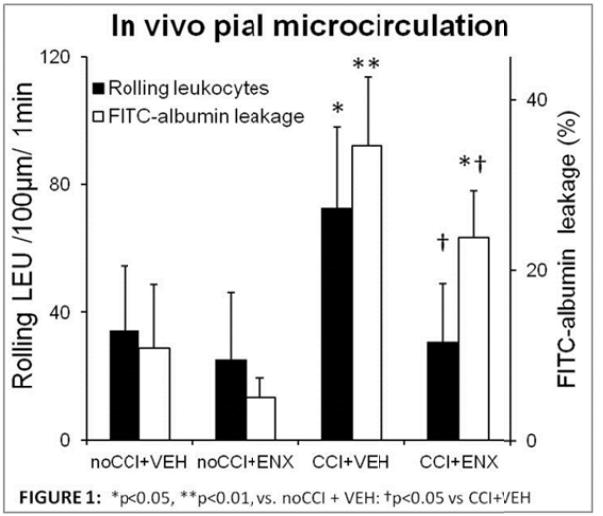


FIGURE 1: *p<0.05, **p<0.01, vs. noCCI + VEH: †p<0.05 vs CCI+VEH

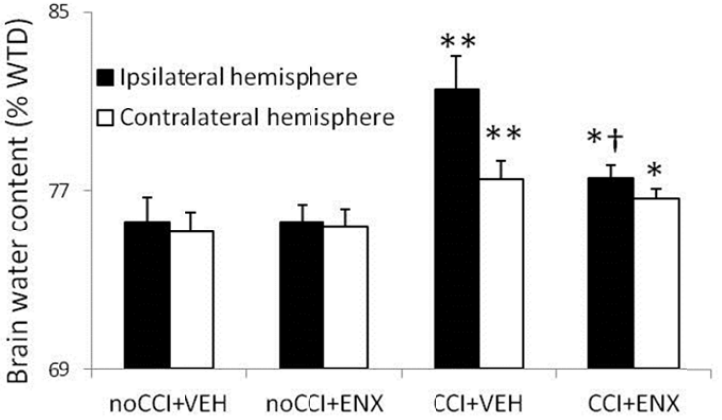


FIGURE 2: *p<0.05, **p<0.01 vs noCCI+VEH; †p<0.01 vs CCI +VEH

Scientific Session IV-A - Basic Science and Education

January 16, 2015
Paper 25
9:20 am

THROMBIN GENERATION AND PROCOAGULANT MICROPARTICLE PROFILES AFTER ACUTE TRAUMA: A PROSPECTIVE COHORT STUDY

Myung Park, MD*, Ailing Xue, Grant Spears, Timothy Halling, ASc,
Satbir K Dhillon, MD, Donald H. Jenkins, MD*, Michael Ferrara, Melissa Kuntz,
William Harmsen, MS, Karla V Ballman, PhD, John Heit
Mayo Clinic

Presenter: Myung Park, MD

Discussant: Amy Makley, MD, University of Cincinnati

Objectives: To identify potential mechanisms for venous thromboembolism and bleeding after acute trauma, we estimated thrombin generation parameters and procoagulant microparticle (MP) concentration in a prospective cohort study of acute trauma patients.

Methods: Whole blood was collected by venipuncture into 3.2% trisodium citrate at 0, 6, and 12 hours and days 1 and 3 after injury, and at discharge. Platelet poor plasma was harvested and stored at -80°C until analysis. Thrombin generation was determined using the calibrated automated thrombogram (**CAT**), reported as lagtime (minutes) and thrombin peak height (nM thrombin]. The concentration of procoagulant MPs expressing phosphatidylserine (number/uL) was measured by flow cytometry. Data presented as median and interquartile range (**IQR**). Wilcoxan rank-sum test was used as needed.

Results: Among 443 trauma patients (1734 samples; ISS = 13 [6, 22], hospital LOS =4 [2, 10] days, age =48 [28, 65] years, 71% male, 95% blunt mechanism, mortality 3.2%). Healthy volunteers (n=89) were enrolled. In the injured, no discernable patterns in thrombin and MP characteristics were observed over time. The comparisons between patients and volunteers are shown in Table 1. Extreme (defined as highest or lowest 5%) values reflecting a possible "hypercoagulable state" were reached within 12 hours after acute trauma, while extreme values representing a possible "hypocoagulable state" were not reached until 1-3 days (Table 2).

Conclusions: Although there was no discernable pattern of coagulopathy observed after acute trauma, injured patients had greater number of procoagulant MPs and accelerated thrombin generation when compared to healthy volunteers. Additionally, those who reached extreme values did so relatively early after injury. These findings should be taken into account when designing risk model tools involving coagulation laboratory parameters.

Variable	Patient median (IQR)	Volunteer median (IQR)	P-value
Lagtime (min)	2.7 (2.4, 3.3)	2.7 (2.3, 2.9)	0.016
Peak Height (nM)	337 (285, 395)	322 (288, 343)	0.051
Procoagulant MP (per uL plasma)	401 (212, 772)	241 (146, 530)	0.0011

Table 1: Comparisons between Trauma Patients and Healthy Volunteers

Variable	N	Extreme 5% Value	Time-to-Extreme Value (Days)
Hypercoagulable			
Lagtime (min)	1575	≤ 2	0.3 (0.12, 0.50)
Peak Height (nM)	1575	≥ 483	0.5 (0.08, 2.97)
Procoagulant MP (per uL plasma)	1734	≥ 2278	0.3 (0.05, 2.0)
Hypocoagulable			
Lagtime (min)	1575	≥ 5	3.0 (1.03, 7.27)
Peak Height (nM)	1575	≤ 195	1.0 (0.49, 3.08)

Table 2: Extreme Values and Time-to-Extreme Values Amongst All Trauma Patient Samples

Scientific Session IV-A - Basic Science and Education

January 16, 2015
Paper 26
9:40 am

ACCURATE ASSESSMENT OF SURGICAL SKILL IMPROVEMENTS AFTER TRAINING

Stacy A. Shackelford, MD*, Evan Garofalo, Valerie Shalin, Kristy Pugh, Jason Pasley, DO*, Babak Sarani, MD, FACS, FCCM*, Mark Bowyer, Collin Mackenzie, MB, ChB
University of Maryland

Presenter: Stacy A. Shackelford, MD

Discussant: Jeffrey E. Carter, MD, Wake Forest University School of Medicine

Objectives: Maintaining trauma specific surgical skills is a challenge for surgical training programs. An objective assessment of surgical skills is needed. We hypothesized that a reliable surgical skills assessment tool could detect knowledge and skill differences following a training intervention.

Methods: Surgical technical skills assessment metrics were developed by discussion with expert surgeons, video review of 10 experts performing four trauma specific procedures on cadavers, and a consensus conference. We then tested knowledge and skill metrics in 12 surgical residents (year 3-5) before and 2 weeks after skills training with the Advanced Surgical Skills for Exposure in Trauma course. Three components of performance were assessed: knowledge (anatomic and management), procedural steps, and technical skills. Performance scores were calculated as a percentage of expert surgeon performance points. A Trauma Readiness Index was created reflecting scores in each category and procedure time. Wilcoxon paired t was used to examine statistical significance at $\alpha < 0.05$.

Results: Trauma Readiness Index for three vascular exposures and lower extremity fasciotomy improved by 14% after training. The skill most improved by 1-day skills training was procedural steps with mean score increased 21%. Technical skill improved 12%. Overall knowledge improved 3%, with an 18% improvement in anatomic knowledge and 2% increase in management knowledge. Time to complete procedures decreased 4.3 minutes (13.4 to 9.1 min).

Conclusions: A detailed surgical skills assessment is a valuable tool to assess surgical training. The measurement tool detected improvements in procedural steps and anatomic knowledge taught during a 1-day course. The tool also detected improvements in technical skills and management normally acquired during the course of residency training. Future applications will include assessing specific skills during various stages of residency training.

Surgical Skills Assessment Scores						
	Pre-training		Post-training			
	Mean	Std Dev	Mean	Std Dev	Improvement	P-value
Knowledge score*						
• Overall	50	13	53	14	3	0.013
○ Anatomic	50	16	68	12	18	0.00001
○ Management	43	17	45	15	2	0.044
Technical skills score*	59	18	71	17	12	0.0001
Procedure steps score*	46	23	67	16	21	0.0000001
Time (minutes)	13.4	5.9	9.1	4.5	-4.3	0.000001
Trauma Readiness Index*	50	12	64	10	14	0.0001
*Scores represent the percentage of expert surgeon performance skills found in residents						

Scientific Session IV-B - Performance Improvement

January 16, 2015
Paper 27
8:00 am

THE IMPACT OF A MULTIDISCIPLINARY SAFETY CHECKLIST ON ADVERSE PROCEDURAL EVENTS DURING BEDSIDE BRONCHOSCOPY-GUIDED PERCUTANEOUS TRACHEOSTOMY

Joshua P. Hazelton, DO*, Erika Orfe, Anthony Colacino, Krystal Hunter, Mary Lachant, Lisa Capano-Wehrle, MPH, Mark J. Seamon, MD*
Cooper University Hospital

Presenter: Joshua P. Hazelton, DO

Discussant: Bradley M. Dennis, MD, Vanderbilt University Medical Center

Objectives: Bedside procedures are seldom subject to the same safety precautions as OR procedures. Since July 2013, we have performed a multidisciplinary checklist prior to all bedside bronchoscopy-guided percutaneous tracheostomy (BBPT) insertions. We hypothesized that the implementation of this checklist before BBPT would decrease adverse procedural events.

Methods: A prospective study of all patients who underwent BBPT after checklist implementation (PostCL, 2013-2014, n=63) at our Level-I Trauma Center were compared to all patients (retrospectively reviewed historical controls) who underwent BBPT without the checklist (PreCL, 2010-2013, n=184). Exclusion criteria included age <16, OR and open tracheostomy. The checklist included both a procedural and timeout component with the trauma technician, respiratory therapist, nurse and surgeon. Demographics and variables focusing on BBPT risk factors were compared. Variables associated with the primary endpoint, adverse procedural events (Fig 1), during univariate analysis were utilized in the multivariate (MVLR) model. A $p \leq 0.05$ was significant.

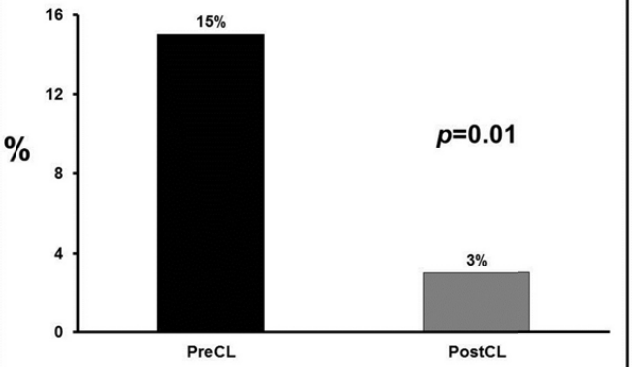
Results: Of 247 study sample patients, no difference existed in BMI, baseline MAP, duration or mode of mechanical ventilation, cervical spine or maxillofacial injury, or prior neck surgery between Pre and PostCL BBPT patients. PreCL patients were younger (48±20 vs. 57±21 yrs; $p<0.01$), but more often had adverse procedural events than PostCL patients (Fig 2). After adjusting for age, vitals, BBPT risk factors, and ICU duration after BBPT, MVLR determined that performing the safety checklist alone was independently associated with a 580% reduction in adverse procedural events (OR 5.8, $p=0.02$).

Conclusions: Our results suggest that the implementation of a multidisciplinary safety checklist similar to those used in the OR would benefit patients during invasive bedside procedures.

Figure 1. Studied Adverse Procedural Events

- Decrease in O2 saturation to <85% or decrease >10% of baseline
- Decrease in MAP to <60mmHg or decrease >20% of baseline
- Need for initiation of IV vasopressors or antiarrhythmics
- Conversion to open tracheostomy
- Loss of airway
- Death

Figure 2. Adverse Procedural Events during BBPT



Scientific Session IV-B - Performance Improvement

January 16, 2015
Paper 28
8:20 am

MAINTAINING AN OPEN ICU BED FOR RAPID ACCESS TO THE TRAUMA INTENSIVE CARE UNIT IS COST EFFECTIVE

Lisa J. Fryman, BSN, Cynthia Talley, MD*, Paul A. Kearney, MD*
University of Kentucky

Presenter: Lisa J. Fryman, BSN

Discussant: Julie Nash, MSN, RN, Barnes-Jewish Hospital

Objectives: Our hypothesis is that a charge nurse without an assignment will address the potential constraints of staffing and bed availability in Trauma ICU (TICU) with potential cost savings and good clinical outcomes.

Methods: A charge nurse without an assignment was implemented in the TICU. All level 1 activations admitted directly to the ICU for the study pre (n = 303) and post (n=261) implementation were examined. Exclusion criteria were as follows: patients taken directly to operating room from the ED, deaths within 24 hours of admission, severe head injuries (AIS > 4), and level 2 trauma activations. We then examined the process for cost effectiveness.

Results: The two groups did not differ significantly: age (42.5 +/- SD 17.8), gender (71.1% male), and injury severity score (14.9 +/- SD 10.5). Patients transferred to TICU (n = 245) experienced a decrease in ED LOS from 4:17 to 2:34 average hours (t-test $p < .001$). Patients transferred to TICU had a decreased mean ICU LOS 7.2 to 5.6 days (t-test $p = .207$) and total LOS 15.3 to 12.1 (t-test $p = .133$). The LOS decrease occurred despite a small increase in ISS (15.7 to 18.4). The O/E mortality showed an insignificant difference of 0.87 pre- (z-score of 7.2353, chi trend <.0001) to 0.92 post (z-score 3.3026, chi trend<.0001) implementation groups. Nursing productivity showed an increase of 1 FTE pre and post-implementation at a rate of $624/day for an average ICU nurse at our institution. The ICU LOS savings of 1.4 days at a rate of $1144 average ICU daily cost of room and board totaled $1601/patient. The decreased ICU LOS dollars minus the increase nurse pay results in an overall savings of $977 per patient.

Conclusions: Rapid access to the TICU made possible by the charge nurse without an assignment has a potential cost savings without adversely affecting patient outcomes.

Notes

Scientific Session IV-B - Performance Improvement

January 16, 2015
Paper 29
8:40 am

PEER-TO-PEER PHYSICIAN FEEDBACK: IMPROVING ADHERENCE WITH BLOOD TRANFUSION GUIDELINES IN THE SURGICAL INTENSIVE CARE UNIT

Daniel Dante Yeh, MD*, Leily Naraghi, Andreas Larentzakis, Nathan Nielsen, Walter Dzik, Edward Bittner, Yuchiao Chang, PhD, David King, MD*, George Velmahos, MD, PhD, MSEd
Massachusetts General Hospital

Presenter: Daniel Dante Yeh, MD

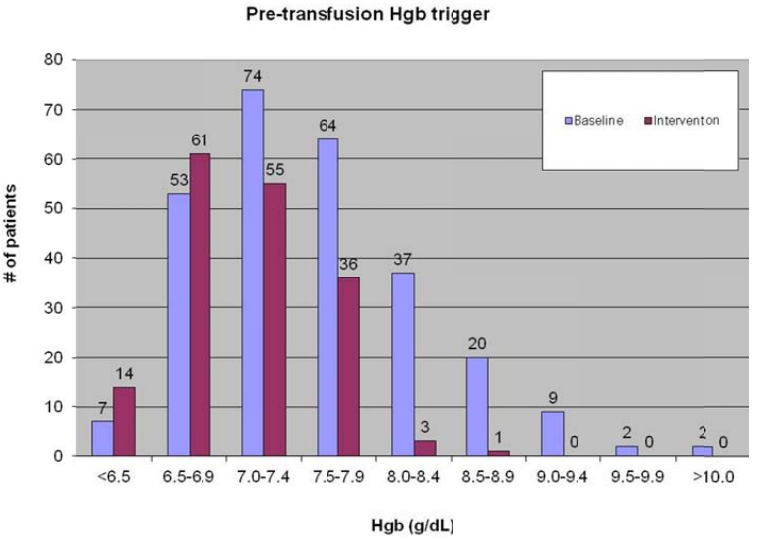
Discussant: Laura J. Moore, MD, University of Texas Health Science Center at Houston

Objectives: We aim to use a multi-modal intervention, founded on peer-to-peer education and monthly feedback, to increase adherence to restrictive red blood cell (RBC) transfusion guidelines without increasing morbidity.

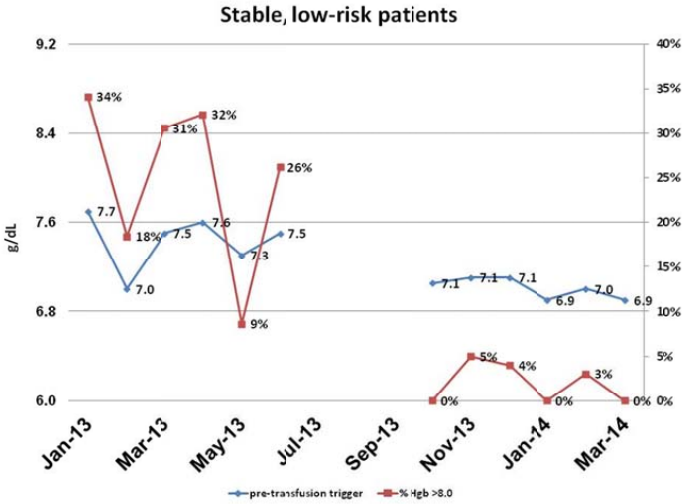
Methods: We conducted a prospective interventional study with retrospective control in our tertiary care center. For the 6-month baseline period (from 1/1/13 to 6/31/13) and the 6-month intervention period (from 10/1/13 to 3/31/14), all RBCs transfused in the surgical intensive care unit (SICU) were tracked daily and examined for pre-transfusion hemoglobin (Hgb) trigger (TRIG). During the intervention, if patients were transfused outside of established hospital guidelines, the ordering clinician received email notification and education from a surgeon colleague within 72 hours of transfusion. The independent t-tests and chi-square tests were used for statistical analysis. A p-value of <0.05 was considered significant.

Results: For stable, low-risk patients, the average total monthly RBCs transfused decreased 35%, from 47 to 31 units ($p=0.11$), mean TRIG decreased from 7.4 g/dL to 7.0 g/dL ($p<0.001$), % of transfusions with TRIG>8.0 g/dL decreased from 23% to 2% ($p = 0.002$) The overtransfusion rate (post-transfusion Hgb>10.0) decreased from 11% to 3% ($p=0.001$). There was no significant difference in maximum lactate, maximum troponin, median SICU length of stay (LOS) or hospital LOS. Although SICU discharge Hgb and hospital discharge Hgb were significantly lower in the intervention period (8.6 vs. 8.2, $p=0.01$ and 9.0 vs. 8.6, $p=0.02$), 30-day readmission rate and mortality were not significantly different.

Conclusions: A blood management program founded on peer-to-peer review was effective in improving adherence to guideline recommendations for transfusion of RBCs to stable, low-risk anemic SICU patients without an increase in morbidity.



Histogram of pre-transfusion hemoglobin triggers in stable, low-risk patients



Effect of intervention on pre-transfusion hemoglobin triggers and % of transfusions given for hemoglobin trigger >8.0 g/dL

Scientific Session IV-B - Performance Improvement

January 16, 2015
Paper 30
9:00 am

ALL THE BANG WITHOUT THE BUCKS: DEFINING ESSENTIAL POINT-OF-CARE TESTING FOR TRAUMATIC COAGULOPATHY

Michael Goodman, MD*, Amy Makley, MD*, Dennis Hanseman, PhD,
Timothy A. Pritts, MD, PhD*, Bryce R.H. Robinson, MD*
University of Cincinnati

Presenter: Michael Goodman, MD

Discussant: Martin A. Schreiber, MD, Oregon Health and Science University

Objectives: Rapid assessment and treatment of coagulopathy reduces post-injury morbidity and mortality. Although thromboelastography (TEG) may be more accurate and efficient than conventional coagulation tests, it requires significant financial and personnel investments. We hypothesized that point-of-care INR (POC INR) may provide a rapid and accurate alternative to TEG.

Methods: A retrospective review of sequential trauma patients who underwent paired POC INR and TEG testing immediately upon presentation to a Level I trauma center from July 2012 to December 2013 was performed. POC INR was correlated with TEG values (*R*-value, K-time, α-angle, MA, LY30) and transfusion requirements. Vital signs, admission labs, and injury severity were analyzed. POC INR testing was performed using i-STAT. All results and correlations (*r*) noted were significant with $p<0.05$.

Results: We identified 628 trauma patients with concomitant TEG and POC INR testing. Median ISS was 13, 20% were in shock (base deficit [BD]≤-5), 21% were transfused, and 11% died. POC INR correlated with all TEG values, with improved correlations for patients in shock (Table). Furthermore, POC INR significantly correlated with packed red blood cells (r=0.1) and plasma (r=0.11) transfused in the first 4 hours and platelets and cryoprecipitate given in the first 24 hours (r=0.12 for both). TEG K-time, MA, and LY30, but not R-value, had similar correlations for blood products transfused. Test duration was 2 minutes for POC INR, compared to at least 30 minutes for TEG. Cohort charges for POC INR were estimated at $21,980 vs. $396,896 for TEG.

Conclusions: POC INR testing is faster and more cost effective than TEG. In addition, POC INR correlates not only with TEG values, but also with acute blood product transfusions. POC INR may provide a practical alternative for rapid coagulopathy assessment in the trauma patient at institutions that lack TEG capability.

TEG Parameter	All patients	Patients with BD ≤-5
R-value	0.26	0.49
K-time	0.32	0.77
α-angle	-0.23	-0.61
MA	-0.27	-0.65
LY30	0.31	0.5

Correlations of POC INR to TEG values; BD = base deficit, MA = maximum amplitude; all correlations $p<0.05$

Scientific Session IV-B - Performance Improvement

January 16, 2015
Paper 31
9:20 am

OPERATIVE DELAY TO LAPAROSCOPIC CHOLECYSTECTOMY: RACKING UP THE COST OF HEALTHCARE

Diane Schwartz, MD*, Adil A. Shah, MD, Lauren Nicholas, Catherine Velopulos, MD, MHS*, David T. Efron, MD*, Eric B Schneider, Cheryl Zogg, Adil H. Haider, MD, MPH*
Johns Hopkins School of Medicine

Presenter: Diane Schwartz, MD

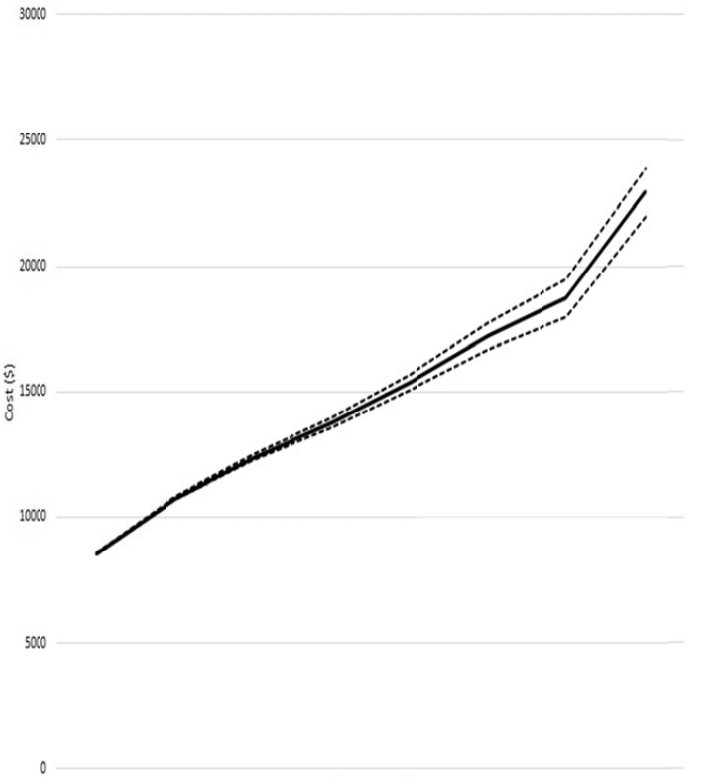
Discussant: Douglas J.E. Schuerer, MD, Washington University School of Medicine

Objectives: Healthcare providers are increasingly focused on cost containment. One potential target for cost containment is in-hospital management of acute cholecystitis. Despite debate in the literature on optimal timing to operation, it is likely that patients are being delayed longer than necessary. We sought to determine the cost consequences of delaying operative management.

Methods: The Nationwide Inpatient Sample (2003-2011) was queried for adult patients (≥16 years) that underwent laparoscopic cholecystectomy for a primary diagnosis of acute cholecystitis. Patients that underwent open procedures or endoscopic retrograde cholangiopancreatography (ERCP) were excluded. Generalized linear models were employed to analyze costs for each day's delay in surgery. The multivariate analysis adjusted for patient demographics, hospital descriptors, Charlson comorbidity index, length of stay, and outcomes.

Results: We analyzed 191,032 records. Around 65% of patients underwent surgery within 24 hours of admission. The average cost of care for same-day surgeries was $11,087. Costs increased by 22% for surgeries taking place on the second day ($13,526), by 37% on the third day ($15,243), by 52% on the fourth day ($16,822), by 64% on the fifth day ($18,196), by 81% on the sixth day ($20,125), and by 100% on the seventh day ($22,250) of hospitalization, when compared to the cost of care for procedures performed within 24 hours of admission. Subset analysis of patients discharged ≤24 hours of surgery demonstrated similar trends.

Conclusions: After controlling for patient- and hospital-related factors, we noted significant cost for every day that operation was delayed. Practice patterns should be modified to optimize timing to operation to prevent unnecessary delays.



Cost ($)	8,552	11,742	12,375	13,735	15,398	17,207	18,728	22,930

**Adjusted for age, gender, race, insurance status, income quartile, procedure day, geographical region, hospital location and teaching status, hospital bed size, length of stay after the procedure, weekend admission, Charlson Comorbidity Index and mortality*

Adjusted cost of delay per day for patients discharged within 24 hours of surgery

Scientific Session IV-B - Performance Improvement

January 16, 2015
Paper 32
9:40 am

THE IMPACT OF WORK SCHEDULE AND FATIGUE ON OUTCOME OF ACUTE CARE SURGICAL CASES

Michael K. Dalton, MPH, Elizabeth McDonald, Pulkesh Bhatia,
Kimberly A. Davis, MD, MBA, FACS, FCCM*, Kevin M. Schuster, MD*
Yale University School of Medicine

Presenter: Michael K. Dalton, MPH

Discussant: Alicia R. Privette, MD, Medical University of South Carolina

Objectives: The optimal work schedule for acute care surgeons has not been defined. Surgeon fatigue may impact patients undergoing operation at night making a night float system for acute care surgeons more ideal. Prior studies examining surgeon fatigue have had mixed results.

Methods: We performed matched retrospective cohort study of all patients undergoing operative intervention at night (starting after 11PM) by acute care surgeons at a single institution over a 2 year period. Cases were matched based on case complexity, age and sex to daytime cases. Other confounders including comorbidities (Charlson comorbidity index) and presenting characteristics, surgical complications, all complications and mortality were then abstracted from the medical record. Outcomes differences between day and night cases were compared. Univariable and multivariable logistic regression was used to identify statistical differences.

Results: One hundred fifteen night cases were matched 1:1 to daytime cases. Average age was 41 and 58% were male. Both groups had similar degrees of comorbidity and those operated at night were more acutely ill with trends toward more hypotension and meeting more criteria for sepsis (table). There was no evidence of a difference in outcome with respect to mortality, complications including infections and anastomotic leak, readmission and need for transfusion (table). After controlling for comorbidity and presenting characteristics the odds ratio for mortality after a day case was closer to unity and remained non-significant (0.45, 95% CI 0.11 – 1.90). The odds ratio for complications was similarly near unity and not-significant (0.92, 95% CI 0.52 – 1.63).

Conclusions: Acute care surgeons working a traditional call period after a day of work can perform emergency cases with equal outcomes despite a more ill patient cohort. A night float system for acute care surgeons may not impact outcomes.

	Day Cases (n, %)	Night Cases (n, %)	p, OR (95% CI)
Presenting hypotension	6 (5.2)	14 (12.2)	0.061, 0.40 (0.15 – 1.07)
Presenting Sepsis	39 (33.9)	53 (46.1)	0.060, 0.60 (0.35 – 1.02)
Charlson Index (value)	2.11	2.30	p=0.529
Mortality	3 (2.61)	8 (6.96)	0.122, 0.36 (0.09 – 1.39)
Any Complication	38 (33.0)	44 (38.3)	0.408, 1.36 (0.63 – 2.95)
Infectious Complication	19 (16.5)	22 (19.1)	0.605, 0.837 (0.43 – 1.65)
Anastomotic leak	2 (1.7)	2 (1.7)	0.999, 1.00 (0.14 – 7.22)
30 day readmission	17 (14.8)	13 (11.3)	0.434, 1.36 (0.63 – 2.95)
Intra-op transfusion	11 (9.7)	7 (7.4)	0.568, 1.34 (0.50 – 3.61)

Scientific Posters - Group I - Basic Science

Poster 1

BACTERIA AND ANTIMICROBIAL RESISTANCE IN THE ORAL FLORA OF SHARKS: GUIDANCE FOR ANTIBIOTIC THERAPY FOR SHARK BITE VICTIMS

Nathan R. Unger, PharmD, Robert Borrego, MD*, Olayemi Osiyemi, Jay Goodman
Nova Southeastern University

Presenter: Nathan R. Unger, PharmD

Objectives: Florida consistently boasts the highest number of shark attacks in the world, accounting for nearly one-third of all incidents in 2013. Although these bites within Florida waters are rarely fatal, victims of severe bites are at risk for subsequent infection due to entry of bacteria from the shark's oral cavity into the open wound. The objective of our study was to identify the bacteria and level of antibiotic resistance in the mouths of live sharks.

Methods: Sharks were caught in the waters off the coast of Florida and the Bahamas. Captures took place between February 2013 and May 2014. The oral cavity of the shark was swabbed along upper and lower teeth and gums using a remote swabbing tool with a BBL™ CultureSwab™ Plus attached to the end. All swabs underwent standard microbiological work-up with identification of organisms and reporting of antibiotic susceptibilities using an automated microbiology system.

Results: A total of 33 sharks were swabbed. An average of 2.52 ± 1.77 bacteria isolates were identified per shark, similar amongst the different species. Gram-negative bacteria, making up 73% of all isolates, were significantly ($p = 0.003$) more common than gram-positive bacteria. The most common organisms were *Vibrio spp*. (22%), *Enterobacter spp*. (10%) and *Pseudomonas spp.* (10%). Nearly 50% of all bacteria were resistant to at least one antibiotic, with 23% of bacteria resistant to more than three antibiotics. Gram-negative bacteria susceptibility was highest for meropenem (98%), piperacillin/tazobactam (98%), levofloxacin (97%), tobramycin (95%), and ceftazidime (93%). Gram-positive bacteria were routinely susceptible to vancomycin (100%), fluoroquinolones (100%) and tetracycline (95%).

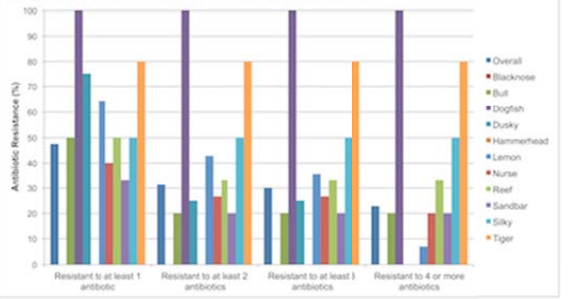
Conclusions: Recommended empiric antimicrobial therapy for severe shark bites should encompass a combination of a fluoroquinolone, piperacillin/tazobactam or ceftazidime plus doxycycline.

Table 1: Comparison of the oral bacterial content and antibiotic resistance amongst several different shark species

Species (n)	No. of bacteria	p-value*	Gram-positive bacteria, %	Gram-negative bacteria, %	p-value*	No. of resistant antibiotics per sample	p-value*
Blacknose (1)	2	0.973	50	50	0.594	0	0.075
Bull (3)	3.33 ± 2.31 (-0.22-3.08)		20	80		1.86 ± 2.06 (0.2-2.75)	
Dogfish (1)	2		50	50		5.5 ± 0.71 (6.35-7.33)	
Dusky (2)	2 ± 0		25	75		1.25 ± 1.26 (0.77-3.24)	
Hammerhead (2)	2 ± 0.71 (-0.26-1.5)		60	40		0	
Lemon (4)	3.5 ± 3 (-0.16-3.3)		21	79		1.83 ± 1.6 (0.09-1.17)	
Nurse (6)	2.63 ± 1.86 (-0.09-1.97)		27	73		1.54 ± 2.09 (0.1-2.27)	
Reef (4)	1.5 ± 1 (-0.25-1.85)		0	100		3.17 ± 4.58 (1.14-8.47)	
Sandbar (6)	2.5 ± 1.52 (-0.07-1.61)		33	67		2.11 ± 2.31 (0.11-2.45)	
Silky (2)	2.5 ± 3.54 (-1.29-7.49)		0	100		2.75 ± 3.4 (2.08-8.15)	
Tiger (2)	2.5 ± 2.12 (-0.77-4.49)		20	80		5.8 ± 3.63 (1.33-7.7)	
Overall (33)	2.52 ± 1.77 (-0.02-1.21)	N/A	27	73	N/A	2.26 ± 2.53 (0.01-1.15)	N/A

All values represent mean ± SD (95% CI) unless otherwise noted
*Analysis conducted using the one-way ANOVA, a p-value of less than 0.05 was considered significant

Figure 1: Level of antibiotic resistance within the various shark species



Scientific Posters - Group I - Basic Science

Poster 2

CHARACTERISTICS OF THE BIOFILM PRESENT IN ENDOTRACHEAL TUBES

James Bardes, Dana Gray, Alison M. Wilson, MD*
West Virginia University

Presenter: James Bardes

Objectives: This study aims to elucidate the microbiata within the biofilm of ETT and compare them to standard BAL cultures.

Methods: This was a prospective, observational study performed at a University, Level 1 trauma center ICU. 40 ETT were collected at extubation. Biofilms were quantified from a standardized point on the ETT. Biofilm microbiata were indentifed using DNA microarrays. BAL cultures were based on clinical lab data. $p<0.05$ was considered significant.

Results: 40 ETT were evaluated. All had biofilm. Mean ventilator time was 137 hours. 16 patients had a diagnosis of pneumonia. The most common biofilm results were: Candida (10), Enterococcus species (10), S. aureus (9) and coag negative Staph (4). The most common culture results from BAL were: Candida (10), Staph species (5), Strep species (5) and Enterococcus (5). Only 9 of 40 had congruence between mircobiata of the biofilm and the BAL.

Analysis was performed based on predominant species found in the biofilm. Candida was most common, the biofilm covered a mean area of 32.47% of the standardized sample. Staph aureus was second, with a mean biofilm area of 29.15%. Enterococcus was third, with mean area of 28.2%. ANOVA analysis was performed for the 6 most common species with no difference between groups, $p=0.44$. ANOVA analysis comparing hours of intubation for the same 6 found no difference, $p=0.98$.

Analysis between hours intubated and stage of the biofilm also showed no significant difference, $p=0.34$. Analysis comparing biofilm stage and diagnosis of pneumonia and showed no correlation. Analysis comparing hours of intubation and pneumonia found no correlation, $p=0.28$.

Conclusions: Comparison between microbiata of biofilms and BAL show divergence in 78%. The microbiata of ETT biofilm is very diverse. There is no relationship between biofilm stage and pneumonia. This supports previous studies that there is no correlation between biofilm stage or pneumonia with duration of intubation.

Notes

Scientific Posters - Group I - Basic Science

Poster 3

HYDROPHOBIC MODIFICATION OF ALGINATE DEMONSTRATES STRONG HEMOSTATIC CAPABILITIES

Mayur Narayan, MD, MPH, MBA, FACS, FICS*, Matthew Dowling, John Gustin,
Ian MacIntire, Hyunpaek Oh, Srinivasa Raghavan
University of Maryland

Presenter: Mayur Narayan, MD, MPH, MBA, FACS, FICS

Objectives: Alginate is a biocompatible polysaccharide commonly used in the pharmaceutical, biomedical, food, and cosmetic industries. Though lyophilized alginate rapidly absorbs water, it is not an effective hemostat. The purpose of this study was to attempt to increase hemostatic capabilities of alginate by hydrophobic modification (hm) . Previous studies have illustrated that hm of biocompatible polysaccharides enhances hemostatic effect as well as cellular adhesion. We hypothesized that hm alginate would demonstrate significant hemostatic effect.

Methods: 15 Yorkshire swine were randomized to receive either hm alginate pads (n = 5), unmodified alginate pads (n = 5), or standard Kerlix^{TM} gauze dressing (n = 5) for hemostatic control. Following splenectomy, a 6 mm punch arterial puncture of the femoral artery was made. Wounds were allowed to freely bleed for 30 seconds at which time dressings were applied and compressed for 3 minutes in a randomized fashion. Fluid resuscitation was given to preserve the baseline mean arterial pressure. Wounds were monitored for 180 minutes after arterial puncture, and surviving animals were euthanized.

Results: Blood loss for the hm-alginate group was significantly less than control groups ($p =< 0.0001$). In addition, eighty percent of hm-alginate pads were able to sustain hemostasis for the full 180 minutes with only one pad whereas control groups of unmodified alginate and Kerlix^{TM} gauze dressings were not able to achieve even initial hemostasis.

Conclusions: Hm alginate dramatically increases hemostatic effect when compared to unmodified alginate and Kerlix^{TM} gauze leading to decreased blood loss and sustained hemostasis. This is a similar result that has been previously described by our group when hydrophobically-modifying chitosan. When taken in conjunction, both works suggest that hydrophobic-modification of polymers can significantly increase their hemostatic capabilities.

Notes

Scientific Posters - Group I - Basic Science

Poster 4

THE SYNERGISTIC EFFECT OF CLOSTRIDIUM DIFFICILE TOXINS ON THE INTESTINAL BARRIER AND REMOTE INFLAMMATORY RESPONSES

Lawrence N. Diebel, MD*, David Liberati, MS
Wayne State University

Presenter: Lawrence N. Diebel, MD

Objectives: The pathogenesis of *Clostridium difficile* colitis is closely linked with the elaboration of two exotoxins; toxin A and toxin B. There is controversy about the relative importance and the specific roles of these two toxins in the severity of colonic disease and the development of systemic complications. We compared the relative effects of toxin A, toxin B and toxin A+B on toxin penetration of the intestinal epithelial barrier and subsequent PMN activation and lung microvascular injury in an *in vitro* model.

Methods: HT29-MTX mucus producing colonic epithelial cell (IEC) monolayers were established in transwell plates. Toxin A, toxin B or toxins A and B were added to the apical chamber. Basal chamber supernatants were collected at intervals. Transepithelial passage of the toxins was determined using an ELISA. The effect of the basal chamber supernatants from IEC exposed to toxin(s) vs. direct toxin exposure on PMN activation and lung microvascular injury (HMVEC) were determined.

Results: Basal chamber concentration of toxins were 2.9 ± 0.5 for toxin A, 5.3 ± 1.0* for toxin B and 3.2 ± 0.6 and 9.4 ± 1.3*# for toxin A/B respectively (*$p<0.001$ vs. toxin A, #$p<0.001$ vs. toxin B alone) at 3 hours.

Conclusions: There were direct and indirect effects of *C. diff*. toxins on PMN activation and indices of HMVEC injury in this model. *C. diff*. toxin A facilitates the translocation of toxin B into the basal (systemic) side of IEC monolayers. The study supports the importance of both toxins in the pathogenesis of intestinal barrier injury and systemic inflammation *in vivo*. This study suggests that measurement of *C. diff.* toxins in systemic blood may have prognostic significance.

Results: mean ± S.D., N = 5 for each group

	PMN			HMVEC	
	O2- (nmol/well)	CD11b (MFI)	Apoptosis (%)	Perm. (nmol/cm^2/hr)	ICAM-1 (MFI)
No toxin	6.0±0.1	93.2±2.2	4.6±0.4	0.34±0.1	9.3±1.1
Direct tox exposure					
Tox A	8.2±1.0	102.4±4.8	5.9±0.3*	0.38±0.1	12.9±1.2*
Tox B	10.0±0.8*	110.3±5.0*	6.2±0.5*	0.44±0.2*	14.3±1.5*
Tox A/B	11.3±2.0*	112.9±5.9*	6.9±0.4*	0.50±0.2*	15.2±2.0*
IEC sups.					
Tox A	32.4±1.2*#	268.4±5.3*#	10.8±1.0*#	0.66±0.2*#	34.6±3.3*#
Tox B	40.4±1.8*#	280.1±6.1*#	14.9±0.9*#	0.72±0.3*#	36.6±2.9*#
Tox A/B	51.3±2.2*#	332.4±6.5*#	23.8±1.2*#	0.86±0.4*#	48.9±4.0*#

*p<0.001 vs. No toxin, #p<0.001 vs. direct toxin exposure.

Scientific Posters - Group I - Basic Science

Poster 5

THE VALUE OF LIVE TISSUE TRAINING FOR COMBAT CASUALTY CARE: A SURVEY OF CANADIAN MILITARY PERSONAL DEPLOYED IN THE AFGHANISTAN CONFLICT

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Presenter: Michael J. Kim, MD, MA

Objectives: The optimum method for training military personnel for combat casualty care is unknown. In particular, there is debate regarding the merits and ethics of live animal tissue training (LTT). While both LTT and inanimate simulation are currently used for pre-deployment training, the efficacy of these models has not been established

Methods: Canadian military personnel, deployed to Afghanistan between 2006-2011, were surveyed retrospectively regarding their experience with combat casualty care and pre-deployment training. Inanimate simulators were used prior to early rotations. In later years, personnel received a combination of training including inanimate simulators and live porcine models. Of those deployed multiple rotations, there was a cohort who performed life-saving skills after receiving only inanimate simulation training, and could compare with their field experience after later training including LTT. Ratings of competence after pre-deployment training were compared using Student's T-Test.

Results: Of 38 respondents, 20 were deployed on multiple rotations. Respondents performed life-saving skills on 89% of rotations. Self-perceived competence ratings were significantly higher for those who trained with live tissue (Table 1). Of respondents deployed on both early and late rotations, 15/17 felt the latter training was more worthwhile. In addition, 16/17 individuals felt that LTT training should be added to inanimate simulation. Narrative comments reiterated the benefits of adding LTT to other training.

Conclusions: Amongst experienced Canadian military personnel, LTT is considered essential pre-deployment preparation. Individuals who experienced only inanimate simulation prior to active duty reported feeling more competent on the battlefield after the addition of live tissue models. LTT appears to be an effective training tool for life-saving skills.

	N	Range (5=highest score)	Mean	± SD	Median	Mode
Perceived competence after simulation	38	1 – 5	3.28*	0.99	3	3
Perceived competence after addition of LTT	31	4 – 5	4.92*	0.28	5	5
Preparedness to save lives after addition of LTT	28	3 – 5	4.64	0.56	5	5
Should LTT continue to be part of pre-deployment training?	37	3 – 5	4.76	0.60	5	5

*($p<0.05$)

Table1: Ratings of perceived competence and preparedness following each method of pre-deployment training

Scientific Posters - Group II - Emergency General Surgery

Poster 6

RACIAL DISPARITIES IN THE MANAGEMENT OF ACUTE ABDOMINAL PAIN IN THE EMERGENCY DEPARTMENT: A NATIONWIDE EXAMINATION

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Presenter: Adil H. Haider, MD, MPH *(on behalf of Adil A. Shah, MBBS)*

Objectives: Single center studies provide conflicting data regarding the presence of race-based disparities in the management of pain in the Emergency Department (ED). Our objective is to use a national sample to investigate the relationship between race and differential use of analgesia in the ED.

Methods: The National Hospital Ambulatory Medical Care Survey (NHAMCS) 2006-2010 was queried for adult ED patients (≥16 years) with a diagnosis of non-traumatic abdominal pain using the classification system recently published by the American Association for Surgery of Trauma (AAST). Multivariate analyses, adjusting for age, gender, race, insurance status, pain score on presentation, hospital location and ownership, and triage status (emergent, urgent, semi-urgent and non-urgent) were performed to determine associations between race and the following outcomes: administration of analgesics, use of narcotic analgesics, ED length of stay (>6hrs), and in-patient admission. An additional analysis that stratified for pain on presentation was also performed.

Results: We analyzed 8,179 visits, weighted to represent 30,944,039 ED visits. Of these 69.6% were female, 61.8% were Non-Hispanic white, 20.9% were Non-Hispanic black, and 13.7% were Hispanic. Multivariate analyses revealed that, non-Hispanic black patients had a decreased odds of receiving analgesia (OR: 0.73; 95% CI: 0.65-0.82) compared to non-Hispanic white patients. This trend was consistent across moderate and severe pain categories. Non-Hispanic black and Hispanic patients were more likely to have a prolonged ED stay (ORs [95% CI]: 1.60 [1.39-1.83] and 1.61 [1.38-1.86], respectively) and less likely to be admitted to the hospital (ORs [95% CI]: 0.81 [0.68-0.98] and 0.76 [0.62-0.95], respectively).

Conclusions: Analysis of this national sample of patients corroborates the presence of racial disparities in the management of abdominal pain in the ED.

Race/Ethnicity	Odds Ratio [95% Confidence Interval] of Receiving Analgesic (Non–Hispanic White patients as referent group)			
	Any Analgesic			
	All Patients (n=30,944,039)	Mild Pain (1-3) (n=2,329,024)	Moderate Pain (4-6) (n=8,010,151)	Severe Pain (7-10) (n=15,196,256)
Non-Hispanic Black	0.73 [0.64-0.82]*	0.94 [0.58-1.51]	0.69 [0.54-0.88]*	0.74 [0.62-0.88]*
Hispanic	0.91 [0.79-1.04]	0.60 [0.36-1.01]	0.91 [0.70-1.17]	0.89 [0.73-1.10]
Non-Hispanic Others	0.77 [0.62-0.96]*	1.08 [0.50-2.37]	0.57 [0.37-0.85]*	0.76 [0.54-1.05]
	Narcotic Analgesics			
	All Patients (n=30,944,039)	Mild Pain (1-3) (n=2,329,024)	Moderate Pain (4-6) (n=8,010,151)	Severe Pain (7-10) (n=15,196,256)
Non-Hispanic Black	0.78 [0.69-0.89]*	0.89 [0.51-1.54]	0.73 [0.56-0.94]*	0.80 [0.68-0.96]*
Hispanic	0.86 [0.74-0.99]*	0.82 [0.46-1.47]	0.82 [0.63-1.08]	0.83 [0.68-1.01]
Non-Hispanic Others	0.78 [0.62-0.98]*	1.24 [0.52-2.97]	0.65 [0.41-1.02]	0.72 [0.51-0.99]*

[(n) represents weighted frequencies for each column]

Table: Odds of administration of analgesics by race/ethnicity groups, compared to Non-Hispanic white patients (reference group), with further stratification by baseline pain severity (* represent results that are statistically significant).

Scientific Posters - Group II - Emergency General Surgery

Poster 7

DEFINING RISK FACTORS FOR ACUTE GANGRENOUS CHOLECYSTITIS

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Presenter: Seda Bourikian, BS

Objectives: Acute gangrenous cholecystitis (AGC) is a medical emergency that carries a mortality rate of up to 22%. The diagnosis is challenging which is problematic since delayed surgical treatment results in complications. The objective of the present study is to define risk factors for detection of this disease

Methods: A retrospective chart review of all patients admitted to an emergency general surgery service from January 2009 to April 2014 who underwent cholecystectomy was performed. Specimen reports were retrospectively evaluated with an attending pathologist to identify patients with AGC and patients with cholecystitis without necrosis (CN). Age, length of stay, comorbidities, mortality, pre-operative bilirubin, lactate and vital signs were compared between the two groups.

Results: A total of 489 patents underwent cholecystectomy during the study period. 464 patients were found to have CN and 25 patients were found to have AGC. Mortality was significantly higher in the patients with AGC compared to those with CN (16 % vs 0.86% p=0.003). Patients with AGC where older (55.8 vs 40.8 years p=0.001) and had a statistically significant higher bilirubin (1.96 vs. 0.89 p=0.001). Diabetes was more common as a comorbidity in patients with AGC (32% vs 6.7% p=0.003). Interestingly, lactate, obesity and systolic blood pressure lower than 100 were not significantly different between the groups. Logistic regression analysis showed that increased age, male gender and presence of diabetes were strongly associated with the development of AGC.

Conclusions: Acute gangrenous cholecystitis carries an increased mortality compared to cholecystitis without necrosis. Older patients with diabetes and elevated bilirubin should be suspected of having AGC. Validation of these risk factors prospectively could be of benefit in creating a score for early identification of this disease.

Notes

Poster 8

THE SURGICAL ACUITY SCORE - SMALL BOWEL OBSTRUCTION (SAS - SBO) — STANDARD CLASSIFICATION FOR THE SEVERITY OF SBO IN EMERGENCY GENERAL SURGERY (EGS)

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Presenter: Yaser Baghdadi, MD

Objectives: The AAST developed a scoring system to standardize the severity of SBO based on anatomic criteria without consideration for the entirety of the patient's clinical situation. Therefore, we created a scoring system that incorporates the patient's physiologic status and pre-existing comorbidities along with anatomic criteria. We hypothesized that it would have a greater association with key outcomes than the anatomic score alone

Methods: Patients ≥18 years admitted for acute SBO between 7/2009-9/2011 were identified. The anatomic, physiologic, and comorbidity scores (Table) were squared and added to calculate the SAS-SBO. Area under the receiver operating characteristic curves (AUROC) was used to compare the SAS-SBO to the anatomic score alone for extended LOS (>75th percentile), complications, and 30–day mortality

Results: A total of 208 patients (mean age 65 ± 17 years) were identified of whom 100 underwent exploration (48%). Complications were encountered in 67 patients (32%), extended LOS (>13 days) in 50 (24%) and early death (30-day mortality) in 15 (7%).The median (interquartile range) anatomic score was 1 (1-2), physiologic score 1 (0-1), and comorbidity score 1 (0-2) for a SAS-SBO of 5 (2-13). Greater mean SAS-SBO were associated with surgical exploration (14 vs 5), complications (14 vs 7), extended LOS (15 vs 7), and 30-day mortality (19 vs 8) (all $p<.01$). AUROC demonstrated closer associations between SAS-SBO and outcomes than the anatomic score alone: complications (0.78 vs. 0.74), extended DOS (0.75 vs. 0.74) and 30-day mortality (0.86 vs. 0.63)

Conclusions: The SAS-SBO is a reliable tool to categorize severity of SBO and has a stronger association with key clinical outcomes than the AAST anatomic score alone. This tool should enhance standardization between institutions and requires validation in a prospective, multi-institutional study

Table: The Surgical Acuity Score - Small Bowel Obstruction (SAS - SBO)			
Points	**Anatomic**	**Physiologic**	**Comorbidity**
0	Normal	Normal	Charlson 0
1	Partial SBO with conservative management	SIRS	Charlson 1-2
2	Required surgical operation	Sepsis	Charlson 3-4
3	Required surgical operation in setting of strangulation with no bowel resection	Severe sepsis	Charlson 5-6
4	Required surgical operation in setting of strangulation requiring bowel resection	Septic shock	Charlson 7-8
5	Required surgical operation in setting of strangulation and perforation	Multiple organ dysfunction syndrome	Charlson ≥9
SIRS: Systemic Inflammatory Response Syndrome SAS-SBO = (Anatomic Score)^2 + (Physiologic Score)^2 + (Comorbidity Score)^2			

Scientific Posters - Group II - Emergency General Surgery

Poster 9

A PRACTICAL SCORE FOR THE DIAGNOSIS OF CHOLECYSTITIS IN PATIENTS PRESENTING TO THE EMERGENCY DEPARTMENT (ED) WITH RUQ PAIN

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Presenter: Daniel Dante Yeh, MD

Objectives: The Tokyo Guidelines (TG13) have been proposed as a diagnostic aid in the evaluation of possible cholecystitis. We sought to test the accuracy of TG13 in a cohort of patients presenting to the ED with RUQ pain and attempt to develop a novel practical score.

Methods: We conducted a retrospective study of 308 patients undergoing evaluation of right upper quadrant (RUQ) pain at an academic tertiary referral hospital between June 2010 and January 2014. Final pathologic diagnosis was used as the gold standard confirmatory test. Signs, symptoms, ultrasound characteristics and laboratory findings were analyzed for specificity, sensitivity, predictive value, and overall accuracy.

Results: Eight predictive factors were found to be useful in making the diagnosis of acute cholecystitis based on a multiple logistic regression model. Their importance, according to the regression coefficients, was determined as follows: presence of gallstones, gallbladder (GB) thickening, distended GB, clinical Murphy's sign, RUQ tenderness, nausea/vomiting, ultrasonographic Murphy's sign, and WBC>11. Based on the magnitude of the independent effect, we devised a practical diagnostic score to aid in the diagnosis of cholecystitis (TABLE). A total score >= 5 had a PPV of 97% for cholecystitis while a total score <3 had 96% NPV for cholecystitis. Our overall accuracy was 90%. By comparison, the accuracy of the Tokyo Guidelines (TG13) diagnostic criteria for suspected and definite diagnosis of acute cholecystitis were 65% and 67%, respectively.

Conclusions: We have developed a new practical score to aid in the diagnosis of cholecystitis in patients presenting to the ED with RUQ pain which performs better than the TG13. This novel score should be externally validated prior to widespread adoption.

	Points
Cholelithiasis	2
US Distended GB	2
Nausea/vomiting	1
RUQ Tenderness	1
Scnographic Murphy's sign	1
Leukocytosis WBC > 11	1
GB wall thickening	2
Murphy's sign	2
Total Score	**12**

Poster 10

NEGATIVE AND NONTHERAPEUTIC LAPAROTOMIES IN EMERGENCY SURGERY

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Presenter: Steven Allen, MD

Objectives: Surgical emergencies offer a significant diagnostic challenge to acute care surgeons as the patients are often unexaminable or too unstable to image. To operate comes with the risk that the diagnosis is ultimately not a surgical one or that the situation is entirely unsalvageable. Negative (NEG) or nontherapeutic (NT) laparotomies (ex lap) are known to occur, however the incidence and consequences of these cases are not well described in the emergency surgery service (ESS) population. We aim to describe the incidence of NEG and NT ex lap's in our ESS population and their clinical circumstances and consequences.

Methods: A retrospective review of an ESS registry from July 2010 to January 2014 of all emergent ex lap was performed. Demographics, comorbidities (PEC), hemodynamics, labs whether therapeutic (THER), NT (abnormal findings identified but not amenable to or requiring intervention) or NEG (intra-abdominal findings grossly normal) were recorded. Outcomes studied were complications, length of stay and mortality.

Results: 430 patients had an emergent ex lap. The incidence of NT and NEG ex lap was 7% with 53% referred from the Cardiac ICU after cardiac procedures. Those with NT and NEG ex lap were older, had lower blood pressure and higher lactate levels than the THER group. Mortality was higher in NT and NEG (41.4%) compared to the THER (12.5%). 71% of those who died in the NT and 100% who died in the NEG group came from the CTICU. Those who died in NT and NEG, the time from consultation to death was shorter than those who underwent a THER laparotomy (Table 1).

Conclusions: The incidence of NT and NEG ex laps is small but often occur in gravely ill patients with conditions that make the diagnosis and treatment of surgical issues difficult and require diagnostic confirmation for a surgically correctable issue. Modalities such as gasless laparoscopy may help to confirm a surgically amenable diagnosis and may reduce NT and NEG ex lap.

	THER (n=400)	NT (n=14)	NEG (n=16)	P
Age: Mean ± SD	57.2 ± 18.1	67.0 ± 17.2	60.1 ± 16.6	0.07
Gender: % male	48.5	57.1	66.7	ns
PEC's: Mean ± SD	1.9 ± 0.7	2.1 ± 0.5	1.9 ± 0.6	ns
Systolic BP: Mean	127.4 ± 47.2	111.8 ± 25.2	96.6 ± 30.6	0.056
Temp: Mean ± SD	98.2 ± 3.3	98.3 ± 1.9	98.0 ± 2.6	ns
BMI: Mean ± SD	28.6 ± 8.6	26.2 ± 6.6	28.7 ± 8.2	ns
WBC: Mean ± SD	12.9 ± 7.5	16.0 ± 8.0	17.1 ± 10.8	ns
Lactic acid: Mean ± SD	3.3 ± 3.9	7.0 ± 4.5	7.6 ± 5.0	0.002
HLOS	18.1 ± 24.2	10.6 ± 8.8	17.3 ± 15.7	ns
Time of consult to death (median days)	10	4	3	0.0004
Mortality (%)	12.5	Combined mortality: 41.4%		0.0001
		50.0	33.3	

Table 1.

Scientific Posters - Group II - Emergency General Surgery

Poster 11

THE IMPACT OF ACUTE CARE SURGERY ON APPENDICITIS OUTCOMES: RESULTS FROM A NATIONAL SAMPLE OF UNIVERSITY AFFILIATED HOSPITALS

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Presenter: John C. Madore, BS

Objectives: Acute appendicitis is the most common indication for emergency general surgery (EGS) in the US. We examined the role of acute care surgery (ACS) on interventions and outcomes for acute appendicitis at a national sample of university-affiliated hospitals.

Methods: We surveyed senior surgeons responsible for EGS coverage at University HealthSystems Consortium (UHC) hospitals, representing >90% of university-affiliated hospitals in the US. The survey elicited data on resources allocated for EGS during 2013. Responses were linked to UHC outcomes data by unique hospital identifiers. Patients treated at hospitals reporting hybrid models for EGS coverage were excluded. Differences in interventions and outcomes between patients with acute appendicitis treated at ACS hospitals vs. hospitals with a traditional on-call model were analyzed using univariate comparisons and multivariable logistic regression models adjusted for patient demographics and clinical acuity.

Results: We found 122 hospitals meeting criteria for analysis where 2,565 patients were treated for acute appendicitis. 48% of hospitals had an ACS team (N =1414), and 52% had a traditional on-call model (N=1151). Hospitals with ACS models were more likely to treat minority patients with greater severity of illness than traditional models. (Table 1) Patients treated at ACS hospitals were more likely to undergo laparoscopic appendectomy. (Table 2) In multivariable modeling of patients who had surgery (N=2,258), patients treated at ACS hospitals had 1.84 [95%CI 1.47-2.31] greater odds of undergoing laparoscopic appendectomy.

Conclusions: In an era when laparoscopic appendectomy is increasingly accepted for treating uncomplicated acute appendicitis, particularly in low risk patients, it is concerning that patients treated at non-ACS hospitals are more likely to undergo traditional open surgery despite having less severity of illness at the time of presentation.

Table 1. Characteristics of patients with acute appendicitis treated at 122 University HealthSystems Consortium Hospitals based on type of care model for emergency general surgery patients. (N=2,565)

Patient Characteristics	Non-ACS model (N=1151)	ACS model (N=1414)	*p* value*
Female	533 (46.3)	622 (44)	0.2404
Age (years)			0.0011
18-25, N (%)	238 (20.7)	346 (24.5)	
26-45, N (%)	407 (35.4)	549 (38.8)	
46-65, N (%)	373 (32.4)	397 (28.1)	
66-85, N (%)	116 (10.1)	114 (8.1)	
>85, N (%)	17 (1.5)	8 (0.6)	
Race			0.0125
White, N (%)	771 (67)	887 (62.7)	
Black, N (%)	102 (8.9)	187 (13.2)	
Hispanic, N (%)	189 (16.4)	237 (16.8)	
Asian, N (%)	53 (4.6)	60 (4.2)	
Other, N (%)	36 (3.1)	43 (3)	
Insurance			<0.0001
Private, N (%)	572 (49.7)	680 (48.1)	
Medicaid, N (%)	165 (14.3)	215 (15.2)	
Medicare, N (%)	158 (13.7)	160 (11.3)	
Other Government, N (%)	18 (1.6)	31 (2.2)	
Other, N (%)	100 (8.7)	76 (5.4)	
Uninsured, N (%)	138 (12)	252 (17.8)	
Severity of Illness			0.1608
Minor, N (%)	601 (52.2)	702 (49.6)	
Moderate, N (%)	507 (44)	637 (45)	
Major, N (%)	41 (3.6)	68 (4.8)	
Extreme, N (%)	2 (0.2)	7 (0.5)	

Table 2. Interventions and Outcomes of patients with acute appendicitis treated at 122 University HealthSystems Consortium Hospitals based on type of care model for emergency general surgery patients.

	Non-ACS model	ACS model	*p* value*
Intervention			
Open appendectomy, N (%)	224 (19.5)	167 (11.8)	<0.0001
Laparoscopic appendectomy, N (%)	795 (69.1)	1072 (75.8)	<0.0001
Open appendectomy + IR drain, N (%)***	—	—	
Laparoscopic appendectomy + IR drain, N (%)***	—	—	
IR drain only, N (%)	19 (1.7)	29 (2.1)	0.4570
None, N (%)	112 (9.7)	143 (10.1)	0.7475
Hospital LOS (days) mean, (SD)	2.88 (3.2)	2.97 (3.9)	0.5733
ICU LOS(days) mean, (SD)**	3 (5.5)	4.7 (9.1)	<0.0001
Total number complications (mean)	1.2	1.03	0.0765
Any major complication, N (%)	16 (1.4)	13 (0.9)	0.8271
In-hospital mortality, N (%)***	—	—	

*Pearson chi-squared test of association or non-parametric tests of comparison of means
**Including only the patients who had ICU stay
***N<10

Scientific Posters - Group III - Clinical Science

Poster 12

VITAL CAPACITY PREDICTS PULMONARY COMPLICATIONS AFTER RIB FRACTURES

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Presenter: Thomas W. Carver, MD

Objectives: Traumatic rib fractures are associated with significant morbidity. Vital capacity (VC) assesses pulmonary function; however, there is limited data linking VC to patient outcomes. Our objective was to determine if VC predicted complications and disposition in patients with rib fractures.

Methods: We conducted a retrospective chart review of all patients with fractured ribs admitted to a level 1 trauma center over a four year period. Patients were excluded if no VC was performed within 48 hours of admission. Data collected included demographics, hospital/ICU length of stay, epidural, discharge disposition to home versus rehab or skilled nursing facility (SNF), mortality, and average daily vital capacity (percent of predicted). A VC <30% was set as a predictor of morbidity. Pulmonary morbidity was defined as pneumonia, need for intubation, or ICU transfer. Statistic analysis was performed using Cox modeling and logistic regression.

Results: Of 801 patients with rib fractures, 683 had VC performed within 48 hours. Average age was 53, median ISS 13 (9-18) and median LOS was 5 days. Most (72%) were discharged home with 26% sent to rehab. Nine patients died (1%) and 10% had a pulmonary morbidity. Every 10% increase in VC increased the likelihood of discharge home by 28% and decreased the risk of discharge to rehab/SNF by 26%. If VC was >50% on day 2 there was a significantly lower risk of pulmonary morbidity (p=0.017). Compared with VC <30%, a VC of 30-40, 40-50, and >50% had significantly lower likelihood of discharge to rehab/SNF, 46%, 74%, and 71%, respectively.

Conclusions: Patients with fractured ribs and a VC <30% have significant risk for pulmonary morbidity. Higher average daily VC is associated with an increased likelihood of discharge home and lower pulmonary morbidity. VC identifies those at risk for complications and may help direct resource utilization. A prospective study is necessary to confirm these findings.

Notes

Scientific Posters - Group III - Clinical Science

Poster 13

PIC SCORE: AN INNOVATIVE INITIATIVE TO IMPROVE OUTCOME FROM CHEST WALL INJURY AT A LEVEL I TRAUMA CENTER

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Presenter: Shawn M. Terry, MD, FACS

Objectives: To develop a valid, practical, and effective clinical assessment scale (PIC Score) applicable to non-intubated chest wall injury patients to facilitate understanding of treatment goals, monitor incremental progress, and promote communication among patients, all members of the trauma care team, and patients' support networks. This scale will be bundled into an electronic treatment Power Plan (PIC Protocol) designed to standardize approach to chest wall injury patients, trigger early detection of treatment failure and initiate immediate, multi-modal intervention to arrest any respiratory status deterioration in order to improve outcomes for non-intubated chest wall injury patients.

Methods: Retrospective review of our first 100 non-intubated chest wall injury patients treated via PIC Protocol and comparison of these results to 100 case-matched prior chest wall injury patient outcomes as identified in our Level I trauma registry databank query of the last four years. Initiative elements included: admission and assessment protocols, patient education, PIC flow sheet, in-room patient progress board. Compliance was assessed daily.

Results: Compliance with protocol was 98% (98/100pts). Unanticipated transfer to higher level of care for respiratory status decline was reduced by 57% ($p=0.02$). Length of stay was reduced by 0.7 days ($p=0.06$). Discharge destination to home was improved by 13% ($p=0.07$).

Conclusions: Application of institution-developed PIC Protocol Chest Wall Injury Initiative improved patient outcomes for non-intubated chest wall injury patients. Respiratory deterioration necessitating level of care transfer was significantly reduced. There were favorable trends toward earlier discharge and discharge to home. Review of additional enrolled patients will be necessary to determine if PIC protocol application achieves significance in all care measures evaluated.

Notes

Poster 14

CONTACT ISOLATION IS ASSOCIATED WITH VENOUS THROMBOEMBOLISM IN TRAUMA PATIENTS

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Presenter: Robert A. Ferguson, DO

Objectives: Contact isolation (CI) is a series of precautions used to prevent the transmission of medically significant infectious pathogens in the healthcare setting. Our institution's implementation of CI includes limiting patient movement to the assigned room. Our objective was to define the association between CI and venous thromboembolism (VTE) at our Level I trauma center.

Methods: Our institution's prospective trauma database was retrospectively queried for all patients admitted to the trauma service between January 1, 2011 and December 31, 2012. Data including demographics, injury severity score (ISS), pre-existing medical conditions, and VTE development were collected. CI status data were obtained from our institution's infection control database. Chi-square was used to examine the unadjusted relationship between CI status and VTE. As the groups were not equivalent, logistic regression was then used to examine the relationship between CI and VTE while adjusting for relevant covariates including gender, age, ISS, and co-morbidities.

Results: Of the 4,423 trauma patients admitted during the study period, 4,317 (97.6%) had complete records and were included in subsequent analyses. 251 (5.8%) of the patients were on CI. VTE occurred in 44 (17.5%) patients on CI vs. 141 (3.5%) patients who were not isolated ($p < 0.0001$, odds-ratio 5.9 [95% CI 4.1-8.5], Table 1). Using logistic regression to adjust for patient risk factors, this relationship remained highly significant ($p < 0.0001$, with an odds-ratio of 3.3 [95% CI 2.2-4.9], Table 2).

Conclusions: CI, ISS, age, male gender, and obesity were associated with VTE. After adjustment for other risk factors, CI remained most strongly associated with VTE. Although any medical intervention may come with unintended consequences, the risks and benefits of CI in this population need to be re-evaluated. Further study is planned to identify opportunities to mitigate this increased VTE risk.

	No Contact Isolation (n = 4,066)	Contact Isolation (n = 251)	p
Age	45 (35)	60 (32)	<0.0001*
ISS	9 (13)	17 (13)	<0.0001*
VTE, %	3.47	17.53	<0.0001*
Obesity, %	6.17	8.37	0.1837
Gender, % Male	65.54	62.15	0.2761

* p<0.05

TABLE 1. Comparison of Patients with Contact Isolation vs. No Isolation

Factor	Estimate	Std Error	p	Odds Ratio
Contact Isolation	0.5934	0.1022	<0.0001*	3.2769
Obesity	0.4266	0.1238	0.0006*	2.3469
Male Gender	0.3713	0.0968	<0.0001*	2.1015
ISS	0.0751	0.0065	<0.0001*	1.0779
Age	0.0165	0.0040	<0.0001*	1.0166
Insulin-Dependent DM	-0.0059	0.1186	0.9605	0.9883
Psychiatric	0.0090	0.1364	0.9472	1.0182
Dementia/Alzheimer's	-0.1764	0.2330	0.4492	0.7028
CVA	-0.0811	0.2733	0.7668	0.8504
Cirrhosis	-0.1733	0.3945	0.6604	0.7070
Cancer	0.1889	0.2729	0.4889	1.4590
Hx Alcohol Abuse	0.1474	0.1369	0.2817	1.3428

* p<0.05

TABLE 2. Patient Factors for the Logistic Regression Model

Poster 15

BIOMARKERS IN TRACHEAL ASPIRATE AS AN EARLY PREDICTOR OF ACUTE LUNG INJURY

Carl Freeman, MD, FACS*, Thomas Dahms, Jeffrey Bailey, MD, Kathryn Lindsay, Craig Dedert, Jonathan Wojcik, Bradley Putty, MD
Saint Louis University

Presenter: Carl Freeman, MD, FACS

Objectives: Up to 30% of patients with multiple traumatic injuries may develop acute lung injury (ALI). The need to be able to predict the development of ALI can be crucial in triage and evacuation of the military trauma patient. We hypothesized that inflammatory markers in tracheal aspirate could predict ALI in the blunt trauma population.

Methods: This prospective observational study was conducted in an academic Level I Trauma Center from November 2010-November 2012. Inflammatory mediators in tracheal secretions and plasma of intubated subjects aged 18-65 years with severe multiple blunt trauma were measured for 4 days post injury. Tracheal and serum samples were analyzed for quantities of tumor necrosis factor (TNF), interleukin 1 beta (IL-1Î²), IL-6, IL-8, IL-10, C-reactive protein, pentraxin 3(PTX3), and activated complement 5 daily for 4 days. The diagnosis of ALI or acute respiratory distress syndrome was made using the international consensus criteria. Comparisons were made from samples collected on the first 24 hours following injury (Day1) between the ALI group (n=6) and the NO ALI group (n=15). Data comparisons were made using non-parametric methods. Significance was determined using the Mann-Whitney test with $p<0.05$ being considered statistically significant.

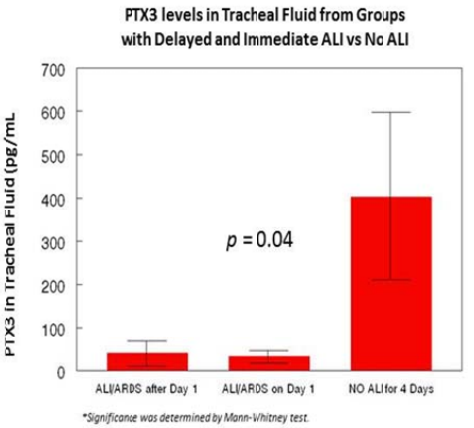
Results: There were no statistical differences in biomarker plasma levels between groups. However, levels of TNF ($p=0.04$), IL-1Î²($p=0.046$), and PTX3 ($p=0.04$) from tracheal aspirates were significantly lower in the group that developed ALI after Day 1 vs. the No ALI group.

Conclusions: The statistically significant differences in three biomarkers in tracheal fluid between groups of trauma subjects (ALI vs. NO ALI) on Day 1 post injury were the key findings of this study. Patients who develop ALI following significant blunt trauma appear to have lower representation of TNF, IL-1Î² and PTX3 in their tracheal aspirate early in their hospital course than subjects with No ALI.

Levels of Inflammatory Mediators in Tracheal Aspirates (Distal to ETT) on Day 1 Following Severe Blunt Trauma[a]

Mediator	IL-β (pg/mL)	TNF (pg/mL)	PTX3 (pg/mL)
Delayed ALI			
Median IQR	5314 1525-8448	161 11-1441	8 2-34
No ALI			
Median IQR	11079 3091-47533	1934 34-4923	184 0-337
p-value ALI vs. N-ALI	0.046	0.04	0.04

[a]Subjects who developed ALI/ARDs on Days 2, 3, or 4 were compared to those who did not develop ALI/ARDS for 4 days. Comparisons were made using non-parametric methods. Mann-Whitney test used to determine significance.
[b]Denotes p-value<0.05.



Scientific Posters - Group III - Clinical Science

Poster 16

PENETRATING CARDIAC INJURIES: YOU MUST LOOK OUTSIDE THE BOX

Peter Chen, MD, Mark L. Gestring, MD, FACS*, Paul E. Bankey, MD, PhD*,
Julius D. Cheng, MD, MPH*, Ayodele T. Sangosanya, MD*,
Nicole A. Stassen, MD, FACS, FCCM*
University of Rochester School of Medicine and Dentistry

Presenter: Peter Chen, MD

Objectives: Penetrating cardiac trauma is highly lethal with mortality rates approaching 70% in patients surviving to the hospital. Delayed recognition/treatment of a cardiac injury places a patient at even greater risk for mortality. The purpose of this study was to define and compare the incidence, severity, and mortality rate of cardiac injuries resulting from penetrating transthoracic or thoraco-abdominal stab wounds (SW) located inside versus outside of the classic cardiac box.

Methods: Patients who sustained thoracic and thoraco-abdominal SW at a single Level I trauma center, from May 2011 to Sept 2013, were identified using our NTRACS database. Data collected included demographics, injury location, admission vitals, ISS, injuries sustained, procedures required, overall/ICU LOS, vent days, complications and mortality. Patients sustaining SW inside the "cardiac box" (Inside) were compared to those with SW outside the borders of the "cardiac box" (Outside). Student's T test was used to compare groups.

Results: 109 patients were identified (51 Inside, 58 Outside). Overall incidence of cardiac injury (CI) was 7%. Demographics, avg admission vitals, CI rate/mortality and LOS were similar between the two groups. ISS was higher in the Inside group.(Table 1) The majority of Outside SWs were in the left hemithorax and below the nipple line. (Table 2) If the patient did not arrive in extremis, the presenting vitals were similar regardless of the presence of a CI.(Table 1) The overall mortality for patients with CI was 38% (40% Inside, 33% Outside). All deaths from CI were in patients who arrived in extremis.

Conclusions: This study shows that evaluation of the precordium must be performed in all patients who sustain any left sided thoracic or thoraco-abdominal SW regardless of vital signs and whether the wounds are located within the classic cardiac box. Improvements in time to diagnosis and treatment in these patients may lead to improved outcome.

		Outside (N = 58)	Inside (N=51)
Gender	M	56 (97%)	51 (100%)
	F	2 (3%)	0 (0%)
Average Age (years)		30 +/- 12	33 +/- 15
Average ISS		9 +/- 8	13 +/-12*
Average Admission	SBP (mmHg)	137 +/-20	117 +/- 46
	HR (bpm)	83 +/-18	83 +/- 34
	RR (bpm)	21 +/-7	19 +/- 7
	GCS	15	13 +/- 4
Average	LOS (days)	4 +/- 3	4 +/- 4
	ICU LOS (days)	0 +/- 1	1 +/- 2
	Vent Days	0 +/- 1	0 +/- 1
Cardiac Injuries		3 (5%)	5 (10%)
Mortality from Cardiac Injury		1 (2%)	2 (4%)
		Cardiac Injury (Not in Extremis)	No Cardiac Injury
Average Admission	SBP (mmHg)	117 +/-23	130 +/- 30
	HR (bpm)	92 +/-9	94 +/- 26
	RR (bpm)	20 +/-4	20 +/- 7

*P<0.05

Table 1: Patient demographics, admission (with and without CI) and disposition data.

Location of Stab Wound	Number of patients	Number of Cardiac Injuries Found
Left Hemi-thorax Lateral to Mid-clavicular line	31	3
Right Hemi-thorax Lateral to Mid-clavicular line	19	0
Both Right and Left Sides Lateral to Mid-clavicular line	7	0
Below Nipple line	34	3

Table 2: Distribution of SW locations for patients with Outside the box SWs

Scientific Posters - Group III - Clinical Science

Poster 17

THE INCIDENCE OF PULMONARY EMBOLISM AFTER COMBAT RELATED TRAUMATIC AMPUTATION IS HIGHER THAN WE THOUGHT: AN ANALYSIS OF 366 COMBAT CASUALTIES

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Jesse Bandle, Kameran Nieses, Michael Galarneau
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Presenter: Matthew Tadlock, MD

Objectives: The incidence of pulmonary embolism (PE) after traumatic amputation (TA) is 1.3% in civilians and 3.7% in a recent analysis of 103 combat amputations. Our goal was to determine PE incidence and risk factors in a large cohort of combat amputees.

Methods: The Expeditionary Medical Encounter Database and chart review were used to identify and abstract data from patients suffering a TA proximal to the wrist or ankle. All patients presenting to a Navy Role 2 or 3 facility from January 2009-December 2011 who underwent surgical amputation within 48 hours of injury were included. Patients were followed for 12 months after injury. . PE risk factors were identified utilizing multivariable logistic regression.

Results: During the 3-year study period, 426 suffered a TA. Of the 366 with adequate records for review, 99.5% were male, 97.5% suffered a blast injury and 94.5% were injured in Afghanistan. Mean age was 24.3, median Injury Severity Score 21 and 86.9% received chemical prophylaxis. PE incidence was 16% (59), of which 20% had a concomitant DVT. The DVT rate was 16% and PE and/or DVT was found in 28%. Those with at least one above knee amputation had a higher PE rate compared to those with only lower level amputations (21% vs. 12.3%, $p<0.04$). Massive transfusion (> 10 units) with packed red blood cells and/or fresh whole blood (PRBC/FWB) occurred in 64.2%. As transfused PRBC/FWB units increased, so did the PE incidence (table 1). Upon multivariable analysis, only units of PRBC/FWB transfused (Odds Ratio 1.24, 95% CI, 1.07-1.45) was associated with PE identification (table 2).

Conclusions: The incidence of post-injury PE in this large cohort of combat amputees is significantly higher than previously described and highest in those with above knee amputations. However, only increasing units of blood transfused was independently associated with PE identification.

Units of RBC + FWB	Number of Patients	% DVT	% PE
0 to 3 units	59	5% (3)	7% (4)
4 to 9 units	72	8% (6)	9% (8)
10 to 19 units	118	14% (17)	22% (26)
20+ units	117	28% (33)	18% (21)
Total	366	16% (59)	16% (59)

Table 1: Blood Transfusion and PE/DVT Incidence ($p<0.01$)

	Univariate Analysis P value		Logistic Regression OR (95%CI)	
Independent Variable	*DVT*	*PE*	*DVT*	*PE*
Multiple Amputations	0.01	0.01	--	--
Above Knee Amputation	<.01	0.09	--	--
Through Knee Amputation	--	--	--	--
Injury Severity Score	<.01	0.06	**1.04 (1.02-1.07)**	--
Head AIS>2	--	--	--	--
Pelvic Fracture	<.01	0.04	--	--
Blood units (square root)	<.01	<.01	--	**1.24 (1.07-1.45)**
Ventilator Days	<.01	0.05	**1.10 (1.01-1.20)**	--

Table 2: Risk Factors For PE and DVT

Poster 18

SEX BASED THROMBOELASTOGRAPHY DISPARITIES POST-INJURY: INDEPENDENTLY DIFFERENT EARLY ON BUT WHY?

Tiahuna Zhou, BS, Samuel Zolin, Timothy Billiar, MD,
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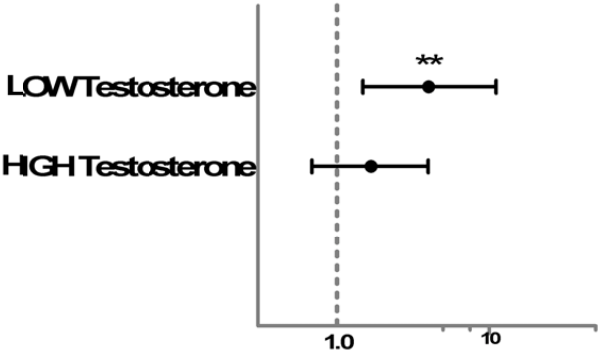
Presenter: Tiahuna Zhou, BS

Objectives: The beneficial use of thromboelastography (TEG) to adequately detect coagulopathy and direct blood component transfusion during resuscitation has been demonstrated. Despite this evidence, little is known regarding male and female differences in TEG measurements and the mechanisms responsible for disparities post-injury. We hypothesized there would be significant differences in TEG parameters with females being more hypercoaguable due to sex hormone differences.

Methods: Data were derived from a prospective cohort study designed to characterize mechanisms responsible for sex based outcome differences post injury. Blunt injured patients requiring ICU admission were included. Isolated TBI, cord injury or patients on anticoagulation were excluded. TEG parameters (r, k-time, alpha angle, MA, G, LY30) and sex hormone levels (estradiol, total testosterone) were obtained <6 hrs and at 24 hrs post injury.

Results: Males and females in the study cohort (n=208) were similar in injury severity, presenting vitals, GCS, 24 hour resuscitation/transfusion needs and presenting INR. Regression analysis demonstrated female sex was independently associated with hypercoaguable TEG parameters at 6 hours (R, k-time, MA, G) and at 24 hours (k-time, alpha angle) after controlling for important confounders. TEG based hypercoagulability in females was present irrespecitve of age (>/< 50yoa) and early estrogen levels (high/low). TEG based hypercoagulability in females was no longer apparent when early testosterone levels were elevated.

Conclusions: Independent disparities exist in TEG parameters across males and females post-injury. These differences were apparent early and remained persistent with females demonstrating a hypercoaguable phenotype. The data suggest that early testosterone rather than age or estrogen levels may be play a role in these independent TEG based disparities across males and females post injury.



Independent OR For TEG Hypercoagulability Associated With Female Sex,**=p< 0.05

Scientific Posters - Group IV - Hemorrhage, Coagulation, and Hematology

Poster 19

RDW: A RELIABLE PREDICTOR OF EMERGENCY SURGERY OUTCOMES

Elizabeth McDonald, Michael K. Dalton, MPH,
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Yale School of Medicine

Presenter: Elizabeth McDonald

Objectives: Red Cell Distribution Width (RDW), a routine component of the complete blood count (CBC) has been shown to predict outcomes in general medical, critically ill, and trauma populations. We evaluated its predictive ability in patients undergoing emergent operative intervention.

Methods: The operative logs for all acute care surgeons at a single center over two years were queried. RDW on presentation and post–operative day one, clinical presentation characteristics, operative intervention, comorbidities, complications, and mortality were abstracted from the medical record. Presenting RDW and change in RDW to post-operative day one were compared to mortality and complications. Univariable and multivariable linear and logistic regression were applied where appropriate.

Results: Among 239 patients the average age was 41, 144 were male and 49 operations were for trauma. On presentation 22 were hypotensive, 78% met at least one criterion for sepsis and 40% met two or more. RDW on presenting CBC was lower for survivors (12.62 vs. 14.38; $p = 0.002$) and higher for those with complication (13.13 vs. 12.45; $p=0.008$). There was no difference in RDW for those with infectious complications (12.72 vs. 12.62; $p = 0.757$). After controlling for comorbidities and shock presenting RDW remained predictive of mortality (OR 1.27 per unit increase in RDW, 95%CI 1.01 – 1.60) and morbidity (OR 1.15 per unit increase in RDW 95% CI 0.99 – 1.34). The effect was similar for emergency general surgery and trauma patients. Change in RDW also predicted mortality (0.83 vs. 0.33; $p= 0.005$) and complications (0.45 vs. 0.27; $p=0.042$) however this correlated with and was likely driven by transfusion of red blood cells ($r=0.230$, $p=0.004$).

Conclusions: RDW is a readily available parameter predictive of survival and complications for emergency surgical procedures. Change in RDW also predicts outcome but may reflect transfusion of potentially aged red blood cells.

Notes

Poster 20

MASSIVE HEMORRHAGE CONTROL - A RE-EVALUATION OF AVAILABLE MODERN TOURNIQUETS

Nicholas M. Studer, MD, EMT-P, Gregory Horn, Paul D. Danielson, MD*
San Antonio Military Medical Center

Presenter: Nicholas M. Studer, MD, EMT-P

Objectives: Extremity tourniquets are proven to reduce mortality from hemorrhage, a leading cause of preventable battlefield death both historically and in the current conflicts in Southwest Asia. The intent of this study was to evaluate the ability and confidence of typical enlisted field medical providers to control massive hemorrhage using four extremity tourniquets sold to the U.S. Government: the Combat Application Tourniquet (CAT), SOF Tactical Tourniquet-Wide (SOFTT-W), Military Emergency Tourniquet (MET), and Ratcheting Medical Tourniquet (RMT).

Methods: A convenience sample of 39 at a Regional U.S. Air Force Hospital participated. An initial survey of prior experience and training was completed followed by skill evaluation using a crossover design where participants applied four devices in random order for time to the KForce Hemostatic Wound Trainer. Finally, participants completed a Likert-scaled survey of confidence and preference on each device. These data were analyzed by ANOVA and Studentâ€™s T-tests.

Results: Less than 1 in 6 in this cohort had used an extremity tourniquet on a live patient. This group averaged only 7 prior training opportunities with extremity tourniquets, with 8/39 reporting either a single iteration or no previous training. In practical application, the CAT scored highest in successful applications (39/39, $p<0.041$). It also scored highest in subjective rating of user confidence (4.69/5, $p<0.026$) and best design (4.36/5, $p<0.042$). Although participants applied the RMT fastest (mean 31 seconds, $p<0.01$), the successful application rate was only 21/39.

Conclusions: Currently available extremity tourniquets would benefit from continued refinement. Of the four devices tested, the CAT demonstrated superiority in this population with no failures to initially control hemorrhage. Military medical personnel would benefit from increased and more realistic training on lower extremity tourniquet application.

Table 1. Successful Application of Tourniquets to Stop Lower Extremity Hemorrhage

Tourniquet	Success Rate	Mean Time To Apply (seconds)
CAT	100.00%	52.3
MET	89.70%	50.9
RMT	55.30%	31.0
SOFFT-W	87.20%	44.8

Note: Results in blue are statistically significant. Time to apply includes only successful trials.

Table 2. Mean Subjective Ratings of Tourniquets After Testing

Tourniquet	CAT	MET	RMT	SOFTT-W
Confidence	4.69	3.90	3.82	4.28
Efficacy	4.23	3.36	3.18	4.00
Design	4.36	3.18	3.21	3.92
Overall	4.10	2.92	2.87	3.79

Note: Results in blue are statistically significant. Likert-scaled data above are scored from 1 to 5 with 5/5 representing a perfect score and 1/5 being very poor.

Poster 21

INTRA-ABDOMINAL PACKING WITH COMBAT GAUZE™ DURING DAMAGE CONTROL LAPAROTOMY: A SAFETY ANALYSIS

Rachel L. Choron, MD, Joshua P. Hazelton, DO*, Krystal Hunter, Lisa Capano-Wehrle, MPH, John Chovanes, DO*, Mark J. Seamon, MD*
Cooper University Hospital

Presenter: Rachel L. Choron, MD

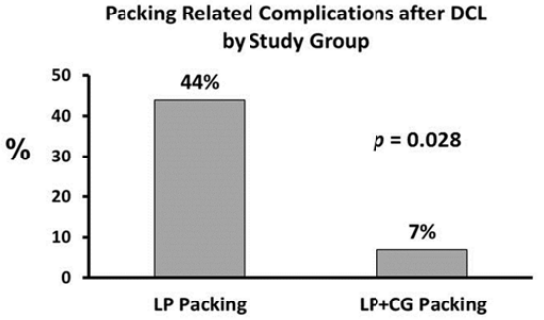
Objectives: Intra-abdominal packing with laparotomy pads (LP) is a common method for hemorrhage control in critically injured patients. Combat Gauze™ ([CG] Z-Medica QuikClot®), a kaolin impregnated hemostatic agent, in addition to LP, may improve hemorrhage control. While CG packing has been proven effective in a swine liver injury model, CG remains unstudied for human intra-abdominal use. We hypothesized that CG packing during damage control laparotomy (DCL) is safe and effectively controls hemorrhage.

Methods: A retrospective review (2011-2013) at an urban, Level-I Trauma Center of all DCL patients with intentionally retained packing was performed. Clinical characteristics, intraoperative and postoperative parameters, and outcomes were compared with respect to packing type (LP vs. LP+CG). To focus on "packing related" complications (defined as enteric fistulae, organ/space infections, or anastomotic leaks), patients who died within 24 hrs were excluded. A $p \leq 0.05$ was significant.

Results: Of 51 patients who underwent DCL with retained packing, 39 survived 24 hrs. When LP (n=25) and LP+CG (n=14) patients were compared (Table), no difference in age, mechanism, GCS, ISS, initial hemodynamic and resuscitation parameters, or operative findings was detected (all $p > 0.05$). After a median of 2 days and 4 units of blood products transfused from initial packing until final abdominal closure in both groups, 72% of LP and 57% of LP+CG patients ($p = 0.482$) developed any complication. Importantly, packing related complications were more common in LP than LP+CG patients (Figure, $p = 0.028$) including organ/space infections (LP, 28%; LP+CG, 7%) and anastomotic leak (LP, 27%; LP+CG, 0%).

Conclusions: While we were unable to prove that the addition of CG to standard LP packing improved hemorrhage control, our postoperative complication analysis does suggest that CG may be safely utilized for intra-abdominal packing during DCL.

Clinical Characteristics Compared with Respect to Combat Gauze™ Packing			
	LP Packing (n=25)	**LP + CG Packing** (n=14)	***p* value**
Age (years)	35.4 ± 16.8*	35.0 ± 12.8*	0.939
Penetrating Injury Mechanism	12 (48%)	8 (57%)	0.741
Initial Glasgow Coma Score	11.0 ± 5.3	11.7 ± 5.0	0.681
Injury Severity Score	22.4 ± 10.8	18.6 ± 11.1	0.305
Massive Transfusion Protocol Activation	16 (64%)	10 (71%)	0.7334
Initial OR Estimated Blood Loss (mL)	1500 (500 – 2250)**	1500 (950 – 7750)**	0.289
Initial OR Systolic Blood Pressure Nadir (mmHg)	85.5 ± 20.9	72.6 ± 39.8	0.196
Initial OR Temperature Nadir (°F)	95.1 ± 1.5	95.1 ± 2.1	0.898
Initial OR pH Nadir	7.21 ± 0.1	7.24 ± 0.1	0.437
Solid Organ Injury	14 (56%)	6 (43%)	0.515
Mean Injury Grade	3.3 ± 1.5	3.0 ± 1.1	0.679
Major Vascular Injury	5 (20%)	6 (43%)	0.156
Mean Injury Grade	3.0 ± 1.4	3.0 ± 1.1	1.000
Enteric Injury	18 (72%)	8 (57%)	0.482
Mean Injury Grade	2.8 ± 1.2	2.2 ± 0.9	0.155
Total Blood Products, Initial Laparotomy to Closure (units)	4.0 (1.5 – 8.0)	4.0 (2.0 – 6.0)	0.718
Total # of Laparotomies per Patient	2.0 (2.0 – 3.5)	2.5 (2.0 – 3.3)	0.761
Days until Abdominal Closure	2.0 (1.0 – 4.5)	2.0 (2.0 – 5.0)	0.392
Total Postoperative Complicatons	18 (72%)	8 (57%)	0.482
Ventilator Days	11.4 ± 9.6	11.1 ± 6.5	0.906
ICU Length of Stay (days)	16.0 ± 10.0	17.1 ± 8.2	0.710
Hospital Survival	24 (96%)	14 (100%)	1.000
*Mean ± Standard Deviation **Median (25th – 75th Percentile)			



Scientific Posters - Group V - Tools and Technologies

Poster 22

WASTE OF PLASMA: AN UNINTENDED CONSEQUENCE OF PREDEFINED RBC: PLASMA RATIOS

Erik W. Streib, MD*, Ben L. Zarzaur, MD, MPH*
Indiana University

Presenter: Erik W. Streib, MD

Objectives: Recent military and civilian trauma center experience indicates a benefit to resuscitation of patients in hemorrhagic shock using predefined ratios of red blood cell(RBC) to thawed plasma(TP). Massive transfusion protocols(MTP) have evolved using predefined ratios of RBC and TP. Over time the suggested ratio has decreased to 1:1. Because the shelf life of TP is much lower than RBC, there may be wastage of TP. The purpose of this study was to examine the evolution of MTP towards 1:1 and to determine if there has been an increase in waste of blood products.

Methods: A retrospective cohort of adult trauma patients admitted to an urban level 1 trauma center from 2008-2014 was formed by merging the MTP activation database and the trauma registry. The study period was divided into 4 time periods based on changes to MTP practices (Table 1). Waste of blood product was defined as a unit that was prepared but not transfused during MTP, and could not be used for another patient before expiration. Cost estimates were made using current cost per unit of blood product. Comparisons were made between periods before and after adjusting for patient level factors.

Results: 212 MTP activations were included. During period 1, the RBC:TP ratio was 3:2. In all subsequent periods, it was 1:1. There was an increase in TP waste in each study period after this change (Figure 1). After adjusting for patient and injury characteristics, this association remained. Decreasing the number of MTP sets prepared by the blood bank in period 4 did not reduce TP waste. Cost of this waste was $9774 in 2013.

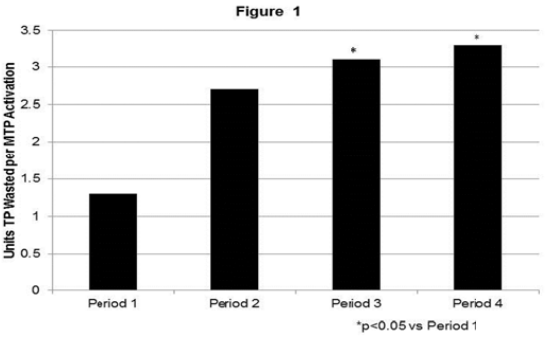
Conclusions: Changing an MTP RBC:TP ratio to 1:1 has resulted in increased waste of TP. Each change toward the goal of hemostatic resuscitation further increased waste without a subsequent decrease in mortality. This is both expensive and results in loss of a scarce resource. Future studies on patient focused TP usage compared to predefined ratios is recommended.

Table 1

Period	Contents of MTP set			RBC:TP Ratio	#sets prepared	Change
	RBC	TP	PLT			
1	6	4	1 every other set	3:2	2 in addition to issued	n/a
2	6	6	1 every other set	1:1	2 in addition to issued	Change in RBC:TP ratio
3	6	6	1 every other set	1:1	2 in addition to issued	TXA protocol added, MTP education
4	6	6	1 every other set	1:1	1 in addition to issued	Decrease number of sets blood bank prepares in excess of current use

MTP, massive transfusion protocol; RBC, red blood cells; TP, thawed plasma; PLT, apheresis unit of platelets; TXA, tranexamic acid

Table 1: Changes to MTP during the study time periods



Results: Plasma waste per MTP activation during the study time periods

Scientific Posters - Group V - Tools and Technologies

Poster 23

HTEE MEASURED SVC INDEX: A USEFUL TOOL FOR PREDICTING FLUID RESPONSIVENESS IN THE TRAUMA PATIENT

Brett M. Howard, MD, Amy Christie, Dudley Benjamin Christie, MD*, Dennis W. Ashley, MD*
Mercer University at Medical Center of Central Georgia

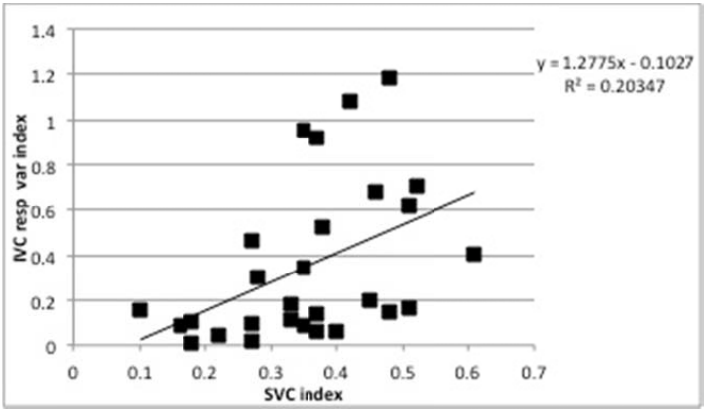
Presenter: Brett M. Howard, MD

Objectives: Both transthoracic echocardiography (TTE) and continuous transesophageal echocardiography (hTEE) may be used for rapid evaluation of hemodynamics in the critically ill trauma patient. TTE captured inferior vena cava (IVC) collapsibility can be useful in determining patient fluid responsiveness. Similarly, hTEE allows for serial measurements of the superior vena cava (SVC) collapsibility and estimation of fluid responsiveness. No studies have evaluated whether SVC and IVC measurements are comparable in estimating resuscitation needs. The objective of this study was to determine if hTEE captured SVC index is comparable and therefore an alternative tool to IVC respiratory variability index (IRVI) in predicting fluid responsiveness.

Methods: Critically ill trauma patients in the ICU of a Level 1 Trauma Center were followed from January- May 2014. Where hTEE was performed for hemodynamic monitoring purposes using Imacor hTEE (ZuraEVOZT1000), a surgical intensivist simultaneously performed TTE exams using Sonosite (MTurbo/2007-2012). SVC max. and min. areas were obtained for calculation of SVC index. IVC diameters, Dmax at end inspiration and Dmin at end expiration, were acquired to calculate IVC respiratory variation index (IRVI).

Results: 28 comparing examinations were obtained. When IRVI predicted fluid responsiveness in the ventilated trauma patient, the simultaneously obtained SVC index also predicated fluid responsiveness. ANOVA, regression, and concordance statistics compared the SVC and IVC measurements ($p < 0.05$).

Conclusions: We have shown a statistically significant correlation between SVC and IVC indices of fluid responsiveness in the mechanically ventilated trauma patients. Our data supports the use of hTEE captured SVC index for fluid responsiveness particularly in those trauma patients in which IVC measurements are difficult to obtain or may be unreliable.



Scatter plot comparing IVC and SVC indices.

Poster 24

RECURRENCE AND COMPLICATION RATES IN ACUTE CARE SURGICAL PATIENTS UNDERGOING VENTRAL HERNIA REPAIR WITH ABSORBABLE BIOSYNTHETIC MESH

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Presenter: Jimmi Mangla, MD

Objectives: Permanent synthetic mesh offers lower overall recurrence rates (≈5% vs. 30%), but biologic prostheses have been increasingly utilized for hernia repair, especially in contaminated operative fields. The purpose of this study was to evaluate our experience in patients undergoing Ventral hernia repair (VHR) using absorbable biosynthetic mesh (BIO-A®).

Methods: All patients undergoing an open VHR using BIO-A® mesh at a single institution from August 2011 to May 2013 were reviewed retrospectively. Patient demographics, early and late wound complications, post-operative outcomes, re-intervention, and recurrence rates were analyzed.

Results: Thirty five patients underwent an open VHR (17 intra-peritoneal, 12 Rives Stoppa, and 6 pre-peritoneal underlay) using BIO-A® mesh. The median age was 61 and median follow-up was 18.5 months. Overall recurrence rate was 31.4%. The median time to recurrence was 7 months. There was no difference in risk of recurrence versus operative wound classification (p=0.55) or location of mesh placement (p=0.48). Table 1 shows demographics and preoperative factors. Table 2 shows the outcome variables in all subgroups. There is no difference in recurrence probability between the clean and clean-contaminated *versus* contaminated and dirty groups (Figure 1) (p=0.73).

Conclusions: BIO-A® mesh prosthesis use is associated with early and high recurrence rates regardless of operative wound classification and location of prosthetic placement. Controlled studies and comparisons with permanent synthetic prostheses are needed to clarify the potential role of BIO-A® in acute care surgery.

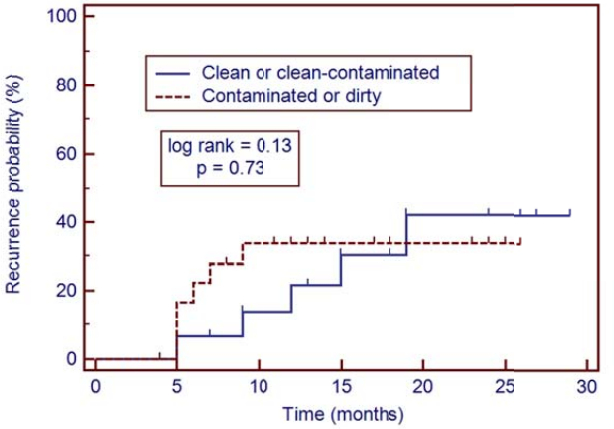

Figure 1 shows Kaplan Meier curve for probability of hernia recurrence and wound classification grouped into two groups (Clean + Clean-contaminated *vs* contaminated + dirty).

Table 1: Demographics and Preoperative Factors

Demographic Variable	All VHR	Intraperitoneal	Rives Stoppa	Preperitoneal
n	35	17	12	6
Age (yrs)	61	65	59	55
Males (%)	4209	47.1	47.1	33.9
Median BMI	34.9	35.6	31.9	33.4
BMI>30 (%)	65.7	64.7	66.6	66.6
Diabetes (%)	25.7	23.5	25	33.3
Smoking(%)	14.3	17.6	8.3	16.7
MRSA(%)	14.2	11.7	16.7	16.7
Number of Previous Abdominal Operations Median (Range)	3 (1-10)	3 (1-6)	2.5 (1-10)	3 (1-4)
Patients with Previous Hernia Repair(%)	57.1	29.4	33.3	33.3
Operative Field (%)*	25 (71.4)	13 (75)	9 (76.5)	3 (50)
• Clean	10	4	3	3
• Clean Contaminated	5	2	2	1
• Contaminated	8	4	3	1
• Dirty	12	7	4	1

VHR: Ventral Hernia Repair *(Clean-Contaminated, Contaminated or Dirty)

Table 2: Outcome Variables

Outcome Variable	All VHR	Intraperitoneal	Rives Stoppa	Preperitoneal
n	35	17	12	6
Median Follow-up Months (Range)	18.5 (4-29)	13(4-27)	16.5 (4-26)	17 (12-29)
Median LOS (days)	8	8	12	4
Early Wound Complications Rate(%)	17.1	5.9	41.7	0
Late Wound Complications Rate(%)	28.6	41.2	16.7	16.7
Overall Recurrence Rate(%)	31.4	23.5	33.3	50
Time to Recurrence Months (Range)	7 (5-19)	7 (5-19)	6.5 (5-9)	12 (5-15)

VHR: Ventral hernia Repair LOS: Length of Stay

Poster 25

EVALUATING THE CONSISTENCY OF PERFORMANCE METRICS AMONG TRAUMA CENTERS CARING FOR INJURED CHILDREN

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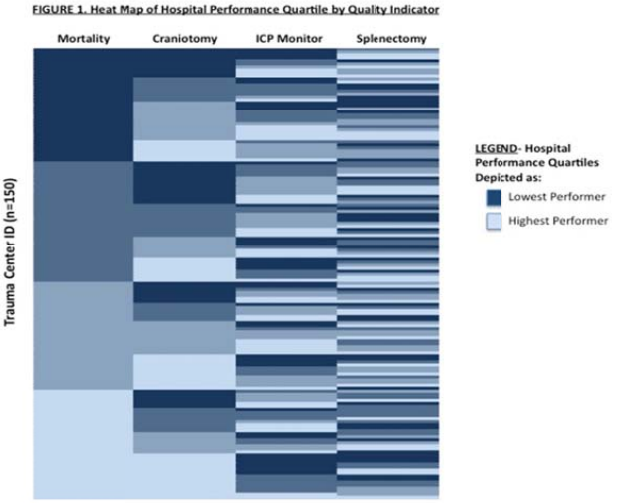
Presenter: Chethan Sathya, MD

Objectives: Several indicators of quality pediatric trauma care have been proposed including low trauma-related mortality, low splenectomy rates after blunt splenic injury (BSI), liberal use of ICP monitors after severe traumatic brain injury (TBI), and high craniotomy rates after severe subdural/epidural hematomas. It is not known if center level performance is consistent in each of these metrics. We sought to evaluate whether center performance in one quality metric predicted similar performance in another.

Methods: We reviewed children ≤18 years old with an injury AIS≥2 treated from 2010-2011 at 150 trauma centers participating in the Trauma Quality Improvement Program (TQIP). Multi-level modeling was used to determine hospital-specific adjusted odds ratios for each quality indicator. Hospitals were ranked into quartiles of odds ratios for each indicator, with quartile 1 and 4 representing low and high performers, respectively. A heat map, which color codes each center based on quartile of performance, was generated to visually depict consistency across each indicator. Kappa statistics were used to test multiple pairwise agreements between indicators and the overall agreement between all four indicators.

Results: Among 84,880 children evaluated, 1320 died, 3603 had BSI, 3503 had severe TBI, and 1286 had an epidural/subdural. Although some agreement between mortality and craniotomy rates was apparent (Figure 1), there was a general lack of concordance among indicators. Kappa statistics showed slight pairwise agreement when comparing mortality and craniotomy rates (0.17(0.02, 0.32)), however, the overall kappa for all four indicators was not significant (-0.012(-0.07, 0.06)).

Conclusions: Trauma centers that are high or low performers in one area do not always perform similarly in other domains. This lack of consistency needs to be considered when developing composite measures of overall hospital performance.



Heat map where dark blue represents low center performance and lighter blue represents high center performance within each quality indicator

Scientific Posters - Group V - Tools and Technologies

Poster 26

THE MODIFIED RANKIN SCORE PREDICTS RETURN TO WORK POST- INJURY

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Presenter: Anirudh Kohli, MD

Objectives: Return to work is a primary metric of functional outcome post-injury. While several studies have examined factors predicting return to work, this data is injury specific, e.g., traumatic brain injury, and has limited clinical utility. The modified Rankin Score (mRS) is a validated and simple measure of physical disability used to assess rehabilitation after stroke. A score of 5 has severe disability and 0 is asymptomatic. We began a performance improvement project to determine how many patients returned to work and in what physical capacity after being discharged from the trauma service. We hypothesized that the mRS could be used to predict patients who returned to work post-injury in a general trauma population.

Methods: The trauma registry was queried for all patients 18-65 years old discharged from June 30, 2012 to July 1, 2013. Exclusion criteria included: prior physical and/or neurocognitive deficits, unemployment, non-English speakers. Patients were contacted by phone survey and asked about employment and their present physical ability to determine the mRS. Patients who had returned to work (RTW) were compared to those who had not (noRTW). Multivariate analysis with de-identified patient data was used to identify independent predictors of return to work with significance $p<0.05$

Results: There were 185 patients who met inclusion criteria with a mean follow-up of 13.5 months. RTW and noRTW groups were similar except the RTW had lower median age, LOS, mRS (Table 1). Multivariate analysis revealed that a mRS of 2 or less was associated with a significant increased return to work (OR 11.65, $p<0.001$) (Table 2).

Conclusions: To our knowledge, this is the first study to apply the modified Rankin Score to predict return to work post-injury. Our performance improvement project shows that the mRS independently predicts a patient's return to work and a patient with a Rankin score of 2 or less is 12 times more likely to return to work.

Demographics	Patents who returned to work	Patierts who did not return to work	p Value
Number	133	52	
Age, years (IQR)	33.7(25.9,46.4)	43.1(33.5,54.8)	0.002
Gender			0.205
Male (%)	97(72.9%)	33(63.5%)	
Race			<0.001
White (%)	27(20.3%)	8(15.4%)	
Black (%)	31(23.3%)	29(55.8%)	
Hispanic (%)	40(30.1)	7(13.5%)	
Other (%)	35(26.3%)	8(15.4%)	
Mech of Injury			0.148
Blunt (%)	112(84.2%)	48(92.3%)	
Penetrating (%)	21(15.8%)	4(7.7%)	
Disposition			<0.001
Home (%)	114(85.7%)	32(61.5%)	
Acute Rehab (%)	17(12.8%)	14(26.9%)	
Long Term Rehab (%)	2(1.5%)	6(11.5%)	
Median ISS Score (IQR)	5(4,10)	5(4,10)	0.574
Median LOS (IQR)	4(2,7)	7(4,11.8)	<0.001
Median Rankin Score (IQR)	1(0,2)	2(2,3)	<0.001
Complications (%)	9(6.8%)	14(26.9%)	<0.001

Table 1 Demographics and Characteristics of Patients Who Returned to Work Versus Those Patients Who Did Not Return To Work Post-Injury

Co-variables	OR	95% CI	p Value
Age	0.949	0.916-0.984	0.004
Gender			0.658
Female (Ref)			
Male	0.808	0.313-2.081	
Race			0.00
White (Ref)			
Black	0.178	0.051-0.621	0.007
Hispanic	1.321	0.337-5.168	0.69
Other	1.466	0.371-5.8	0.585
Mech of Injury			0.244
Blunt(Ref)			
Penetrating	2.418	0.547-10.684	
Rankin score </= 2	11.646	3.548-38.226	<0.001
ISS	1.018	0.957-1.083	0.574
LOS	1	0.98-1.02	0.975
Disposition			0.117
Home (Ref)			
Acute Rehab	0.331	0.108-1.018	0.054
Long Term Rehab	0.304	0.034-2.746	0.289
Complications	0.386	0.091-1.644	0.198

Table 2 Multivariate Analysis to Show Independent Predictors For Returning to Work Post-Injury

Poster 27

IMPROVING UNDER TRIAGE IN A RURAL LEVEL 1 TRAUMA CENTER: ESTABLISHING A STANDARDIZED TOOL FOR THE CRITICAL TRAUMA DECISION

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Johnson City Medical Center

Presenter: Carol Jones, APN

Objectives: Imprecision in a trauma triage system results in under triage (UT), ineffective resource utilization and increased mortality. The objective of this project was to improve patient care and UT rates by implementing revised Trauma Team (TT) activation guidelines using a standardized method; the Value Optimization System (VOS).

Methods: Data was analyzed over a 2.5 year period. Beginning in 2012, baseline UT rates were retrospectively measured by chart review of pre-hospital mechanism of injury (MOI) and anatomy of injury compared to the level of TT activation. Activation guidelines were improved to emphasize ground level falls, special populations and low volume/high risk MOI. A VOS/LEAN PI team initiative (Rapid Improvement Event) was implemented in Jan 2013 to include daily concurrent chart review comparing revised TT guidelines to pre-hospital information. NTRACS registry data was utilized to compare ISS to TT activation levels.

Results: Following revision of activation criteria and VOS Team collaboration, the UT rate decreased from 35% (2012), 10%(2013) to 3.9%(2014). For 2012 deaths, 60% included TT activations, 79% of which had ISS >15; in 2013, 62% included TT activation; 64% had ISS >15. The percentage of all traumas >ISS 15 with no TT activation was 21.5 % in 2012 and 21% in 2013. Overall death rate decreased from 3% to 2% by end of the study period.

Conclusions: Using a standardized, system wide method (VOS) to revise and implement TT guidelines, a marked decrease in UT (35% to 3.9%) and decreased mortality at our Level 1 rural trauma center were noted. The success of this standardized method may offer a rapid solution for other trauma centers faced with high UT rates and contribute to improved resource utilization and, most importantly, lower trauma mortality. Further analysis of non-surgical trauma admissions as well as increased TT activations are required.

Notes

Poster 28

EVALUATION OF THE MILITARY ACUTE CONCUSSION EVALUATION (MACE) TO SCREEN FOR MILD TRAUMATIC BRAIN INJURY IN A CIVILIAN TRAUMA POPULATION

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Presenter: Melvin E. Stone Jr, MD

Objectives: Mild traumatic brain injury (mTBI) comprises 75% of over 1.5 million traumatic brain injuries annually. There exists no consensus on point-of-care screening for mTBI. The Military Acute Concussion Evaluation (MACE) is a quick and easy test used by the U.S. Army to screen for mTBI; however, its utility in civilian trauma is unclear. It has two parts: a history section and the Standardized Assessment of Concussion (SAC) score (0-30) previously validated in sports injury. As a performance improvement project, our institution sought to evaluate the MACE as a concussion screening tool that could be used by house staff in a general civilian trauma population.

Methods: From June 2013 to May 2014, patients 18 to 65 with suspected concussion were given the MACE within 72 hours of admission to our urban Level I trauma center. Patients with a positive head CT were excluded. Demographic data and MACE scores were recorded in prospect. Concussion was defined as loss of consciousness (LOC) and/or post-traumatic amnesia (PTA); concussed patients were compared to non-concussed. Sensitivity and specificity for each respective MACE score was used to plot a receiver operating characteristic (ROC) curve. A ROC curve area of 0.8 was set as the benchmark for a good screening test to distinguish concussion from non-concussed.

Results: There were 84 concussions and 30 patients non-concussed. Both groups were similar; however, the concussion group had a lower mean MACE score than the non-concussed (Table1). Table 2 shows sensitivity/specificity for a range of MACE scores used to plot the ROC curve. ROC curve area was only 0.65.

Conclusions: The MACE had a lower mean score for patients with concussion, defined by LOC and/or PTA. However, the low ROC curve area of 0.65 highly suggests the MACE alone would be a poor screening test for mTBI in the general civilian trauma population.

	Non-Concussed	Concussion	P-Value
Age (Mean±SD)	36.9±13	36.1±13	0.77
Gender (M/F %)	76.7/23.3	76.2/23.8	0.95
Admission GCS (Mean±SD)	14.9±0.2	14.8±0.4	0.11
Injury Severity Score (Mean±SD)	5.1±5.9	4.3±4.6	0.52
Total MACE Score (Mean±SD)	25.9±2.7	23.5±4.8	**0.001**
Time to evaluation (Mean – Hours)	21.5±15	23.6±14	0.48
Education level %			
Grad School	6.7	6.2	
College	23.3	32.1	0.66
High School	53.3	40.7	
Other*	16.7	21.0	
Language %			
English	86.6	81	
Spanish	6.7	16.6	0.24
Other	6.7	2.4	
Mechanism %			
Assault	20.0	23.8	
Fall from Height	13.3	6.0	
Fall from Standing	3.3	11.9	
MVC**	10.0	7.1	0.14
MCC‡	30.0	31.0	
Pedestrian Struck	10.0	17.9	
Others	13.3	2.4	

** MVC: Motor Vehicle Collision, ‡ MCC: Motorcycle Collision, * Patients who did not complete high school

Table 1. Demographics/Characteristics of MACE Study Groups: Concussed and Non-Concussed

≤ MACE Score	Sensitivity	Specificity
22	28.5%	93%
23	36.9%	90%
24	40.4%	80%
25	40.4%	80%
26	47.8%	77.7%
27	69%	53%
28	83.3%	20%

*Area under ROC curve is 0.65

Table 2. Concussion Screening Sensitivity and Specificity for each MACE Score and To Generate Receiver Operator Characteristic Curve (ROC)*

Poster 29

DEFINING THE CERVICAL SPINE CLEARANCE ALGORITHM: A SINGLE INSTITUTION PROSPECTIVE STUDY OF OVER 9000 PATIENTS

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Virginia Commonwealth University

Presenter: Therese M. Duane, MD, FACS

Objectives: There is variability in the approach to cervical spine (c-spine) clearance. This study provides an evidence-based algorithm that allows for timely removal of collar, appropriate spine consultations, and optimal use of imaging.

Methods: A prospective study of all adult blunt trauma patients presenting as trauma team alerts (TTA) at a Level-I trauma center who underwent CT c-spine to diagnose/rule-out c-spine injury (1/08-5/14). Mechanism, demographics and presenting signs/symptoms were documented. Patients with and without c-spine injury were compared and risk factors for fracture and/or ligament injury were identified using regression analysis with p value <0.05 considered significant.

Results: 9232 patients met inclusion criteria. C-spine injury was identified in 588 (6.37%). 574 (6.22%) patients had fractures and 59 (0.64%) had ligament injuries with 14 (0.15%) having ligament injury with no fracture. No patient with a normal CT was found to have an injury. Table 1 shows the independent risk factors for injury. Only 66 TTA patients had none of these risk factors. There were three independent predictors of ligament injury: midline tenderness to palpation (TTP) (2.32; 1.32-4.07, p=0.0033), initial GCS < 15 (MS) (2.36; 1.33-4.18, p=0.0035), and fracture (FX) (37.87; 20.19-71.04). Patients with either TTP or MS had a ligament injury rate of 0.21% and those with FX had a rate of 2.84%. Patients with all three factors had a rate of 20%. Figure 1 demonstrates the algorithm.

Conclusions: All TTA patients should undergo c-spine CT to rule out injury. Most patients will have a normal CT and can have their collars safely removed. A select group of patients will require collars and spine consultation and a smaller subset an early MRI to rule out ligament injury. By instituting this algorithm trauma centers will improve resource utilization and comfort of the trauma patient without sacrificing safety.

	Odds Ratio	Confidence Interval	P value
Tenderness to midline	3.123	2.584-3.774	<0.0001
GCS < 15	2.743	2.249-3.344	<0.0001
Intoxicated	1.329	1.091-1.620	0.0048
Age 65 years	2.529	1.988-3.217	<0.0001
Paresthesias	2.067	1.494-2.861	<0.0012
Headload mechanism	2.221	1.369-3.604	0.0012
High speed MVC	1.410	1.155-1.721	0.0007
Rollover MVC	1.365	1.107-1.682	0.0036
Ejection	2.017	1.587-2.564	<0.0001
Not simple rearended MVC	1.861	1.089-3.181	0.0231
Never sitting up in ED	5.019	3.018-8.348	<0.0001
Never ambulatory at scene	1.453	1.107-1.908	0.0071

Table 1: Risk factors for injury

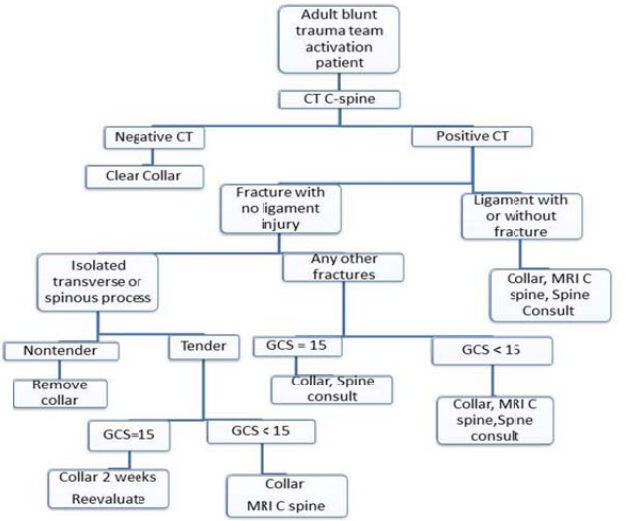


Figure 1: C-spine clearance algorithm

Poster 30

POST DISCHARGE TBI MORTALITY

Gabriel E. Ryb, MD, MPH, FACS*, Christina Greene,
Patricia C Dischinger, PhD, Gordon Smith
University of Maryland School of Medicine

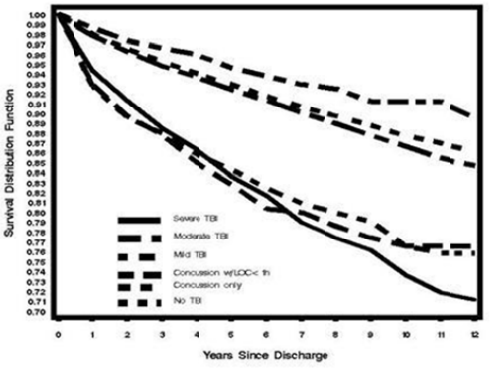
Presenter: Gabriel E. Ryb, MD, MPH, FACS

Objectives: To describe the post discharge mortality (PDM) of TBI patients.

Methods: Blunt injury adults discharged alive from a Level I Trauma Center 7/1995 through 12/2008 were identified in the trauma registry. For those with anatomically identifiable (AI) TBI, severity was determined as "severe", "moderate" and "mild" based on the admission GCS (<9, 9-12, 13-15, respectively). Those without AI TBI were classified as "concussion with loss of consciousness (LOC)", "concussion without LOC" and "no TBI". Determination of death and its date was obtained from the National Death Index through 12/31/2008. Cases dying within 30 days were excluded. Differences in the PDM in relation to TBI severity were determined with Kaplan-Meier curves using the log rank test with adjustment for multiple comparisons. Cox proportional hazard regression(CPHR) was used to adjust for confounders (age, gender, injury severity, mechanism, race and alcohol use). Results were reported as Hazard Ratios (HR) and their 95% CI.

Results: A total of 48,864 cases ["severe" (3.0%), "moderate" (1.2%), "mild" (8.4%), "concussion with LOC" (32.5%), "concussion without LOC" (6.9%), and "no TBI" (48.0%)] were available for analysis. 4,320 deaths occurred during the 12.5 year follow up period (median 5.1 years). Survival analysis (see figure) revealed significant differences among all groups except between the two concussion groups. CPHR using the "no TBI" cases as reference population revealed an increase in all-cause PDM for "severe" TBI [HR 1.85 (1.58-2.18)], "moderate" TBI [HR1.35 (1.09-1.66)] and "concussion with LOC" cases [HR 1.16 (1.01, 1.34)]. Older age, male gender, higher ISS, and black ethnicity were also associated with PDM.

Conclusions: Patients with AI moderate TBI, AI severe TBI and concussions with LOC, but not patients with AI mild TBI, experience higher adjusted PDM than non-TBI patients. Further research should identify the causes of death and possible causal pathways that explain this association.



KAPLAN-MEIER CURVE: SURVIVAL AFTER DISCHARGE BY TBI SEVERITY

	Hazard Ratio (95% CI)
Concussion without LOC	0.86 (0.73-1.02)
Concussion with LOC	1.16 (1.01-1.34)
Anatomical Injury w/ GCS 13+	1.06 (0.95-1.18)
Anatomical Injury w/ GCS 9-12	1.35 (1.09-1.66)
Anatomical Injury w/ GCS<9	1.85 (1.58-2.18)
Positive BAC	1.21 (1.02-1.43)
Unknown BAC	1.10 (1.01-1.20)
ISS 9-15	1.08 (1.00-1.17)
ISS 16-24	1.16 (1.05-1.28)
ISS 25-49	1.42 (1.25-1.61)
ISS 50 +	3.18 (2.30-4.38)
ISS Missing	0.95 (0.78-1.16)
Age 30-44	2.46 (2.15-2.82)
Age 45-54	4.97 (4.32-5.71)
Age 55-64	7.40 (6.39-8.57)
Age 65+	25.47 (22.37-29.0)
Male	1.24 (1.16-1.33)
Other Blurt	0.84 (0.70-1.02)
Other Vehicle	0.58 (0.42-0.80)
Fall	1.87 (1.74-2.01)
Beating	1.64 (1.44-1.86)
Pedestriar	1.23 (1.08-1.41)
Motorcycle	0.71 (0.57-0.89)
Black	1.21 (1.13-1.30)
Other and Unknown ethnicity	0.61 (0.52-0.72)

COX PROPORTIONAL HAZARD MODEL PREDICTING POSTDISCHARGE MORTALITY (YEARS) - (Non-TBI, BAC -, ISS<9, age 18-29, female sex, MVC and White race used as reference)

Poster 31

OCCULT HYPOPERFUSION IS ASSOCIATED WITH MORTALITY FOLLOWING TRAUMATIC BRAIN INJURY

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Fred Bongard, Brant Putnam, David S. Plurad, MD*
Harbor-UCLA Medical Center

Presenter: Dennis Kim

Objectives: Although secondary brain injury due to hypotension and hypoxia is known to increase mortality in patients with traumatic brain injury (TBI), the impact of occult hypoperfusion (OH) on outcomes is not well-defined. We hypothesized that OH is associated with mortality following TBI.

Methods: We performed a retrospective analysis of adult patients with TBI directly admitted to our Level I trauma center following a blunt mechanism of injury over a 5-year period (Jan. 1, 2008 - Dec. 31, 2013). Patients with an Abbreviated Injury Scale score ≥3 in more than two body regions were excluded. Patients with OH (defined as an admission arterial blood gas [ABG] lactate ≥2 mmol/L or base deficit ≤-4 mmol/L in the absence of hypotension [SBP ≤90 mmHg]) were compared to patients without OH. Multivariate logistic regression analysis was performed to identify independent predictors of mortality.

Results: Of 518 patients, 311 (60%) met criteria for OH. Patients with OH demonstrated a higher Injury Severity Score (23 vs. 19, $p<0.0001$) and were more likely to present with severe TBI (48% vs. 19%, $p<0.001$) than patients without OH. OH patients also underwent more frequent intracranial pressure monitoring ($p<0.001$) and neurosurgical operative intervention ($p=0.02$). On multivariate analysis, OH was independently associated with mortality (OR=2.61; 95% CI=1.31-5.20, $p=0.006$) (Table 1). Subgroup analysis among patients with both an admission and 24-hour ABG demonstrated that clearance of lactate and base deficit was associated with decreased mortality (OR=0.33; 95% CI=0.11-0.96, $p=0.04$).

Conclusions: OH is common following TBI and associated with increased mortality. In addition to avoiding hypotension and hypoxia, identifying and reversing OH may improve survival in patients with TBI.

Variable	Odds Ratio	95% Confidence Interval	P value
Occult hypoperfusion	2.61	1.31 – 5.20	0.006
Hypotension	2.88	1.33 - 6.27	0.008
Age >40	3.62	1.74 – 7.55	0.001
Warfarin	3.81	1.83 – 12.82	0.03
Severe TBI	6.71	3.51 – 12.85	<0.001
Injury Severity Score ≥25	7.29	3.78 – 14.08	<0.001
Intoxicated*	0.40	0.21 -0.75	0.005
ICP monitor	0.28	0.13 – 0.60	0.001

Other variables: gender, acetylsalicylic acid, clopidogrel, craniotomy/craniectomy, hypoxia
TBI=traumatic brain injury; ICP=intracranial pressure
*Intoxicated (defined as serum alcohol ≥80mg/dL)

Table 1. Predictors of Mortality on Multivariate Regression Analysis

Poster 32

THORACOLUMBAR SPINE CLEARANCE: CLINICAL EXAMINATION IN PATIENTS WITH DISTRACTING INJURIES

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Sidney Brevard, MD, MPH*, Richard P. Gonzalez, MD*
University of South Alabama

Presenter: Jack Rostas, MD

Objectives: The purpose of this study was to prospectively assess the sensitivity of clinical exam to screen for thoracolumbar spine (TL-spine) injury in awake and alert blunt trauma pts with distracting (dst) injuries.

Methods: During the period from 07/12 to 04/14, all blunt trauma pts >13 years were prospectively evaluated per standard TL-spine exam protocol at a Level 1 Trauma Center. Awake and alert pts with GCS >14 underwent clinical exam of the TL-spine. Clinical exam was performed regardless of dst injuries. Pts with no complaints of pain or tenderness on exam of the TL-spine were considered clinically cleared of injury. Pts with dst injuries, including those clinically cleared and those with complaints of TL-spine pain or tenderness underwent CT scan of the entire TL-spine. Dst injuries were defined as closed head injury, extensive facial fxs, > 2 rib fxs, sternal fxs, intra-abdominal organ injury, pelvic fxs and long bone fxs. Patients with minor dst injuries were not considered to have a dst injury.

Results: 950 blunt trauma pts were entered, 530(56%) of whom had at least one dst injury. 209(40%) pts with dst injuries had a positive TL-spine clinical exam, of whom 101(48%) were diagnosed with TL-spine injury. 321 (60%) pts with dst injuries were initially clinically cleared, in whom 19(6%) TL-spine injuries were diagnosed. No missed TL-spine injuries required surgical intervention with only 5 injuries requiring TL orthotic bracing. This yielded an overall clinical clearance sensitivity of 96% (115/120) for clinically significant TL-spine injury.

Conclusions: In awake and alert blunt trauma pts with dst injuries, clinical exam is a sensitive screening method for significant TL-spine injury. Radiological assessment is unnecessary for safe clearance of the asymptomatic TL-spine in pts with dst injuries. These findings suggest significant potential reduction of both healthcare cost and radiation exposure.

Notes

Scientific Posters - Group VII - Systems and Processes

Poster 33

THE PRIVATE-ACADEMIC SURGEON SALARY GAP

Joseph M. Lopez, MD, James H. Holmes IV, MD*, Preston B. Rich, MD*, Jeffrey Carter, MD*
Wake Forest University Medical School

Presenter: Joseph M. Lopez, MD

Objectives: Every year a new class of surgeons is faced with the question: "Academic practice or private practice?" Both come with advantages and drawbacks. One of the well-known, but least discussed, differences is salary disparity. We seek to quantify the difference in salaries for surgeons entering practice.

Methods: A net present value (NPV) calculation was performed to assess positive and negative cash flows with a 5% discount rate and accounting for inflation for surgeons to assess the benefits and consequences of different careers. Positive cash flows were salary minus federal income tax according to the Medical Group Management Association and the Association of American Medical Colleges. For academic careers, it was assumed that 6 years were spent as an assistant professor and associate professor with the remainder of the career as full professor. Negative cash flows were the principle of student loans and interest at 5% fixed-rate over 25 years.

Results: The average reduction in 5% NPV for an academic surgeon as compared to a private surgeon is 12.8%. The reduction ranged from 4.2% to 25.5%. Neurosurgeons have the largest reduction at 25.5% with trauma surgeons at 23.1%. Pediatric surgeons have the smallest reduction at 4.2% while cardiothoracic, transplant and plastic surgeons also have reductions under 10%.

Conclusions: Academic and private practices have many intangible qualities that cannot be accounted for in our model. Our study demonstrates a lack of equitable income when comparing academic and private practice for different fields of surgery. Market economics may be driving this disparity based upon distribution of supply and demand. Our concerns center upon the large financial liability that surgeons incur due to growing educational debt and longer training. Coupled with changes in income gradients, this could shift physician practices in a short time period and threaten the fiscal viability of certain surgical fields or academic surgical careers.

Profession	Training (Yrs)	Private 5% NPV	Academic 5% NPV	Difference in 5% NPV	% Difference in 5% NPV
Trauma Surgeon	7	$2,028,234.00	$1,647,055.00	$381,179.00	23.14%
General Surgeon	5	$1,899,405.00	$1,711,108.00	$188,297.00	11.00%
General Surgeon	7	$1,723,456.00	$1,566,772.00	$156,684.00	10.00%
Cardiothoracic Surgeon	7	$2,453,976.00	$2,283,863.00	$170,113.00	7.45%
Pediatric Surgeon	7	$2,185,802.00	$2,096,975.00	$88,827.00	4.24%
Plastic Surgeon	6	$2,163,945.00	$2,009,261.00	$154,684.00	7.70%
Vascular Surgeon	7	$2,002,490.00	$1,727,962.00	$274,528.00	15.89%
Neurosurgeon	7	$3,049,108.00	$2,429,427.00	$619,681.00	25.51%
Surgical Oncologist	7	$1,829,603.00	$1,573,230.00	$256,373.00	16.30%
Transplant Surgeon	7	$2,033,974.00	$1,867,463.00	$166,511.00	8.92%
Orthopedic Surgeon	5	$2,582,615.00	$2,327,993.00	$254,622.00	10.94%
			Mean Difference	$246,499.91	12.83%

Academic Private Surgeon Salary Gap

Scientific Posters - Group VII - Systems and Processes

Poster 34

INTIMATE PARTNER AND SEXUAL VIOLENCE IN A LEVEL I TRAUMA CENTER

Tanya L. Zakrison, MD, FRCSC*, Gabrielle Moore, Laura Zebib, Benjamin Abo, Jacqueline Vilaire, Carl I. Schulman, MD, MSPH*, Louis R. Pizano, MD*, Nicholas Namias, MD*, Alan S. Livingstone, MD, Gabriel Ruiz
University of Miami Miller School of Medicine

Presenter: Tanya L. Zakrison, MD, FRCSC

Objectives: Screening for Intimate Partner and /or Sexual Violence (IPSV) occurs sporadically in trauma centers based on the discretion of the attending physician, nurse or social worker. Additionally, men are screened less than women for IPSV. The objective of this study was to determine the feasibility of screening for IPSV in all trauma patients presenting for treatment.

Methods: We conducted a prospective, pilot feasibility study to examine if trauma patients can be screened for IPSV. Clinical Social Workers screened all consecutive adult trauma patients who met eligibility criteria for IPSV at our Level I Trauma Center. We used a four-item questionnaire that asked respondents how often their partner physically Hurt, Insulted, Threatened with harm, and Screamed at them (HITS). The Screen, Ask, Validate, Evaluate (SAVE) questionnaire was then used for screening for a current or past history of sexual violence. Demographic data were collected and chi squared test was used for categorical data with a $p < 0.05$.

Results: Over a four-month period, 664 patients were treated in the trauma center. Three hundred and ninety nine consecutive trauma patients were approached to complete the survey (62%). There were 191 patients who were successfully screened (75% male, 25% female) with an average age of 40. Of the 191 patients who were screened, twelve did not want to participate in the HITS screening, but did participate in the SAVE screening. Overall, 23 screened patients (13%) were found to be at risk of intimate partner violence and 18 (78%) were men One out of every twelve screened trauma patients (8%) was positive for sexual violence with both men and women equally affected.

Conclusions: Screening for IPSV is feasible and should be incorporated into the screening algorithm for all patients presenting at a Level I Trauma Center. Because men represent a large proportion of positive IPSV screens, they should not be excluded from the screening process.

Notes

Poster 35

WHEN IS DEAD "DEAD"? THE PROBLEM OF CASE ASCERTAINMENT IN ASSESSING TRAUMA CENTRE PERFORMANCE

James P. Byrne, MD, Xiong Wei, David Gomez, MD, PhD,
Homer Tien, MD*, Avery B. Nathens, MD, PhD, MPH*
Sunnybrook Health Sciences Center

Presenter: James P. Byrne, MD

Objectives: Processes of trauma performance improvement seek to identify patients with modifiable outcomes, hence it is critical to exclude patients from benchmarking or PI efforts who have no chance of survival. The objective of this work was to develop the optimal case definition of "Dead on Arrival" (DOA) to identify who should be excluded from benchmarking efforts in the American College of Surgeons Trauma Quality Improvement Program (ACS TQIP).

Methods: Data were derived from ACS TQIP (2012-13). Three case definitions of DOA were proposed: 1) No signs of life as determined by local providers (NSOL); 2) pre-hospital cardiac arrest (PHCA) as entered into local trauma registries; 3) a proxy (PROXY) for death established by ACS TQIP defined as ED heart rate= 0 AND ED systolic blood pressure= 0 AND Glasgow Coma Scale motor component= 1. Case definitions were compared using standard predictive tests to evaluate specificity, positive and negative predictive values (PPV, NPV) as the goal was to exclude patients who were certain to die but include those who had a chance of survival (hence sensitivity and NPV were not relevant).

Results: During the study period 266,201 patients met inclusion criteria and 9.6% died. For all patients, specificity for any of the criteria was excellent (>99%). Other measures of predictive utility differed by mechanism (Table). NSOL and PHCA had PPVs low enough such that many patients with these criteria would go on to survive (~27% and ~11%, respectively for all patients). By contrast, PROXY had very high predictive utility for death, with just over 1% of patients meeting this criterion going on to survive. NPV did not differ significantly across criteria.

Conclusions: The proxy for "no signs of life" (HR=0, SBP=0 and GCS motor =1) is the most predictive criteria for identifying patients who will likely die and thus can be used to reliably exclude patients from PI and/or benchmarking activities.

	Predictive measure	All	Blunt	Penetrating
Mortality		7.80%	6.80%	17.90%
NSOL	Specificity	99.56%	99.59%	99.21%
	PPV	73.15%	62.71%	89.84%
	NPV	93.13%	93.76%	86.55%
PHCA	Specificity	99.94%	99.95%	99.89%
	PPV	89.53%	86.14%	95.75%
	NPV	93.37%	94.00%	86.59%
PROXY	Specificity	99.99%	100.00%	99.88%
	PPV	98.98%	99.42%	98.53%
	NPV	93.58%	94.03%	88.93%

Poster 36

INJURY SEVERITY SCORE (ISS) FIDELITY IS DEPENDENT ON AUTOPSY DATA

Roseanna Guzman-Curtis, MD, MPH*, Mark L. Gestring, MD, FACS*,
Julius D. Cheng, MD, MPH*, Paul E. Bankey, MD, PhD*, Ayodele T. Sangosanya, MD*,
Gina Ryan, Nicole A. Stassen, MD, FACS, FCCM*
University of Rochester School of Medicine and Dentistry

Presenter: Roseanna Guzman-Curtis, MD, MPH

Objectives: Trauma centers are facing increased pressure to meet the demands of outcomes-driven health care. Their expected outcomes depend on accurate patient data collection which often relies on incomplete and inaccurate hospital coding data. The purpose of this study was to evaluate whether ISS determinations based on autopsy data differ from and are more accurate than those based on hospital chart data.

Methods: All trauma deaths at a single Level I Trauma Center were identified using our NTRACS database from January 2011 to September 2013. Demographics, injury mechanism, autopsy findings, ED and overall LOS and pre/post autopsy ISS scores were collected. The "pre" ISS was determined using hospital coding and the patient's medical records. The "post" score is an adjusted score based on autopsy findings discussed in a medical examiner (ME) mortality review conference. T-test was used for statistical analysis.

Results: 200 patients were identified. 69(35%) underwent autopsy. Autopsy patients were younger, had shorter ED and hospital LOS and were more likely to have a penetrating injury.(Table 1) The post autopsy ISS changed significantly for the entire autopsy group. On sub-group analysis, the only group with an unchanged ISS was patients with an ED LOS>1 hour. In all other groups, injury mechanism and ED LOS <1 hour, ISS was significantly changed.(Table1) 60% of autopsy patients had a significant ISS classification change, most commonly from minor to very-severe.(Table 2)

Conclusions: This study shows that the addition of autopsy data from the ME is essential for determining the "true" ISS of a trauma patient regardless of injury mechanism. This is even more pronounced in those who have a short ED LOS. Knowing this "true" ISS does little for the deceased patient, but the enhanced information improves data fidelity allowing for true expected outcomes to be determined and compared to national standards.

		Autopsy (N = 69)	No-Autopsy (N=131)
Average Age (years)		39 +/- 22	61 +/- 24*
Average ISS		Pre 12 +/- 14*	27 +/-16
		Post 32-/-17	
Mechanism	**Blunt**	26 (38%)	129 (98%)*
	Penetrating	43 (62%)	2 (2%)*
Average	**ED LOS (hours)**	1+/-2	4 +/- 5*
	Overall LOS (days)	2 +/- 4	10 +/- 20*
		Pre-Autopsy Average ISS	**Post-Autopsy Average ISS**
Overall Group		12 +/-14	32+/-17*
Blunt Trauma (N=26)		12+/-14	40+/-18*
Penetrating Trauma (N=43)		12+/-14	27+/-14*
ED LOS <1 hour (N=53)		9+/-14	33+/-23*
ED LOS >1 hour (N=16)		23+/-10	23+/-14

*P<0.05

Table 1: Age, Average ISS, Mechanism and LOS data for study group. Variation in Pre and Post autopsy ISS change based on mechanism and ED LOS.

Patient ISS Classification Change	Number
None	27 (39%)
Minor to Severe	7 (10%)
Minor to Very-severe	29 (42%)
Moderate to Severe	3 (4%)
Moderate to Very-severe	0 (0%)
Severe to Very-severe	3 (4%)

Minor - ISS 1-9; Moderate – ISS 10-15; Severe – ISS 16-24; Very Severe ISS>25

Table 2: Patient ISS classification change based on autopsy data

Poster 37

WISER WITH AGE? INCREASED PER-SURGEON ELDERLY PATIENT VOLUME IS ASSOCIATED WITH LOWER POST-INJURY COMPLICATIONS

Joshua A. Simon, DO, Quoc Dang, Joseph D. Catino, MD*,
Ivan Puente, MD*, Fahim Habib, MD, MPH, Marko Bukur, MD
Delray Medical Center, Delray Beach, Florida

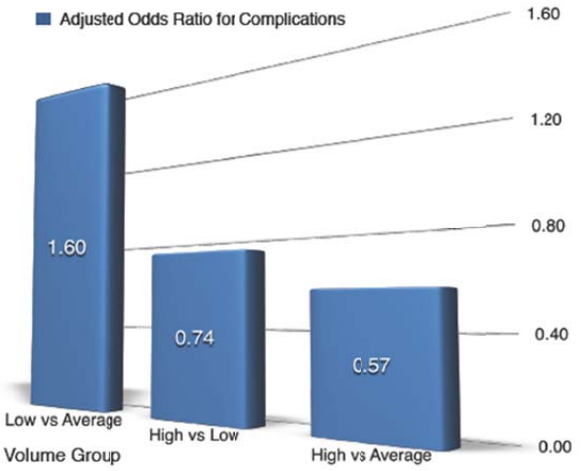
Presenter: Joshua A. Simon, DO

Objectives: The elderly population is the fastest growing age group in the United States with trauma being a significant cause of death and disability. Previous studies have suggested improved outcomes with increased per-surgeon volumes in injured patients. This effect has not been examined in the elderly trauma population. We hypothesized that increased per-surgeon elderly trauma volume would impact outcomes.

Methods: This was a 5 year registry review of elderly patients admitted to a State Level I trauma center. All trauma surgeons were stratified into Low (LV), Average (AV), and High (HV) Volume Groups according to average patient admission/year. The primary outcomes were in-hospital mortality and complication rate. Forward logistic regression was used to analyze the effect of surgeon volume on outcomes.

Results: During the 5 year study period a total of 2,379 elderly patients were evaluated. Mean admission volume per year was 9.8 ± 5.5, 28.8 ± 6.8, and 62.4 ± 9.1 in the LV, AV and HV Groups, respectively ($p<0.001$). The median number of years in practice was not different between the groups. Patients in the HV group were older, had higher Charlson scores, more severe head injuries, and higher injury severity than those admitted by the AV and LV. Need for operative intervention was similar between the 3 groups. Overall complications were significantly higher in patients admitted by the LV and AV Groups (21% vs 18.1% vs 15%, $p<0.027$). Forward logistic regression identified HV to be associated with a lower overall complication rate (HV vs LV AOR 0.57, 95%CI [0.40,0.81], $p=0.002$, HV vs AV AOR 0.74, [0.57,0.97], $p<0.032$). In-hospital mortality was not significantly different between groups.

Conclusions: Our results suggest that overall morbidity of the elderly trauma patient may be impacted by surgeon volume. Further studies identifying the optimal level of surgeon experience should be undertaken.



Adjusted Complication Rate Stratified By Surgeon Volume Groups

Poster 38

TRAUMA CENTER VARIATION IN THE MANAGEMENT OF PEDIATRIC PATIENTS WITH BLUNT ABDOMINAL SOLID ORGAN INJURY

Arash Safavi, MD, MHSc, Peter Rhee, MD, MPH*, Bardiya Zangbar, MD,
Terence O'Keeffe, MD, MSPH*, Andrew L. Tang, MD*, Randall S. Friese, MD*,
Narong Kulvatunyou, MD*, Rifat Latifi, MD*, Erik Skarsgard, Bellal Joseph, MD*
The University of Arizona

Presenter: Arash Safavi, MD, MHSc

Objectives: Non-operative management of hemodynamically stable children with solid organ injury (SOI) has become standard of care. The aim of this study was to identify differences in management of children with SOI treated at adult trauma centers (ATC) versus pediatric trauma centers (PTC). We hypothesized that these patients would endure more operative treatment at ATC compare to PTC.

Methods: Patients younger than 18 years old with SOI (spleen, liver, kidney) who were treated at level I-II ATC or PTC were identified from the 2011-2012 National Trauma Data Bank. The primary outcome measure was the incidence of operative management. Data was analyzed using univariate and multivariate logistic regression analyses.

Results: 6799 children with SOI (spleen: 2375, liver: 2867, kidney: 1557) were included. Spleen procedures were performed more frequently at ATC than PTC (101 (7.7%) vs. 52 (4.9%); P=0.007). After adjusting for potential confounders (grade of injury, age, gender and injury severity score), admission at ATC was associated with significantly higher odds of splenic procedure (OR: 1.5, 95% CI: 1.02-2.25;p=0.03). Only 11 and 8 children underwent kidney and liver procedures respectively. Transarterial embolization (TAE) was performed in 17 patients with spleen, 34 with liver and 14 with kidney trauma. There was no practice variation between ATC and PTC regarding kidney and liver injuries or incidence of TAE.

Conclusions: Operative management for SOI was more often performed at ATC than PTC. The presence of significant disparity in the management of pediatric patients with SOI justifies efforts to standardize treatment on a national basis.

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Dear Colleagues,

The EAST Foundation begins each New Year with so much promise and potential to excel in our mission *to assure the future for the care, investigation and prevention of injury*. I am very pleased to be a part of such an exciting time in the 28 year history of the Eastern Association for the Surgery of Trauma (EAST) and the 12 year history of the Foundation. The EAST Foundation was officially incorporated in 2002 for the purpose of providing EAST with the capability to fully achieve its objective of supporting and promoting the key missions of EAST to provide trauma education and collaboratively promoting the development of the young trauma practitioner and investigator. This is synergistically accomplished by both EAST and the EAST Foundation committing to support the EAST members in achieving their goals as young Trauma and Acute Care Surgeons. As a Foundation, we have an obligation to be good stewards of the resources we have been given to continue to increase the margin of excellence in the care of the trauma patient. The Foundation seeks to achieve a number of objectives that support the mission of EAST. These include promoting research and education to achieve advances in the care of the injured patient and in injury control and prevention; enhancing the professional growth and development of established and prospective trauma and acute care surgeons; and promoting quality educational programs for trauma and acute care surgeons and trauma providers.

The EAST Foundation is fortunate to be able to achieve its goals through the generosity of individuals, groups, organizations, and our corporate partners that have made a commitment to advancing the field of trauma. The EAST Foundation has provided support for the following activities:

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Thank you to all of the donors who gave so generously in 2014! Your gifts help support many practitioners early in their careers allowing them to work at their fullest potential and assure the future for the care of the patient. We have the opportunity to build on this momentum and continue to be a catalyst for innovation. Thank you for your commitment to the EAST Foundation by investing in making a difference; together we can make a big impact!

I consider it such a privilege to have served as the EAST Foundation President for the past three years. Thank you for placing your trust in me and for helping the EAST Foundation grow to such great heights.

Sincerely,

Fred A. Luchette

Fred A. Luchette, MD, MSc, FACS, FCCM
President, EAST Foundation