72nd Annual Meeting
of the
American Association for the Surgery of Trauma
and
Clinical Congress of Acute Care Surgery

September 18—September 21, 2013

HILTON SAN FRANCISCO

SAN FRANCISCO, CA

HISTORICAL BACKGROUND

AAST

The American Association for the Surgery of Trauma started with conversations at the meetings of the Western Surgical Association and Southern Surgical Association in December, 1937. The 14 founders, who were present at one or both of these meetings subsequently invited another 68 surgeons to a Founding Members meeting in San Francisco on June 14, 1938. The first meeting of the AAST was held in Hot Springs, Virginia, in May, 1939, and Dr. Kellogg Speed's first Presidential Address was published in *The American Journal of Surgery* 47: 261-264, 1940. Today, the Association holds an annual scientific meeting, owns and publishes *The Journal of Trauma and Acute Care Surgery*, initiated in 1961, and has approximately 1,300 members from 30 countries.

American Association for the Surgery of Trauma
(AAST)

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

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

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

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 sponsorship of the American College of Surgeons and the American Association for the Surgery of Trauma. The American College 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 31.5 *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 18 credits meet the requirements for Self-Assessment.**

"In order to receive self-assessment credit, you must take and pass the self-assessment test within ten (10) days of session."

American College of Surgeons
Division of Education

*** Credits available are for the Wednesday, Acute Care Surgery-Maintenance of Certification (3hrs) and each lunch session on Thursday and Friday (1.25hrs).*

STATEMENT OF ATTENDANCE FORM
THE AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA
72nd Annual Meeting of AAST and Clinical Congress of Acute Care Surgery
San Francisco Hyatt, San Francisco, CA, September 18-21, 2013

As a participant in this educational activity, indicate by marking (x) by each session you attended. To receive your CME certificate follow the instructions below for completing the online evaluation. By September 21, 2013 all registered participants will receive an email with instructions for claiming CME credit. **No paper forms will be accepted. The boxes below are for record-keeping purposes only.**

WEDNESDAY, SEPTEMBER 18, 2013 (total for day 9.25, including 3 self-assessment credits)

_____ Optional Session: ACS-MOC (3)
_____ Optional Session: Military (3)
_____ Session I: Plenary (2.75)
_____ Session II: Master Surgeon Lecture I (.5)
_____ Session III: Challenging Cases Panel I (1)
_____ Session IV: Posters (2)

*** You can only check one Optional Session, you cannot check both.*

THURSDAY, SEPTEMBER 19, 2013 (total for day 8.25, including 1.25 self-assessment credits)

_____ Session V: Master Surgeon Lecture II (.5)
_____ Session VI: Papers 9-12 (1)
_____ Session VIII: Papers 13-16 (1.5)
_____ Session IX: Presidential Address (1)
_____ Lunch Sessions (1.25)
_____ Session XA: Papers 17-25 (3)
_____ Session XB: Papers 26-34 (3)

*** You can only check XA or XB, you cannot check both.*
If you attended one of the six lunch sessions, check here: □

FRIDAY, SEPTEMBER 20, 2013 (total for day 10, including 1.25 for self-assessment credit)

_____ International Breakfast (1)
_____ Session XI: Master Surgeon III (.5)
_____ Session XII: Panel II (1)
_____ Session XIII: Papers Quick Shots (2)
_____ Session XIV: Fitts Lecture (.75)
_____ Lunch Sessions (1.25)
_____ Session XVA: Papers 35-44 (3.5)
_____ Session XVB: Papers 45-54 (3.5)

*** You can only check XVA or XVB, you cannot check both.*
If you attended one of the six lunch sessions, check here: □

SATURDAY, SEPTEMBER 21, 2013 (total for day 4)

_____ Session XVI: Papers 55-66 (4)

Total hours available: 31.5
Self-assessment hours will be uploaded into the system by AAST Staff.

TOTAL CME HOURS CLAIMING:_____
TOTAL SELF-ASSESSMENT HOURS

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 2013 Annual Meeting of AAST and Clinical Congress of Acute Care Surgery, please read over the instructions below. All CME forms must be completed within 30 days after the meeting (by October 25, 2013). *To be eligible for self-assessment credit you MUST take AND pass the self-assessment test within ten (10) business days of the session(October 4, 2013).*

By Saturday, September 21st, the email address on file (the email address you submitted on your registration form) will be sent an email with information for claiming your CME for the 2013 Annual Meeting.

If you are an AAST Member, your information is already in the AAST database and you have an account on the AAST website at www.aast.org. To claim CME please click on the link on the home page once you sign in using the "log in" button on the top right hand corner.

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

If you are not an AAST member and have not created an account, you will need to create an account. It is suggested that you create an account prior to Saturday, September 21st. However, if you choose not to do that, to create an account, go to www.aast.org and click on "Create an Account" in the top right hand corner.

After you log in/created an account:
You will see a "To Do" prompt in the right hand corner of the home page that will display the title of the activity and the activity date (AAST Annual Meeting September 21, 2013). Click on this activity, complete the evaluation form, and select your sessions from the other side and click submit.

Once you filled out all required fields and hit submit, a "Print Certificate" button should appear. A PDF of the certificate will be generated. The Certificate will open in a separate window.

If you need another certificate, you can find it in the e-Learning section, My Courses page, or go to www.facs.org and go to MYCME Portal Page.

Disclosure Information

72nd Annual Meeting of AAST and Clinical Congress of Acute Care Surgery

September 18-21, 2013

San Francisco, CA

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)
Shannon	Acker	No	
Charles	Adams Jr.	No	
Zia	Ahmad Dehqanzada	No	
Aziz Alali	Alali	No	
Salam	Al-Kassis	No	
Hasan	Alam	No	
Darwin	Ang	No	
Devashish J.	Anjaria	No	
Saman	Arbabi	No	
Juan A.	Asensio	No	
Dennis	Ashley	No	
Christopher	Baker	No	
Miklosh	Bala	No	
Anthony J.	Baldea	No	
Sarah	Balderston Murthi	No	
Jesse	Bandle	No	

Aman	Banerjee	No	
Samiksha	Bansal	No	
Philip	Barie	No	
Galinos	Barmparas	No	
Erik	Barquist	No	
Robert David	Becher	No	
Alec	Beekley	No	
Matthew V.	Benns	No	
Denis	Bensard	No	
Indermeet	Bhullar	No	
Walter	Biffl	No	
Nicholas W.	Blank	No	
Matthew	Bloom	No	
Anthony J.	Bottiggi	No	
Eric H.	Bradburn	No	
Karen	Brasel	No	
Scott	Bricker	No	
L. D.	Britt	No	
Karim Brohi	Brohi	Yes	Sangart Inc., Travel Expenses, Consultancy Fee, Advisor/Advisitory Committee Member. TEM International: equipment
Steven Edward	Brooks	No	
Carlos	Brown	No	
Eileen	Bulger	No	
Marko	Burker	No	
Joshua	Burton Brown	No	
Christina M.	Busuito	No	
Karyn	Butler	No	
Rachael A.	Callcut	No	
Andre	Campbell	No	
Juan Pablo	Carbonel	No	
Ellen	Carraro	No	
Howard	Champion	No	
Michael	Chang	No	
Michael Patrick	Chapman	No	
Vastal	Chikani	No	
William G.	Cioffi	No	
Ian	Civil	No	
Christine S.	Cocanour	No	
Mitchell Jay	Cohen	No	
Raul	Coimbra	No	
Courtney E.	Collins	No	
Charles H.	Cook	No	
Alan	Cook	No	
Carnell	Cooper	No	

Leonard M.	Copertino	No	
Edward	Cornwell	No	
Todd	Costantini	No	
Clay	Cothren Burlew	No	
Marie L.	Crandall	No	
Jennifer	Crebs	No	
Martin	Croce	No	
Chasen A.	Croft	No	
H. Gill	Cryer	No	
John David	Cull	No	
Joseph	Cuschieri	No	
Jacob B.	Daigle	No	
Ross	Davenport	Yes	ROTEM: Equipment & reagent support, honorarium: speaker/consultant. Haemonetics: Study costs, independent contractor. CSL Behring: honorarium, speaker
James	Davis	No	
Kimberly	Davis	No	
James Solomon	Davis	No	
Marc	de Moya	No	
Mia	Debarros	No	
Demetrios	Demetriadas	No	
Christopher J.	Dente	No	
Jose	Diaz	Yes	Lifecell, Acute Innovation, Synthes: Honorarium, Consultant
Rafael F.	Diaz-Flores	No	
Rochelle	Dicker	No	
Mark	Diebel	No	
Kelly Ann	Dinnan	No	
Michael F.	Ditillo	No	
Jay	Doucet	No	
Therese	Duane	No	
Michael A.	Dubick	No	
Vincent Pierre	Duron	No	
Soumitra	Eachempati	No	
Austin T.	Eagleton	No	
David T.	Efron	No	
Akopofure	Ekeh	No	
Eric	Elster	No	
Thomas	Esposito	No	
Charity H.	Evans	No	
Susan	Evans	No	
Timothy	Fabian	No	
Peter	Fagenholz	No	
Berry	Fairchild	No	
Samir	Fakhry	No	

Mary	Fallat	No	
Rashna	Farhad Ginwalla	No	
Jason Paul	Farrah	No	
David	Feliciano	No	
Paula	Ferrada	No	
John J.	Fildes	No	
Sandy L.	Fogel	No	
Heidi	Frankel	No	
Richard	Frazee	No	
Randall	Friese	No	
Matthias Nikolaus	Fröhlich	No	
Barbara	Gaines	No	
Alberto	Garcia	No	
Zain	Ghani Hashmi	No	
Thomas L.	Gillespie	No	
Enrique	Ginzburg	No	
Jacob	Glaser	No	
Stephanie	Goldberg	No	
Michael D.	Goodman	No	
Vicente	Gracias	No	
Patrick	Greiffenstein	No	
Chrissy	Guidry	No	
Oscar D.	Guillamondegui	No	
Shabnam	Hafiz	No	
Adil	Haider	No	
Nora	Ham-Ting Cheung	No	
Erin M.	Hanna	No	
David	Harrington	No	
Emily	Hathaway	No	
Carl	Hauser	No	
Joaquim Michael	Havens	No	
Elizabeth Jane	Helmer	No	
Sharon	Henry	No	
John B.	Holcomb	No	
J. Jason	Hoth	No	
Jarett Kent	Howe	No	
David	Hoyt	No	
Shente	Hsu	No	
Martin	Hylleholt Sillesen	No	
Irada	Ibrahim-zada	No	
Sadia	Ilyas	No	
Kenji	Inaba	No	
David S.	Inouye	No	
Tazo S.	Inui	No	
Rao	Ivatury	Yes	KCI: honorarium, speaker & consultant

David	Gomez Jaramillo	No	
Vijay	Jayaraman	No	
Donald	Jenkins	No	
James	Jezior	No	
Steven	Johnson	No	
D'Andrea Krista	Joseph	No	
Hee Soo	Jung	No	
Gregory	Jurkovich	No	
Steven A.	Kahn	No	
Meghann Lee	Kaiser	No	
Efstathios	Karamanos	No	
George	Kasotakis	No	
Zachary Jon	Kastenberg	No	
Krista	Kaups	No	
Chonna L.	Kendrick	No	
David	Khang Nguyen	No	
Dennis	Kim	No	
David R.	King	No	
Patrick K.	Kim	No	
Andrew	Kirkpatrick	Yes	Sonosite: equipment, KCI: Grant
M. Margaret	Knudson	No	
Thomas	Kobina Duncan	No	
Jared A.	Konie	No	
Lucy Z.	Kornblith	No	
Rosemary A.	Kozar	No	
Deborah	Kuhls	No	
Kosei	Kunitatsu	No	
Lidie	Lajoie	No	
Lydia	Lam	No	
Abdulraouf	Lamoshi	No	
Anna	Ledgerwood	No	
John C.	Lee	No	
Tim H.	Lee	No	
Wayne S.	Lee	No	
Luke	Leenen	No	
Ari	Leppaniemi	No	
Frank	Lewis	No	
Eric	Ley	No	
Brandon	Libby	No	
Douglas Z.	Liou	No	
David H.	Livingston	No	
Daniel Isaac	Lollar	No	
Gary G.	Lombardo	No	
Sarah	Lombardo	No	
Kira	Long	No	
Scott Gregory	Louis	No	

Catherine Elizabeth	Loveland-Jones	No	
Charles	Lucas	No	
Frank	Luchette	No	
Robert C.	Mackersie	No	
Ronald	Maier	No	
Sarah	Majercik	No	
Mark A.	Malangoni	No	
Ajai	Malhotra	No	
Darren	Malinoski	No	
Hisatake	Matsumoto	No	
Kazuhide	Matsushima	No	
Kenneth	Mattox	No	
R. Todd	Maxon	Yes	ACS: Consultant Fees, Consultant; Arkansas Dept. of Health: Consultant Fees, Consultant.
Cathy A.	Maxwell	No	
Jack	McAninch	No	
Lisa	McIntyre	No	
Ashley Danielle	Meagher	No	
John Nicholas	Melvan	No	
J. Wayne	Meredith	No	
Christopher	Michetti	No	
Shahin	Mohseni	No	
Nathan M.	Mollberg	No	
Sean F.	Monaghan	No	
Ernest E.	Moore	Yes	Haemonetics: Research Support
Frederick	Moore	No	
Laura	Moore	No	
Leslie	Morgan Kobayashi	No	
Koji	Morishita	No	
Richard	Mullins	No	
Kaveh	Najafi	No	
Nicholas	Namias	No	
Michael	Nance	No	
Lena	Napolitano	No	
Raminder	Nirula	No	
David	Notrica	No	
James	O'Connor	No	
Terrence	O'Keefee	No	
Alicia Olson	Olson	No	
Adrian W.	Ong	No	
Carlos A.	Ordonez	No	
Alessandro	Orlando	No	
Yashuhiro	Otomo	No	
Viraj	Pandit	No	

Hans-Christoph	Pape	Yes	Medartis: Consulting fee, Consultant/Advisor.
Myung S.	Park	No	
Jose	Pasquale	No	
Rachel	Pastorek	No	
Nirav	Patel	No	
Elena M.	Paulus	No	
Kimberly A.	Peck	No	
Andrew B.	Peitzman	No	
Rebecca	Plevin	No	
Matthew J.	Pommerening	No	
Austin	Porter	No	
Joseph	Posluszny	No	
Rebecca D.	Powell	No	
Alicia R.	Privette	No	
Basil A.	Pruitt Jr.	No	
Laurie	Punch	No	
Viren	Punja	No	
Reuven	Rabinovici	No	
Krishnan	Raghavendran	No	
Ramita	Rahimian	No	
Alexander	Raines	No	
Joseph Frederick	Rappold	No	
Todd	Rasmussen	No	
Subhash	Reddy	No	
R. Lawrence	Reed	No	
Patrick	Reilly	No	
Kyle Norman	Remick	No	
Shelby	Resnick	No	
Peter	Rhee	No	
J. David	Richardson	No	
Jennifer	Rittenhouse-Puhak	No	
Sandro	Rizoli	No	
Bryce	Robinson	No	
Lauren	Rodriguez	No	
Amelia Therese	Rogers	No	
Michael	Rotondo	No	
Grace	Rozycki	No	
Arash	Safavi	No	
Scott	Sagraves	No	
Edgardo S.	Salcedo	No	
Ali	Salim	No	
Mitchell Brett	Sally	No	
Jeffrey	Salomone	No	
Kristin M.	Salottolo	No	
Alvaro Ignacio	Sanchez Ortiz	No	
Babak	Sarani	No	

Mohammad	Sarhan	No	
Angela	Sauaia	No	
Jack	Sava	No	
Stephanie Ann	Savage	No	
Thomas	Scalea	No	
John E.	Scarborough	No	
Martin	Schreiber	No	
Thomas J.	Schroeppel	No	
Kevin M.	Schuster	Yes	Medtronic Mini Med: Equipment
C. William	Schwab	No	
Diane A.	Schwartz	No	
Steven R.	Shackford	No	
Shahid Shafi	Shafi	No	
David	Shatz	No	
Binod	Shrestha	No	
Eric R.	Simms	No	
Michael	Sise	No	
Robert George	Sise	No	
Jeff J Skubic	Skubic	No	
Peter John	Smit	No	
Jason Wayne	Smith	No	
Justin	Sobrino	No	
Kendell Jean	Sowards	No	
David	Spain	No	
Jason	Sperry	No	
Kristan Lea	Staudenmayer	No	
Stanislaw P.	Stawicki	No	
Deborah M.	Stein	No	
Mike	Stiefel	No	
Colleen M.	Stoeppel	No	
Joseph J.	Tepas, III	No	
Glen	Tinkoff	No	
Eric A.	Toschlog	No	
Donald D.	Trunkey	No	
Marc D.	Trust	No	
Junya	Tsurukiri	No	
Garth H.	Utter	No	
Alex	Valadka	No	
Evan	Valle	No	
Robert M.	Van Haren	No	
Erin	Vanzant	No	
George	Velmahos	No	
Gregory	Victorino	No	
Carole Y.	Villamaria	No	
Fausto Y.	Vinces	No	
Matthew J.	Wall Jr.	No	

Mbaga S.	Walusimbi	No	
Ann Marie	Warren	Yes	Baylor University Medical Center: grant
Robert	Winchell	No	
Sharon	Weeks	No	
Michael	West	No	
Sonlee Denise	West	No	
Hale Edward	Wills	No	
David	Wisner	No	
G. Paul	Wright	No	
Yoshiaki	Yoshikawa	No	
Syed	Zafar	No	
Ben L.	Zarzaur	No	

PROGRAM COMMITTEE		NOTHING TO DISCLOSE	DISCLOSURE (As it pertains to the content of the presentation)
Raul	Coimbra	NO	
William	Cioffi	NO	
Martin	Croce	NO	
Mary	Fallat	NO	
Heidi	Frankel	NO	
David	Livingston	NO	
Robert	Mackersie	NO	
Ernest E.	Moore	YES	Haemonetics: Research Grant
Reuvin	Rabinovici	NO	
Grace	Rozycki	NO	
George	Velmahos	NO	

Rev 1-13

GENERAL SCHEDULE

72ND ANNUAL MEETING OF THE
AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA AND
CLINICAL CONGRESS OF ACUTE CARE SURGERY

GENERAL PROGRAM AND SOCIAL SCHEDULE

HILTON SAN FRANCISCO
SAN FRANCISCO, CA

Wednesday, September 18th, 2013

6:30 AM – 5:30 PM.....Registration
East Lounge

6:45 AM – 11:00 AM..... AAST Foundation Board Meeting
Union Square 5 & 6

7:00 AM – 11:00 AM.....Optional Session: ACS-MOC
Continental Ballroom 4 & 5

7:00 AM – 11:00 AM.....Optional Session: Military
Continental Ballroom 6

12:00 PM – 12:50 PM.....Welcome
Robert Mackersie, M.D., AAST President
Continental Ballroom 4, 5 & 6

12:50 PM – 3:30 PM.....Session I:
Plenary Papers #1-8
Continental Ballroom 4, 5 & 6

3:30 PM – 4:00 PM.....Session II:
Master Surgeon Lecture I
Jack McAninch, M.D.
"Genitourinary Trauma – 2013"
Continental Ballroom 4, 5 & 6

4:00 PM - 5:00 PM.....Session III:
Challenging Cases Panel I
Moderator: L.D. Britt, M.D., M.P.H.
Continental Ballroom 4, 5 & 6

5:00 PM – 7:00 PM.....Exhibits Open
*Golden Gate Ballroom

*Golden Gate & Plaza A are on the lobby level. All other educational sessions are on the ballroom level.

5:00 PM – 7:00 PM…….....…….……..……Session IV:
Poster Rounds and Reception
*Golden Gate Ballroom

Thursday, September 19th, 2013

6:15 AM – 7:30 AM.....Resident, Medical Student and
In-Training Fellow Breakfast
"A Career in Trauma: So Many Options"
Presenter: William Cioffi, M.D., AAST President-Elect
*Plaza A

6:15 AM - 7:30 AM……..……...…..……..Critical Care Committee Meeting
Continental Ballroom 1

6:15 AM - 7:30 AM……..……. Acute Care Surgery Committee Meeting
Continental Ballroom 2

6:15 AM – 7:30 AM…..…… International Relations Committee Meeting
Continental Ballroom 7

6:15 AM - 7:30 AM…..……Geriatric Trauma/ACS Ad Hoc Committee Meeting
Continental Ballroom 8

6:15 AM – 7:30 AM…..…….....Multi-Institutional Trials Committee Meeting
Continental Ballroom 9

6:30 AM – 4:00 PM.....…….....Registration
East Lounge

7:00 AM – 8:30 AM..... Continental Breakfast
*Golden Gate Ballroom

7:00 AM – 3:30 PM.....Exhibits and Posters
*Golden Gate Ballroom

7:30 AM – 8:00 AM…...…..…….....Session V:
Master Surgeon Lecture II
Rao Ivatury, M.D.
"Pressure, Perfusion and Compartments:
Challenges for the Acute Care Surgeon"
Continental Ballroom 4, 5 & 6

8:00 AM – 9:20 AM…….....….....….....Session VI:
Plenary Papers #9-12
Continental Ballroom 4, 5 & 6

*Golden Gate & Plaza A are on the lobby level. All other educational sessions are on the ballroom level.

9:20 AM – 9:40 AM…….....…….....…..……..…....Session VII:
Scholarship Presentations
Presiding: Robert Mackersie, M.D., AAST President
Continental Ballroom 4, 5 & 6

9:40 AM - 10:00 AM……..……...…….....Break
*Golden Gate Ballroom

10:00 AM – 11:20 AM.....Session VIII:
Plenary Papers #13-16
Continental Ballroom 4, 5 & 6

11:30 AM – 12:30 PM..….....……..……Session IX:
AAST Presidential Address
Robert Mackersie, M.D.
"For the Care of the Underserved"
Presiding: William Cioffi, MD., AAST President-Elect
Continental Ballroom 4, 5 & 6

12:30 PM -1:45 PM…...……..……....……. Lunch Sessions
(Ticketed Events)
Various Locations

LOCATIONS: ROOM LOCATIONS SUBJECT TO CHANGE, PLEASE CHECK LOCATION ON TICKET

L - I "Management of the complex dismounted blast injury: translatable lessons learned from the military's experience with the management of pelvic, rectal, lower GU, lower extremity and massive soft tissue injuries"
Moderator: Todd Rasmussen, MD
Speakers: Richard Mullins, MD, James Jezior, MD, and Eric Elster, MD
Location: Continental Ballroom 1

L - II "Open Access and New Standards in Scientific Publishing"
Speakers: Ernest Moore, MD and Jennifer Crebs
Location: Continental Ballroom 2

L – III **"**Complicated Pancreatitis"
Moderator: George Velmahos, MD, PhD
Speakers: Jose Diaz, MD, David Efron, MD and Peter Fagenholz, MD
Location: Continental Ballroom 7

*Golden Gate & Plaza A are on the lobby level. All other educational sessions are on the ballroom level.

L - IV "Hemostatic resuscitation for traumatic hemorrhage: What is the role of TXA, PCC and Fibrinogen concentrates in treating acute traumatic coagulopathy?"
Moderator: Martin Schreiber, MD
Speakers: Mitchell Cohen, MD and Rosemary Kozar, MD, PhD
Location: *Plaza A

L - V "Tuck Everlasting: Advanced Directives and Palliative Care for Elderly Trauma Victims"
Moderators: Frederick Luchette, MD
Speakers: Karen Brasel MD, MPH and Michael Sise MD
Location: Continental Ballroom 9

L - VI "Challenging Blunt Abdominal Trauma Cases: What to do when you need to operate"
Speakers: David Feliciano, MD and Raul Coimbra, MD, PhD
Location: Continental Ballroom 8

1:45 PM - 2:00 PM…….……....Break and Passport to Prizes Drawing
*Golden Gate Ballroom

2:00 PM – 5:00 PM…..……..……...…….…….Session XA:
Neurological Trauma, Abdominal and Shock, Resuscitation Papers #17-25
Continental Ballroom 4 & 5

2:00 PM – 5:00 PM…..……..……...……..Session XB:
Thoracic Trauma and Critical Care Papers #26-34
Continental Ballroom 6

Friday, September 20th, 2013

6:15 AM - 7:30 AM……..Military Liaison Committee Meeting
Continental Ballroom 1

6:15 AM – 7:30 AM…..…..... Injury Assessment/Outcomes Committee Meeting
Continental Ballroom 2

6:15 AM - 7:30 AM…….Publications and Communications Committee Meeting
Continental Ballroom 7

6:15 AM – 7:30 AM……...……...Prevention Committee Meeting
Continental Ballroom 8

*Golden Gate & Plaza A are on the lobby level. All other educational sessions are on the ballroom level.

6:15 AM – 7:30 AM….....….Pediatric Trauma Ad Hoc Committee Meeting
Continental Ballroom 9

6:15 AM – 7:30 AM…..……..…..Education/CME Ad Hoc Committee Meeting
Plaza B

6:30AM - 7:30 AM….....International Attendees Breakfast
"Organizing Acute Care Surgery, from National to Hospital Level"
Presenter: Ari Leppaniemi, M.D.
(Ticketed Event)
*Plaza A

7:00 AM – 8:30 AM...……....…….....Continental Breakfast
*Golden Gate Ballroom

7:00 AM – 2:00 PM…….....…….....Exhibits and Posters
*Golden Gate Ballroom

7:00 AM – 3:00 PM..…….....…..…….....Registration
East Lounge

7:30 AM – 8:00 AM..……...…….……...…..Session XI:
Master Surgeon Lecture III
Kenneth Mattox, M.D.
"*The Acute Care Surgeon's Role in Vascular Trauma***"**
Continental Ballroom 4, 5 & 6

8:00 AM - 9:10 AM .....……..…….....Session XII:
Use of Advanced Techniques in the ACS/Trauma Setting Panel II
Moderators: Robert Mackersie, M.D. & Mark Malangoni, M.D.
Continental Ballroom 4, 5 & 6

9:10 AM - 11:10 AM ……....…..……..……....Session XIII:
Quick Shots#1-20
Moderator: C. William Schwab, M.D.
Continental Ballroom 4, 5 & 6

11:10 AM – 11:25 AM…...…….……....…..……....Break
*Golden Gate Ballroom

11:25 AM - 12:15 PM ..……....……Session XIV:
AAST 39th William T. Fitts Lecture
Frank Lewis, Jr., M.D.
"The Control of the Circulation"
Continental Ballroom 4, 5 & 6

*Golden Gate & Plaza A are on the lobby level. All other educational sessions are on the ballroom level.

12:15 PM -1:30 PM.....……..…….……..… Lunch Sessions
(Ticketed Events)
Various Locations

LOCATIONS: ROOM LOCATIONS SUBJECT TO CHANGE, PLEASE CHECK TICKET FOR LOCATION

L - I "Writing and Reviewing for the Journal of Trauma: A Primer"
Speakers: Steven Shackford, MD and
Angela Sauaia, MD, PhD
Location: Continental Ballroom 2

L - II "Thoracic Problems for the Acute Care Surgeon: Mediastinitis, Air Leaks, Retained Hemorthorax, and Empyema"
Moderator: John Fildes, MD
Speakers: J. David Richardson, MD and
J. Wayne Meredith, MD
Location: *Plaza A

L – III **"**Providing Comfort in the ICU—Treating Pain, Agitation, Delirium and Immobility"
Moderator: Karyn Butler, MD
Speakers: Oscar Guillamondegui, MD and
Bryce Robinson, MD
Location: Continental Ballroom 7

L - IV "Gun Violence: Pediatric, Prevention and Advocacy Perspectives"
Moderators: Mary Fallat, MD and Carnell Cooper, MD
Panelists: Michael Nance, MD and Deborah Kuhls, MD
Location: Continental Ballroom 9

L - V "Life Threatening Chest Injuries"
Speakers: Juan Asensio, MD and Thomas Scalea, MD
Location: Continental Ballroom 8

L - VI "Emergency Bedside Procedures in the ER"
Moderator: Kenji Inaba, MD
Speakers: Carlos Brown, MD and Ali Salim, MD
Location: Continental Ballroom 1

1:30 PM – 4:50 PM.……..…….……..…..Session XVA:
Acute Care Surgery
Papers #35-44
Continental Ballroom 4 & 5

*Golden Gate & Plaza A are on the lobby level. All other educational sessions are on the ballroom level.

1:30 PM – 4:50 PM……..…...……..……..Session XVB:
Neurologic, Shock Resuscitation Outcomes/Trauma System, Critical Care
Papers #45-54
Continental Ballroom 6

4:50 PM – 5:00 PM…..……..…… Military Awards Ceremony
Continental Ballroom 6

5:00 PM – 6:15 PM…..……..……Annual Business Meeting
Continental Ballroom 6
(Fellows Only)

7:30 PM – 8:00 PM ….....……..……...……AAST Reception
East Lounge

8:00 PM – 11:00 PM…..……..……..…….....AAST Banquet
(Black Tie)
Continental Ballroom 4, 5 & 6

Saturday, September 21st, 2013

7:00 AM – 8:00 AM…….....New Fellows Breakfast
Continental Ballroom 1

7:00 AM – 9:00 AM...…..…….....Continental Breakfast
East Lounge

7:00 AM – 10:00 AM……...…....…….....Registration
East Lounge

8:00 AM - 11:40 PM…...……..……..Session XVI:
Neurologic, Prevention, Trauma Systems, Critical Care and Outcomes
Papers #55-66
Continental Ballroom 6

PRESENTATIONS: Papers must be original presentations. They become the property of the American Association for the Surgery of Trauma when read and are submitted to *The Journal of Trauma and Acute Care Surgery* for consideration for publication. Manuscripts must have been submitted to *The Journal of Trauma and Acute Care Surgery* prior to the meeting.

Authors are required to stay within the time allotted. Fellows and guests are invited to participate in the discussion upon recognition by the Chair, as time permits.

*Golden Gate & Plaza A are on the lobby level. All other educational sessions are on the ballroom level.

CME CATEGORY I CREDITS: Participants in the 2013 Meeting of the American Association for the Surgery of Trauma are eligible for Category I Continuing Medical Education credits. These credits are available on an hour-for-hour basis. Each attendee should complete a log of his/her attendance at this meeting.

SPECIAL EVENTS:

Poster Session/Reception.....Wednesday, 5:00 PM
Golden Gate Ballroom

Resident, Medical Student and In-Training Fellow Breakfast .....Thursday, 6:15 AM
(Ticketed Event) *Plaza A

Scholarship Presentations.....Thursday, 9:20 AM
Continental Ballroom 4, 5 & 6

Presidential Address.....Thursday, 11:30 AM
Continental Ballroom 4, 5 & 6

39th William T. Fitts Lecture.....Friday, 11:25 AM
Continental Ballroom 4, 5 & 6

International Attendees Breakfast.....Friday, 6:30 AM
(Ticketed Event) *Plaza A

Military Awards Ceremony.....Friday, 4:50 PM
Continental Ballroom 6

New Fellow Breakfast.....Saturday, 7:00 AM
(Ticketed Event) Continental Ballroom 1

SPEAKER READY ROOM: All speakers are required to turn in their presentations 24 hours prior to their scheduled presentation time, unless you are presenting on Wednesday morning.

LOCATION: Continental Ballroom Parlor 3

HOURS OF OPERATION:

Tuesday, September 17, 2013 – 4:00 PM – 7:00 PM

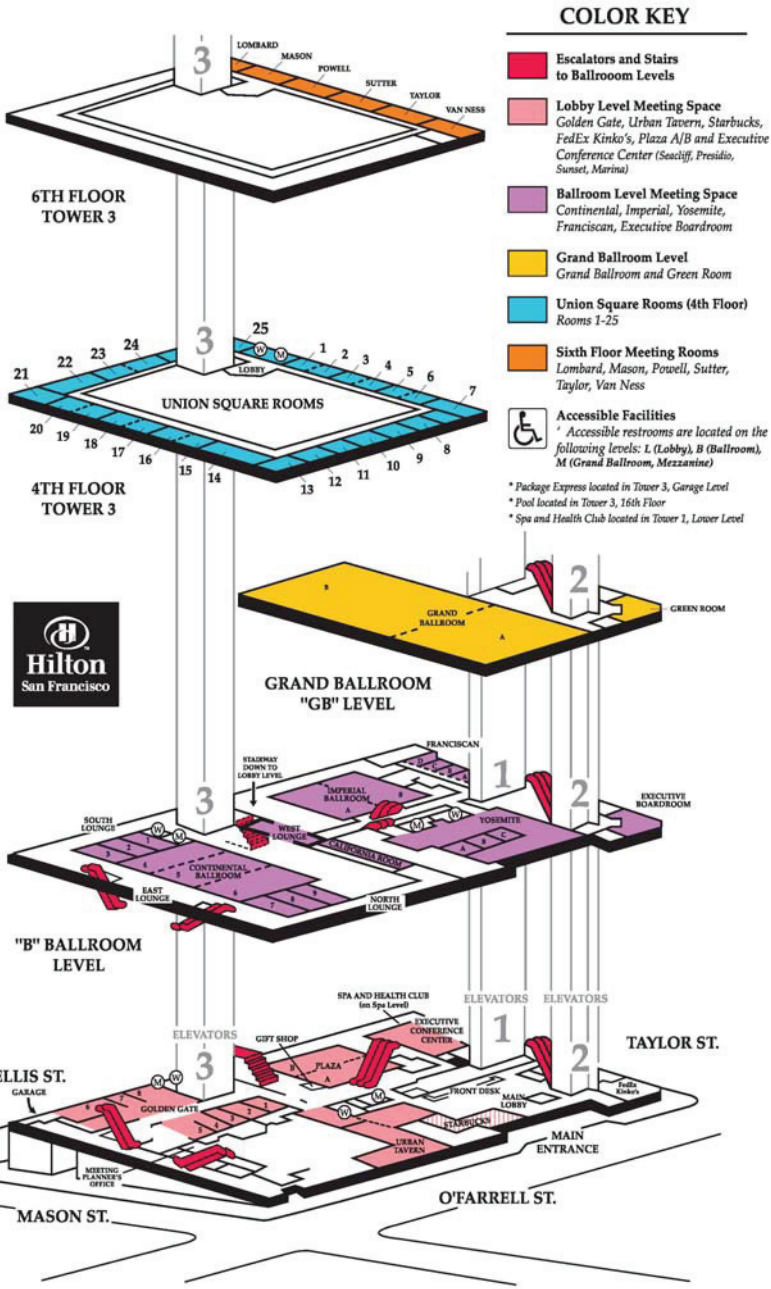
Wednesday, September 18, 2013 – 6:30 AM – 5:00 PM

Thursday, September 19, 2013 – 7:00 AM – 5-00 PM

Friday, September 20, 2013 – 7:00 AM – 5:00 PM

Saturday, September 21, 2013 – 7:00 AM – 10:00 AM

*Golden Gate & Plaza A are on the lobby level. All other educational sessions are on the ballroom level.



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FUTURE AAST MEETINGS

73rd Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery

September 10-13, 2014
Philadelphia Marriott Downtown
Philadelphia, PA

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

September 9-12, 2015
Wynn Las Vegas
Las Vegas, NV

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

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

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

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

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

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

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2012	Kauai, Hawaii	J. Wayne Meredith, M.D.
2011	Chicago, Illinois	L.D. Britt, M.D., M.P.H.
2010	Boston, Massachusetts	Andrew B. Peitzman, M.D.
2009	Pittsburgh, Pennsylvania	Gregory J. Jurkovich, M.D.
2008	Maui, Hawaii	Timothy C. Fabian, M.D.
2007	Las Vegas, Nevada	David V. Feliciano, M.D.
2006	New Orleans, Louisiana	C. William Schwab, M.D.
2005	Atlanta, Georgia	Steven R. Shackford, M.D.
2004	Maui, Hawaii	H. Gill Cryer, M.D., Ph.D.
2003	Minneapolis, Minnesota	David B. Hoyt, M.D.
2002	Orlando, Florida	Ronald V. Maier, M.D.
2001	No Meeting Due to 9/11	Ronald V. Maier, M.D.
2000	San Antonio, Texas	Frank R. Lewis, M.D.
1999	Boston, Massachusetts	J. David Richardson, M.D.
1998	Baltimore, Maryland	Anna M. Ledgerwood, M.D.
1997	Waikoloa, Hawaii	Anthony A. Meyer, M.D., Ph.D.
1996	Houston, Texas	Kenneth L. Mattox, M.D.
1995	Nova Scotia, Canada	Cleon W. Goodwin, M.D.
1994	San Diego, California	Ernest E. Moore, Jr., M.D.
1993	New Orleans, Louisiana	C. James Carrico, M.D.
1992	Louisville, Kentucky	Lewis M. Flint, M.D.
1991	Philadelphia, Pennsylvania	F. William Blaisdell, M.D.
1990	Tucson, Arizona	P. William Curreri, M.D.
1989	Chicago, Illinois	H. David Root, M.D., Ph.D.
1988	Orange County, California	Donald S. Gann, M.D.
1987	Montreal, Canada	Donald D. Trunkey, M.D.
1986	Honolulu, Hawaii	Francis C. Nance, M.D.
1985	Boston, Massachusetts	David S. Mulder, M.D.
1984	New Orleans, Louisiana	George F. Sheldon, M.D.
1983	Chicago, Illinois	Basil A. Pruitt, Jr., M.D.
1982	Colorado Springs, Colorado	Robert J. Freeark, M.D.
1981	Hot Springs, Virginia	Charles R. Baxter, M.D.
1980	Phoenix, Arizona	Leonard F. Peltier, M.D.
1979	Chicago, Illinois	Roger Sherman, M.D.
1978	Lake Tahoe, Nevada	William R. Drucker, M.D.
1977	Detroit, Michigan	Alexander J. Walt, M.D.
1976	Colorado Springs, Colorado	Joseph D. Farrington, M.D.
1975	Scottsdale, Arizona	John H. Davis, M.D.
1974	Hot Springs, Virginia	John A. Moncrief, M.D.
1973	Chicago, Illinois	Crawford Campbell, M.D.
1972	San Francisco, California	Moore Moore, Jr., M.D.
1971	New York City, New York	Curtis P. Artz, M.D.
1970	Chicago, Illinois	Sawnie R. Gaston, M.D.
1969	Portland, Oregon	John E. Raff, M.D.
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1965	Philadelphia, Pennsylvania	William T. Fitts, Jr., M.D.
1964	Chicago, Illinois	Rudolph J. Noer, M.D.
1963	San Francisco, California	Oscar P. Hampton, Jr., M.D.

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

SCIENTIFIC SCHEDULE

SEVENTY-SECOND ANNUAL MEETING
OF THE
AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA
AND
CLINICAL CONGRESS OF ACUTE CARE SURGERY
SEPTEMBER 18-21, 2013
HILTON SAN FRANCISCO UNION SQUARE
SAN FRANCISCO, CA

SCIENTIFIC PROGRAM SCHEDULE

Wednesday, September 18, 2013

12:00 PM **WELCOME**
LOCATION:CONTINENTAL BALLROOM 4/5/6
Presiding: Robert Mackersie, MD
AAST President

SESSION I **Plenary**
LOCATION: CONTINENTAL BALLROOM 4/5/6
Moderator: Robert Mackersie, MD
Recorder: Raul Coimbra, MD, PhD

12:50 pm Paper #1 TRENDS IN TRAUMA SURGERY - ANALYSIS OF THE AAST PROGRAM 1939-2012
Presenter: Reuven Rabinovici, MD
Discussant: Basil Pruitt, Jr., MD

1:10 pm Paper #2 TRENDS IN TRAUMA-RELATED MORTALITY IN THE UNITED STATES FROM 2002-2010
Presenter: Robert Sise, MBA, MPH
Discussant: Christopher Baker, MD

1:30 pm Paper #3 TEMPORAL TRENDS OF POSTINJURY MULTIPLE ORGAN FAILURE: STILL RESOURCE-INTENSIVE, MORBID AND LETHAL
Presenter: Angela Sauaia, MD, PhD
Discussant: H. Gill Cryer, MD, PhD

1:50 pm Paper #4 A PROSPECTIVE RANDOMIZED TRIAL OF THE EFFICACY OF "TURNING POINT", AN INPATIENT VIOLENCE INTERVENTION PROGRAM
Presenter: Catherine Loveland-Jones, MD
Discussant: Rochelle Dicker, MD

2:10 pm Paper #5 UNRELENTING VIOLENCE: AN ANALYSIS OF 6327 GUNSHOT WOUNDS AT LEVEL I TRAUMA CENTER
Presenter: David Livingston, MD
Discussant: Demetrios Demetriades, MD, PhD

2:30 pm	Paper #6	BRIEF INTERVENTIONS AS A MEANS TO REDUCE PROBLEMATIC DRINKING BEHAVIOR AMONG FIRST-TIME DUI ARRESTEES: A RANDOMIZED TRIAL Presenter: Garth Utter, MD, Msc Discussant: Deborah Kuhls, MD
2:50 pm	Paper #7	THROMBELASTOGRAM GUIDED ENOXAPARIN DOSING LEADS TO INCREASED SERUM ANTI-XA LEVELS, BUT DOES NOT CONFER PROTECTION FROM DVT: A RANDOMIZED CONTROLLED PILOT STUDY Presenter: Scott Louis, MD Discussant: Sandro Rizoli, MD
3:10 pm	Paper #8	FINDINGS OF A RANDOMIZED CONTROLLED TRIAL USING LIMITED TRANSTHORACIC ECHOCARDIOGRAM (LTTE) AS A HEMODYNAMIC MONITORING TOOL IN THE TRAUMA BAY. Presenter: Paula Ferrada, MD Discussant: Heidi Frankel, MD

SESSION II:	**Master Surgeon Lecture I** **LOCATION: CONTINENTAL BALLROOM 4/5/6** Presenter: Jack McAninch, MD
3:30 pm	***Genitourinary Trauma 2013***

SESSION III:	**Panel I: Challenging Cases** **LOCATION: CONTINENTAL BALLROOM 4/5/6** Moderated by L.D. Britt, MD, MPH
4:00 pm	***Panelists:*** Sharon Henry, MD Gregory Jurkovich, MD Ari Leppaniemi, MD Anna Ledgerwood, MD Luke Leenen, MD, PhD Nirav Patel, MD, PhD

Session IV — **Poster Session**
5:00 – 7:00 pm — **LOCATION: GOLDEN GATE**

Poster #s	Category/Professors
1-10	Abdominal Trauma/Thoracic/Burns/Vascular Professors: Luke Leenen, MD, PhD and Andre Campbell, MD
11-22	Acute Care Surgery Professors: Jose Diaz, MD and Michael Chang, MD
23-32	Critical Care I Professors: Vicente Gracias, MD and Charles Cook, MD
33-42	Critical Care II Professors: Christopher Michetti, MD and Krista Kaups, MD
43-53	Trauma Prevention/Epidemiology and Socioeconomics/Ethics Professors: A. Peter Ekeh, MD and Deborah Kuhls, MD
54-63	Neurological I Professors: Darren Malinoski, MD and Therese Duane, MD
64-72	Neurological II/Pediatrics Professors: R. Todd Maxson, MD and Barbara Gaines, MD
73-82	Outcomes I Professors: Adil Haider, MD and R. Lawrence Reed, MD
83-92	Outcomes II Professors: Raminder Nirula, MD, MPH and Shahid Shafi, MD
93-102	Outcomes III/Soft Tissue/Head, Neck Professors: Scott Sagraves, MD and Ajai Malhotra, MD
103-111	Shock/Transfusions Professors: Gregory Victorino, MD and Carl Hauser, MD
112-121	Trauma Systems Professors: David Shatz, MD and Enrigue Ginzburg, MD

Thursday, September 19, 2013

SESSION V	**Master Surgeon Lecture II** **LOCATION: CONTINENTAL BALLROOM 4/5/6** Presenter: Rao Ivatury, MD
7:30 am	"***Pressure, Perfusion and Compartments: Challenges for the Acute Care Surgeon"***

SESSION VI	**Plenary Session** **LOCATION: CONTINENTAL BALLROOM 4/5/6** Moderator: Grace Rozycki, MD, MBA Recorder: Raul Coimbra, MD, PhD

8:00 am	Paper #9	REPEAL OF THE CONCEALED WEAPONS LAW AND ITS IMPACT ON GUN-RELATED INJURIES & DEATHS Presenter: Rashna Ginwalla, MD Discussant: Glen Tinkoff, MD
8:20 am	Paper #10	MORE HARM THAN GOOD: ANTI-SEIZURE PROPHYLAXIS AFTER TRAUMATIC BRAIN INJURY DOES NOT DECREASE SEIZURE RATES BUT MAY INHIBIT FUNCTIONAL RECOVERY Presenter: Indermeet Bhullar, MD Discussant: Kenji Inaba, MD
8:40 am	Paper #11	HEMOSTATIC RESUSCITATION IS NEITHER HEMOSTATIC NOR RESUSCITATIVE IN TRAUMA HEMORRHAGE Presenter: Ross Davenport, MD Discussant: Yasuhiro Otomo, MD
9:00 am	Paper #12	ARE WE LEMMINGS?: NON-SELECTIVE USE OF ANGIOGRAPHY PROVIDES NO BENEFIT IN HIGH-GRADE BLUNT SPLENIC INJURY Presenter: Ben Zarzaur, MD, MPH Discussant: Thomas Scalea, MD

SESSION VII 9:20 am	**Scholarship Presentations** **LOCATION: CONTINENTAL BALLROOM 4/5/6**

SESSION VIII	**Plenary Session** **LOCATION: CONTINENTAL BALLROOM 4/5/6** Moderator: Donald Trunkey, MD Recorder: David Spain, MD

10:00 am Paper #13 BLUNT CEREBROVASCULAR INJURY SCREENING WITH 64-CHANNEL MULTIDETECTOR COMPUTED TOMOGRAPHY: MORE SLICES FINALLY CUT IT
Presenter: Elena Paulus, MD
Discussant: Walter Biffl, MD

10:20 am Paper #14 MANAGEMENT OF COLONIC INJURIES IN THE SETTING OF DAMAGE CONTROL LAPAROTOMY – ONE SHOT TO GET IT RIGHT.
Presenter: Devashish Anjaria, MD
Discussant: Timothy Fabian, MD

10:40 am Paper #15 EFFECTS OF MP4OX, AN OXYGEN THERAPEUTIC ON CLINICAL OUTCOMES IN TRAUMA PATIENTS WITH HEMORRHAGIC SHOCK: A PHABE IIB MULTI-CENTER RANDOMIZED PLACEBO-CONTROLLED TRIAL
Presenter: Karim Brohi, MD
Discussant: Frederick Moore, MD

11:00 am Paper #16 DAMAGE CONTROL THORACIC SURGERY: MANAGEMENT AND OUTCOMES
Presenter: James O'Connor, MD
Discussant: J. Wayne Meredith, MD

SESSION IX	**AAST Presidential Address** **LOCATION: CONTINENTAL BALLROOM 4/5/6** Presiding: William Cioffi, MD AAST President-Elect
11:30 am – 12:30 pm	***"For the Care of the Underserved"*** Robert Mackersie, MD, AAST President

12:30-1:45 pm Lunch Session/Lunch on your own

12:30-1:45 pm **LUNCH SESSIONS (1-6)**
LOCATIONS: CONTINENTAL BALLROOM 1, 2,7,8,9, PLAZA A

L-1 Management of the complex dismounted blast injury: translatable lessons learned from the military's experience with the management of pelvic, rectal, lower GU, lower extremity and massive soft tissue injuries
Moderator: Todd Rasmussen, MD
Speakers: Richard Mullins, MD, James Jezior, MD, and Eric Elster, MD

L-2 Open Access and New Standards in Scientific Publishing
Speakers: Ernest Moore, MD and Jennifer Crebs

L-3 Complicated Pancreatitis
Moderator: George Velmahos, MD, PhD
Speakers: Jose Diaz, MD, David Efron, MD, and Peter Fagenholz, MD

L-4 Hemostatic resuscitation for traumatic hemorrhage: What is the role of TXA, PCC and Fibrinogen concentrates in treating acute traumatic coagulopathy?
Moderator: Martin Schreiber, MD
Speakers: Mitchell Cohen, MD and Rosemary Kozar, MD, PhD

L-5 Tuck Everlasting: Advanced Directives and Palliative Care for Elderly Trauma Victims
Moderator: Frederick Luchette, MD
Speakers: Karen Brasel, MD, MPH and Michael Sise, MD

L-6 Challenging Blunt Abdominal Trauma Cases: What to do when you need to operate
Speakers: David Feliciano, MD and Raul Coimbra, MD, PhD

SESSION XA **Neurological Trauma, Abdominal and Shock, Resuscitation**
LOCATION: CONTINENTAL BALLROOM 4/5
Moderator: Ian Civil, MBE, KStJ, ED, MBCHB, FRACS
Recorder: Michael Rotondo, MD

2:00 pm Paper #17 TRAUMATIC BRAIN INJURY CAUSES PLATELET ADP AND AA RECEPTOR INHIBITION INDEPENDENT OF HEMORRHAGIC SHOCK IN HUMANS AND RATS
Presenter: Michael Chapman, MD
Discussant: Mitchell Cohen, MD

2:20 pm	Paper #18	IMPACT OF VOLUME OF INFUSION OF FRESH FROZEN PLASMA AND PLATELETS DURING THE FIRST 180 MINUTES OF RESUSCITATION: MINUTE-BY-MINUTE ANALYSIS OF INFUSION RATES ON SURVIVAL BIAS Presenter: Eric Simms, MD Discussant: Martin Croce, MD
2:40 pm	Paper #19	MORTALITY AFTER GROUND-LEVEL FALL IN THE ELDERLY ANTICOAGULATED PATIENT: A LONG-TERM ANALYSIS OF RISK VS BENEFIT Presenter: Tazo Inui, MD Discussant: Nicholas Namias, MD, MBA
3:00 pm	Paper #20	PLACEMENT OF TRACRANIAL BOLT MONITORS BY TRAUMA SURGEONS - A 6 YEAR REVIEW Presenter: Sadia Ilyas, MD Discussant: Alex Valadka, MD
3:20 pm	Paper #21	MULTI-CENTER ANALYSIS OF DIAPHRAGM PACING IN SPINAL CORD INJURY: SUCCESSFUL IN NOT ONLY WEANING FROM VENTILATORS BUT IN BRIDGING TO INDEPENDENT RESPIRATION Presenter: Joseph Posluszny, MD Discussant: George Velmahos, MD, PhD
3:40 pm	Paper #22	MAKING THE FINANCIAL CASE FOR A SURGEON DIRECTED CRITICAL CARE ULTRASOUND PROGRAM (CCUP) Presenter: Sarah Murthi, MD Discussant: Andrew Kirkpatrick, MD
4:00 pm	Paper #23	POSITIVE CT ANGIOGRAPHY AFTER PELVIC TRAUMA DOES NOT ALWAYS PREDICT NEED FOR ANGIOEMBOLIZATION Presenter: Peep Talving, MD, PhD Discussant: Babak Sarani, MD
4:20 pm	Paper #24	COMPLEX PENETRATING DUODENAL INJURIES: LESS IS BETTER Presenter: Carlos Ordonez, MD Discussant: David Feliciano, MD
4:40 pm	Paper #25	THE EARLY BIRD GETS THE WORM: PRE TRAUMA CENTER BLOOD TRANSFUSION IS ASSOCIATED WITH REDUCED MORTALITY AND COAGULOPATHY IN SEVERELY INJURED BLUNT TRAUMA PATIENTS Presenter: Joshua Brown, MD Discussant: Stephanie Savage, MD

SESSION XB **Thoracic Trauma and Critical Care**
LOCATION: CONTINENTAL BALLROOM 6
Moderator: Steven Johnson, MD
Recorder: Patrick Reilly, MD, MPH

2:00 pm Paper #26 COMPLEMENT MEDIATES A PRIMED INFLAMMATORY RESPONSE AFTER TRAUMATIC LUNG INJURY
Presenter: Jason Hoth, MD
Discussant: Krishnan Raghavendran, MD

2:20 pm Paper #27 THE EFFECT OF EPIDURAL PLACEMENT IN PATIENTS AFTER BLUNT THORACIC TRAUMA
Presenter: Saman Arbabi, MD, MPH
Discussant: David Harrington, MD

2:40 pm Paper #28 IS IT SAFE? TWICE DAILY DOSING OF ENOXAPARIN IN TRAUMA PATIENTS WITH INDWELLING THORACIC EPIDURAL CATHETER
Presenter: Shente Hsu, MD
Discussant: M. Margaret Knudson, MD

3:00 pm Paper #29 AGE-RELATED IMPACT ON PRESENTATION AND OUTCOME OF PENETRATING THORACIC TRAUMA IN THE ADULT AND PEDIATRIC PATIENT POPULATIONS
Presenter: Nathan Mollberg, DO
Discussant: Mary Fallat, MD

3:20 pm Paper #30 COMPUTER VERSUS PAPER ICU SYSTEM FOR RECOGNITION AND MANAGEMENT OF SURGICAL SEPSIS
Presenter: Chasen Croft, MD
Discussant: Lena Napolitano, MD

3:40 pm Paper #31 REDUCING UNNECESSARY BLOOD TRANSFUSTIONS IN THE SICU WITH A SIMPLE CHECKLIST
Presenter: Ellen Carraro, MD
Discussant: Lydia Lam, MD

4:00 pm Paper #32 SURGICAL ICU PATIENTS BOARDING IN OTHER ICUs: GREATER DISTANCES EQUAL MORE FREQUENT COMPLICATIONS
Presenter: Jose Pascual, MD
Discussant: Grace Rozycki, MD, MBA

4:20 pm	Paper #33	DETERMINING THE OPTIMAL THRESHOLD FOR GLUCOSE CONTROL IN ORGAN DONORS AFTER NEUROLOGIC DETERMINATION OF DEATH: A PROSPECTIVE ANALYSIS FROM THE UNOS REGION 5 DONOR MANAGEMENT GOALS WORKGROUP Presenter: Mitchell Sally, MD Discussant: Ali Salim, MD
4:40 pm	Paper #34	BETA BLOCKERS FOR ACUTE ATRIAL DYSRHYTHMIAS IN TRAUMA PATIENTS IMPROVES OUTCOMES Presenter: Jason Farrah, MD Discussant: Terence O'Keeffe, MD, MPH

5:00 pm **OPEN EVENING**

Friday, September 20, 2013

SESSION XI	**Master Surgeon Lecture III** **LOCATION: CONTINENTAL BALLROOM 4/5/6** Presenter: Kenneth Mattox, MD
7:30 am	***The Acute Care Surgeon's Role in Vascular Trauma***

SESSION XII	**Panel II:** Use of Advance Techniques in the ACS/Trauma Setting **LOCATION: CONTINENTAL BALLROOM 4/5/6** Moderators: Robert Mackersie, MD and Mark Malangoni, MD
8:00 am	***Panelists:*** John Holcomb, MD, Andrew Peitzman, MD and Todd Rasmussen, MD

SESSION XIII	**Quickshots** **LOCATION: CONTINENTAL BALLROOM 4/5/6** Moderator: C. William Schwab, MD

9:10 am	Quickshot #1	DAMAGE CONTROL RESUSCITATION INCREASES THE RISK OF THROMBOTIC COMPLICATIONS IN TRAUMA PATIENTS Presenter: Jesse Bandle, MD Discussant: David Wisner, MD
9:16 am	Quickshot #2	BLOOD TRANSFUSION IN YOUNG WOMEN RESULTS IN EXCESS MORTALITY FOLLOWING TRAUMA Presenter: Sean Monaghan, MD Discussant: Laura Moore, MD
9:22 am	Quickshot #3	SIRT-1 TARGET PROTEIN ACETYLATION IS BLUNTED BY ADMINISTRATION OF RESVERATROL FOLLOWING ISCHEMIA-REPERFUSION INJURY Presenter: Susan Evans, MD Discussant: Hasan Alam, MD

9:28 am	Quickshot #4	EXOGENOUS PHOSHATIDYLCHOLINE SUPPLEMENTATION IMPROVES INTESTINAL BARRIER DEFENSE AGAINST C. DIFFICILE TOXIN Presenter: Alicia Olson, MD Discussant: Soumitra Eachempati, MD
9:34 am	Quickshot #5	CHILDREN ARE SAFER IN STATES WITH STRICT FIREARM LAWS: A NATIONAL INPATIENT SAMPLE STUDY. Presenter: Arash Safavi, MD, MHSc Discussant: Michael Nance, MD
9:40 am	Quickshot #6	TRAUMATIC BRAIN INJURY AND BETA-BLOCKERS: NOT ALL DRUGS ARE CREATED EQUAL Presenter: Thomas Schroeppel, MD Discussant: Eric Ley, MD
9:46 am	Quickshot #7	THE ROLE OF THYROXINE INFUSION IN PATIENTS WITH NONSURVIVABLE BRAIN INJURY FOR HEMODYNAMIC STABILIZATION PRIOR TO THE DECLARATION OF BRAIN DEATH Presenter: Meghann Kaiser, MD Discussant: Darren Malinoski, MD
9:52 am	Quickshot #8	THE EFFECT OF AGE ON GLASGOW COMA SCALE IN PATIENTS WITH TRAUMATIC BRAIN INJURY Presenter: Kristin Salottolo, MPH Discussant: Joseph Minei, MD
9:58 am	Quickshot #9	BLOOD COMPONENT TRANSFUSION INCREASES RISK OF DEATH IN CHILDREN WITH TRAUMATIC BRAIN INJURY Presenter: Shannon Acker, MD Discussant: David Notrica, MD
10:04 am	Quickshot #10	WHEN BIRDS CAN'T FLY: AN ANALYIS OF ADVANCED LIFE SUPPORT GROUND TRANSPORT WHEN HELICOPTER EMERGENCY MEDICAL SERVICE (HEMS) IS UNAVAILABLE Presenter: Eric Toschlog, MD Discussant: Dennis Ashley, MD
10:10 am	Quickshot #11	A CONCLUDING AFTER ACTION REPORT OF THE SENIOR VISITING SURGEON PROGRAM WITH THE UNITED STATES MILITARY AT LANDSTUHL REGIONAL MEDICAL CENTER, GERMANY Presenter: M. Margaret Knudson, MD Discussant: Donald Jenkins, MD

10:16 am Quickshot #12 CLEARED FOR TAKEOFF: THE EFFECTS OF HYPOBARIC CONDITIONS ON TRAUMATIC PNEMOTHORACES
Presenter: Sarah Majercik, MD
Discussant: Erik Barquist, MD

10:22 am Quickshot #13 COMPLETE ULTRASONOGRAPHY OF TRAUMA (CUST) IN SELECTED BLUNT TRAUMA PATIENT IS AN EQUIVELANT SCREENING EXAM TO COMPUER TOMOGRAPHY AND IS ASSOCIATED WITH REDUCED RADIATION EXPOSURE AND INCREASED SAVINGS
Presenter: Zia Dehqanzada, MD
Discussant: Jason Sperry, MD, MPH

10:28 am Quickshot #14 PAN CT VERSUS SELECTIVE CT IN BLUNT TRAUMA: A COST-UTILITY ANALYSIS
Presenter: Wayne Lee, MD
Discussant: Samir Fakhry, MD

10:34 am Quickshot #15 OUTCOMES OF ABDOMINAL TRAUMA PATIENTS WITH HEMORRHAGIC SHOCK REQUIRING AN EMERGENCY LAPAROTOMY: EFFICACY OF INTRA-AORTIC BALLOON OCCLUSION
Presenter: Kosei Kunitatsu, MD
Discussant: Joseph Rappold, MD

10:40 am Quickshot #16 LONG-TERM OUTCOMES OF GROUND-LEVEL FALLS IN THE ELDERLY
Presenter: Lisa McIntyre, MD
Discussant: Clay Cothren Burlew, MD

10:46 am Quickshot #17 COSTS AND OUTCOMES OF TRAUMA CARE AT CENTERS TREATING A HIGHER PROPORTION OF OLDER PATIENTS: THE CASE FOR GERIATRIC TRAUMA CENTERS
Presenter: Syed Nabeel Zafar, MD, MPH
Discussant: Marc de Moya, MD

10:52 am Quickshot #18 HOSPITAL READMISSION TO AN ACADEMIC LEVEL I TRAUMA CENTER WITHIN 30 DAYS OF DISCHARGE
Presenter: Leonard Copertino, MD
Discussant: John Fildes, MD

10:58 am Quickshot #19 HOW ARE YOU REALLY FEELING? A PROSPECTIVE EVALUATION OF COGNITIVE FUNCTION FOLLOWING TRAUMA
Presenter: Deborah Stein, MD
Discussant: Kristan Staudenmayer, MD

11:04 am Quickshot #20 MID-TERM, AMPUTATION FREE SURVIVAL AND PATIENT BASED OUTCOMES FOLLOWING WARTIME VASCULAR INJURY
Presenter: Chonna Kendrick, MD
Discussant: Matthew Wall, Jr., MD

SESSION XIV	**AAST Fitts Orator** **LOCATION: CONTINENTAL BALLROOM 4/5/6**
11:25 am	Frank Lewis, MD

12:15-1:30 pm Lunch Sessions/Lunch on your own

12:15-1:30 pm **LUNCH SESSIONS (7-12)**
LOCATIONS: CONTINENTAL BALLROOM 1, 2,7,8,9, PLAZA A

L-7 Writing and Reviewing for the Journal of Trauma: A Primer
Speakers: Steven Shackford, MD and Angela Sauaia, MD, PhD

L-8 Thoracic Problems for the Acute Care Surgeon: Mediastinitis, Air Leaks, Retained Hemothorax, and Empyema
Moderator: John Fildes, MD
Speakers: J. David Richardson, MD and J. Wayne Meredith, MD

L-9 Providing Comfort in the ICU—Treating Pain, Agitation, Delirium and Immobility
Moderator: Karyn Butler, MD
Speakers: Oscar Guillamondegui, MD and Bryce Robinson, MD

L-10 Gun Violence: Pediatric, Prevention and Advocacy Perspectives
Moderators: Mary Fallat, MD and Carnell Cooper, MD
Speakers: Michael Nance, MD and Deborah Kuhls, MD

L-11 Life Threatening Chest Injuries
Speakers: Juan Asensio, MD and Thomas Scalea, MD

L-12 Emergency Bedside Procedures in the ER
Moderator: Kenji Inaba, MD
Speakers: Carlos Brown, MD and Ali Salim, MD

SESSION XVA **Acute Care Surgery**
LOCATION: CONTINENTAL BALLROOM 4/5
Moderator: Mark Malangoni, MD
Recorder: David Livingston, MD

1:30 pm	Paper #35	FIBRINOGEN AND PLATELET CONTRIBUTIONS TO CLOT FORMATION: IMPLICATIONS FOR TRAUMA RESUSCITATION AND THROMBOPROPHYLAXIS Presenter: Lucy Kornblith, MD Discussant: Ernest Moore, MD
1:50 pm	Paper #36	COMPARISON OF THE HEMOSTATIC EFFICACY OF LOW VOLUME LYOPHILIZED PLASMA RECONSTITUTED USING STERILE WATER, LACTATED RINGER'S, NORMAL SALINE, AND HEXTEND® SOLUTIONS Presenter: Tim Lee, MD, MS Discussant: Charles Lucas, MD
2:10 pm	Paper #37	PERSISTENT INFLAMMATION IMMUNOSUPPRESSION AND CATABOLISM SYNDROME AFTER SEVERE BLUNT TRAUMA Presenter: Erin Vanzant, MD Discussant: David Hoyt, MD
2:30 pm	Paper #38	ASPIRATION OF ACID AND FOOD PARTICLES PRODUCES A SYNERGISTIC PULMONARY EXPRESSION OF SRAGE AND HMGB1 IN MICE. Presenter: Peter Smit, MD, MS Discussant: Ronald Maier, MD
2:50 pm	Paper #39	TO SWAB OR NOT TO SWAB: A PROSPECTIVE ANALYSIS OF 341 SICU VRE SCREENS Presenter: Marko Burkur, MD Discussant: Kimberly Davis, MD, MBA
3:10 pm	Paper #40	HOW MUCH AND WHAT TYPE...ANALYSIS OF THE FIRST YEAR OF THE ACUTE CARE SURGERY OPERATIVE CASE LOG Presenter: Christopher Dente, MD Discussant: James Davis, MD
3:30 pm	Paper #41	DOES RVU-BASED COMPENSATION SHORT-CHANGE THE ACUTE CARE SURGEON? Presenter: Diane Schwartz, MD Discussant: R. Lawrence Reed, MD
3:50 pm	Paper #42	ADJUNCTIVE TREATMENT OF ABDOMINAL CATASTROPHES AND SEPSIS WITH DIRECT PERITONEAL RESUSCITATION (DPR): INDICATIONS FOR USE IN ACUTE CARE SURGERY. Presenter: Jason Smith, MD, PhD Discussant: John Holcomb, MD

4:10 pm Paper #43 OUTPATIENT LAPAROSCOPIC APPENDECTOMY SHOULD BE THE STANDARD OF CARE FOR UNCOMPLICATED APPENDICITIS
Presenter: Richard Frazee, MD
Discussant: Andrew Peitzman, MD

4:30 pm Paper #44 SELF-EXPANDING FOAM FOR PREHOSPITAL TREATMENT OF SEVERE INTRA-ABDOMINAL HEMORRHAGE: DOSE FINDING AND SURVIVAL STUDIES
Presenter: David King, MD
Discussant: Randall Friese, MD

SESSION XVB **Neurologic, Shock Resuscitation/Outcomes/Trauma System, Critical Care**
LOCATION: CONTINENTAL BALLROOM 6
Moderator: Christine Cocanour, MD
Recorder: Thomas Esposito, MD, MPH

1:30 pm Paper #45 TRAUMATIC BRAIN INJURY AND HEMORRHAGE DISRUPTS COAGULATION AND PROTEIN C SYSTEMS, AND RESULTS IN ENDOTHELIAL INJURY AND INFLAMMATION IN A PORCINE MODEL
Presenter: Martin Sillesen, MD
Discussant: Eileen Bulger, MD

1:50 pm Paper #46 VAGAL NERVE STIMULATION MODULATES THE DENDRITIC CELL PROFILE IN POST-HEMORRHAGIC SHOCK MESENTERIC LYMPH
Presenter: Todd Costantini, MD
Discussant: William Cioffi, MD

2:10 pm Paper #47 THE EFFECT OF TRANEXAMIC ACID IN A PORCINE TRAUMATIC ISCHEMIA REPERFUSION MODEL
Presenter: Mia Debarros, MD
Discussant: Martin Schreiber, MD

2:30 pm Paper #48 STEMMING THE TIDE: THE IMPACT OF PLATELET AND DESMOPRESSIN ADMINISTRATION ON EARLY RADIOGRAPHIC PROGRESSION OF TRAUMATIC INTRACRANIAL HEMORRHAGE
Presenter: Dennis Kim, MD
Discussant: Raminder Nirula, MD, MPH

2:50 pm Paper #49 TRACHEOSTOMY TIMING IN ISOLATED TRAUMATIC BRAIN INJURY: PROPENSITY-MATCHED COHORT FROM THE AMERICAN COLLEGE OF SURGEONS TRAUMA QUALITY IMPROVEMENT PROGRAM
Presenter: Aziz Alali, MD
Discussant: Charles Adams, Jr., MD

Friday, September 20, 2013 (continued)

3:10 pm	Paper #50	ARE ALL DEATHS RECORDED EQUALLY? THE IMPACT OF HOSPICE CARE TO RISK ADJUSTED MORTALITY Presenter: Rosemary Kozar, MD, PhD Discussant: Michael Sise, MD
3:30 pm	Paper #51	BENCHMARKING TRAUMA CENTERS ON MORTALITY ALONE DOES NOT REFLECT QUALITY OF CARE: IMPLICATIONS FOR P4P. Presenter: Zain Hashmi, MBBS Discussant: Robert Winchell, MD
3:50 pm	Paper #52	EPIDEMIOLGY AND RISK FACTORS OF MULTIPLE ORGAN FAILURE (MOF) AFTER MULTIPLE TRAUMA: AN ANALYSIS OF 31154 PATIENTS FROM THE TRAUMA REGISTRY OF THE GERMAN TRAUMA SOCIETY Presenter: Matthias Fröhlich, MD Discussant: Joseph Cuschieri, MD
4:10 pm	Paper #53	GUIDING THE MANAGEMENT OF INTUBATED PATIENTS WITH PNEUMONIA AND VENTILATOR ASSOCIATED EVENTS USING SERIAL CATHETER-DIRECTED BRONCHO-ALVEOLAR LAVAGE. Presenter: Colleen Stoeppel, MD Discussant: Karen Brasel, MD, MPH
4:30 pm	Paper #54	PROGNOSTIC ABILITY OF A NOVEL QUANTITATIVE PCR METHOD FOR ANALYZING BRONCHOALVEOLAR LAVAGE SAMPLES IN VENTILATED TRAUMA PATIENTS Presenter: Alessandro Orlando, MPH Discussant: Michael West, MD, PhD
4:50 pm		Military Awards

5:00-6:15 pm	**ANNUAL BUSINESS MEETING** ***(AAST VOTING MEMBERS ONLY)*** **LOCATION: CONTINENTAL BALLROOM 6**

7:30 PM	**ANNUAL MEETING RECEPTION AND BANQUET** **LOCATION: CONTINENTAL BALLROOM 4/5**

Saturday, September 21, 2013

SESSION XVI **Neurologic, Prevention, Trauma Systems, Critical Care and Outcomes**
LOCATION: CONTINENTAL BALLROOM 6
Moderator: William Cioffi, MD
Recorder: Eileen Bulger, MD

8:00 am	Paper #55	ENDOVASCULAR SKILLS FOR TRAUMA AND RESUSCITATIVE SURGERY (ESTARSTM) COURSE: CURRICULUM DEVELOPMENT, CONTENT VALIDATION AND PROGRAM ASSESSMENT Presenter: Carole Villamaria, MD Discussant: Steven Shackford, MD
8:20 am	Paper #56	IS ROUTINE REPEAT BRAIN CT SCAN NECESSARY IN All CHILDREN WITH MILD TRAUMATIC BRAIN INJURY? Presenter: Jarett Howe, MD Discussant: Denis Bensard, MD
8:40 am	Paper #57	INHIBITION OF SEPSIS-INDUCED INFLAMMATORY RESPONSE BY BETA1-ADRENERGIC ANTAGONISTS Presenter: Irada Ibrahim-zada, MD, PhD Discussant: Philip Barie, MD, MBA
9:00 am	Paper #58	PROSPECTIVE EVALUATION OF INTRAVASCULAR VOLUME STATUS IN CRITICALLY ILL PATIENTS: DOES IVC COLLAPSIBILITY CORRELATE WITH CVP? Presenter: Stanislaw Stawicki, MD Discussant: Jay Doucet, MD
9:20 am	Paper #59	A COMPARISON OF THE INJURY SEVERITY SCORE AND THE TRAUMA MORTALITY PREDICTION MODEL: SHALL THE ISS PASS GENTLY INTO THAT GOOD NIGHT? Presenter: Alan Cook, MD Discussant: Howard Champion, FRCS
9:40 am	Paper #60	IMPLEMENTATION OF CLOUD-BASED IMAGE SHARING TECHNOLOGY SIGNIFICANTLY REDUCED REPEAT CT IMAGING IN A REGIONAL TRAUMA SYSTEM Presenter: Aman Banerjee, MD Discussant: Reuven Rabinovici, MD
10:00 am	Paper #61	UNREGULATED PROLIFERATION OF TRAUMA CENTERS UNDERMINES COST EFFICIENCY OF POPULATION BASED INJURY CONTROL Presenter: Joseph Tepas, III, MD Discussant: Michael Rotondo, MD

Saturday, September 21, 2013 (continued)

10:20 am Paper #62 EVIDENCE-BASED PROTOCOL FOR PROPHYLACTIC ANTIBIOTICS IN OPEN FRACTURES: IMPROVED ANTIBIOTIC STEWARDSHIP WITH NO INCREASE IN INFECTION RATES
Presenter: Lauren Rodriguez, BA
Discussant: Hans-Christoph Pape, MD

10:40 am Paper #63 POSITIVE EFFECTS OF A COMMUNITY PROGRAM AND LEVEL II TRAUMA CENTER, ON DECREASING GANG WARFARE IN SOUTHERN CALIFORNIA BEACH CITIES
Presenter: Thomas Duncan, DO
Discussant: Edward Cornwell, MD

11:00 am Paper #64 DO SPEED CAMERAS IMPACT TRAUMA CENTERS?
Presenter: Jeff Skubic, MD
Discussant: Jack Sava, MD

11:20 am Paper #65 THE EFFECTIVENESS OF A STATEWIDE TRAUMA CALL CENTER IN REDUCING TIME TO DEFINITIVE CARE FOR SEVERELY INJURED PATIENTS
Presenter: Deidra Wyrick, MD
Discussant: Jeffrey Salomone, MD

11:40 am Paper #66 ENTERAL ALBUTEROL DECREASES THE NEED FOR CHRONOTROPIC AGENTS IN PATIENTS WITH CERVICAL SPINAL CORD INJURY (CSCI) INDUCED BRADYCARDIA
Presenter: Charity Evans, MD
Discussant: Deborah Stein, MD, MPH

12:00 pm **MEETING ADJOURNS**

ABSTRACTS OF PAPERS

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

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

WELCOME
Wednesday, September 18, 2013, 12:00 PM – 12:50 PM
CONTINENTAL BALLROOMS 4, 5 and 6
PRESIDING: Robert C. Mackerise, M.D., AAST President

SESSION I: Plenary – Papers #1-#8
Wednesday, September 18, 2013, 12:50 pm
CONTINENTAL BALLROOMS 4, 5 and 6
PRESIDING: Robert C. Mackerise, M.D.
RECORDER: Raul Coimbra, M.D., Ph.D.

Session: I: Plenary Papers 1-8
Paper 1: 12:50-1:10 pm

TRENDS IN TRAUMA SURGERY - ANALYSIS OF THE AAST PROGRAM 1939-2012

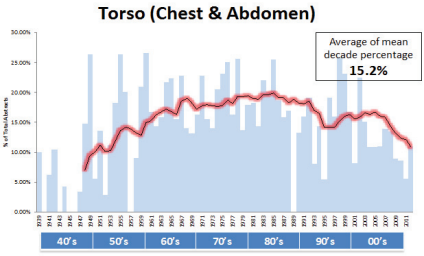
Reuven Rabinovici* MD, Sharon Gautschy Raul Coimbra* MD,Ph.D., Tufts Medical Center

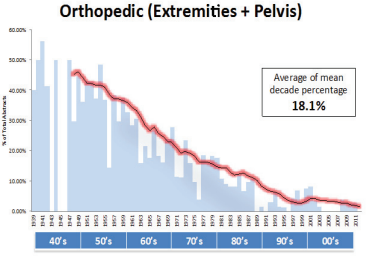
Invited Discussant: Basil Pruitt, MD

Introduction: Major trauma-related clinical and basic science innovations were presented at AAST since its establishment in 1938. Thus, an analysis of all podium presentations at the Annual Meeting of the Association was carried out to identify historical and current trends in trauma surgery.

Methods: All abstract books of the Annual Meetings of AAST from 1939 (first meeting) to 2012 were identified except for 1943 and 1945 (no meeting due to WWII) and 1946 (not found). A master list of abstracts (n=3,637) was generated in Excel. Abstracts were assigned to 14 different categories, and the percentage of each category was tabulated per year. Trend lines were then generated using a mean of 10 zones. Additionally, the year in which major clinical and basic science advancements were first presented was recorded.

Results: Overall, most (20%) AAST presentations were related to the resuscitation, shock, infection, inflammation, immunology, endocrinology, and metabolism category. This was followed by the orthopedic (18%) and the torso (chest and abdomen) trauma categories (15%). The trend for each category over time was identified. Prominent trends included a bell-shaped curve for torso injuries (left figure), a progressive decrease in orthopedic topics (right figure), an increase in critical care topics since the 70's, in resuscitation/infection/shock abstracts since the 80's, and in trauma system presentations since the 90's. 175 first presentations of key topics were identified. Prominent examples include use of penicillin (1941), sepsis (1948), use of plasma (1950), tetanus immunization (1953), trauma education (1954), first controlled clinical trial (1955), iv nutrition (1957), traumatic coagulopathy (1963), hypertonic saline (1966), angiography for trauma (1967), first inflammation study (1968), "wet lungs" (1968), use of PEEP (1971), use of computers in trauma (1971), description of ED thoracotomy (1972), pulmonary capillary wedge pressure (PCWP, 1972), ICP monitoring (1976), splenorrhaphy (1978), H2 blockers (1979), use of CT scan in trauma (1980), selective management of splenic injury (1981), ATLS (1984), use of ultrasound in trauma (1987), damage control laparotomy (1992), laparoscopy (1992), DVT prophylaxis (1995), endovascular stenting (2000), telemedicine (2005), and damage control resuscitation (2007).





Conclusions: Analysis of all oral AAST presentations identified trends and significant milestones in trauma care and research. In 75 years of existence, the AAST Annual Meeting remains the forum in which major developments in trauma care and scientific knowledge are presented and disseminated.

NOTES

Session: I: Plenary Papers 1-8
Paper 2: 1:10-1:30 pm

TRENDS IN TRAUMA-RELATED MORTALITY IN THE UNITED STATES FROM 2002-2010

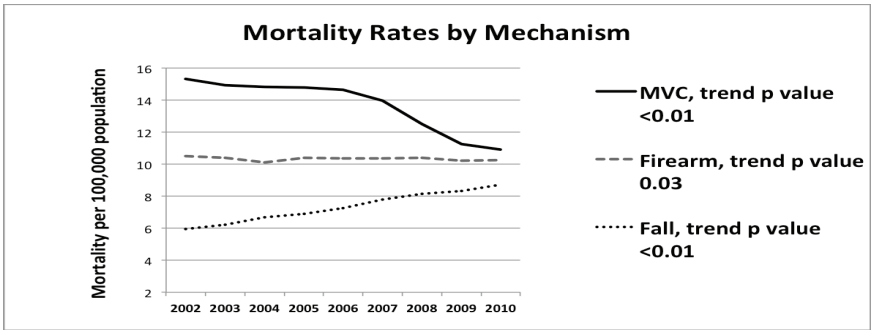
Robert G. Sise MBA,MPH, Richard Y. Calvo MPH, Lakshika Tennakoon MD, David A. Spain* MD, Thomas G. Weiser MD,MPH, Kristan L. Staudenmayer* MD, MS Stanford University

Invited Discussant: Christopher C. Baker, MD

Introduction: Epidemiologic trends in trauma-related mortality in the U.S. require updating and characterization. In the past, improvements in trauma care and vehicle safety, as well as changes in population demographics, have led to reduced mortality for the three most common causes of trauma-related deaths: motor vehicle crashes (MVCs), firearms, and falls. We hypothesized that while this trend continues, there have been changes in the proportions of deaths from the different mechanisms.

Methods: Multiple sources were queried for the time period of 2002-2010: the National Trauma Data Bank (NTDB), the National Centers for Disease Control (CDC), the National Highway Traffic Safety Administration (NHTSA), and the U.S. Census Bureau. The incidence of injury and mortality for MVCs, firearms, and falls were determined using CDC data. NHTSA data were used to determine annual vehicle miles traveled (VMT). Injury severity data were derived from the NTDB. Census data were used to determine population rates and demographic changes. Injury Severity Score (ISS) was analyzed between 2002 and 2010 with t-tests. Analysis of mortality trends by year was performed using the Cochran-Armitage test for trend.

Results: From 2002-2010, the total mortality decreased by 6% ($p<0.01$). However, mortality trends differed by mechanism (Fig.). The large decrease in fatal MVCs was associated with a decrease in the annual number of all MVCs (6.3 to 5.4 million), fewer injuries per MVC (463 to 413 injuries/1000 MVCs), and a decrease in mean ISS per MVC (11.1 to 10.5, $p<0.01$). The decrease in the number of MVCs was not associated with a decrease in VMT (2.9 to 3.0 billion). Firearm-related mortality decreased slightly despite a 10% increase in firearm-related injuries (31 to 34/100,000 population). In contrast, fall-related mortality increased by 46% (5.95 to 8.70, $p<0.01$) and was associated with a 2.4 million (9.3%) increase in population over 70 years of age.



Conclusion: MVC mortality rates have decreased over the last decade, due in part to decreases in the number and severity of MVC-related injuries. Improvements in trauma care also likely play a role. Conversely, fall-related mortality is increasing and is projected to exceed both MVC and firearm mortality rates should current trends continue. Trauma systems will need to take account of these changing injury mortality patterns and demographics to best accommodate the needs of the injured population.

NOTES

Session: I: Plenary Papers 1-8
Paper 3: 1:30-1:50 pm

TEMPORAL TRENDS OF POSTINJURY MULTIPLE ORGAN FAILURE: STILL RESOURCE-INTENSIVE, MORBID AND LETHAL

Angela Sauaia MD,Ph.D., Ernest E. Moore* MD, Jeffrey Johnson* MD, Theresa Chin MD, Anirban Banerjee Ph.D., Jason L. Sperry MD, Ronald V. Maier* MD, Clay Burlew* MD, Colorado School Of Public Health

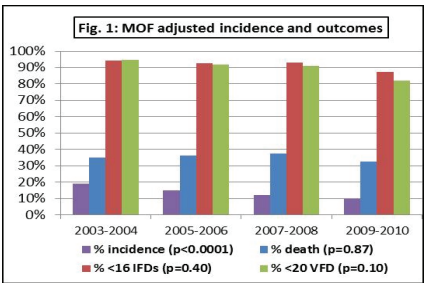
Invited Discussant: H. Gill Cryer, MD, PhD

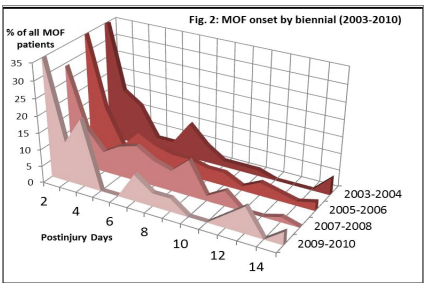
Introduction: While the incidence of postinjury multiple organ failure (MOF) has declined over the past decade, temporal trends of its morbidity, mortality, presentation patterns and healthcare resources utilization have been inconsistent. The purpose of this study is to describe the evolving epidemiology of postinjury MOF from 2003-2010 in multiple trauma centers sharing standard treatment protocols.

Methods: "Inflammation and Host Response to Injury Collaborative Program" institutions that enrolled >20 eligible patients per biennial during the entire 2003-2010 study period were included. Patients aged 16-90 years, with blunt torso trauma and hemorrhagic shock [systolic blood pressure (SBP) <90 mm Hg, base deficit (BD) >=6 mEq/L, blood transfusion /12hrs], without severe head injury were followed for 28 days. ICU free days (IFD) and ventilator free days (VFD), were categorized at their median values (<16 IFD; <20 VFD). All rates were adjusted for temporal trends and admission risk factors [age, sex, BMI, new injury severity score (NISS), SBP, BD] using logistic regression. MOF was defined as a Denver MOF score>3.

Results: 1643 patients from four institutions were evaluated. MOF adjusted incidence decreased over time (Fig. 1) but MOF related death rate (p=0.87), IFD (p=0.40) and VFD (p=0.10) did not improve. Lung and cardiac dysfunctions became less frequent (61% to 53%, p<0.001; 22% to 13%, p=0.004), but kidney and liver failure rates did not change (11% to 13%, p=0.10; 17% to 14%, p=0.15). The onset of MOF has retained a multimodal distribution (Fig. 2). Age, BMI, and shock severity upon admission (SBP, BD) increased over time, but not NISS. No changes were detected in 12hrs blood transfusions over time. Infections and non-septic complications (NSC) rates did not decline (Infections: 54% to 58%, p=0.22; and NSC: 54% to 57%, p=0.17).

Conclusions: Postinjury MOF remains a resource-intensive, morbid, and lethal condition. Lung injury is an enduring challenge and should be a research priority. Lack of outcome improvements suggests that reversing MOF is difficult and prevention is still the best strategy.





NOTES

Session: I: Plenary Papers 1-8
Paper 4: 1:50-2:10 pm

A PROSPECTIVE RANDOMIZED TRIAL OF THE EFFICACY OF "TURNING POINT", AN INPATIENT VIOLENCE INTERVENTION PROGRAM

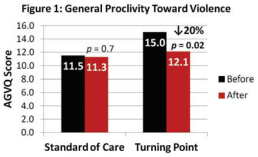
Catherine E. Loveland-Jones MD, Scott Charles MAPP, Lucas Ferrar MD, Andrea VanZandt BA, Thomas A. Santora* MD, Abhijit S. Pathak* MD, Jay E. Dujon* MD, Lars O. Sjoholm* MD, Joseph F. Rappold* MD, William Dubin MD, Amy J. Goldberg* MD, Temple University Hospital

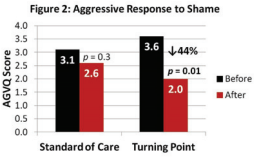
Invited Discussant: Rochelle Dicker, MD

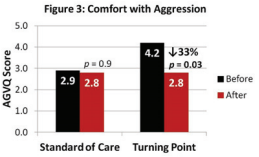
Introduction: From 2002-2011, there were over 17,000 shootings in Philadelphia. "Turning Point (TP)", an inpatient violence intervention program, was established to take advantage of the teachable moment that occurs after violent injury. In addition to receiving social work services, TP patients watch their trauma bay resuscitation video and a movie about violence, meet with a gunshot wound survivor and an outpatient case manager, and also undergo psychiatric assessment. The purpose of this study was to determine the efficacy of TP in changing attitudes toward violence among victims of penetrating trauma.

Methods: An IRB-approved prospective randomized study was conducted at an urban Level 1 trauma center from January-June 2012. Patients ≥18y who sustained a gunshot or stab wound were randomized to standard of care (SOC; social work services), or TP. The validated Attitudes Toward Guns and Violence Questionnaire (AGVQ) was administered at the beginning and end of the hospital stay in order to assess attitudinal change. Analysis was performed with the Wilcoxon signed-rank test. A $p < 0.05$ was significant.

Results: A total of 40/159 subjects were randomized (21 SOC, 19 TP). The most common reason for exclusion was anticipated length of stay <48h. Only 9% of eligible patients refused participation. The SOC and TP groups were similar with respect to demographics and injuries except in age (SOC 31y, TP 22y). In comparison to the SOC group, the TP group demonstrated a 20% reduction in General Proclivity toward Violence (p=0.02; Figure 1), a 44% reduction in Aggressive Response to Shame (p=0.01; Figure 2), and a 33% reduction in Comfort with Aggression (p=0.03; Figure 3).







Conclusions: TP is effective in changing attitudes toward violence among victims of penetrating trauma. Continued enrollment and longer follow-up are necessary to determine if this program can truly be a turning point in patients' lives.

NOTES

Session: I: Plenary Papers 1-8
Paper 5: 2:10-2:30 pm

UNRELENTING VIOLENCE: AN ANALYSIS OF 6327 GUNSHOT WOUNDS AT LEVEL I TRAUMA CENTER

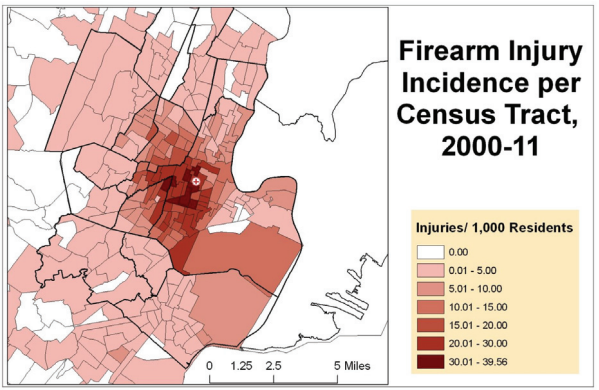
David H. Livingston* MD, Robert F. Lavery MA, Maeve C. Lopreiato MPH,RN, David F. Lavery BS, Marian R. Passannante Ph.D., New Jersey Medical School

Invited Discussant: Demetrios Demetriadas, MD, PhD

Introduction: Perceptions of violence are too often driven by individual sensational events yet "routine" gunshot wound (GSW) injuries are largely under reported and hidden to policy makers. Previous studies have mostly focused upon GSW homicides. To illuminate this public health problem we studied the health care burden of interpersonal GSW at a Level I Trauma Center.

Methods: Retrospective analysis of all interpersonal GSW injuries (excluding self inflicted and law enforcement GSW) treated from 1/2000-12/2011. Data collected included: body region injured, # of wounds and mortality. GIS mapping of the incident location and home addresses were determined. Hospital costs were calculated using Medicare cost-charge modifiers.

Results: 6327 patients were treated with a mean of 527/year (range 389 to 640). Of interest 23% of patients mostly with peripheral GSW were never seen by the trauma service. There were significant increases in proportions of patients with ≥3 wounds (13% to 22%; p<0.0001) and ≥3 body regions injured (6% to 16%; p<0.0001). Mortality increased over the 12 years (9% to 14%; p<0.0001). GIS mapping revealed significant clustering of GSW (figure; + = Trauma Center). 5 cities accounted for 85% of the GSWs. The GSW rate (per 100,000 residents) for these cities ranged from 19-108 compared to a national rate of 20. Only 2% of the census tracts had no GSWs during the time period and 39% of census tracts had at least one GSW/yr for 12 years. 70% of patients were shot in the city where they lived; 25% within 168 meters and 55% within 1600 meters of their home. Total inpatient cost was $115 million, 75% being unreimbursed. Cost/patient increased three-fold which is in excess of the health care inflation rate over the same time period.



Conclusions: GSW violence remains a significant public health problem with significant increases in mortality and health costs. Relying on trauma registry data alone will seriously underestimate GSW numbers. In contrast to episodic and random mass casualties which make national news, GIS mapping demonstrates that the majority of "routine" GSW violence is geographically restricted and not random. To combat this problem, policy makers must understand that the determinants of firearm violence reside at the community level.

NOTES

Session: I: Plenary Papers 1-8
Paper 6: 2:30-2:50 pm

BRIEF INTERVENTIONS AS A MEANS TO REDUCE PROBLEMATIC DRINKING BEHAVIOR AMONG FIRST-TIME DUI ARRESTEES: A RANDOMIZED TRIAL

Garth H. Utter* MD, MSc, Jason B. Young MD, PharmD, Daniel Eisenberg Ph.D., Carol R. Schermer* MD,MPH, Leon J. Owens* MD, University of California, Davis

Invited Discussant: Deborah Kuhls, MD

Introduction: In medical settings, a form of counseling based on motivational interviewing known as brief intervention (BI) reduces alcohol-related risk-taking behavior and harm in high-risk populations. Individuals arrested for driving under the influence of alcohol (DUI) are another population at increased risk for future harm from their drinking behavior. We hypothesized that a BI administered shortly after a first DUI arrest might decrease problematic drinking behavior.

Methods: We conducted a single-center randomized trial, enrolling first-time DUI arrestees at a county jail from December, 2010 through April, 2011. Prior to their release, we assessed baseline characteristics, then randomized participants to either a single BI or no discussion. Ninety days later, we administered the Alcohol Use Disorders Identification Test (AUDIT) (range 0-40, higher values indicating more problematic drinking) and assessed whether, independent of court order, subjects sought treatment for their drinking.

Results: We enrolled 200 subjects and 181 (90.5%) completed 90-day follow-up. Mean age was 30 ± 10 years, and 50% were men. Mean blood alcohol concentration upon arrest was 0.14 ± 0.04%. Baseline AUDIT scores were 7.7 ± 6.3 among control subjects and 8.8 ± 5.8 among BI subjects. By 90 days, AUDIT scores decreased by 3.4 ± 5.0 units among control subjects and 4.7 ± 5.1 among BI subjects [difference 1.3 (95% C.I. -0.1 to +2.8)]. The likelihood of subsequent binge drinking [RR 0.95 (95% C.I. 0.46-1.93)], abstinence [RR 1.10 (95% C.I. 0.48-2.52)], alcohol-related injury to self or others [RR 2.2 (95% C.I. 0.4-11.8)], and seeking treatment [RR 1.01 (95% C.I. 0.47-2.17)] did not differ between the arms.

Conclusion: A single BI counseling session shortly after first-time DUI arrest does not reduce 90-day self-reported drinking behavior or increase seeking treatment for drinking beyond that which normally occurs. Further efforts to evaluate motivational interviewing for first-time DUI arrestees should focus on different applications of BIs—e.g., extended counseling or in subgroups more receptive to changing their drinking behavior—and possibly longer follow-up.

NOTES

Session: I: Plenary Papers 1-8
Paper 7: 2:50-3:10 pm

THROMBELASTOGRAM GUIDED ENOXAPARIN DOSING LEADS TO INCREASED SERUM ANTI-XA LEVELS, BUT DOES NOT CONFER PROTECTION FROM DVT: A RANDOMIZED CONTROLLED PILOT STUDY

Scott G. Louis MD, Philbert Van MD, Gordon Riha MD, Jeffrey Barton MD, Elizabeth Rick BS, Misa Sato Samantha Underwood MS, Jerome Differding MPH, Enrique Ginzburg* MD, Martin A. Schreiber* MD, Oregon Health & Science University

Invited Discussant: Sandro Rizoli, MD

Introduction: The incidence of DVT remains high in general surgery and trauma patients despite widespread prophylaxis with enoxaparin. A recent observational study demonstrated decreased incidence of DVT if patients on enoxaparin had a change in R time (ΔR) >1 minute when heparinase-activated TEG was compared to normal TEG. We hypothesized using ΔR guided dosing would result in decreased DVT rates

Methods: A prospective, randomized controlled trial was performed at a level 1 trauma center. Both trauma and general surgery patients were included. Upon enrollment demographic data including age, gender, BMI, and APACHE II score were obtained. Enrolled patients were randomized to standard (30mg BID) or TEG-guided dosing. Dose-adjusted patients underwent daily enoxaparin titration to achieve a ΔR of 1-2 minutes. VTE screening was performed per institutional protocol. Antithrombin III (AT-III) and anti-Xa levels were drawn at peak enoxaparin concentrations.

Results: 87 patients were enrolled. There was no difference in demographic data between the groups. No pulmonary emboli were identified. The control group had a DVT rate of 16% while the experimental group had a rate of 14%, p=NS. The experimental group's median enoxaparin dose, 40mg BID, was significantly higher than that of the control, $p<0.01$. TEGΔR was not different between the control and experimental groups. Beginning at day 3, anti-Xa levels were higher in the experimental group ($p<0.05$). There was no difference in AT-III activity between the two groups; 67% of patients demonstrated AT-III deficiency.

Conclusion: TEG adjusted enoxaparin dosing led to significant increases in anti-Xa activity that did not correlate with a decreased DVT rate. Failure to reduce the DVT rate and increaseΔR despite increased dosing and increased anti-Xa activity is consistent with the high rate of AT-III deficiency detected in this study cohort. These findings suggest the need for novel advances in chemoprophylaxis which either increase AT-III directly or are independent of the AT-III pathway.

NOTES

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

FINDINGS OF A RANDOMIZED CONTROLLED TRIAL USING LIMITED TRANSTHORACIC ECHOCARDIOGRAM (LTTE) AS A HEMODYNAMIC MONITORING TOOL IN THE TRAUMA BAY.

Paula Ferrada MD, David Evans MD, Luke Wolfe MS, Rahul J. Anand MD, Julie Mayglothling MD, Therese Duane* MD, James Whelan MD, Stephanie Goldberg MD, Ajai Malhotra* MD, Poornima Vanguri MD, Rao R. Ivatury* MD, Michel Aboutanos* MD, Virginia Commonwealth University

Invited Discussant: Heidi Frankel, MD

Introduction: Limited transthoracic echocardiogram (LTTE) has been introduced as a technique to direct resuscitation in trauma patients. We hypothesize that LTTE is a useful tool to guide therapy during the initial phase of resuscitation in trauma patients.

Methods: All highest level alert patients with at least one measurement of systolic blood pressure <100 mmHg, a mean arterial pressure < 60 mmHg, and/or a heart rate >120 bpm who arrived to the trauma bay (TB) at a level 1 center were randomized to have either LTTE performed (LTTEp), or not performed (nonLTTE) as part of their initial evaluation from July 1 to December 31 2012. Images were stored and results were reported regarding contractility (good vs. poor), fluid status (empty inferior vena cava: eIVC [hypovolemic] vs. full inferior vena cava: fIVC [not hypovolemic]), and pericardial effusion (present vs. absent). Time from TB to operating room (OR), intravenous fluid (IVF) administration, blood product requirement, ICU admission, and mortality were examined in both groups.

Results: 240 patients were randomized. 25 patients were excluded since they died upon arrival to the TB, leaving 215 patients in the study. 92 patients were in the LTTEp group with 123 patients in the nonLTTE group. LTTE helped guide resuscitation as patients with eIVC received on average significantly more fluid than patients with fIVC (1.8L vs. 1.0L, p<0.0001). The LTTEp and nonLTTE groups were similar in age, (38 vs. 38.8, p=0.75), ISS (19.2 vs. 19.0, p=0.94), RTS (5.5 vs. 6.0, p=0.09), lactate (4.2 vs. 3.6, p=0.14) and mechanism of injury, (Blunt 64% vs. 63%, penetrating 28% vs. 33%, burns 7.6% vs. 4%, p=0.44). Strikingly, LTTEp had significantly less IVF than nonLTTE patients, (1.5L vs. 2.5L, p<0.0001), less time from TB to OR, (35.6 min vs. 79.1 min, p=0.0006), higher rate of ICU admission, (80.4% vs. 67.2%, p=0.04), and although not statistically significant, a lower mortality rate (11% vs. 19.5%, p=0.09). Mortality differences were particularly evident in the traumatic brain injury (TBI) patients, (14.7% in LTTEp vs.39.5% in nonLTTE, p=0.03) as shown in table 1

Table1 TBI Patients

	LTTEp	nonLTTEp	p value
Mean Age	37y	42y	0.32
Mean ISS	21.7	18.8	0.39
Mean IVF	1.04L	2.4L	<0.0001
Blood Transfusion	17.7%	2.6%	0.05
Min to OR	40min	65min	0.15
Mortality	17.7%	39.5%	p0.0336

Conclusion: LTTE is a useful guide for therapy in hypotensive trauma patients during the early phase of resuscitation. In this study, there was an improved outcome in patients where therapy was guided by LTTE findings

NOTES

WEDNESDAY, SEPTEMBER 18, 2013, 3:30 PM – 4:00 PM

SESSION II: MASTER SURGEON LECTURE I

LOCATION: CONTINENTAL BALLROOMS 4/5/6

"Genitourinary Trauma - 2013"

Jack W. McAninch, M.D., F.A.C.S.

Professor

Department of Urology

University of California, San Francisco

San Francisco, CA

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WEDNESDAY, SEPTEMBER 18, 2013, 4:00 PM—5:00 PM

SESSION III:
PANEL I: CHALLENGING CASES

LOCATION: CONTINENTAL BALLROOM 4/5/6

MODERATOR: L.D. BRITT, M.D., M.P.H.

Sharon Henry, M.D
Baltimore, MD

Gregory J. Jurkovich, M.D.
Denver, CO

Anna Ledgerwood, M.D.
Detroit, MI

Ari Leppaniemi, M.D.
Helsinki, Finland

Luke Leenan, M.D., Ph.D.
Utrecht, Netherlands

Nirav Patel, M.D.
Phoenix, AZ

SESSION IV:

POSTER SESSION/OPENING RECEPTION

WEDNESDAY, SEPTEMBER 18, 2013, 5:00 PM – 7:00 PM

LOCATION: GOLDEN GATE

Poster #	Professors	Category
1-10	Luke Leenen, MD, PhD Andre Campbell, MD	Abdominal Trauma/ Thoracic/Burns/Vascular
11-22	Jose Diaz, MD Michael Chang, MD	Acute Care Surgery
23-32	Vicente Gracias, MD Charles Cook, MD	Critical Care I
33-42	Christopher Michetti, MD Krista Kaups, MD	Critical Care II
43-53	A. Peter Ekeh, MD Deborah Kuhls, MD	Trauma Prevention/Epidemiology and Socioeconomics/Ethics
54-63	Darren Malinoski, MD Therese Duane, MD	Neurological I
64-72	R. Todd Maxson, MD Barbara Gaines, MD	Neurological II/Pediatrics
73-82	Adil Haider, MD R. Lawrence Reed, MD	Outcomes I
83-92	Raminder Nirula, MD, MPH Shahid Shafi, MD	Outcomes II
93-102	Scott Sagraves, MD Ajai Malhotra, MD	Outcomes III/Soft Tissue/ Head, Neck
103-111	Gregory Victorino, MD Carl Hauser, MD	Shock/Transfusions
112-121	David Shatz, MD Enrigue Ginzburg, MD	Trauma Systems

THURSDAY, SEPTEMBER 19, 2013, 7:30 AM – 8:00 AM

SESSION V: MASTER SURGEON LECTURE II

LOCATION: CONTINENTAL BALLROOM 4/5/6

"Pressure, Perfusion and Compartments: Challenges for the Acute Care Surgeon"

Rao R. Ivatury, M.D.

Professor Emeritus of the Department of Surgery

Virginia Commonwealth University

Richmond, VA

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SESSION VI:

PLENARY

PAPERS #9-#12

THURSDAY, SEPTEMBER 19, 2013, 8:00 AM – 9:20 AM

CONTINENTAL BALLROOMS 4/5/6

MODERATOR: GRACE S. ROZYCKI, M.D., M.B.A.

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

Session: VI: Plenary Papers 9-12
Paper 9: 8:00-8:20 am

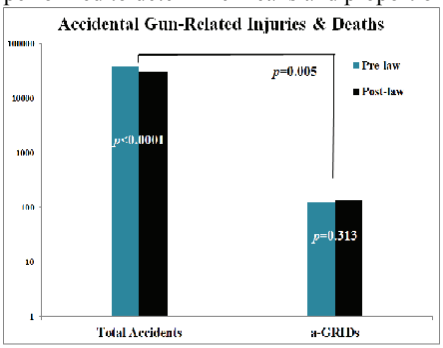
REPEAL OF THE CONCEALED WEAPONS LAW AND ITS IMPACT ON GUN-RELATED INJURIES & DEATHS

Rashna F. Ginwalla MD, Andrew Tang MD, Randall Friese* MD, Donald J. Green MD, Lynn Gries MD, Bellal Joseph MD, Narong Kulvatunyou MD, Dafney Lubin MD, Terence O'Keeffe MB,ChB; MSPH, Gary Vercruysse* MD, Julie L. Wynne MD,MPH, Peter Rhee* MD,MPH, University of Arizona - Tucson

Invited Discussant: Glen Tinkoff, MD

Introduction: SB-1108, enacted on July 29, 2010, allowed citizens over 21 years to carry concealed weapons without a permit or completion of a previously mandatory training course. It is unclear whether the law creates a "deterrent factor" to criminals, or escalates gun- related violence as a result of an increased number of concealed weapons being carried by inexperienced individuals without the proper training. We hypothesized that SB-1108 would result in an increase in gun-related injuries and deaths (GRIDs).

Methods: We performed a retrospective, population-based cohort study spanning 24 months before (pre-law) and after (post-law) SB-1108. Death statistics, injury and in-hospital death data, overall crime & accident trends and the number of firearm purchase-related background checks between the two periods was determined. Injured patients were dichotomized into two groups, intentional (i-GRIDs) and accidental gun-related injuries and deaths (a-GRIDs), which were analyzed separately. The primary outcome was any gun-related injury or death (GRID), while gun-related death alone was analyzed as a secondary outcome. Student's t-tests and chi-square analyses were performed to determine means and proportional differences in GRIDs between the two time periods respectively. Relative risks were calculated for each subgroup.



Results: National and state background checks for firearms purchase increased between the two study periods (national p=0.0003; state p=0.0006), and were proportionately reflected in a relative increase in state firearm purchase (1.50% pre-law vs 1.59% post-law, p<0.001). The proportion of i-GRID to overall city violent crime remained the same over the two periods (9.74% pre-law vs 10.36% post-law, RR 1.06, 95%CI 0.96,1.17). However, the proportion of gun-related homicides increased in the post-law cohort (1.97% pre-law vs 2.45% post-law, p=0.058). Victims of violent crimes had a 24% increased risk of death by firearms after passage of SB-1108 (RR 1.24, 95%CI 1.00-1.54). The proportion of a-GRIDs increased significantly in the post-law cohort such that accident victims were at a 41% increased risk of being injured or killed by firearm (RR 1.41, 95%CI 1.11-1.80).

Conclusion: Both nationally and statewide, there was an increase in firearm sales over the study periods. Although the proportion of intentional GRIDs to overall city violent crime remained constant, there was an increase in homicide by firearm and accidental GRIDs since the institution of SB-1108. Liberalization of gun access has resulted in an increase in fatalities and should be critically assessed.

NOTES

Session: VI: Plenary Papers 9-12
Paper 10: 8:20-8:40 am

MORE HARM THAN GOOD: ANTI-SEIZURE PROPHYLAXIS AFTER TRAUMATIC BRAIN INJURY DOES NOT DECREASE SEIZURE RATES BUT MAY INHIBIT FUNCTIONAL RECOVERY

Indermeet Bhullar* MD, Donald Johnson PharmD, David Chesire Ph.D., Eric Frykberg* MD, University of Florida, Jacksonville

Invited Discussant: Kenji Inaba, MD

Introduction: The purpose of this study was to examine the current Brain Trauma Foundation recommendation for anti-seizure prophylaxis with Phenytoin during the first seven days after traumatic brain injury [TBI] in preventing seizures and to determine if this medication affects functional recovery as measured by Glasgow Outcome Score (GOS) at discharge.

Methods: The records of adult (age≥18) patients with blunt severe TBI (positive computed tomography [CT] scan of the head and admission Glasgow Coma Score [GCS] of [3-8]) that remained in the hospital at least 7 days after injury at a Level I trauma center were retrospectively reviewed from Jan 2008 to Jan 2010. Seizure rates during the first seven days after injury were compared for two groups based on anti-seizure prophylaxis provided: No prophylaxis (NP) vs. Phenytoin prophylaxis (PP). Phenytoin levels were checked and doses adjusted appropriately to achieve therapeutic levels. The two groups were well matched for demographic characteristics and received identical treatments based on Brain Trauma Foundation Guidelines. Length of stay in the hospital, mortality, seizure rates and functional outcome as determined by GOS were compared for the two groups. Patients with mortality due to other causes outside of brain injury were excluded. Statistical analysis was performed using mean, Fisher's Exact test, and Mann-Whitney *U* test, accepting $p<0.05$ as significant.

Results: 93 adult patients that met the above criteria were identified (43 [46%] NP group vs. 50 [54%] PP group). The two groups were well matched with no significant differences in age, sex, GCS, and AIS, mechanism of injury, and other demographic characteristics. Contrary to expectation, more seizures occurred in the PP group as compared to the NP group, however, this did not reach significance (PP vs. NP, 2[4%] vs. 0[0%], p=0.5). Therapeutic Phenytoin levels were present at the time of the two seizures which occured at day 5 and 6 after TBI. There was no significant difference in the two groups (PP vs. NP) as far as disposition: mortality due to head injury (4 [8%] vs. 3 [7%], p=1); discharge home (16 [32%] vs. 17 [40%], p=0.7); and discharge to Rehab (30[60%] vs. 23[53%], p=0.9). However, with Phenytoin prophylaxis there was a significantly longer hospital LOS (PP vs. NP, 36 vs. 25 days, p=0.04) and significantly worse functional outcome at discharge based on GOS (PP vs. NP, 2.9 vs. 3.4, $p<0.01$).

Conclusion: Anti-seizure prophylaxis with Phenytoin may be detrimental after TBI; while providing no benefit in decreasing seizure rates, Phenytoin significantly increased LOS and resulted in worse functional outcome at discharge (lower GOS score). Use of this medication needs to be re-evaluated with current randomized trials that incorporate many of the newer management strategies (such as Diprivan [Propofol] infusion) which were not found in the original landmark study of 1990 by Temkin et al. that helped define the current Brain Trauma Foundation anti-seizure prophylaxis guideline.

NOTES

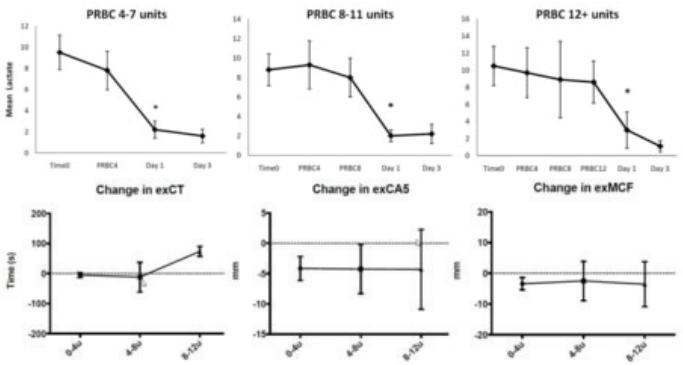
Session: VI: Plenary Papers 9-12
Paper 11: 8:40-9:00 am

HEMOSTATIC RESUSCITATION IS NEITHER HEMOSTATIC NOR RESUSCITATIVE IN TRAUMA HEMORRHAGE

Karim Brohi* MD, Sirat Khan MD, Manik Chana MD, Imran Raza MD, Ross Davenport MD, Christine Gaarder* MD,Ph.D., International Trauma Research Network (INTRN)

Invited Discussant: Yashuhiro Otomo, MD

Introduction: Trauma hemorrhage continues to carry a high mortality rate despite changes in modern practice. Traditional approaches to the massively bleeding patient have been shown to result in persistent coagulopathy, bleeding and poor outcomes. The concept of hemostatic (or damage control) resuscitation has developed from the discovery of acute traumatic coagulopathy and increased recognition of the negative consequences of dilutional coagulopathy. These strategies concentrate on the early delivery of coagulation therapy (plasma and platelet transfusions) combined with permissive hypotension. The efficacy of hemostatic resuscitation in correcting coagulopathy and lactic acidemia during acute hemorrhage has not been studied. **Methods:** This was a prospective study of ROTEM and lactate measurements taken from trauma patients recruited to the multi-center Activation of Coagulation and Inflammation in Trauma (ACIT) study. Patients are enrolled into ACIT immediately on arrival in the emergency department. A blood sample is taken for, among other tests, point of care ROTEM analysis and blood gas measurements. Further blood samples are taken during the acute bleeding phase after administration of every four units of packed red blood cells (PRBC), up to the 12 PRBC units. The quantity of plasma and other coagulation therapy administered within each interval is recorded. For the purposes of this study we selected the first 100 patients who received at least 4 units of PRBCs. **Results:** Of the 100 patients receiving at least 4 units of PRBCs, 33 patients received 8-11 units of PRBCs and 18 received 12 or more PRBC units. On admission, 40% of patients were coagulopathic (CA5≤35mm). This increased to 60% by PRBC 4; 88% by PRBC 8 and 87% at PRBC 12. The average FFP:PRBC ratio between intervals was PRBC 0-4: 0.6; PRBC 4-8: 0.9 and PRBC 8-12: 0.9. There was no improvement in any ROTEM parameter during on-going bleeding. There was no effect of higher ratios of FFP on coagulopathy during acute bleeding. Average admission lactate was 6.2 mEq/l. Patients with a high lactate (>5mEq/l) on admission did not correct lactate levels until hemorrhage control was achieved and no further PRBC units were required. **Discussion:** While hemostatic resuscitation offers several advantages over historical strategies, it still does not achieve correction of hypoperfusion or coagulopathy during the acute phase of trauma hemorrhage. There are still significant opportunities to improve management and improve outcomes for bleeding trauma patients.



NOTES

Session: VI: Plenary Papers 9-12
Paper 12: 9:00-9:20 am

ARE WE LEMMINGS?: NON-SELECTIVE USE OF ANGIOGRAPHY PROVIDES NO BENEFIT IN HIGH-GRADE BLUNT SPLENIC INJURY

Ben L. Zarzaur* MD,MPH, Stephanie A. Savage* MD, Martin A. Croce* MD, Timothy C. Fabian* MD, University of Tennessee Health Science Center - Memphis

Invited Discussant: Thomas Scalea, MD

Introduction: The role of angiography (ANGIO) as a diagnostic and therapeutic modality in the management of high-grade (Abbreviated Injury Scale (AIS) $\geq$ 3) blunt splenic injury (BSI) remains controversial. Studies that show a potential benefit to liberal use of ANGIO are balanced by studies that demonstrate no benefit, increased costs and/or complications, with ANGIO. As a result, some centers have developed liberal protocols using ANGIO as initial therapy while others have more selective criteria or do not utilize ANGIO in the management of BSI. The purpose of this study was to determine if a trauma center's ANGIO utilization rates are associated with delayed splenectomy in BSI following initial non-operative management, as well as to determine factors associated with splenectomy after ANGIO.

Methods: The National Trauma Data Bank was used to identify a cohort of patients 18 – 81 with BSI (AIS $\geq$ 3) treated at Level I or II trauma centers that admitted at least 10 patients with high-grade BSI from 2007-10. Patients who had early splenectomy (splenectomy < 6 hours from admission) were excluded. Timing of ANGIO and delayed splenectomy (splenectomy$\geq$ 6 hours from admission) were determined. The rate of ANGIO utilization was determined for each hospital by dividing the number of patients with BSI who received ANGIO by the total number of eligible patients with BSI. Hospitals were stratified based on ANGIO utilization rates into 3 groups: 0% (NO ANGIO); 1-19.9% (LOW ANGIO); $\geq$20% HIGH ANGIO). Hierarchical logistic regression was used to control for patient clustering at the hospital level and to determine factors associated with delayed splenectomy.

Results: 7412 (Age$\geq$ 55=16.5%; Male=64.6%; Non-White=28%; ISS $\geq$ 25 = 54%) met inclusion criteria. After adjusting for age $\geq$ 55, male gender, race, and increasing injury severity, LOW ANGIO (OR=0.89 95%CI=0.66, 1.19) and NO ANGIO (OR=1.22 95%CI=0.67, 2.18) centers showed no difference with regard to delayed splenectomy compared to HIGH ANGIO centers. Among patients who received ANGIO, higher overall injury severity and AIS 5 BSI was positively associated with delayed splenectomy (Table).

Factors Associated with Delayed Splenectomy after ANGIO (*p<0.05)

Variables	OR (95%CI)
AIS 5 BSI	2.07 (1.17, 3.67)*
ISS 10-24 vs ISS < 10	2.61 (0.36, 19.15)
ISS $\geq$ 25 vs ISS < 10	2.01 (1.05, 3.84)*

Conclusions: Trauma centers with NO ANGIO and LOW ANGIO utilization are no different than HIGH ANGIO centers in terms of the odds of delayed splenectomy. Further, more severe spleen injuries and patients with higher injury severity are likely to fail attempted ANGIO. Nonselective protocol driven ANGIO following high-grade BSI does not appear to offer a benefit at the center level. Thus, ANGIO use should be tailored to the individual patient and should not be based solely on BSI grade or other single criterion.

NOTES

SCHOLARSHIP PRESENTATIONS
BY 2012-2013 AAST RESEARCH SCHOLARSHIP RECIPIENTS
THURSDAY, SEPTEMBER 19, 2013, 9:20 AM – 9:40 AM
CONTINENTAL BALLROOMS 4/5/6
PRESIDING: ROBERT C. MACKERSIE, M.D., AAST PRESIDENT

9:21 AM – 9:26 AM	Todd Costantini, MD, PhD UC San Diego School of Medicine San Diego, CA *AAST Research & Education Foundation Award (2012-2013)* Project Title: Defining the role of nicotinic cholinergic signaling in vagal nerve-mediated gut protection
9:27 AM – 9:33 AM	Steven Schwulst, MD Northwestern University Chicago, IL *AAST Research & Education Foundation Award (2012-2013)* Project Title: Traumatic Brain Injury-Induced Immune Dysfunction
9:34 AM – 9:39 AM	Mitchell Cohen, MD University of California San Francisco San Francisco, CA *ACS/AAST/NIGMS Award (2008-2013)* Project Title: Mechanism of Traumatic Coagulopathy

SESSION VIII:

PLENARY

PAPERS #13-#16

THURSDAY, SEPTEMBER 19, 2013, 10:00 AM –11:20 AM

CONTINENTAL BALLROOMS 4/5/6

MODERATOR: DONALD D. TRUNKEY M.D.

RECORDER: DAVID SPAIN, M.D.

Session: VIII: Plenary Papers 13-16
Paper 13: 10:00-10:20 am

BLUNT CEREBROVASCULAR INJURY SCREENING WITH 64-CHANNEL MULTIDETECTOR COMPUTED TOMOGRAPHY: MORE SLICES FINALLY CUT IT

Elena M. Paulus MD, Timothy C. Fabian* MD, Martin A. Croce* MD, Vandana Botta BS, Wesley Dutton BS, Stephanie A. Savage* MD, University of Tennessee Health Science Center - Memphis

Invited Discussant: Walter Biffl, MD

Introduction: Aggressive screening to diagnose blunt cerebrovascular injury (BCVI) results in early treatment, leading to improved outcomes and reduced stroke rates. While computed tomographic angiography (CTA) has been widely adopted for BCVI screening, evidence of its diagnostic sensitivity is marginal. Previous work from our institution using 32-channel multidetector CTA in 684 patients demonstrated an inadequate sensitivity of 51% (Ann Surg, 2011). Digital subtraction angiography (DSA) continues to be the reference standard of diagnosis, but has significant drawbacks of invasiveness and resource demands. There have been continued advances in CT technology, and this is the first report of an extensive experience with 64-channel multidector CTA.

Methods: Patients screened for BCVI using CTA and DSA (reference) at a level one trauma center over the 12 month period ending May 2012 were identified. Results of CTA and DSA, complications, and strokes were retrospectively reviewed and compared.

Results: 594 patients met criteria for BCVI screening and had both CTA and DSA. 128 patients (22% of those screened) had 163 injured vessels: 99 (61%) carotid artery injuries (CAI) and 64 (39%) vertebral artery injuries (VAI). CTA and DSA results are shown in table. The 52 false negatives on CTA were composed of 34 CAI and 18 VAI; 32 (62%) were grade one injuries. Overall, positive predictive value was 36.2% and negative predictive value was 97.5%. Five (1%) procedure related complications occurred with DSA: 3 puncture site hematomas and 2 iatrogenic dissections.

		No Injury (DSA-)		Injury (DSA+)		
		(CTA -)	(CTA +)	(CTA -)	(CTA +)	Sensitivity
	# vessels	True -	False +	False -	True +	(%)
Overall	2376	2017	196	52	111	68
Carotid	1188	979	110	34	65	66
Vertebral	1188	1038	86	18	46	72

Conclusion: 64-channel CTA demonstrated a significantly improved sensitivity of 68% versus the 51% previously reported for the 32-channel CTA (p=.0075). 62 percent of the false negatives occurred with low grade injuries. Considering complications, cost, and resource demand associated with DSA, this study suggests 64-channel CTA produces acceptable accuracy to replace DSA as the primary screening tool for BCVI.

NOTES

Session: VIII: Plenary Papers 13-16
Paper 14: 10:20-10:40 am

MANAGEMENT OF COLONIC INJURIES IN THE SETTING OF DAMAGE CONTROL LAPAROTOMY – ONE SHOT TO GET IT RIGHT.

Devashish J. Anjaria* MD, Timothy M. Ullmann BA, Robert F. Lavery MA, David H. Livingston* MD, UMDNJ - New Jersey Medical School

Invited Discussant: Timothy Fabian, MD

Introduction: Optimal management of colonic injuries in patients requiring damage control laparotomy (DCL) remains controversial. Primary repair, delayed anastomosis or colostomy have all been advocated after DCL, however some evidence suggests that colonic related complications are increased in patients with delayed primary fascial closure We hypothesized that increased complications associated with colonic repair/anastomosis occurs in those patient undergoing DCL who cannot achieve fascial closure on their initial reoperation.

Methods: A retrospective review of all patients sustaining colonic injury between January 1, 2001 and August 31, 2010 who survived ≥ 4 days. Patients were classified as having management of abdominal injuries during either a single laparotomy (SL), DCL with complete treatment and fascial closure on the initial reoperation (DCL1), or DCL with open abdomen for greater than 2 operations (DCL2). Data was collected on post operative complications and need for intervention. Kruskal-Wallis ANOVA was used to determine differences between groups.

Results: 317 patients were treated with colonic injuries, 70 were excluded due to incomplete charts, leaving 247 patients included in the study. The group was primarily male (93%) with a mean (± SD) age of 29 ± 9 years. 92% sustained penetrating injuries. Injury severity scores were similar between groups. Mean time for the DCL1 was 1.2 ± 0.6 days after injury and 4.1 ± 2.8 days for DCL2. Inability to achieve fascial closure by the time of the initial reoperation was associated with significant increase in intraabdominal abscess and anastomotic leaks (Table).

	SL (n = 179)	**DCL1 (**n = 42)	**DCL2** (n = 26)
ISS	18 ± 10	15 ± 9	19 ± 11
Wound infection	6% (11)	14% (6)	12% (3)
Abdominal abscess	17% (30)	31% (13)	50% (13)*****
Fistula	1.1% (2)	2.4% (1)	7.7% (2)
Anastomotic leak	2.2% (4)	2.4% (1)	19% (5)*****
IR drainage	7% (12)	12% (5)	19% (5)
Unplanned reoperation	15% (27)	31% (13)	---

*p < 0.01 vs. SL

The primary reasons for the unplanned reoperations were intra-abdominal sepsis, peritonitis and/or fascial dehiscence. 19 (73%) patients in DCL2 never achieved complete fascial closure and required split thickness or full thickness skin coverage.

Conclusion: Primary repair or delayed anastomosis after DCL is feasible with complication rates similar to SL when successful fascial closure is completed on the first post-DCL reoperation. However, if fascial closure is not possible on the second operation, patients should be treated with a stoma as there is an 8 fold increase in the incidence of anastomotic leak. We believe that these data indicate that there is a single opportunity for reestablishing colonic continuity after DCL.

NOTES

Session: VIII: Plenary Papers 13-16
Paper 15: 10:40-11:00 am

Effects of MP4OX, an oxygen therapeutic, on clinical outcomes in trauma patients with hemorrhagic shock: a Phase IIb multi-center randomized placebo-controlled trial

Karim Brohi* MD, Ken Boffard* MD, Dirk Zielske MD, Bruno Riou MD, Queen Mary University Of London

Invited Discussant: Frederick Moore, MD

Introduction: Hemorrhagic shock is associated with a high mortality and morbidity, in part due to end-organ ischaemia. MP4OX is an oxygenated pegylated hemoglobin molecule that has been shown to enhance tissue oxygen delivery in experimental models. We assessed the potential effect of early MP4OX administration on clinical outcomes after trauma hemorrhage.

Methods: This was a multi-center randomized placebo-controlled trial at 38 hospitals in 14 countries. Patients in hemorrhagic shock with blood lactate levels of 5mEq/l or higher and within 2 hours of hospital arrival were eligible for enrolment. Patients were block-randomized by site to receive either 250ml MP4OX or 0.9% normal saline (NS) within 30 minutes of randomization. Patients with continued bleeding could receive additional doses of investigational product up to a maximum of 3 further doses in 12 hours. Patients were followed up for 28 days. The primary end-point was the proportion of patients discharged alive at 28 days. Secondary endpoints included adverse event rates; ventilator, ICU and hospital days; organ failure scores; 48-hour and 28-day mortality.

Results: 329 patients were enrolled between May 2011 and September 2012, 165 to receive MP4OX and 164 NS. After exclusions, 313 patients (153 MP4OX and 160 NS) were randomized and received study drug. The MP4OX and NS groups were well-matched for age, sex, mechanism (49% vs 42% penetrating) and severity of injury (median ISS 20 vs 22); admission physiology and lactate levels. There was no difference in Serious Adverse Events (36% vs 37%) or adverse events between the two groups. Overall mortality in MP4OX group was 11.6% vs 13.9% in control patients. For the primary endpoint, 57% of MP4OX patients were alive and discharged from hospital at Day 28, compared to 50% of NS patients, which did not reach statistical significance. There were further trends towards improved outcomes in the secondary endpoints, with MP4OX patients having more ventilator, ICU and hospital-free days as well as faster times to complete resolution of organ failure, but these were also not statistically significant.

Conclusions: The modified hemoglobin oxygen therapeutic 250ml MP4OX has a good safety profile in trauma patients with severe hemorrhagic shock. While there were promising trends to suggest a potential for improved outcomes, the study was underpowered to confirm the efficacy of MP4OX in trauma hemorrhage.

NOTES

Session: VIII: Plenary Papers 13-16
Paper 16: 11:00-11:20 am

DAMAGE CONTROL THORACIC SURGERY: MANAGEMENT AND OUTCOMES

James O'Connor MD, Joseph DuBose* MD, Thomas Scalea* MD, R Adams Cowley
Shock Trauma Center

Invited Discussant: J. Wayne Meredith, MD

Introduction: Damage control surgery (DCS) is successfully employed for severe abdominal trauma. Although the DCS principles of early hemorrhage control, subsequent resuscitation and delayed planned definitive surgery are applicable to thoracic trauma, there is a dearth of data on damage control thoracic surgery (DCTS).

Methods: An IRB approved retrospective trauma registry and chart review from January 2002 to December 2012 for thoracic injuries requiring emergency thoracotomy or sternotomy, and temporary closure. Demographics, physiologic and laboratory data, operative procedures and outcomes were abstracted. Data are presents as mean and standard deviation; Student t-test was used with $p < 0.05$ conferring statistically significance.

Results: 44 patients were identified. Mean age 34, 86% were male. ISS 33.2±14.7, 89% had ISS ≥ 15 and severe chest injury was common (chest AIS ≥ 3 = 93%; ≥ 4 = 61%, ≥ 5 = 32%) with gunshot (48%) and stab wounds (21%) the most common mechanisms. Admission temperature, pH, base deficit and INR were 36±1 C, 7.07±0.13, -11.1±6.5, and 1.7 respectively. Operative approaches included unilateral thoracotomy 50%, clamshell 32% and sternotomy 23%. 52% required pulmonary resection (pneumonectomy 3, lobectomy 11, non-anatomic resection 9), 20% had cardiorraphy; the remainder had a variety of vascular injuries. 43% required intra-operative CPR, and 41% left the OR on vasoactives. Mean intra-operative blood requirement was 13 units pRBC's. 42(95%) patients had packing with vacuum assisted closure; the only thoracic compartment syndrome occurred in one to the two who had packing and skin closure. The decision to close the bony thorax was based on normalized physiology, with the time to closure of 3±1 days. At chest closure, echocardiography (TEE) was utilized for patients on vasoactives to assess evidence of tamponade physiology precluding closure. Comparing the physiologic parameters during the initial operation and prior to chest closure; temperature C (34.4±1.3 vs. 37.4±0.8), pH (7.13±0.14 vs.7.38±0.6) and INR (1.8±0.9 vs. 1.2±0.3), were all statistically significantly ($p < 0.001$). Complications were common, including sepsis (36%), local wound infection (30%), acute renal failure requiring CRRT (30%), ARDS 25% and empyema (23%). Adjunctive salvage ECMO was utilized in 4 patients with 1 survivor. Mean ventilator days, ICU length of stay and hospital length of stay were 19, 20 and 30 days respectively. Overall mortality was 23%. Excluding the 3 ECMO deaths, in-hospital mortality was 16%. Follow-up was available for 73% with a mean duration of 34 months, with all survivors neurologically intact and dialysis free.

Conclusions: Patients with severe chest trauma and marked physiologic derangement can benefit from DCTS. Thoracic packing and temporary vacuum closure avoids thoracic compartment syndrome. Timing of thoracic closure is based on physiology, and TEE is a useful adjunct when closing the thorax of those on vasoactives. While complication were common, mortality is acceptable in this group of these severely injured, metabolically depleted, challenging patients.

NOTES

THURSDAY, SEPTEMBER, 19, 2013, 11:30 AM

SESSION IX: AAST PRESIDENTIAL ADDRESS

LOCATION: CONTINENTAL BALLROOMS 4/5/6

"For the Care of the Underserved"

Robert C. Mackersie, M.D., President
American Association for the Surgery of Trauma

Professor of Surgery,
University of California San Francisco
Director, Trauma Services
San Francisco General Hospital & Trauma Center
San Francisco, California

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Presiding: William G. Cioffi, M.D.

AAST President-Elect, 2012-2013

SESSION XA:

NEUROLOGICAL TRAUMA, ABDOMINAL AND SHOCK RESUSCITATION

PAPERS #17-#25

THURSDAY, SEPTEMBER 19, 2013, 2:00 PM – 5:00 PM

CONTINENTAL BALLROOMS 4/5

MODERATOR: IAN CIVIL, MBE, KStJ, ED, MBCHB

RECORDER: MICHAEL ROTONDO, MD

Session: XA: Neurological Trauma, Abdominal and Shock Resuscitation Papers 17-25
Paper 17: 2:00-2:20 pm

TRAUMATIC BRAIN INJURY CAUSES PLATELET ADP AND AA RECEPTOR INHIBITION INDEPENDENT OF HEMORRHAGIC SHOCK IN HUMANS AND RATS

Michael P. Chapman MD, Scott Thomas* MD, Ernest E. Moore* MD, Victoria Ploplis Ph.D., Deborah Donohue MS, Julia Beck BS, Mark Walsh MD, Sagar Patel BS, Jospeph Cappanari MS, Hanuma S. Chitta MD, Francis Castellino Ph.D., University of Colorado Denver

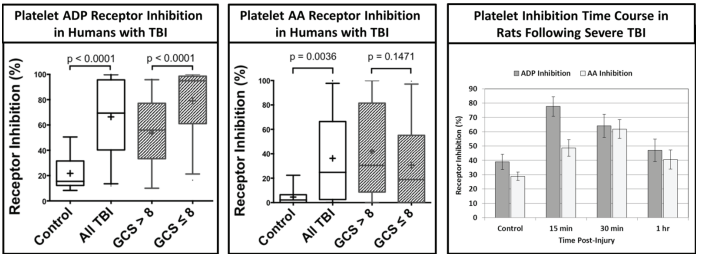
Invited Discussant: Mitchell Cohen, MD

Introduction: Coagulopathy in traumatic brain injury (CTBI) is a well-established phenomenon, but its mechanism is poorly understood. Some studies indicate that CTBI stems from maladaptive protein C activation and hyperfibrinolysis related to the global insult of hemorrhagic shock and multi-system trauma. Conversely, other data implicate overwhelming brain tissue factor release with resultant depletion of platelets and coagulation factors. We hypothesized that the platelet dysfunction of CTBI is, in fact, an intrinsic effect of brain injury and is a distinct phenomenon from the coagulopathy following hemorrhagic shock.

Methods: We first conducted an analysis of field blood from patients with isolated head injury (Abbreviated Injury Score (AIS)-head >3 and AIS-other <2) admitted to our regional trauma center (n=72). Thromboelastography (TEG) with platelet mapping was used to measure platelet function and the degree of inhibition of the ADP and arachidonic acid (AA) receptor pathways. Glasgow Coma Score (GCS) was used to quantify the severity of brain injury. Base deficit (BD) and systolic blood pressure (SBP) were used as measures of tissue perfusion. Patients on clopidogrel or aspirin were excluded. Next, we studied the time course of platelet inhibition in a rat model of severe blunt TBI.

Results: Severe TBI patients (GCS $\leq$ 8) showed a significant increase in ADP receptor inhibition in their immediate post-injury sample, compared to both mild TBI patients and healthy controls ($p<0.0001$). Median ADP receptor inhibition was 95.0% (IQR 61.5-98.6%) in the severe TBI cohort, compared to 56.0% (IQR 35-74.6%) in mild TBI and 15.4% (IQR 12.7-30.5%) in controls. No patient had significant hypotension (all SBP $\geq$90) or acidosis (BD: 0.3 ± 3.2). Additionally, non-survivors showed a significant difference in ADP receptor inhibition compared to survivors ($p= 0.04$). In rats with TBI, ADP receptor inhibition peaked at 15 minutes post-injury, at 77.6% ± 6.7% versus 39.0% ± 5.3% for uninjured controls ($p<0.0001$; n=45). Parallel trends of lesser magnitude were noted in AA receptor inhibition in both humans and rats.

Conclusions: Platelet ADP and AA receptor inhibition is a prominent early feature of CTBI in humans and rats and is linked to severity of brain injury and to poor outcomes in patients with isolated head trauma. This phenomenon is observed in the absence of hemorrhagic shock or multi-system injury. Thus, TBI alone is shown to be sufficient to induce a profound platelet dysfunction equivalent to the use of clopidogrel and aspirin.



NOTES

IMPACT OF VOLUME OF INFUSION OF FRESH FROZEN PLASMA AND PLATELETS DURING THE FIRST 180 MINUTES OF RESUSCITATION: MINUTE-BY-MINUTE ANALYSIS OF INFUSION RATES ON SURVIVAL BIAS

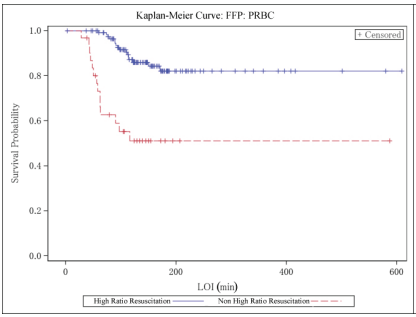
Eric R. Simms MD, Dietric L. Hennings MD, Ibrahim Musa MD,MPH, Kira N. Long MD, Julie Wascom MT, Jiselle Bock-Heaney MD,MPH, John P. Hunt* MD,MPH, Norman E. McSwain* Jr., MD, Peter C. Meade* MD,MPH, Tulane School of Medicine

Invited Discussant: Martin Croce, MD

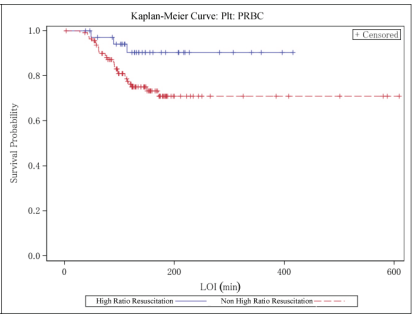
Introduction: Survival bias is the logical error of focusing on people that "survived" a process while inadvertently overlooking those that did not survive because of their lack of visibility. A now classic example is questioning whether High Ratio Resuscitation (HRR) provides true survival benefit, or if patients received HRR merely because they had longer survival. To date the question of survival bias versus survival advantage with respect to HRR persists. We hypothesize a direct correlation between HRR infusion rates in the first 180 minutes of resuscitation and survival.

Methods: A 24-month retrospective analysis of all adult massively transfused trauma patients surviving >30 minutes and undergoing damage control surgery at an urban Level 1 trauma center. Mean Infusion Rates (MIR: cc/min) of PRBCs, FFP, and Plts were calculated for Length Of Intervention (LOI: ED time + OR time). Patients were grouped into HRR (FFP:PRBC > 0.7, and/or Plts:PRBC >0.7) during the first 180 minutes of resuscitation, versus Low Ratio Resuscitation (LRR). Student's t-tests were performed to analyze the impact of MIR for each blood product on 180-minute survival (180-MS). Kaplan-Meier (KM) survival curves were generated.

Results: 151 patients met inclusion criteria. 120 (79.5%) patients achieved HRR of FFP:PRBC (180-MS= 86.67%) vs. 31 (20.5%) that did not (180-MS = 54.84%), p<0.001. 37 (24.5%) patients achieved HRR of Plt:PRBC ratios (180-MS = 91.89%) vs. 114 (75.5%) with LRR (180-MS = 76.32%), p<0.004. 124 (82.1%) patients achieved HRR of either FFP:PRBC or Plt:PRBC (180-MS = 86.29%) vs. 27 (17.9%) patients that did not (180-MS = 51.85%), p<0.0001. Regarding survival bias analysis: 121 (80.1%) patients survived 180 minutes, (PRBC MIR 71.9 cc/min, FFP MIR 92.0 cc/min, Plt MIR 3.45 cc/min) vs. 30 (19.9%) who did not survive (PRBC MIR 47.3 cc/min, FFP MIR 33.7 cc/min, Plt MIR 1.05 cc/min), p= 0.43, p<0.0001, p<0.011.



FFP:PRBC Kaplan-Meier curve



Plt: PRBC Kaplan-Meier curve

Conclusion: To the best of our knowledge this is the first study to analyze the impact of MIRs on survival bias. Minute-by-minute we demonstrated a dose-dependent survival advantage in the first 180 minutes of resuscitation at high MIRs of FFP and Plts. Early use of high MIRs for FFP and Plts conveys a survival advantage in patients with severe hemorrhage.

NOTES

MORTALITY AFTER GROUND-LEVEL FALL IN THE ELDERLY ANTICOAGULATED PATIENT: A LONG-TERM ANALYSIS OF RISK VS BENEFIT

Tazo S. Inui MD, Ralitza Parina MPH, David Chang MBA,MPH,Ph.D., Thomas S. Inui MD, MSc, Raul Coimbra* MD,Ph.D., University of California, San Diego

Invited Discussant: Nicholas Namias, MD

Introduction: Elderly patients who suffer ground level falls represent a population at risk for head injury. Previous trauma literature has demonstrated in single-institution settings that the use of oral anticoagulation (OAC) for stroke prevention in patients with cardiac arrhythmias may increase risk of mortality. We conducted an observational study to determine the long-term outcomes of ground-level fall patients on OAC and assess risk factors for mortality due to falls both for short- and long-term timeframes.

Methods: Retrospective analysis of the longitudinal version of the California Office of Statewide Planning and Development database was performed, which included 100% of hospitals for years 1995 to 2009. Inclusion criteria were elderly (age >=65) ground-level fall patients, who had a prior admission diagnosis of atrial fibrillation and a code for chronic OAC use. These patients were stratified by CHA2DS-VASC score and compared to a similarly stratified cohort with no documented history of OAC. Cox proportional hazard was used to evaluate risk for head injury and death. Logistic regression was used to identify risk factors associated with death due to head injury at first admission following a fall. Analysis was performed adjusting for patient demographics, risk factors from which the CHA2DS-VASC model is comprised, and injury severity as measured by ICISS.

Results: A total of 43,169 patients met the inclusion criteria. The mean age was 82 years. Most (68.4%) were female; most (67%) had CHA2DS-VASC scores between 3-5. Patients admitted after a fall had a 20.8% mortality rate in the first admission f (n=8986) and had a head injury rate of 9.2% (n=3991). Patients who died with a head injury comprised 10% of all deaths (n=895). The mortality rate of patients sustaining a head injury during the first admission following a fall ranged from 1.4-3.4% and was significantly different from most groups when stratified by CHA2DS-VASC score. Predictors for mortality with head injury on the first admission included male gender (OR 1.9, 95% CI 1.6-2.32), Asian ethnicity (OR 2, 95% CI 1.4-2.9), and a history of previous stroke (OR 4.2, 95% CI 3.3-5.3). Risk of eventual mortality with head injury from a fall significantly exceeded annualized stroke risk for patients with CHA2DS-VASC scores of 0-3 if taken off OAC (p-value <0.001-0.015).

Conclusion: Elderly patients on OAC who fall are at significantly higher risk for mortality than their non-anticoagulated peers. Mortality due to head injury following a single fall substantially exceeds those not taking OAC. However, the risk of death with a head injury from a single fall is not more likely than the annualized risk of stroke for appropriately anticoagulated patients (CHA2DS-VASC ≥2). These data suggest that patients with atrial fibrillation who are very high fall risk but who score low on the CHA2DS-VASC scoring system should not take OAC for stroke prevention, as their risk for death outweighs (or is equivalent to) the benefit of stroke prevention.

Table 1. Comparative mortality of OAC and non-OAC users, admitted with head bleed on initial fall.

CHA2DS-VASC score	OAC (% mortality)	No OAC (% mortality)	*p*-value
0	1(1.4)	12 (1.1)	0.832
1	9 (1.4)	122 (1)	0.309
2	96 (2.2)	456 (0.9)	<0.001
3	244 (2.2)	760 (0.7)	<0.001
4	249 (1.8)	657 (0.6)	<0.001
5	164 (2)	382 (1)	<0.001
6	93 (3.4)	213 (1.5)	<0.001
7	34 (3.4)	57 (1.65)	<0.001
8	4 (2.3)	8 (2.2)	0.981

NOTES

Session: XA: Neurological Trauma, Abdominal and Shock Resuscitation Papers 17-25
Paper 20: 3:00-3:20 pm

PLACEMENT OF INTRACRANIAL BOLT MONITORS BY TRAUMA SURGEONS - A 6 YEAR REVIEW.

Sadia Ilyas MD, Jonathan Saxe* MD, Melissa Whitmill MD, Priti Parikh Ph.D., Mary C. McCarthy* MD, Akpofure Peter Ekeh* MD,MPH, Wright State University Boonshoft School of Medicine

Invited Discussant: Alex Valadka, MD

Introduction: Brain Trauma Foundation guidelines advocate for the use of intracranial pressure (ICP) monitoring following traumatic brain injury (TBI) in patients with a GCS > 8 and an abnormal CT scan. The absence of 24 hour in-house Neurosurgery coverage could however negatively impact timely monitor placement. We reviewed our experience with placement of ICP bolts by Trauma Surgeons who had been trained and credentialed in their insertion.

Methods: In 2005, the Trauma surgeons at a Level I Trauma who are always available in-house were trained and credentialed in the placement of ICP bolt monitors by the Neurosurgeons. We subsequently identified all TBI patients who had ICP bolts placed between January 2006 and December 2011 noting demographic information, GCS, ISS, outcome as well as who placed the bolt – Neurosurgeon or Trauma Surgeon. Misplacement, hemorrhage, malfunctions and dislodgement were considered complications. Comparisons were performed by chi-square testing.

Results: Over the 6 year period over 407 ICP bolts were placed for TBI. Mean age was 40.9 ± 18.9 years, 73.2% were male, mean ISS was 27.9 ± 16, average length of stay 11.6 ± 9.7 days and mortality 35.4%. MVCs and Falls were the most common mechanisms of injury (35.2% & 28.7%) The Trauma surgeons placed 71 % of the all ICP bolts and Neurosurgeons, 27.5%. The Neurosurgeons placed most of their ICP bolts in the operating room during cranial procedures. (71%) The overall complication rate was 2.5% - there was no difference between the Trauma Surgeons and Neurosurgeons (3.1% vs. 0.8%, $p = 0.2951$) Mortality in both groups was similar- Trauma Surgeons 36.9% vs. Neurosurgeons 30.6% ($p = 0.2896$).

Conclusion: After appropriate training, ICP bolt monitors can be safely placed by Trauma Surgeons with minimal adverse effects. With current and expected subspecialty coverage shortages, Acute Care Surgeons can successfully adopt procedures such as ICP bolt placement with minimal complications.

NOTES

Session: XA: Neurological Trauma, Abdominal and Shock Resuscitation Papers 17-25
Paper 21: 3:20-3:40 pm

MULTI-CENTER ANALYSIS OF DIAPHRAGM PACING IN SPINAL CORD INJURY: SUCCESSFUL IN NOT ONLY WEANING FROM VENTILATORS BUT IN BRIDGING TO INDEPENDENT RESPIRATION

Joseph Posluszny MD, Raymond Onders MD, Andrew Kerwin* MD, Deborah Stein* MD, Jennifer Knight* MD, Lawrence Lottenberger* MD, Michael Cheatham* MD, Saeid Khansarinia MD, Dayal Saraswati* MD, Michael Weinstein* MD, Patricia Byers* MD, Lawrence Diebel* MD, University Hospitals Case Medical Center

Invited Discussant: George Velmahos, MD, PhD

Background: Ventilator dependent spinal cord injured (SCI) patients require significant resources related to ventilator dependence including intensive care unit time for weaning, appropriate rehabilitation and stays in long term ventilator facilities. Diaphragm pacing (DP) has been used successfully to replace mechanical ventilators for tetraplegics with most experience outlining use in chronic spinal cord injury. Early use of DP following SCI has not been described. Here, we report the largest multi-center experience with utilization of DP in the early phase or initial hospitalization after traumatic spinal cord injury in this rare condition. **Methods:** Under IRB approval for a humanitarian use device (HUD), we retrospectively reviewed our multi-center non-randomized interventional protocol (laparoscopic diaphragm motor point mapping with electrode implantation and subsequent diaphragm conditioning and ventilator weaning) for the early implantation of DP in SCI patients. Our primary goal was to determine successful independence of ventilator support. Our secondary goals were to determine time from implantation to ventilator wean and/or independence, delays until surgery, causes of failure to wean, and baseline demographic characteristics of these patients.**Results:** From 2007 to 2013, 245 SCI patients were implanted with DPs. During this time, 28 patients at 11 centers met the criteria of early laparoscopic evaluation and DP implantation. Average age was 31.2 years (range 16-65) with only 2 females. All patients had cervical spinal cord injuries and mechanism of injury included motor vehicles(8), diving (6), gunshot wounds(4), falls (4), athletic injuries(3), bicycles(2) and tree falling on spine(1). Elapsed time from injury to surgery was 49.1 days (range 3-112). Delays until surgery involved attempting and failing standard weaning, securing IRB approval, insurance coverage and transfers to implanting centers. Seven of the 28 patients (25%) who were evaluated for DP placement had non-stimulatable diaphragms from either phrenic nerve damage or infarction of the involved phrenic motor neurons and were not implanted. Two recently implanted patients are still progressing. Only 2 of the remaining 19 patients (10.5%) implanted were unable to be weaned; one went to a long term acute care hospital (LTACH) and subsequently withdrew all support and one patient uses DP with the ventilator by choice. Thus 89% (17of 19) were completely weaned from ventilator support in an average of 20.2 days (range 1-180 days). In fact, 12 patients who did not proceed to LTACHS were weaned in only 5.7 days. These patients had earlier implantation at 11.1 days post injury. Additionally, 7 patients (33%) had complete recovery of respiration and DP was no longer needed for respiration and underwent easy removal of the percutaneous electrodes. **Conclusion:** DP implantation can successfully wean traumatic SCI patients from ventilator support, precluding the need for long term ventilator use and need for LTACH placement post injury. In fact, 33% of implanted patients had complete recovery of diaphragm function and no longer required DP. In addition, early laparoscopic evaluation is also diagnostic, in that, a non-stimulatable diaphragm is irrefutable evidence of an inability to be weaned; therefore, long term ventilator management can be immediately instituted.

NOTES

Session: XA: Neurological Trauma, Abdominal and Shock Resuscitation Papers 17-25
Paper 22: 3:40-4:00 pm

Making the Financial Case for a Surgeon Directed Critical Care Ultrasound Program (CCUP)

Sarah B. Murthi MD, Heidi L. Frankel* MD, Mayur Narayan MD, Matthew Lissauer MD, Thomas M. Scalea* MD, R Adams Cowley Shock Trauma Center

Invited Discussant: Andrew Kirkpatrick, MD

Objective: We sought to demonstrate that a well-staffed, surgeon-directed CCUP is both financially sustainable and a source of valuable training.

Methods: A CCUP was developed to provide daytime clinical service, educational/training support and infrastructure support for off hours imaging. Thoracic, abdominal, extremity, ocular imaging and echocardiography were provided. We prospectively recorded initial program and annual costs and hospital and professional billing.

Results: Over 36 months, the CCUP covered 4 surgical ICUs (55 beds). A consult service was added to support other areas. Start-up costs included one basic and one cardiovascular unit per 25 beds, and a data storage system linking reports and images to the electronic medical record (total cost $189,764). Yearly costs include 0.5 FTE sonographer and 0.2 FTE surgeon ($106,025). There was three-fold increase in billing from year 1-3, with a 17% increase between yrs 2-3 (Table). The CCUP met operating costs at year 2 and broke even overall in year 3. Assuming the same rate of increase, and increased additional costs including fulltime sonographer and increased surgeon support (0.25 FTE), the CCUP remains financially feasible both for physician and hospital billing at 5 years. We have now trained 36 fellows and approximately 300 residents from various departments.

Conclusions: A surgeon-directed CCUP is financially sustainable and provides valuable training. Departments of Surgery should develop these programs before other sub-specialties fill the void.

Current Cost Analysis

Year	Exams	Cost Hospital	Cost MD Salary	Professional Fee	Hospital Fee
1	108	$ 240,789	$ 55,000	$ 22,032	$ 52,812
2	296	$ 51,025	$ 55,000	$ 60,834	$ 144,744
3	357	$ 51,025	$ 55,000	$ 72,828	$ 174,573
Total	**761**	**$ 342,839**	**$ 165,000**	**$ 155,694**	**$ 372,129**

Projected Costs Analysis

4	418	$ 102,050	$ 68,750	$ 85,272	$ 204,402
5	489	$ 102,050	$ 68,750	$ 99,756	$ 239,150
Total	**1,668**	**$ 546,939**	**$ 275,000**	**$ 340,722**	**$ 815,681**

NOTES

POSITIVE CT ANGIOGRAPHY AFTER PELVIC TRAUMA DOES NOT ALWAYS PREDICT NEED FOR ANGIOEMBOLIZATION

Efstathios Karamanos MD, Peep Talving* MD,Ph.D., Stuart Schroff MD, Shelby Resnick MD, Gerard K. Nguyen BS, Lydia Lam* MD, Demetrios Demetriades* MD,Ph.D., Michael D. Katz MD, LAC+USC Medical Center

Invited Discussant: Babak Sarani, MD

Introduction:Computed tomographic angiography (CTA) is a rapid and comprehensive investigation for patients suffering pelvic fractures. We hypothesized that contrast extravasation (CE) seen on CTA early after admission may not accurately predict clinically significant bleeding requiring angioembolization.

Methods:All patients admitted to an urban Level 1 trauma center between 1/2006 and 6/2012 with pelvic injury who underwent pelvic CTA and subsequent emergent catheter-based diagnostic angiography were retrospectively identified. Patient demographics, injury severity indices, and severity of pelvic fractures were collected. Time to CTA, CT findings, demographics and lab values were evaluated as potential predictors for therapeutic angioembolization, using regression models.

Results:Overall, 94 patients were studied, 45 patients underwent emergent therapeutic angioembolization and 49 had only a diagnostic run. After multivariate analysis, a CTA >60 minutes after admission with CE [AOR (95% CI): 6.92 (2.03, 23.58)], large volume of CE (> 4 cm ^{3}), sacroiliac joint disruption, pubic symphysis diastasis, splenic injury, and female gender were identified as independent predictors (table). Early positive CTA, number of areas with CE, density and diameter of CE did not predict the need for embolization. CTAs with CE did not require angioembolization if the CE volume was small and singular, and the patient had stable vital signs prior to diagnostic angiography.

Conclusion:An early positive CTA does not accurately predict the clinically significant hemorrhage requiring angioembolization. A single small CE and stable vital signs are associated with non-therapeutic angiography.

Predictors of Therapeutic Angioembolization

Step	Variable Entered	AOR (95% CI)	adj-p	Cumulative R^2
1	Positive CTA in > 60 min after admission	6.92 (2.03, 23.58)	0.002	0.17
2	Large Volume of CE	19.0 (3.72, 96.64)	<0.001	0.35
3	Sacroiliac Joint Disruption	4.74 (1.38, 16.23)	0.013	0.41
4	Diastasis of Pubic Symphysis	0.21 (0.06, 0.77)	0.019	0.45
5	Splenic Injury	15.56 (1.58, 153.17)	0.019	0.50
6	Female Gender	3.45 (1.34, 11.11)	0.036	0.54

NOTES

COMPLEX PENETRATING DUODENAL INJURIES: LESS IS BETTER

Carlos A. Ordonez* MD, Alberto F. Garcia MD, M.Sc(c), Michael W. Parra MD, David A. Scavo MD, Luis F. Pino MD, Mauricio Millan MD, Marisol Badiel MD, (a)Ph.D, Juan F. Sanjuan MD, (s)M.Sc, Fernando Rodriguez MD, Ricardo Ferrada MD, Juan C. Puyana* MD, Universidad Del Valle

Invited Discussant: David Feliciano, MD

Introduction: The traditional management of complex penetrating duodenal trauma (PDT) has been the utilization of elaborate reconstructive procedures such as the pyloric exclusion (PE) and duodenal diverticulization. Lengthy, detailed procedures in these cases inevitably lead to potentially poor outcomes and significant complications. The aim of the present study was to evaluate a simplified approach to the management of complex PDT injuries, which emphasizes the current trend of organ specific damage control (DC) surgery.

Method: A retrospective review of all consecutive penetrating duodenal injuries from 2003 to 2012 at a Regional Level I Trauma Center.

Results: There were 44 consecutive patients with PDT and 41(93.2%) of them were from gunshot wounds. Seven patients were excluded due to early intra-operative death secondary to associated devastating traumatic injuries. Of the remaining 37 patients, 12(32.4%) had AAST Organ Injury Scale Grade II, 16(43.2%) Grade III, 8(21.6%) Grade IV and 1(2.7%) Grade V. Primary duodenal repair (PDR) was performed as a definitive procedure in 18.9% of cases and as part of DC in 43.2%. The duodenum was over sewn and left in discontinuity (OSLD) in 37.9% of cases. Subsequent duodenal reconstruction was performed in 92.8% of cases of OSLD and in 12.5% of cases that required PDR during their initial DC surgery. Most frequent form of reconstruction was a duodeno-jejunostomy in 7(46.7%), gastro-jejunostomy in Roux en Y in 3(20.0%), duodeno-duodenostomy in 2(13.3%), pyloric exclusion in only 2(13.3%) and a Whipple procedure in 1(6.7%) case. The most common complication was the development of a duodenal fistula in 12/37(32.4%) cases. These leaks were managed by vacuum assisted closure in 3/12(25%) cases, and posterior drainage by lumbotomy in 9/12(75%). The duodenal fistula closed spontaneously in 7/12(58.3%) cases, 2/12(16.6%) required re-intervention, 2/12(16.6%) died and 1/12(8.3%) is still patent. Overall mortality was 13.5%. The PDR group had the lowest mortality of 8.7% followed by 21.4% in the OSLD group.

Conclusion: Application of basic DC techniques for PDT leads to improve survival and a low incidence of complications. Furthermore, the management of possible subsequent complications of initial DC management can be managed with the same philosophy of simplicity with acceptable outcomes.

NOTES

Session: XA: Neurological Trauma, Abdominal and Shock Resuscitation Papers 17-25
Paper 25: 4:40-5:00 pm

THE EARLY BIRD GETS THE WORM: PRE TRAUMA CENTER BLOOD TRANSFUSION IS ASSOCIATED WITH REDUCED MORTALITY AND COAGULOPATHY IN SEVERELY INJURED BLUNT TRAUMA PATIENTS

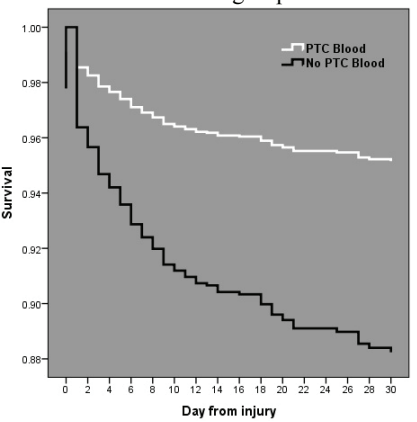
Joshua B. Brown MD, Mitchell J. Cohen* MD, Joseph P. Minei* MD, Ronald V. Maier* MD, Michael A. West* MD,Ph.D., Timothy R. Billiar* MD, Andrew B. Peitzman* MD, Ernest E. Moore* MD, Joseph Cuschieri* MD, Jason L. Sperry* MD,MPH, University of Pittsburgh

Invited Discussant: Stephanie Savage, MD

Introduction: Hemorrhage and coagulopathy remain major drivers of mortality in injured patients. While significant advances have been made in trauma center based resuscitation, there is little evidence supporting pre-trauma center (PTC) interventions to reduce the mortality associated with early hemorrhage and coagulopathy. Our objective was to evaluate the association of PTC blood transfusion with mortality and coagulopathy in severely injured patients.

Methods: Blunt injured patients in hemorrhagic shock who arrived at a trauma center within 2 hours of injury were included from the Inflammation and Host Response to Injury prospective cohort study. Outcomes included 24 hour mortality, 30 day mortality, and trauma induced coagulopathy (TIC), defined as an admission INR>1.5. Cox proportional hazard regression and logistic regression were used to characterize the risks of these outcomes associated with PTC blood transfusion after controlling for demographics, PTC time, injury and shock severity, early resuscitation, and center level effects.

Results: Of 1415 subjects arriving within 2 hours of injury, 50 received PTC blood. There were no differences in age, gender, or ISS between the PTC blood and No PTC blood groups ($p>0.05$). The PTC blood group was more commonly hypotensive and had a lower base deficit ($p<0.01$), demonstrating a higher overall injury and shock severity as compared to the No PTC blood group. The PTC blood group received a median of 1.3 units of blood in the PTC period and 52% were transported from the scene. In regression analysis, PTC blood was independently associated with a 90% reduction in 24 hour mortality (OR 0.10; 95%CI 0.01-0.95, p=0.04), a 60% reduction in 30day mortality (HR 0.40; 95%CI 0.16-0.97, p=0.04), and an 86% reduction in TIC (OR 0.14; 95%CI 0.02-0.94, p=0.04) after adjusting for confounders. Cox adjusted survival curves showed early separation of the groups with lower survival of the No PTC blood group over the first 30 days (Figure).



Conclusions: PTC blood administration is independently associated with a lower risk of 24 hour mortality, 30 day mortality, and TIC. Early aggressive resuscitation initiated before arrival at the trauma center incorporating blood transfusion appears to be associated with improved outcomes in severely injured blunt trauma patients, and warrants further prospective study and validation.

NOTES

SESSION XB:

THORACIC TRAUMA AND CRITICAL CARE

PAPERS #26-#34

THURSDAY, SEPTEMBER 19, 2013, 2:00 PM – 5:00 PM

CONTINENTAL BALLROOM 6

MODERATOR: STEVEN JOHNSON, M.D.

RECORDER: PATRICK REILLY, M.D., M.P.H.

Session: XB: Thoracic Trauma and Critical Care Papers: 26-34
Paper 26: 2:00-2:20 pm

COMPLEMENT MEDIATES A PRIMED INFLAMMATORY RESPONSE AFTER TRAUMATIC LUNG INJURY

J. Jason Hoth* MD,Ph.D., Jonathan D. Wells BS, Sarah E. Jones AAS, Barbara K. Yoza Ph.D., Charles E. McCall MD, Wake Forest University School of Medicine

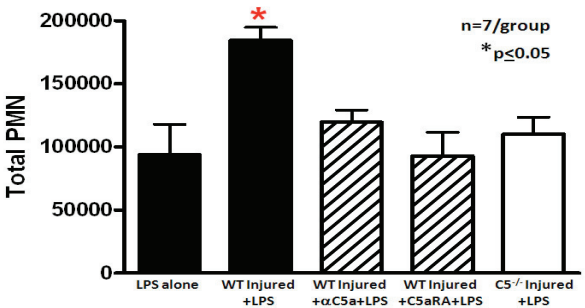
Invited Discussant: Krishnan Raghavendran, MD

Introduction: Pulmonary contusion (PC) is a common, potentially lethal injury that results in priming for exaggerated inflammatory responses to subsequent immune challenge like infection (2nd hit). The molecular mechanism of priming and the 2nd hit phenomenon after PC remain obscure. We hypothesize PC-induced activation of the complement (C) system participates in the priming effect seen after injury.

Methods: Male, 8-9 wk, C57BL/6 mice (WT, $C5^{-/-}$) underwent blunt chest trauma resulting in PC. The inflammatory response at 3H/24H after injury was quantified by measuring C5a, KC, IL-6 levels in serum/bronchoalveolar lavage (BAL), determining BAL neutrophil/protein levels, and evaluating lung histology. Additionally, mice were treated with the thrombin inhibitor, hirudin, to determine if injury-induced thrombin participated in the activation of C. Injury-primed responses were tested by challenging mice with intratracheal (IT) bacterial endotoxin (LPS) as a 2 nd hit at 24H after PC. Inflammatory responses were assessed in the serum, BAL and lung tissue at 4H after LPS challenge. Data were analyzed using one way ANOVA with Bonferroni multiple comparison post-test with significance defined as $p \leq 0.05$). All experimental protocols were approved by the WFUHS Animal Care and Use Committee.

Results: We found significantly increased levels of C5a in the BAL of injured animals as early as 24H, persisting for up to 72H after injury. To determine the molecular mechanism of C activation after injury, we used hirudin-treated mice and found significantly decreased levels of thrombin in the BAL of hirudin treated injured mice that correlated with markedly reduced C5a levels. When challenged with IT LPS, injured mice demonstrated a correlation between increased C5a and increased neutrophils in the BAL and inflammatory mediators in the serum. Conversely, inhibition of C5a or its receptor, C5aR, in WT injured mice prior to LPS challenge correlated with decreased neutrophils in the BAL; C5a deficient mice showed a similar loss of primed response to LPS challenge.

Conclusion: Complement C5a levels in the BAL are increased over several days after PC. Pre-morbid inhibition of thrombin markedly abrogates C5a production after PC, suggesting thrombin-induced C activation is the major pathway of activation after PC. Similarly, inhibition of C5a after PC will diminish the measured priming response to LPS stimulation. Our findings suggest cross-talk between the coagulation and complement systems that induce immune priming after PC.



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Session: XB: Thoracic Trauma and Critical Care Papers: 26-34
Paper 27: 2:20-2:40 pm

THE EFFECT OF EPIDURAL PLACEMENT IN PATIENTS AFTER BLUNT THORACIC TRAUMA

Saman Arbabi* MD,MPH, Alexis Gage MD,MPH, Frederick Rivara MD,MPH, Jin Wang Ph.D., Gregory J. Jurkovich* MD, Ronald V. Maier* MD, University Of Washington

Invited Discussant: David Harrington, MD

Introduction: In studies of trauma patients with rib fractures, conclusions on the benefits derived from epidural analgesia versus other analgesic modalities are inconsistent. The purpose of this study was to further evaluate placement and efficacy of epidural analgesia nationwide. We hypothesized that epidural analgesia improves outcomes of blunt trauma patients with 3 or more rib fractures (the cutoff point in previous studies that demonstrated benefit).

Methods: This was a retrospective cohort study of prospectively gathered data from the National Study on Cost and Outcomes of Trauma (NSCOT) database. Patients for this study came from the NSCOT, a multisite prospective cohort study of injured patients aged 18-84 years who were treated in 69 participating hospitals (18 Level I trauma centers and 51 non-trauma centers) across the United States. Our analysis was limited to patients with a blunt mechanism of injury and a thoracic maximum Abbreviated Injury Score (maxAIS) of ≥ 2. Excluded were patients that were not potential candidates for epidural placement, such as patients with significant head and spine injuries (maxAIS head>2 or maxAIS spine>2), significant neurological impairment (best motor GCS<4), unstable pelvic fractures, coagulopathy, or patients that died within 48 hours. The primary intervention was epidural catheter placement, and primary outcome was death in 30, 90, and 365 days after injury.

Results: The NSCOT database contains 5,043 patients (weighted N=14,477), of which 836 (16.5%) patients were identified as potential candidates for epidural placement. Of patients included in the study, 736 patients (88%) did not receive an epidural catheter, and 100 patients (12%) had epidural catheters placed. The epidural cohort was significantly older (51+/-25 versus 44+/- 28), had higher number of rib fractures, and more likely to have chest tubes (58% versus 39%). There was no significant difference in insurance status, GCS, or thoracotomies (2.2% versus 2.8%). The likelihood of epidural catheter placement was significantly higher is trauma centers as compared to non-trauma centers (adjusted odds ratio 3.06, 95% CI 1.80-5.22). In the epidural group as compared to no epidural cohort, the adjusted odds of death in patients with 3 or more rib fractures at 30, 90, and 365 days was 0.21 (95%CI 0.05-0.94), 0.27 (95% CI 0.07-1.00), and 0.33 (95% CI 0.12-0.91) respectively (propensity score analysis). We adjusted for age, gender, ISS, shock, Charlson Comorbidity Index score, trauma center status, number of rib fractures, chest tube placement, thoracic maxAIS, flail chest, and intubation status (since maxhead AIS was limited to 2 or lower, it was not a confounder in our model). Limiting the study to patients treated in trauma centers only did not significantly change the results, and epidural placement was associated with significant reduction in mortality.

Conclusion: In this multicenter retrospective cohort study, epidural catheter placement was associated with a significantly decreased risk of dying up to a year post injury in patients with blunt thoracic injury of ≥ 3 rib fractures.

NOTES

Session: XB: Thoracic Trauma and Critical Care Papers: 26-34
Paper 28: 2:40-3:00 pm

IS IT SAFE? TWICE DAILY DOSING OF ENOXAPARIN IN TRAUMA PATIENTS WITH INDWELLING THORACIC EPIDURAL CATHETER

Shente Hsu MD, Soumojit Ghosh BS, Michael Bottros MD, Douglas Schuerer* MD,
Washington University

Invited Discussant: M. Margaret Knudson, MD

Introduction: Thoracic epidural catheters are an effective method used for pain relief of traumatic rib fractures. Trauma patients are commonly given enoxaparin twice daily for deep vein thrombosis (DVT) prophylaxis given its superiority to unfractionated heparin in randomized trials. However, American Society of Regional Anesthesia recommends against twice daily prophylactic enoxaparin in patients with an indwelling epidural catheter, citing concern for risk of epidural hematoma, although rare. DVT and pulmonary embolism (PE) remain common in this population, but there is a paucity of data examining the safety of enoxaparin twice daily in patients with an indwelling epidural catheter.

Methods: We performed a retrospective review of all patients with rib fractures who received a thoracic epidural catheter at our level 1 trauma center from 2005-2012. Data collected included patient demographics, Injury Severity Score, anticoagulant use, presence of significant coagulopathy or thrombocytopenia, difficult epidural placement, and development of epidural hematoma.

Results: We identified 158 patients. There were no epidural hematomas. Patient demographics and other results are in Table 1. Twice daily enoxaparin was given to 83 (52.5%) patients, while 105 (66%) had at least one dose of daily enoxaparin. 17 (10.8%) received no chemical prophylaxis. Significant thrombocytopenia (Plt < 100,000) and coagulopathy (INR > 1.5) developed in 14 (8.9%) and 11 (7.0%) patients, respectively. 8 (5%) patients developed DVT or PE, 5 of whom were on less than twice daily enoxaparin, and only 1 of those had a closed head injury. Patients with PE were noted to have a longer length of stay compared to the whole group (13.0 vs 10.2 days).

Table 1. Patient Demographics and Results

Age	53.4
Male	69% (109)
Female	31% (49)
ISS	18
Closed Head Injury	22.7% (20)
Median Rib fractures/ pt.	6
Hospital day Epidural Placed	2
Epidural duration	5.1 days
DVT/PE	5% (8)
Epidural Hematoma	0

Conclusion: In this largest reported dataset of epidural catheters and concurrent enoxaparin use, there were no epidural hematomas. There is a significantly high rate of DVT and PE in these patients. Even though this study is not powered to detect a small increase in epidural hematomas, given the risk benefit ratio, maintaining appropriate DVT prophylaxis should be favored until a larger multi-center study can be performed.

NOTES

Session: XB: Thoracic Trauma and Critical Care Papers: 26-34
Paper 29: 3:00-3:20 pm

AGE-RELATED IMPACT ON PRESENTATION AND OUTCOME OF PENETRATING THORACIC TRAUMA IN THE ADULT AND PEDIATRIC PATIENT POPULATIONS

Nathan M. Mollberg DO, Robert Kanard MD, Deborah Tabachnik MD, Thomas K. Varghese MD, Michele Holevar* MD, Gary J. Merlotti MD, Robert Arensman MD, Malek G. Massad MD, Mount Sinai Hospital

Invited Discussant: Mary Fallat, MD

Introduction: Studies reporting on penetrating thoracic trauma in the pediatric population have been limited by small numbers and implied differences with the adult population. Our objective was to report on a large cohort of pediatric patients presenting with penetrating thoracic trauma and to determine age-related impacts on management and outcome through comparison with an adult cohort.
Methods: A Level I trauma center registry was queried between 2006 and 2012. All patients presenting with penetrating thoracic trauma were identified. Patient demographics, injury mechanism, injury severity, admission physiology, and outcome were recorded. Patients were compared and outcomes analyzed based on age at presentation, with those patients ≤ 17 years old defining our pediatric cohort.
Results: 1423 patients with penetrating thoracic trauma were admitted over the study period. 220 (15.5%) patients were pediatric, with 205 being adolescents (13-17) and 15 being children (≤ 12). In terms of management for the pediatric population, tube thoracostomy alone was needed in 32.7% (72/220), whereas operative thoracic exploration was performed in 20.0% (44/220). Overall mortality was 13.6% (30/220). There was no significant difference between the pediatric and adult population regarding need for therapeutic intervention, or outcome (Table 1). Regression analysis failed to identify age as a predictor for the need for either therapeutic intervention or mortality between the two age groups. However, subgroup analysis revealed that age ≤ 12 (odds ratio: 3.84, confidence intervals: 1.29-11.4) was an independent predictor of mortality.
Conclusion: This series represents the largest to date reporting outcomes for penetrating pediatric thoracic trauma. Management of traumatic penetrating thoracic injuries in terms of need for therapeutic intervention, and operative approach were similar between the adult and pediatric populations. Mortality from penetrating thoracic trauma can be predicted based on injury severity, the use of EDT, and admission physiology for both adolescents and adults. Children are at increased risk for poor outcome independent of injury severity.

Table 1. Outcome and management comparison between pediatric and adult patient populations presenting with penetrating thoracic trauma

Parameter n (%)	Pediatric	Adult	*p* value
	220 (15.5)	1203 (85.5)	
Demographics			
Age, mean ± standard deviation	15.4 ± 2.3	28.7 ± 9.6	<0.001
Gender, male	180 (81.8)	1063 (88.4)	0.011
Injury mechanism			
Stab wound	135 (61.4)	698 (58.0)	0.372
Therapeutic intervention	117 (53.2)	552 (45.9)	0.07
Tube thoracostomy	72 (32.7)	327 (27.2)	0.102
Intrathoracic operation	45 (20.5)	225 (18.7)	0.575
Operative approach			
Thoracotomy	38 (65.6)	162 (55.8)	0.14
Sternotomy	3 (22.6)	23 (34.6)	0.786
Thoracoscopy	3 (3.2)	31 (5.8)	0.345
Clavicular/Axillary	1 (8.6)	9 (5.8)	0.345
Laparotomy	33 (15.0)	160 (13.3)	0.52
Multiple cavity	4 (1.8)	20 (1.4)	0.779
Emergency department thoracotomy	26 (11.8)	131 (10.9)	0.725
Chest abbreviated injury score, mean ± SD	2.4 ±1.5	2.2 ±1.5	0.07
Revised Trauma Score, mean ± SD	7.0 ±2.2	7.0 ±2.4	1
New Injury Severity Score, mean ± SD	12.6 ±17.3	11.2 ±17.0	0.263
Overall mortality	31 (14.1)	139 (11.6)	0.309

NOTES

COMPUTER VERSUS PAPER ICU SYSTEM FOR RECOGNITION AND MANAGEMENT OF SURGICAL SEPSIS

Chasen A. Croft MD, Frederick A. Moore* MD, Philip A. Efron MD, Peggy S. Marker RN, Andrea Gabrielli MD, Lawrence J. Caruso MD, Fitzgerald J. Casimir MD, Janeen Jordan MD, Lawrence Lottenberg* MD, Lynn S. Westhoff RN, Victoria Klink RN, R. Matthew Sailors BE, Bruce A. McKinley PhD University of Florida - Gainesville

Invited Discussant: Lena Napolitano, MD

Introduction: A system for sepsis management was implemented for acute care surgery ICU patients using a paper system followed by a computerized system. We hypothesized that better outcomes would be associated with the computerized system.
Methods: Using literature and guideline evidence, and local expert consensus, a rule based, data driven system was designed that provides early recognition and guides patient specific management of sepsis including: 1. modified early warning signs–sepsis recognition score (MEWS-SRS; summative point score of ranges of vital signs, mental status, WBC; Q4hr) by bedside RN; 2. suspected site assessment (vascular access, lung, abdomen, urinary tract, soft tissue, other) at bedside by MD or extender; 3. sepsis management protocol (replicable, point of care decisions) at bedside by RN, MD and extender. The system was implemented first using paper forms and then a computerized system. Sepsis severity was defined using standard criteria, and patients were categorized using the 1 st sepsis encounter.
Results: In Jan-May 2012 (22wks), a paper system was used to manage 77 consecutive sepsis encounters (3.9±0.5 cases/wk) in 65 patients (77% m; age 53±2). In Jun-Dec 2012 (30wks), a computer system was used to manage 132 consecutive sepsis encounters (4.4±0.4 cases/wk) in 119 patients (63% m; age 58±2). MEWS-SRS elicited 683 site assessments and 201 had sepsis diagnosis and protocol management. Incidence and outcome are summarized.

	Paper system					Computerized system				
[a,b;1,2]p<0.05 (X^2,ANOVA)	number		hosp mort rate	ICU free dy	home disp	number		hosp mort rate	ICU free dy	home disp
severity	total	m (%)	n (%)	m±sem	n (%)	total	m (%)	n (%)	m±sem	n (%)
sepsis	16(25)	81	1(6)	[1]10±2	4(31)	44(37)	66	[a]1(2)	[a,2]17±1	[a]21(62)
severe sepsis	34(52)	79	[1]8(24)	13±2	[3]7(54)	21(18)	62	[b,2]3(14)	[a]14±2	[4]7(21)
septic shock	15(23)	67	[1]6(40)	13±2	2(15)	54(45)	61	[b,2]12(22)	[b]9±1	[b]6(21)
all	65(100)	77	15(23)	13±1	13(20)	119(100)	53	16(14)	13±1	34(34)

Hospital mortality rate for severe sepsis (paper 24 vs computer 14%) and for septic shock (paper 40 vs computer 22%) was greater with the paper than the computer system. With the computer system, ICU stay increased with sepsis severity. For sepsis, disposition to home tended to be more frequent with the computer than the paper system (p=0.06). Septic shock patients (paper 71%; computer 46%) were transferred to ICU from elsewhere.
Conclusions: Sepsis management for acute care surgery patients is a frequent requirement that requires ongoing surveillance and involves a complex care process. A computerized system designed to facilitate early recognition and to prompt individual patient optimized care of sepsis improves outcomes compared with a paper system. Hospital sepsis survival is not associated with disposition to home, but with disposition to ongoing long term care.

NOTES

Session: XB: Thoracic Trauma and Critical Care Papers: 26-34
Paper 31: 3:40-4:00 pm

Reducing Unnecessary Blood Transfusions In The SICU With A Simple Checklist

Ellen Carraro MD, Naeem A. Ali MD, Kay Ashworth RN, Cheryl Newton RN, Jennifer MacDermott RN, Gary Phillips MAS, David Evans MD, Daniel Eiferman MD, Stanislaw Stawicki MD, David Lindsey* MD, Steven Steinberg* MD, Charles H. Cook* MD, The Wexner Medical Center At The Ohio State University

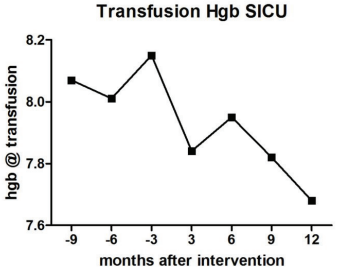
Invited Discussant: Lydia Lam, MD

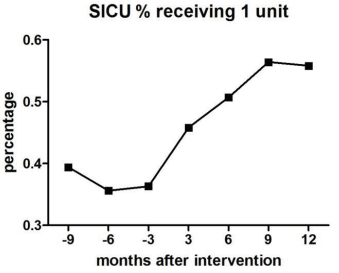
Introduction: The decades old practice of liberal transfusions in critically ill patients using higher than necessary transfusion thresholds and multiple units of blood continues unabated in many intensive care units (ICU). This occurs despite recent consensus recommendations for more restrictive transfusion practices in critically ill patients. We hypothesized that implementation of a simple 4 step checklist would impact such transfusion practice in a large multispecialty surgical ICU (SICU).

Methods:We retrospectively evaluated transfusion practices for all patients admitted to our SICU for 10 months prior and 15 months after checklist implementation. As a control, we monitored transfusion practice in our medical ICU (MICU, no checklist) during the same time period.

Results:From Jan 2009 to Dec 2010, 3292 and 2550 individual packed red blood cell (prbc) transfusions occurred respectively in our 44 bed SICU and 38 bed MICU (excludes massive transfusion protocol events). For transfusion trigger, random effects linear regression analysis over continuous time shows a statistically significant decrease in the mean hemoglobin (HGB) at time of transfusion in SICU after protocol implementation ($p=0.002$), and without concomitant decrease in the MICU ($p=0.386$). When patients did receive "routine" transfusion, random effects logistic regression analysis shows that SICU patients were 91% more likely to receive 1 prbc (instead of 2) after protocol implementation ($p<0.001$), while MICU patients were only 3% more likely to receive a single unit transfusion ($p=0.003$).

Conclusion: Implementation of a simple 4 step nursing driven transfusion protocol can reduce the transfusion trigger and the number of units transfused in a large SICU.





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Session: XB: Thoracic Trauma and Critical Care Papers: 26-34
Paper 32: 4:00-4:20 pm

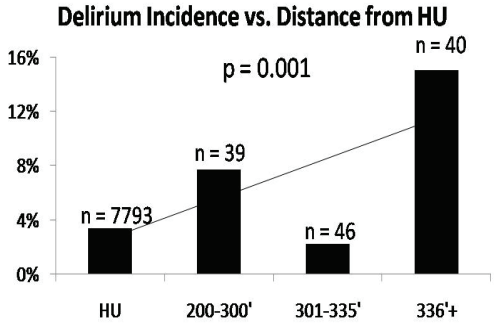
SURGICAL ICU PATIENTS BOARDING IN OTHER ICUs: GREATER DISTANCES EQUAL MORE FREQUENT COMPLICATIONS

Nicholas W. Blank Daniel H. Holena MD, Matthew Robertson CRNP, Mouhamed Diop Steve R. Allen MD, Niels Martin MD, Carrie Sims* MD, Patrick M. Reilly* MD, Jose L. Pascual MD,Ph.D., University of Pennsylvania

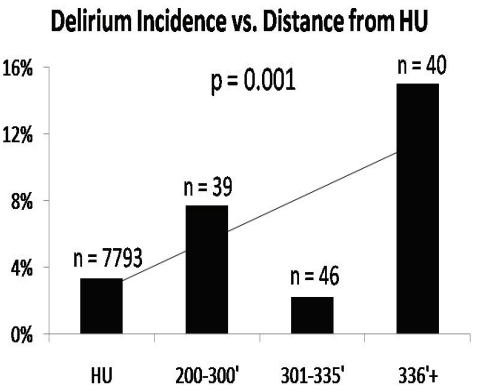
Invited Discussant: Grace Rozycki, MD, MBA

Introduction: Intensive Care Units (ICUs) are frequently at capacity and critically ill patients are often admitted to geographically distinct non-home ICUs. In medical ICU settings, such 'boarding' practices have been associated with increased rates of complications. We hypothesized that surgical ICU patients boarding in a separate neuro ICU but cared for by their 'home team' would suffer a greater number of complications.

Methods: A retrospective review of a prospectively maintained ICU database was performed over a 5-year period ('06/2005-'06/2010). Demographics, diagnosis, APACHE II scores, length of stay and incidence of delirium, pneumonia, ARDS, aspiration, re-intubation and self-extubation were extracted. Distances between the home Surgical ICU (HU) and the non-home neuroICU (NHU) rooms were measured using a surveyor's wheel and divided into 4 groups (HU, 200-300', 331-335', 336'+). Multivariate binomial logistic regression was used to control for age, APACHE II score, and length of stay. A p-value of <0.05 was considered significant.



Results: 7793 patients were admitted to the HU unit and 125 to the NHU unit with similar demographics and from similar surgical services. Incidence of delirium (3.33% vs. 8.00%, p=0.003) and reintubation (3.30% vs. 6.40%, p=0.038) in the HU was significantly lower than in the NHU. Figures depict the significantly rising incidence of delirium and re-intubation by patient room distance from HU controlling for age, APACHE II and LOS. No significance difference in incidence of other complications were found.



Conclusions: Incidence of delirium and need for reintubation is greater in SICU patients boarding away from the home unit, and this is directly related to physical distance from the HU. Further evaluation of contributing nursing, medical or geographic factors are needed to address the root causes of these findings and improve ICU patient safety.

NOTES

Session: XB: Thoracic Trauma and Critical Care Papers: 26-34
Paper 33: 4:20-4:40 pm

DETERMINING THE OPTIMAL THRESHOLD FOR GLUCOSE CONTROL IN ORGAN DONORS AFTER NEUROLOGIC DETERMINATION OF DEATH: A PROSPECTIVE ANALYSIS FROM THE UNOS REGION 5 DONOR MANAGEMENT GOALS WORKGROUP

Mitchell B. Sally MD, Tyler Ewing BS, Megan Crutchfield MPH, Madhukar Patel MD, Shariq Raza MD, Darren Malinoski* MD, Portland Veterans Affairs Medical Center

Invited Discussant: Ali Salim, MD

Introduction: A glucose level $\leq$ 180 mg/dL is currently recommended for the management of patients in the intensive care unit. In organ donors after neurological determination of death (DNDD), guidelines and regional practices target a glucose level $\leq$ 150 mg/dL, but evidence supporting this practice is lacking. We sought to determine the impact of hyperglycemia on organ transplantation rates and graft outcomes in DNDDs and hypothesized that a glucose target of 180 mg/dL would be effective in optimizing organ transplantation rates and outcomes.

Methods: Donor demographic, critical care endpoints, treatments, organ transplantation rates, and graft outcome data were prospectively collected on all DNDDs in United Network for Organ Sharing Region 5 between July 2010 and December 2012. Critical care endpoints and treatments were assessed at referral for potential organ donation, at the time of consent, 12-18 hours after consent, and prior to organ recovery. The primary outcome measure was having $\geq$ 4 organs transplanted per donor (OTPD). Univariate analyses were conducted to determine the crude relationship between glucose levels and overall OTPD, individual organ transplantation rates, and recipient graft function. Glucose levels were analyzed as continuous values as well as at the following cutoff points: $\leq$ 150, 180, and 200 mg/dL. Crude results were then adjusted for gender, age, extended criteria donor (ECD) status, BMI, diabetes, blood type, and thyroid hormone usage in order to determine independent predictors of $\geq$ 4 OTPD. Results with a $p<0.05$ are expressed in the results section.

Results: There were 1611 DNDDs with a mean age of 38 years, 62% were male, 8% ECDs, and 8% diabetic. Mean glucose was 168 mg/dL overall, 198 mg/dL at referral, 160 mg/dL at consent, 172 mg/dL 12-18 hours after consent, and 151 mg/dL prior to recovery. 537 (33%) hearts, 591 (18%) lungs, 1264 (78%) livers, 251 (16%) pancreata, and 2663 (83%) kidneys were transplanted. Mean OTPD were 3.4 $\pm$ 1.7 and 41% had $\geq$ 4 OTPD. Glucose levels $\leq$ 150 mg/dL were not associated with differences in organ utilization. However, levels $\leq$ 180 mg/dL were associated with more OTPD (3.5 vs 3.2) and a higher rate of $\geq$ 4 OTPD (42% vs 34%) as were levels $\leq$ 200 mg/dL (3.5 vs 3.3 and 42% vs 32%). After controlling for other factors, a glucose level $\leq$ 180 mg/dL remained an independent predictor of $\geq$ 4 OTPD (OR 1.4). In terms of specific organ utilization, mean glucose levels were lower in donors whose hearts and/or kidneys were transplanted (165 vs 170 and 168 vs 175 mg/dL, respectively). Levels $\leq$ 180 were associated with higher heart (34% vs 28%), pancreas (18% vs 11%), and kidney (85% vs 81%) transplantation rates. Levels $\leq$ 200 mg/dL were associated with higher heart (34% vs 24%) and kidney (85% vs 78%) transplantation rates. As for graft function, mean glucose levels were lower at 12-18 hours in hearts that were functioning after 9.0 $\pm$ 4.8 months of recipient follow-up (162 vs 178 mg/dL). Levels $\leq$ 150, 180, and 200 mg/dL were associated with higher kidney graft survival after 10 $\pm$ 6.0 months of follow-up (97% vs 95%).

Conclusion: Hyperglycemia is common in DNDDs and is associated with lower organ transplantation rates and worse graft outcomes. Targeting a glucose level $\leq$ 180 mg/dL appears to preserve outcomes and is consistent with general critical care guidelines.

NOTES

Session: XB: Thoracic Trauma and Critical Care Papers: 26-34
Paper 34: 4:40-5:00 pm

BETA BLOCKERS FOR ACUTE ATRIAL DYSRHYTHMIAS IN TRAUMA PATIENTS IMPROVES OUTCOMES

Jason P. Farrah MD, Patrick Robinson BS, Christopher Hunter MD, Preston R. Miller* III, MD, Robert S. Martin* MD, Gerald Rebo PharmD, Nathan T. Mowery* MD, Wake Forest University School of Medicine

Invited Discussant: Terence O'Keeffe, MD, MPH

Introduction:Acute atrial dysrhythmias (AADs) are a common problem for injured patients. AADs have been identified as independent predictors of mortality in trauma. Treatment of these dysrhythmias are well described in other surgical populations with beta blockers having been shown to improve outcomes. Little is known regarding the optimal treatment of these dysrhythmias in the setting of trauma resulting in inconsistent treatment. We hypothesized that treatment with beta blockers would confer improved outcomes and less recurrence of AADs.

Methods:A retrospective chart review of all patients admitted to our level 1 trauma center over the last ten years was performed. Patients with AADs, defined as atrial fibrillation, atrial flutter, or supraventricular tachycardia were selected for further analysis. Patients were divided into three groups based on initial medical treatment received (beta blockers, calcium channel blockers, or amiodarone) and then compared by univariate and multivariate analysis. Patients with a past medical history of atrial dysrhythmias were excluded from the study.

Results:There were 194 patients included in the study. Patients had a mean age of 64 ± 18 and a mean ISS of 20 ± 13. 63% of the patients had chest trauma. We constructed a logistic regression analysis for mortality controlling for ISS, age, and shock (admission lactic acid) and found that using beta blockers as the initial treatment of AAD (OR .473, 95% CI .233-.960, p=.038) was protective compared to other classes of agents. The recurrence of atrial fibrillation was also significantly higher when comparing beta blockers to calcium channel blockers (21% vs 48%, p=0.015) and equivalent when comparing beta blockers to amiodarone (21% vs. 32%, p=.121)

	Beta Blocker (n=82)	Calcium Channel Blocker (n=31)	Amiodarone (n=81)	p
ISS	17 (IQR 9-26)	17 (IQR 9-27)	20 (IQR 10-34)	NS
Lactic Acid	2.9 (IQR 1.5-3.4)	2.1 (IQR 1.4-2.6)	2.8 (IQR 1.8-3.9)	NS
Hospital Day AAD Occurred	2 (IQR 1-5)	3 (IQR 0-5)	3(IQR 2-6)	NS
Mortality	21.0%	32.3%	42.0%	<0.05*
NS: all comparisons among groups are non-significant; *comparisons among groups are significant with p-value <0.05				

Conclusion:These data suggest that beta blockers should be the initial agent chosen to control AAD in the trauma population. Use of beta blockade is shown to be as effective or better in controlling atrial fibrillation than other agents. The use of beta blocker as the initial agent is associated with a decreased mortality in both univariate and multivariate analysis.

NOTES

FRIDAY, SEPTEMBER 20, 2013 7:30 AM – 8:00 AM

SESSION XI: MASTER SURGEON LECTURE III

LOCATION: CONTINENTAL BALLROOMS 4/5/6

"The Acute Care Surgeon's Role in Vascular Trauma"

Kenneth L. Mattox, MD, FACS

Distinguished Service Professor
Michael E. DeBakey Department of Surgery
Baylor College of Medicine
Chief of Staff & Chief of Surgery
Ben Taub General Hospital
Houston, TX

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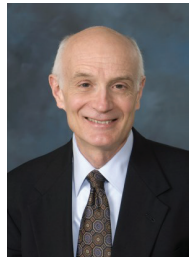
FRIDAY, SEPTEMBER 20, 2013, 8:00 AM—9:10 AM

SESSION XII:
PANEL II: USE OF ADVANCE TECHNIQUES
IN THE
ACS/TRAUMA SETTING

LOCATION: CONTINENTAL BALLROOMS 4/5/6

MODERATORS:
ROBERT C. MACKERSIE, M.D.
and
MARK MALANGONI, M.D.



John B. Holcomb, M.D.
Houston, TX

Andrew B. Peitzman, M.D.
Pittsburgh, PA

Todd Rasmussen, M.D.
Fort Detrick, MD

SESSION XIII:

QUICKSHOTS

FRIDAY, SEPTEMBER 20, 2013, 9:10 AM – 11:10 AM

CONTINENTAL BALLROOMS 4/5/6

MODERATOR: C. WILLIAM SCHWAB, M.D.

Session: XIII: Quickshots
Paper QS1: 9:10-9:16 am

DAMAGE CONTROL RESUSCITATION INCREASES THE RISK OF THROMBOTIC COMPLICATIONS IN TRAUMA PATIENTS

Jesse Bandle MD, Steven R. Shackford* MD, Jessica E. Kahl BA, Richard Y. Calvo MPH, Kimberly A. Peck* MD, Meghan C. Shackford BA, C. B. Sise MSN, Michael J. Sise* MD, Bryan S. King MD, Scripps Mercy Hospital Trauma Service

Invited Discussant: David Wisner, MD

Introduction: Damage control resuscitation (DCR) improves survival after hemorrhagic shock. However, the thrombotic complications of DCR are unknown. We evaluated the impact of DCR on the incidence of venous thromboembolic disease (VTE) in trauma patients.

Methods: DCR (administration of fresh frozen plasma [FFP], packed red blood cells [PRBC] and platelets in a fixed ratio) was implemented at our Level I trauma center in 4/2007. The records of patients admitted from 4/2007-4/2011 were reviewed. All patients received venous duplex surveillance of the lower extremities, and deep venous thrombosis (DVT) prophylaxis was administered according to American College of Chest Physician guidelines (ACCP-G). Demographics, injury data, VTE-risk factors and units of PRBC and FFP transfused within 24 hours of admission were recorded. Patients were stratified for VTE risk by ACCP-G and grouped by intent-to-treat (DCR vs. Non-DCR). Endpoints were lower-extremity DVT, symptomatic upper-extremity DVT, and symptomatic pulmonary embolus. The association of DCR and VTE was evaluated.

Results: A total of 1,838 patients were at high risk for VTE and were included for analysis. VTE and DVT events were significantly more likely in DCR patients (Table). Compared to Non-DCR, DCR patients were significantly younger, more likely to suffer blunt trauma, had a higher Injury Severity Score and lower initial systolic blood pressure. Following adjustment for these and other VTE-risk factors, DCR remained an independent predictor of VTE events (OR=1.72, 95% CI: 1.22-2.65).

	DCR (n=198)	Non-DCR (n=1640)	p
Patients with VTE	45 (23%)	166 (10%)	<0.01
Above-Knee DVT	17 (8.6%)	61 (3.7%)	<0.01
Below-Knee DVT	30 (15.2%)	109 (6.7%)	<0.01
Upper-Ext. DVT	8 (4.0%)	17 (1.0%)	<0.01
Pulmonary Embolus	2 (1.0%)	21 (1.3%)	0.731

Conclusion: DCR significantly increases the risk-adjusted rate of VTE events in trauma patients despite standard prophylaxis. The increased risk of thrombotic complications highlights the need to reserve DCR for selected patients.

NOTES

Session: XIII: Quickshots
Paper QS2: 9:16-9:22 am

BLOOD TRANSFUSION IN YOUNG WOMEN RESULTS IN EXCESS MORTALITY FOLLOWING TRAUMA

Sean F. Monaghan MD, Charles A. Adams* MD, Andrew H. Stephen MD, Michael D. Connolly MD, Shea C. Gregg MD, Stephanie N. Lueckel MD, Jason Machan Ph.D., William G. Cioffi* MD, Daithi S. Heffernan MD, Brown University Rhode Island Hospital

Invited Discussant: Laura Moore, MD

Background: Gender and sex hormones have been shown to play important roles in response to inflammatory conditions such as traumatic injuries. This is particularly important as it relates to multi-organ failure and ultimately mortality following trauma. Gender discrepancies have been described for outcomes following transfusions across several chronic medical conditions. However it is unclear how gender across a spectrum of age ranges impacts outcomes in trauma patients requiring blood transfusions.

Methods: Retrospective review of blunt trauma patients aged >/=18 years admitted to a level 1 trauma center. Charts were reviewed for age, gender, Injury Severity Score, all blood transfusions required, and outcomes including mortality. Independent models were selected both for men and women as well as with respect to total quantity of units of blood transfused and whether they received fewer than 3 units packed Red Cells (<3U) versus 3 or more units (3+U). Logistic models were used to determine risk of mortality as a function of age, sex and number of units of blood transfused.

Results: For the total population of 3,482 patients each additional unit of blood transfused was associated with an increased risk of death (OR=1.05(95%CI=1.03-1.08)). However, in a covariate model, there was a 3 way interaction between age, sex and number of units transfused indicating a synergistic relation (p=0.0148).

Comparing 3+U versus <3U in men, the risk of death remained stable over increasing age groupings: 20yr old OR=2.57 (95%CI=1.03-6.46), 30yr old OR=2.53 (95%CI=1.19-5.36), 50yr old OR=2.45 (95%CI=1.53-3.92), 70yr old OR=2.37 (95%CI=1.55-3.61) and 90yr old OR=2.29 (95%CI=1.19-4.40). However, unlike men, the risk of death comparing 3+U to <3U was dramatically elevated in younger women as compared to older women: 20yr old OR=27.4 (95%CI=7.91-94.96), 30yr old OR=18.47 (95%CI=6.57-51.92), 50yr old OR=8.33 (95%CI=4.29-16.39), 70yr old OR=3.81 (95% CI=2.25-6.42), and 90yr old OR=1.73 (95%CI=0.83-3.60). Thus with increasing age, the effect upon mortality of additional blood transfusions approached parity across genders.

Conclusions: Overall, requiring 3 or more units of blood was associated with increased risk of mortality. Whereas there was a marked gender difference in the effect of increasing blood transfusion upon mortality of younger women, this effect was no longer evident with ages above 50 years old. We postulate that estrogen mediated responses may influence the impact of blood transfusions for young female trauma patients.

NOTES

Session: XIII: Quickshots
Paper QS3: 9:22-9:28 am

SIRT-1 TARGET PROTEIN ACETYLATION IS BLUNTED BY ADMINISTRATION OF RESVERATROL FOLLOWING ISCHEMIA-REPERFUSION INJURY

Rebecca D. Powell Ph.D., Elizabeth Brandon-Warner Ph.D., Kyle J. Thompson Ph.D., Toan Huynh* MD, Iain H. Mckillop Ph.D., Susan L. Evans MD, Carolinas Medical Center

Invited Discussant: Hasan Alam, MD

Introduction: Hypoxic injury and oxidative stress associated with hemorrhagic shock and resuscitation (HSR) leads to cellular damage and multiple organ dysfunction. Sirtuin-1 (Sirt-1) is a key metabolic intermediary that regulates stress responses, inflammation, and apoptosis via acetylation/de-acetylation of transcription factors such as the inflammatory mediator, Nuclear Factor-κB (NFκB), and the apoptosis initiator, p53. Suppression of Sirt -1 activity in sepsis can be reversed with administration of the antioxidant resveratrol, a Sirt-1 agonist. The aims of this study were to determine if Sirt-1 expression is altered following HSR and if resveratrol affects Sirt-1 activity following hypoxic stress.

Methods: *In vivo:* Hemorrhagic shock was achieved in male Sprague-Dawley rats by arterial blood withdrawal to mean arterial pressure (MAP) of 25 ± 5mmHg for 1-Hr prior to resuscitation. Hepatic tissue was stained and blind scored for relative Sirt-1 expression. *In vitro:* Primary hepatocytes were isolated from male Sprague-Dawley rats (≥ 95% purity, ≈ 97% viability). Cells were allowed to adhere in culture (3-Hrs) prior to 6-Hrs hypoxia (HYP) (CO_2 ≥ 10%) in the absence or presence of resveratrol (RES; 75μM). Cell lysates were collected in RIPA buffer and immunoprecipitated (IP) using antibodies against NFκB or p53. The resulting IPs were resolved by SDS-PAGE and probed using antibodies specific against acetylated-lysine.

Results: *In vivo:* No mortality was observed in sham animals 44-Hrs post surgery (n=5). 70% of animals undergoing HSR died within 4-Hrs of resuscitation and only one animal survived to protocol end; 44-Hrs post-HSR (n=10, $p < 0.05$). Liver enzymes (ALT/AST) significantly declined in HSR animals compared to pre-hemorrhage (ALT: 534 ± 122.2 IU/L; AST: 940.4 ± 205.0 IU/L). Scoring of hepatic tissue demonstrated significantly lower Sirt-1 expression in HSR compared to Sham (1.67 ± 0.13 *vs.* 2.2 ± 0.15). *In vitro*: Analysis of NFκB and p53 acetylation demonstrated 1.4-fold increase in acetylated NFκB in HYP hepatocytes compared to CTRL, 6-Hrs post-normoxia. Conversely, HYP hepatocytes treated with resveratrol demonstrated a 65% decrease in acetylated NFκB compared to CTRL hepatocytes 6-Hrs post-normoxia. Analysis of acetylated p53 expression demonstrated a similar pattern whereby a 1.6-fold increase in acetylation was measured in HYP hepatocytes compared to CTRL, and resveratrol decreased p53 acetylation by 73% compared to basal expression.

Conclusions: Our *in vivo* studies demonstrated a marked decrease in Sirt-1 expression following HSR. Parallel analysis of hepatocytes *in vitro* showed increased NFκB and p53 acetylation under hypoxic conditions. Resveratrol pretreatment blunted acetylation to a level ≈ 4-fold lower than that measured in CTRL cells. Collectively, these data suggest Sirt-1 may act as an intermediary between early cell responses to hypoxic stress and the transition to apoptosis. Resveratrol, a Sirt-1 agonist, promoted target protein de-acetylation in response to hypoxic injury meaning Sirt-1 agonists are potential agents for therapeutic use in protecting hepatic tissue following HSR.

NOTES

Session: XIII: Quickshots
Paper QS4: 9:28-9:34 am

EXOGENOUS PHOSHATIDYLCHOLINE SUPPLEMENTATION IMPROVES INTESTINAL BARRIER DEFENSE AGAINST C. DIFFICILE TOXIN

Alicia Olson MD, David M. Liberati MS Wayne State University

Invited Discussant: Soumitra Eachempati, MD

Introduction: The incidence and severity of *Clostridium difficile (C. diff.)* colitis have increased dramatically in the last decade. Disease severity is related to *C. diff*. virulence factors, including toxins A and B, as well as the patient's immune status. In addition to antimicrobial therapy, previously described adjunctive measures include colonic flora replenishment and immune enhancing therapies. The intestinal mucus is an important component of innate barrier function in the intestine. Phosphatidylcholine (PC) is a key constituent of the intestinal mucus barrier and exogenous PC administration has had therapeutic efficacy in patients with ulcerative colitis. We studied the protective function of exogenous PC on *C. diff*. toxin effects on the intestinal barrier *in vitro*.

Methods: Mucus producing (HT29-MTX strain) and non-mucus producing (HT29 strain) intestinal epithelial monolayers were co cultured with PC and C. diff. toxin A added to the apical media. Basal chamber culture supernatants were subsequently obtained and TNF and IL-6 quantitated by ELISA. In other experiments HT29 toxin A uptake, intestinal monolayer permeability, necrosis and actin microfilament disruption were determined.

Results: (mean ± SD, N = 4 for each group)

	TNF (pg/ml)	IL-6 (pg/ml)	Toxin A(ng/ml)	Perm. (nmol/cm^2/hr)	Necrosis (MFI)
HT29 control	6.7±1.1	2.5±0.7	-----	0.34±0.012	3.8±0.2
HT29+*C.diff.*	39.8±2.5*	25.3±1.7*	98.3±7.9	0.76±0.021*	17.9±0.7*
HT29-MTX+*C.diff.*	23.3±1.5*#	11.7±1.1*#	32.8±4.0#	0.50±0.017*#	9.9±0.5*#
HT29+PC+*C.diff*	9.7±2.1#	7.6±1.5*#	25.2±1.9#	0.38± 0.021#	8.9±0.3*#
HT29-MTX+PC+*C.diff*	7.5±2.1#	6.8±0.9*#	20.4±1.1#$	0.26±0.01#$	6.7±0.3*#$

*p<0.001 vs. HT29 control, #p<0.001 vs. HT29+*C.diff*., $p<0.001 vs. HT29+PC+*C.diff*.

Integrity of HT29 cell cytoskeleton was demonstrated by both the mucus layer of the HT29-MTX strain and by exogenous PC administration by phalloidin staining of actin microfilaments.

Conclusion: PC supplementation was effective in improving barrier defense against *C. diff*. toxin A challenge. PC administration may be a useful therapeutic adjunct in severe cases of *C.diff.* colitis or in patients who do not improve with conventional treatment.

NOTES

Session: XIII: Quickshots
Paper QS5: 9:34-9:40 am

CHILDREN ARE SAFER IN STATES WITH STRICT FIREARM LAWS: A NATIONAL INPATIENT SAMPLE STUDY.

Arash Safavi MD, MHSc, Bellal Joseph MD, Randall S. Friese* MD,MPH, Viraj Pandit MD, Narong Kulvatunyou MD, Andrew L. Tang MD, Julie L. Wynne* MD, Gary A. Vercruysse* MD, Terence Okeefe* MB, ChB, Peter M. Rhee* MD, University of Arizona - Tucson

Invited Discussant: Michael Nance, MD

Introduction: Firearm control laws vary across the United States and remain state specific. The purpose of this study was to determine the relationship between variation in firearm control laws and the risk of firearm-related injuries in pediatric population. We hypothesized that strict firearm control laws impact the incidence of pediatric firearm injury.

Methods:All patients with trauma E codes and age< 18 y.o. were identified from the 2009 Nationwide Inpatient Sample. Individual States' firearm control laws were evaluated and scored based on background checks on firearm sales, permit requirements, assault weapon and large capacity magazine ban, mandatory child safety lock requirements, and regulations regarding firearms in college and work places. States were then dichotomized into Strict firearm laws [SFL] or Non-strict firearm laws [Non-SFL] state based on median total score. Primary outcome measure was incidence of firearm injury. Data was compared between two groups using simple linear regression analysis.

Results:60,224 pediatric patients with trauma related injuries across 44 states were included. 33 states were categorized as Non-SFL and 11 as SFL. 286 (0.5%) cases had firearm injuries of which 31 were self-inflicted. Mean firearm injury rates per 1000 trauma patients were compared between 2 groups (SFL: 2.2±1.6, Non-SFL: 5.9±5.6; P=0. 001). Being in a Non-SFL state increased the mean firearm injury rate by 3.75 (Beta coefficient: 3.75, 95% CI: 0.25- 7.25; P=0.036)

Conclusion:Children living in States with SFL are safer. Efforts to decrease pediatric firearm injuries by improving and standardizing national firearm control laws are warranted.

NOTES

Session: XIII: Quickshots
Paper QS6: 9:40-9:46 am

TRAUMATIC BRAIN INJURY AND BETA-BLOCKERS: NOT ALL DRUGS ARE CREATED EQUAL

Thomas J. Schroeppel* MD, John P. Sharpe MD, Louis J. Magnotti* MD, Lesley P. Clement PharmD, Jordan A. Weinberg* MD, Martin A. Croce* MD, Timothy C. Fabian* MD, University of Tennessee Health Science Center - Memphis

Invited Discussant: Eric Ley, MD

Introduction: Catecholamine surge following traumatic brain injury (TBI) contributes to increased morbidity and mortality. While multiple studies have shown a protective effect of *beta*-adrenergic blockade in TBI, no studies have focused on the most effective drug. We hypothesize that propranolol (PRO) is the best *beta*-blocker (BB) due to its lipophilic properties allowing it to cross the blood brain barrier with central and peripheral *beta*-adrenergic blockade.

Methods: The trauma registry at an urban level-one trauma center was queried for TBI from 1/1/08 to 12/31/11. Patients who received > 1 dose BB were identified after excluding deaths within 48 hours and head abbreviated injury score (Head AIS) < 3 and >5. PRO was then compared to other BB. Multivariable logistic regression analysis was used to adjust for age, admission heart rate, base deficit (BD), transfusions, admission Glasgow Coma Score (ADM GCS), and injury severity score (ISS) to determine whether receiving PRO was protective in patients sustaining TBI.

Results: 1825 patients were admitted with TBI during the study period. 619 (34%) received BB and 79 received PRO. PRO patients were younger (31 vs. 53 yrs, $p<0.001$), but had more severe injury (ISS 33 vs. 28, $p<0.001$), more severe TBI (Head AIS 5 vs. 4, $p<0.001$; ADM GCS 6 vs. 10, $p<0.001$), and higher level of shock on presentation (BD 4.8 vs. 3.2 mmol/L, $p=0.013$; transfusions 3 vs. 2 units, $p=0.05$). Despite being more injured, mortality was lower in the PRO group (3% vs. 14%, $p=0.002$). Stepwise backward multivariable logistic regression analysis identified PRO as protective in TBI (OR 0.203, CI 0.047-0.881), reducing mortality by 80% (independent predictors are listed in table).

	Adjusted OR	CI	*p*
Propranolol	0.203	0.047-0.881	0.03
Age	1.030	1.016-1.045	<0.001
ADM GCS	0.891	0.846-0.937	<0.001

Conclusions: PRO was associated with significant reduction in mortality in patients with moderate to severe head injury. This inexpensive drug and simple intervention may have profound effects in patients with severe, but salvageable TBI. Further prospective study is warranted.

NOTES

Session: XIII: Quickshots
Paper QS7: 9:46-9:52 am

THE ROLE OF THYROXINE INFUSION IN PATIENTS WITH NONSURVIVABLE BRAIN INJURY FOR HEMODYNAMIC STABILIZATION PRIOR TO THE DECLARATION OF BRAIN DEATH

Meghann L. Kaiser MD, Konstatinos Chouliaras MD, Kenji Inaba* MD, Joseph Dubose* MD, LAC+USC Medical Center

Invited Discussant: Darren Malinoski, MD

Introduction: Thyroxine (T4) infusions are commonly used to maintain organ perfusion in brain dead donors and are associated with improved organ procurement. However, benefits in patients with nonsurvivable brain injury prior to the declaration of brain death have not been well-established. These patients are prone to hemodynamic instability, which may delay completion of clinical brain death exams and even prompt code team activations, thus consuming hospital resources. Such instability may be taxing to family members attempting to make decisions during a difficult time and, importantly, compromise the perfusion of organs that may subsequently be considered for donation. We hypothesized that T4 in patients with nonsurvivable brain injury, prior to brain death declaration, may facilitate the diagnosis of brain death and optimize the potential for organ donation by fostering hemodynamic stabilization.

Methods: This was a retrospective review at an urban, Level-I trauma center over a 5 yr period (9/1/07 – 8/31/12). We included trauma patients with head and neck Abbreviated Injury Score (HNAIS) $\geq$3 who expired 48 hrs to 3 weeks from admission and required a vasopressor or inotrope at any point prior to the declaration of brain or cardiac death (whichever preceded). We excluded patients with evidence of sepsis or hemorrhage outside the first 48 hrs. Primary endpoint was declaration of brain death. Potential risk factors (RF) analyzed included T4 infusion, steroids, age, injury severity score (ISS), Glasgow Coma Scale (GCS) at time of presentation, evidence of shock at time of presentation (including systolic blood pressure, lactate at arrival, and transfusion in trauma bay), neurosurgical interventions and extent of resuscitation (including lactate within 2 hrs of death and net fluid balance at time of death). T4 was administered at the discretion of the treating clinician.

Results: 135 pts were included. Mean age was 46.1$\pm$22.1 yrs. 30(22.2%) suffered penetrating mechanism. 100 (74%) were declared brain dead. Mean ISS was 31.7$\pm$10.8; 127 pts (94%) had HNAIS$\geq$5. Mean GCS at presentation was 5.2$\pm$3.9. 96 pts (71.9%) required 2 or more pressors or inotropes simultaneously, and 23 experienced $\geq$1 code event. 88 pts (65.2%) received T4.

On binary logistic regression, T4 was the only independent predictor of brain death declaration (O.R. 4.13, p=0.012), and was associated with significantly decreased time to declaration or cardiac death (5.56 vs. 2.74 days, p=0.012). Significantly fewer T4 pts experienced a fatal code event (4.5% vs. 17%, p=0.015), and significantly fewer required norepinephrine, phenylephrine or dopamine infusions.

Conclusions: T4 infusions may hemodynamically stabilize patients with nonsurvivable brain injury, thereby allowing definitive and earlier clinical brain death declaration. Such a benefit would conserve hospital resources, provide closure to grieving families, and potentially increase organ donation.

NOTES

Session: XIII: Quickshots
Paper QS8: 9:52-9:58 am

THE EFFECT OF AGE ON GLASGOW COMA SCALE IN PATIENTS WITH TRAUMATIC BRAIN INJURY

Kristin M. Salottolo MPH, Andrew S. Levy MD, Denetta S. Slone* MD, Charles W. Mains MD, David Bar-Or MD, St. Anthony Hospital

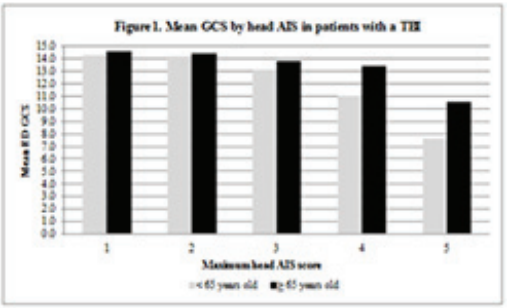
Invited Discussant: Joseph Minei, MD

Introduction: The Glasgow Coma Scale (GCS) is frequently used to define severity of neurologic injury in patients with a traumatic brain injury (TBI). It is unknown whether age affects the predictive ability of GCS for anatomic severity of TBI. Because confusional states are increasingly common with age, we hypothesized that elderly TBI patients would have a worse (lower) GCS compared to younger patients with similar TBI severity.

Methods: We examined all patients with a TBI, defined as head abbreviated injury scale (AIS) ≥ 1, admitted during 2007–2012 at two level 1 trauma centers. Student's t-tests were used to examine the mean ED GCS at each maximum head AIS score, stratified by age (< 65 vs ≥ 65). GCS components (eye, verbal, motor) and ICD9 diagnosis codes were also examined.

Results: There were 8,629 patients identified with a TBI. Compared to younger adults, elderly TBI patients had more major TBI (AIS ≥ 3: 39.3% vs 56.0%, $p < 0.001$). At the highest head AIS 5, the majority of elderly patients had a mild neurologic deficit (GCS 13-15, 55.4%), whereas the majority of younger patients had a severe neurologic deficit (GCS 3-8, 61.9%). Further, at every head AIS score, the mean GCS was significantly better for elderly vs. younger TBI patients, particularly with worse anatomic injuries: AIS 4, 13.4 vs 11.0; AIS 5, 10.6 vs 7.6, figure 1. These findings persisted for the subset of patients with an isolated TBI, and patients who suffered a fall cause of injury. There was not a particular GCS component that accounted for the observed differences, while diagnoses of subdural hematoma or subarachnoid hemorrhage showed significant differences in mean GCS, by age.

Conclusions: Age affects the relationship between anatomic severity and GCS in the TBI population. Contrary to our hypothesis, elderly TBI patients have higher GCS scores than younger TBI patients at each level of head AIS. Either elderly patients have a blunted or delayed clinical response to the injury than younger TBI patients, they tolerate equivalent injuries better, or the head AIS overestimates the severity of injury in elderly patients. These findings have implications for TBI outcomes research as well as protocols and research study selection criteria which utilize GCS. The results may also help explain why research in the mild TBI population (GCS 13-15) consistently shows more surgical interventions and worse mortality and functional status for elderly patients than their younger counterparts.



NOTES

Session: XIII: Quickshots
Paper QS9: 9:58-10:04 am

BLOOD COMPONENT TRANSFUSION INCREASES RISK OF DEATH IN CHILDREN WITH TRAUMATIC BRAIN INJURY

Shannon Acker MD, David A. Partrick* MD, James Ross BS, Michael Bronsert Ph.D., Denis Bensard* MD, University of Colorado Denver

Invited Discussant: David Notrica, MD

Introduction: Blood transfusion has been associated with worse outcomes in adult trauma patients, including those with severe traumatic brain injury (TBI). However, the effects of blood transfusion in injured children have not been evaluated. We hypothesize that blood transfusion is also associated with worse outcomes in children with TBI.
Methods: A retrospective review of the trauma database at a level one pediatric trauma center was performed. All children age 18 years old and under with a diagnosis of TBI between 2002 and 2012 were included. Exclusion criteria include those who underwent craniotomy in order to eliminate possible confounding factors of intraoperative blood loss. A policy of restricted transfusion was not in place during this time. Data collected include age, sex, injury severity score (ISS), GCS on presentation, cause of injury, number and type of transfusions, infectious complications, and outcome. Univariate and multivariate analysis were performed.
Results: A total of 1602 children with TBI who did not undergo craniotomy were identified (average age 5.6 (±5.1) years; 65% male). The most common causes of injury include abusive head trauma (AHT) (N= 378, 23%), fall (N=345, 22%), and motor vehicle crash (N=264, 16%). Mean injury severity score (ISS) was 18.7 (±11.3); mean GCS on presentation was 11.9 (±4.4). A total of 271 (17%) patients received a blood component transfusion; 249 received pack red blood cells (PRBCs), 101 received fresh frozen plasma (FFP), 23 received platelets, and 17 received cryoprecipitate. Data are presented in Table 1. After controlling for age, sex, ISS, and GCS on presentation, patients who received any blood product transfusion had an increased risk of dying, being dependent on caretakers at follow up, and requiring an ICU stay. They also had an increased risk of developing the following infectious complications: positive blood culture, pneumonia, and urinary tract infection (UTI).

Table 1	No Transfusion (N=1331)	Any Transfusion (N = 271)	OR	95% CI	P value
Survival to hospital discharge	1298 (81%)	176 (65%)	4.2	2.4-7.3	<0.0001
Discharge to rehab	126 (8%)	92 (33%)	1.5	1.0-2.3	0.05
Dependece on caretakers	74 (5%)	58 (21%)	4	2.3-6.7	<0.0001
ICU stay	863 (5%)	236 (87%)	3.2	1.9-5.3	<0.0001
Infectious complications:					
Positive blood culture	3 (0%)	9 (3%)	7.7	1.3-44.5	0.02
Pneumonia	18 (1%)	28 (10%)	2.5	1.2-5.4	0.01
UTI	7 (0%)	15 (6%)	7.7	2.3-25.5	<0.001
Sepsis	1 (0%)	4 (1%)	13.4	0.8-228.2	0.07

Conclusion: Pediatric patients sustaining traumatic brain injury who receive a blood product transfusion and do not require operative interventions have worse outcomes compared to patients who do not receive a transfusion. This includes an increased risk of death. These data suggest that a restrictive transfusion policy in injured children with TBI may be beneficial.

NOTES

Session: XIII: Quickshots
Paper QS10: 10:04-10:10 am

WHEN BIRDS CAN'T FLY: AN ANALYIS OF ADVANCED LIFE SUPPORT GROUND TRANSPORT WHEN HELICOPTER EMERGENCY MEDICAL SERVICE (HEMS) IS UNAVAILABLE

Eric A. Toschlog* MD, Brett H. Waibel* MD, Gregory M. Borst MD, David J. Skarupa MD, Nathaniel R. Poulin MD, Mark A. Newell* MD, Michael R. Bard* MD, Claudia E. Goettler* MD, Michael F. Rotondo* MD, The Brody School Of Medicine At East Carolina University

Invited Discussant: Dennis Ashley, MD

Introduction: HEMS transport of trauma patients is costly and of unproven benefit. Recent retrospective studies are limited by comparison of non-similar groups, failing to control for crew expertise. Prior studies may therefore represent comparisons of highly-trained ALS versus less-trained BLS crews. The purpose of our study was to compare HEMS to GND transport controlling for crew training.
Methods: Our NTRACS database was queried to identify consecutive hospital transfers (1/1/08-11/1/12) to our ACS Level I center. Utilizing an HEMS database, the transfers were divided into two groups, those transported by HEMS, and those for whom HEMS was requested but were transported by ground (GND) due to weather or lack of HEMS availability. HEMS and GND cohorts included only transports by an ALS crew. Cohorts were compared across standard demographic and clinical variables using univariate analysis. Multivariate logistical regression was performed to determine the relationship of these variables to mortality.
Results: On univariate analysis, the HEMS (n=2,190) and GND (n=226) cohorts were well-matched; no significant differences were noted for demographics, mechanism of injury, injury severity (14.6±10.6 vs. 14.0±9.5), RTS (9.5±3.6 vs. 9.6±3.6), length of stay, or complications. Mean time from injury to definitive care was significantly lower for HEMS (203±177 minutes vs. 293±158, $p < 0.001$). Mortality was not different between HEMS and GND (9.0% vs. 8.0% $p = 0.713$). Multivariate regression analysis identified no relationship between transport mode and mortality. When transport mode was added to the mortality model, the p value was 0.772.
Conclusions: Despite significantly faster transport times, HEMS offers no mortality benefit versus GND when crew expertise is similar, contradicting recent large, retrospective National Trauma Databank studies failing to control for crew training. Given the entrenched status of HEMS, our methodology, focusing on patients that a referring provider deemed worthy of HEMS, may represent the best possible approximation of a prospective study. Although HEMS may seem intuitively beneficial for time-dependent injuries, larger studies with a similar methodology are warranted to justify the cost and risk of HEMS, and to identify subsets of patients who may truly benefit.

Mortality Multivariate Logistic Model				
	p	Adjusted Odds Ratio	95% C.I.	
			Lower	Upper
Cube of Age	< 0.001	1.00000575	1.000005	1.000007
Square Root of ISS	< 0.001	2.313	1.961	2.728
Revised Trauma Score	0.001	0.817	0.724	0.922
Temperature	< 0.001	0.836	0.76	0.921
Penetrating Injury	0.006	2.005	1.218	3.301
Advanced Airway	0.03	3.075	1.117	8.46
Pneumonia	0.001	0.331	0.172	0.636
Urinary Tract Infection	0.037	0.302	0.098	0.932
Acute Renal Failure	0.009	14.733	1.932	112.323

NOTES

Session: XIII: Quickshots
Paper QS11: 10:10-10:16 am

A CONCLUDING AFTER ACTION REPORT OF THE SENIOR VISITING SURGEON PROGRAM WITH THE UNITED STATES MILITARY AT LANDSTUHL REGIONAL MEDICAL CENTER, GERMANY

M. Margaret Knudson* MD, Todd E. Rasmussen* MD, Thomas W. Evans Jr., BS, David L. Gillespie MD, Kenneth J. Cherry Jr., MD, University of California, San Francisco

Invited Discussant: Donald Jenkins, MD

Introduction: The Senior Visiting Surgeons Program was developed to build military-civilian collaboration during the wars in Iraq and Afghanistan. The purpose of this study was to evaluate the program with the hypothesis that key elements of success could be identified as well as factors essential for sustainment and readiness during peacetime.

Methods: A survey designed by members of the AAST Military Liaison Committee was distributed electronically to 192 surgeons who participated in the program at Landstuhl Regional Medical Center, Germany (LRMC) between the years 2005-2012. LRMC has been the US military's level IV hospital for service members injured over the decade of war. The survey included multiple choice and open-ended questions regarding clinical, research and mentoring experiences during the 2-week rotation.

Results: The response rate was 61% with the largest number of respondents being vascular surgeons. Among respondents, 24% had prior military service and 22% rotated through LRMC more than one time (range 1-5 tours). Overall, 76% rated the experience as extremely satisfying. On average, senior visiting surgeons participated in 2-5 operative cases per week a number which varied with operational tempo. The majority of operations were directed at wound and burn care, followed by abdominal and vascular procedures. Over 60% of visiting surgeons felt that their time in the intensive care unit was most valuable and 16% collaborated in research resulting in a number of published manuscripts. The military Clinical Practice Guidelines found to be most translatable to civilian practice included management of complex wounds and prophylaxis for venous thromboembolism. Half of the surgeons maintained contact with military colleagues over the ensuing year.An overwhelming majority (94%) support continuation of the program at US military bases and 86% which would welcome military surgical residents into their civilian training programs.

Conclusions: This report codifies the most prolonged civilian-military wartime surgical collaboration in US history. Visiting civilian surgeons were honored to be allowed to participate in the care of wounded warriors, filled occasional gaps in surgical care and provided important mentorship. Continuation of key elements of this program including shared research platforms, cross-training between military and civilian surgical programs, and the evolution of practice management guidelines for the critically injured will assure the sustainability of this successful program during inter-war periods

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Session: XIII: Quickshots
Paper QS12: 10:16-10:22 am

CLEARED FOR TAKEOFF: THE EFFECTS OF HYPOBARIC CONDITIONS ON TRAUMATIC PNEMOTHORACES

Sarah Majercik MBA,MD, Steven R. Granger MD, Mark H. Stevens MD, Thomas W. White MD, Donald H. Van Boerum MD, William Beninati MD, Joseph Bledsoe MD, Lindell Weaver MD, Intermountain Medical Center

Invited Discussant: Erik Barquist, MD

Introduction: Current medical guidelines suggest that traumatic pneumothorax (PTX) is an absolute contraindication to commercial airline travel and patients should wait at least two weeks after radiographic resolution of their PTX to fly. This recommendation is rather arbitrary, and not based on prospective, physiologic study. We hypothesized that despite having a radiographic increase in pneumothorax size while at increased altitude, patients would not exhibit any adverse physiologic changes nor report any subjective symptoms of cardiorespiratory compromise.

Methods: Prospective, observational study of 10 patients with a traumatic PTX that had been treated, either by chest tube (CT) or high flow oxygen therapy. CT must have been removed within 24 hours of entering the study. Subjects were acutely exposed to 2 hours of hypobaria (554mm Hg) in a chamber simulating an altitude of 8400 feet, similar to a pressurized commercial airline cabin during flight. A trauma service clinician with a CT kit and a radiologic technologist were in the chamber with the subject. Vital signs including oxygen saturation and subjective symptoms were recorded every 10 minutes during the "flight". After 2 hours, while still at simulated altitude, a portable CXR was obtained. This CXR was compared to a pre-"flight" CXR, and the difference in PTX size was measured.

Results: 10 subjects successfully completed the 2 hour flight. 9 (90%) were male. Mean age was 56±5 years. Mean ISS was 10.5±1.4. 6 (60%) had a CT to treat PTX. In those with a CT, it had been removed a mean of 17 (range 4-21) hours prior to beginning the study. No subject complained of any cardiorespiratory symptoms while at simulated altitude. Average radiographic increase in PTX size at altitude was 6.3mm (26%) from pre-flight CXR. No subject developed a tension PTX. No subject required any procedural intervention during the flight, or immediately after.

Conclusion: : Patients with traumatic PTX have a small increase in the size of PTX when subjected to simulated altitude. This appears to be clinically well-tolerated, however. Current prohibitions regarding air travel following traumatic PTX should be reconsidered and further studied.

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Session: XIII: Quickshots
Paper QS13: 10:22-10:28 am

COMPLETE ULTRASONOGRAPHY OF TRAUMA (CUST) IN SELECTED BLUNT TRAUMA PATIENT IS AN EQUIVELANT SCREENING EXAM TO COMPUER TOMOGRAPHY AND IS ASSOCIATED WITH REDUCED RADIATION EXPOSURE AND INCREASED COST SAVINGS

Zia A. Dehqanzada MD, Quinn Meisinger MD, Jay Doucet* MD, Alan Smith MPH,Ph.D., Giovanna Casola MD, Raul Coimbra* MD,Ph.D., University Of California San Diego

Invited Discussant: Jason Sperry, MD, MPH

Introduction: Many major trauma victims undergo routine screening CT scan examinations to rule out blunt abdominal trauma (BAT). Increasing costs and radiation exposure have heightened concerns for this practice. We sought to demonstrate that in a select group of BAT patients, our protocol for Complete Ultrasonography of Trauma (CUST) is equivalent to routine CT imaging but associated with significantly decreased radiation exposure and cost.

Methods: A retrospective analysis of patients screened for BAT from 2000 – 2011 in a level-1 trauma center was performed. CUST was performed by experienced sonographers using our previously published protocol. Interpretations were performed by attending radiologists. CUST was available from 0800 – 2300 daily. Between 2300 and 0800, routine abdominal CT was used (CT). Decision to perform CT or CUST between 0800 and 2300 hours was at the discretion of the attending trauma surgeon based on clinical exam and associated injuries. False negatives (FN) were described as either negative CUST or CT imaging which later required a laparotomy, (FN-CUST or FN-CT, respectively). Demographics and outcome data were compared. Mean Medicare rates were used to compare costs. Prior published data for radiation exposure per abdominal CT scan examination was used for estimation of radiation exposure savings.

Results: There were 19,128 patients screened for BAT. 12,565 (61%) patients underwent initial CUST and 8,057 underwent routine initial CT. 385 of the 493 positive CUST patients and 1,119 of the 12,070 negative CUST patients underwent subsequent CT. A total of 11068 patients (58% of the total BT patients) avoided a CT, yielding an estimated savings of $5.5 million and 188,156 mSv less in radiation dose exposure. Compared to the CT group, patients undergoing CUST had lower ISS (8.1 vs. 9.6, $p < 0.001$), were older (44.7 vs. 35.2, $p < 0.001$), had lower Abdominal AIS (2.0% vs. 3.6%, $p < 0.001$) less hollow viscus injury (0.4% vs. 0.8%, $p = 0.002$), and less traumatic brain injury (61.4% vs. 69.3%, $p < 0.001$). Mortality was higher in the CUST group (1.8% vs. 1.2%, $p = 0.02$) but it is insignificant when adjusted for age >65 (1.1% vs. 0.9%, $p = 0.02$) or head injury (0.6% and 0.3%, $p = 0.4$). FN-CUST and FN-CT were both 1% of the images performed. ICU length of stay (20.8 vs. 20.6, p=NS), ventilator days (15.6 vs. 14.9, p =NS), hollow viscus injury rates (8.8% vs. 5.6%, p =NS) and mortality (6.6% vs. 5.6%, p =NS) were similar for FN-CUST and FN-CT, respectively. Sensitivity, specificity, positive predictive value and negative predictive value of CUST were 46%, 97%, 24% and 99%, respectively.

Conclusion: A surgeon-directed CUST protocol is equivalent to routine CT for blunt abdominal injury screening, but leads to 42% less radiation exposure and over $500,000 savings per year.

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Session: XIII: Quickshots
Paper QS14: 10:28-10:34 am

PAN CT VERSUS SELECTIVE CT IN BLUNT TRAUMA: A COST-UTILITY ANALYSIS

Wayne S. Lee MD, Nancy A. Parks MD, Arturo Garcia MD, Barnard J. Palmer MD, M.Ed., Terrence H. Liu MD,MPH, Gregory P. Victorino* MD, University of California San Francisco - East Bay

Invited Discussant: Samir Fakhry, MD

Introduction: Pan CT (PCT) of the head, c-spine, chest, abdomen, and pelvis is a beneficial approach to the initial evaluation of severely injured blunt trauma patients. PCT is also widely used in patients with lower injury severity, however the cost to benefit ratio is unknown. The advantage of rapidly identifying nearly all injuries must be weighed against the risk of radiation-induced cancer. Our goal is to determine the cost utility of PCT in blunt trauma patients with low injury severity. We hypothesize that PCT is cost effective.

Methods: This is a Markov model based, cost-utility analysis of a hypothetical cohort of hemodynamically stable, 30 year-old males after motor vehicle crash. The model compared PCT to selective CT scans (SCT); indication for CT was mechanism of injury. The analysis was over a one year time frame with an analytical horizon including the lifespan of the patients. The probability of possible outcomes, utilities of health states, and health care costs including radiation-induced cancer (Table 1) were derived from reviews of the medical literature and public data. Costs were measured in U.S. 2010 dollars and incremental effectiveness was measured in quality adjusted life-years (QALYs), both calculated at a 3% annual discounted rate. Multi-way sensitivity analyses were performed on all variables.

Results: The total cost for blunt trauma patients undergoing PCT is $15,668 vs. $17,212 for SCT. There is no significant difference in QALYs between the two groups (26.42 vs. 26.40). There is a cost savings of $59 per QALY in patients receiving PCT vs. SCT ($593/QALY vs. $652/QALY). Sensitivity analyses never reached threshold with any variable, but approached threshold when the cost of SCT and the cost of observation for patients with a negative SCT were minimized.

Table 1: Costs and Utilities (US 2010 dollars)

Parameters	**Total Cost**	**First Year Utility**
ED Discharge After Negative PCT	$13,293	0.99
Observation after Negative SCT	$14,507	0.95
Routine Trauma Admission	$16,304	0.82
Non-Critical Occult Injury	$28,530	0.78
Critical Occult Injury	$44,929	0.75
Radiation-Induced Cancer	$337,847	0.72

Conclusions: PCT enables surgeons to identify, and rule out, injuries promptly - thereby reducing the need for inpatient observation. Additionally, the risk of radiation-induced cancer is low following a single PCT. This cost-utility analysis finds PCT based on mechanism, with early discharge of the uninjured, is an effective utilization of limited health care resources.

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Session: XIII: Quickshots
Paper QS15: 10:34-10:40 am

OUTCOMES OF ABDOMINAL TRAUMA PATIENTS WITH HEMORRHAGIC SHOCK REQUIRING AN EMERGENCY LAPAROTOMY: EFFICACY OF INTRA-AORTIC BALLOON OCCLUSION

KOSEI KUNITATSU MD, Kentaro Ueda MD,Ph.D., Yasuhiro Iwasaki MD, Shinji Yamazoe MD, Yu Kawazoe MD, Syuji Kawashima MD, Takafumi Yonemitsu MD, Seiya Kato MD,Ph.D., Department Of Emergency And Critical Care Medicine, Wakayama Medical University

Invited Discussant: Joseph Rappold, MD

Introduction: The aims of this study were to investigate outcomes of abdominal trauma patients with hemorrhagic shock requiring an emergency laparotomy, and to clarify the beneficial effects of intra-aortic balloon occlusion (IABO) in intra-abdominal hemorrhage for patients with critically uncontrollable hemorrhagic shock (CUHS).

Methods: We reviewed 44 patients with hemorrhagic shock who underwent an emergency laparotomy for intra-abdominal hemorrhage between January 2007 and December 2012. Of these patients, we examined the data on 19 patients who underwent IABO using the percutaneous occlusion balloon catheter purchased from SENKO MEDICAL INSTRUMENT Mfg. Co., Ltd. Japan during initial resuscitation to control massive intra-abdominal bleeding leading to CUHS.

Results: The average Injury Severity Score (ISS) and Probability of survival (Ps) of the 44 patients were 27.6 ± 15.4 and 0.735 ± 0.304, and the overall survival rate was 77.3%. Two of the patients had a possibly preventable trauma-related death. Thirty-one of these patients (70.5%) had already been in vital shock when they arrived at the emergency room, while 13 of them (29.5%) went into vital shock during the early medical examination and treatment. The average time from the onset of vital shock to laparotomy was 88 ± 39 min. The difference in the lactate level (5.1 ± 4.1 mmol/L) and body temperature (36.1 ± 1.2 C) between the two groups (survival or expired) was statistically significant ($P < 0.05$). Furthermore, 23 patients had CUHS, and the survival rate of those patients was 60.9%, which was significantly poorer than that (95.2%) of 21 patients without CUHS ($P = 0.0102$). IABO was attempted in 19 of 23 patients (82.6%) with CUHS, and in all patients, these balloons were successfully placed in 8.1 ± 3.3 minutes in thoracic aorta, and a significant increase in systolic blood pressure was observed immediately after IABO. We could repeat the inflation/deflation of balloons or perform 1/3~2/3 inflation to shorten the total occlusion time, and therefore, we could perform the operation while ensuring stable conditions. Nevertheless, seven of the 19 patients (36.8%) died; five due to progressive intra-abdominal hemorrhagic shock after the operation and two because of brain edema or heart injury.

Conclusion: The IABO procedure can be life-saving during the management of patients with CUHS arising from intra-abdominal hemorrhage, permitting transport to surgery. However, the decision to perform such treatment (IABO and laparotomy) must be made as quickly as possible after trauma to reduce the duration of occlusion.

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Session: XIII: Quickshots
Paper QS16: 10:40-10:46 am

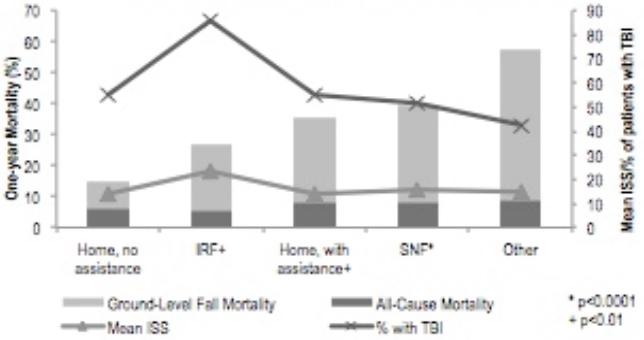
LONG-TERM OUTCOMES OF GROUND-LEVEL FALLS IN THE ELDERLY

Lisa McIntyre MD, Christopher Mack M.S., Patricia Ayoung-Chee MD,MPH, Beth Ebel MD, Wayne McCormick MD, Ronald V. Maier* MD, Harborview Medical Center

Invited Discussant: Clay Cothren Burlew, MD

INTRODUCTION: For older adults, even ground-level falls (GLF) can result in multiple injuries and are associated with significant morbidity and mortality. Previous studies have focused on in-hospital outcomes and patients with isolated injuries. Our study examines outcomes following discharge for older adults who were hospitalized following a GLF. **METHODS:** Retrospective cohort study of patients > 65 years old admitted to a Level I trauma center, from 2005 to 2008, after a GLF. Hospital trauma registry data were linked to state hospital discharge data and the death certificate registry. Skilled nursing facilities (SNF) were contacted to verify ultimate patient placement, with follow-up through December 2010. Kaplan-Maier and Cox proportional hazards models were used to analyze post-discharge mortality. **RESULTS:** There were 1,352 consecutive admissions; 48% had an ISS > 15 and 12% died during admission. Of the patients who survived hospitalization, 51% were discharged to SNF, 33% to home without assist, 6% to home with assist and 5% to inpatient rehabilitation facilities (IRF). Within one year of injury, 31% of patients were readmitted. The one-year mortality for this cohort of was 33%, significantly greater than age- and sex-matched all-cause mortality (Figure 1). After adjusting for confounders, patients

Figure 1. Ground-Level Fall vs All-Cause One-Year Mortality, age- and gender-adjusted, based on Washington State Population



discharged to SNF had a three-fold greater risk of one-year mortality (HR 2.63;CI 2.01-3.43), compared to patients discharged home without assist. Patients discharged home with assist also had a significantly higher risk of mortality (HR 1.75;CI 1.14-2.67), but patients discharged to IRF did not (HR 1.02;CI 0.53-1.99). Of the patients discharged to SNF, 48% died by the end of the follow-up period and 61% of these died while residing at a SNF. **CONCLUSION:** Ground-level falls in the elderly result in severe injury, readmissions and increased mortality, both in-hospital and post-discharge. One-third of patients were discharged home to independent living, despite having a moderate injury severity and high proportion of TBI. Although less severely injured than those discharged to IRF, patients discharged to SNF or home with assist were more likely to die during the year following injury. Future efforts should examine modification of criteria for post-discharge options in improving outcomes and their cost effectiveness.

NOTES

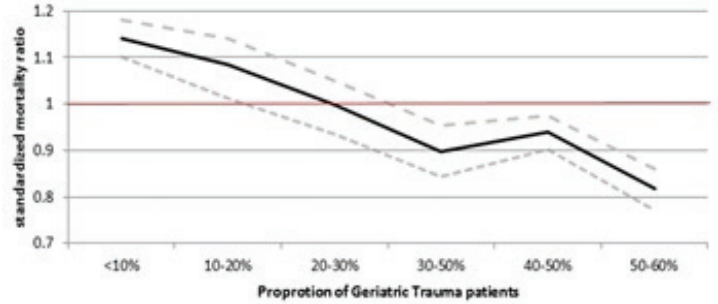
Session: XIII: Quickshots
Paper QS17: 10:46-10:52 am

COSTS AND OUTCOMES OF TRAUMA CARE AT CENTERS TREATING A HIGHER PROPORTION OF OLDER PATIENTS: THE CASE FOR GERIATRIC TRAUMA CENTERS

Syed Nabeel Zafar MD,MPH, Augustine Obirieze MD,MPH, Eric Schneider Ph.D., Valerie K. Scott BS, David T. Efron* MD, Wendy R. Greene MD, Zain G. Hashmi MD, Ellen MacKenzie Ph.D., Edward E. Cornwell* MD, Adil Haider* MD, Howard University Hosptial

Invited Discussant: Marc de Moya, MD

Introduction: The burden of injury among older patients continues to grow. Trauma management and outcomes are known to differ between old and young patients. Our objective is to determine if older trauma patients have better outcomes at centers with higher volumes of older trauma patients and whether cost of trauma care for the elderly varies by volume of older patients treated at a center. **Methods:** We analyzed level 1 and 2 trauma centers contributing to the 2007-2010 National Trauma Databank (NTDB) with at least 500 trauma admissions per year. Patients were grouped as older (O, >=65 yrs) and younger adults (Y, 16-64 yrs). Multivariate logistic regression was performed to determine differences in demographics/ injury severity, and coarsened exact matching was used to determine differences in mortality between older (O) and younger (Y) adults. Trauma centers were then categorized by the proportion of older trauma patients seen and hierarchical modeling techniques were applied to determine differences in outcome by proportion of O patients. Risk adjusted Observed to Expected mortality ratios were calculated and plotted against proportion of O trauma patients. Using the Nationwide Inpatient Sample (NIS) generalized linear modeling with a log link and gamma distribution was used to determine adjusted cost differences for O patients across trauma centers by proportion of O trauma patients seen. **Results:** Older patients accounted for 24% of trauma visits. Numerous independent differences between O and Y trauma were identified. Matched analysis revealed that O trauma patients were 6.2 (5.79-6.57) times more likely to die than similarly injured Y patients. Older patients presenting at centers that treat a high proportion of elder trauma were 24% less likely to die than those presenting at lower proportion centers (OR= 0.76, 95% CI: 0.56-0.97) (figure 1). Additionally the average cost of care for O trauma patients was lower by 11% or $2,650 ($2,630-2,672) per patient at centers that saw a high proportion of O trauma when compared with low proportion centers (OR= 0.89, 0.886- 0.895)**Conclusions:** Geriatric trauma patients treated at centers with a higher proportion of older patients have improved outcomes and incur lower costs. This evidence supports the notion of older trauma patients receiving care at trauma centers specialized in care for older patients.



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Session: XIII: Quickshots
Paper QS18: 10:52-10:58 am

Hospital Readmission to an Academic Level I Trauma Center Within 30 Days of Discharge

Leonard M. Copertino MD, Jane E. McCormack BSN, Emily C. Huang MS, Marc J. Shapiro* MD, FACS, James A. Vosswinkel MD, State University Of New York At Stony Brook

Invited Discussant: John Fildes, MD

Introduction: Readmission to the hospital within 30 days of discharge is a costly event. Recent changes for reimbursement from Centers for Medicare and Medicaid Services (CMS) makes avoiding readmission within 30 days of discharge a top priority for all institutions. Studies published in the literature have shown readmission rates for medical and surgical patients may occur as high as 20 percent. However, there are only limited reports addressing the trauma population specifically. Our goal was to examine the readmission rates, reasons, and processes at an academic Level 1 trauma center.

Methods: Readmissions within 30 days of hospital discharge after trauma were tracked by nurse registrars and entered into the Trauma Registry. Dates of admission, discharge, diagnosis, procedure codes, and admitting service were reported and linked to the trauma registry record for the original injury. This report examines readmissions occurring over a four year period (2009 - 2012), comprising 3622 patients. Only unscheduled readmissions (USR) are reported in this study. For this study, patients under 18 years of age were excluded. Pre-existing conditions and hospital complications are those described and collected in the National Trauma Data Standard (NTDS).

Results: The readmission rate within 30 days in our patient population was 6.57% (238 of 3622). Patients with a USR were older (61.5 vs. 52.9, $p<0.001$), had a longer initial admission (18.4 days vs. 9.9, $p<0.001$) and had initially sustained more severe injuries (ISS 13.3 vs. 11.3, $p=0.001$) on the first admission. Initial admissions which required a major neurologic, thoracic, or abdominal operation were associated with a higher USR (11.3% vs. 5.8%, $p=0.02$). However there was no significant difference for those with an orthopedic operation alone (38.9% vs. 42%, $p=0.337$). Patients with pre-existing anticoagulation/antiplatelet therapy, diabetes, or hypertension had an increased risk of a USR. Logistic regression demonstrated that patient age, length of stay, discharge to a skilled or subacute nursing home, and the presence of any pre-existing condition were associated with USR. Notably, a complication during the first hospitalization, a major operation, or a high ISS was not found to be independent risk factors for USR. The most frequent indications for USR were infection (31%), unrelated medical condition (19%), and pain (10.5%).

Conclusion: Unscheduled readmission rates following hospitalization for traumatic injury at a level 1 Trauma Center are lower than the rates reported for medical or surgical patients. The number of patients readmitted for unrelated medical issues and the increasing age of the trauma patient has concerning financial implications particularly in light of the CMS reimbursement changes. Trauma centers should and need to identify patients at risk for USR, and identify strategies to reduce the risk.

NOTES

Session: XIII: Quickshots
Paper QS19: 10:58-11:04 am

HOW ARE YOU REALLY FEELING? A PROSPECTIVE EVALUATION OF COGNITIVE FUNCTION FOLLOWING TRAUMA

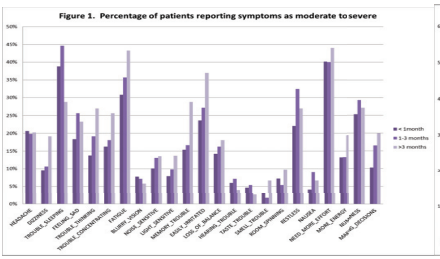
Deborah M. Stein* MD,MPH, Erin C. Hall MD, Eric Lund MS, Diane Brown RN, Karen R. Murdock DScPT, Lisa Gettings MS, Thomas M. Scalea* MD, R Adams Cowley Shock Trauma Center

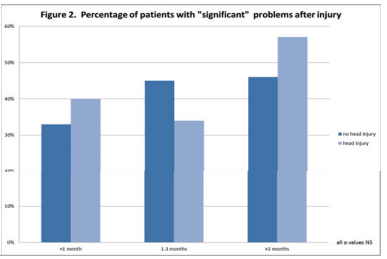
Invited Discussant: Kristan Staudenmeyer, MD

Introduction: It is well-known that mild traumatic brain injury (TBI) is highly associated with cognitive difficulties that can persist for weeks to months following injury. However, these symptoms are non-specific and are also referable to overall poor health and post-traumatic stress disorder. We sought to evaluate the incidence of these symptoms in patients following trauma.

Methods: A prospective analysis of a convenience sample of patients who were seen in the outpatient trauma clinic over a 20-month period and completed self-administered Rivermead Post Concussion Symptoms Questionnaire (RPQ) was conducted. The time of the completed RPQ was stratified into Early (<1 month following injury), Mid (1-3 months) and Late (>3 months) and the patient was matched with their Trauma Registry data. Patients reporting symptoms as moderate to severe were considered positive, and "significant" difficulty with cognition was defined by ≥2 symptoms reported as severe or ≥4 symptoms reported as moderate. Head injury was defined as Head AIS >0, including the diagnosis of concussion.

Results: 586 completed questionnaires were matched to Trauma Registry admissions (393 Early, 118 Mid, 75 Late). Patient characteristics included: 73% males, mean age 37±16 years, median ISS 12 (4-21), median length of stay 2.8 days (0.4-7.8), 28% head injury diagnosis. The incidence of symptoms is shown in figure 1. 35% at <1 month, 41% at 1-3 months, and 48% of patients at >3 months following injury were having significant difficulty with cognition. Only 17%, 14%, and 19% had returned to work or school at the 3 follow up time frames and only 5% and 3%, 15% and 9%, and 23% and 5% were receiving psychiatric or cognitive rehabilitation services, respectively. There was no significant difference in symptomatology in patients who carried a head injury diagnosis and those that did not (figure 2).





Conclusion: Cognitive problems occur frequently following injury even in the absence of a head injury diagnosis. Either mild TBI is grossly underdiagnosed or these symptoms are not specific to post-concussive states and simply are the cognitive sequelae of traumatic injury. The reporting of moderate to severe symptoms suggest a need to better understand the affects of trauma on cognitive function and strongly suggests that services for these patients are badly needed to maximize cognitive function and return to pre-injury quality of life.

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Session: XIII: Quickshots
Paper QS20: 11:04-11:10 am

MID-TERM, AMPUTATION FREE SURVIVAL AND PATIENT BASED OUTCOMES FOLLOWING WARTIME VASCULAR INJURY

Chonna L. Kendrick MD, Joe M. Holguin RN, Diane L. Lynd-Miller RN, Lee A. Zarzabal MS, Todd E. Rasmussen* MD, United States Army Institute for Surgical Research

Invited Discussant: Matthew Wall, Jr., MD

Background: Extremity vascular injury is a leading cause of morbidity and amputation in combat. Throughout the decade of war clinical studies have focused on early management strategies and short-term statistical limb salvage. To date mid- and long term quality of life and functional limb salvage have not been quantified in US service personnel. The objective of this study is to characterize patient based outcomes following wartime extremity vascular injury including mid-term freedom from amputation and functional recovery using standardized survey questionnaires.

Methods: The Global War on Terrorism Vascular Initiative Oracle® database was queried for US troops having undergone attempted limb salvage following extremity vascular injury in Afghanistan or Iraq (2002-2012). Demographics, injury characteristics and management strategies were recorded. Patients were contacted, consented, and surveyed using the standardized Short Form 36 (SF36) and Short Musculoskeletal Function Assessment (SMFA). The SF36 is comprised of mental (MCS) and physical (PCS) composite scores with a recognized national norm of 50. The SMFA is comprised of dysfunction (DI) and bother (BI) indices with validated extremity injury norms 27±17 and 31±21 respectively.

Results: A total of 227 respondents completed both SF36 and SMFA surveys (98% male; age 24±3 years). The majority of respondents had lower (n=138; 61%) compared to upper (n=95; 42%) extremity vascular injury. Mean injury severity (ISS) and mangled extremity severity (MESS) scores were 14.5±8 and 5.7±1 respectively. Injuries were isolated artery (n=152; 67%), vein (n=22; 10%) or combined artery and vein (n=53; 23%). Fifty-four percent (n=124) of respondents had associated fracture while 57% (n=130) and 90% (n=204) had nerve and soft tissue injuries respectively. Thirty-six (16%) patients had secondary amputation at a mean of 7 months after injury and initial vascular repair. Forty-two percent (n=96) of respondents were active duty status at a mean follow-up of 51±31 months following injury and amputation free survival at this same time was 84%. For the entire cohort, mean SF36 MCS and PCS were 47±13 and 43±9 respectively, and mean SMFA DI and BI were 25±15 and 26±11 respectively. There was no difference between SF36 component scores between those with limb salvage and those with secondary amputation (MCS: 46±9.3 vs. 49±8.9; p=0.07 respectively and PCS: 43±9.3 vs. 40±8.9; p=0.07 respectively). Active duty status at the time of survey was independently associated with favorable SF36 MCS (p=0.0001) and SMFA DI (p=0.05).

Conclusions: This study characterizes patient based outcomes following wartime vascular injury. Findings demonstrate a favorable mid-term limb salvage rate and underscore the resiliency of a military population including the benefit of active duty status during recovery. A physical and emotional burden exists among patients with limb salvage which limits their recovery. Further study of this burden is necessary to improve long-term function after wartime vascular injury.

NOTES

39TH WILLIAM T. FITTS, JR., M.D., LECTURE

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

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

****

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

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

American Trauma Society:
President, 1972-1973

FRIDAY, SEPTEMBER 20, 2013, 11:25 AM – 12:15 PM

AAST 39TH WILLIAM T. FITTS, JR. LECTURE

LOCATION: CONTINENTAL BALLROOMS 4/5/6

"The Control of the Circulation"

Frank R. Lewis, Jr., M.D.
Executive Director
The American Board of Surgery
Philadelphia, PA

****

PREVIOUS FITTS ORATORS

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

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

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

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

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

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

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

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

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

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

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

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

13. 1987 Paul Dudley Hart
Woods Hole, MA

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

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

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

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

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

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

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

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

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

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

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

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

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

27. 2001 Janet Reno
Washington, DC
(Cancelled)

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

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

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

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

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

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

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

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

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

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

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

SESSION XVA:

ACUTE CARE SURGERY

PAPERS #35-#44

FRIDAY, SEPTEMBER 20, 2013, 1:30 PM – 4:50 PM

CONTINENTAL BALLROOMS 4/5

MODERATOR: MARK MALANGONI, M.D.

RECORDER: DAVID LIVINGSTON, M.D.

Session: XVA: Acute Care Surgery Papers 35-44
Paper 35: 1:30-1:50 pm

FIBRINOGEN AND PLATELET CONTRIBUTIONS TO CLOT FORMATION: IMPLICATIONS FOR TRAUMA RESUSCITATION AND THROMBOPROPHYLAXIS

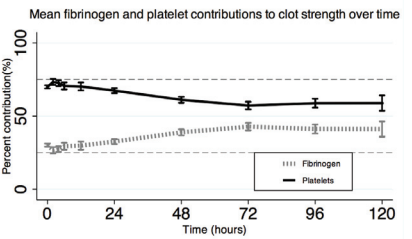
Lucy Z. Kornblith MD, Matthew E. Kutcher MD, Brittney J. Redick BA, Ryan F. Vilardi BS, Mary F. Nelson RN, MPA, Mitchell J. Cohen* MD, University Of California San Francisco/San Francisco General Hospital

Invited Discussant: Ernest Moore, MD

Introduction: Thromboelastography (TEG) is widely used to diagnose the perturbations in clot formation and lysis characteristic of acute traumatic coagulopathy (ATC). With the recent addition of functional fibrinogen testing to standard TEG, relative fibrin- and platelet-based contributions to clot formation can be elucidated. This crucial data can assist in tailoring both early resuscitation and later thromboprophylaxis. We therefore sought to describe the longitudinal relative contributions of fibrinogen and platelets to clot strength after injury, hypothesizing that a low contribution of fibrinogen to clot strength on admission would be associated with coagulopathy, transfusion requirements, and worse outcomes.

Methods: Longitudinal plasma samples were prospectively collected from 165 critically-injured trauma patients at a single Level 1 Trauma Center on arrival and serially for 120h, and matched with demographic and outcomes data. Standard kaolin TEG maximal amplitude (MA), functional fibrinogen (FF) TEG MA, von Clauss fibrinogen, and standard coagulation measures were performed in parallel. Platelet contribution to clot strength was calculated as MA_{TEG}-MA_{FF}=$MA_{platelets}$. Percent contributions of FF (%MA_{FF}) and platelets (%$MA_{platelets}$) were calculated as each respective MA divided by the overall kaolin TEG MA.

Results: 402 FF-TEGs were performed on longitudinal samples from 165 patients. Coagulopathic patients (INR>=1.5) had significantly lower admission %MA_{FF} than non-coagulopathic patients (21% vs. 31%, $p<0.05$). In addition, patients requiring plasma transfusion had a significantly lower admission %MA_{FF} (25% vs. 30%, $p<0.05$). Higher admission %MA_{FF} was predictive of reduced mortality (hazard ratio 0.875, $p<0.001$). A 10% increase in admission %MA_{FF} was associated with an INR decrease of 0.12, PTT decrease of 4.22 sec, 24 hour red blood cell transfusion decrease of 3 units, and 24 hour plasma transfusion decrease by 2.2 units (all $p<0.05$). %$MA_{platelets}$ was higher than %MA_{FF} at all time points, decreased over time, and stabilized at 72 hours (70% at 0h, 57% at 72h; Figure). In contrast, %MA_{FF} increased over time and stabilized at 72 hours (30% at 0h, 43% at 72h).



Conclusion: The recent addition of FF testing to standard TEG affords novel differentiation of fibrin- versus platelet-based clot dynamics. Coagulopathy and plasma transfusion were associated with a lower %MA_{FF}, and higher admission %MA_{FF} predicted reduced mortality. Despite the importance of fibrinogen function, we found that platelet function plays a greater role in clot strength at all time points after injury. This finding is the first suggestion that attention to the relative contribution of fibrinogen and platelet function should guide both early resuscitation and later thromboprophylaxis, and that antiplatelet therapy may be of under-recognized importance to adequate thromboprophylaxis after trauma.

NOTES

Session: XVA: Acute Care Surgery Papers 35-44
Paper 36: 1:50-2:10 pm

COMPARISON OF THE HEMOSTATIC EFFICACY OF LOW VOLUME LYOPHILIZED PLASMA RECONSTITUTED USING STERILE WATER, LACTATED RINGER'S, NORMAL SALINE, AND HEXTEND® SOLUTIONS

Tim H. Lee MD, MS, Sean P. McCully MD, Belinda H. McCully Ph.D., Claire Sands CVT, David A. Hampton MD, Scott G. Louis MD, Jerome Differding MPH, Martin A. Schreiber* MD, Oregon Health & Science University

Invited Discussant: Charles Lucas, MD

Introduction: Optimization of ascorbic acid buffered reconstituted lyophilized plasma (LP) into a low volume solution provides significant logistical advantages, reduces the risks associated with large volume resuscitation, modulates inflammation, and is equally effective for hemostatic resuscitation compared to full volume LP. To further optimize low volume LP, this study compared the physiologic effects of resuscitation using LP reconstituted with sterile water (LP-SW), lactated Ringer's (LP-LR), normal saline (LP-NS), and Hextend ® (LP-Hx).

Methods: We performed a prospective, blinded animal study. Plasma was lyophilized following whole blood collection from anesthetized swine. LP was reconstituted to create four test solutions: LP-SW, LP-LR, LP-NS, or LP-Hx. Forty swine were anesthetized and subjected to a validated model of polytrauma and hemorrhagic shock (including a Grade V liver injury), then randomized to resuscitation using one of the four test solutions. Physiologic data were monitored and blood loss, lactate and hematocrit (Hct) were followed. Coagulation status was evaluated using thrombelastography (TEG). Expression of inflammatory mediators was evaluated by RT-PCR.

Results: Forty animals were included in the study (10 animals per fluid group). Baseline vital signs, lactate, and Hct were similar between groups. During the study, there were no differences in vital signs between groups at any time point. Serial serum lactate values were not different between groups. One animal died following LP-Hx resuscitation. There was significantly less blood loss in the groups receiving LP-SW and LP-LR compared to the LP-NS and LP-Hx groups (Figure 1). Differences in TEG parameters between groups were not significant. There was higher expression of the anti-inflammatory cytokine IL-10 mRNA by the LP-SW and LP-LR groups compared to the LP-Hx group (Figure 2).

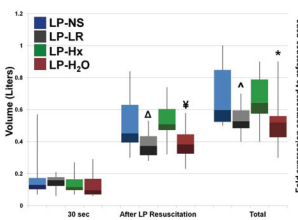


Figure 1. Blood Loss. *LP-H_2O < LP-NS and LP-H_2O < LP-Hx; ^LP-LR < LP-Hx; ¥LP-H_2O < LP-Hx ; ΔLP-LR < LP-NS and LP-LR < LP-Hx. Significance defined as $p < 0.05$.

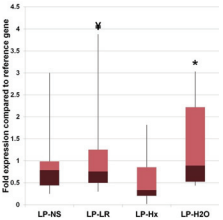


Figure 2. IL-10 mRNA expression. *LP-H_2O > LP-Hx; ¥LP-LR > LP-Hx. Significance defined as $p < 0.05$

Conclusions:Resuscitation using low volume LP-SW and LP-LR buffered with ascorbic acid confers an anti-inflammatory benefit and results in less blood loss in a swine model of polytrauma and severe hemorrhage. Sterile water is a safe, cost effective, and universally available fluid for creating a low volume hemostatic LP resuscitation solution.

NOTES

PERSISTENT INFLAMMATION IMMUNOSUPPRESSION AND CATABOLISM SYNDROME AFTER SEVERE BLUNT TRAUMA

Erin Vanzant MD, Lori F. Gentile MD, Maria Lopez MBA, Jennifer Lanz RN, Ruth Davis RN, Alex G. Cuenca MD,Ph.D., Henery Baker Ph.D., Frederick Moore* MD, Lyle Moldawer* Ph.D., Philip Efron MD, University of Florida - Gainesville

Invited Discussant: David Hoyt, MD

Introduction: Analysis of the *"Inflammation and Host Response to Injury"* Glue Grant(GG) data base documenting the current epidemiology of severe blunt trauma, identified that the second peak of late multiple organ failure(MOF) has disappeared and that hospital mortality has decreased dramatically over the study period with increasing compliance of standard operating procedures. However, 37% of these patients had a 'complicated' clinical course defined by ongoing low level organ dysfunction requiring >14 days ICU care. Based on this, previous published data on chronic critical illness and ongoing observations, a new syndrome was recently described called the persistent inflammation, immunosuppression and catabolism syndrome(PICS). We propose that PICS has replaced late MOF and is the predominant phenotype of chronic critical illness that modern ICUs are producing and can be validated at the genomic level.

Methods: Isolated blood leukocyte(monocytes, PMN and T-cells) microarray data and geneome wide espression from 244 severely traumatized patients (ISS >15, no TBI, in shock, requiring blood, age >16) were analyzed. Patients outomes were identified as 'complicated'(>14 ICU days,n=68) or 'uncomplicated'(<5 days n=63). Analysis consisted of identifying gene expression differences, comparison of functional pathways, and individual gene changes(fold changes in magnitude from control; $p<.001$) between groups and healthy subjects(n=21) using IPA. Pathway significance was determined by the use of a z-score, and values of $Z>2$ (95% CI) were considered significant. Z scores were determined using IPA's prediction models of known gene relationships in molecular pathways. Epidemiologic data and outcomes were analyzed on admission, and hospital day 7 and 14.

Results: Day 7 and 14, gene expression patterns from PMN and monocytes in complicated patients had significant changes in individual genes that indicate defects in adaptive immunity, decreased MHC expression, and myeloid cell induced lymphocyte T-cell suppression&Th2 skewing. On day 7, only PMNs from uncomplicated patients compared to non-trauma controls had increased expression of functional pathways related to cell movement, chemotaxis, differentiation, homing and cell movement. In monocytes, pathways for chemotaxis involved in inflammation and immune function were significantly up in the uncomplicated vs controls. Clinical analysis showed complicated patients had persistent leukocytosis, lymphopenia, and low albumin concentrations throughout their stay. Of the patients discharged, 28% of the complicated vs 62% uncomplicated were discharged home without rehabilitation.

Conclusion: Isolated leukocyte cell populations from severe blunt trauma patients with a complicated clinical outcome exhibit persistent(>14d) genomic expression changes, with increased inflammation and defects in adaptive immunity. These trends are supported by the failure of complicated patients to demonstrate the same increase in specific immune functional pathways as the uncomplicated. This indicates a defect in the complicated patients' immune response to severe injury, especially their innate immune system. They also exhibit persistent inflammation, immunosuppression and protein depletion, supporting the genomic changes, as well as the hypothesis that these subjects are exhibiting PICS. Further attempts to delineate why these differences exist are important for future improvements in outcomes in the critically ill.

NOTES

Session: XVA: Acute Care Surgery Papers 35-44
Paper 38: 2:30-2:50 pm

ASPIRATION OF ACID AND FOOD PARTICLES PRODUCES A SYNERGISTIC PULMONARY EXPRESSION OF SRAGE AND HMGB1 IN MICE.

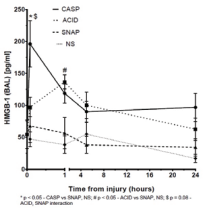
Peter J. Smit MD, MS, Bruce A. Davidson Ph.D., Weidun A. Guo* MD,Ph.D., Jadwiga D. Helinski MS, Barbara A. Mullen MS, Merril T. Dayton MD, Paul R. Knight MD,Ph.D., Dept of Surgery, SUNY-Buffalo

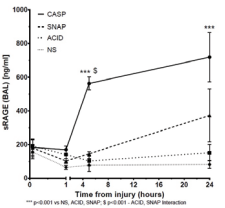
Invited Discussant: Ronald Maier, MD

Introduction: Trauma patients often aspirate with full stomachs, which can lead to a pulmonary inflammatory response and ARDS. Previous work in our lab has demonstrated that together, the aspirate components (acid and food particles) produce a synergistic (i.e., greater than additive) lung injury. To investigate this mechanism, we hypothesized that there is an associated synergistic expression of the soluble receptor for advanced glycation end-products (sRAGE) and its ligand, high mobility group box1 (HMGB1) in response to aspiration. Both compounds have been shown to be associated with aspiration-induced acute lung injury.

Methods: Aspiration in CD-1 mice was induced by intratracheal administration of normal saline (NS), hydrochloric acid (ACID), small non-acidified gastric particles (SNAP), or combined acid plus small gastric particles (CASP, i.e., ACID+SNAP). Bronchial alveolar lavage (BAL) was collected at 5 min, 1, 5, or 24 hrs post-injury for sRAGE and HMGB1 assays. In a second experiment, an NF-kB inhibitor, ethyl pyruvate, was intraperitoneally injected after CASP aspiration and BAL was obtained at 5 hrs post-injury for the same assays. Interaction between ACID and SNAP injuries was assessed by 2-way ANOVA.

Results: Immediately after injury (5 min) HMGB1, but not sRAGE, increased in the CASP group. There was an interaction here between ACID and SNAP on HMGB1 levels trending toward significance ($p=0.08$). At 1 hr post-injury, HMGB1, but not sRAGE, increased in the ACID group ($p<0.05$). At 5 and 24 hrs post-injury, there were no differences between the injury groups with respect to HMGB1, but sRAGE levels were higher after CASP than either ACID or SNAP alone ($p<0.001$). There was an interaction between ACID and SNAP contributing to 22% of the variation in sRAGE levels of CASP-injured mice at 5 hrs ($p<0.001$). Ethyl pyruvate administration reduced HMGB1 ($p<0.05$) and sRAGE levels ($p<0.01$) at 5 hrs post-injury.





Conclusion: Combined acid and food particles are associated with the synergistic expression of HMGB1 and sRAGE, which may contribute to the exaggerated pulmonary inflammatory response and resultant lung injury observed after aspiration. Application of NF-kB inhibitors, such as ethyl pyruvate, may be useful adjuncts in the prevention and treatment of aspiration-induced ARDS in trauma and ICU patients. Future investigation is necessary to refine our understanding of the interaction between RAGE, HMGB1, and the effector cells of the inflammatory response.

NOTES

Session: XVA: Acute Care Surgery Papers 35-44
Paper 39: 2:50-3:10 pm

TO SWAB OR NOT TO SWAB: A PROSPECTIVE ANALYSIS OF 341 SICU VRE SCREENS

Douglas Z. Liou MD, Galinos Barmparas MD, Eric J. Ley MD, Ali Salim* MD, Aasin Tareen BS, Tamara Casas BS, Debora Lee BS, Marko Bukur MD, Cedars-Sinai Medical Center

Invited Discussant: Kimberly Davis, MD, MBA

Introduction: Vancomycin-resistant *Enterococcus* (VRE) screening is routine practice in many ICUs despite the question of its clinical significance. The value of VRE screening at predicting subsequent VRE or other hospital-acquired infection (HAI) is unknown. The purpose of this investigation was to examine the rate of subsequent VRE HAI in patients undergoing VRE screening.

Methods: This study was conducted in a 24-bed SICU at a Level 1 trauma center. Patients admitted to the SICU between January and August 2011 who had rectal swab for VRE screening within 72 hours were followed prospectively for the development of VRE and other HAI. Demographics, clinical characteristics, and infection rates were compared between VRE+ and VRE- patients. Sensitivity, specificity, positive predicative value (PPV), and negative predicative value (NPV) of VRE screening for predicting subsequent VRE HAI were calculated.

Results: A total of 341 patients had VRE screening within 72 hours of SICU admission, with 32 (9%) VRE+ and 309 (91%) VRE- patients. Patients with VRE+ had a higher incidence of any HAI (78% vs 36%, $p<0.001$) (TABLE). Eight (25%) VRE+ patients developed VRE HAI compared to only 3 (1%) VRE- patients ($p<0.001$). VRE screening had a 73% sensitivity, 93% specificity, 25% PPV, and 99% NPV for determining subsequent VRE HAI.

Conclusion: VRE colonization was present in 9% of SICU patients upon admission. Negative VRE screening had a high specificity and NPV for the development of subsequent VRE HAI. Empiric treatment of VRE infection may be unnecessary in VRE- patients.

	VRE+ (n=32)	VRE- (n=309)	*p*-value
Age (years), mean ± SD	62 ± 17	60 ± 19	*0.52*
Male, % (n)	53% (17)	56% (174)	*0.73*
Trauma, % (n)	19% (6)	22% (67)	*0.70*
SICU LOS (days), mean ± SD	4.0 ± 4.9	4.2 ± 6.3	*0.88*
APACHE IV, mean ± SD	14 ± 12	18 ± 19	*0.27*
HAI within hospital stay, % (n)	78% (25)	36% (111)	*<0.001*
VRE HAI, % (n)	25% (8)	1% (3)	*<0.001*

VRE - vancomycin-resistant enterococcus; HAI - hospital-acquired infection

NOTES

Session: XVA: Acute Care Surgery Papers 35-44
Paper 40: 3:10-3:30 pm

HOW MUCH AND WHAT TYPE...ANALYSIS OF THE FIRST YEAR OF THE ACUTE CARE SURGERY OPERATIVE CASE LOG

Christopher J. Dente* MD, Therese M. Duane* MD, Gregory J. Jurkovich* MD, LD Britt* MD,MPH, J W. Meredith* MD, John J. Fildes* MD, Emory University

Invited Discussant: James Davis, MD

Introduction: A case log data base was created by the AAST ACS committee to track trainee operative experiences, allowing them to enter their cases in the form of CPT codes or manually, if no CPT code could be established. We hypothesized that the number of cases an ACS trainee performed would be similar to the ACGME expectations of a fifth year general surgery resident. We further hypothesized that the list of Essential and Desired cases (E/D list) created at the inception of the training paradigm would accurately reflect the cases done in an ACS fellowship. **Methods:** The AAST case log database was queried for all cases entered from 7/1/11- 6/30/12. Trainees were classified as those participating in AAST-accredited fellowships (accACS, n = 8) and those who were participating in ACS fellowship not yet accredited (nonaccACS, n = 7). CPT codes were mapped individually to the E/D list and tallied. Cases entered manually were reviewed and assigned a CPT code if possible, or left as "non codable". To compensate for non-operative rotations and non-compliance with data entry, case numbers were analyzed on a monthly basis and then annualized to estimate average annual case numbers for all trainees. In addition, the operative experience of the fellows was compared to the E/D list. **Results:** 18 accACS and 11nonacc ACS trainees entered 5630 CPT codes and 409 entries deemed non-codable from a total of 3933 individual cases. 181 non-codable entries were able to be mapped to CPT codes bringing that total to 5811 codes. At least one case was entered in 242 of 348 (70%) potential "fellow-months." accACS fellows performed 16.5$\pm$ 12.7 cases per month compared to 15.8 $\pm$ 14.3 cases for nonaccACS fellows (p = .71) When annualized, fellows performed, on average, 195 cases per year (197.5 cases accACS and 189.4 nonaccACS). Actual operative experiences compared to the E/D list are described in the table. Only 77 cases (2.6 cases/fellow) were categorized as pediatric.

Category	% of all Codes	Codes Captured by E/D List (%)
Airway	7%	392/398 (98%)
Chest	13%	437/739 (59%)
Abdomen	50%	1723/2920 (59%)
Extremity	9%	271/524 (52%)
Face	< 1%	9/39 (23%)
Misc	19%	184/1082 (17%)
Neck	2%	8/109 (7%)
Total	100%	3033/5811 (52%)

Conclusions: Acc and nonacc ACS trainees have substantial operative experience averaging nearly 200 major cases during their ACS year. However, high variability exists in the number of essential or desirable cases being performed with about 50% of the fellows' operative experience falling outside of the E/D list of cases. Modification of the fellows' operative experience and/or the rotation requirements appears to be needed to provide experience in E/D cases.

NOTES

Session: XVA: Acute Care Surgery Papers 35-44
Paper 41: 3:30-3:50 pm

DOES RVU-BASED COMPENSATION SHORT-CHANGE THE ACUTE CARE SURGEON?

Diane A. Schwartz MD, Xuan Hui MD, MS, Eric B. Schneider Ph.D., Catherine G. Velopulos MD, Shalini Selvarajah MD, Donald J. Lucas MD, Elliot R. Haut* MD, Nathaniel McQuay* Jr., MD, Timothy M. Pawlik MD, David T. Efron* MD, Adil H. Haider* MD, Bayview Hospital Of Johns Hopkins Medical Center

Invited Discussant: R. Lawrence Reed, MD

Introduction: Emergent operations are known to demand more surgeon attention, time, and resources compared to planned, elective cases, and it remains unclear whether RVU compensation plans effectively capture these differences. Our objective was to determine if RVUs adequately reflect the increased surgeon effort required to treat emergent versus elective patients receiving similar procedures.

Methods: The American College of Surgeons National Surgical Quality Improvement Program (NSQIP) 2011 dataset was queried, and patients undergoing elective or emergent colectomy, hernia repair, or biliary procedures were identified using CPT codes. RVUs, OR time, major/minor complications, and patient length of stay (LOS) were compared across elective and emergent operations. Generalized linear models were employed to assess outcomes, controlling for 12 preoperative risk factors that included demographics and comorbidities. Analyses were then stratified by open versus laparoscopic intervention.

Results: Of the 442,149 patients in NSQIP for the year 2011, there were 27,636 biliary, 28,722 colorectal, and 31,090 hernia procedures. The table displays mean RVUs, LOS, and OR time for elective procedures followed by a column noting the difference off the mean for the emergent counterparts in each category. RVUs are noted to be the same or less for emergencies, excepting hernias, and LOS is longer for all emergent operations. Odds ratios for complications are also higher in emergent procedures as shown below. Major complications are defined as deep insicional surgical site infection, wound complication, unplanned intubation, pulmonary embolus, acute renal failure requiring dialysis, cerebral vascular accident, shock, cardiac arrest, acute myocardial infarction, bleeding requiring transfusion, sepsis, or return to OR. The minor complications comprise superficial infection, pneumonia, progressive renal insufficiency without the need for dialysis, urinary tract infection, and deep vein thrombosis.

Table 4. Estimates of patients by surgery types for the outcomes of LOS, OR time

	Biliary				Colorectal				Hernia			
	Laparoscopic		Open		Laparoscopic		Open		Laparoscopic		Open	
	Mean	Diff	Mean	Diff	Mean	Diff	Mean	Diff	Mean	Diff	Mean	Diff
	elective	emergent	elective	emergent	elective	emergent	elective	emergent	elective	emergent	elective	emergent
RVU	11.86	0.01	17.54	-0.09	27.51	-0.50	26.01	-0.31	9.50	1.93	9.73	0.56
LOS (days)	1.64	1.48	7.36	1.25	6.16	2.36	10.07	3.26	0.58	2.63	1.34	3.16
OR Time (min)	66.36	8.40	131.40	-7.45	172.31	-30.36	184.27	-45.47	71.31	8.77	76.53	4.20
		OR		OR		OR		OR		OR		OR
major complications	ref.	1.46	ref.	1.60	ref.	1.51	ref.	1.84	ref.	3.08	ref.	1.97
minor complications	ref.	1.30	ref.	1.10	ref.	1.77	ref.	1.19	ref.	2.42	ref.	2.22

*Work Relative Value Unit *unite-day *OR time in minutes

Conclusion: Emergent operative management for various procedures is similarly compensated despite longer LOS, more complications, and subsequently increased physician attention. Reevaluating the utility of a modifier that might better capture the additional work involved in emergent patient care may be justified given these findings.

NOTES

Session: XVA: Acute Care Surgery Papers 35-44
Paper 42: 3:50-4:10 pm

ADJUNCTIVE TREATMENT OF ABDOMINAL CATASTROPHES AND SEPSIS WITH DIRECT PERITONEAL RESUSCITATION (DPR): INDICATIONS FOR USE IN ACUTE CARE SURGERY.

Jason W. Smith* MD,Ph.D., Paul J. Matheson Ph.D., Brian G. Harbrecht* MD, Matthew V. Benns MD, Glen A. Franklin* MD, Keith R. Miller MD, J D. Richardson* MD, R. N. Garrison* MD, University of Louisville

Invited Discussant: John Holcomb, MD

Introduction: The success of damage-control surgery (DCS) for the treatment of trauma has led to use in other surgical diseases associated with shock states such as abdominal sepsis. Previous studies utilizing direct peritoneal resuscitation (DPR) for the treatment of traumatic injuries have yielded promising preliminary results. We present the inital results of the application of technique to patients suffering abdominal sepsis treated with DCS.

Methods: We enrolled 44 DCS patients over a 5 year period (01/2008 to 12/2012) to undergo DPR in addition to standard resuscitation as part of a prospective case-control study. DPR consisted of peritoneal lavage with 2.5% commercially available peritoneal dialysis solution (Delflex) at a predetermined rate. Temporary abdominal closure was standardized. Patients were propensity score matched to contemporaneous controls for demographics, APACHE II, and cause of abdominal sepsis. Univariate and Multivariate analysis was performed.

Results: There were no differences between the control and experimental group with regard to age, gender, ethnicity, or APACHE II. Indications for damage control included pancreatitis, perforated hollow viscous, bowel obstruction and ischemic enterocolitis. Patients undergoing DPR had both a higher rate of (68% vs. 43%, $p \leq 0.03$) and a shorter time to definitive fascial closure (5.9 ± 3.2 vs. 7.7 ± 4.1 days, $p \leq 0.02$). At 48 hours post-operation, DPR patients had a decreased APACHE II and Sequential Organ Failure Assessment (SOFA) score compared to controls. Additionally, DPR patients had fewer abdominal complications compared to controls (RR 0.57; 0.32-1.01, p =0.038). Failure to utilize DPR was a significant predictor of post-operative morbidity in multivariate analysis. Also, inability to definitively close the abdomen following DCS was a predictor of increase post-operative morbidity and increased length of stay in both groups.

Application of DPR to General Surgery DCS Patients

	DPR (n=44)	Controal (n=44)	P value
Age (years)	52 ± 12	50 ± 8	0.36
Gender (% male)	59	56	--
Indication for OR (n)			
Pancreatitis	8	8	--
Perforated Viscous	18	17	--
Bowel Obstruction	8	8	--
Ischemia	10	11	--
APACHE II @ OR	25.5 ± 11.4	27.9 ± 13.2	0.36
SOFA @ OR	12.1 ± 5.9	12.9 ± 7.8	0.57
APACHE II @ 48 H	19.3 ± 10	24.7 ± 14.5	0.04
SOFA @ 48 H	8.4 ± 6.1	10.3 ± 5.4	<0.01
Primary Fascial Closure (n)	29 (68%)	19 (43%)	0.03
Time to Closure (days)	5.9 ± 3.2	7.7 ± 4.4	0.02
Abdominal Complication (n)	12 (27%)	21 (47%)	0.038
Mortality (n)	7 (16%)	12 (27%)	0.15

Conclusions: DPR shortens the interval to definitive abdominal closure, increases primary fascial closure rate and reduces intra-abdominal complications following DCS for abdominal sepsis. As a result, DPR following DCS may afford better outcomes to patients suffering shock due to severe secondary peritonitis.

NOTES

Session: XVA: Acute Care Surgery Papers 35-44
Paper 43: 4:10-4:30 pm

OUTPATIENT LAPAROSCOPIC APPENDECTOMY SHOULD BE THE STANDARD OF CARE FOR UNCOMPLICATED APPENDICITIS

Richard Frazee MD, Stephen Abernathy MD, Matthew Davis* MD, Travis Isbell MD, John Hendricks MD, Justin Regner MD, Randall Smith* MD, Texas A&M Health Science Center & Scott and White Hospital

Invited Discussant: Andrew Peitzman, MD

Introduction:

In 2012, a protocol for routine outpatient laparoscopic appendectomy for uncomplicated appendicitis was published reflecting high success, low morbidity, and significant cost savings. In spite of this, national data reflect the majority of laparoscopic appendectomies are done with overnight admission. This study updates our experience with outpatient appendectomy since our initial report, confirming the efficacy of this approach.

Methods:

In July 2010, a prospective protocol for outpatient laparoscopic appendectomy was adopted at our institution. Patients were dismissed from the post-anesthesia recovery room or day surgery if they met predefined criteria for dismissal. Patients admitted to a hospital room as either full admission or observation status were considered failures of outpatient management. An IRB approved retrospective review of patients having laparoscopic appendectomy for uncomplicated appendicitis from July 2010 through December 2012 was performed to analyze success of outpatient management, postoperative morbidity and mortality, and readmission rates.

Results:

Three hundred forty-five patients underwent laparoscopic appendectomy for uncomplicated appendicitis during this time frame. There were 166 men and 179 women with a mean age of 35 years. Three hundred five patients were performed as outpatients for a success rate of 88%. Forty patients (12%) were admitted for pre-existing comorbidities (15 patients), postoperative morbidity (6 patients) or lack of transportation or home support (19 patients). Twenty-three patients (6.6%) experienced postoperative morbidity. There were no mortalities. Four patients (1%) were readmitted for transient fever, nausea/vomiting, partial small bowel obstruction, and deep venous thrombosis. If this outpatient protocol was adopted nationally, there would be a projected health care savings of $920,000,000 compared to current practice.

Conclusion: Outpatient laparoscopic appendectomy can be performed with a high rate of success, a low morbidity and a low readmission rate. This study reaffirms our original pilot study and should serve as the basis for a change in the standard of care for appendicitis. Adoption of this practice nationally would translate into significant health care savings.

NOTES

Session: XVA: Acute Care Surgery Papers 35-44
Paper 44: 4:30-4:50 pm

SELF-EXPANDING FOAM FOR PREHOSPITAL TREATMENT OF SEVERE INTRA-ABDOMINAL HEMORRHAGE: DOSE FINDING AND SURVIVAL STUDIES

David R. King MD, Miroslav P. Peev MD, John O. Hwabejire MD, Michael J. Duggan DVM, John Beagle BS, Adam Rago BS, Greg Zugates Ph.D., Rany Busold Ph.D., Toby Freyman Ph.D., Tat F. Ng Ph.D., George Velmahos* MD, Marc A. DeMoya* MD, Upma Sharma Ph.D., Massachusetts General Hospital

Invited Discussant: Randall Friese, MD

Introduction:Noncompressible abdominal bleeding is a significant cause of preventable death on the battlefield, with no effective therapies available at point of injury. We previously described the development of a percutaneously-administered, self-expanding, polyurethane foam that improved survival in a lethal Grade V hepatic and portal vein injury model in swine. We hypothesized that survival with foam treatment is dose dependent, and 28 day survival after adequate foam treatment is possible.

Methods: Experiment #1 was a high grade hepato-portal injury created in a closed abdominal cavity resulting in massive noncompressible hemorrhage. After injury, the animals were randomized into five groups. The control group (n=12) was treated only with fluid resuscitation and four foam groups received different volumes (group 1: 64ml, n=6; group 2: 85ml, n=6; group 3: 100ml, n=13; group 4: 120ml, n=10) in addition to fluids. Ten minutes after injury, foam was percutaneously administered, and animals were monitored for 3 hours. Experiment #2 assessed safety with a non-lethal splenic injury model. After splenic injury, animals had fluid resuscitation (control, n=6), or fluids plus foam (dose volumes 100ml, n=6, or 120ml, n=6), were monitored for 3 hours, underwent splenorraphy, foam explantation, and recovered for 28 days.

Results: Survival with hepato-portal injury was highest in group 4 (90%; p=0.0007) and decreased in a dose-dependent fashion (group 3: 62%, group 2: 33%, group 1: 17%). All foam groups survived significantly longer than the controls (8.3%). Hemorrhage rate was reduced in all groups, but lowest in group 4 vs. control group (0.34±0.052 vs. 3.0±1.3 ml/kg/min, p=0.005). Increasing foam volume was associated with transient increased peak intra-abdominal pressure (88.2±38.9 in group 4 vs. 9.5±3.2 mmHg in controls, $p<0.0001$) and increased incidence of focal bowel injuries. Experiment #2 (safety) required between 1 and 9 bowel repairs due to focal injuries after foam removal, but all animals recovered for 28 days without physiologic or histologic abnormalities.

Conclusion: The self-expanding foam improves survival in a dose-dependent fashion in an otherwise lethal injury. Higher doses are associated with better survival, but resulted in increased intra-abdominal pressure and the need for bowel resection. Small bowel repairs were required in the safety model and all animals lived 28 days. Future work will focus on the optimal balance between intra-abdominal pressure and hemostatic efficacy.

NOTES

SESSION XVB:

NEUROLOGIC/SHOCK RESUSCITATION/

OUTCOMES/TRAUMA SYSTEMS/CRITICAL CARE

PAPERS #45-#54

FRIDAY, SEPTEMBER 20, 2013, 1:30 PM – 4:50 PM

CONTINENTAL BALLROOM 6

MODERATOR: CHRISTINE COCANOUR, M.D.

RECORDER: THOMAS ESPOSITO, M.D., M.P.H.

TRAUMATIC BRAIN INJURY AND HEMORRHAGE DISRUPTS COAGULATION AND PROTEIN C SYSTEMS, AND RESULTS IN ENDOTHELIAL INJURY AND INFLAMMATION IN A PORCINE MODEL

Martin H. Sillesen MD, Pär I. Johansson MD, Dmsc, Lars S. Rasmussen MD,Ph.D., Dmsc, Guang Jin MD,Ph.D., Cecilie Jepsen MD, Ayesha Imam MD, John Hwabejire MD,MPH, Jeniffer Lu BS, Michael Duggan DVM, George Velmahos* MD,Ph.D., Marc DeMoya* MD, Hasan Alam* MD, University of Michigan

Invited Discussant: Eileen Bulger, MD

Introduction:Effects of traumatic brain injury (TBI) and hemorrhagic shock (HS) on coagulation and inflammation are poorly defined, which limits our ability to design better interventions, and monitor the response to treatments. We hypothesized that combined TBI and HS would induce coagulation, activate endothelium, and stimulate inflammatory/complement cascades.

Methods: A total of 33 swine were allocated to either TBI+HS (n=27, TBI and volume-controlled 40% blood loss) or controls (n=6, anesthesia and instrumentation). TBI+HS animals were left hypotensive (mean arterial pressure between 30-35mmHg) for 2 hours. Blood samples were drawn at baseline, 3 and 15 minutes post injury, and after 2 hours of shock. In addition to thrombelastography (TEG), markers of coagulation, anticoagulation, endothelial activation/glycocalyx shedding, complement and sympatho-adrenal functions, and inflammation were measured.

Results:TBI+HS group demonstrated an immediate (3 min post-injury) and sustained activation of the coagulation (TEG r-time 3.8min vs. 5.1min, $p<0.01$) and complement (C5a, 2.83ng/ml vs. 2.05ng/ml, $p=0.05$) systems. There was a significant increase in thrombin generation (higher prothrombin fragment 1+2), shedding of the endothelial glycocalyx (Syndecan-1), and protein C activation (figure 1). There was also an increase in endothelial activation (von Willebrand factor, 784 U/l vs. 645 U/l, $p<0.01$), inflammation (TNF alpha, 81.1pg/ml vs. 50.8pg/ml, $p=0.03$) and sympatho-adrenal function (epinephrine 576 ng/ml vs. 463ng/ml, $p=0.01$).

Conclusion:The combination of TBI and shock results in an immediate and sustained activation of the coagulation and complement systems, sympatho-adrenal function, endothelial glycocalyx shedding and activation as well as protein C system activation and inflammation.

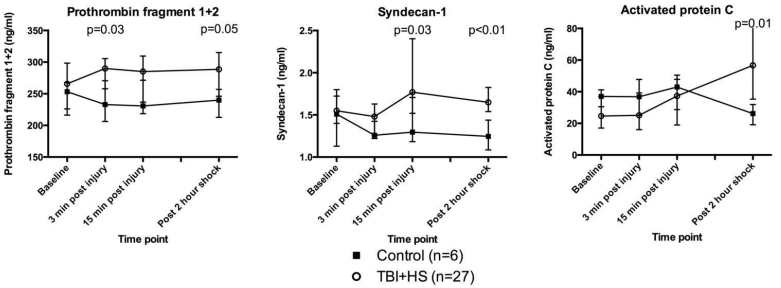


Figure 1: Median prothrombin fragment 1+2 (left), syndecan-1 (middle) and activated protein C (right) at different time points. Error bars indicate interquartile range

NOTES

Session: XVB: Neuro/Shock Resus/Outcomes/Trauma System/CC Papers 45-54
Paper 46: 1:50-2:10 pm

VAGAL NERVE STIMULATION MODULATES THE DENDRITIC CELL PROFILE IN POST-HEMORRHAGIC SHOCK MESENTERIC LYMPH

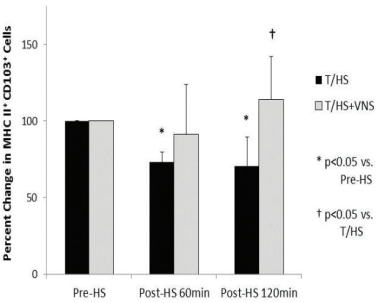
Koji Morishita MD, Todd W. Costantini MD, Brian Eliceiri Ph.D., Vishal Bansal* MD, Raul Coimbra* MD,Ph.D., University of California, San Diego

Invited Discussant: William Cioffi, MD

Introduction: Previous studies have established that post-hemorrhagic shock mesenteric lymph (PHSML) contains proinflammatory mediators that may drive the systemic inflammatory response to injury. Although the cellular basis of PHSML is less well characterized in acute models of injury, CD103+MHCII+ dendritic cells (DC) have been identified in the mesenteric lymph in models of chronic gut inflammation suggesting an important role for this cell population in the immune response. We have previously demonstrated the ability of vagal nerve stimulation (VNS) to prevent gut barrier failure after injury, however, the ability of VNS to alter DC trafficking in the gut is unknown. We hypothesized that CD103+MHCII+ DC populations would decrease in mesenteric lymph after trauma and hemorrhagic shock (T/HS) and vagal nerve stimulation (VNS) would prevent injury-induced changes in this population of DCs.

Methods: Male Sprague Dawley rats underwent cannulation of the the femoral artery and vein, and the mesenteric lymph duct prior to HS. The abdomen was opened to simulate trauma. The phases of injury were defined in order as the pre-HS phase (30 min), HS phase (60 min at a mean arterial pressure of 35 mmHg), and post-HS phase (120 min) with resuscitation of shed blood and normal saline. A separate cohort of animals underwent cervical VNS after the HS phase. Gut tissue was harvested at 4 hours after injury for histologic analysis. Mesenteric lymph flow was measured at each phase of the experiment. Mesenteric lymph was harvested to determine cell count and viability. For analysis by flow cytometry, cells were subjected to staining with CD103 and MHCII antibodies, and quantification of this cell population compared in the pre-HS and post-HS phase from the same animal.

Results: T/HS caused histologic gut injury which was prevented in animals treated with VNS. VNS limited the T/HS-induced increase in mesenteric lymph flow at 60 and 120 minutes post-HS. There was no difference in cell count nor cell viability between groups. The percentage of CD103+MHCII+ DC in the PHSML was found to be significantly decreased at 60 and 120 minutes post-HS when compared with that of pre-HS. Performing VNS after T/HS prevented the decrease in CD103+MHCII+ DC population in the PHSML caused by acute injury (see Figure).



Conclusion: T/HS decreases gut DC migration through the mesenteric lymph. VNS alters mesenteric lymph flow and prevents the HS-induced decrease in gut DC migration. VNS modulates intestinal DC trafficking thus altering the gut inflammatory response to injury. Treatments aimed at either directly or pharmacologically stimulating the vagus nerve may represent an ideal strategy to limit the systemic inflammatory response to severe trauma.

NOTES

Session: XVB: Neuro/Shock Resus/Outcomes/Trauma System/CC Papers 45-54
Paper 47: 2:10-2:30 pm

THE EFFECT OF TRANEXAMIC ACID IN A PORCINE TRAUMATIC ISCHEMIA REPERFUSION MODEL

Mia Debarros MD, Quinton Hatch MD, Porta Rees MD, Seth Izenberg MD, Joseph DuBose* MD, Matthew Eckert MD, Matthew Martin* MD, Madigan Army Medical Center

Invited Discussant: Martin Schreiber, MD

Introduction: Tranexamic acid (TXA) is an antifibrinolytic with anti-inflammatory properties that is associated with improved outcomes when administered to trauma patients at risk of bleeding, but little is known about its efficacy in an acidotic environment. We evaluated the effect of TXA on hyperfibrinolysis and inflammatory cytokines in a porcine trauma hemorrhage model that reliably induces severe acidosis.

Methods: 10 adult Yorkshire swine underwent a 30% controlled hemorrhage followed by supra-celiac aortic cross-clamping for 50 minutes. 5 control animals received standard resuscitation as well as a 100 mg bolus of rTPA 30 minutes after cross-clamp removal. Experimental animals received standard resuscitation, a 100 mg bolus of rTPA 30 minutes after cross-clamp removal, and a 1000 mg bolus of TXA 5 minutes after the rTPA bolus. ROTEM analysis was performed at baseline, 5 minutes after rTPA dosing, 15 minutes after rTPA dosing, and at 4 hours post cross-clamp removal. Levels of pro-inflammatory cytokines (TNF-a, IL-6, IL-8, IL-1b) and anti-inflammatory cytokines (IL-10) were assessed at baseline and throughout resuscitation with the use of electrochemiluminescence technology.

Results: Control and experimental animals had similar hemodynamics and routine labs at baseline and throughout the resuscitation phase. At the time of TXA administration the average pH was 7.21. Clot formation time (CFT) was prolonged from baseline at all resuscitation time points in both groups, however there was no difference in CFT between control and experimental groups at any point (59 seconds vs. 69 seconds, $p=0.1$ at 5 minutes; 53 seconds vs. 59 seconds, $p=0.3$ at 15 minutes; 62 seconds vs. 72 seconds, $p=0.1$ at 4 hours). Maximum clot firmness (MCF) was decreased from baseline at all resuscitation time points in both groups, although no difference was observed between control and experimental groups (37 mm vs. 33 mm, $p=0.2$ at 5 minutes; 60 mm vs. 64 mm, $p=0.3$ at 15 minutes; 69 mm vs. 65 mm, $p=0.2$ at 4 hours). Maximum lysis (ML) was increased from baseline at 5 and 15 minutes after rTPA administration in the control group (9% baseline vs. 100% at 5 minutes, $p<0.001$; 9% baseline vs 92% at 15 minutes). In experimental animals, ML was increased from baseline 5 minutes after rTPA (9% vs. 99%, $p<0.001$), but returned to baseline by 10 minutes after administration of TXA (9% vs. 9%, $p=0.8$). There was a dramatic difference in ML between control and experimental animals at 15 minutes (92% vs. 9%, $p=0.001$) after rTPA administration. No fibrinolysis was present in either group at the 4 hour time point. Cytokine analysis is currently pending.

Conclusion: TXA rapidly and fully reverses hyperfibrinolysis despite severe acidemia in a large animal trauma model. While more studies are needed, TXA is a promising adjunct to trauma resuscitation that can be easily administered in the austere or pre-hospital setting.

NOTES

Session: XVB: Neuro/Shock Resus/Outcomes/Trauma System/CC Papers 45-54
Paper 48: 2:30-2:50 pm

STEMMING THE TIDE: THE IMPACT OF PLATELET AND DESMOPRESSIN ADMINISTRATION ON EARLY RADIOGRAPHIC PROGRESSION OF TRAUMATIC INTRACRANIAL HEMORRHAGE

Dennis Kim MD, Michael O'Leary MD, Scott Bricker MD, Angela Neville* MD, Frederic Bongard* MD, Brant Putnam* MD, David Plurad* MD, Harbor-UCLA Medical Center

Invited Discussant: Raminder Nirula, MD, MPH

Introduction: Limited data exists regarding the use of hemostatic adjuncts on the progression of post-traumatic intracranial hemorrhage. The objective of this study was to examine the impact of platelet transfusion and desmopressin (DDAVP) administration on hemorrhage progression following TBI. We hypothesized that platelet and DDAVP administration would not result in decreased early hemorrhagic progression.
Methods: A 3-year retrospective analysis of a Level-1 trauma center database of all adult blunt TBI patients. Patients who died within the first 24 hours, required immediate operative intervention, or sustained severe polytrauma were excluded. The primary outcome of interest was early (<24 hours) computerized tomography hemorrhagic progression. Secondary outcomes included quantitative changes in coagulation parameters, the need for delayed operation, complications, and mortality. Subset analysis of patients taking antiplatelets/coagulants was performed in addition to a multiple logistic regression analysis to identify independent predictors for hemorrhage progression.
Results: Of 362 TBI patients meeting the inclusion criteria, 117 (32.3%) received platelets and DDAVP [P/D(+)] and 245 did not [P/D(-)]. Overall, 31% of patients demonstrated early radiographic hemorrhage progression. Patients on antiplatelet agents were more likely to receive platelets and DDAVP ($p<0.04$). On univariate analysis, there was a statistically significant difference in the incidence of hemorrhage progression (46% [P/D(+)] vs. 24% [P/D(-)], $p<0.001$). On multivariate analysis, after controlling for age, use of antiplatelet agents, injury severity, and admission platelet count, platelet and DDAVP administration was independently associated with a decreased risk of hemorrhage progression (OR=0.39 [CI=0.23-0.70], p=0.001).
Conclusion: The administration of platelets and DDAVP results in a decreased incidence of hemorrhage progression following TBI. Prospective validation of these findings is warranted.

Predictors of Hemorrhage Progression After Logistic Regression			
Variable	Odds Ratio	95% Confidence Interval	p-value
P/D (+)	0.39	0.23-0.70	0.001
Age >= 65 years	2.60	1.30-5.20	0.009
Variables in model: age, sex, head AIS, ISS, platelet/DDAVP administration, pre-injury antiplatelet/coagulant use, admission platelet count			

NOTES

TRACHEOSTOMY TIMING IN ISOLATED TRAUMATIC BRAIN INJURY: PROPENSITY-MATCHED COHORT FROM THE AMERICAN COLLEGE OF SURGEONS TRAUMA QUALITY IMPROVEMENT PROGRAM

Aziz Alali MD, Damon Scales MD,Ph.D., Robert Fowler MD, MSc, Todd Mainprize MD, Alexander Kiss Ph.D., Charles De Mestral MD, Avery B. Nathens* MD,MPH,Ph.D., Department Of Surgery, University Of Toronto

Invited Discussant: Charles Adams, Jr., MD

Introduction: Tracheostomy is commonly performed in patients with severe traumatic brain injury (TBI) but its optimal timing is controversial.

Methods: Data on adults with isolated TBI who underwent tracheostomy were derived from 135 centers participating in the American College of Surgeons Trauma Quality Improvement Program (TQIP) over 2009-2011. Patients were divided into two exposure groups: those who received early tracheostomy (ET, ≤8 days) vs. late tracheostomy (LT, >8 days). Outcomes were compared between propensity score-matched groups to reduce confounding by indication. Proportional hazards regression treating tracheostomy as a time-dependent exposure was also undertaken as a secondary approach accounting for survivor-treatment bias and censoring of outcomes by mortality.

Results: Females, patients with older age, more comorbid illnesses, history of cardiac disease, fall-related injuries, higher initial motor GCS score, subdural hematoma and non-commercial insurance were more likely to undergo LT. From 1,811 patients, a well-balanced propensity-matched cohort of 1,154 patients was defined. ET was associated with fewer mechanical ventilation days, shorter ICU and hospital stay, lower odds of pneumonia, deep venous thrombosis, pulmonary embolism and decubitus ulcers. Hospital mortality was not significantly different between matched groups. Similar results were noted with the use of proportional hazards regression considering tracheostomy as a time-dependent variable.

Outcome	ET (N=577)	LT (N=577)	Adjusted RR/OR (95% CI)
Median ventilator days (IQR)	10 (7-15)	16 (12-22)	0.70 (0.65-0.75)
Median ICU days (IQR)	13 (9-18)	18 (15-25)	0.69 (0.65-0.74)
Median hospital days (IQR)	20 (15-28)	27 (20-38)	0.79 (0.73-0.85)
Pneumonia-no. (%)	238 (41.3)	313 (54.3)	0.59 (0.47-0.74)
DVT-no. (%)	46 (8.0)	76 (13.2)	0.57 (0.39-0.84)
PE-no. (%)	8 (1.4)	21 (3.6)	0.37 (0.16-0.85)
Decubitus ulcers-no. (%)	22 (3.8)	48 (8.3)	0.44 (0.26-0.73)
Mortality-no. (%)	52 (9.0)	40 (6.9)	1.33 (0.87-2.03)

Conclusion: In this observational study, ET was associated with shorter mechanical ventilation, ICU and overall hospital stay; but, no change in hospital mortality. Early tracheostomy may represent a mechanism to reduce in-hospital morbidity for patients with TBI.

NOTES

ARE ALL DEATHS RECORDED EQUALLY? THE IMPACT OF HOSPICE CARE TO RISK ADJUSTED MORTALITY

Rosemary A. Kozar* MD,Ph.D., John B. Holcomb* MD, Wei Xiong MSc, Avery Nathens* MD,Ph.D., University Of Toronto

Invited Discussant: Michael Sise, MD

Introduction: Hospice care can provide dignity and comfort at end of life. However, transfer of care to hospice is not recorded as an in-hospital death in some trauma registries or administrative discharge data. As a result, mortality rates for the purpose of performance improvement or public reporting will be artificially low. The current study sought to determine the impact of discharges to hospice care on risk-adjusted mortality for trauma deaths reported to TQIP (Trauma Quality Improvement Performance).
Methods: Data were derived from TQIP participating centers in 2011. Center performance was evaluated using risk-adjusted mortality and presented as observed to expected (O/E) mortality ratios derived from a logistic regression model adjusting for clinically relevant risk factors. Impact of discharge to hospice care on center performance was measured by determining the changes in performance if hospice cases were treated as survivors rather than deaths. Differences between groups (hospice vs non-hospice deaths) were compared by nonparametric Wilcoxon rank-sum test for skewed distribution data. Odds ratios are presented with their 95% CI.
Results: Data were submitted by 167 centers on 126,259 injured patients. There were 8,862 deaths: 746 (8.4%) of who were discharged to hospice and the remainder captured as in-hospital deaths. Overall, 106 centers (63.5%) reported at least one discharge to hospice care. Across centers, the proportion of deaths recorded as discharged to hospice ranged from zero to 57 %. By univariate analysis, hospice patients were older (77.1±16.2 vs 55.9±23.6 years), had lower ISS (19.2±8.4 vs28.3±13.2) and a lower head AIS (3.1±1.9 vs 3.3±2.1) than patients recorded as in-hospital deaths for centers with hospice deaths. After controlling for age, gender, race, payment status, and comorbidities logistic regression demonstrated that age>70 (OR 4.3, CI 3.5-5.1), male gender (OR 0.7, (CI 0.6-0.8), non-black race (OR 1.9, CI 1.3-2.7), non-commercial insurance (OR 1.4, CI 1.1-1.7) and and co-morbidity >2 (OR 1.3, CI 1.1-1.6) were associated with hospice care. If patients transferred to hospice care were treated as survivors in the estimation of risk adjusted mortality, 30 centers (18%) would have a change in their status (Table, ^ = changed to). Changes would be in both directions for average performing centers, while high performing centers would appear worse and poor performing centers would appear better. For centers that reported hospice deaths, the risk adjusted mortality decreased by 9.3% for every 10% increase in the proportion of deaths recorded as discharged to hospice.

Mortality including in-hospital and hospice deaths

Mortality (in-hospital)	^ high	^ average	^low	N
High	14	7	0	21
Average	9	107	7	123
Low	0	7	16	23

Conclusion: Public reporting of risk adjusted mortality is appropriately increasing. Given the large variation in proportion of deaths recorded as “discharged to hospice” rather than an in-hospital death, there is the potential for significant distortion of actual performance. Failure to consider this potential will also misguide efforts directing performance improvement activities. Discharges to hospice should be aggregated with in-hospital deaths when reporting risk-adjusted mortality.

NOTES

Benchmarking Trauma Centers on Mortality Alone Does not reflect Quality of Care: Implications for P4P.

Zain G. Hashmi MBBS, Eric B. Schneider Ph.D., Renan Castillo Ph.D., Elliott R. Haut* MD, Syed N. Zafar MD,MPH, Edward E. Cornwell* III, MD, Ellen MacKenzie Ph.D., Asad Latif MD,MPH, Adil H. Haider* MD,MPH, Johns Hopkins School of Medicine

Invited Discussant: Robert Winchell, MD

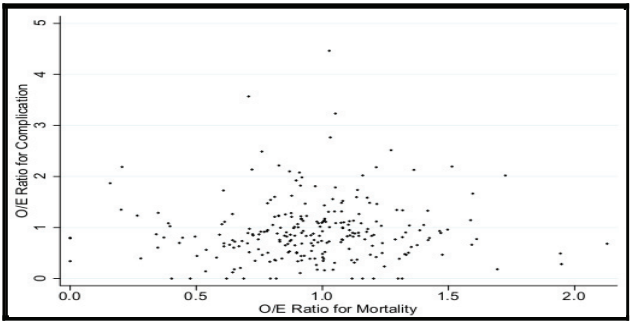
Introduction: Trauma centers are currently benchmarked on mortality outcomes alone. However, pay-for-performance (P4P) measures will allocate funding based on complications. Our objective was to determine if trauma centers were profiled on complications, would the results be similar to the current standard method of mortality based benchmarking.

Methods: Analysis of National Trauma Data Bank 2007-2010. Patients ≥16 years, with blunt/penetrating injuries and an Injury Severity Score≥9 were included. Risk adjusted observed-to-expected (O/E) mortality ratios for each center were generated and used to rank each facility as: high, average or low performing. We similarly ranked facilities on O/E morbidity ratios (defined as occurrence of any one of the following complications: pneumonia, deep venous thrombosis, acute respiratory distress syndrome, sepsis, pulmonary embolism, decubitus ulcer, surgical site infection, myocardial infarction, cardiac arrest, unplanned intubation or stroke). Concordance between hospital performance rankings was evaluated using a weighted kappa statistic. Correlation between morbidity and mortality-based O/E ratios were assessed using Pearson's R. Multiple sensitivity analyses were performed to ensure that the competing risk of death did not bias the morbidity analyses.

Results: A total of 449,743 patients from 248 facilities were analyzed. The unadjusted morbidity and mortality rates were 10.0% and 6.9%, respectively. Only 40% centers had similar performance rankings for both mortality and morbidity. Of the 114 high performers for mortality, only 66 were also high performers for morbidity (11 were ranked as average on both and 19 were low performers on both mortality and morbidity rankings). Comparison of hospital performance status using mortality and morbidity outcomes demonstrated poor concordance (weighted kappa=0.03, p=0.30). Additionally, no correlation was found between morbidity and mortality-based O/E ratios (r=0.03, p=0.60).

Conclusions: Mortality-based external benchmarking does not identify centers with high complication rates. This creates a dichotomy between current trauma center profiling standards and measures used for P4P. A benchmarking mechanism that reflects all measures of quality is needed.

Figure 1. Scatterplot comparing hospital rankings on mortality/morbidity.



NOTES

Session: XVB: Neuro/Shock Resus/Outcomes/Trauma System/CC Papers 45-54
Paper 52: 3:50-4:10 pm

EPIDEMIOLGY AND RISK FACTORS OF MULTIPLE ORGAN FAILURE (MOF) AFTER MULTIPLE TRAUMA: AN ANALYSIS OF 31154 PATIENTS FROM THE TRAUMA REGISTRY OF THE GERMAN TRAUMA SOCIETY

Matthias N. Fröhlich MD, Marco M. Schneider MD, Rolf Lefering Ph.D., Christian Probst MD, Thomas Paffrath MD, Bertil Bouillon* MD, Arasch Wafaisade MD, Department Of Trauma And Orthopedic Surgery , University Of Witten-Herdecke, Cologne-Merheim Medical Center

Invited Discussant: Joseph Cuschieri, MD

Introduction: In severely injured, who survive the early posttraumatic phase, multiple organ failure is considered as the main cause for morbidity and mortality. Current literature describes an increasing incidence of MOF. A reliable prediction of MOF could have an influence on individual monitoring and therapy of severely injured patients. The objectives of this study were 1) to assess the potential changes in the incidence and outcome of MOF after multiple trauma in Germany between 2002 and 2011 and 2) to evaluate independent risk factors for posttraumatic MOF.

Methods: We conducted a retrospective analysis of a nationwide prospective database, the Trauma Registry of the German Society for Trauma Surgery. Patients registered in the Trauma Registry between 2002 and 2011 with complete data sets were analyzed, who presented with a relevant trauma load (Injury Severity Score of >= 16) and were admitted to an intensive care unit.

Results: In total, 10201 out of 31154 trauma patients (32.7%) developed a MOF. Patients had a mean age of 45 (± 21) years, were predominantly male (73%) and had a mean ISS of 28 ± 12. During the study period mortality of all patients decreased from 18.1% in 2002 to 15.3% in 2011 ($p<0.001$). Meanwhile MOF occurred significantly more often (24.6% in 2002 vs. 31.5% in 2011; $p<0.001$). In patients with MOF, mortality decreased over the study period (42.6% vs. 33.3%; $p<0.001$). Patients who died following a MOF survived two days shorter than non-MOF patients (11 days in 2002 vs. 8.9 days in 2011; $p < 0.001$). Independent risk factors for the development of MOF following severe trauma were: age, ISS, AIS Head >= 3, AIS thorax >= 3, male gender, GCS <=8, mass transfusion, base excess < -3, systolic blood pressure < 90mmHg at admission and coagulopathy.

Conclusion: Over a study period of 10 years an ongoing decrease of mortality after multiple trauma was observed. Concordantly mortality decreased in patients with MOF. However, incidence of MOF in severely injured increased significantly. Therefore, MOF after multiple trauma remains a challenge in critical care. The prediction model from the multivariate analysis could help recognizing the early development of a MOF and preventing fulminant courses in clinical treatment. Furthermore a reliable prediction model is helpful for patient enrolment in trauma studies, in which MOF marks the primary endpoint.

NOTES

Session: XVB: Neuro/Shock Resus/Outcomes/Trauma System/CC Papers 45-54
Paper 53: 4:10-4:30 pm

GUIDING THE MANAGEMENT OF INTUBATED PATIENTS WITH PNEUMONIA AND VENTILATOR ASSOCIATED EVENTS USING SERIAL CATHETER-DIRECTED BRONCHO-ALVEOLAR LAVAGE.

Colleen M. Stoeppel MD, Evert A. Eriksson MD, Rafael Diaz-Flores MD,MPH, Pamela Coffie Pharm. D., Jojo Koshy Pharm. D., Cory Kacir Pharm. D., Kenneth Hawkins RRT, Joseph Minei* MD, Christian Minshall* MD,Ph.D., University of Texas Southwestern Medical Center at Dallas

Invited Discussant: Karen Brasel, MD, MPH

Introduction: This is the 6-month analysis of a quality initiative project evaluating the role of serial catheter-directed brocho-alveolar lavage (CDBAL) in the diagnosis and management of pneumonia in ventilated surgical intensive care unit (SICU) patients.

Methods: All intubated patients in the SICU were prospectively evaluated with serial CDBALs from 9/1/12 to 2/27/13 (57% Trauma, 22% Surgery, 19% Neurosurgery and 2% Burn). The initial screening CDBAL was performed 36 to 48 hours after time of intubation. Subsequent CDBALs were performed every four days after the screening-BAL or if the patient developed clinical signs of infection. Pneumonia was diagnosed using clinical pneumonia infection score > 6 and the presence of > 5 x 10^4 colony forming units of pathogenic organisms in the BAL culture. Patients were also evaluated for sustained (>48 hrs) respiratory deterioration requiring increased FiO_2 or PEEP corresponding to the National Health Safety Network (NHSN) definition of ventilator associated event (VAE).

Results: 100 patients underwent screening CDBAL. 41 patients had multiple CDBALs performed per the protocol. 26 patients were diagnosed with pneumonia, and 11 of these patients also met NHSN criteria for VAE. All patients that had sustained respiratory deterioration had a resolution of hypoxia an average of 51 hours after starting antibiotics. 19 of the patients with pneumonia demonstrated no growth of pathogenic bacteria in subsequent CDBAL cultures an average of 4.8 ± 1.2 days after initiation of antibiotics. The duration of antibiotic therapy averaged 9.5 ± 3.6 days in this group, and none of the patients in this group had recurrence of their pneumonia. The remaining 7 patients with pneumonia had repeat positive culture results from the serial CDBALs that were performed while they were undergoing antibiotic therapy. The average duration of treatment in this group was 21.6 ± 7 days. The antibiotic sensitivity data from the serial CDBAL cultures were used to adjust the antibiotic regimen in these patients a median 3 (2, 6) times during treatment.

Conclusion: Serial CDBAL may be a useful tool to guide the duration of antibiotic therapy in patients with pneumonia and VAE. Patients with sustained hypoxia or persistent bacterial growth may require prolonged therapy. Further studies will determine whether patients with improved oxygenation and no growth in CDBAL cultures may be candidates for early elimination of antibiotic therapy.

NOTES

Session: XVB: Neuro/Shock Resus/Outcomes/Trauma System/CC Papers 45-54
Paper 54: 4:30-4:50 pm

PROGNOSTIC ABILITY OF A NOVEL QUANTITATIVE PCR METHOD FOR ANALYZING BRONCHOALVEOLAR LAVAGE SAMPLES IN VENTILATED TRAUMA PATIENTS

Alessandro Orlando MPH, Gregory W. Thomas BS, David Bar-Or MD, Swedish Medical Center

Invited Discussant: Michael West, MD, PhD

Introduction: Standard quantitative culture techniques offer results within 2-3 days, precluding targeted and timely antibiotic therapy in ventilated trauma patients. Our real-time quantitative polymerase chain reaction (qPCR) method can detect 25 different bacteria and fungi, gram characteristics and resistance factors, and offers results in as little as 1.5 hours. Our qPCR test has undergone many refinements since its creation, and its 90 primer combinations have been finalized for initial prognostic testing. The objective of this study was to compare the qPCR method to standard quantitative culture techniques.

Methods: This was an observational cohort-study at a Level I Trauma Center from 2009 to 2012. Consecutively-admitted adult trauma patients who were ventilated, had at least one bronchoalveolar lavage (BAL) sample, and quantitative or semi-quantitative culture results were eligible for inclusion. We examined 18 randomly-chosen BAL samples for preliminary prognostic testing. DNA was isolated from the BAL samples and analyzed in 96-well plates using qPCR primers designed to amplify 90 different bacterial, fungal and resistance sequences. Culture findings were obtained from the hospital's microbiology laboratory electronic medical record system. Student's t-tests were used to examine differences in mean qPCR cycle counts, and the qPCR sensitivity was analyzed at both the genus and species level of identification.

Results: The qPCR method detected a total of 104 organisms in the 18 BAL samples, whereas quantitative culture only found 29. At the genus level of identification, the qPCR had an overall sensitivity of 76%; 70% at the species level. When examining sensitivity by individual genera, *Staphylococcus* and *Streptococcus* had the highest sensitivities (92% and 83%). The 7 organisms missed by qPCR at the genus level were *Candida* (n=4), *Pseudomonas* (n=1), *Staphylococcus* (n=1) and *Streptococcus* (n=1). The qPCR method detected 82 organisms that were not detected through quantitative cultures, including various *pneumoniae* and *pneumophila* species. When examining differences in cycle counts between qPCR and quantitative culture methods, we found that those organisms that were only identified through qPCR had significantly less DNA than those identified through both methods (mean cycle count, 28.7 vs. 23.9, $p<0.001$).

Conclusion: Our qPCR method has shown promising initial prognostic results. In an initial sample of 18 BALs, it was able to correctly identify over 75% of the bacteria cultured through the microbiology laboratory, and achieved higher sensitivities for the most common culprits of pneumonia. Many of the organisms not identified by quantitative culture had large cycle counts, suggesting that the amount of DNA (i.e. number of cells) might have been too low to result in culture identification. This study has provided us with the data necessary to further refine our primer sets. The genus-specific *Candida* primer might require modification because we were not able to detect the 4 *Candida* organisms that were grown through quantitative culture methods; this might also suggest that our institution has a unique *Candida* sequence, different from the standard *Candida* primer. Once refined, our qPCR method has the potential to identify ventilator-associated pneumonia faster and earlier than standard quantitative culture methods, allowing for targeted antibiotic therapy within 1-2 hours.

NOTES

MILITARY AWARDS

FRIDAY, SEPTEMBER 20, 2013, 4:50 PM – 5:00 PM

CONTINENTAL BALLROOM 6

PRESIDING: ROBERT C. MACKERSIE, M.D.
AAST PRESIDENT

AAST ANNUAL BUSINESS MEETING *(FELLOWS ONLY)*

FRIDAY, SEPTEMBER 20, 2013, 5:00 PM – 6:15 PM

CONTINENTAL BALLROOM 6

AAST BANQUET RECEPTION

FRIDAY, SEPTEMBER 20, 2013, 7:30 PM – 8:00 PM

CONTINENTAL BALLROOM FOYER

AAST BANQUET *(BLACK TIE)*

FRIDAY, SEPTEMBER 20, 2013, 8:00 PM – 12:00 AM

CONTINENTAL BALLROOMS 4/5/6

PETER C. CANIZARO, M.D.
June 30, 1935-September 3, 1990

Peter C. Canizaro was born on June 20, 1935, in Vicksburg, Mississippi. He received his B.A. degree from the University of Texas, Austin, in 1956 and his M.D. degree from the University of Texas Southwestern Medical School, Dallas, in 1960. Following an internship at Parkland Memorial Hospital/UTSMS, he spent two years as a Captain in the Surgical Research Unit, Brooke Army Hospital, Fort Sam Houston. Following another year as a NIH Research Fellow, he completed his surgical residency at Parkland/UTSMS from 1964-1968. He remained on staff at Parkland/UTSMS from 1968-1974, and then subsequently served on the faculty at the University of Washington (1974-1976) and Cornell University Medical Center (1976-1981) where he became Professor of Surgery. Dr. Canizaro became Professor and Chairman of the Department of Surgery at the Texas Tech University Health Sciences Center in 1982 and remained there until his untimely death in 1990. Dr. Canizaro was an innovative surgical scientist who made multiple contributions to the field of trauma and resuscitation. Examples of topics covered in his published manuscripts include the following:

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

1975 Stroma-free hemoglobin

1985 Ultrasound detection of fluid collection

1986 Endopeptidase in human lung

In recognition of Dr. Peter Canizaro's outstanding contributions to the science of trauma, the AAST has presented the Canizaro Award since 1993 to the best paper by a new member in their first two years of membership.

PETER C. CANIZARO AWARD

1993 Philip S. Barie, M.D., M.B.A.

1994 Frederick A. Luchette, M.D.

1995 Patrick J. Offner, M.D.

1996 Rodney M. Durham, M.D.

1997 Ronald J. Simon, M.D.

1998 Charles N. Mock, M.D., M.P.H., Ph.D.

1999 David A. Spain, M.D.

2000 John T. Owings, M.D.

2001 Hans-Christoph Pape, M.D.

2002 Karen J. Brasel, M.D., M.P.H.

2003 James Jeng, M.D.

2004 Eileen M. Bulger, M.D.

2005 Carnell Cooper, M.D.

2006 Saman Arbabi, M.D.

2007 Kari Hansen, M.D.

2008 Randall S. Friese, M.D.

2009 Andrew C. Bernard, M.D.

2010 Oscar D. Guillamondegui, M.D.

2011 Jay Manaker, M.D., FACEP

2012 Stephanie Savage, M.D.

SESSION XVI:

NEUROLOGIC/PREVENTION/TRAUMA SYSTEMS/CRITICAL CARE/OUTCOMES

PAPERS #55-#66

SATURDAY, SEPTEMBER 21, 2013, 8:00 AM – 12:00 PM

CONTINENTAL BALLROOMS 4/5/6

MODERATOR: WILLIAM G. CIOFFI, M.D.

RECORDER: EILEEN M. BULGER, M.D.

ENDOVASCULAR SKILLS FOR TRAUMA AND RESUSCITATIVE SURGERY (ESTARS^{TM}) COURSE: CURRICULUM DEVELOPMENT, CONTENT VALIDATION AND PROGRAM ASSESSMENT

Carole Y. Villamaria MD, Jonathan L. Eliason* MD, Brent Stansfield Ph.D., Jerry R. Spencer BS, Todd E. Rasmussen* MD, United States Air Force, 59th Medical Deployment Wing

Invited Discussant: Steven Shackford, MD

Introduction: Early definitive treatment of noncompressible torso hemorrhage (NCTH) has potential to significantly improve outcome in civilian and military trauma. Management of NCTH requires early hemostasis and definitive hemorrhage control. A potential adjunct to hemostatic resuscitation in early hemorrhage control is the use of endovascular skills involving resuscitative endovascular balloon occlusion of the aorta (REBOA). ESTARS^{TM} course was developed with the primary goal of providing fundamental endovascular training for trauma surgeons.

Methods: A team of experts developed the content for the ESTARS^{TM} 2-day course, incorporating pre and post-test exams, modular lectures, hands-on endovascular and open vascular instruments exposure, Vascular Intervention System Trainer (VIST) endovascular simulator, and live animal labs for training and testing. Course training was conducted by the same individuals using the same techniques (lecture, discussion, simulation, live animal lab). The curriculum included endovascular techniques for trauma, review of wires, sheaths, catheters, and specific regional vascular injury management (cervical, abdominal, aortic, pelvis, extremity). Live animal labs integrated femoral access, diagnostic aortography, selective angiography, coil embolization, REBOA, control of standardized iliac arterial injury, proximal/distal arterial control, and shunt placement. Participants completed a knowledge test (pre and post-course) and a summative skills assessment. The knowledge test measured participants' knowledge and management of vascular injury defined in the course learning objectives and didactics. Final exams used VIST simulator and live animal lab with standardized injury and resultant hemorrhagic shock. Subjective performance was graded by expert observers utilizing a structured global assessment scale and VIST performance metrics.

Results: Four pilot ESTARS^{TM} courses were completed; 4 participants per course. Participant knowledge and performance significantly improved after ESTARS^{TM}, measured by pre/post-test, VIST exam, and animal lab exam. Mean test scores rose from 75.3% to 85.4% after training. All participants significantly improved in performance (10% mean change, $t(7) = 5.39$, $p = 0.001$). The test was unidimensional (Cronbach's = 0.74) and showed no ceiling effect; this suggests the total test score is a reliable and useful measure of participant knowledge. Performer technical skill significantly improved for both endovascular simulation and live animal lab exams. VIST simulator skills assessment included a standardized set of procedures; participants spent a mean of 15:52 min on the task which consisted of recording 4 cine loops. Procedure times ranged from 11:06 to 25:07 min. All participants passed the live animal practical examination.

Conclusions: ESTARS^{TM} course provides optimal endovascular training for trauma utilizing both endovascular simulator training and live animal practicals with standardized injury and ensuing hemorrhagic shock. ESTARS^{TM} was confirmed as a stepwise and hierarchical training curriculum. This course demonstrated measurable improvements in key performance metrics in trauma endovascular techniques for early definitive treatment of NCTH, and should serve as a model for future competency-based structured training in endovascular trauma skills.

NOTES

IS ROUTINE REPEAT BRAIN CT SCAN NECESSARY IN All CHILDREN WITH MILD TRAUMATIC BRAIN INJURY?

Jarett K. Howe MD, Colleen M. Fitzpatrick MD, Lt. Col., USAF, Dana R. LaKam MD, Ana Gleisner MD,Ph.D., Cardinal Glennon Children's Medical Center

Invited Discussant: Denis Bensard, MD

Introduction: The use of CT for the evaluation of pediatric head trauma is common and valuable. Recent evidence suggests up to 1 in 1200 of children undergoing CT will die of a malignancy secondary to radiation exposure from their scans. Guidelines for radiation reduction in children are being developed to minimize exposure in this population. Presently, there is no accepted protocol for surveillance in children with traumatic brain injury (TBI) where repeat CT (rCT) is often performed. We hypothesized that rCT could be avoided in many children with TBI when careful clinical examination was performed. The objective of this study was to evaluate the utility of rCT by comparing the outcomes of similar patients who had a routine rCT with patients followed by clinical exam alone.

Methods: A retrospective cohort review was performed of patients admitted to a level one tertiary pediatric trauma center between July 2004 and July 2012 with a TBI, meeting the inclusion criteria of having both CT evidence of an intracranial hemorrhage (ICH) and a GCS of 14-15. Children were separated into two groups, those who underwent rCT (rCT+) and those who did not (rCT-). Data collected included age, injury severity score (ISS), mechanism of injury (MOI), and type of ICH, and clinical outcome. Patients with coagulopathies, ventriculo-peritoneal shunts, developmental disabilities, concomitant injuries or medical problems resulting in intubation or sedation not attributed to the neurologic insult were excluded.

Results: Of 435 patients admitted with accidental TBI, 120 were included in the study. 106 patients were rCT+, and 14 rCT-. rCT+ children were older (mean age 98.7 ± 7.3 vs 35.3 ± 11.5 months, p=0.0025) and more likely to have an epidural hematoma (EDH) (100% rCT with EDH vs 76% rCT all other ICH, p=0.044) as the initial CT finding. Mechanism of injury (assault, fall, sports related, motor vehicle collision, motorcycle collision, and auto vs pedestrian, p=0.557) and mean ISS (15.2±0.6 vs 13.0±1.1, p=0.195) were not significantly different between the groups. There were no worsening neurological symptoms or need for surgery in rCT- children. rCT identified 7 patients (6.6%) with CT progression of their injury. Five of these had an EDH and 2 a sub arachnoid hemorrhage. Two children underwent operation, both with EDH. Only one child demonstrated a change (decrease) in their physical examination (one of the children with EDH undergoing surgery).

Conclusion: Our study indicates that routine rCT without evidence of clinical deterioration is not indicated in children with an admission GCS of 14-15 and documented ICH on CT scan. Children with EDH appear to have a higher potential for progression of their lesion and rCT appears to be indicated in this sub group.

NOTES

Session: XVI: Neuro/Prev/Trauma Systems/CC/Outcomes Papers 55-66
Paper 57: 8:40-9:00 am

INHIBITION OF SEPSIS-INDUCED INFLAMMATORY RESPONSE BY BETA1-ADRENERGIC ANTAGONISTS

Irada Ibrahim-zada MD,Ph.D., Christopher T. Gomez BS, Peter Rhee* MD,MPH, Randall Friese* MD, University of Arizona - Tucson

Invited Discussant: Philip Barie, MD, MBA

Introduction: The use of β1-selective adrenergic antagonists (β1AA) in the setting of a pro-inflammatory state is controversial. We have previously described increased survival with β1AA treatment in an animal model of sepsis. The aim of this study was to examine the signaling pathways associated with β1AA treatment in septic animals.
Methods: 8-12 week C57BL/6 mice received intra-peritoneal injection of 12.5mg/kg lipopolysaccharide (LPS). Intravenous pumps (Alzet, Cupertino, CA) continuously delivered β1AA (esmolol; 6.7ug/kg/min) or equal volume of saline (control). A total of six animals were sacrificed at 48 hours after LPS to obtain whole blood for microarray analysis (3/group). Molecular profiling was performed on mRNA with Affymetrix Mouse Gene 1.0ST array and analyzed using ANOVA. Genes with at least 1.3-fold change in expression were included for Ingenuity pathway analysis (IPA) to identify signaling pathways associated with β1AA treatment. Top candidate genes were analyzed *in silico* based on Transfac sequences to identify common functional motifs. Additionally, the GEO database (GSE28750) was queried on 41 patient samples assayed using Human U133 Plus 2.0 Affymetrix GeneChips to compare the expression of our candidate genes between septic patients and healthy volunteers. Gene expression was compared by independent samples t-test. P value <0.05 were accepted as significant.
Results: Microarray expression analysis of mouse blood identified 348 genes differentially expressed between groups. IPA identified immunological disease as well as cell death and survival as the top gene networks significantly associated with improved survival in septic mice treated with esmolol (p=0.0001–0.036). The *CAMP* (-2.9), *TNFSF10* (-2.4), *LY6I* (-2.4), *IL18BP* (-1.7), *EDA2R* (-1.7) and *BCL2L14* (-1.7) were among the top 15 genes down-regulated in the esmolol group. Transfac analysis of the gene structure revealed that eight genes shared common promoter activating sequence for NFKB and/or BRCA1 motifs. There was no change in expression of β1-adrenoreceptor (*ADRB1*) gene in animals treated with esmolol. Analysis of GEO samples identified down-regulation of *CAMP* (p=0.032) and *TNFSF10* (p=0.001) genes in septic patients compared to healthy controls.

Gene	Chromosome	p-value	Fold change	Common Motifs
CAMP	3	0.0124	-2.9	NFKB
TNFSF10	3	0.0099	-2.4	NFKB/BRCA1
LY6I	15	0.0059	-2.4	BRCA1
TINAGL1	1	0.0361	-2.1	NFKB/BRCA1
ZBP1	1	0.0360	-1.9	BRCA1
GPR31B	17	0.0295	-1.9	NFKB
IRGM2	11	0.0126	-1.8	NFKB/BRCA1
EDA2R	X	0.0362	-1.7	NFKB/BRCA1
BCL2L14	6	0.0139	-1.7	None
IL18BP	7	0.0420	-1.7	None

Conclusion: Immunomodulation may be a major mechanism of the survival benefit observed with β1AA treatment in sepsis. β1AA treatment may lead to normalization of the TNFSF10 and CAMP genes up-regulated by sepsis. Down-regulation of these genes may be explained by activation of NFKB and BRCA1 which are involved in the immune response and cell repair pathways. Further studies using knock-out models are warranted to investigate downstream inflammation and apoptotic pathways.

NOTES

PROSPECTIVE EVALUATION OF INTRAVASCULAR VOLUME STATUS IN CRITICALLY ILL PATIENTS: DOES IVC COLLAPSIBILITY CORRELATE WITH CVP?

Stanislaw P. Stawicki MD, Eric J. Adkins MD, Naeem A. Ali MD, Chinedu Njoku Ph.D.,RN, David C. Evans MD, David E. Lindsey* MD, Charles H. Cook* MD, Daniel S. Eiferman MD, Jayaraj M. Balakrishnan MD, Sebastian Valiyaveedan MD, Sagar Galwankar MD,MPH, Creagh T. Boulger MD, Andrew Springer MD, David P. Bahner MD, RDMS The Ohio State University College Of Medicine

Invited Discussant: Jay Doucet, MD

Introduction: Intravascular fluid status assessment continues to pose a challenge in the intensive care unit (ICU). We performed a prospective study comparing the sonographic inferior vena cava collapsibility index (IVC-CI) and the traditional central venous pressure (CVP). Our primary goal was to determine the behavior of quantized CVP across commonly employed IVC-CI ranges in a large set of measurement pairs.
Methods: A prospective, multinational, observational study was performed in a sample of surgical and medical ICU patients between Oct 2009-Feb 2013. Study participats underwent scheduled, repeated sonographic evaluations of IVC-CI. Demographics, illness severity, ventilatory support status and vital signs were collected. Correlations were made between CVP ranges (<7, 7-12, 12-18, 19+) and IVC-CI ranges (<25, 25-49, 50-74, 75+). Quantized comparison of CVP (2-unit quanta) and IVC-CI (5-unit quanta) was made. Finally, we examined patterns of IVC-CI behavior with unitary CVP changes (ΔIVC-CI/ΔCVP). Of note, IVC-CI was measured using standard sonographic windows and was defined as $[(IVC_{max}\text{-}IVC_{min})/IVC_{max}]x100\%$.
Results: Fifty-nine patients with CVP/IVC-CI measurement pairs were included (mean age 55.6±17.8, 23 women and 36 men. Mean APACHE II 11.2±6.52). We analyzed 226 IVC-CI/CVP measurement pairs (mean, 3.8/patient). 83% of measurements were collected in ventilated patients. Results (**Figure 1A**, left) show that high collapsibility was associated with low CVP (<7). Specifically, CVP <7 was noted in <10% of patients with IVC-CI <25% while >80% of patients in the highest collapsibility (≥75%) group had CVP <7. **Figure 1B** (right) showss the behavior of 5-unit IVC-CI quanta versus 2-unit CVP quanta. The mean ΔIVC-CI per unit CVP was 4.86±4.84 (median 3.13) percent collapsibility.

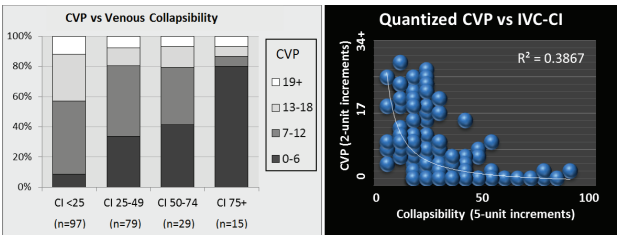


Figure 1. (A, left) Vertical bar show the proportion of patients within given CVP ranges grouped by the collapsibility index (horizontal axis); (B, right) Relationship between quantized (2-unit) CVP measurements versus quantized (5-unit) IVC-CI measurements.

Conclusion: We observed an inverse relationship between IVC-CI and CVP, with each unit of CVP corresponding to a median difference of 3.1% venous collapsibility. Our data support the contention that low collapsibility is consistent with either euvolemia or hypervolemia while high collapsibility suggests intravascular volume depletion. The behavior of the relationship between IVC-CI and CVP across the middle ranges is likely reflective of the role of the vena cava as a capacitance vessel, meant to "preserve" venous return across a broad variety of hemodynamic conditions.

NOTES

A COMPARISON OF THE INJURY SEVERITY SCORE AND THE TRAUMA MORTALITY PREDICTION MODEL: SHALL THE ISS GO GENTLE INTO THAT GOOD NIGHT?

Alan Cook MD, Jo Weddle MD, Turner Osler* MD, MSc (Biostatistics), Laurent Glance MD, David Hosmer Ph.D., Susan Baker MPH, Baylor University Medical Center

Invited Discussant: Howard Champion, FRCS

Introduction: Performance benchmarking requires accurate injury severity measurement. Despite known shortcomings, the ISS has remained the industry standard for 40 years. TMPM uses AIS or ICD-9 lexicons and may capture injury severity better than ISS. We compared TMPM to ISS and other popular injury severity measures.

Methods: We used years 2009 and 2010 of the NTDB and extracted 337,359 patient records from 146 centers with injuries reliably described in both AIS and ICD-9 lexicons. Five measures (ISS, Max AIS, NISS, ICISS, TMPM) were computed using either AIS or ICD-9 codes. The models were compared using statistical measures of performance (ROC, AIC, Brier score) as well as calibration plots. The 95% CIs were based on 1,000 bootstrapped models.

Results:

	Area Under ROC Curve		Akaike Information Criterion		Brier Mean Probability Score	
AIS	Median	95% CI	Mean	95% CI	Median	95% CI
ISS	0.85	(0.848 - 0.853)	82107	(81270 - 83046)	0.031	(0.03 - 0.031)
Maximum AIS	0.85	(0.852 - 0.857)	75992	(75055 - 76873)	0.028	(0.028 - 0.029)
NISS	0.86	(0.853 - 0.859)	75352	(74475 - 76292)	0.028	(0.027 - 0.028)
TMPM for AIS	0.89	(0.886 - 0.891)	68174	(67303 - 68965)	0.025	(0.025 - 0.026)
ICD-9						
ISS for ICD-9	0.83	(0.828 - 0.833)	88545	(87718 - 89352)	0.033	(0.032 - 0.033)
NISS for ICD-9	0.83	(0.830 - 0.837)	78048	(76918 - 79286)	0.028	(0.028 - 0.029)
ICISS	0.84	(0.835 - 0.841)	75784	(74743 - 76653)	0.026	(0.026 - 0.027)
TMPM for ICD-9	0.87	(0.869 - 0.874)	75580	(74690 - 76295)	0.029	(0.028 - 0.029)

Conclusion: NISS proved superior to the ISS in both lexicons, and is far simpler to compute. NISS should replace ISS for a quick estimate of injury severity. TMPM demonstrated superior mortality prediction compared to the ISS and other popular models using AIS or ICD-9 lexicons. The non-monotonic nature of ISS may undermine its performance. AIS captures injury severity more reliably than the ICD-9 lexicon. Regardless of lexicon, TMPM provides significantly better outcome prediction than any other model.

NOTES

IMPLEMENTATION OF CLOUD-BASED IMAGE SHARING TECHNOLOGY SIGNIFICANTLY REDUCED REPEAT CT IMAGING IN A REGIONAL TRAUMA SYSTEM

Aman Banerjee MD, David Bronson MD, Deborah Allen RN, Patricia Wilczewski RN, Robert Ferguson MD, Jeffrey A. Claridge* MD, MS MetroHealth Medical Center - Cleveland

Invited Discussant: Reuven Rabinovici, MD

Introduction: The practice of repeating computed tomography (re-CT) is common among trauma patients transferred between hospitals incurring additional cost and radiation exposure. This study sought to evaluate the effectiveness of implementing modern cloud-based technology (lifeIMAGE ®) across a regional trauma system to reduce the incidence of re-CT imaging.

Methods: This is a prospective interventional study to evaluate outcomes after implementation of lifeIMAGE® in January 2012. Key outcomes were rates of CT imaging, including the rates and costs of re-CT from January 2009 through December 2012.

Results: There were 1082 trauma patients transferred from participating hospitals during the study period (657 patients before and 425 patients after implementation) with the overall re-CT rate of 20.5%. Rates of any CT imaging at referring hospitals decreased (62% vs. 55%, $p < 0.05$) and also decreased at the accepting regional level 1 center (58% vs. 52%, $p < 0.05$) following system implementation. There were 639 (59%) patients who had CT imaging performed prior to transfer (404 patients before and 235 patients after implementation). Of these patient the overall re-CT rate decreased from 38.4% to 28.1% ($p = 0.01$). Rates of re-CT head (21% vs. 11%, $p < 0.001$), chest (7% vs. 3%, $p = 0.05$), and abdomen and pelvis (12% vs. 5%, $p < 0.001$) were significantly reduced following system implementation. The cost of repeat imaging per patient was significantly lower following system implementation (mean charges of $1,046 vs. $589, $p < 0.001$). These results were more pronounced in a subgroup of patients with an ISS > 14 with a reduction in overall re-CT from 51% to 30% ($p = 0.03$).

Conclusion: The implementation of modern cloud-based technology across the regional trauma system resulted in significant reductions in re-CT imaging and cost.

NOTES

Session: XVI: Neuro/Prev/Trauma Systems/CC/Outcomes Papers 55-66
Paper 61: 10:00-10:20 am

UNREGULATED PROLIFERATION OF TRAUMA CENTERS UNDERMINES COST EFFICIENCY OF POPULATION BASED INJURY CONTROL

Joseph J. J. Tepas, III* MD, Andrew J. Kerwin* MD, Jin H. Ra MD, University of Florida, Jacksonville

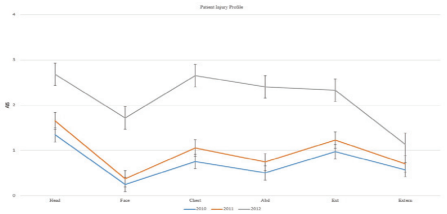
Invited Discussant: Michael Rotondo, MD

When creating your abstract, the only section headers to be used in the abstract and they need to be in this format:

Introduction: Our State trauma system includes Level I (L1) and II(L2) centers for adult care. Both levels require the same commitment of resources and clinical personnel. We evaluated the impact on coverage and regional cost of trauma care produced by activation of a LII center with no preceding needs analysis in an established trauma region with a LI center.

Methods: Patient de-identified trauma registry data for years 2010, 2011, and 2012 were analyzed to assess the effect on trauma service volume over a period at the midpoint of which the LII center was activated. Trends for each year were evaluated by patient volume, mechanism, resource utilization as reflected in transfer to ICU and ICU stay, patient severity as defined by ISS, and patient injury profile determined by mean body region AIS.

Results: Between 2010 and 2011, during which the L2 opened, overall volume at the LI center dropped 3.7% and blunt volume remained unchang ed. From 2011 to 2012 overall LI volume dropped 9.4%, and blunt injury fell by 14%. Proportions requiring immediate OR or ICU care did not change. ISS distribution at the LI center across the years was similar, however injury severity as indicated by proportion requiring >4 days of ICU significantly increased from 42%, 2011, to 77%, 2012 (Chi Square p<.0001). Injury severity increased occurred across all body regions (figure). For 2012 the new center publically reported treating 1100 patients.



Conclusion:Addition of a second trauma center in a stable region in which injury incidence was actually decreasing, doubled the cost of the most expensive component of the trauma system. These added systems costs were incurred while changing coverage for <10% of patients and adding access for the equivalent of another 20%. As evidenced by the significant increase in severely injured patients requiring >4 days of ICU care, the net effect of this was selection of less severe injury away from the established LI center, thereby concentrating its exposure to the most complex and costly components of injury care. Trauma system expansion must be based on needs assessment which assures system survival and controls societal cost.

All images, charts and tables must be placed and uploaded in the body of your abstract exactly as you want them.

NOTES

Session: XVI: Neuro/Prev/Trauma Systems/CC/Outcomes Papers 55-66
Paper 62: 10:20-10:40 am

EVIDENCE-BASED PROTOCOL FOR PROPHYLACTIC ANTIBIOTICS IN OPEN FRACTURES: IMPROVED ANTIBIOTIC STEWARDSHIP WITH NO INCREASE IN INFECTION RATES

Lauren Rodriguez BA, Hee Soo Jung MD, James A. Goulet MD, Lena M. Napolitano* MD, University of Michigan

Invited Discussant: Hans-Christoph Pape, MD

Introduction: Evidence-based guidelines for prophylactic antibiotic use in open fractures recommend short-course, narrow spectrum antibiotics for Gustilo Grade I or II open fractures and broader gram-negative coverage for Grade III open fractures. There is concern that narrow spectrum activity and decreased duration of antimicrobial prophylaxis could result in higher rates of skin and soft tissue infection after open fracture. No studies to date have assessed the impact of these guidelines on infection rates in open fractures. Infection rates before and after new protocol implementation were examined.

Methods: A new open fracture protocol was implemented; including antibiotic prophylaxis based on Gustilo Grade of open fracture, early orthopedic consultation, standardized wound inspection and dressing application to limit exposure/contamination, and tetanus prophylaxis. By protocol, Grade I and II fractures were to receive cefazolin for 48 hours or clindamycin if there was an allergy. Grade III fractures were to receive ceftriaxone for 48 hours or clindamycin and aztreonam if there was an allergy. Aminoglycosides, vancomycin, and penicillin were removed from the algorithm. Data for 174 femur and tibia/fibula open fractures (101 pre-protocol and 73 post-protocol) were retrospectively collected and analyzed. Patients who were moribund or were managed at another institution for greater than 24 hours were excluded. The National Healthcare Safety Network (NHSN) risk index was used to provide risk adjustment of surgical site infections rates. The NHSN risk index is comprised of 3 variables: ASA score (3, 4, or 5), wound classification (contaminated, dirty), and procedure duration in minutes (>75 th percentile). Each factor represents 1 point with a risk index range of 0 (low risk) to 3 (high risk).

Results: No significant differences in the study cohorts (pre- and post-protocol) were identified for demographics (age: 37.2 ± 14.8 vs 40.0 ± 17.9; male: 71.3% vs 79.5%), mechanism of injury (MVC: 67.3% vs 64.4%; other blunt: 28.7% vs 32.9%; penetrating: 4.0% vs 2.8%), or disposition (home: 46.0% vs 45.2%, care facility: 49.5% vs 50.7%, transfer: 2.0% vs 1.4%, death: 2.0% vs 2.7%). After protocol implementation, the use of aminoglycoside and glycopeptide antibiotics was significantly reduced (53.5% vs 16.4%, p=0.0001). The skin and soft tissue infection rate per fracture event was 20.8% pre- and 24.7% post-protocol (p=0.58). There was no statistically significant change after stratification for fracture grade (I: 29.4% vs 6.7%, p=0.18; II: 8% vs 20%, p=0.38; III: 29.7% vs 40%, p=0.56; no category: 13.6% vs 27.8%, p=0.43), NHSN Risk Index (0: 0% vs 0%, p=n/a; 1: 0% vs 0%, p=1; 2: 13.3% vs 28.2%, p=0.07; 3: 21.7% vs 11.8%, p=0.68, not scored: 47.1% vs 35.7%, p=0.72), or fracture site (tibia/fibula: 22.0% vs 25%, p=0.68, femur: 15.8% vs 23.8%, p=0.70). The rate per fracture event of resistant gram-positive and gram-negative organisms (defined by culture and antibiotic use) was not different (15.8% vs 17.8%, p=0.84). The MRSA rate per fracture event was also not different (2.0% vs 4.1%, p=0.65).

Conclusion: Implementation of an evidence-based protocol (short course of narrow spectrum antibiotics, excluding glycopeptides and aminoglycosides) for open fractures antibiotic prophylaxis resulted in significantly decreased use of aminoglycoside and glycopeptide antibiotics with no increase in skin and soft tissue infection rates.

NOTES

Session: XVI: Neuro/Prev/Trauma Systems/CC/Outcomes Papers 55-66
Paper 63: 10:40-11:00 am

POSITIVE EFFECTS OF A COMMUNITY PROGRAM AND LEVEL II TRAUMA CENTER, ON DECREASING GANG WARFARE IN SOUTHERN CALIFORNIA BEACH CITIES

Thomas K. Duncan DO, Javier Romero* MD, Ventura County Medical Center

Invited Discussant: Edward Cornwell, MD

When creating your abstract, the only section headers to be used in the abstract and they need to be in this format:

Introduction: Creating a change in the mindset of youth/young adults re: perception towards gangs, in the aim to decrease homicides and assaults can be challenging.

Study design: A retrospective analysis of the gang related homicides and assaults in three cities in Ventura County, California was conducted. The study evaluated data pre- and post institution of a community outreach gang violence reduction program – Operation PeaceWorks, spanning a ten year period (2002 – 2012). The program targeted gang members from 12 – 24 years of age. It involves a collaboration of previous gang members dissuading gang activity, peace building between community and gang members, as well as call-in meetings which involve: representatives of an adult level II Trauma Center, Police Department, Parents of Murdered Children, District Attorney, Probation Agency, Clergy, and City Corps. Attendees of the meetings are mentored and counseled, so that they are placed in job training/civic responsibility program, and have the opportunity to further their education, or eventually secure a permanent job. The significance of change was tested by Chi Squared analysis.

Results: The average number of participants was 40 per month; while the total number of interactions was 3,430 meetings. There was a reduction in the number of serious gang assaults over a 4 year period by 24% ($p<.05$) and by 29% over a 10 year period ($p<.01$). There was also a reduction in the average number of gang related homicides by 70% per year over a 4 year period ($p<.01$), and 75% per year over a 10 year period ($p<.01$). The average reduction in total gang related assaults was 41%, and assaults involving firearms was 60%.

Conclusion: Institution of a community gang warfare reduction program was associated with a highly significant decrease in the number of injuries related to gang activity. We believe that Trauma Center participation was an essential component of the program's success.

NOTES

Session: XVI: Neuro/Prev/Trauma Systems/CC/Outcomes Papers 55-66
Paper 64: 11:00-11:20 am

DO SPEED CAMERAS IMPACT TRAUMA CENTERS?

Jeff J. Skubic MD, Steven Vanhoy Chengcheng Hu Ph.D., Steven B. Johnson* MD, Chris K. Salvino* MD, Banner Good Samaritan Medical Center

Invited Discussant: Jack Sava, MD

Introduction: While studies, mostly from Europe and Australia, have examined the effect of speed cameras on motor vehicle collisions (MVC), little data exists regarding their impact on charges and number of patients taken to Level 1 trauma centers (L1TCs). Because of conflicting perceptions and data on their value, speed cameras were implemented along select Arizona highways in 2008 but then removed in 2010. The hypotheses of our study were two-fold: 1) Speed cameras reduce admissions to L1TCs and 2) Speed cameras reduce crash kinetic energy resulting in lower injury severity score (ISS), mortality, hospital costs and length of stay.

Methods: A retrospective review was performed of all patients admitted to L1TCs that were injured in motor vehicle crashes along a 26 mile segment of interstate I-10 in urban and suburban Phoenix. Patients were identified using both the Arizona State Trauma Registry and the Arizona Department of Transportation collision data for 2009-2011. This specific 26 mile segment of I-10 was selected because it contained at least one speed camera within one mile along its entire length from October 2008 to October 2010. Two time frames were evaluated: January 1 – December 31, 2009 when cameras were in place (2009 cameras group) and January 1 – December 31, 2011 when no cameras were in place (2011 no cameras group). Variables analyzed included number of injured persons sent to the L1TC, age, injury severity score (ISS), mortality, total hospital charges and hospital days. Mann-Whitney rank-sum and Fischer's exact test were used.

Results: The number of injured patients taken to Level 1 trauma centers increased significantly during the time frame after cameras were removed (20 vs 51, $p < 0.0001$). Similarly total hospital charges (1,173,184 vs 1,989,693, $p < 0.0001$) and total hospital days (47 vs 126, $p < 0.001$) were increased. There were no significant differences between the two time frames for age, ISS, mortality, mean charges per patient and mean length of stay per patient (See Table). In comparison, there was an overall 3% reduction in crashes in Arizona between 2009 and 2011.

Table

	2009 (Cameras)	2011 (No Cameras)	Difference	*p* value
Admissions	20	51	31(+155%)	0.0001
ISS	5.5	4.5	1.0 (-18%)	NS
Age	31.8	35.6	3.8 (+12%)	NS
Mortality (%)	1 (5%)	1 (2%)	0	NS
Total Hosp Charges	$1,173,184	$1,989,693	$816,509 (+70%)	<0.0001
Total Hosp Days	47	126	79 (+168%)	<0.0001
Mean Charges	$58,659	$39,014	$19,645 (-33%)	NS
Mean LOS	2.35	2.46	0.11 (+5%)	NS

Conclusion: In this study, removal of speed cameras from a 26 mile segment of interstate resulted in a 155% increase in injured persons taken to L1TC and a 70% increase in total hospital charges associated with a 168% increase in total hospital days. Speed cameras did not appear to impact severity of injuries. Based on this study, installing speed camera along the entire 47,000 miles of U.S. interstate highway might save nearly three billion dollars in hospital charges annually.

NOTES

THE EFFECTIVENESS OF A STATEWIDE TRAUMA CALL CENTER IN REDUCING TIME TO DEFINITIVE CARE FOR SEVERELY INJURED PATIENTS

Austin Porter MPH, Deidre Wyrick MD, Stephen Bowman Ph.D., Jeff Tabor
NREMT-P/I Arkansas Department Of Health

Invited Discussant: Jeffrey Salomone, MD

Introduction: The State of Arkansas developed and implemented its trauma system in July 2010. The Arkansas Trauma Call Center (ATCC) was a critical component in the system and was designed to navigate trauma patients, from the scene of injury or in intra-facility transfer to the appropriate trauma center based on their needs. The ATCC began operations on January 3, 2011, and at that time was not uniformly utilized by transferring facilities. The first 18 months of operations were examined to evaluate the relationship between ATCC utilization and emergency department length of stay (ED LOS) at sending facilities for patients who require urgent care.

Methods: ATCC data were linked to the Arkansas Trauma Registry (ATR) using unique identifiers; linked records were determined to have used the call center. Patients with significant injury, requiring transfer from one hospital in the system to another were the cohort of the study. This cohort was then stratified by use of the call center. Patients with significant injury were defined as those with hypotension (SBP < 90 mm Hg) or Glasgow Coma Scale (GCS) < 9 at the sending facility or Injury Severity Score (ISS) ≥ 16 at the definitive care facility. Patients under the age of 15 years of age were excluded from the analysis. patients who require urgent care.

Results: The study population who met the inclusion criteria was 834; 615 (74%) of which utilized the call center and 219 (26%) that did not utilize the call center to facilitate patient transfers. There were no statistically significant differences between the two groups (those that utilized the call center and those that did not) in terms of ISS, SBP, and GCS. The mean and median ED LOS at the sending facility for transfers in which the call center was utilized was 161 and 143 minutes compared to 181 and 160 minutes in which the call center was not utilized (p=0.03). The results of a linear regression model showed that call center utilization accounted for a 19 minute reduction in the ED LOS at the sending facility when controlling for age, SBP, GCS, ISS, and gender (p=0.01). The results of a t-test indicated that there were no statistically significant difference in the ED LOS at the sending facility for severely injured patients in which the call center was not utilized when compared to patients who were not severely injured but the call center was utilized (p= 0.6).

Conclusion: In the first eighteen (18) months following inception, a state implemented centralized call center has been effective in expediting the transfer process, and thus reducing the time to definitive care for severely injured patients. Call center utilization has improved since inception and is now a contract deliverable for trauma hospitals based on these early results.

NOTES

ENTERAL ALBUTEROL DECREASES THE NEED FOR CHRONOTROPIC AGENTS IN PATIENTS WITH CERVICAL SPINAL CORD INJURY (CSCI) INDUCED BRADYCARDIA

Charity H. Evans MD, Jeremiah J. Duby PharmD, Andrew Berry PharmD, Carol R. Schermer* MD, Christine S. Cocanour* MD, University Of California, Davis Medical Center

Invited Discussant: Deborah Stein, MD, MPH

Introduction: Cervical spinal cord injury (CSCI) is often complicated by autonomic instability and life-threatening bradycardia requiring rescue treatment with chronotropic agents or pacemaker implantation. β-adrenergic receptors offer a potential target for modulating cardiac vagal activity and heart rate. Enteral albuterol may mitigate symptomatic bradycardia in CSCI patients. The purpose of this study is to examine the effect of enteral albuterol on the frequency of symptomatic bradycardia and the need for rescue therapy in CSCI patients.

Methods: The charts of CSCI patients admitted to a level I trauma center from Feb 2008 through Mar 2012 were reviewed for demographics, episodes of symptomatic bradycardia (defined as heart rate <60 and systolic blood pressure <90), use of enteral albuterol, hospital days requiring chronotropic use, and total atropine administered. In the Albuterol group, patients received scheduled enteral albuterol after experiencing symptomatic bradycardia, with chronotropic agents used as needed for rescue treatment. In the No Albuterol group, only chronotropic agents were used as needed for rescue treatment. The Albuterol and No Albuterol groups were compared using Independent-Samples Kruskal-Wallis test for total number of bradycardic episodes, hospital days requiring chronotropic use, and total atropine administered.

Results: 18 patients with CSCI-induced bradycardia were identified. Eight patients received treatment with enteral albuterol and 10 patients did not receive enteral albuterol. 22% were female, 78% were male. The median age did not differ significantly between the 2 groups (Albuterol median age 49, IQR 28-52.5, No Albuterol median age 51, IQR 43.5-65.5). However, the median ISS was higher in the Albuterol group (median ISS 36.5, IQR 35-66.5 vs median ISS 26, IQR 27-37.25 in No Albuterol group). Patients receiving albuterol experienced 1.8 symptomatic bradycardic episodes vs 4.3 episodes in those patients not receiving albuterol (p=0.08). Hospital days on chronotropic agents were significantly less in the Albuterol group vs the No Albuterol group (1.8 vs 8.6; p=0.01). The median total atropine given was 1 mg in the No Albuterol group vs 0 mg in the Albuterol group. One patient, in the No Albuterol group, required pacemaker placement. Four patients died in each group, but no death was related to bradycardia.

Conclusions: Enteral albuterol may reduce the frequency of symptomatic bradycardia in patients with CSCI, resulting in less rescue therapy using chronotropic agents. Although this is a small study, it provides a compelling argument for the study of prophylactic enteral albuterol for CSCI-induced bradycardia.

NOTES

POSTERS

Poster # 1

SIMPLIFYING THE MEASUREMENT OF PULMONARY CONTUSION TO PREDICT PATIENT OUTCOMES

Elizabeth J. Helmer MD, Mims G. Ochsner* MD, Ernest Gray MD, William Brown MD,
Memorial University Medical Center

Introduction: Pulmonary contusion is the most frequent injury identified following blunt trauma. Complications occur in fifty percent of affected patients including positive pressure ventilation, ventilator dependent respiratory failure, acute lung injury, acute respiratory distress syndrome, and pneumonia. Previous reports have suggested that when pulmonary contusion involves greater than 20% of the pulmonary parenchyma, the incidence of complications is greater. To date, no easy method to quantify pulmonary contusion exists barring special software or formulas. The purpose of this study is to determine if a novel, simplified approach using standard lung volume measurements by CT imaging, will be predictive of complications.

Methods: A prospective study of all adult patients who sustained blunt trauma was included in this cohort. Exclusion criteria included coexisting traumatic brain injury, Glasgow Coma Score < 14, traumatic quadriplegia, tracheal or great vessel injury, severe facial and/or neck trauma, intubation prior to arrival or intubation for operative intervention. Demographic data and incidence of complications was collected. Meanwhile percentage of pulmonary contusion was measured on the admission CT using standard lung volumes in which the right upper lobe, right lower lobe, left upper lobe, and left lower lobe were designated as 20% of lung volume. The right middle lobe represented 10% with 10% variance. Incidence of complications was determined when the group was divided by percentage of lung injured (less than or greater than 20%). Confirmation that degree of lung injury was a contributor to pulmonary complications was analyzed with univariate logistic regression analysis.

Results: 125 patients met inclusion criteria and were included in this study. The mean volume of pulmonary contusion was 14%. Patients with pulmonary contusion involving greater than 20% of the pulmonary parenchyma had a statistically significant increase in the incidence of all pulmonary complications (Table). Data is incidence and * = $p < 0.05$ v < 20%.

Complication	<20% PC (n=88)	>20% PC (n=37)
Positive Pressure Ventilation	4 (4.5%)	11 (29.7%) *
Ventilator Dependent Respiratory Failure	3 (3.4%)	9 (24.3%) *
Acute Lung Injury	0 (0%)	4 (10.8%) *
Acute Respiratory Distress Syndrome	3 (3.4%)	5 (13.5%) *
Pneumonia	2 (2.2%)	6 (16.2%) *

Conclusion: Using standard lung volumes, pulmonary contusion can be easily calculated upon hospital admission and requires no additional software or formulas. In this prospective analysis, patients with more than 20% pulmonary contusion have an increased risk of complications. Simple calculation of pulmonary contusion allows rapid identification of patients at risk for complications and may improve triage of patients between hospitals to regional trauma centers and improve triage within hospitals to care areas with higher acuity care.

Poster # 2

CHARACTERISTICS OF PATIENTS WITH INHALATION INJURY WHO WERE SAFELY EXTUBATED LESS THAN FORTY-EIGHT HOURS FROM ARRIVAL AT A BURN CENTER

Salam Al-Kassis MD, Alisa Savetamal MD, Roselle Crombie* MD,MPH, Stephen Chiu MD, Criag Moores MD, Tabitha Ku Deborah Chen Tawnya Hansen John T. Schulz* MD,Ph.D., Bridgeport Hospital/Yale School Of Medicine

Introduction: Because airway protection is paramount in transport of burn patients to a burn center, first responders and emergency physicians in referring institutions have been encouraged to take a liberal approach to endotracheal intubation in those suspected of smoke inhalation injury. Intubation in the Emergency Department setting, however, is sometimes complicated by hypoxemia during intubation, aspiration, inadvertent intubation of the esophagus, and increased cost. These complications might be safely avoided if we could more precisely determine what population of patients truly need endotracheal intubation. Working with the premise that patients extubated in less than 48 hours might safely have avoided intubation, we compared records of intubated incoming transfers who were extubated within 48 hours to those who required longer mechanical ventilation in an effort to identify clinical characteristics that might be considered in the decision to intubate emergently.

Methods: We retrospectively reviewed charts of patients who were intubated at an outside hospital and transferred to our Burn Center from 2006 to 2011. Patient age, TBSA burned, mechanism of burn, patient comorbidities, presence of associated trauma, presence of upper airway edema, soot in the naso- or oropharynx, singed facial hairs, presence of stridor, abnormal lung exam, and presence of respiratory distress were factors included for analysis. Two-tailed student's t-test or Fisher's exact test were used when appropriate for comparison of variables. Statistical significance was defined as $p<0.05$.

Results: 114 patients were identified. Time to extubation was not recorded in 2 charts. 45 out of 112 patients (40.2%; 95% CI 31.6 to 49.4%) were extubated within 48 hours of arrival (26 of these 45 were extubated in less than 24 hours). 67 of 112 patients either expired soon after transfer or required more than 48 hours of mechanical ventilation. As a group, the 45 patients who were extubated within 48 hours were younger, had smaller burn injuries, were less likely to be diabetic, and had fewer overall comorbidities. Presence of upper airway edema (p 0.68); soot in the naso/oropharynx (p 0.85); singed facial hairs (p 0.21); or stridor, abnormal lung exam, or respiratory distress (p 0.34) were not statistically different between the two groups.

Conclusions: Previously identified risk factors for mortality in burns, including age and TBSA burned, were correlated with a prolonged ventilator course. Interestingly, traditionally taught clinical stigmata of smoke inhalation injury did not correlate with amount of time spent on the ventilator. Further research needs to be done to evaluate significant risk factors for safe airway management so unnecessary intubations are reduced.

Poster # 3

RATIO DRIVEN RESUSCITATION LEADS TO INCREASED RATES OF FASCIAL CLOSURE

Jacob Glaser MD, James Dunne* MD, Eric Elster MD, Emily Hathaway MD, Shawn Safford MD, Carlos Rodriguez DO, Walter Reed National Military Medical Center

Introduction: With the institution of the clinical practice guidelines, ratio driven resuscitation (RDR) in patients requiring massive transfusion (MT) has become common practice in combat casualties. Therefore, we sought to determine the effect RDR has on achieving early definitive abdominal fascial closure in combat casualties undergoing exploratory laparotomy.

Methods: Medical records of 1977 combat casualties admitted to a single US military hospital from Apr 2003 to Dec 2011 were reviewed. Patients receiving an MT and laparotomy in theater comprised the study cohort (n=172). The cohort was divided into RDR, defined as 0.8-1.2 u PRBC:1 u FFP, and no-RDR groups. Age, mechanism of injury, injury severity, blood products transfused, number of laparotomies, and days to fascial closure were collected. Assessed outcomes were early fascial closure ($\leq$ 2 days) and number of laparotomies to fascia closure. Significance and odds-ratios were determined utilizing Kruskal-Wallis Chi-Square and Backward Elimination Mutlivariable Logistic Regression

Results: The mean age of the study cohort was 24.0, mean ISS was 24.8 and IED blast was the most common mechanism of injury (74.4%).The cohort was divided in to RDR patients (N=73) and no-RDR (n=99). There was no significant difference in mean age, mean ISS, or rate of non-therapeutic ex laps between the groups. However, RDR patients had a significantly lower abdominal injury rate (34.2% v 72.7%, $p<0.01$), decreased number of laparotomies (2.7 v 4.3, $p=0.003$), and a achieved primary fascial closure faster (2.4d v 7.2d, $p=0.004$) . On multivariate analysis, RDR (OR 2.05, CI 1.03-4.07, $p=0.04$), and intra-abdominal injuries (OR 0.49, CI 0.22-0.86, $p=0.01$) were identified as independent predictors for early fascial closure.

Conclusion: Adherence to RDR guidelines resulted in significantly decreased number of abdominal operations and was identified as an independent predictor for early fascial closure. Further analysis is warranted to validate these findings.

Poster # 4

DOES TUBE THORACOSTOMY LOCATION MATTER? CURRENT TRAINING GUIDELINES MAY LEAD TO SUBOPTIMAL DRAINAGE AND THE NEED FOR SECONDARY INTERVENTIONS.

Matthew V. Benns MD, Keith R. Miller MD, Jason W. Smith* MD,Ph.D., Brian G. Harbrecht* MD, Glen A. Franklin* MD, J. D. Richardson* MD, University of Louisville

Introduction: Current training for tube thoracostomy (TT) suggests the use of the nipple line as the most inferior landmark for placement, leading most tubes to be placed at the 5th intercostal space or higher. We hypothesized that TTs placed in this manner would be suboptimal for drainage compared to TTs placed through a more inferior inter-space and thus increase the duration of TT and the need for secondary interventions. **Methods:** A retrospective review of all patients undergoing TT at a level 1 trauma center from 1/1/2010 – 9/30/2012 was performed. Only patients who had a computed tomography scan following TT insertion were included so that rib inter-space placement and position of the tube within the thorax relative to the lung parenchyma could be recorded. The duration of TT drainage and the need for secondary interventions was determined and compared for tubes placed in different rib spaces and locations. TTs were additionally divided into a HIGH and LOW interspace group for comparison. Patients who died or had an early (< 24 hours from admission) thoracotomy were excluded. Other variables included in the analysis were patient age, injury severity score (ISS), ventilator days, trauma mechanism, and chest abbreviated injury scores (AIS). **Results:** 8186 trauma patients were screened over the study period and 862 patients received tube thoracostomy. After exclusions, 291 chest tubes were analyzed. 196 (67%) patients had a blunt trauma mechanism, 95 (33%) suffered penetrating trauma.

Rib Space	Number (%)	Location	Number (%)
3 (HIGH)	2 (0.6)	Anterior	42 (14.4)
4 (HIGH)	29 (10.0)	Fissure	98 (33.7)
5 (HIGH)	75 (25.8)	Inferior	4 (1.4)
6 (LOW)	106 (36.4)	Lateral	21 (7.2)
7 (LOW)	53 (18.2)	Posterior	113 (38.8)
8 (LOW)	26 (8.6)	Intra-parenchymal	10 (3.4)
9 (LOW)	1 (0.3)	Extra-thoracic	3 (1.0)

Table 1: Distribution of rib spaces and locations (relative to lung) of TTs

Average length of TT duration was 6.0 days. 66 (22.6%) patients required a secondary intervention after primary TT insertion. Among these patients, the most common intervention was an additional TT (58.5%), followed by video assisted thoracoscopic surgery (15.4%), thoracotomy (13.8%), and percutaneous drainage by interventional radiology (12.3%). TT duration increased with increasing vent days, ISS, and chest AIS. The need for secondary interventions was significantly increased among those in the HIGH placement group (29.2% vs. 18.9%, $p = 0.03$) **Conclusion:** There is significant variability in the level and location of TT placement after trauma, but this does not appear to affect TT duration. Tubes placed in higher interspaces are associated with an increased need for secondary interventions. Although current training guidelines exist to minimize extra-thoracic placement, they may promote suboptimal drainage.

Poster # 5

RECTAL CONTRAST IS NOT A RISK FACTOR FOR SURGICAL SITE INFECTION FOLLOWING TRAUMA

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Introduction : The use of rectal contrast to enhance detection of traumatic injury to the colon and intraperitoneal rectum during computed tomography (CT) scan of the abdomen and pelvis is controversial. Concern has been raised that the addition of contrast could lead to increased fecal spillage and subsequent morbidity. We performed this study to identify the impact of preoperative rectal contrast administration on outcomes in patients with colon or intraperitoneal rectal injuries.

Methods: A retrospective review of the trauma registry of a Level I Trauma Center was performed. All patients undergoing pre-operative abdominal CT subsequently identified as having colon or intraperitoneal rectal injuries at the time of laparotomy were included. Data related to demographics, injury mechanism and severity, operative findings and interventions, postoperative complications and mortality were collected. Patients receiving rectal contrast were compared to those who did not. Study outcomes were surgical site infection, organ dysfunction, any infectious complication, and mortality.

Results: Over a five-year period, 138 patients were identified as having a colon or intraperitoneal rectal injury at the time of laparotomy. Sixty-five (47.1%) patients without immediate indication for laparotomy underwent abdominal CT prior to surgery, and comprised the study sample. Of this cohort, 42 (64.6%) patients received rectal contrast. Baseline demographic analysis revealed no difference in age, ethnicity or injury severity between the groups. Likewise, there was no difference in associated injuries, transfusion requirement or need for fecal diversion. With regard to primary outcomes, no differences in surgical site infection, organ dysfunction or mortality were identified. Logistic regression revealed that procedures involving colon repair (versus resection) had a protective effect over the incidence of surgical site infections, and any infectious complication. The only independent risk factor for any infectious complication was the transfusion of more than 4 units of packed red blood cells in the operating room.

Conclusion: Pre-operative rectal contrast for the evaluation of trauma patients can be administered safely in the presence of intraperitoneal rectal or colon injuries, without concern for increased risk of surgical site infection, organ dysfunction, infectious complications, or mortality.

Variables Associated with Surgical Site Infection			
Variable	Odds Ratio	95% CI	p-value
Colon repair (vs. resection)	0.101	0.011-0.893	0.039
Rectal Contrast	2.269	0.392-13.140	0.361

Variables Associated with any Infectious Complication			
Variable	Odds Ratio	95% CI	p-value
Colon Repair (vs. resection)	0.160	0.040-0.649	0.01
> 4 units PRBC transfused	14.908	2.132-104.256	0.006
Rectal Contrast	1.390	0.379-5.090	0.619

Poster # 6

THE INCREASING ROLE OF ENDOVASCULAR TECHNIQUES IN ARTERIAL VASCULAR TRAUMA OF THE THORACIC OUTLET: REVIEW OF A CONTEMPORARY SERIES

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Introduction:Endovascular techniques (ET) have emerged in recent years as alternative treatments for traumatic vascular lesions especially in areas of difficult access such as the thoracic outlet (TO)

Methods: A retrospective review of patients with arterial trauma of the TO treated at a Level I Trauma Center from 2008 to 2012 was conducted. Clinical presentation, treatment, and results are shown.

Results: Twenty-three patients were treated; 22 were men. The median age was 37 (IQR 23–46).Injuries were caused by firearms in 18 patients, sharp objects in three, blunt trauma in one, and iatrogenic causes in one. Median ISS and RTS were 20 (IQR 16-29) and 7.55 (IQR 6.38-7.84), respectively. Twenty-five arterial segments were compromised, most frequently the subclavian in 13 (52.0%) and the axillary in eight (32.0%). Treatment was open in 13 patients (OPEN group), initially endovascular in eight (ENDO group), and initially open with endovascular treatment of complications (ENDOc group) in two. Ten patients in the OPEN group, three in the ENDO group, and two in the ENDOc group had hypotension or active bleeding at arrival. In the ENDO group, seven patients received definitive management with primary endovascular stenting, two of them with embolization. One received endovascular proximal control with an angioplasty balloon and was subsequently repaired open. The ENDOc group patients had been repaired by open surgery, developed postoperative ischemia, and were rescued by endovascular thrombectomy and stenting. Serious complications occurred in four patients in the OPEN group: death due to exanguination in one case, cerebral infarction with subsequent death in one case, infection of the repair with exanguinating bleeding in one case, and extensive ischemic damage of the extremity treated with amputation in one case. No major complications occurred in the ENDO and ENDOc groups; their repairs were found permeable at follow-up.

Conclusion: Endovascular treatment was used in the spectrum of complex TO arterial injuries in 43% cases, from vascular control before open repair in a hypotensive patient, to the definitive and complete treatment of injuires in stable patients and the rescue of occluded open repairs. ET options continue to increase for vascular injuries in this complex topography.

Poster # 7

IMMEDIATE VERSUS DELAYED REPAIR OF DESTRUCTIVE BOWEL INJURIES IN PATIENTS WITH AN OPEN ABDOMEN

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Introduction: Trauma surgeons frequently encounter destructive bowel injuries requiring surgery. Many management strategies have been described, including delayed abdominal closure. However, the timing in which repair of the bowel injury should be performed in patients with planned open abdomen management has not been specifically addressed. Our primary objective was to determine if there was a significant difference in the incidence of major complications between immediate and delayed repair among patients with traumatic bowel injuries and planned open abdomens; we hypothesized there would be no significant difference. **Methods**: This was a retrospective cohort study of adult patients with traumatic bowel injuries treated at an ACS verified Level I trauma center between 2001 and 2011 and who underwent laparotomy and were left with an open abdomen with a planned second operation. Pediatric patients (age less than 15 years) and patients who died in the first 24 hours were excluded. Patients were identified from the trauma registry. The primary exposure of interest was dichotomously defined as definitive repair of the bowel injury during the initial trauma operation (immediate) or definitive repair during a subsequent surgery (delayed). Multiple other covariates of interest were included. The primary outcome of interest was major complications (enterocutaneous fistula, dehiscence, and abscess). Other secondary outcomes crudely evaluated included length of hospital stay (LOS), ventilator days, intensive care unit (ICU) days and mortality. The difference in incidence of major complications between the two groups was evaluated using Poisson regression. **Results**: A total of 92 patients met study eligibility. Of these, 50 (54%) underwent immediate bowel repair. No significant differences were observed between the two groups in the distribution of body mass index, race, presenting vital signs, blood product utilization, injury severity score (ISS) and overall injury pattern (based on ISS body regions). However, patients in the delayed group had somewhat ($p<0.1$) greater age, incidence of penetrating injury, mean heart rate, packed red blood cell transfusion requirements, number of surgeries, and time to abdominal closure. Patients in the delayed group had a higher number of colon injuries compared to the immediate group (86% vs 60% respectively); these patients also sustained more injuries to multiple bowel sites ($p<0.05$). The delayed group also experienced more ventilator and ICU days ($p<0.05$). Univariate analysis suggested no significant differences in the proportion of major complications between the two groups. After adjusting for ISS, penetrating injury, initial base deficit, and presence of colon injury, there was no statistical difference in incidence of major complications [(RR)=1.35, 95% CI 0.8-2.3]. ISS, penetrating injury, and colon injury were significant independent predictors of major complications. No significant differences were observed in mean LOS and mortality. **Conclusion**: Patients undergoing immediate versus delayed repair of traumatic bowel injuries and who are left with an open abdomen have comparable outcomes in terms of major complications. In our population, delayed repair appears to have been chosen more frequently in patients with an increased injury burden and physiologic demands. The clinical decision to delay definitive repair should be considered in those patients with multiple or colonic injuries, and penetrating mechanism. Our study results suggest that both approaches (immediate or delayed) may be appropriate treatment options. Significant independent predictors of major complications in our study include ISS, presence of penetrating injury, and presence of colon injury.

Poster # 8

EXPLORATORY LAPAROTOMY FOR PROXIMAL VASCULAR CONTROL IS ASSOCIATED WITH SIGNIFICANT MORBIDITY IN COMBAT TRAUMA

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Introduction: Since 2009, blast injuries have caused an increase in high level lower extremity amputations. Pre-hospital hemorrhage control through application of combat action tourniquets has been life saving. However, some traumatic amputations are very proximal and are associated with such significant soft tissue injury, that control of the iliac vessels is necessary to perform adequate surgical debridement. We seek to report the safety profile of exploratory laparotomy (EXLAP) for proximal control (PC) of extremity hemorrhage in war-injured patients

Methods: Medical records of 845 combat casualties admitted to a single US military hospital from Apr 2009 – Dec 2011 were reviewed. Patients undergoing EXLAP in theater comprise the study cohort (n=135). The cohort was divided by EXLAP indication into PC and no-PC (nPC) groups. Variables collected included demographics, injury severity and mechanism, blood transfusion, and EXLAP findings. Outcome variables included number of EXLAP/days to fascial closure, abdominal complications, and need for re-operation after initial fascial closure. Kuskal-Wallis Chi-Square test was utilized to determine significance and odds ratios.

Results: The study cohort had a mean age of 24.0±4.5, a mean ISS of 22.9±9.0, and the most common mechanism of injury was IED blast (67.7%). 44 patients were identified as PC (n=44) and 91 were identified as nPC. When comparing PC to nPC, ISS was higher (25.8±8.2 v 21.4±9.1, p=0.008), more patients had at least one lower extremity amputation (93.1% v 28.6%, p=0.0001), more units of PRBC were transfused (38.0±30.9 U v 12.3±13.2 U, p=0.0001), more units of FFP were transfused (36.1±27.2 U v 11.7±14.0 U, p=0.0001), and there were fewer non-therapeutic EXLAP rates (0% v 35.2%, p=0.0001). There were no intra-abdominal injuries found at time of index operation for the PC group. Time to fascia closure (1.8±1.9 days v 1.7±2.8 days) and EXLAPs to closure (2.4±1.3 v 2.1±1.5) were similar, p>0.05. Intra-abdominal complications were higher for PC (43% v 24%, p=0.03, OR 0.45 (95% CI 0.21, 0.95). Likewise, re-operation rates were higher for PC (29.5% v 19.8%, p =0.03, OR 2.5 (95% CI 1.1, 6.0).

Conclusion: There is significant abdominal related morbidity associated with PC. Therefore, when the clinical situation allows, alternative approaches should be considered in achieving proximal vascular control (e.g. extraperitoneal or intravascular). Further studies are warranted to determine optimal methods of proximal control in these patients.

Poster # 9

SUCCESSFUL NONOPERATIVE MANAGEMENT (NOM) OF HIGH GRADE BLUNT SPLENIC INJURY IN PATIENTS WITH CONCOMITANT SEVERE TRAUMATIC BRAIN INJURY(TBI), A NTDB STUDY

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Introduction: It is well established that even high grade (grade 4 and 5) blunt splenic injury can be managed non operatively. It is less clear if this practice should be pursued in the patient with concomitant TBI where hypotension can cause secondary brain injury. The aim of this study is to look at outcomes of NOM of high grade splenic injury in the National Trauma Database (NTDB) in patients with TBI to see if this practice should be entertained.

Methods: The NTDB was queried to evaluate all patients from 2007 to 2010 (V8-11) with blunt splenic injury OIS≥4. Patients who required immediate operation (within 4 hours of admission) were compared to those with NOM. We enumerated the NOM patients who had angioembolization (AE). We compared admission age, gender, admission systolic blood pressure, heart rate, GCS, OIS for splenic injury and AIS for head injury. The following outcomes were evaluated: mortality, hospital LOS and ICU LOS. Patients who failed nonoperative management (f-NOM) were compared to those in which nonoperative management succeeded (s-NOM) looking at the same outcomes. A statistical analysis was performed, including an odds ratio for independent predictors of f-NOM. We performed subset analysis on patients who had NOM with AIS-Head ≥4. Significance was set at 0.05

Results: Of 9,248 patients presenting with spleen OIS≥4 , 2895 patients underwent immediate surgery and 6353 had NOM. 52% of grade 5 spleens required immediate operation. 26.2% of OIS 5 splenic injuries had s-NOM. Only 6% of s-NOM had AE. Hospital (10.6 ± 12.8 vs. 14.4 ± 17) and ICU length of stay (6.8 ± 9.6 vs. 9.5 ± 12.6) were significantly (p=0.001) shorter in the nonoperative group. Only 782(12.3%) of 6353 patients failed nonoperative management of their splenic injury. Those who failed were older than 55 (26.3% vs16.9% p=0.001), and had a higher percentage of grade 5 injury (40.9% vs. 24.1% p=0.001). There was no difference in the percentage of severe brain injury (AIS ≥ 4) in patients who failed nonoperative management (18.5% vs. 19.8% p=0.395). Independent predictors of failure of nonoperative management are age 55-81 (OR 1.75, 95% CI 1.48- 2.09) and OIS-Spleen grade 5 (OR 2.18, 95% CI 1.86 – 2.54).

In the subset analysis on 1570 patients with AIS-Head ≥4 and OIS≥4, 36.2% required immediate operation. Only 170(10.8%) f-NOM. Independent predictors of f-NOM included age 55-81 (OR 1.45, 95% CI 1.09-1.93) admission SBP <90 mmHg (OR 1.62, 95% CI 1.16-2.25) and OIS≥4 (OR 4.23, 95% CI 3.34-5.38). GCS<9 did not predict f-NOM

Conclusion: 89.2% of patients with severe Traumatic brain injury and severe splenic injury (OIS grade ≥4) were successfully managed nonoperatively. Older patients with grade 5 splenic injury were more likely to require splenectomy. Severity of brain injury did not negatively affect NOM and we should continue to attempt NOM in severe TBI.

Poster # 10

NON-OPERATIVE MANAGEMENT OF SOLID ORGAN INJURY: WHO'S DOING IT RIGHT?

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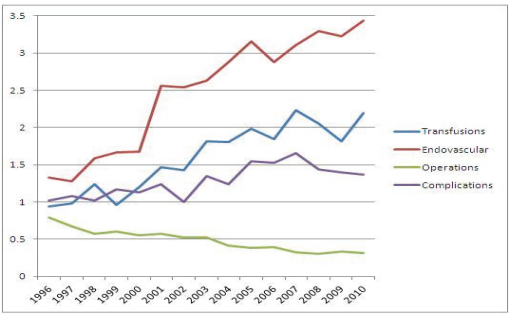
Introduction: Treatment of solid organ injury has undergone a paradigm shift from operative to non-operative management with the selective use of angiography. We hypothesized that the driving force for this change has come mainly from academic trauma centers and therefore shifts in management would lag behind in non-trauma and non-teaching hospitals. We also sought to evaluate any impact these changes may have had on transfusions, complications, and mortality.

Methods: The California Office of Statewide Health Planning and Development (OSHPD) hospital discharge database, including all non-federal hospitals in California was retrospectively reviewed. All patients admitted between 1995 and 2010 with liver, spleen, or kidney injuries were included. Bivariate and multivariate analyses were done for institutional and patient factors associated with interventions, transfusion, death and complications. Complications included surgical site infection, sepsis, urinary tract infection, pneumonia, venous thromboembolism, myocardial infarction and renal failure. Factors studied included; admission year, age, gender, injury type, race, insurance status, Survival Risk Ratio, Charlson co-morbidity index, teaching hospital and trauma center status.

Results: 93,401 patients met inclusion criteria, 28,191(30.18%) patients had an intervention; 25,691 (27.51%) operative, 3,368 (3.61%) endovascular, and 868 (0.9%) combined. Independent predictors of operation included; splenic injury, undesirable insurance, and Black or Hispanic race. Splenic injury, age 60-65, and admission to a teaching hospital or trauma center predicted endovascular intervention. Operations decreased while endovascular interventions significantly increased over time.



Independent predictors of transfusion included splenic injury, undesirable insurance, female, age>30, and Black race. Splenic injury, undesirable insurance, female gender, and age >35 were independent predictors of complications. Lack of insurance, age>35 or <5, and Hispanic race increased risk of death. Blood transfusion and complication rates increased, while the risk of death remained steady throughout the study period.

Trends in both interventions and outcomes were similar and concurrent among trauma and non-trauma centers, as well as teaching and non-teaching institutions.

Conclusion: The trend toward non-operative management was similar between teaching and non-teaching hospitals as well as trauma and non-trauma centers. Despite significant shifts in management strategy, mortality has remained steady. However, this has come at the cost of increased transfusion requirements and complication rates.

BEYOND EMERGENCY SURGERY: THE PATIENTS, SKILL SET, TRAINING, AND RESOURCES THAT DEFINE ACUTE CARE SURGERY

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Introduction: The specialty of Acute Care Surgery (ACS) is still in its formative stages and considerable debate exists regarding definition, skill-set, and training requirements. While others have described the economic, case volume, and efficiency advantages of having an in-house surgeon for common emergency conditions, no clear data exists regarding the variation in patient pathology and physiology encompassed by this category. We hypothesized that a subset of patients with pathological and physiological criteria that require a level of care that exceeds the scope of general surgery practice could be defined and this unique patient population justifies the creation of this new surgical specialty.

Methods: We reviewed patient admissions over a 1-year period to the only general surgical service at a Level I trauma center. This service is staffed by trauma/critical care trained physicians who provide elective general surgery, trauma/critical care, and emergency general surgery services. Patient data was obtained from hospital billing, OR, trauma, and ICU databases. Patients were classified into four categories: Trauma, ACS, EGS or elective. We defined ACS patients as non-elective, non-trauma patients with significantly altered physiology requiring ICU admission and/or those with specific complex operative interventions. Differences in operative interventions, ICU & hospital LOS, mortality, and discharge disposition were analyzed using Chi-square, Fishers-exact and Kruskal-Wallis tests.

Results: Over 12 months, the in-patient service evaluated approximately 5500 patients, including 3300 trauma patients. 2152 were admitted: 37% trauma, 30% elective, 28% EGS, and 4% ACS. 67% of all patients required an operation. Excluding trauma, ACS patients accounted for 13% of emergent surgical admissions. ACS & Trauma patients were more likely to require multiple operations (ACS RR=11.5 (6-22.1) $p<0.0001$; Trauma RR=5.7 (3.2-10), $p<0.0001$), have longer hospital & ICU LOS, and higher mortality compared to the EGS group ($p<0.0001$) (Table). ACS & Trauma patients were significantly less likely to be discharged directly home, reflecting a need for a higher level of care (ACS RR=0.75 (0.65-0.85), $p<0.0001$; Trauma RR=0.67 (0.64-0.71) $p<0.0001$). EGS & elective patients were similar with respect to mortality and disposition at discharge.

	Total	Trauma	Acute	Emergent	Elective	p
Admitted patients	2152	805 (37.4%)	90 (4.2%)	613 (28.4%)	644 (30%)	-
Operation Gen Surg	1291	182 (22.6%)	77 (85.5%)	390 (63.8%)	642 (99.7%)	<0.0001
Operation any service	1451	339 (42.1%)	77 (85.5 %)	393 (64.1%)	642 (99.7%)	<0.0001
Multiple Operations	143	97 (12%)	22 (24.4%)	13 (2.1%)	11 (1.7%)	<0.0001
Hospital LOS (days)	2152	8.9	23.9	4.4	2.2	0.0001
ICU LOS (days)	424	6.8	7.9	0	4.1	0.25
D/C Home	1753	506 (63%)	63 (70%)	573 (94%)	611 (95%)	<0.0001
Death	68	59 (7.3%)	7 (7.8%)	1 (0.2%)	1 (0.2%)	<0.0001

Conclusion: Although ACS patients comprise a relatively small component of patients, they represent a distinctly different cohort than EGS patients. These differences are reflected in a significantly greater need for critical care, higher likelihood of multiple operations, and greater need for post-discharge rehabilitation services. In contrast, EGS patients were most similar to Elective surgery patients. The skills and expertise to adequately care for ACS patients, including the ability to rescue from complications and provide critical care interventions, differs from those required to manage EGS patients. This important distinction lends support to development of ACS training and certification beyond that required for basic emergency general surgery.

Poster # 12

OLD DOGS AND NEW TRICKS: LENGTH OF STAY FOR APPENDICITIS IMPROVES WITH AN ACUTE CARE SURGERY PROGRAM AND THE TRANSITION FROM PRIVATE SURGICAL PRACTICE TO MULTI-SPECIALTY GROUP PRACTICE

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Introduction: Acute care surgery (ACS) programs have emerged mainly at academic medical centers in response to the American Association for the Surgery of Trauma (AAST) leadership's endorsement of ACS as an emerging specialty. We hypothesized that the transition from private surgical group practice (PP) to a not-for-profit multi-specialty group practice with an ACS program would improve outcomes for patients with acute appendicitis.

Methods: A retrospective analysis of all patients with acute appendicitis presenting to a large tertiary care hospital was performed in two time periods: 18 months of PP and the following 12 months with ACS coverage. The severity of appendicitis was graded by the proposed classification of Garst and colleagues. Length of stay (LOS) was the primary outcome measure with secondary measures including morbidity, operative duration, and resource allocation.

Results: A total of 871 patients were studied (526 PP, 345 ACS). There were no significant differences in demographics, appendicitis grade, SIRS criteria, or symptom duration between the PP and ACS cohorts. The ACS group had higher ASA classifications ($p=0.01$), greater proportion of laparoscopic appendectomy ($p<0.01$), more transitions in care between the admitting/consulting and operative surgeon ($p<0.01$), and fewer surgeons performing appendectomy (12 vs. 22). There were no differences in operative duration, disposition, 30-day emergency department visits, hospital readmission, or morbidity between groups. LOS was shorter in the ACS group (median 1.6 vs. 1.9 days, $p=0.02$) and more cases were performed during the daytime shift (44.9% vs. 36.6%, $p=0.02$). Multivariate analysis identified that overall LOS was related to appendicitis grade ($p<0.01$), ASA class ($p<0.01$), symptom duration ($p<0.01$), and laparoscopic approach ($p<0.01$), while the ACS group was less likely to revisit the emergency department postoperatively (OR 0.47, 95% CI 0.25-0.88).

Conclusions: The initial transition from PP to ACS in patients with appendicitis resulted in decreased LOS. Revisit to the emergency department was higher in the PP era and there was no increased morbidity related to transitions of surgical care with ACS.

Poster # 13

SHOULD ADHESIVE SMALL BOWEL OBSTRUCTION BE MANAGED LAPAROSCOPICALLY? A NSQIP PROPENSITY SCORE ANALYSIS

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Introduction:Celiotomy is the most common approach for medically refractory small bowel obstruction (SBO). Small reviews suggest that a laparoscopic approach is associated with shorter length of stay (LOS) and less morbidity. Given the limitations of previous studies, we sought to evaluate outcomes of laparoscopic (L) compared to open (O) adhesiolysis for small bowel obstruction, utilizing the NSQIP dataset.
Methods:Patients from the ACS-NSQIP 2005-2009 database who underwent surgery for SBO were stratified based upon surgical approach. A propensity score (PS) to undergo L instead of O was calculated based upon demographics, comorbidities, physiology, and laboratory values. Outcomes between those who actually underwent L were compared to O patients who were PS matched.

Results:There were 6,762 patients who underwent surgery. The PS matching process created 222 matched patients in L and O groups. Laparoscopy was associated with significantlylower rates of any complication (OR 0.48; 95% CI: 0.30, 0.77), including superficial site infections (OR 0.17; 95% CI:0.05, 0.57), intra-operative transfusion (OR 0.15; 95% CI:0.03, 0.71), and shorter hospital length of stay (4 vs. 10 days; $p < 0.001$). There was no significant difference in operative time, rates of re-operation within 30 days or mortality.

Conclusion:Laparoscopic treatment of SBO is associated with lower rates of post-operative morbidity than laparotomy as well as shorter hospital length of stay. Laparoscopic treatment of surgical SBO is not associated with higher rates of early re-operation and appears to be associated with lower resource utilization

Poster # 14

THE OPEN ABDOMEN IN ACUTE CARE SURGERY: FACTORS ASSOCIATED WITH SUCCESS OF DEFINITIVE FASCIAL CLOSURE

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Introduction: Damage control surgery (DCS) has been widely used in trauma patients and its use in Acute Care Surgery (ACS) has been rapidly expanding; however, surgical strategies and factors associated with success of definitive fascial closure (DFC) are not as clearly defined as in the trauma literature. The objective of our study was to identify risk factors for failure of DFC in ACS in patients with severe secondary peritonitis (SSP).

Methods:A retrospective review (2004-2010) of a prospectively collected data on patients with SSP and DCS was performed at a level one trauma/ACS center. Demographics, presentation, and management variables were used to compare primary DFC and failure of fascial closure after the initial laparotomy.

Results:A total of 217 patients, (54% male) median age 55 (IQR 40-70) underwent DC for SSP. Post-operative adverse events (failure of anastomosis) were the cause of peritonitis in 141 (65.6%) and primary inflammatory (perforated viscus /abscess) caused peritonitis in 74 (34%). Median APACHE was 16 (11-21). DFC was achieved in 111/217 (51%). Failure of DFC occurred in 106 (49%) patients; of these, 72 were managed with skin only closure (SOC) 72/106 (68%), 6 underwent split thickness skin grafting (STSG), and 5 closed by wound granulation. DFC failure patients also presented greater incidence of persistent infections (56.3% vs. 23.4%, $p<0.001$) anastomotic leaks (21,2% vs. 6.3%, $p=0.001$), and longer length of stay in hospital and ICU (Median 30 days [IQR=17-47] vs. 21 days [IQR=14-32], $p=0.006$ and Median 13 days [IQR=7-24] vs. 9 days [IQR=5-16], $p=0.002$ respectively). The median number of laparotomies after the index (re-laparotomies) was two (IQR 1-3) in the DFC versus four (IQR= 2-7) laparotomies in the SOC group ($p<0.001$). Median DFC closure time was 5 days (IQR 3-10) compared to 12 days (IQR=8-18) in the SOC group ($p<0.001$). Overall mortality was 42 (19.5%), mortality in patients with DFC was 12/111 (10.8%) compared to 30/106 (28.3%) in failure of DFC ($p<0.001$).

Conclusion: The most significant factors associated with DFC are the total number of laparotomies and time required to obtain control of abdominal cavity contamination from the original insult. Our data show that the median of two re-laparotomies carried out preferable in the first 5 days from the initial surgery are conducive to DFC success. DFC failure is associated with increased intra-abdominal septic complications. Furthermore, SOC is successful in approximately 70% of DFC failure patients and it may take up to a week longer in order to achieve SOC.

Poster # 15

THE EFFECT OF AN ACCUTE CARE SURGERY (ACS) HYBRID MODEL ON HOSPITAL LENGTH OF STAY, HOSPITAL COSTS AND OR UTILIZATION

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Introduction: Prior to July, 2012 acute care services were provided by a combination of trauma surgeons and general surgeons, with the traditional paradigm of daily/nightly coverage added to a typical general surgeon elective workload. In July of 2012 we began a hybrid ACS service comprised of both general and trauma surgeons dedicated to the 24/7 care of urgent and emergent non-trauma general surgery patients. The ACS model had dedicated operating room (OR) time, an attending surgeon of the week, and a resident team seven days a week. The purpose of this review was to evaluate Pre- and Post-ACS data for the effects on hospital length of stay (LOS), OR utilization, and hospital costs. Our hypothesis was that the dedication of a hybrid ACS team would lead to improved outcomes in this patient population.

Methods: This retrospective data review compared Pre-ACS (7/1/2011- 6/30/2012) and Post-ACS (7/1/2012- 12/31/2012) at a 763 bed Level I Trauma Center and tertiary referral hospital. The three most common acute general surgery DRGs were analyzed: acute appendicitis, acute cholecystitis, and small bowel obstruction (SBO). Average hospital LOS and total hospital costs were evaluated. The time of day that the operations were done was also recorded.

Results: A total of 582 patients were included in the study. The Pre-ACS group, totaled 392 patients and the Post-ACS group consisted of 190 patients. For all three DRGs , the ED to OR arrival time was unchanged, but average LOS (aLOS) was shorter. For acute appendicitis aLOS decreased 30.3 hours per patient. For acute cholecystitis, aLOS decreased only 3.4 hours per patient. For SBO, aLOS decreased 33.9 hours per patient. The number of cases done past the regular operating day decreased. Pre-ACS 146 cases over the 12 months were done between the hours of 5 PM and 7 AM (41.2% of the total), compared to 54 cases in the Post-ACS group (29.8% of the total, p=.01 by Fisher's Exact Test). The overall savings on hospital costs for all three DRGs over the 6 month Post-ACS period was approximately $300,000.

Diagnosis	Total pts (n)		After hours cases (n)		Avg hospital LOS (hrs)	
	Pre-ACS	Post-ACS	Pre-ACS	Post-ACS	Pre-ACS	Post-ACS
Acute Appendicitis	198	96	93	37	71.5	41.3
Acute Cholecystitis	158	78	42	14	65.0	61.7
SBO	36	16	11	3	266.3	232.4
Totals	392	190	146	54	86.8	65.7

Conclusions: A hybrid model for the ACS service, including both general surgeons and trauma surgeons, with a dedicated weekly surgeon and reserved OR time demonstrates a decrease in hospital aLOS and hospital costs, with improved OR utilization.

Poster # 16

AN ACUTE CARE SURGERY FELLOWSHIP BENEFITS A GENERAL SURGICAL RESIDENCY

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Introduction: The ACS fellowship is a 2-year program that incorporates trauma, emergency general surgery and surgical critical care. One of the requirements in establishing the fellowship is that it does not negatively impact the existing general surgery residency. The purpose of this study was to prove that the fellowship did not adversely affect the residents' operative cases and to investigate the residents' attitudes toward the ACS fellowship.

Methods: The study was conducted at a university-affiliated residency with an accredited ACS fellowship. The ACGME operative case logs of graduating residents from consecutive academic years were reviewed; for the 3 years prior to the ACS fellowship (Pre), with 1 and then 2 ACS fellows (ACS 1R, ACS 2R). The ACS fellows' cases were tracked using the AAST case log (ACS 1F, ACS 2F). Surveys based on a Likert scale (1, strongly agree; 5, strongly disagree) were distributed to the general surgery residents to evaluate the residents' perspective on the fellows. Statistical analysis was performed with one-way ANOVA.

Results:

	Pre-ACS	ACS 1R	ACS 2R	*p* value	ACS 1F	ACS 2F
Total Residents	20	22	23	N/A	1	2
Mean graduating resident major cases	1361	1341	1301	.53	172	221
- Trauma	90	87	64	.20	45	55
- Thoracic	36	28	26	.20	3	3.5
- Vascular	131	176	195	.17	7	32
- Liver	16	11	11	.16	0	2.5

There was no significant decrease in the total number of resident cases, in spite of both the fellowship and the expansion of the residency. The number of trauma cases decreased but remained above the minimum ACGME requirement . 73% of the residents participated in the survey; the majority of responses to all survey questions were "strongly agree" or "somewhat agree," indicating a very positive attitude toward the ACS Fellowship.

Conclusion: An ACS Fellowship can be established and obtain adequate case volumes for the fellows without negative impact on a surgical residency. The surgery residents viewed the ACS fellows as an asset to their education.

Poster # 17

SLIDING CT SCANNER WITH INTERVENTIONAL RADIOLOGY FEATURES (IVR-CT) SYSTEM IMPROVE THE SURVIVAL IN THE PATIENTS WITH SEVERER BLUNT TRAUMA WHO REQUIRED EMERGENCY BLEEDING CONTROL

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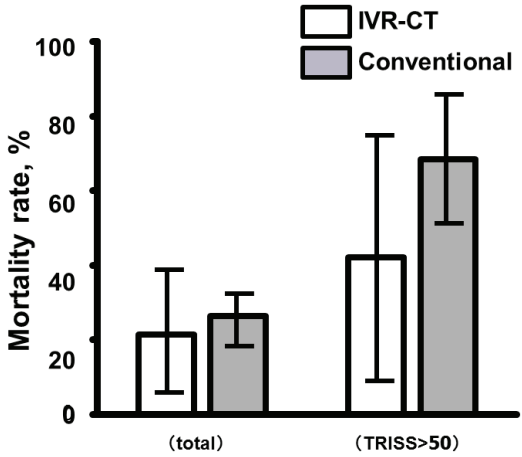
Introduction: We have advocated that CT performed before emergency bleeding control was associated with improved survival in severe trauma patients. In recent years, some major urban trauma centers have elected to install CT scanners inside emergency room. In August 2010 we installed a sliding CT scanner with interventional radiology features (IVR-CT) in our emergency room that allows emergency bleeding control without relocating the patients. The objective of this study was to assess whether IVR-CT has a beneficial impact on survival of patients with severe blunt trauma.

Methods: This historical control study was conducted from 2003 to 2012 in a level I trauma center. Inclusion criteria were patients with blunt trauma who admitted directly from the incident scene and required emergency bleeding control. We compared the time from patient arrival to CT initiation, to start emergency bleeding control procedures, and the mortality ratio in the patients of new workflow (IVR-CT group) with that of conventional workflow(C group).

Results: There were 152 patients in group C and 28 patients in group IVR-CT. CT initiation was faster in IVR-CT group. There was not significant difference of 28-days mortality ratio if compared all patients in both group. However, we found the lower mortality of IVR-CT group (42%) compared with group C (68%) in the severe patients who showed higher trauma and injury severity score (TRISS>50).
Conclusion: IVR-CT in the emergency room might create the beneficial effects on survival in severe trauma patients at high risk of death.



Poster # 18

THE ROLE OF LPS STRUCTURE IN MONOCYTE ACTIVATION AND CYTOKINE SECRETION

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Background: Gram-negative sepsis is a leading cause of morbidity and mortality as a result of organ failure. Organ failure occurs through the activation and alteration of immune cell function following exposure to lipopolysaccharide (LPS) from gram-negative bacteria. Poorly regulated cytokine secretion is a factor in the development of organ failure. These cytokines are produced in response to LPS binding to toll-like receptor 4 (TLR4) complexes. This complex is composed of the TLR4 receptor, CD14, and several supporting proteins. Binding to the complex activates mitogen-activated protein (MAP) kinase cascades and downstream synthesis and secretion of cytokines. The LPS molecule has three components: a core hydrophobic lipid (Lipid A), a hydrophilic polysaccharide chain, and a hydrophilic O-antigen chain. Lipid A has historically been implicated as responsible for the development of sepsis. However, the role of the O-Antigen is less clear. The purpose of this study is to describe the effects of monocyte stimulation with structural variants of LPS molecules.

Methods: PBMCs were isolated and stimulated with LPS, LPS with attenuated O-antigen chain (RF5), or an LPS variant containing only Lipid A (DPL). Total cell protein was extracted and the concentration of phosphorylated and unphosphorylated p38, ERK, and JNK were assessed by Western blotting. PBMCs were stimulated with LPS, DPL, or RF5 and TNF-α and IL-10 levels in cell supernatants were measured using Luminex. In order to characterize the cell-surface components involved in cytokine generation, this was repeated in PBMCs that had been pre-treated with monoclonal antibody to CD14 or TLR4. TNF-α and IL-10 mRNA levels were measured by real-time PCR following cell stimulation.

Results: PBMC treatment with wild-type LPS activates p38, ERK, and JNK, increases de novo synthesis of both TNF-α and IL-10, and stimulates the release. This cytokine release appears to be CD14 dependent but largely TLR4 independent, as treatment with CD14 antibody results in nearly complete loss of cytokine release while treatment with TLR4 antibody only attenuated cytokine release. RF5 similarly activates all three MAP kinases in a CD14-dependent and TLR4-independent manner and stimulates synthesis and release of TNF-α and IL-10. However, these cellular responses are attenuated compared to cells treated with wild type LPS. DPL selectively activates p38 but not ERK or JNK, and no increase in TNF-α or IL-10 synthesis is observed.

Conclusions: Wild-type LPS has the greatest effect on monocytes by activating MAP kinase, increasing TNF-α and IL-10 synthesis, and stimulating largely TLR4-independent cytokine secretion. The presence of intact O-antigen appears important to this activation, as evidenced by the fact that the LPS variant with attenuated O-antigen activates the same cellular pathways as wild-type LPS, but to a much lesser degree. Isolated Lipid A selectively activates only p38 without activation of transcription of inflammatory cytokines. However, despite this attenuated transcription, isolated lipid A does result in secretion of pre-formed IL-10. This finding suggests that Lipid A has an alternate mechanism for stimulating cytokine release. Given the hydrophobic structure of Lipid A, activation by lipid A could be due to direct plasma membrane binding which is distinct from activation by the TRL4 dependent O-antigen activation.

Poster # 19

DEFINING CRITERIA FOR THE RAPID SOURCE CONTROL LAPAROTOMY IN EMERGENCY GENERAL SURGICAL PATIENTS

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Introduction: The staged laparotomy in the operative management of emergency general surgery (EGS) patients is a natural by-product of trauma surgeons operating on the EGS patient-population. Indications for its application, however, are not well defined, and are currently based on the lethal triad used in trauma patients *in extremis*. This study sought to determine the acute physiologic indications for the staged, rapid source control laparotomy (RSCL) in EGS patients.

Methods: All EGS patients undergoing emergent RSCL and non-RSCL over 3 years were studied. Demographics, physiologic parameters, perioperative variables, outcomes, and survival were compared. Logistic regression models determined the influence of acute physiologic parameters on mortality and postoperative complications. EGS-based RSCL indications were defined.

Results: 215 EGS patients underwent emergent laparotomy during the study period, 53 (25%) were RSCL. With the application of the lethal triad to guide the use of RSCL, overall mortality in the RSCL group was significantly higher than in the non-RSCL population (45% vs 20%), as were complications (55% vs 28%). In EGS patients undergoing rapid source control laparotomy, hypothermia (temp<36F) and coagulopathy (requiring >3units blood) did not discriminate between survivors and non-survivors. However, compared to non-RSCL, survival was the same or significantly improved when RSCL was applied in the setting of preoperative sepsis (SIRS + infectious source), elevated lactate (≥3), acidosis (pH<7.2), high ASA score (=5), and increased age (≥70). Of the 162 non-RSCL emergent laparotomies, 27 (17%) required unplanned re-explorations; of these, 17 (63%) had sepsis preoperatively and 9 (33%) died.

Conclusion: The acute physiologic indicators which help guide operative decisions in trauma patients may not confer a similar survival advantage in EGS-RSCL patients. To replace the lethal triad, criteria for application of the rapid source control laparotomy in EGS need to be defined. Based on these results, the indications should include sepsis, lactate, acidosis, ASA score, and age. When correctly applied, the rapid source control laparotomy may help to improve survival in EGS patients *in extremis*.

Poster # 20

MALPRACTICE RISK IN ACUTE CARE SURGERY: WHAT IS THE BENCHMARK?

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Introduction: Trauma and emergency surgery care is perceived by many as a high malpractice risk specialty. Little data is available regarding malpractice risk in Acute Care Surgery. Malpractice claims history was examined over a 17-year time period in an academic Level I Trauma Center with transition to a Division of Acute Care Surgery.

Methods: The Divisions of Trauma/Burn and Surgical Critical Care were merged in 2005 to form the Division of Acute Care Surgery (ACS); including Trauma, Burn, Surgical Critical Care and Emergency Surgery. The ACS Division then expanded from 5 faculty in 2005 to 9 faculty in 2012. From 1996 to 2012, several system changes occurred. In 2002, an institutional policy of open disclosure was established in order to facilitate risk management and rapid settlement of appropriate cases outside of the court system. In 2005, an ACS faculty clinical mentorship program pairing new junior faculty members with senior faculty members was created to mitigate medicolegal liability. Internal review processes and house officer training oversight/regulation were also improved. An institutional risk management database, containing claims-related performance data, was queried to identify all ACS Division claims during the 17-year study period (Fiscal Year 1996 - FY 2012). Pre-ACS (FY 1996 - FY 2004) was compared with post-ACS (FY 2005 - FY 2012).

Results: The number of total annual claims over this time period did not change and ranged from 2 to 5 per year. With the creation of the ACS Division, the number of claims per 1000 Work Relative Value Units decreased significantly from 0.1 in FY 2002 to a nadir of 0.04 in FY 2012. The total incurred costs paid per FY decreased from a high of $3 million in FY 1996 to $0 in FY 2012. The pre-ACS period had 28 claims with $9.1 million incurred compared to the post-ACS period with 21 claims and $1.7 million incurred. A detailed analysis of claims made from FY 2002 to FY 2012 was performed. Of the 34 total cases within this time period, 14 (41%) were settled, 18 (53%) were closed, 1 (3%) resulted in plaintiff verdict, and 1 (3%) remains open. The majority of allegations were “failure to properly perform” (n=16, 47%). Of these, 12% were trauma-related, 25% ICU-related, and the remainder was related to emergency general surgery. Interestingly, “failure to monitor” (n= 6, 17%) comprised the majority of settlement dollars paid ($2.8 million vs. $1.0 million for “failure to properly perform”). Examination of settlement dollars allocated by service over the 10-year period documented that Acute Care Surgery only comprised 14.2% ($0.8 million).

Conclusion: In an academic Level I Trauma Center, malpractice risk significantly decreased over time with the development of an Acute Care Surgery model, faculty mentorship programs, open disclosure programs, improved internal review processes and house officer training. These data refute the perception that trauma and emergency surgery care is associated with high medicolegal risk.

Poster # 21

NATIONAL TRENDS IN HOSPITALIZATIONS, DEATHS, AND COSTS FROM ACUTE CARE SURGICAL EMERGENCIES, 2005-2010: BUILDING THE STAGE FOR COMPARATIVE FRAMEWORKS AND NATIONAL STANDARDS

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Introduction: The escalating crisis in access to emergency care, in addition to the growth and aging of the population, is contributing to the increasing demands for acute surgical care. This has raised questions about variations over time of mortality and costs associated with surgical emergencies. We aimed to evaluate trends of yearly estimates of hospitalizations, deaths, and costs (adjusted for inflation over time) associated with non-traumatic surgical emergencies (NTSE) in the United States (US).

Methods: From six years (2005-2010) of the Nationwide Impatient Sample (NIS) database, patients with discharge diagnoses of acute appendicitis, acute mesenteric ischemia, abdominal sepsis, non-traumatic aortic aneurysm and dissection, bowel obstruction, bowel perforation, and necrotizing fasciitis were analyzed. Yearly odds of hospitalizations and deaths and yearly averages of log-transformed costs were assessed using multilevel regressions controlled for demographics, the Charlson Comorbidity Index, and hospital characteristics. Analyses were repeated by US regions and hospital location (rural/urban).

Results: There were 1,973,604 hospital discharges with diagnoses of NTSE, accounting for 4.12% of total NIS discharges during 2005-2010. NTSE hospitalizations increased from 3.87% in 2005 to 4.37% in 2010 (adjusted odds ratio [aOR] =1.024, p-value<0.001). Overall mortality decreased from 5.32% in 2005 to 4.68% in 2010 (aOR=0.962, p-value<0.001). The greatest trend toward reduction in mortality was observed for acute appendicitis (aOR=0.889, p-value<0.001). Trends toward reduction in mortality for bowel perforation (aOR=0.996, p-value=0.746) and necrotizing fasciitis (aOR=0.976, p-value=0.213) did not reach statistical significance. Mortality increased significantly over time for bowel perforation in the South (aOR=1.031, p-value=0.041) and in rural hospitals (aOR=1.082, p-value=0.008). Median costs decreased from $12,693 in 2005 to $10,981 in 2010 (adjusted coefficient [aC] =-0.029, p-value<0.001), a trend that was consistent among all US regions. Cost did not vary significantly over time in rural hospitals (aC=0.000, p-value=0.759).

Conclusion: Despite the significant increase in NTSE related hospitalizations over time, mortality and costs are decreasing significantly, perhaps related to improvements in hospital management and increased penetration over time of acute care surgical models in the US. However, variations among US regions and hospital location were observed, these may be related to geographical differences in acute care surgical coverage for these conditions.

Poster # 22

Perineal Necrotizing Soft Tissue Infection (PNASTI) : An Observational Study of Multidisciplinary Care and Lower than Expected Mortality.

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Introduction: Fournier's gangrene, or perineal necrotizing soft tissue infection (PNASTI) is an aggressive time sensitive disease associated with high mortality and disability. Previous reviews report a mortality rate ranging from 20-30% and up to 80%. We reviewed the treatment and outcome of patients presenting to our center with PNASTI under the care of a multidisciplinary team. This includes immediate surgery performed by an in hospital trauma team after admission from a referring facility. The patient is then transferred to the Soft Tissue service within 12 hours of admission with a surgical team dedicated to the management of necrotizing soft tissue infection. Further surgical debridement, wound care, and fecal and urinary management are performed at the discretion of the team with return to the operating occurring on average every 48 to 72 hours until the wound is clean or closed. Consultations to hyperbaric oxygen therapy, infectious disease, nutrition, physical therapy are done for every patient as well as Endocrinology evaluation and admission to a closed surgical intensive care unit as indicated. Ongoing outpatient care occurs in a dedicated clinic.

Methods: We abstracted records of patients presenting with PNASTI to our center from 2006-2012 including demographics, comorbidities, surgical interventions, and outcome.

Results: Of 190 patients presenting with PNASTI average age was 54 and 26% of patients were female. Diabetes was the most prevalent comorbidity in 116 patients (61%). An average of 3.2 operations were performed over a 15.7 mean length of stay with 43% of patients undergoing surgery at a referring facility before transfer. Fifty-five (29%) of the patients had wounds too extensive to accomplish primary wound closure. Orchipexy was used to facilitate wound closure in 51% of male patients and 54 (28%) underwent surgical fecal diversion. Surgical urinary diversion was performed in 7.8% of patients. Primary wound closure was accomplished in 85 patients (45%) before discharge. Amongst 144 patients who survived and returned for follow up, 106 (74%) achieved complete wound healing observed over a mean period of 8.4 weeks after discharge. Mortality rate was 10.2%, including withdrawal of care for 12 (57%) of these patients:

Conclusion: In this observational study of PNASTI, the largest yet reported, a far lower than previously reported mortality rate was observed, with only 4.7% of deaths occuring in patients without the intention of withdrawal of care, and 10% mortality overall. While primary wound closure was acheived in less than one half of the patients, the majority of patients went on to wound healing with ongoing outpatient wound care and treatment. This model of care demonstrates a successful approach to this physiologically challenging and anatomically complex disease process.

Poster # 23

EARLY TRACHEOSTOMY IN POLYTRAUMA PATIENTS SAVES TIME AND MONEY

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Introduction: Patients suffering brain and thoracic injuries are often difficult to liberate from the ventilator and require tracheostomy. Best timing of tracheostomy remains ill-defined. While prior studies have addressed early versus late tracheostomy, they have generally suffered from the use of historical controls, which cannot account for variations in critical care management over time. Propensity scoring can be utilized to identify controls from the same patient population, minimizing the impact of confounding variables. The purpose of this study was to determine outcomes associated with early versus late tracheostomy by application of propensity scoring methodology.

Methods: Patients requiring intubation within 48 hours and ultimately receiving tracheostomy from January 2010 to June 2012 were identified from the trauma registry at a Level 1 trauma center. Early tracheostomy (ET) was defined as tracheostomy performed on or before the fifth hospital day. ET patients were matched to late tracheostomy patients (LT, tracheostomy after day 5 of admission) using variables including severity of chest and head injury, age and transfusion requirement. Outcomes included TICU length of stay (LOS), ventilator days and ventilator associated pneumonia (VAP) rates. Costs for these services were calculated using average daily billing rates for ICU care and ventilator management at our institution.

Results: There were 106 patients included in this analysis, 53 each in the ET (mean day of tracheostomy = 4) and the LT (mean day of tracheostomy = 10) cohorts. 71% of patients had an average age of 47 years and 94% suffered blunt injury, with an average NISS of 23.7 (Table). Patients in the ET group had a significantly shorter TICU LOS (21.4 days vs. 28.6 days, $p<0.0001$) and a significantly lower number of ventilator days (16.7 days vs. 21.9, $p<0.0001$) compared to the LT group. ET patients also had significantly less VAP compared to LT patients (34% vs. 64.2%, $p=0.0019$).

Table 1. Demographics of Early and Late Tracheostomy Groups

	ET (n=53)	LT (n=53)	p-values
Age (years)	48	46	0.6798
Blunt (%)	92.5%	94.3%	0.6957
Head AIS ($\geq$ 3)	37.7%	41.5%	0.6912
Chest AIS ($\geq$ 3)	66%	62.3%	0.6854
Admit SBP	110.2	118.9	0.1391
Admit BE	-4.88	-3.48	0.3285
PRBC/24hr	3.89	2.36	0.2077
ICU LOS	21.37	28.64	<0.0001
Ventilator Days	16.69	21.92	<0.0001
VAP	34%	64.2%	0.0019

Conclusion: In the current era of increased focus on resource utilization and health-care costs, early tracheostomy significantly decreased both pulmonary morbidity and critical care resource utilization. This translates to an appreciable cost savings, at minimum $52,173 per patient and a potential total savings of $2.8 million/year for the entire LT cohort. For trauma patients requiring prolonged ventilatory support, early tracheostomy should be performed.

Poster # 24

MIDDLE LATENCY AUDITORY EVOKED POTENTIAL INDEX MONITORING OF CEREBRAL FUNCTION TO PREDICT FUNCTIONAL OUTCOME AFTER EMERGENCY CRANIOTOMY IN PATIENTS WITH BRAIN DAMAGE

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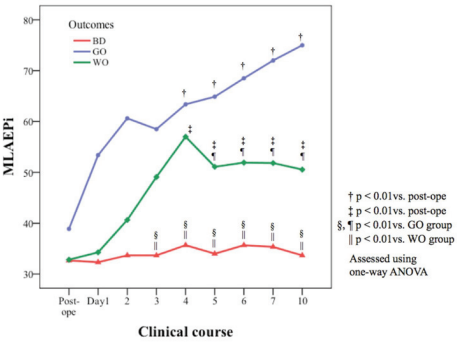
Introduction: Monitoring cerebral function is crucial in surgical critical care. However, until date, there is no satisfactory report on the monitoring of cerebral function to predict functional outcome after brain damage, i.e., traumatic brain injury (TBI) and stroke. The middle latency auditory evoked potential index (MLAEPi) monitor (aepEX plus®, Audiomex, Glasgow, UK) is a mobile MLAEP monitor measuring the degree of consciousness and representing it using numerical values. We considered that MLAEPi can predict neurological outcome after emergency craniotomy among patients with disturbance of consciousness (DOC) caused by brain damage.

Methods: After obtaining approval, the abovementioned patients who underwent emergency craniotomy within 12 hours of the damage, and who were subsequently monitored using MLAEPi were entered in this study. DOC was defined as an initial GCS score less than 8. MLAEPi was measured for 30 days after craniotomy. All patients were administered sedatives for 2 or 3 days after the onset of brain damage. Neurological outcome was evaluated before discharge using a cerebral performance category (CPC) score, and classified into 3 groups: good outcome (GO) for a CPC score of 1 or 2, worse outcome (WO) for a score of 3 or 4, and brain death (BD) for a score of 5.

Results: Twenty-six patients were included in this study (12 TBIs; 8 cerebral hemorrhage; 5 subarachnoid hemorrhage and 1 infarction). With regard to outcome, 9 patients had GO, 12 had WO, and 5 showed BD. MLAEPi was observed to be significantly higher on day 4 than at immediately after craniotomy in cases of GO or WO; significantly lower in BD than in GO or WO after day 4; and significantly higher in GO than in WO after day 5. (see Figure)

Conclusion: MLAEPi satisfactorily denotes cerebral function and predicts outcomes after emergency craniotomy in patients with DOC due to brain damage.



Poster # 25

CLINICAL RELEVANCE OF A ROUTINE DAILY CHEST X-RAY IN THE SURGICAL INTENSIVE CARE UNIT

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Introduction: A daily Chest X-ray (CXR) is routine in many surgical intensive care units (SICU). However, this practice has more recently come into question. The purpose of this study was to implement a selective CXR protocol in a high volume academic SICU and evaluate its impact on clinical outcomes.

Methods: A continuous series of patients admitted to the Los Angeles County + University of Southern California (LAC+USC) Medical Center SICU in February 2010 was compared with the patients admitted in February 2012. Between the two time periods a protocol was instituted in the SICU designed to eliminate the routine ordering of daily CXRs. All CXRs performed for each patient were reviewed and the indication for ordering documented. CXRs were divided into 2 groups, those without a documented indication; the automatic daily CXR (ADCXR) and those with documented indication; the physician-directed (PDCXR). All findings were reviewed by a board-certified radiologist. Patient demographics, comorbidities, ICU interventions, and admitting surgical service were documented. Outcome data collected included mortality, overall length of stay (LOS) and ICU LOS, mechanical ventilator free days, and complications.

Results: In 02/2010 and 02/2012, 107 and 90 patients were admitted to the SICU, respectively, for a total of 1,384 patient days. Overall the number of CXRs performed decreased from 363 (56.8% of patient-days) in 2010 to 291 (39.8% of patient days; $p<0.01$) in 2012. ADCXRs decreased in 2012 (123, 60.9% of patient days) from 2010 (211, 83.7% of patient days, $p<0.01$) with a concomitant increase in the number of PDCXR, from 16.3% to 39.1% of patient days ($p<0.001$). A greater proportion of PDCXRs had new findings (80.8%) compared to ADCXRs (23.5%, $p<0.001$). None of the findings on ADCXRs were considered of clinical significance. PDCXRs identified more new pneumonias (0, 0.0% vs 9, 9.3%; $p= 0.04$) and were used more often in management of tubes and lines (0, 0.0% vs 78, 80.4%; $p<0.001$). There was no difference between the two years in terms of overall LOS, ICU LOS, ventilator free days, morbidity or mortality.

Conclusion: Institution of a SICU protocol eliminating the automatic ordering of daily CXRs was successful in decreasing the number of CXRs performed, without affecting ICU LOS, overall LOS, need for mechanical ventilation, morbidity or mortality. Physician-directed ordering of CXRs increased the diagnostic value of the CXR and decreased the number of clinically irrelevant CXRs performed, resulting in decreased overall radiation exposure and hospital costs.

Poster # 26

PROPORTIONAL ASSIST VENTILATION VERSUS PRESSURE SUPPORT FOR SPONTANEOUS BREATHING TRIALS: A MECHANISTIC STUDY

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Background: Proportional assist ventilation (PAV+) is an novel ventilator setting that adjusts the level of ventilator support based upon moment-to-moment changes in breathing mechanics. This study was designed to determine ventilatory response when PAV was used for spontaneous breathing trial (SBT). Pressure support (PS), a frequently used method for ventilator discontinuation, was selected for control.

Methods: All adult patients on mechanical ventilation for > 48hours in the Trauma Intensive Care Unit (TICU) were eligible. Patients determined to be ready for a SBT were placed on a PS setting of 5 cmH_20 and Positive End Expiratory Pressure (PEEP) of 5 cmH_20 (PS 5/5) for 10 min and average rapid shallow breathing index (RSBI) was calculated. This value was then used as our target RSBI to determine comparable PAV+ % support. Patients with average RSBI > 100 after 10min on PS were considered to have failed their SBT and were not included in this study. Eligible patients were initiated on PAV+ of 30% support for 10 min after which, if the RSBI was more than ± 10% target RSBI, the percent support was adjusted in ± 10% increments. Trials were performed in 2 min intervals and respiratory mechanics recorded until the target RSBI was achieved. SBTs lasted a total of 30 min. Qualified patients were extubated shortly therafter.

Results: A total of 53 patients underwent a total of 59 trials. The average RSBI, respiratory rate, tidal volume, and minute ventilation on PS are shown in the table. The differences between the two modalities were not statistically significant. There was a significant difference in the mean positive airway pressure (MPAP) as well as the Delta-P (calculated as the difference between Peak Inspiratory Pressure and the Peak End Expiratory Pressure or PEEP). The patients had a significantly lower Delta-P and MPAP on PAV+30 when compared to PS, as shown. There were no complications during the SBT's and all the patients studied appeared to tolerate both modalities equally well.

	Units	PS 5/5	PAV+ 30%	p Value
Resp Rate (f)	breaths/min	19.98 +/- 0.7	20.48 +/- 0.9	0.66
Tidal Volume (Vt)	mL	522 +/- 16	517 +/- 18	0.84
RSBI		41.6 +/- 14	41.6 +/- 15	0.53
Minute Ventilation (VE)	L/min	10.14 +/- 0.44	10.46 +/- 0.64	0.68
MPAP	cmH2O	7.2 +/- 0.06	6.9 +/- 0.09	0.02*
ΔP	cmH2O	4.8 +/- 0.25	5.6 +/- 0.07	0.003*

Conclusion: This study compared respiratory mechanics of patients on proportion assist ventilation to pressure support settings during an SBT. We found that when patients met criteria for SBT, PAV+ at 30% support was an equivalent mode of ventilation with regards to respiratory rate, RSBI, tidal volume, and minute ventilation as well as patient tolerance. Of note, when patients were placed on PAV+30% they had an average drop in their Delta-P and MPAP, possibly indicating improved patient-ventilator synchrony and patient comfort. Furthermore, we noted that PAV30+ may offer some clinical advantages over conventional ventilation, in that more information such as compliance, resistance, and work of breathing measurements can be obtained. These data provide evidence for the interchangeable use of PAV+ and PS in patients undergoing SBT and potential benefits of PAV+ over conventional ventilator settings.

Poster # 27

IT'S ALL ABOUT COMPLIANCE: PROPORTIONAL ASSIST VENTILATION HELPS PREDICT SUCCESSFUL LIBERATION FROM MECHANICAL VENTILATION IN TRAUMA ICU PATIENTS

Patrick Greiffenstein MD, John N. Melvan Ph.D., Terry Forrette MHS, RRT, Jeffrey Gruner MD, Rebecca Schroll MD, Jennifer Mooney MD, Alan B. Marr MD, Lance E. Stuke MD, John P. Hunt* MD,MPH, Juan C. Duchesne* MD, LSU Department of Surgery

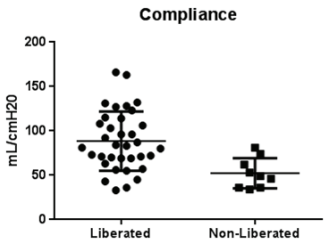
Background: One of the most accurate predictors of successful liberation from mechanical ventilation (MV) is the rapid shallow breathing index (RSBI). However, many patients predicted to successfully liberate from MV based on RSBI eventually fail. We hypothesized that other measurements obtained using Proportional Assist Ventilation (PAV+) during a Spontaneous Breathing Trial (SBT) can better predict liberation failures.

Methods: A retrospective review of our database examining MV liberation in our trauma/surgical ICU. Patients who met criteria for SBT per our protocol, having adequate neurologic, hemodynamic and respiratory parameters on Pressure Support 5 cmH2O, PEEP 5 cmH2O (PS 5/5) and RSBI <100, were placed on PAV+ 30% support for 30 min. We have found PAV+30% to be well-tolerated and equivalent to PS 5/5 as an SBT mode in our patients (unpublished data). Liberation was defined as greater than 24 hour ventilator-free breathing. Non-liberated patients required return to MV within 24hrs.

	Units	Lib	Non-Lib	p Value
# Trials		35	9	N/A
f on PS 5/5	breaths/min	18.4 +/- 0.9	23.7 +/- 2	0.01*
f on PAV 30%	breaths/min	18.4 +/- 0.9	25.1 +/- 3	0.006*
VE on PS 5/5	L/min	9.5 +/- 0.4	12.6 +/- 1.1	0.004*
VE on PAV 30%	L/min	9.0 +/- 0.4	14.3 +/- 2.4	0.0007*
MPAP on PS 5/5	cmH2O	7.1+/- 0.07	7.6 +/- 0.05	0.007*
MPAP on PAV-30%	cmH2O	6.8 +/- 0.07	7.5 +/- 0.3	0.003*
ΔP on PAV 30%	cmH2O	4.3 +/- 0.2	6.9 +/- 0.9	0.0003*
WOB on PAV 30%	Joules/L	0.7 +/- 0.05	1.2 +/- 0.1	0.001*
Compliance	mL/cmH2O	88.5 +/- 5.6	52.33 +/- 5.6	0.003*

Results: A total of 44 trials were conducted on 43 patients. There was no statistical difference in the average RSBI or tidal volumes (Vt) between the liberated (Lib) and the non-liberated (Non-Lib) groups. There were significant differences between Lib and Non-Lib in the respiratory rate (f) and minute ventilation (VE) as shown. The ΔP is the Peak Inspiratory Pressure minus PEEP, which also varied significantly when patients were on PAV+30%, reflecting the real respiratory support requirements. Lastly, Non-Lib patients exhibited a higher Work of Breathing (WOB) and lower compliance , as shown.

Conclusion: This study examined the respiratory mechanics of ventilated patients during the SBT. We found important differences in the respiratory demands between patients who were successfully liberated and those who were not. The ΔP was significantly higher in the latter, which on PAV+30% setting is patient-driven. This reflects a decreased compliance and a corresponding increased WOB, as these patients maintained their low RSBI by temporarily compensating with a higher f. We postulate that decreased compliance among Non-Lib patients increased respiratory demand and led to liberation failure.

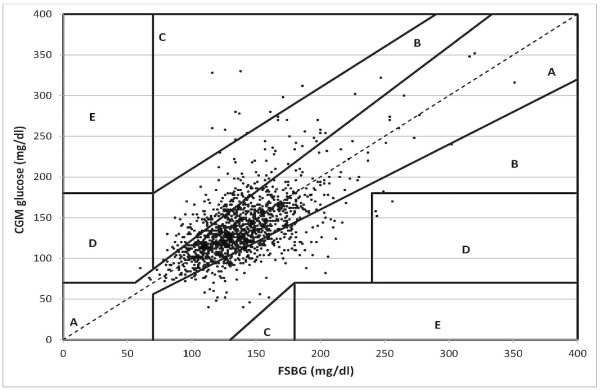


Poster # 28

CONTINUOUS GLUCOSE MONITORING IN THE SURGICAL INTENSIVE CARE UNIT: FINDING THE SWEET SPOT

Kevin M. Schuster* MD, Kimberly Barre RN, Kimberly A. Davis, MD* MBA, Silvio E. Inzucchi MD, Robert Udelsman, MD MBA, Yale School of Medicine

Introduction: Intensive glycemic control (IGC) in the surgical intensive care unit remains controversial partly because it entails a substantial risk of hypoglycemia. If demonstrated to be accurate, continuous glucose monitoring (CGM) using subcutaneous (SQ) sensors may mitigate this risk of IGC. **Methods:** In this blinded prospective study, patients admitted to the surgical intensive care unit (SICU) requiring insulin infusion were eligible. SQ CGM (Medtronic Guardian REAL-Time CGM, Northridge, CA) was placed in the abdomen or thigh and calibrated every 8-hrs, based on capillary (fingerstick) blood glucose readings (FSBG). Monitors were changed every 72 hrs (or if malfunction) until 144 hours or insulin infusion stopped. CGM data were compared with FSBG at least every 2 hours. Other data included demographics, diagnoses, fluid balance, doses of vasopressors and/or steroids, and any IV or enteral glucose source. FSBG and CGM readings were compared (mean and median absolute difference [MAD/MedAD], correlation coefficients, Bland-Altman plots, and Clarke error grids.) **Results:** Twenty four patients were enrolled (11 men; mean age 59±14.1 yrs; BMI 37.9±10.1 kg/m^2; fluid resuscitation in first 24 hrs, mean 6.1±3.5 L; APACHE II on day 1: 20.3±6.4; 17 requiring vasopressor therapy). Correlation coefficient between FSBG and CGM was 0.61 ($p<0.001$). The MAD between FSBG and CGM was 22.0 ± 21.9 mg/dl and the MedAD 16.0 IQR 24.0 mg/dl. The Bland-Altman plot did not identify any trends in accuracy related to FSBG level. Time from calibration did not correlate with MAD , coefficient of 0.008 ($p=0.771$). The Clarke error grid (figure) analysis demonstrated that 98.9% of data points were in zones A (71.3%), indicating agreement with FSBG ±20%, or zone B (divergent, but discrepancy would likely not lead to patient harm) Just 0.81% of data points were in zone C (potentially dangerous overcorrection likely) and only 0.27% were in zones D or E (potentially dangerous failure to detect hypoglycemia or hyperglycemia). **Conclusions:** In this preliminary investigation, CGM appears reasonably accurate in the SICU, despite widespread use of pressors and large volume resuscitation. Further investigation into the accuracy of these devices to assist clinicians in achieving IGC is warranted.



Poster # 29

EXPRESSION OF CELL SPECIFIC SURFACE ANTIGENS ON ENDOTHELIAL MICROPARTICLES IN PATIENTS WITH SYSTEMIC INFLAMMATORY RESPONSE SYNDROME

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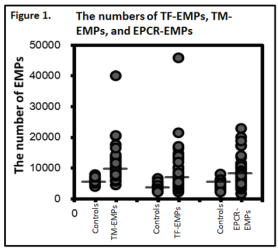
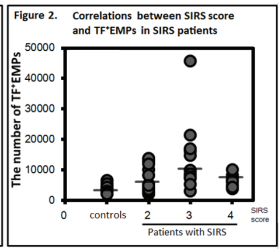
Introduction: The role of endothelial microparticles (EMPs) has not been thoroughly clarified in the pathogenesis of critical illness. EMPs present several cell specific surface antigens and these subpopulations are heterogeneous with different antigenic profiles and function. The objective of this study was to investigate the role of EMPs in patients with systemic inflammatory response syndrome (SIRS) by evaluating surface antigen expression on EMPs.

Methods: This prospective observational study was conducted from November 2012 to February 2013. Criteria for inclusion were adult patients with SIRS. Blood samples were collected from each patient on the day met the SIRS criteria and from the healthy volunteers. The number of tissue factor-positive EMPs (TF-EMPs), thrombomodulin-positive EMPs (TM-EMPs), and endothelial protein C receptor-positive EMPs (EPCR-EMPs) were measured by flow cytometry immediately after blood sampling. EMPs was defined as events detected by annexin V+/CD146+ with the diameter of <2.0um. To determine surface antigen expression of EMPs, anti-CD142, anti-CD141 and anti-CD201 antibodies were used for TF, TM and EPCR, respectively. The relation was evaluated between each expression and severity of illness assessed by SIRS score, APACHE II score, and SOFA score.

Results: This study was composed of 35 patients who met the inclusion criteria and 12 healthy controls. Causes of SIRS were trauma in 11 patients, post-cardiac arrest syndrome in 8, sepsis in 5, encephalitis in 5, others in 6. The numbers of TF-EMPs, TM-EMPs, and EPCR-EMPs were significantly increased in patients with SIRS versus those in controls ($p<0.05$) (Figure1). As shown in Figure 2, the number of TF-EMPs was significantly increased with the increases of SIRS score in patients with mild to moderate SIRS (score 2 or 3), whereas that was decreased in patients with severe SIRS patients (score 4) ($p<0.05$). Similar trend was observed in other disease severity scores such as APACHE II or SOFA scores.





Conclusion: In SIRS patients with highest degree of disease severity, the enhanced expression of surface antigens on EMPs declined, suggesting that EMPs may reflect the severity of endothelial damage in the pathophysiology of SIRS.

Poster # 30

ELEVATED SERUM CREATINE PHOSPHOKINASE IS ASSOCIATED WITH MORTALITY AND INOTROPIC REQUIREMENT IN CRITICALLY INJURED ADULTS

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Introduction: Hemeproteins such as myoglobin induce lipid peroxidation and cause oxidative injury when released as a result of cell damage. Creatine phosphokinase (CPK) elevation is a marker for free myoglobin, which can undergo autoxidation and catalyze lipid peroxidation, increasing oxidative stress. Myoglobin-induced oxidative stress is associated with renal failure in patients with rhabdomyolysis. Since oxidative injury is a key mechanism of injury-related organ dysfunction, we hypothesized that serum CPK levels correlate with mortality and duration of inotropic support, i.e. shock, among critically injured patients.

Methods: We conducted a retrospective review of 16,695 patients admitted to the Trauma Intensive Care Unit over nine years. 2,793 patients with serum CPK levels were included in the analysis. Mortality and inotrope requirement were collected continuously into an electronic ICU repository. Univariate analysis was accomplished using Spearman correlation and the Mann Whitney U test. A propensity score for elevated CPK was determined using a linear regression model that included 13 covariates. Adjustments for propensity score, age, gender, race, and University Healthsystem Consortium expected mortality were utilized in regression models: logistic regression to assess the independent effect of CPK level on mortality and need for inotropic support, and Poisson regression to assess the independent effect of CPK level on duration of inotropic support.

Results: Median CPK was significantly higher in patients who died (895 [IQR 331, 2366] vs. 719 [257, 1954], $p= 0.008$) and in those who required any inotropic medications (945 [357, 2436] vs. 464 [183, 1217], $p< 0.001$). A propensity score adjustment model controlling for potential confounders was utilized to determine that the adjusted odds of mortality increased by 1.15 (95% CI 1.04- 1.28) per natural log unit increase in CPK ($p= 0.009$) and the adjusted odds of requiring inotropic medication increased by 1.31 (95% CI 1.22-1.41) per natural log unit increase in CPK ($p< 0.001$). There was a significant association between CPK level and duration of inotropic support (Spearman's rho .234, $p< 0.001$) that remained significant after propensity score adjustment and controlling for potential confounders.

Conclusion: In critically injured patients, elevated serum CPK level is independently associated with mortality, need for inotropic support, and duration of inotropic support. If this association is verified prospectively, there may be a role for treatment with hemeprotein reductants, e.g. acetaminophen, to mitigate the effects of shock and end-organ dysfunction in critically injured patients with elevated CPK.

Poster # 31

PRE-OPERATIVE PROLONGED FASTING: IS IT REALLY NECESSARY?

Chrissy Guidry DO, Nairmeen Haller Ph.D., Charu Paranjape MD, Akron General Medical Center

Introduction Western surgical standards for pre-operative management for adult surgical patients include having patients fast for eight hours before an elective, scheduled surgical time. This has been proven to cause patient discomfort, increased insulin levels, decreased glucose levels, and other complications currently under investigation. In Europe, common practice is not to have patients fast for eight hours, but rather they have adopted practices of *nil per os* (NPO, fast) of solids for six hours and liquids for two hours. We hypothesize the amount of gastric contents does not affect lung complications in trauma patients who require urgent operative intervention.

Methods: This is a 5-year retrospective descriptive review from January 2008-December 2012 at a Level 1 Trauma Center. Inclusion criteria: Trauma patients who went to the operating room within 3 hours of arrival to the Emergency Department (ED) and who had a Computerized Topography (CT) of the abdomen and pelvis prior to operative intervention. The CTs of the patients included were used to calculate the size and amount of approximate gastric contents prior to operative intervention. The maximal axial diameter of the stomach was recorded. Post-operative complications were analyzed. Patients were excluded if they were intubated prior to arrival to the Operating Room (OR). Multiple logistic regression was used determine, if any, risks for developing pneumonia.

Results: Of the 561 patients with trauma admissions requiring operative intervention, 86 patients met the inclusion criteria. Mean age of patients included was 36.2 years old. Mean Heart Rate (HR) was 95.4 bpm, mean Systolic Blood Pressure (SBP) 122.7 mmHg, mean time to the OR from ED arrival was 1hour and 28 minutes. Of the patients included, 6% developed pneumonia. Mean maximal diameter of patients who developed pneumonia was 9.2 cm (SD 5.02), and of the 94% that did not develop pneumonia, mean was 10.97 cm (SD 3.88); p = 0.33. On a multiple logistic regression analysis, maximal axial diameter of stomach on pre-operative CT of the abdomen and pelvis was not a significant risk factor for development of pneumonia (Table I).

Table I. Logistic Regression for Developing Post-Operative Pneumonia

	OR	CI (95%)	p
Injury Severity Score (ISS)	1.01	0.80 - 1.26	0.96
Ventilator Days	4.81	1.28 - 18.02	*0.02
Crystalloid Volume, Intra-Operative (ml)	1.00	0.99 - 1.84	0.24
PRBC, Intra-Operative (units)	0.01	0.00 - 1.842	0.08
CT Abd/Pelvis Maximal Diameter (cm)	0.67	0.38 - 1.19	0.67

Significance p < 0.05; OR = Odds Ratio; CI = Confidence Interval; PRBC = Packed Red Blood Cell

Conclusion: The results in this study provide further evidence showing no correlation between gastric contents and developement of post-operative pneumonia. In elective surgery, keeping patients NPO for prolonged periods of time pre-operatively could add undue negative consequences that can be avoided. Ventilator days were the only significant predictor with an increased odds ratio of developing pneumonia. Findings of this study in urgent and emergent trauma patients with full stomach contents, could be potentially applied to elective surgical practice. Perhaps further randomized trials could be designed to explore different elective, pre-operative regimens to investigate the effects on post-operative outcomes.

Poster # 32

TIMING AND IMPLICATIONS OF POST-TRAUMATIC EARLY ACUTE KIDNEY INJURY

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Introduction: Severely injured patients are often in positive fluid balance in the first few days post-injury. We questioned whether early mild acute kidney injury (eAKI) predicts positive fluid balance and whether excessive fluid administration might worsen outcomes in patients with eAKI.

Methods: We reviewed records of trauma patients with a heart rate > 90 admitted to the ICU, with no known history of renal dysfunction, for fluid balance and changes in serum creatinine in the first 48 hours after admission. We defined eAKI by RIFLE criteria within 48 hours. We evaluated the impact of baseline characteristics, injury severity, and fluid balance at 8 and 24 hours on eAKI and the impact of creatinine changes on ICU length of stay with multivariate analysis.

Results: Of 148 patients, 26 (18%) had eAKI (Risk=18, Injury=6, Failure=2) either upon presentation (n=25) or within 48 hours (n=1). Patients with eAKI had a higher ISS (22 vs 15, p=.04) and were more likely to receive blood (58 vs 26%, p=.001) but did not have a lower admission blood pressure than those without eAKI. Early AKI patients had a higher fluid balance at 8 hrs (3.8 vs 1.4 L, p<.001) and 24 hrs (6.5 vs 2.4 L, p<.001) despite similar 8 hr (1.2 vs 1.2 L, p=.85) and 24 hr (2.4 vs 2.6 L, p=.43) urine output. 24 hr positive fluid balance was associated with AKI (OR 1.16 [CI 1.03-1.29]) independent of ISS, diabetes, blood transfusion, age, or admission SBP or HR. Patients with eAKI had a median ICU length of stay 1 day longer than those without (3 days [IQR 2,11] vs 2 days [IQR 1,7], p=.02). Increased ICU stay was associated with 24 hr change in creatinine (p=.003), ISS (p=.08) and 24 hr fluid balance (p=.03) but not with age (p=.45) or transfusion (p=.11). Among the 26 patients with eAKI, there was a trend towards 24 hour fluid balance predicting an ICU stay longer than the median (OR 1.3, CI .98-1.7, p=.07).

Conclusions: Early AKI manifests at presentation and should be recognized to avoid unnecessary volume administration. Although early AKI might be interpreted as an indication for vigorous fluid administration, the injured kidney shows signs of inability to tolerate excess fluid as early as 8 hours. Even mild renal dysfunction may lead to a prolonged stay in the ICU.

Poster # 33

ULTRASOUND-GUIDED THORACOSTOMY TUBE PLACEMENT IN SURGICAL INTENSIVE CARE PATIENTS

KAVEH NAJAFI DO, STEVEN MAXIMUS MD, JACQUELINE K. PHAM BS, MICHAEL E. LEKAWA* MD, MATTHEW O. DOLICH* MD, ALLEN P. KONG MD, NICOLE P. BERNAL MD, LAURA K. FINDEISS MD, CRISTOBAL BARRIOS Jr., MD, University of California, Irvine - Orange County

Introduction:
Pleural effusions are common in the critically ill, occurring in over 60% of patients. Pleural effusions in critically ill patients have been associated with a longer duration of mechanical ventilation, ICU stay, and increased mortality. Drainage of large pleural effusions by thoracentesis produces improvement in lung mechanics and oxygenation and significantly relieves dyspnea in most cases. Transportation logistics and complications related to pleural drainage remain a concern in mechanically ventilated patients. Given the issues that arise, we aimed to document our early experience with ultrasound guided thoracostomy tube placement of critically ill patients in the SICU. We hypothesized that patients undergoing US guided tube thoracostomy placement in the SICU achieve equivalent outcomes compared to patients undergoing similar procedures with Interventional Radiology (IR).

Methods:
This is a retrospective review comparing patients with radiographically evident pleural effusions or pneumothorax treated with percutaneous placement of thoracostomy tubes using thoracic ultrasound compared to patients undergoing tube thoracostomy placement or thoracentesis done by IR. Duration of tube placement, volume of fluid removed at insertion, total volume removed, time in IR suite, and complications were noted.

Results:
A total of seventy three patients were analyzed, with twenty patients (27.4%) undergoing ultrasound guided chest tube placement in the SICU via surgical intensivists compared to fifty three patients (72.6%) undergoing thoracentesis or chest tube placement with IR. All SICU patients (100%) had chest tubes inserted, compared to 21 IR patients (39.6%). Compared to IR patients, SICU patients had similar volume removed at insertion (948.2 ml vs. 838.4; p= 0.54), and total volume removed (1736.4 vs. 1637.7; p=0.82). The average duration of tube placement for SICU patients was 3.86 days, compared to 6 days for IR patients (p=0.01). The remaining thirty one IR patients underwent thoracentesis (60%), with the average volume removed 778.2 ml. The average time in the IR suite was 131.8 minutes. No complications were noted for either group.

Conclusion:
Ultrasound enhances the practitioner's ability to evaluate, diagnose and treat critical ill patients. US is easily available, portable, non-invasive, and virtually painless, making it an increasingly popular and valuable tool in the ICU. Our case series provides early evidence that US guided chest tube placement by intensivists can produce similar results to IR procedures without the issues of transportation, resource expenditure, and time off unit, making it safe and efficient for critically ill patients.

Poster # 34

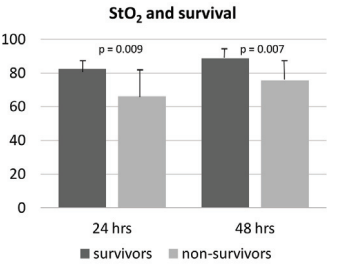
TISSUE PERFUSION MEASUREMENTS AND MORTALITY IN THE CRITICALLY-ILL

David S. Inouye MD,Ph.D., Michael S. Hayashi MD, Sharon Takiguchi Ph.D., Christie Nakamura BA, Danny M. Takanishi Jr., MD, Mihae Yu* MD, The Queen's Medical Center

Introduction: Measurement of tissue perfusion may facilitate the detection of early shock and guide its subsequent treatment. Several promising noninvasive methods provide quantitative measurement of tissue perfusion in normal and in shock states. Transcutaneous PO_2 ($PtcO_2$) changes with PaO_2 and FiO_2 in non-shock states, but during shock, $PtcO_2$ approximates cardiac output with minimum response to increasing FiO_2 and PaO_2 due to vasoconstriction of the skin (1). This response is called the Oxygen Challenge Test (OCT), and has been shown to predict organ failure, mortality, and used as an endpoint of resuscitation. OCT value of ≥25 mmHg implies adequate perfusion, and <25 mmHg implies shock (1). Near-infrared spectroscopy measurements of tissue hemoglobin oxygen saturation (StO_2, Hutchinson Technologies, Hutchinson MN) and a pulse oximetry-based perfusion index (PI, Masimo, Irvine CA) are two additional non-invasive methods of tissue perfusion. Both StO_2 and PI have been shown to correlate with hypoperfusion and tissue ischemia in critically-ill subjects (2,3). However, its utility in resuscitation and its use as endpoints have yet to be defined.

Methods:Simultaneous measurements of OCT, StO_2, and PI were done in 52 critically-ill subjects with pulmonary artery catheters during resuscitation and throughout the ICU stay. Fisher's exact test was used to compare OCT at 24 and 48 hours to survival. The t-test was used to compare StO_2 measurements in survivors versus non-survivors. The same was done with PI measurements.

Results: Tissue perfusion measurements were performed in 52 patients over the first 24 and 48 hours. Demographics of the 52 patients were: 66±16 yrs of age, 32 males: 20 females, APACHE II 26.9±8.6, 35 septic shock/severe sepsis, 15 hemorrhagic shock, 16 cardiac failure, 44 respiratory failure patients. Thirty-three of the 52 subjects survived to discharge or transfer to other acute care facilities. There was no association between survival and OCT measured at either 24 hours or 48 hours. Likewise, PI values were not different between survivors and non-survivors. In contrast, StO_2 in survivors was significantly higher when compared to StO_2 in non-survivors. This difference was observed with measurements obtained at 24 hours and 48 hours after ICU admission.



Conclusion: Measurements of tissue perfusion can provide valuable information in the detection and treatment of shock. While the OCT has previously shown an association to survival, this was not the case in this investigation. Higher values of StO_2 are associated with survival in this investigation. Further investigation is needed to determine the utility of these perfusion measurements as resuscitation endpoints.

1) Yu M et al, Shock 2007;27:615. 2) Crookes BA et al, J Trauma 2005;58:806. 3) Felice C et al, Eur J Pediatr 2002;161:561.

Poster # 35

INTERLEUKIN-6 PREDICTS MULTI-ORGAN SYSTEM FAILURE IN ADULTS WITH SEVERE BLUNT TRAUMA: AN ANALYSIS OF THE GLUE GRANT

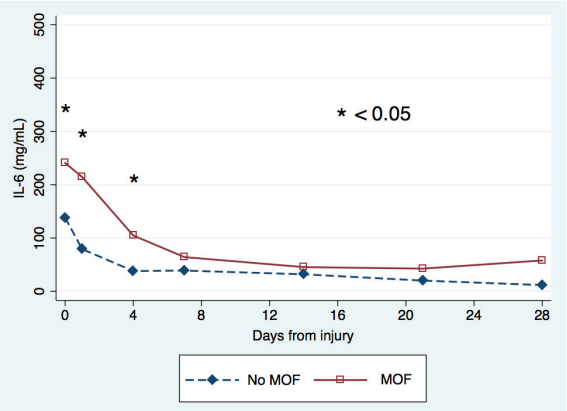
George Kasotakis MD,MPH, Antonis Sideris MD, Eric Klein MD, Marc De Moya* MD, Ronald Tompkins* MD, ScD, George Velmahos* MD,Ph.D., Peter A. Burke* MD,
Harvard School Of Public Health

Introduction: Despite advances is surgical critical care, multi-organ system failure (MOF) remains the leading cause of late mortality after trauma, accounting for up to 80% of all injury-related deaths in the Surgical Intensive Care Unit. With this project we attempt to identify a reliable predictor for development of MOF in adults with severe blunt trauma.

Methods: Data were extracted for secondary analysis from the prospectively collected multicenter cohort of severely injured blunt trauma patients with hemorrhagic shock, the Glue Grant. A subset of patients consented to have serial measurements of pro-inflammatory mediators, including IL-6. Diagnosis of MOF required a Marshall Multiple Organ Dysfunction Score ≥5. The Mann-Whitney test was used to compare the serial IL-6 levels between MOF and non-MOF patients, and Receiver Operating Characteristic (ROC) Curves were plotted for the early (≤day 4) IL-6 measurements.

Results: From the overall cohort, 73 subjects had early serial measurements of their IL-6 levels and comprised our sample. The mean Injury Severity Score was high at 30.4±13.5 and 31.5% of our patients developed MOF on day 3.5±2.6 on average. The distribution of IL-6 levels across MOF & non-MOF subjects is summarized in the figure below. The C-statistic of IL-6 measured on post-injury day 4 was 0.77, indicating good predictive capability for MOF, while the sensitivity, specificity and accuracy were 86.4%, 67.4% and 73.9% respectively.

Conclusion: IL-6 reliably predicts development of MOF among blunt trauma patients with hemorrhagic shock.



Poster # 36

HYPERGLYCEMIA IS ASSOCIATED WITH VENOUS THROMBOEMBOLISM IN CRITICALLY ILL TRAUMA PATIENTS

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Introduction: Hyperglycemia has many physiologic consequences and is associated with diabetes, critical illness, and trauma. Blood viscosity increases with hyperglycemia, which may potentially result in formation of venous thromboembolism (VTE). In the intensive care unit, VTE is one of the most common complications, and standard prophylactic measures exist to prevent its development. We hypothesize that critically ill post-trauma patients with elevated average blood glucose levels have an increased rate of VTE.

Methods: Data were collected on trauma patients 18 to 50 years of age admitted from 2009 to 2011 at an urban Level-1 trauma center. Demographics, injury severity scores, ICU length of stay, ventilator days, and glucose levels (maximum, minimum, and average) were obtained. Hyperglycemia was defined as maximum or average glucose >140 mg/dL or a minimum glucose >110 mg/dL. Univariate and multivariate analyses were performed to identify independent predictors.

Results: 120 patients were included in the study. Development of VTE was associated with ICU length of stay (18 vs. 9, $p<0.01$) and hyperglycemia based on average (57.6% vs. 20.7%, $p<0.01$), maximum (84.8% vs. 42.5%, $p<0.01$), and minimum (66.7% vs, 31.0%, $p<0.01$) glucose levels. Independent predictors of VTE included maximum glucose level >140mg/dL (OR 5.79, $p=0.01$).

Conclusion: Critically ill hyperglycemic patients are associated with VTE formation. This may reinvigorate the debate on tight glucose control. Also, given that many hospital protocols do not consider hyperglycemia as a criterion for VTE prophylaxis, its inclusion in such protocols may be needed. Further studies are warranted to confirm these results.

Poster # 37

MODULATION OF THE NICOTINIC ANTI-CHOLINERGIC PATHWAY PROTECTS AGAINST INTESTINAL BARRIER DYSFUNCTION AND RELEASE OF DAMPS IN VITRO

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Introduction: Damage associated molecular patterns (DAMPs) are endogenous molecules released after shock conditions and activate innate immunity which may lead to systemic inflammation and organ injury. Preinjury vagal nerve stimulation and nonspecific (nicotine) and alpha-7 specific nicotinic agonists (AR-R17779) protect against gut barrier failure and lung injury in conditions associated with intestinal hypoperfusion. Intestinal epithelial cells (IEC) selectively express the alpha7-nicotinic acetylcholine reseptor (nAChR). We compared pre vs. post-insult administration of nicotinic agonists on intestinal barrier function and DAMPs release in an *in vitro* intestinal epithelial model.

Methods: IEC-6 intestinal epithelial cell monolayers were subjected to hypoxia (90 min)/reoxygenation challenge. Cells were treated before or after hypoxic challenge with nicotine (5μM) or AR-R17779 (4μM). IEC-6 cell apoptosis, actin cytoskeletal integrity (phalloidin staining) and permeability to FITC-dextran (FD4) were determined. DAMPs production was indexed by HMGB-1 (Western blot) and mitochondrial DNA (coxIII using RT-PCR) release.

Results: (mean ± SD, N = 4 for each group)

	% apoptosis	Perm. (nmol/cm^2/hr)	HMGB-1(relative density)	Cox III(mRNA levels)
IEC-6 control	4.8±0.3	0.34±0.01	0.47±0.2	1.0
IEC+HR	12.2±1.6*	0.48±0.03*	1.89±0.4*	3.2
IEC+nico pre-HR	11.5±2.0*	0.43±0.04*	1.56±0.3*	2.8
IEC+nico post-HR	5.3±0.5#$	0.36±0.02#$	0.41±0.2#$	0.4
IEC+ARR pre-HR	11.9±1.7*	0.44±0.03*	1.66±0.3*	2.1
IEC+ARR post-HR	6.1±1.0#$	0.32±0.01#$	0.46±0.1#$	0.3

*p<0.001 vs. IEC-6 control, #p<0.001 vs. IEC +HR, $p<0.001 vs. same group pre-HR

IEC cytoskeletal integrity was preserved by either agonist when administered post-hypoxic insult only.

Conclusion: Nonspecific and specific nicotinic agonists protected against intestinal epithelial barrier derangement and DAMPs release when administered post-hypoxia only. The disparate effects noted likely reflect increased agonist sensitivity due to activation of intracellular signalling pathways related to the hypoxic insult. This has clinical relevance especially with the nonspecific agonist nicotine, where toxicity from dose and duration of administration has limited further trials. Our data suggest that there is a therapeutic window following injury where these agents may be effective in limiting intestinal barrier derangement and resultant inflammatory injury and remote organ failure.

Poster # 38

A TWO MINUTE TEST DURING ROUNDS CAN REPLACE A SPONTANEOUS BREATHING TRIAL

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Introduction: The Spontaneous Breathing Trial (SBT) is commonly used to assess for extubation readiness, but takes 30-60 minutes to administer. A two-minute test affords rapid evaluation during rounds. We hypothesized that a two-minute pre-extubation test (2MIN) could replace the SBT. The primary endpoint was ability to predict successful extubation. The secondary endpoint was missed opportunities to extubate.

Methods: Data were prospectively collected on all patients endotracheally intubated for >48 hours nearing extubation in a tertiary center's mixed trauma/surgical ICU from August 2012 to January 2013. The SBT was performed for at least 30 minutes at 40% FiO2, PEEP 5, PS 8. This was followed by a 2MIN trial, in which patients were disconnected from the ventilator and directly observed. Patients who failed the SBT were allowed to recover for several hours before performing the 2MIN trial. A successful 2MIN was defined as maintaining all of the following: heart rate ≤ 120, systolic blood pressure 90-180, respiratory rate ≤ 35, SpO2 ≥ 90%, and no signs of patient agitation. The decision to extubate was made at the attending's discretion. Successful extubation was defined as not requiring reintubation within 48 hours.

Results: Seventy sets of evaluations were performed, resulting in 51 extubations. 47(92.2%) of these were successful. The 2MIN test correctly predicted success (*PPV*) in 42/45(93.3%) extubations vs. 46/50(92.0%) via SBT. 5/47(10.6 %) successful extubations were missed (*1-sensitivity*) by the 2MIN test vs. 1/47 (2.1%) with an SBT. No adverse effects were attributed to the 2MIN test. Oxygen saturation <90% was present in all 18 (of 70) 2MIN failures, tachypnea in 4, hypertension in 1, and tachycardia in 1.

	Successful extubation	Required reintubation
Passed SBT	46	4
Failed SBT	1	0
Passed 2MIN	42	3
Failed 2MIN	5	1

Conclusion: This preliminary study demonstrates that the 2MIN test predicts extubation success with rates similar to that of the longer SBT. However, the 2MIN test missed more opportunities for extubation. The most efficient extubation regimen may consist of a 2MIN test and immediate extubation for those who pass, followed by an SBT for the others. Additional studies may further improve the overall predictive accuracy of the 2MIN.

Poster # 39

FC-GAMMA-RIIA POLYMORPHISM IS ASSOCIATED WITH INCREASED RISK OF SEPSIS IN TRAUMA PATIENTS

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Introduction: Infections cause the majority of morbidity and mortality in trauma patients who have survived the initial trauma and subsequent resuscitation. A dysregulated immune response leading to multiple organ dysfunction is the most frequent cause of late post-traumatic deaths. We have found a novel anti-inflammatory pathway that is initiated by the acute phase protein, C-reactive protein (CRP), interacting with FcγR on macrophages. This pathway is protective in animal models of endotoxin shock, immune complex inflammation and autoimmune disease. However, it also may contribute to trauma-induced immunodeficiency. We hypothesized that genetic polymorphisms in the receptor for CRP might contribute to individual differences in cytokine responses and susceptibility to infectious complications after severe trauma.

Methods: We conducted a case-control study on a prospectively identified cohort of adult patients admitted after severe trauma (as defined by an Injury Severity Score > 16 or ICU admission). The Human Research Review Committee approved all protocols prior to sample collection. We enrolled 50 patients and collected blood samples at enrollment and again at 48 and 72 hrs. Patients were followed through their hospital stay and any septic events before 30 days were recorded, as defined by the presence of SIRS and a documented infection as defined by the CDC guidelines. CRP levels and a panel of inflammatory cytokines were determined in the plasma from all three blood draws. Additionally, DNA was extracted from blood and analyzed for the 131 H/R FcγRIIa polymorphism, that strongly affects the binding of IgG and CRP to this receptor.

Results: We identified a 3.5 times increased odds of sepsis in patients with CRP levels greater than the median on day 2 and in individuals with the polymorphism of the FcγRIIa receptor that binds CRP poorly. In multivariate analysis, we found that high ISS and elevated CRP and IL-6 levels on day 2 increased the probability of developing sepsis in our patients.

Conclusions: The FcγRIIa polymorphism has been described as a heritable risk factor for autoimmune and certain infectious diseases. Our findings suggest that a common genetic variation in the FcγRIIa receptor may contribute to infectious susceptibility in trauma patients.

Poster # 40

IMPACT OF POSITIVE FLUID BALANCE ON CRITICALLY ILL SURGICAL PATIENTS: A PROSPECTIVE OBSERVATIONAL STUDY

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Introduction: Post-operative fluid therapy has been a mainstay in the care of the critically ill surgical patient. Recently several retrospective studies have shown deleterious outcomes in patients receiving liberal fluid administration. The purpose of the current prospective investigation was to determine the effect of post-operative fluid-balance on subsequent outcomes in Acute Care Surgical (ACS) patients admitted to the surgical intensive care unit (SICU).

Methods: This study was conducted in a 24-bed dedicated SICU at a Level 1 trauma center with a dedicated ACS service. ACS patients admitted to the SICU from 06/2012 to 01/2013 were followed prospectively. Demographics, clinical characteristics, as well as daily recorded fluid intake and output were collected. Patients were stratified by fluid balance (FB) into FB positive (FB +) and FB negative (FB -) group by SICU day 5 or day of discharge from the SICU. A Cox-Regression was used with fluid balance as time-dependent variable to derive factors independently associated with mortality and in-hospital complications.

Results: A total of 144 ACS patients met inclusion criteria. The mean age of the cohort was 55.8±24.3 (y), with 68.8% of patients admitted for traumatic injuries. Mean APACHE IV score, admission lactate, co-morbidity burden, and vasopressor requirements were similar between FB + and FB – groups. Duration of mechanical ventilation was shorter for the (FB –) group (5.4±5.6 vs 8.6±9.2 days, p=0.059). Although there was no statistically significant difference in mortality (11% (FB -) vs 15.5% (FB+), p=0.422), after adjusting for confounding factors, (FB –) status was independently associated with significantly lower complications, both overall and infectious (AOR [95% CI]: 0.65 [0.54, 0.79] and 0.65 [0.53, 0.78] respectively).

Conclusion: In a cohort of critically-ill ACS patients achieving (FB –) status early during the SICU admission was associated with a nearly 40% reduction in the risk for post-operative complications. Further large prospective investigation should be undertaken to characterize this discrepancy and derive the optimal practices of fluid resuscitation in the ACS patient.

Poster # 41

SHOULD the INTRA-CRANIAL PRESSURE MONITOR go the way of the PULMONARY ARTERY CATHETER?

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Introduction: Brain Trauma Foundation (BTF) guidelines recommend intracranial pressure (ICP) monitoring for traumatic brain injury (TBI) patients with a Glasgow Coma Scale (GCS) score of 8 or less, with an abnormal head CT, or a normal head CT scan with systolic blood pressure $\leq$ 90mmHg or abnormal motor posturing in patients of age >40. The benefits of these guidelines on outcome remain unproven. We hypothesized that adherence to BTF guidelines does not improve outcome after TBI.

Methods: All TBI patients with an admission GCS $\leq$8 admitted to our Level I trauma center over a 3 year period were identified. Adherence to the individual components of our institutional TBI Bundle (ICP Monitoring, SpO2>95%, PaCO2 30-39, SBP>90, CPP>60, ICP <25, Temp 36-37^{O}C) was assessed, and comparisons in mortality and discharge functional status were made between the different bundle elements. High discharge functional status was defined as discharge to home.

Results: We identified 2,618 TBI patients, 261 of whom met the BTF criteria for ICP monitoring. After excluding those with non-survivable injuries (n=67), 194 patients were available for analysis (71 received an ICP monitor and 123 did not). There were no significance differences in demographics, admission GCS (4±1.7 vs. 3.9 ± 1.7; *p*-0.7), Injury Severity Score (25.7±9.9 vs. 26±10; *p*-0.1), and head Abbreviated Injury Scale (4±0.8 vs. 4.2±0.8; *p*-0.1), between the two groups. Survival was higher in patients without an ICP monitor (98% vs. 76%, p<0.004). Non-monitored patients were discharged with higher levels of function per discharge location (28% home vs. 4% home; *p*<0.001). No other components of the bundle were statistically different between groups, but overall compliance was poor - median 3 components out of 6 (IQR 2-4).

Compliance with Brain Trauma Foundation Goals

	ICP + (n=71)	ICP- (n=123)	*p*
SaO_2 = 95%, (%)	93%	91%	0.3
SBP > 90 mm Hg, (%)	91%	92%	0.5
Temperature 36-37°C, (%)	18%	21%	0.4
PCO_2 30-39 mm Hg, (%)	26%	29%	0.3
CPP =60, (%)	67%	Nil	-
ICP <25 mm Hg, (%)	64%	Nil	-

SBP – Systolic Blood Pressure, CPP –Cerebral Perfusion Pressure, ICP – Intra-cranial Pressure

Conclusion: Our data suggest that there is a subset of patients meeting BTF criteria for ICP monitoring that do well without ICP pressure monitoring. This finding should provoke re-evaluation of the indication and utility of ICP monitoring in TBI patients.

Poster # 42

LEVELS OF ADRENOMEDULLIN IN SCREENING BRONCHOALVEOLAR LAVAGE FLUID PREDICT THE PRESENCE OF PATHOGENIC MICROORGANISMS IN THE LUNGS OF INTUBATED TRAUMA AND SURGICAL PATIENTS, A PROSPECTIVE STUDY

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Introduction: Pneumonia is a significant problem, particularly in the ventilated and critically ill patient. Recent evidence suggests that trauma and surgical patients' deep airways are frequently colonized with bacteria on admission. Furthermore, a positive screening CDBAL is a predictor of a subsequent pneumonia with the same microorganism, which suggests that the pneumonia may be an extension of a complication present at the time of admission. ADM is an endothelial-derived protein with multiple actions in the cardiovascular system, including affecting cardiac and vascular contractility in response to disease, injury, and shock states. It has previously been shown to predict morbidity and mortality in septic patients, as well as rates of pneumonia in ventilated patients with a high clinical pulmonary infection score.

Methods: CDBAL samples were prospectively collected for all subjects admitted to the Surgical Intensive Care Unit at Parkland Memorial Hospital who were intubated for longer than 48 hours between April of 2011 and June of 2012, as per our protocol previously approved by our hospital-acquired infection control committee. Patients who later in their hospital course had an elevated CPIS had a second diagnostic CDBAL performed, as per our institution's VAP protocol. Any time a CDBAL was performed, 10 ml were sent to the laboratory for the intended purpose and all remaining fluid was frozen and stored in a designated study freezer. ADM levels were measured by ELISA (ng/ml).

Results: During the study period 154 screening CDBAL samples were collected, ADM levels were measured in 79 samples and the rest were inadequate due to insufficient quantity to perform the test. There was a statistically significant difference between the ADM levels of patients that had a positive culture and those that did not ($p=0.03$) with a sensitivity of 92.31% and specificity of 80.56%. There was also a statistically significant difference between patients that eventually developed a pneumonia and those who did not, regardless of whether or not their screening CDBAL was positive ($p<0.0001$), with a sensitivity of 93.18% and a specificity of 84.85%. There was no difference between ADM levels in patients with a positive screening CDBAL and pneumonia and those with a positive screening CDBAL and no pneumonia. Most of the diagnostic CDBALs performed on patients with an elevated CPIS were positive for the same microorganism that was noted on the initial screening CDBAL.

Conclusion: ADM is a vasoactive peptide with an increasingly wide diagnostic and prognostic profile. It has been noted to predict morbidity and mortality in a wide variety of disease states, and is thought to be useful in the diagnosis of VAP. Levels in CDBAL samples of patients with a high CPIS have been shown to be predictive of pneumonia, something that can be a useful tool in reducing the use of unnecessary antibiotics while waiting for culture results. In this study, we attempted to evaluate ADM levels on screening CDBALs performed in trauma and surgical ICU patients that had been intubated for over 48 hours. We found that the ADM levels in CDBAL fluid predict the presence of a microorganism in the airway, regardless of whether or not the patient does eventually develop pneumonia. This holds true even for patients that develop pneumonia several days after their screening CDBAL.

Poster # 43

LOOKING BEYOND DISCHARGE: CLINICAL VARIABLES AT TRAUMA ADMISSION PREDICT LONG TERM SURVIVAL IN THE OLDER SEVERELY INJURED PATIENT

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Introduction: Increasing age and co-morbidity are established risk factors for mortality following trauma. Furthermore, although long term follow up is difficult to obtain in most trauma settings, these data are particularly essential for assessing outcomes in the older (≥60) patient. We hypothesized that clinical data obtained during initial hospital stay could accurately predict long term survival.

Methods: Using our trauma registry and hospital database, we reviewed all trauma admissions (age ≥60, ISS>15) to our Level 1 center over the most recent 7 years. Mechanism of injury, co-morbidities, ICU admission, and ultimate disposition were assessed for 2-7 years post-discharge. Primary outcome was defined as long term survival to the end of the last year of the study. Multivariate analysis identified independent predictors of long term survival.

Results: Of 342 patients discharged following initial admission, mean age was 76.2 ± 9.7, and ISS 21.5 ± 6.9. 119 patients (34.8%) died (mean follow up 18.8 months; range 1.1 -66.2). For 233 survivors, mean follow-up was 50.2 months (range 24.8 -83.8). Univariate analysis disclosed post discharge mortality was associated with age(80.1 ± 9.64 vs 74.2 ± 9.07), mean number of co-morbidities(1.6 ± 1.1 vs 1.0 ± 1.2), fall as a mechanism, lower GCS upon arrival (11.85 ± 4.21 vs 13.73 ± 2.89), intubation at the scene and discharge to an assisted living facility (all= p<0.001). Cox regression analysis hazard ratio (HR) showed that independent predictors of mortality on long term follow-up included: older age (HR=1.044; Fig. 1), fall as mechanism (HR= 1.9), lower GCS at admission (HR = 0.883) and discharge to assisted living facility (HR = 0.315; Fig. 2) (all= p<0.0001).

Figure 1

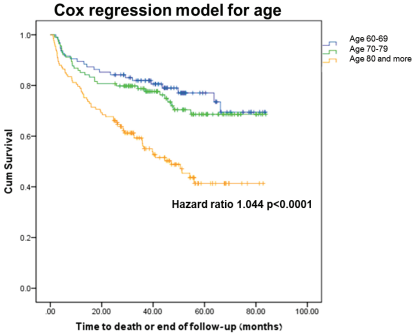
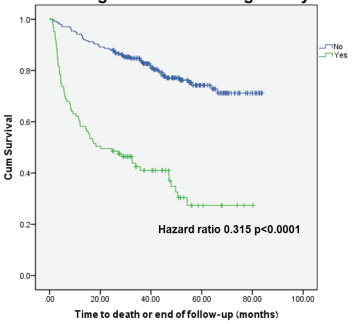


Figure 2



Conclusion: Nearly two-thirds of patients ≥60 who were severely injured survived >4 years following discharge; furthermore, admission data, including younger age, injury mechanism other than falls, higher GCS and home discharge predicted a favorable long term outcome. These findings suggest that common clinical data at initial admission can predict long term survival in the older trauma patient.

Poster # 44

PREDICTORS OF RECURRENT VIOLENT INJURY

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Introduction: A significant number of patients who present after intentional violent injury will endure multiple traumas resulting from violence, resulting in potentially avoidable utilization of healthcare and municipal resources. This study aims to identify those most at risk for recurrent violent injury.

Methods: A retrospective cohort study was conducted including all victims of initial intentional violent injury presenting to an urban trauma center from 2004-2009. Patients were followed for recurrence through 2012. Chi-squared and logistic regression analysis were used to identify factors associated with increased risk for recurrent violent injury.

Results: During the study period, a total of 2748 patients survived initial violent injury and were included the analysis. Of these, 314 (11%) returned with recurrent violent injury. Five characteristics of the initial injury presentation were found which together predicted a nearly tenfold increased risk for recurrence in logistic regression analysis: age < 25 years (adjusted-OR 1.8, CI 1.4-2.3), having medical insurance (adjusted-OR 2.4, CI 1.8-3.1), residence in a >85% black neighborhood (adjusted-OR 1.7, CI 1.1-2.6), assault as mechanism (adjusted-OR 1.5, CI 1.2-2.1), and discharge home from emergency department (adjusted-OR 2.3, CI 1.8-3.0). All five predictors were significant at the $P<0.01$ level. Gender, race, and injury severity score were not statistically significant predictors in our analysis.

Conclusion: Five criteria of patients who present with initial violent injury can be used to predict those who are most likely to return with recurrent violent injury: age, insurance, neighborhood, mechanism, and disposition. We hope that using these criteria for enrollment in our community-based violence prevention program will direct resources toward patients most likely to benefit from intervention.

Poster # 45

CHANGES IN TRAUMA SERVICE CODING PRACTICES FOLLOWING ELECTRONIC HEALTH RECORD IMPLEMENTATION

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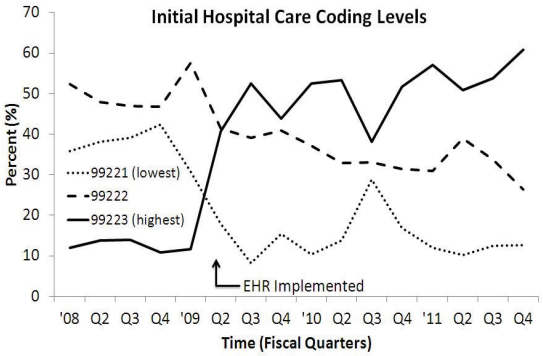
Introduction: Implementing an electronic health record (EHR) system is an expensive and large-scale project. Few studies have examined the impact of inpatient EHR's on documentation coding levels and professional fee reimbursement. Trauma and Emergency Surgery services are ideal for the study of this question given their high percentage of inpatient evaluation and management (E & M) work. The purpose of this study is to elucidate the effect of an EHR on coding practices for the inpatient Trauma and Emergency Surgery Service at an academic level I Trauma Center. Our hypothesis is that EHR implementation leads to higher coding levels and increased professional fee revenue.

Methods: De-identified data was extracted from the University Health System Consortium and Association of American Medical Colleges Faculty Practice Solution Center database (FPSC). Our medical center transitioned from written physician notes to the EHR in May 2009. The database was queried for notes written by the trauma and emergency surgery service in calendar years 2008 and 2011 to compare years before and after EHR implementation. The CPT codes of interest were for E & M Initial Hospital Care (99221, -2, and -3) and Subsequent Hospital Care (99231, -2, and -3). Coding levels were linked to standard Medicare Relative Value Units (RVU's). Professional coders were used throughout and coding guidelines were unchanged over the study period.

Results: The figure shows the distribution of Initial Hospital Care codes for 2008 to 2011. The arrow indicates the transition to EHR. Coding levels for Initial Hospital Care (admission) notes increased immediately and markedly. Revenue from these codes went up by 28.1%. Subsequent Hospital Care (progress notes) codes went up less dramatically by 1.7%.



Conclusions: The increase in higher E & M coding levels activity as a result of EHR implementation was financially significant, immediate and durable. The increase in total Initial Hospital Care notes resulted from improved coder note recognition and higher note quality. Revenue increased measurably.

Poster # 46

BREAKING DOWN THE BARRIERS! FACTORS CONTRIBUTING TO BARRIER DAYS IN A MATURE TRAUMA CENTER

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Introduction: As we enter the brave new world of the Patient Protection and Affordable Care Act of 2010, it is imperative that trauma centers provide not only excellent trauma care but cost-effective trauma care. To that end, we sought to determine those factors, which contribute significantly to barrier days (BD), which is when a patient is medically cleared for discharge (D/C) but unable to leave the hospital. We hypothesized that there would be significant demographic and payor factors associated with barrier days

Methods: In a Pennsylvania-verified Level II trauma center, since 1986, all trauma admissions who were discharged alive from 2010-2012 were queried from the trauma registry. Barrier days were identified by physicians at daily sign-out and recorded by the trauma registrars. Patients with a hospital length of stay (LOS) ≤ 24hours or transferred to another hospital were excluded. Univariate logistic regression was used to analyze which factors were significant for barrier days. Significant variables were then included into a multivariate logistic regression model. A p-value≤0.05 was considered significant

Results: A total of 3056 patients, after exclusion criteria, were included in the study. There were 105 (3.44%) patients with at least one barrier day.

Variables	Unadj. Rates for Hospital BD n(%)	Adjusted OR (95%CI)	P-Value
Vent Days >=1	20 (8.3)	2.40 (1.37-4.20)	0.002
ISS >=15	79 (4.3)	1.69 (1.05-2.73)	0.030
Medicaid	21 (5.4)	2.05 (1.22-3.46)	0.007
D/C Dest. (Rehab)	30 (4.5)	2.79 (1.55-5.03)	0.001
D/C Dest. (Nursing Home)	52 (7.3)	6.39 (3.71-11.00)	<0.001
Co-Morbidities >=1	92 (6.0)	1.96 (1.04-3.69)	0.036

Conclusion: Patients awaiting nursing home placement and rehab placement were at 6.39 and 2.79 times higher odds of having significant barriers to discharge, respectively. More severe injuries and ventilator assistance also constituted significant barriers to discharge. Understanding what type of patient is prone to develop barriers to discharge will allow case managers and social workers to intervene with discharge planning early on in that patient's hospital course and possibly reduce healthcare costs.

Poster # 47

BOOZE AND BULLETS: GEOGRAPHIC ASSOCIATION OF LIQUOR LICENSES AND GUNSHOT WOUNDS IN CHICAGO

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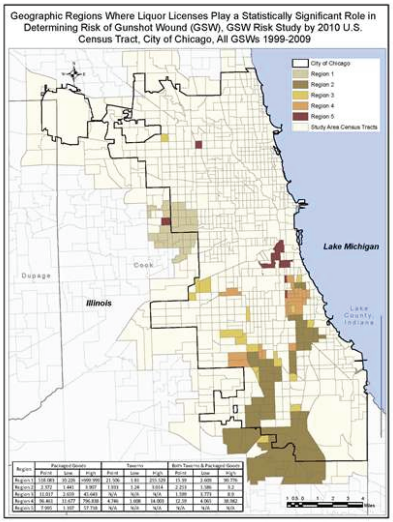
Introduction: The association between alcohol and interpersonal violence is well established. Up to 80% of homicide perpetrators and victims are known to have used alcohol before the incident. As reaction to the high rate of gunshot wound (GSW) deaths in South Central Los Angeles, a community coalition sought to close liquor stores, which they identified as being foci of violence. However, many store owners felt they were being unfairly targeted, as little data has supported these claims. We hypothesized that proximity to a liquor-selling establishment would be associated with GSWs in Chicago.
Methods: Scene address data from the Illinois State Trauma Registry from 1999-2009 was utilized to geocode all GSWs that presented to trauma centers in Chicago during the study period. We compared this with publicly available U.S. Census demographic data and City of Chicago Liquor Board data. A combination of Ordinary Least Squares (OLS) and geographically weighted regression (GWR) was performed, using ArcGIS 10.0, to identify homogenous 'risk regions' throughout the study area. Liquor licenses (LL) per census tract, as well as their position relative to gunshot wound assaults, were combined with U.S. Census demographic and American Community Survey 5 year estimated socio-economic data to identify these regions. The results were then used to develop a Weighted Spatial Morbidity Rate (WSMR) estimate of per person risk throughout the city. Logistic regression analysis was then performed, using SAS statistical software, to obtain the independent effect of access to liquor on hospitalizations for GSWs.



Results: A total of 11,744 GSWs were geocoded. We did not find an association of LL with GSWs for the city overall (OR 0.97, 95%CI 0.96-0.99). However, using OLS and GWR regression, we included areas where there was an association with LL in a map of overall per person risk (WSMR) for the entire city. Figure 1. In the area of highest LL association, which is also an area with a high incidence of GSWs, the effect was very strong (OR 42.88, 95%CI 2.42-759.84).
Conclusion: We found that liquor licenses were a strong independent predictor of GSW incidence in many areas of Chicago. However, this association was not demonstrable for the entire city, and, in fact, marked regional variation was apparent. This regional variation may explain heterogeneity in previously reported work.

These data may contribute to our understanding of the interplay between alcohol and violent injury disparities.

Poster # 48

MINOR TRAUMATIC INJURY IN GERIATRIC POPULATION - NOT SO MINOR AFTER ALL

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Introduction: Geriatric trauma is an expanding demographic that continues to grow as the population ages. Many geriatric traumas present with a relatively minor injury severity score (ISS) complicated by multiple co-morbidities and decreased physiologic reserve. We hypothesize that the geriatric trauma patient has a poorer outcome as compared to their younger counterparts when controlling for injury severity and sought to quantify this difference.

Methods: Trauma patients admitted to a single Level I trauma center from 2006 until 2011 were retrospectively analyzed using the hospital trauma registry database. The in-hospital mortality of this population was reviewed for co-morbidities, age, and ISS using hierarchical logistic regression. Age was subdivided into young (18-39 years old), middle-aged (40-64 years old), and geriatric (65 and older). ISS was categorized into mild (<15), moderate (15-29), and severe (>30) injury.

Results: 16562 patients were admitted during the study period, and 5257 were 65 years or older. Co-morbidities of coronary artery disease (CAD), congestive heart failure (CHF) and dementia were significantly associated with mortality with respective odds ratios (OR) of 2.58, 2.29, and 1.89 ($p<0.01$). Geriatric age was associated with mortality when compared to young and middle-aged cohorts (OR 4.18 and 3.34 respectively; $p<0.01$). Geriatric trauma patients had higher associated mortality across all injury levels compared to young patients, and in instances of minor injury severity, showed eleven-fold higher odds of mortality ($p<0.01$; see Table).

Odds Ratios of Risk of Mortality Age Specific to Injury Severity

	ISS Score (injury severity)		
	Mild	Moderate	Severe
Geriatric *vs.* Young*	11.16	4.76	1.44
Geriatric *vs.* Middle-Aged*	10.56	3.49	1.35
*p < 0.05			

Conclusion: Minor injury (ISS<15) in the geriatric population is associated with an eleven-fold higher mortality as compared to similarly injured younger patients. This discord between minor injury severity and higher mortality is likely secondary to limited reserve and co-morbidities.These patients are a vulnerable trauma population who, with even minor injuries, are strongly associated with an adverse outcome and require vigilance to minimize untoward events and a multidisciplinary approach for goals of care and end of life discussions.

Poster # 49

ADDING INSULT TO INJURY: DISCONTINUATION OF INSURANCE FOLLOWING SPINAL TRAUMA

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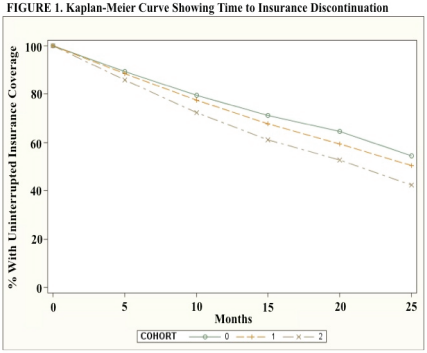
Introduction: Per-person 30-year medical payments following traumatic injury are estimated to be in excess of $345,000. Those with medical insurance are not necessarily protected from this economic risk, as they depend on continuation of insurance to prevent catastrophic financial ruin. We hypothesized that severely injured patients with spinal cord injuries (SCI) undergoing surgery are at increased risk for loss of insurance relative to more moderately injured individuals and non-trauma patients.

Methods: We used 2006-2010 data from MarketScan® to identify elective spine surgery patients (n = 155,832), spine trauma patients undergoing surgery without SCI (n = 3,433), and spine trauma patients undergoing surgery with SCI (n = 419). The main outcome measure was duration of insurance coverage. Descriptive insurance coverage analysis was performed using Kaplan-Meier methodology. Multivariate analysis was performed by Cox regression.

Results: In the 12 months following index admission, elective and trauma patients without SCI had lower rates of insurance discontinuation than trauma patients with SCI (24.2% vs. 26.2% vs. 32.5%, $p < 0.001$). This trend persisted at 24 months (39.1% vs. 43.3% vs. 50.4%, $p < 0.001$). Kaplan-Meier analysis revealed an increased rate of insurance discontinuation for the patients with SCI in the 24 months following surgery (Figure 1). The unadjusted hazards ratios (HR) for insurance discontinuation in the Trauma with SCI cohort were 1.41 (95% CI, 1.19-1.67) and 1.44 (95% CI, 1.26-1.65) at 12 and 24 months, respectively, but became nonsignificant after adjustment. However at 5 years even the adjusted HR was significant for this group (1.18, 95% CI 1.04-1.35). Significant covariates included age, length of stay, and discharge status.

Conclusions: In this large, high integrity longitudinal database, almost a third of trauma patients undergoing spine surgery for SCI had discontinuation of their insurance. While a number of factors contribute to this, including loss of employment-based medical coverage, future medical costs typically fall on patients, their families, and publicly funded organizations. This study highlights an area for future policy development if the United States hopes to move toward a more efficient, equitable health care environment.

FIGURE 1. Kaplan-Meier Curve Showing Time to Insurance Discontinuation



Cohorts: 0 - Elective; 1 - Trauma without SCI; 2 - Trauma with SCI
Log-Rank Chi-Square = 54.0; $p < 0.001$

Poster # 50

OBESITY PREDISPOSES TRAUMA PATIENTS TO WORST OUTCOMES: A NATIONAL TRAUMA DATA BANK ANALYSIS

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Introduction: One-third of U.S. adults are obese. The impact of obesity on outcomes after blunt traumatic injury have been studied with disparate results. The aim of our study was to evaluate outcomes in obese trauma patients after blunt trauma. We hypothesized that obese patients have adverse outcomes as compared to non-obese patients after blunt traumatic injury.

Methods: We performed a retrospective analysis of all patients (≥18y.o.) sustaining blunt injury using the National Trauma Data Bank (NTDB) for years 2007-2010. Patients with recorded comorbidity of obesity (BMI ≥ 40) were identified. Patients transferred, dead on arrival, and with isolated traumatic brain injury were excluded. Propensity score matching was utilized to match obese patients to non-obese patients in a 1:1 ratio based on age, gender, injury severity score (ISS), Glasgow coma scale (GCS), and systolic blood pressure on presentation. The primary outcome was mortality and the secondary outcome was in-hospital complication.

Results: A total of 32,780 (Obese: 16,390, Non-obese: 16,390) patients were included in the study. Obese patients were more likely to have in hospital complications (OR: 1.8, 95%CI: 1.6-1.9), longer hospital length of stay (OR: 1.2, 95%CI: 1.1-1.3), and longer intensive care unit length of stay (OR: 1.15, 95%CI: 1.09-1.2).

In-Hospital Complications

	Obese (n=16,390)	Non-Obese (n=16,390)	P
Pneumonia	1.7% (283)	1.3% (204)	0.02
ARDS	2.1% (336)	1% (167)	0.001
Surgical Site Infection	0.4% (73)	0.2% (31)	0.01
Sepsis	0.3% (48)	0.1% (23)	0.03
DVT	1.2% (194)	0.6% (100)	0.001
PE	0.4% (64)	0.3% (43)	0.04
Decubitus Ulcer	0.8% (136)	0.4% (64)	0.01

The overall mortality rate was 2.8% (n=851). Mortality was higher in obese patients compared to non-obese patients (3.0%vs.2.2%, OR: 1.4, 95% CI: 1.1-1.5).

Conclusion: Obesity is independent predictor of mortality and in hospital complications after blunt traumatic injury. Obesity is a systemic problem affecting multiple organ systems response to trauma. The results of our study call for attention through focused injury prevention efforts. Future studies are needed to help define the consequences of obesity that influence outcomes.

Poster # 51

DIFFERENCES IN INJURY PATTERNS BETWEEN MALE AND FEMALE DOMESTIC VIOLENCE PATIENTS: A CALL FOR EXPANDED HOSPITAL-BASED VIOLENCE SCREENING AND INTERNTION

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Introduction: Domestic violence (DV) resulting from an intimate partner or family member represents a significant public health concern. Hospital initiated screening and intervention have focused predominately on female victims. Few studies have focused on the prevalence of males as victims, and fewer characterized injuries in male victims. We sought to characterize injury patterns of male compared to female DV victims and hypothesized that male victims would have different injury pattern, therefore necessitating targeted screening measures.

Methods: Retrospective review of trauma patients at a Level 1 trauma center from 2010-2012 was performed to identify male and female victims of DV with injuries severe enough to warrant hospital admission. Data analyzed included sex, race, age, co-morbidities, mechanism, injuries, hospital LOS, ISS, associated substance abuse and co-morbidities. Injuries were evaluated according to region of body injured. Child abuse and sexual assault victims were excluded. Data for male and female victims were compared using SAS software. Statistics consisted of Fisher's extract test and Chi-Square analysis.

Results: Of the 11, 193 trauma admissions, 129 victims (70 males, 59 females) of DV were recorded in the registry. Men and women were well matched in terms of demographics, hospital LOS, ISS, and medical co-morbidities. Men were more often victims of stab wounds (M: 31.07% vs. F: 13.59%) and women were more likely victims of assault (F: 23.3% vs. M: 13.59%; p-value =0.011). Women had a higher incidence of injuries to the neck (10.85% vs. 3.88%, p=0.0081) and face (19.38% vs. 13.95% p=0.045), while men experienced 2x the number of abdominal injuries as women (19.38% vs. 10.08%, p=NS). There were no differences in drug use at time of injury, however males were more likely to have a history of alcohol and substance abuse than females (13.88% vs. 1.55%, p=0.0008; 5.43% vs. 0.78%, p<0.0001). Twice as many males tested positive for alcohol at the time of injury compared with females although not significant (30% vs. 14%).

Conclusion: Injury patterns among male victims of DV are different. This study suggests that tailored screening of male victims and substance abuse evaluation should be conducted in a hospital setting.

Poster # 52

RISK FACTORS FOR SYMPTOMATIC VENOUS THROMBOEMBOLISM AFTER TRAUMA: A POPULATION-BASED CASE-COHORT STUDY

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Introduction: Failure to provide appropriate prophylaxis for venous thromboembolism (VTE) to hospitalized, at-risk patients is considered a medical error by the Institute of Medicine. Hence, it is important to understand which risk factors, available during the first 24 hours of admission, help predict which hospitalized patients go onto develop symptomatic VTE. Within a population-based study, we tested pre-hospital and in-hospital risk factors which may be associated with incident VTE after trauma up to 92 days after injury.

Methods: We utilized the Rochester Epidemiology Project to identify all Olmsted County, MN residents from 1988-2005 who met criteria for a first lifetime (objectively documented, symptomatic) VTE event after trauma. Random cohort sample of trauma patients stratified on sex, year of trauma and likelihood of surgery (ICD-9 injury codes) were also chosen. Complete medical histories in the community were reviewed and collected for 92 days prior to and after trauma date. Sample weights were used for univariable and multivariable survival analysis. Data are presented as median interquartile range (IQR) and hazard ratio (HR) with 95% confidence interval (95% CI) with $p < 0.05$ considered as significant.

Results: Two hundred incident VTE cases and 370 random cohort members were identified. The overall estimated incidence of VTE in patients who are hospitalized for their trauma is 1.09% (0.94, 1.25; 95% CI). The time (days) from trauma to diagnosis of VTE was 18 (6, 41). Univariable survival analysis revealed several pre-hospital and injury - related risk factors predictive of VTE. In a multivariable model, several risk factors for VTE were identified (Table).

Variable	HR (95% CI)	P - value
Leg Paresis after Trauma	3.77 (1.79, 7.94)	0.0005
Chronic Renal Disease	3.12 (1.72 , 5.67)	0.0002
Superficial Thrombosis	2.10 (1.21, 3.64)	0.0081
Non-hospital Related Immobility History	1.91 (1.26, 2.91)	0.0025
Age at Trauma / 10	1.34 (1.22, 1.47)	0.0001
Weight (kg) / 10	1.24 (1.13, 1.35)	0.0001

Conclusions: This is a first report of a population-based case-cohort study evaluating the incidence of VTE after trauma up to 92 days after injury. The risk factors identified in this study will be validated in a prospective case-cohort study, which is currently open to enrollment.

Poster # 53

ACE'S ADVENTURE AND RICHIE'S NEIGHBORHOOD: A PROSPECTIVE RANDOMIZED TRIAL OF A VIDEOGAME AS AN EDUCATIONAL TOOL FOR PEDIATRIC INJURY PREVENTION

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Introduction: Injury is the number one cause of death and disability in children in the United States and an increasingly important public health problem globally. While prevention of injuries is an important goal, prevention efforts are currently fragmented, poorly funded and their effectiveness is rarely studied. Among school-aged children, pedestrian crashes are a major mechanism of injury. We hypothesized that we could develop a game-based educational tool that would be effective in teaching early elementary school children the principles of pedestrian safety.

Methods: We designed a unique interactive video game (Ace's Adventure Game) featuring a child walking to school. Within the game are several "mini-games" each focusing on a different pedestrian safety message. The game is available in both English and Spanish. We also built a life-size simulated street (Richie's Neighborhood) modeled after the game that can be rolled out in a parking lot or school gymnasium for education and testing purposes. After obtaining consent from schools and parents, 2 nd and 3rd grade students were randomly assigned to play the pedestrian safety videogame or to attend a 20 minute didactic teaching session where the same pedestrian safety topics that were included in the game were discussed. Both groups were then "tested" on the simulated street where trained observers recorded whether the students demonstrated correct pedestrian behaviors at 8 testing constructs covered by both the videogame and the didactic session. A perfect score on the simulated street was 8.

Results: A total of 299 students were enrolled in the study which included 14 schools; 161 in the game arm and 138 in the didactic. 46% were 2nd graders and for many children Spanish was their primary language. The mean score for those who were in the didactic arm was 5.3 (SD+1.1) and 5.4 (SD=1.1) for those in the videogame arm (p-value=0.9968).

Conclusions: Students who played the educational videogame focused on pedestrian safety performed similarly to those who attended a more traditional and labor-intensive didactic learning session. Innovative educational methods, such as game-playing, could significantly change our approach to injury prevention and have the potential to decrease the burden of injury among children world-wide.

Poster # 54

PRE-INJURY BETA-BLOCKADE IS PROTECTIVE IN ISOLATED SEVERE TRAUMATIC BRAIN INJURY

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Introduction: The purpose of this study was to investigate the effect of pre-injury beta-blockade in patients suffering isolated severe traumatic brain injury (TBI). We hypothesized that beta-blockade prior to TBI is associated with improved survival.

Methods: The trauma registry of an urban academic trauma center was queried to identify patients with an isolated severe TBI between 1/2007 and 12/2011. Isolated severe TBI was defined as an intracranial injury with an abbreviated injury scale of (AIS) ≥3 excluding all extracranial injuries AIS ≥3. Patient demographics, clinical characteristics on admission, injury profile, Injury Severity Score, AIS, in-hospital morbidity, and beta-blocker exposure were abstracted for analysis. The primary outcome evaluated was in-hospital mortality stratified by pre-injury beta-blockade exposure.

Results: Overall, a total of 662 patients met study criteria. Of these 25% (n=159) were exposed to beta-blockade prior to their traumatic insult. When comparing the demographics and injury characteristics between the groups, the sole difference was age with the beta-blocked group being older (69 ± 12 yrs vs. 63 ± 13 yrs,p <0.001). Beta-blocked patients had a higher rate of infectious complications (30% vs. 19%, p = 0.04), with no difference in cardiac or pulmonary complications between the cohorts. Patients exposed to beta-blockade vs. no beta-blockade experienced 13% and 22% mortality, respectively (p = 0.01). Stepwise logistic regression predicted the absence of beta-blockade exposure as a risk factor for mortality (OR 1.9, 95% CI 2.3-9.8, p= 0.01). After adjustment for significant differences between the groups, patients not exposed to beta-blockade experienced 2-fold increased risk of mortality (AOR 2.2, 95% CI 1.3-3.7, p = 0.004).

Conclusion: Pre-injury beta-blockade improves survival following isolated severe traumatic brain injury. The role of prophylactic beta-blockade and the timing of initiation of such therapy after traumatic brain injury warrant further investigations.

Poster # 55

A PROPHYLACTIC WARFARIN REVERSAL POLICY UTILIZING FROZEN PLASMA IS INEFFECTIVE IN PREVENTING DELAYED INTRACRANIAL HEMORRHAGE AFTER TRAUMA

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Introduction: Trauma centers are seeing an increasing number of elderly patients using anticoagulants who are often injured after low energy mechanisms. The most common anticoagulant used is warfarin. Intracranial hemorrhage (ICH) after trauma in these patients can occur either acutely or in a delayed fashion and can lead to devastating consequences. We hypothesized that a policy of prophylactically reversing anticoagulation in all patients on warfarin with frozen plasma would decrease the delayed development of ICH.

Methods: After institutional review board approval, we retrospectively reviewed all trauma patients from January 2010 until November 2012 admitted to our trauma center with ground level fall as a mechanism of injury, on warfarin with an INR within 4 hours of triage time of > 1.5 and a negative initial head CT who were observed for delayed hemorrhage. Patients admitted had either suffered a loss of consciousness or had external signs of head trauma. Based on our reversal policy, they were then transfused with fresh frozen plasma (FFP) on arrival with a goal to reduce the INR to < 1.5. Patients were classified as reversed if their INR reached < 1.5 between 4 and 24 hours of hospital arrival (REV) or unreversed if lowest INR was > 1.5 during the same time frame (NREV). Patients were assessed clinically for change in neurologic exam and CT scanning was performed selectively based on neurologic changes.

Results: Of 392 patients who fell on anticoagulants during the study period, 194 met our inclusion criteria. Forty-three (22%) patients were able to be reversed using an aggressive pre-emptive FFP transfusion strategy, while 151 (78%) remained unreversed. Demographics and clinical characteristics of both groups are summarized in Table 1. NREV patients were predominantly male and younger compared to the REV group ($p<0.05$). Mean FFP units received in both groups were the same (1.6 units, $p=0.968$). NREV patients had a higher INR value of 3 (± 1.7) on arrival in comparison with REV patients with INR of 2.5(± 1), $p<0.0.5$. There was only one patient during the study period that developed an ICH in a delayed fashion; this patient belonged to the REV group and was identified by neurologic changes.

Conclusion: The incidence of delayed hemorrhage in this study was 0.5 % which is similar to previous reports. An aggressive prophylactic strategy of FFP transfusion for anticoagulation resulted in a low proportion of patients who were effectively reversed and did not have an impact on the rate of delayed hemorrhage. We recommend a period of observation only for patients on anticoagulation with suspected head trauma and a negative initial CT.

	Anti-coagulation Not Reversed (n=151)	Anti-coagulation Reversed (n=43)	p-value
Age	82.2 (10)	85.8 (5.9)	<0.05
Number of Males	74 (49)	11 (25.6)	<0.05
Fresh Frozen Plasma (units)	1.6 (0.8)	1.6 (0.7)	0.968
Length of Stay	2.7 (1.8)	2.7 (1.4)	0.9856
Injury Severity Score	3.8 (3.2)	4.7 (4.6)	0.25
INR- Arrival	3 (1.7)	2.5 (1)	0.018
INR- Follow Up	1.8 90.4)	1.4 (0.1)	<0.05

Poster # 56

DYSPHAGIA PREDICTS ONE-YEAR MORTALITY IN ELDERLY PATIENTS WITH CERVICAL SPINE FRACTURES

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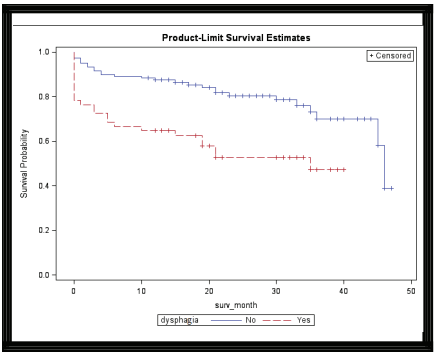
Introduction:

Dysphagia increases mortality in hospitalized elders. We sought to identify predictors of dysphagia in patients ≥ 65 with cervical spine fractures, and to determine the impact of dysphagia on mortality.

Methods:

All trauma patients ≥ 65 with cervical spine fractures, without spinal cord injury (SCI), from 2009- 2011 were identified from our level one trauma registry. Data about demographics, injury characteristics, co-morbidities, in hospital complications and mortality was collected. The Social Security Index was used to identify death up to one year after injury. Chi-square test and Wilcoxon rank-sum test were used for comparisons between groups, and multivariate logistic regression to identify predictors of dysphagia, p <0.05.

Results:



Of 171 patients, 51 (29.8%) patients had dysphagia. Patients with dysphagia were older (85.7 ± 7.7vs. 79.7 ± 8.2years, P <0.001), were more likely to have sustained a fall (90% vs. 76%, p=0.031), had lower initial GCS (12.3 ± 7.4 vs. 14.1 ± 8.8, p<0.001), had higher age adjusted Charlson Co morbidity Score (4.5± 3.3 vs. 5.8 ± 3.0, P 0.02), and were more likely to have multiple cervical spine fractures (37% vs. 21%, p=0.025). During hospitalization, dysphagia was associated with higher rates of delirium (20% vs. 6%, P 0.006), pneumonia (14% vs. 1%, P <0.001), mechanical ventilation ≥ 2 days (P < 0.001). Patients with dysphagia were more likely to get tracheostomy and feeding tubes (14% vs. 7%, p=0.001, and 43% vs. 2%, p < 0.001, respectively). Comparatively few patients with dysphagia were discharged home (6% vs. 28% p = <0,001). Logistic Regression showed that increasing age (OR 1.12 4, 95% CI (1.058-1.193)) and cause of injury (OR 4.12 95%CI (1.664-10.202)), were both significant predictors for dysphagia. Patient with dysphagia were more likely to have mechanical ventilation ≥ 2 days in duration (OR 38.4, 95% CI (8.574-172.21)). Log Rank Survival analysis showed that patients with dysphagia have significantly lower survival (p=0.0003) at all points throughout the course of the study.

Conclusion:

Dysphagia is associated with several adverse outcomes, including lower probability of survival in geriatric patients after cervical spine fracture. Dysphagia after cervical spine fractures is an important finding, and should be considered when communicating prognosis with patients and their families.

Poster # 57

OUTCOMES IN TRAUMATIC BRAIN INJURY FOR PATIENTS PRESENTING ON ANTIPLATELET THERAPY

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Introduction: As the population ages, a growing number of patients are presenting to trauma units with head injuries while on anti-platelet therapy (APT). The influence of APT on these patients is poorly defined. This study examines the outcomes of patients on APT presenting to the hospital with blunt head trauma (BHT).

Methods: The registries of two level I trauma centers were reviewed for patients over 40 years of age presenting from January 2008 to December 2011 with BHT. Patients on APT were compared to patients presenting with BHT not on APT. The primary outcome measures were in-hospital mortality, intracranial hemorrhage (ICH) and need for neurosurgical intervention. Hospital length of stay (LOS) was reviewed as a secondary outcome measure. Both crude and multivariate-adjusted logistic regression models were fit to estimate odds ratios and 95% confidence intervals. Adjusted models included antiplatelet status as well as age, injury severity score (ISS) and Glasgow coma score (GCS).

Results: All patients meeting inclusion criteria and having complete data (n=1547) were included in the analytic cohort ; 422 (27%) of these patients were taking APT [aspirin, n=330; clopidogrel, n = 36; aspirin and clopidogrel, n = 56]. Overall rates of ICH, neurosurgical intervention and in-hospital mortality of patients with BHT in our study were 45.4%, 3.1% and 5.8%, respectively. Controlling for age, ISS and GCS, there was no significant difference in ICH (OR=0.84, 95% CI: 0.61-1.16), neurosurgical intervention (OR=1.26, 95% CI: 0.60-2.67), or mortality (OR=1.79 95% CI: 0.89-3.59) associated with APT. Subgroup analysis revealed that among more severely injured patients (ISS $\geq$ 20), those on APT had elevated odds of in-hospital mortality (OR=2.34, 95% CI: 1.03-5.31) compared with non-users. Prolonged hospitalization (LOS>14 days) was more likely in the APT group than those in the non APT group (OR=1.85, 1.09-3.12).

Conclusion: This is the largest study examining the effects of APT on outcomes in BHT. While the effects of anti-platelet therapy in BHT patients aged 40 years and older showed no significant difference in ICH, neurosurgical intervention and in-hospital mortality, older and more severely injured patients on APT may carry an increased risk of poor outcome when compared with non-APT patients. Larger studies are needed to appropriately assess the effects of antiplatelet therapy on BHT outcomes in these populations.

Poster # 58

DOES EVERY TBI WITH POSITIVE HEAD CT NEED A NEUROSURGEON? SCREENING CRITERIA FOR TRANSFER TO LEVEL 1 AND 2 TRAUMA CENTERS

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Introduction:Traumatic brain injury (TBI) is common but only 5% of patients with TBI require surgical intervention. Recent studies have suggested that there might be criteria by which patients can be safely monitored at lower tiered trauma centers (Level 3 or 4). The purpose of this study was to investigate potential criteria for safe observation of mild TBI patients without transfer to Level 1 or 2 trauma centers.

Methods:Retrospective review of the trauma registry for patients with mild TBI from 6/ 2006- 9/2011, with a positive finding on head CT was performed . The investigational criteria for 'observation' included patients with GCS > 13, blunt injuries with small SAH, IPH, EDH or SDH, non-displaced calvarial fractures. The criteria for 'transfer' included GCS<13, penetrating injury, moderate to large SAH, IPH > 10 mm, SDH or EDH > 5 mm, midline shift > 3 mm, anticoagulation, and depressed or basilar skull fractures. All neurosurgical diagnostic and therapeutic interventions (ICP monitor, external ventricular drain (EVD), craniotomy) were compared for both groups. Statistical analysis was performed using Chi Square and Fisher's Exact Test.

Results: 1504 patients met inclusion criteria.

	N	Mortality	Repeat CT scan	ICP	EVD	Crani
Observe	676	4 (0.5%)	155 (23%)	0	0	0
Transfer	828	21(3%)	445 (54%)	10 (1%)	6 (0.7%)	112 (14%)
P value	---	.006	<.001	.003	.04	<.001

No patient that met observation criteria required an ICP monitor, EVD or craniotomy. None of the deaths in the Observe group were secondary to head injury. .

Conclusion:Select patients with mild TBI meeting criteria could be safely observed at Level 3 and 4 trauma centers, decreasing trauma system expenses, and transfer risks while preserving Level 1 and 2 trauma center resources.

Poster # 59

THE MODIFIED BERNE-NORWOOD CRITERIA PREDICT TWO TIERS OF RISK FOR TBI PROGRESSION

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Introduction: As a basis for venous thromboembolism (VTE) prophylaxis after traumatic brain injury (TBI), we have previously described an algorithm based on hemorrhage patterns first described by Berne and Norwood and modified by our group. Based on these injury criteria and their behavior over time, we classify patients as Low-, Moderate-, or High-risk for spontaneous progression of hemorrhage with specific VTE prophylaxis regimens tailored to each tier of risk. Here we sought to internally validate the modified Berne-Norwood criteria as a tool for stratifying TBI patients by risk for spontaneous progression.

Methods: In our algorithm, patients with any or all of the following modified Berne-Norwood criteria are classified "Low-risk" for spontaneous progression: subdural hemorrhage (SDH) <9 mm thick, epidural hemorrhage (EDH) <9 mm thick, contusion <20 mm in diameter, a single contusion per lobe, any amount of subarachnoid hemorrhage (SAH), or any amount of intraventricular hemorrhage (IVH). Patients with any injury exceeding these criteria are labeled "Moderate-risk" for progression, and any patient undergoing a monitor or craniotomy is classified "High-risk." From 2/2010 to 11/2012, patients presenting with intracranial hemorrhage were prospectively entered into a dedicated database tracking their injury types and sizes, risk category at presentation, and any progression on subsequent CTs. Exclusions were receipt of only 1 CT or preinjury warfarin.

Results: The cohort of 414 subjects were classified as Low-risk (n=201), Moderate-risk (n=74), or High-risk (n=139) after their first CT. After repeat CT scan, radiographic progression was noted in 27% of Low-risk subjects, 51% of Moderate-risk, and 58% of High-risk. Omnibus testing for differences in progression rates between the three risk strata was significant overall ($p<0.0001$). ANOVA showed the Low-risk progression rate to be significantly lower than both the Moderate- and the High-risk arms, while no significant difference was seen between the Moderate- and the High-risk arms themselves.

Conclusions: The modified Berne-Norwood criteria are a valid tool for classifying TBI patients into two categories of risk for spontaneous progression of their intracranial hemorrhage patterns. This in turn supports the creation of tailored VTE prophylaxis regimens for each arm which reflect these different levels of risk.

Poster # 60

ROUTINE TRANSFER TO TRAUMA CENTER FOR MILD TRAUMATIC BRAIN INJURY (mTBI) IS UNNECESSARY

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Introduction: Patients with mTBI are frequently transferred to trauma centers for neurosurgical (NSG) consultation. Previous studies suggest that these patients may be managed safely without NSG consultation even with abnormal computed tomographic (CT) findings. The purpose of our study was to assess the outcomes of patients transferred to our Level I trauma center with mTBI compared with direct admission with mTBI.

Methods:Retrospective review was performed of trauma admissions from 2007-2012. Inclusion criteria were TBI with initial Glasgow Coma Scale (GCS) 14-15 (mTBI). Demographics, initial and follow up CT findings, NSG consultation, neurosurgical intervention, and outcomes were reviewed. Continuous variables between the two groups were compared using Student's t-test; Comparisons between the two groups on unranked categorical variables were performed by Chi-square. Significance was set at $p<0.05$.

Results: 1,324 patients identified; 531 patients were transferred from outlying hospitals and 793 were direct admits. Median time prior to transfer was 3 hours. Of all patients, 44% received NSG consultation (70.0% transferred vs. 26%, $p<.01$). Twenty six patients (1.9%) required NSG intervention (2.5% transferred vs. 1.6%). Neurosurgical interventions consisted of elevation of depressed skull fractures, removal of foreign bodies and repair of injury associated aneurysms. Transferred patients were older, and more frequently required NSG consultation.

Table: Patient characteristics and outcomes

Group	Transfer	Direct Admit	p
n	531	793	
Age (years)	45.3 ± 28.8	33.4 ± 21.9	<0.01
ICU LOS	0.5 ± 1.4	0.2 ± 1.3	<0.01
Hospital LOS	2.9 ± 3.6	2.0 ± 3.0	<0.01
ISS	6.9 ± 2.5	5.0 ± 2.7	<0.01
RTS	12.0 ± 0.3	11.9 ± 0.4	0.04
NSG Consult	70%	26%	<0.01

Conclusion: The incidence of NSG consultation resulting in intervention, beyond observation, was low. Our data suggest that most patients may be safely managed at their originating hospital; particularly if the initial head CT scan demonstrates no significant pathology. The need for neurosurgical intervention was always clinically or radiographically apparent. To improve resource utilization, reduce healthcare costs and streamline the process of care, we have enacted guidelines across our healthcare system for appropriate indications to transfer patients with mild TBI.

Poster # 61

HEAD INJURY SEVERITY IS ASSOCIATED WITH VENOUS THROMBOEMBOLISM IN PATIENTS WITH ISOLATED TRAUMATIC BRAIN INJURY

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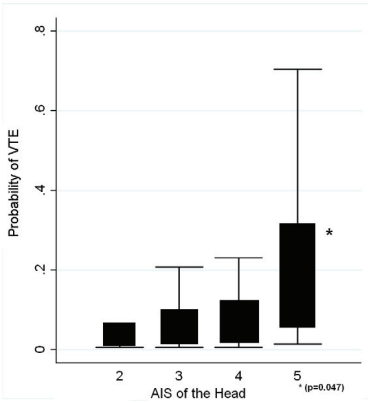
Introduction: Traumatic brain injury is thought to be an independent risk factor for venous thromboembolism (VTE). Previous investigations have been limited by inclusion of patients with multiple injuries, and many lack results of surveillance ultrasound. We hypothesized that increased brain injury severity in patients with *isolated* traumatic brain injury (IsoTBI) is associated with VTE.

Methods: The records of patients admitted to our Level I trauma center from 6/2006-12/2011 were reviewed for injury data, VTE risk factors, results of surveillance ultrasound, and severity of IsoTBI (Head-AIS). Patients were identified by ICD-9 codes for traumatic brain injury, and those who had no additional major injuries (non-head AIS ≤1) were included in the study. The association of Head-AIS and VTE was analyzed using a case-control design. Among the IsoTBI patients, those diagnosed with lower extremity deep vein thrombosis or symptomatic pulmonary embolus (cases) were matched for age, gender, and admission year to those without VTE (controls).

Results: 345 IsoTBI patients were identified. There were 41 cases (11.9%). The number of controls matched to each case ranged from 1 to 16. Cases had a higher mean Head-AIS (4.36 vs. 3.89, p=0.001) and overall injury severity score (20.4 vs. 16.8, p=0.001). Although cases were more likely to have received pharmacologic prophylaxis (53.7% vs. 11.9%, p<0.001), the mean time to initiation of prophylaxis was 11 days. Following adjustment for all factors found to be associated with VTE (Glascow Coma Scale score, ventriculostomy placement, ventilator days, history of previous VTE, chronic obstructive pulmonary disease, and placement of a central or femoral line) cases were significantly more likely to have a greater severity of head injury (Head AIS of 5, OR = 2.57, 95%CI 1.01-6.53, p = 0.047).



Conclusion: The prevalence of VTE in IsoTBI patients is significantly associated with the severity of traumatic brain injury. VTE surveillance protocols are warranted in these high risk patients. Because of the difficulties associated with early initiation of pharmacologic prophylaxis in the most severely injured IsoTBI patients, placement of a prophylactic inferior vena cava filter may be considered.

Poster # 62

A GOAL-DIRECTED MULTIMODALITY MONITORING AND THERAPEUTIC PROTOCOL DECREASES MORTALITY IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY (sTBI)

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Introduction: Patients with sTBI (Glasgow Coma Scale-GCS ≤ 8) are conventionally monitored and treated using the Brain Trauma Foundation guidelines; however, recent studies question the utility of intracranial pressure (ICP) monitoring. This study examined whether a goal-directed multimodality monitoring and therapeutic protocol (GD-MM&TP) can decrease 14-day mortality compared to that predicted by the CrasH model.

Methods: from 7/2011 to 9/2012, 33 patients with sTBI (mean age 46 ± 21, GCS 5 ± 2) were monitored and treated with a 5-day protocol that included maintenance of normothermia with dry water immersion, brain O_2 (PbO_2) ≥ 20 mm Hg, ICP ≤ 20 mm Hg, cerebral perfusion pressure (CPP) ≥ 60 mm Hg to keep tissue oxygen saturation (bi-frontal Near-Infrared Spectroscopy) ≥ 60%, burst suppression as needed, nutritional support targeted to a Respiratory Quotient (RQ) of 0.83 by day 3, osmotherapy (OsmRx) and decompressive craniectomy (DC) when indicated.

Results: 2/33 patients failed OsmRx requiring DC. The predictive mortality (PM) was 55% (18/33). Actual mortality (AM) was 33.3% (11/33), yielding a 39% reduction in mortality. The decrease in mortality ranged from 11.6% to 69.7%.

PM	N	Mean %ile	AM	Decrease
0-20	7	12.9 ± 4.5	0/7	na
21-50	8	40.4 ± 9.2	1/8 (12.5%)	69.7%
51-79	9	62.8 ± 6.7	5/9 (55.5%)	11.6%
80-100	9	92.2 ± 6.0	5/9 (55.5%)	39.8%

Conclusion: A GD-MM&TP can decrease predicted mortality in patients with sTBI.

Poster # 63

PLATELET TRANSFUSION IMPROVES ASPIRIN INDUCED PLATELET DYSFUNCTION IN PATIENTS WITH TRAUMATIC BRAIN INJURY>

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Introduction: Platelets are critical for initial hemostasis after trauma. Management of patients with intracranial hemorrhage (ICH) taking antiplatelet agents (aspirin or clopidogrel) often includes platelet transfusion however there is little evidence to support this. We investigated platelet function before and after platelet transfusion in patients taking antiplatelet agents with traumatic ICH.

Methods: Blood samples were collected from patients with traumatic ICH. Patients known or suspected to be taking antiplatelet medications were transfused one bag of pooled platelets (6 units). Platelet function was assessed using a Multiplate multiple electrode aggregrometer (Verum Diagnostica GmbH, Munich Germany) within 3 hours of sample collection. Platelet activation was induced by adenosine diphosphate (ADP), Collagen, and arachodonic acid (AA).

Results: 14 patients with ICH were enrolled in the pilot study. 10 patients were taking aspirin at the time of injury and 2 of those were also taking clopidogrel. 11 patients received platelet transfusion (all 10 patients taking aspirin +/- clopidogrel and 1 patient not known to take antiplatelet agents). Median admission platelet function for the 3 patients not taking aspirin that did not receive platelet transfusion was ADP 51 (range 39 to 86), Collagen 34 (range 27 to 53) and AA 26 (range 11 to 53). Median admission platelet function for the patients that received platelet transfusion (10 patients taking aspirin +/- clopidogrel and one patient taking no antiplatelet agents) is shown below.

	Reference Range	**Admission value median (Q1, Q3)**	**4-12 hours post tx median (Q1, Q3)**	**12-36 hours post tx median (Q1, Q3)**
ADP, U	43-92	29.0 (26.0,59.0)	27.0 (23.0,51.0) p=0.331*	46.0 (33.0,49.0) p=0.437**
Collagen, U	43-90	24.0 (22.0,31.0)	24.0 (18.0,29.0) p=0.196*	34.0 (31.0,41.0) p=0.437**
AA, U	40-91	19.0 (17.0,24.0)	26.0 (23.5,36.5) p=0.015*	37.0 (34.0,52.0) p=0.031**
Platelets x $10^3/\mu L$	150-450	213 (192,234)	220 (186,254) p=0.492*	

Tx=platelet transfusion, ADP-adenosine diphosphate, AA-arachadonic acid * Admission value compared to 4-12 hours post platelet transfusion ** Admission value compared to 12-36 hours post platelet transfusion

Conclusion: In this pilot study we demonstrate platelet dysfunction in patients with isolated ICH. The greatest degree of dysfunction is in the response to platelet activation by arachadonic acid in patients taking aspirin which inhibits arachadonic acid metabolism by interfering with the cyclo-oxygenase pathway. This aspirin induced platelet dysfunction is improved with platelet transfusion and that improvement continues beyond 12 hours, which supports the practice of platelet transfusion for patients with traumatic ICH taking aspirin or clopidogrel.

Poster # 64

ENHANCED IDENTIFICATION OF CHILDREN WITH NON ACCIDENTAL TRAUMA IN THE EMERGENCY ROOM

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INTRODUCTION: Non-accidental trauma (NAT) is extremely difficult to identify in pediatric emergency rooms. Victim and parental cooperation is uncommon as the guardians are often the perpetrators and the child victim is afraid of additional retribution. We hypothesized that an analysis of injury patterns and presently available injury assessment tools in this cohort would elucidate criteria that assist in the identification of NAT.

METHODS: All cases of NAT seen at a level 1 tertiary pediatric trauma center over a 3 ½ year period were reviewed. Children were retrospectively identified by court affidavit, Child Protection Team notes or other records in the chart confirming NAT. Prospective data collected included, presenting complaint, HPI, physical examination, vital signs, injury severity score (ISS), and hospital disposition. Pediatric trauma score (PTS) was calculated from this data set. Patients were subdivided by age: G1 = 0-1 yr old, G2 = 1-2 yrs old, G3 = 2-3 yrs old. Comparison was made to age-matched accidental trauma patients from the same time period.

RESULTS: Of 125 children discharged from our hospital with a diagnosis of NAT, 107 (85.6%) were under 3 years of age (68.2% G1, 19.6% G2, 12.1% G3). These children represented 14.4% of all trauma victims aged 0-3 at our institution (23.3% G1, 9.4% G2, 6.2% G3). Most arrived by private car (67%) and most had a trauma-related complaint (68%); however, the majority of presenting complaints inaccurately described the etiology of the injury (80%). Common presenting findings were mental status change (54%), bruising (49%), favoring/tenderness of a limb (27%), change in PO tolerance (17%). Mean PTS for NAT vs. accidental trauma patients was 6.9 vs. 8.6 (G1), 8.1 vs. 9.5 (G2), and 8.7 vs. 9.8 (G3). No NAT patient had a PTS > 10, whereas 45% of accidental trauma patients had a PTS > 10. Linear regression showed the correlation between declining PTS and increasing rate of NAT to be significant (ANOVA: $F(1,708)= 88.611$, $p < .001$, R squared = .111). Mean ISS for NAT vs. accidental trauma patients was 11.93 vs. 9.17 (G1), 12.05 vs. 7.37 (G2), and 8.92 vs. 6.59 (G3).

CONCLUSION: PTS < 10 was significantly associated with NAT in this population. When age (<1 yr), any mental status change in the child, and arrival by private vehicle are combined with PTS <10 the likelihood if NAT is almost assured. We feel these data indicate that PTS should be obtained as a screening tool on any child presenting to an emergency room with injuries, not involved in the presenting complaint, or when they appear out of proportion to a described injury. PTS <10 appropriately indicates a NAT work up if these criteria are applied.

Poster # 65

LIBERAL UTILIZATION OF REPEAT CT IMAGING IN MILD BLUNT HEAD INJURY: DOES ANTI-PLATELET THERAPY INFLUENCE INJURY PROGRESSION

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Introduction: Traumatic brain injury (TBI) accounts for significant morbidity and mortality. There are increasing numbers of patients currently receiving anti-platelet therapy (APA). The objectives of this study are to evaluate injury progression on repeat CT imaging in patients admitted with mild TBI (GCS 13- 15) and to assess the effect of pre-injury anti-platelet therapy.

Methods: Retrospective review of prospectively collected institutional data of all patients admitted with mild TBI. Inclusion criteria: 1) patients with mild TBI on admission, 2) patients requiring serial brain imaging (2 or more). Exclusion criteria: 1) patients with moderate and severe TBI (GCS 3- 12), 2) patients receiving pre injury anticoagulation. Data collected included demographics, injury severity score (ISS), admission GCS, mechanism of injury, length of stay, APA therapy, platelet function/ ASA assay, therapeutic platelet transfusions, surgical intervention and initial and subsequent brain imaging. Changes in CT imaging defined as any progression in hemorrhagic volume as determined by an attending neuro-radiologist on serial imaging. Data was analyzed, and the mean of the continuous variables were compared using student's T- test and Anova. The relative frequency of the categorical variables were compared using Pearson chi square test or the Fisher exact test with statistical significance set at a $p< 0.05$.

Results: 105 patients with mild TBI were included during the 13 month study period. Patients were divided into two groups; Group I: APA Group (anti-platelet agent) and Group II: non-APA Group (no anti-platelet agent). Group I consisted of 58% male, 42% female, mean age of 74.7 years, hospital length of stay 13.7 days, average ISS 17.5 and Group II 67% male, 33% female, mean age 46.3 length of stay 8.1 days and average ISS 15.7. Mechanism of injury in Group I; 83% fall, 14% MVC, 2% bicycle crash and in Group II; 47% fall, 19% MVC, 9% bicycle crash, 11% pedestrian struck, 2% ATV crash and 12% assault. Hemorrhagic progression on serial CT imaging was evaluated among the two groups. No statistically significant difference in the hemorrhagic volumetric progression on CT imaging between Group I and Group II was noted, 12.3% vs. 14.3% ($p= 0.9$). Mean ASA assay Group I at the time of admission was 482.8 and 569.4 in Group II ($p<0.0001$). Surgical interventions were higher in Group I, 8% vs. 3% in Group II ($p<0.05$). Among the patients in Group I, 83% received aspirin (ASA), 4% were on Clopidogrel and 13% received both. 56.2% patients in Group I received therapeutic platelet transfusion and the mean ASA assay of the patients pre and post platelet transfusion was 452 vs. 573 ($p<0.0001$). Intra-group analysis of Group I revealed the patients that received platelet transfusion had higher progression in the hemorrhagic volume on serial CT imaging than those that did not receive platelet transfusion, 25% vs. 2% ($p=0.002$). The initial ASA assay in the patients receiving platelets was significantly lower with mean assay of 459 vs. 516 ($p=0.01$) although there was no significant difference in the ASA assay post transfusion.

Conclusion: Potential for significant hemorrhagic progression noted on serial CT imaging requiring surgical intervention in mild TBI patients is small with no additional risk of progression in the cohort of patients receiving pre-injury anti-platelet therapy. Although transfusion of platelets corrected the measured ASA assay, it offered no advantage in limiting volumetric progression among the APA patients.

Poster # 66

DIFFUSE AXONAL INJURY IN CHILDREN: INSIGHT INTO DIAGNOSTIC AND PROGNOSTIC INDICATORS

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Introduction: Diffuse axonal injury (DAI) is associated with significant morbidity and mortality. Pediatric DAI remains a diagnostic and prognostic challenge. We present the largest reported series of pediatric DAI patients, highlighting clinical presentation, diagnostic methods and factors associated with increased risk for mortality.

Methods: A retrospective review of 2,989 children (age < 18 years) with moderate to severe traumatic brain injury (TBI), defined as head abbreviated injury score (AIS)$\geq$ 3,who presented to a level 1 pediatric trauma center over a 15 year period (1997-2011) was carried out. Diagnosis of DAI was made based on predefined radiographic criteria. Patient demographics, clinical, laboratory and radiographic findings, rate of survival to discharge and factors influencing survival were recorded. Data is presented as mean $\pm$ SEM. A $p<0.05$ was considered statistically significant.

Results: Patients were divided into two groups: DAI (n=103, mean age 6.8 ± 0.5) and non-DAI (n=2,886, mean age 4.9 ± 0.1)). DAI was suggested on initial head computed tomography scan in 17% of patients. In contrast, magnetic resonance imaging was diagnostic in 91% patients at 6.45 ± 1.02 days, while continuous electroencephalography (cEEG) provided high diagnostic yield in 83% at 2.6 ± 0.53 days.

After adjusting for injury severity and head AIS scores, initial GCS scores were significantly lower in patients with DAI (7.7 vs 12.1, $p <0.001$). ICP monitoring was higher in DAI patients (48.5% vs 7.7%). Children with DAI had lower initial pH (7.25 vs 7.28, p=0.036), higher base deficit (-6.8 vs -5.8, $p<0.001$) and increased mortality (18.5% vs 6.9%, χ^2_1 10.635, p=0.001) than those in the non-DAI group.

Among survivors, DAI patients had longer ICU stays (Z score 14.01, $p<0.001$), higher number of ventilator days (Z score 9.63, $p<0.001$), longer overall length of stay (Z score 12.39, $p<0.001$) and increased need for rehabilitation (χ^2_1 254.44, $p<0.001$).

Multivariate analysis was performed to determine independent predictors of mortality among DAI patients. These included lower initial GCS (χ^2_1 9.25, p=0.002, OR 0.34), hyperglycemia at admission (χ^2_1 4.97, p=0.025, OR 1.02), pupillary dilation (χ^2_1 17.43, $p<0.001$, OR 21.08), anisocoria (χ^2_1 3.98, p=0.046, OR 5.43) and pressor requirement (χ^2_1 3.88, p=0.048, OR 6.89).

Conclusion: Utilization of bedside cEEG plays an important role in early suspicion for DAI, thus reducing the need for urgent MRI and facilitating targeted therapeutic interventions . Insight into prognostic factors can be an important asset in patient management, promoting early consideration for rehabilitation and parent counseling.

Poster # 67

IMPACT OF PRE-INJURY WARFARIN USE AMONG MEDICARE BENEFICIARIES WITH HEAD TRAUMA

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Introduction: The effect of warfarin on outcomes of head injured patients remains controversial. Yet more than 2 million Americans, many of them elderly, are started on warfarin annually resulting in more than 30 million prescriptions per year. Meanwhile, with the aging US population, elderly Americans are becoming an increasingly large proportion of head injured patients. We studied a national cohort of Medicare beneficiaries with head injuries to determine the effects of pre-injury warfarin on outcomes.

Methods: A retrospective review of a 5% random sample of Medicare claims data (2009-2010) was performed for enrollees with at least 1 year of Medicare eligibility and Part D prescription drug claims available. Head injury cases were identified using ICD-9 codes for intracranial hemorrhage with or without accompanying skull fractures. Patients with isolated skull fractures or concussions without mention of hemorrhage were excluded. Using Part D prescription drug claims, warfarin exposure was defined as two or more warfarin prescriptions filled within 60 days prior to injury. Characteristics (age, sex, race, co-morbidities) and outcomes (mortality, length of stay (LOS), ICU LOS) between warfarin patients and patients not on warfarin (non-users) were compared using univariate tests of association. Multivariable models adjusting for patient characteristics, concomitant torso injuries and long-bone fractures, and need for ICU care were conducted to measure the independent effect of warfarin on in-hospital mortality.

Results: Of 773,389 eligible Medicare beneficiaries, we identified 3,420 head injured patients (0.4%), 6.6% of whom were treated with warfarin. While warfarin users and non-users were similar in race and co-morbidities, warfarin users were more likely to be female (74.2% vs. 65.6%, $p<0.01$), and older (median age 83, IQR 78-88 vs. 82, IQR 75-87, $p=0.04$) than non-users. Warfarin users had higher in- hospital mortality compared to non-users (16.9 vs. 10.2%, $p < 0.01$). In multivariable analyses, only torso trauma and ICU stay were found to be significant independent predictors of mortality. Warfarin users had 1.9 times the odds (95% CI 1.3-2.7) of dying in the hospital compared to non-users when adjusting for confounders. Eighty-nine percent of patients (N=3,055) survived hospitalization, but warfarin use did not predict ICU admission, ICU LOS, or overall LOS among these survivors.

Conclusion: Anticoagulation with warfarin increases risk of mortality after head injury nearly two fold in Medicare beneficiaries even after adjusting for other risk factors. As new, more difficult to reverse, agents are introduced for chronic anticoagulation this problem may be exacerbated. Physicians should exercise caution when initiating chronic anticoagulation in patients over the age of 65.

Poster # 68

SEVERELY INJURED CHILDREN HAVE HIGHER LIFETIME RISK OF CANCER

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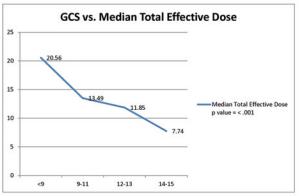
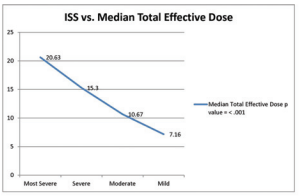
Introduction: The number of imaging studies performed in the United States has increased exponentially since the 1980s. Radiation exposure in pediatric trauma patients has come under much scrutiny. Multiple studies have shown that for an entire population of pediatric trauma patients, the average radiation dose and associated lifetime attributable risk(LAR) is acceptably low. However, no study to date has stratified patients according to Injury Severity Score(ISS) or Glasgow Coma Scale(GCS). Our hypothesis is that pediatric trauma patients with higher ISS or lower GCS have significantly more radiation exposure and associated LAR than that of the pediatric trauma population as a whole or those children who are less severely injured.

Methods: A retrospective review of medical records was completed for children who presented to an urban ACS Verified Level I Trauma Center during 2008-2009. Demographic, injury, and radiographic data were recorded for each patient based on the actual radiation delivered for each radiographic study through hospital discharge. The effective dose was recorded and the LAR was calculated using models from the BEIR VII Report for each patient.

Results: A total of 1252 children were evaluated during the study period. A total of 959 were included in this analysis representing all children discharged alive from the Trauma Center with complete radiation dose reports from imaging studies. Mean age was 7.25(+4.74) years. Overall mean effective dose (EffD) was 12.91 (+15.80) mSy with a range of 0- 146.77 mSy. Radiation dose varied by ISS and GCS. When ISS categories were evaluated, mean EffD ranged from 7.79 (median 7.16) for mild injuries to 28.76 (median 20.63) for the most severely injured (p-value < 0.001). EffD based on GCS ranged from a mean of 12.16 (median 7.74) for those with a GCS of 14-15 to 27.35 (median 20.56) for GCS <9 (p-value < 0.001). The mean lifetime attributable risk of cancer for these children was 2.62 (+3.23), range 0 to 32.13.





Conclusion: Though the overall mean effective dose of radiation children were exposed to was similar to previously published studies, when patients were stratified according to ISS or GCS, the amount of radiation severely injured children were exposed to was higher than has previously been reported in the literature. Moreover, severely injured children were exposed to a significantly higher dose of radiation and will have a significantly higher risk of cancer than less severely injured children. This should be disclosed to parents during their children's hospitalization.

Poster # 69

SURVIVAL OF PEDIATRIC BLUNT TRAUMA PATIENTS PRESENTING WITH NO SIGNS OF LIFE IN THE FIELD

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Introduction: Pre-hospital traumatic cardiopulmonary arrest is associated with a dismal prognosis, and these patients rarely survive to hospital discharge. Although there are clear guidelines for resuscitation efforts in adult blunt trauma patients who are found with no signs of life in the field, these guidelines do not apply to the pediatric population, mostly due to the paucity of data. The objective of our study is to gather data from a large patient database and determine the survival rate of pediatric patients presenting in the field with no signs of life after blunt trauma, as well as describe the impact that resuscitation efforts, including Emergency Department (ED) thoracotomy have on outcomes.
Methods: After Institutional Review Board (IRB) approval, we conducted a retrospective review of the American College of Surgeons National Trauma Data Bank research data set (2002-2010). All patients 18 years and under who experienced blunt traumatic injuries were identified (ICD-9 800-869). For each patient, we determined age, gender, race, and injury severity score (ISS). “No signs of life” (SOL) was defined as: pulse=0, respiratory rate=0, systolic blood pressure=0 and Glasgow Coma Scale (GCS)=3. These same four criteria were then re-assessed on arrival at the ED. Subjects were then re-assessed upon arrival to the ED and separated into "responders" (at least 1 sign on life) and "non-responders" (no SOL) of field resuscitation. We compared survival to hospital discharge between children who responded to field resuscitation and those who did not, and patients who underwent ED thoracotomy and those who did not.
Results: Among patients 18 and younger, there were a total of 3,115,597 patients who were found in the field by EMS after suffering blunt trauma. Of those patients, 0.26% (N=8058) had no SOL when they were found in the field. 70% were male. 10% were less than 1 year old, 20.4% were 1-4, 11.1% were 5-9, 12.7% were 9-14, and 45.8% were 15-18 years old. 38% were white, 34.4% were black, and 17.5% were Hispanic. 81% of these children had major trauma (ISS>15). Survival to hospital discharge of all patients presenting with no SOL was 4.4% (N=354). 25% of patients found in the field with no SOL were successfully resuscitated by EMS in the field and had regained SOL by the time they arrived to the ED (N=1993). Of those patients who regained SOL, 13.3% (N=265) survived. 75% of patients still did not have SOL by the time they arrived to the ED. Only 1.5% (N=89) of those patients survived. Overall, for patients found in the field with no SOL, survival was significantly higher in patients who did not receive a resuscitative thoracotomy than for those who did, even when they had regained signs of life in the ED.

	Thoracotomy		No Thoracotomy		P-value
	Survived N (%)	Died N (%)	Survived N (%)	Died N (%)	
No SOL in field – total (N=8058)	7 (1.4)	504 (98.4)	347 (4.6)	7152 (94.8)	P=0.0011
No SOL in field or in ED (N=6065)	3 (0.73)	405 (99.0)	86 (1.5)	5534 (97.8)	P=0.2692
No SOL in field but SOL in ED (N=1993)	4 (3.9)	99 (96.1)	261 (13.8)	1618 (85.6)	P=0.0106

Conclusion: Survival of pediatric blunt trauma patients who are found in the field with no signs of life is dismal. Resuscitation by EMS prior to arrival in the ED improves survival, however resuscitative thoracotomy in these patients cannot be justified as it exposes personnel to blood-borne pathogens and does not improve patient survival.

Poster # 70

THROMBOELASTOGRAPHY PARAMETERS VERSUS CLASSICAL COAGULATION PROFILE IN TBI AND NON-TBI TRAUMA PATIENTS

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Introduction: Thrombelastography (TEG™, Hemoscope,Niles,IL) is increasingly utilized to detect coagulopathy. As TEG depicts overall coagulation it may be more comprehensive and capable to detect any coagulation abnormalities in comparison to classical coagulation tests (CCT: PT,PTT,INR,plt). Traumatic brain injury (TBI) is thought to contribute to coagulopathy. The primary aim was to compare TEG parameters of TBI vs Non-TBI patients. The secondary aim was to identify TEG vs CCT parameters associated with outcome (mortality, need for transfusion, length of stay (LOS)).

Methods: This was a cross sectional, retrospective, observational study of 142 patients (full trauma team activations only) admitted to a university based, Level 1 trauma center. TEG and CCT (PT,PTT,INR, plt) were collected on admission. Citrated Kaolin samples were utilized. Data was analyzed by a biostatistician using JMP V10.

Results: Data was collected from 142 patients (pts), 44 (31%) women and 98 (69%) men. 48 pts had TBI and 94 pts were NTBI. Overall mortality was 20.4% (45.8% TBI vs 7.4% NTBI). There were no significant associations between any TEG or CCT parameters and ISS, scene vs transfer, hospital LOS, or ventilator days. There was no difference between the TBI and NTBI groups in terms of TEG or CCT parameters. Variables found to be associated with mortality were ↓K *($p = 0.0118$)* and age *($p = 0.0057$)*. MA was the only parameter (TEG or CCT) associated with need for transfusion of pRBC (*$p= 0.0377$*). PRBC transfusion was given in 94% of 16 patients with an MA < 57.4 (1-4 units in 44% and > 4 units in 50%). Platelet transfusion was given in 89% of 9 patients who have MA < 58.1. FFP transfusion was given in 80% of 15 patients who have R ≥ 5.8. Decreased MA *($p=0.0003$),* ↓K *($p=0.0154$),* ↑PT *($p= 0.0015$),* and ↑INR *($p=0.0014$)* were significantly associated with FFP transfusion. **K** value was significantly associated with mortality *($p = 0.0118$*) and hypotension *($p=0.0172$)*.

Conclusion: TEG parameters are potentially useful as an initial tool to rapidly diagnose coagulopathy and predict transfusion in trauma patients. Presence of TBI is not independently associated with a detectable coagulopathy. MA is the best single indicator for pRBC and/or FFP transfusion in trauma patients. TEG analysis is more efficient than the classical parameters in detecting patients who will need pRBC and/or FFP transfusion.

Poster # 71

PATIENTS WITH BLUNT HEAD TRAUMA ON ANTICOAGULANTS OR ANTIPLATELETS: CAN BE SAFELY DISCHARGED AFTER A NORMAL CRANIAL CT?

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Introduction:Trauma centers are more frequently evaluating patients with blunt head trauma who are receiving anticoagulant or prescription antiplatelet (ACAP) therapy. Because of reports of delayed intracranial hemorrhage (ICH) after blunt trauma in this patient group, many trauma centers are performing repeat head CTs on all patients taking ACAP therapy. We evaluated patients on ACAP following blunt head trauma for the occurrence of delayed ICH and the necessity of repeat head CTs

Methods:We retrospectively reviewed adult blunt head trauma patients admitted to our urban Level I trauma center from January 2008 to December 2010 who were receiving preinjury ACAP therapy. All had cranial CT scans. We reviewed medications, mechanism of injury, head CT results, and outcomes. Demographic data, international normalized ratio (INR), and results of neurologic examinations were recorded. We determined the incidence of delayed ICH on the second CT scan (CT2) for patients with a negative initial CT scan (CT1).

Results:Two hundred and sixty patients qualified for the study. Sixty-one patients (23%) with a mean age of 77 years were found to have ICH on cranial CT examination. Thirty-two (52%) were men and 29 (48%) were women. Coumadin was taken by 10 (16%) of 61 patients, 22 (36%) took plavix, and 47 (77%) took aspirin. Twelve (20%) patients took plavix and aspirin. Four (7%) took coumadin and aspirin together. The average INR for patients on coumadin was 2.3. Two patients with positive findings on CT1 and on coumadin had sub-therapeutic INR levels (1.5, 1.6) but were also taking aspirin. Falls (75%) were the most common mechanism of injury found in patients.Two patients (3%) had a negative CT1 but were found to have evidence of an intracranial hemorrhage on CT2 (one patient was taking coumadin (INR =2.6) and the other patient was taking plavix and aspirin). These two patients did not require surgical intervention.

Conclusion:Only 23% of patients on ACAP suffering blunt trauma were found to have findings of ICH on CT1. The incidence of delayed ICH in our study was 3%. However, none of the delayed findings were clinically significant or required surgical intervention. Our findings suggest that, among patients on ACAP therapy with a negative CT1 and a normal or unchanged neurologic examination, a routine CT2 is unnecessary. It is possible that a period of observation may be sufficient to recognize those patients with symptoms that could be due to delayed ICH. Intracranial hemorrhage following trauma in patients on ACAP therapy will present on CT1 in the majority of patients. Therefore, patients could be safely discharged if CT1 is normal with appropiate instructions.

Poster # 72

EARLY DIFFUSE SLOWING ON ELECTROENCEPHALOGRAM IN PEDIATRIC TRAUMATIC BRAIN INJURY: IMPACT ON MANAGEMENT AND PROGNOSIS

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Introduction: Traumatic brain injury (TBI) in children continues to be a major public health problem resulting in long term disability. Bedside early electroencephalogram (EEG) is frequently utilized in moderate and severe TBI for early recognition of subclinical seizure activity and to direct patient management. However, the significance of diffuse slowing (DS) on EEG monitoring remains unclear. The aim of our study is to explore the frequency of DS on EEG in pediatric TBI patients, and determine its association with patient outcomes.

Methods: We performed a retrospective review at a level I pediatric trauma center of all children with moderate and severe TBI (Glasgow Coma Scale (GCS) <10) over a 3 year period from January 2010 to December 2012. EEG monitoring results, patient demographics, clinical characteristics, length of stay and post injury outcomes were recorded. Data are presented as mean$\pm$ SEM, $p<0.05$ was considered statistically significant.

Results: 219 children, ages 0-18 years, were identified with GCS <10. 81 of these patients who had bedside EEG performed within 48 hours of admission were included in the study. Patients were divided into 2 groups based on the presence (Group A, n=50, mean age 5.7 $\pm$ 0.7 years) or absence (Group B, n=31, mean age 4.2 $\pm$ 0.9 years) of diffuse slowing pattern on EEG. After adjusting for injury severity score and head abbreviated injury scale, initial GCS scores were significantly lower in group A patients compared with group B (4.9 vs 8.1, $p<0.001$). Among survivors, group A patients had significantly higher number of ventilator days (8.6 vs 4.7 days, $p<0.05$) and longer ICU stay (11.1 vs 6.2 days, $p<0.05$) compared with group B. Although mortality rate was similar in both groups (14% vs 19.3%), the need for in-hospital rehabilitation was found to be significantly higher in patients with diffuse slowing (74% vs 19.3%, $p<0.05$). Group A patients also had increased rehabilitation length of stay (21.8 vs 4.1 days, $p<0.05$) and worse Glasgow outcome scores at the time of discharge from rehabilitation unit (6 vs 8).

Conclusion: The presence of diffuse slowing on EEG within 48 hours of injury in children with TBI is associated with prolonged patient recovery and poor functional outcomes. DS on early EEG monitoring should prompt early consideration for rehabilitation and the need for intensive directed therapy.

Poster # 73

THE IMPACT OF LEVEL IV TRAUMA CENTER DESIGNATION IN A STATE TRAUMA SYSTEM: SURVIVAL, LENGTH OF STAY AND CHARGES

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Introduction: While Level I Trauma Centers (L1TCs) have been shown to improve outcome for trauma patients, the degree to which the addition of Level IV Trauma Centers (L4TCs) in rural settings to a statewide Trauma System influences outcomes is unknown. We sought to evaluate the impact of relatively recent designation of L4TCs within a statewide Trauma System. We hypothesized that trauma patients treated at one of 15 Arizona State designated L4TCs and transferred to L1TCs post designation will have improved survival, reduced length of stay (LOS) and charges compared to those treated pre-designation.

Methods: Arizona State Trauma Registry data were analyzed for the years 2005-11. Between 2008-11, Arizona designated 15 L4TCs in rural areas of the State. Pre (P-1) and Post (P-2) designation groups were classified based on the designation date of each L4TC. Confounding effects were controlled by removing 3 months of data before and after designation.

Variables included LOS at the transferring facility, LOS at L1TCs, hospital charges (L1TCs), injury severity score (ISS), and mortality. SAS (version 9.3) was used for data analysis and manipulation. The Kruskal-Wallis test for multiple comparisons was used to identify potential differences among groups. A sub-cohort of severely injured patients (ISS >15) was further analyzed under the premise that this population may benefit the most by L4TCs designation.

Results :2,504 Patients met inclusion criteria, 1,367 P-1 and 1,137 P-2. In general, P-2 compared to P-1 had a significantly lower median total LOS at the L1TC (2 vs. 3 days, p <0.005) but no significant difference in other outcome variables (Table). The SUB-COHORT group did not show any significant difference between P-1 and P-2 with respect to the outcome variables.

Conclusion: In Arizona, early data from the state trauma registry post implementation of a system of rural Level-IV Trauma Centers demonstrates significant reduction in median LOS at the receiving Level I Trauma Centers, but no difference in survival, LOS at referral hospital or charges. Further analysis is needed to define the role and confirm statistically the benefit of Level IV Trauma Centers in a Trauma System.

Outcome Variables	(P-1)	(P-2)	P value
LOS (Hours) at Transferring Facility	3	3	0.0981
LOS (Days) - L1TCs	3	2	0.006 *
Hospital Charges at L1TCs	$27,128	$30,303	0.058
ISS at Level I			0.87
0-8	40.1%	40.3%	
9-15	32.3%	32.5%	
16-25	17.8%	18.3%	
>25	9.1%	7.1%	
Final Outcome at Level I			
Mortality	2.56%	2.46%	0.40
* Significant =P < 0.05			

Poster # 74

THE OUTCOME OF PATIENTS WITH "DO NOT RESUSCITATE" ORDERS: IS THERE ANY DIFFERENCE BETWEEN LEVEL 1 VERSUS LEVEL 2 TRAUMA CENTERS?

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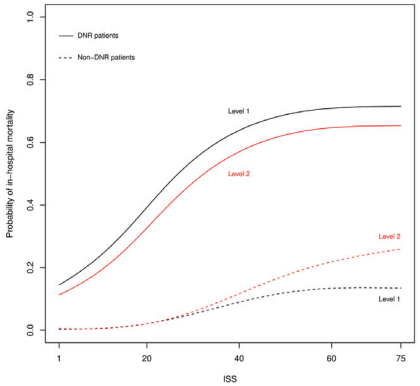
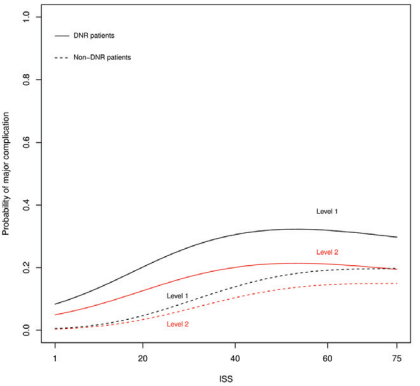
Introduction: Institutional variation in outcome of patients with "do-not-resucitate (DNR)" orders has not been well described in the setting of trauma. The purpose of this study was to assess the impact of trauma center designation on outcome of patients with DNR orders.

Methods: A statewide trauma database (PTOS: Pennsylvania Trauma Outcome Study) was used for the analysis. Characteristics of patients with DNR orders were compared between state-desginated Level 1 and 2 trauma centers. In-hospital mortality and major complication rates were compared using hierarchical logistic regression models that included a random effect for trauma centers. We adjusted for a number of potential confounders and allowed for non-linearity in injury severity score (ISS) and age in these models.

Results: A total of 106,291 patients (14 Level 1 and 11 Level 2 trauma centers) were identified in the PTOS database between 2007 and 2011. We included 5,953 patients with DNR orders (5.6%). Although more severely injured patients with comorbid disease were made DNR in Level 1 trauma centers, trauma center desgnation level was not a significant factor for in-hospital mortality of patients with DNR orders (OR:1.33, 95% CI: 0.81-2.18, p=0.26). Level 1 trauma centers were significantly associated with higher rate of major complication (OR: 1.75, 95% CI:1.11-2.75, p=0.016). For patients without DNR orders, Level 1 trauma centers were significantly associated with lower in-hospital mortality rate in patients with very high ISS (>40) and higher major complication rate (OR: 0.75, p=0.05 and OR: 1.39, p=0.04, respectively).

Conclusion: In-hospital mortality of patients with DNR orders is not significantly influenced by trauma designation level after adjusting for case mix. More aggressive treatment or other unknown factors may have resulted in significantly higher complication rate in Level 1 trauma centers.





Poster # 75

MEASURING PATIENT SATISFACTION: FACTORS THAT DRIVE HCAHPS SURVEY RESPONSES IN A TRAUMA AND ACUTE CARE SURGERY POPULATION

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Introduction: Hospital quality metrics new reflect patient satisfaction and are measured by the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) Survey scores. Understanding these metrics and their drivers will be integral in providing quality care as this process evolves. This study identifies factors associated with patient satisfaction as determined by HCAHPS survey responses in trauma and acute care surgery patients.

Methods: HCAHPS survey responses from acute care surgery and trauma patients at a single institution between 3/11-10/12 were analyzed. Logistic regression determined which patient characteristics and responses to individual HCAHPS care questions predicted highest hospital score (a rating of 9-10/10 or a *"definitely yes"* hospital recommendation). Demographic and clinical variables (age, gender, education, ethnicity, insurance provider, length of stay, complications, ISS and whether surgery was performed) were also analyzed as predictors of satisfaction. Subgroup analysis for trauma patients was also performed.

Results: The highest hospital ranking was noted in 70.3% of 182 total survey responses, and 78.6% gave a "definitely yes" recommendation. With the exception of new medication explanations, all responses to questions about care and environment were associated with satisfaction measured by either numeric score or recommendation to family and friends. The strongest predictors of highest hospital ranking were respect shown by doctors (OR 24.5, CI 5.44-110.4), doctors listening to the patient (OR 9.33, CI 3.7-23.5), nurses listening to the patient (OR 8.65, CI 3.62-20.64), doctor's explanations (OR 8.21, CI 3.5-19.2), and doing everything possible to control pain (OR 7.71, CI 3.22-18.46). Clinical factors and outcomes such as complications, hospital length of stay, ICU length of stay, mechanism of injury, and need for an operation were not significant predictors of satisfaction. In trauma patients alone, an increase in ISS was inversely related to numeric hospital score (OR=0.93, CI=0.87-0.98). Demographic predictors included insurance status and educational level. Enhanced Medicare plans were negatively associated with highest hospital ranking (OR 0.17, CI 0.06-0.51) compared to Medicare/Medicaid/commercial insurance. "At least some college education" was also inversely associated with highest hospital ranking (OR 0.36, CI 0.18-0.74). Disposition to either a nursing or rehabilitation facility was associated with higher hospital ranking (OR 29.74, CI 1.20-735) compared to discharge home without outpatient services. Discharge home with home health nursing (OR 0.168, CI 0.05-0.6) were associated with an even lower numeric hospital score. Age, gender, and ethnicity were not significant predictors. Predictors of a "definitely yes" recommendation were similar to score. The only major difference was that discharge to inpatient rehab was associated with a lower recommendation compared to discharge home without services (OR 0.052, CI 0.007-0.393).

Conclusion: This study reinforces the relationship between provider interpersonal skills and patient satisfaction. A patient's perception of how well the clinical team (doctors and nurses) interacted and communicated with them was the strongest predictor of satisfaction reflected in HCAHPS survey answers. With the exception of injury severity score, clinical factors and outcomes such as complications, length of stay, and mechanism of injury were not associated with patient satisfaction. Insurance status and disposition after hospital stay were also potential predictors of numeric hospital rating. Listening to patients, treating them with respect, and fully explaining the plan of care were identified as interactions most strongly tied to patient satisfaction, as measured by the HCAHPS.

Poster # 76

THE IMPACT OF DEVICE-ASSOCIATED INFECTION ON TRAUMA PATIENT OUTCOMES AT A MAJOR TRAUMA CENTER

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Introduction: Catheter-associated urinary tract infection (CAUTI) and ventilator-associated pneumonia (VAP) are infections that are considered performance measures. We sought to analyze the incidence, prevalence and risk of CAUTIs, and VAP, in trauma patients, the demographic and injury factors related to CAUTI and VAP and their relative risk of negative outcomes [prolonged length of stay (LOS), sepsis and death].

Methods: Trauma registry data were analyzed (age >18, LOS > 24 hours) from 1/1/07 to 12/31/11, excluding burns. Demographics, injury location, severity, and blunt vs. penetrating were analyzed relative to outcomes along with device-associated infection as defined by the CDC (CAUTI or VAP). Outcomes analyzed included ICU and hospital LOS, sepsis and in-hospital death. We set the significant threshold at $p<0.005$ to allow for multiple comparisons. Multivariable logistic regression was then used to determine contributing factors to sepsis, including device-associated infections.

Results: The included population (n=10,755), were 66.6% male, had a mean age of 45.1 years, 91.8% blunt trauma, a median injury severity score (ISS) of 10 and a mean albumin of 2.80 g/dL. Patients developing CAUTI (n= 324, 3.0%, $p<0.005$) were more likely female (59.4%), had higher median ISS (20.5), and were older (56.7 years). Patients with VAP (n=161, 1.5%, $p<0.005$) had higher median ISS (27) and decreased admission albumin (2.51g/dL). Septic patients (n=149, 1.4%, $p<0.005$) had a higher median ISS (24.0), were older (52.3 years), and had a lower admission albumin (2.41g/dL). Sepsis was associated with increased death and prolonged LOS as expected ($p < .005$). In multivariable analysis, independent predictors for sepsis included: CAUTI (odds ratios [OR] 16.15, $p<0.001$), VAP (OR. 6.95 $p<0.001$), ISS (OR 1.05 per unit, $p<0.001$), age (OR 1.02 per year, $p<0.001$) and penetrating, abdominal, pelvic and/or chest injury.

Conclusion: Development of CAUTI and VAP significantly increase the risk of sepsis in trauma patients after adjustment for injury type, location, severity, and age. This study suggests the importance of device-associated infections as vectors for sepsis in trauma and highlights the importance of prevention initiatives.

Poster # 77

IMPACT OF PREINJURY ANTICOAGULANTS AND PRESCRIPTION ANTIPLATELET AGENTS ON OUTCOMES IN OLDER PATIENTS WITH TRAUMATIC BRAIN INJURY

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Introduction: Many older patients with traumatic brain injury (TBI) are on pre-injury anticoagulants or prescription antiplatelet agents (ACAP). We sought to determine if ACAP use adversely affected patient outcomes and survival.

Methods: Retrospective analysis of patients age ≥55 years with blunt-force TBI (head Abbreviated Injury Score >1) was performed. Patients were categorized as ACAP (warfarin, clopidogrel, dipyridamole/ASA, enoxaparin, subcutaneous heparin or multiple agents) or non-ACAP. ACAP patients were further stratified by class of agent (anticoagulant vs. antiplatelet). Primary outcome was in-hospital mortality. Secondary outcomes were progression of initial TBI, development of a new hemorrhagic focus (remote from initial injury) and need for increased level of care at discharge (relative to pre-admission living status).

Results: A total of 362 patients admitted to our Level I trauma center from 7/2006-12/2011 were analyzed: 277 (77.2%) non-ACAP and 82 (22.8%) ACAP. ACAP status was significantly related to decreased survival. After adjustment for age, comorbidities, Injury Severity Score and Glasgow Coma Scale score, ACAP patients were almost 3 times more likely to die than non-ACAP (Table). ACAP use predicted development of new hemorrhage, but was not associated with either progression of initial TBI or an increase in level of care at discharge. Compared to non-ACAP, the increased mortality risk was greater for antiplatelet use than for anticoagulants. Antiplatelet use was also associated with need for skilled nursing facility or rehabilitation placement.

Hazard Ratios for Mortality			
	HR	95% CI	p-value
ACAP	2.81	1.20-6.57	0.017
Age, years	1.06	1.02-1.10	0.007
Charlson Index	1.58	0.92-2.72	0.100
ISS	1.11	1.04-1.18	0.001
GCS	0.76	0.70-0.83	< 0.001

Conclusion: Older TBI patients on ACAP at the time of injury are more likely to develop a new focus of hemorrhage and are significantly more likely to die than non-ACAP patients. Additional study of the independent relationship between ACAP and TBI mortality and of the impact of prescription antiplatelet agents on outcomes is warranted.

Poster # 78

Sarcopenia and Frailty in Elderly Trauma Patients

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Introduction: Sarcopenia describes a loss of muscle mass and resultant decrease in strength, mobility and function that can be quantified by CT. We hypothesized that sarcopenia and related frailty characteristics are related to discharge disposition after blunt traumatic injury in the elderly.

Methods: We reviewed the charts of 252 patients, 65 years of age and older, who sustained blunt trauma without traumatic brain injury and subsequently underwent abdominal CT as part of their initial evaluation prior to admission to a Level 1 trauma center. Data for 7 frailty risk factors were abstracted. Sarcopenia was measured by obtaining the skeletal muscle cross sectional area (CSA) from each patient's psoas major muscle at the level of the L4-L5 intervertebral disc space, using Slice-O-Matic® software. Discharge destinations were defined as death, skilled-nursing facility, nursing home, rehabilitation, home and home-health. The latter 3 were grouped as independent outcomes. Chi-square, Fisher's exact, and logistic regression were used to determine factors associated with discharge dependence.

Results: Mean age was 76 years, 49% were male, and the mean ISS was 13.3. Discharge destination was independent in 61.5%, dependent in 29%, and 9.5% of patients died. Lower psoas major muscle CSA in elderly trauma patients was related to discharge destination. Controlling for age and other significant factors in a final model, revealed that each 1 cm^2 increase in psoas muscle CSA was associated with a 20% decrease in the odds of dependent living ($p<0.001$). Other variables significantly associated with the disposition outcome were gender, weakness, hospital complication, and cognitive impairment. The effect of ISS was not found to be significant ($p=0.475$).

	Odds Ratio	p value
Sex (male)	4.7 (1.8-12.5)	0.002
Age (64-74)	Reference	
75-84	3.32 (1.35-8.16)	0.009
>84	2.96 (1.03-8.51)	0.044
Psoas major CSA	0.80 (0.73-0.88)	<0.001
Weakness	3.38 (1.46-8.76)	0.005
Complications	4.48 (1.08-18.52)	0.038
Cognitive Imapairment	3.81 (1.37-10.62)	0.010

Conclusion: Lower psoas major muscle CSA is related to discharge destination in elderly trauma patients and can be obtained from the admission CT. Lower CSA is related to loss of independence upon discharge in the elderly. The early availability of this variable during the hospitalization of elderly trauma patients may aid in discharge planning and the transition to dependent living.

Poster # 79

WHO SHOULD ADMIT GERIATRIC GROUND LEVEL FALLS?

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Introduction: There is significant known morbidity and mortality associated with geriatric ground level falls. Given that the injury severity is often under appreciated, there is growing sentiment that this patient population may be better served with admittance to a surgical service. We hypothesize that geriatric patients sustaining a ground level fall can be selectively managed on either medical and surgical services with equivalent outcomes.

Methods: We performed a retrospective cohort study of all geriatric patients (>/= 65 years old) after sustaining a ground level fall that were admitted to our ACS-verified level 1 trauma center from January 2006 – April 2012. Patients admitted to a surgical service were compared to those admitted to a medical service for demographics, admission physiology, as well as injury pattern and severity. The primary outcome was mortality while secondary outcomes included hospital and ICU length of stay.

Results: There were 1,188 patients identified, 801 (67%) of which were medical admissions (MA) and 387 (33%) surgical admissions (SA). The SA group was younger (77 vs. 79 years old, $p = .0002$) but did not differ by male gender (38% vs. 34%, $p = 0.24$) or Caucasian race (80% vs. 76%, $p = 0.17$). There were no differences in admission pulse (82 vs. 82, $p = 0.66$), systolic blood pressure (149 vs. 150, $p = 0.42$), or GCS (14 vs. 14, $p = 0.13$) but the ISS was slightly higher in the SA group (12 vs. 11, $p = 0.006$). The SA group more often had severe injuries (AIS >/= 3) to the face (4% vs. 1%, $p = 0.007$), chest (12% vs. 2%, $p < 0.0001$), and abdomen (3% vs. 1%, $p = 0.02$), while the MA group more often had severe injury to the extremities (33% vs. 26%, $p = 0.02$). There was no difference in severe head injury between groups (42% vs. 41%, $p = 0.89$). There was no difference in mortality for surgical admissions (9%) vs. medical admissions (6%), $p = 0.09$. Among survivors, the SA group spent more days in the ICU (1 vs. 0.7, $p = 0.01$) but there was no difference in hospital length of stay (5 days vs. 5 days, $p = 0.10$).

Conclusion: After ground level falls, elderly patients admitted to a surgical service are more severely injured and more often sustain severe injuries to the face, chest, and abdomen, while those admitted to a medical service more often sustain severe extremity injury. Regardless of admitting service there is no difference in mortality or hospital length of stay. Elderly patients who sustain ground level falls can be selectively managed on medical or surgical services with equivalent outcomes.

Poster # 80

OUTCOMES OF TRANSPLANT PATIENTS AFTER BLUNT TRAUMA

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Introduction: Recipients of solid organ transplantation are altered hosts. The impact of post-transplant status on trauma outcomes is not known. We hypothesized that transplant patients (TXP) with blunt trauma have higher complication rates and mortality compared to nontransplant patients (non-TXP).

Methods: We performed retrospective case-control study at our hospital, a Level I trauma center and solid organ transplant center. The trauma registry was queried for blunt trauma patients admitted 1999 to 2011 with history of solid organ transplant. TXP (cases) were matched by age, ISS, and physiology (initial SBP <90) to non-TXP (controls) at ratio of 1:3. We compared ICU and hospital length of stay (LOS), complication rate, hospital mortality and discharge disposition, using Fisher's exact test, chi-square or Mann-Whitney U test where appropriate, with significance defined as 2-tailed $p < 0.05$.

Results: Fifty-three TXP were identified and matched to 159 non-TXP. TXP did not have significantly different ICU length of stay, complication rate or mortality compared to non-TXP. However, TXP had longer hospital LOS, were less likely to be discharged to home, and were more likely to be discharged to rehabilitation.

Conclusion: Transplant patients who sustain blunt trauma have comparable morbidity and mortality to matched nontransplant patients but are more likely to require acute rehabilitation. Modifiable factors of the acute care phase remain to be identified.

1. Transplant patients	**N =53**
Age (mean ± SD)	55 ± 14 yrs
Male:female	70:30
ISS (mean ± SD)	9.6 ± 6.4
Organ transplant	
Kidney	21
Liver	15
Lung	7
Kidney+pancreas	4
Heart	3
Kidney+liver	1
Heart+kidney	1
Heart+lung	1

2. Outcome	**TXP N = 53**	**Non-TXP N = 159**	**p**
ICU LOS (mean ± SD)	2.9 ± 8.4	1.3 ± 6.4	NS
Hospital LOS (mean ± SD)	8.7 ± 11.6	5.1 ± 7.6	<0.05
Overall complication rate	11.3%	10.7%	NS
Hospital mortality	5.7%	3.2%	NS
Discharge disposition			
Home	61%	78%	<0.05
Rehabilitation	21%	8%	<0.05
Skilled nursing	16%	8%	NS

Poster # 81

ARE THE ELDERLY MORE LIKELY TO FAIL NON-OPERATIVE MANAGEMENT OF BLUNT SPLENIC INJURIES?

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Introduction: There is conflicting data on whether non-operative management (NOM) of blunt splenic injuries (BSI) carries a greater risk of failure in elderly patients compared to younger patients. This has important implications as the elderly are more likely to have acquired bleeding disorders, and may be less tolerant of acute blood loss.

Methods: We used the 2011 National Trauma Data Bank dataset to extract information from level 1 and 2 trauma centers. Patients 13 years and older sustaining BSI were divided into three age groups—13-54 years, 55-74 years, and ≥75 years. Splenic injury severity, determined from AIS 98 predot codes, the presence of congenital or acquired bleeding disorder, gender, the presence of associated intra-abdominal injuries with an AIS>=3, the presence of pelvic or acetabular fractures were noted. We assumed that in patients who underwent splenic procedures within 1 hour of arrival, NOM was not attempted. These patients, as well as those who died or were discharged <1 hour of arrival were excluded from analysis. Univariate analyses were done using Kaplan-Meier survival curves for time to splenectomy. Significant variables ($p<0.10$) were entered into a Cox proportional hazards regression model.

Results: After exclusions, 15450 patients remained. Of these, 380 patients had grade 1 injuries and none in this subgroup had any splenic procedures. After exclusion of these patients, of the remainder, 2286 had splenic procedures, thus giving a NOM failure rate of 15%. Unadjusted incidences of NOM failure were 14.2%, 19.2 % and 16.6% respectively in the three age groups in ascending order based on age. Cox regression analysis found increasing splenic injury severity, bleeding disorder, associated abdominal injuries with AIS>=3, associated pelvic and/or acetabular fractures, age groups 55-74 and ≥75 years to be independent predictors of failure of NOM (table).

Conclusions: Elderly patients with BSI have an increased risk of failure of NOM after adjusting for splenic injury severity, presence of associated abdominal injuries, pelvic fracture and bleeding disorder. Future studies could target interventions that might decrease NOM failure rates without increasing morbidity or mortality. The indications and effectiveness of splenic angioembolization in the elderly could be evaluated.

parameter	hazard ratio (95% confidence intervals)
bleeding disorder	1.29 (1.02 to 1.63)
splenic grade 3*	3.40 (3.01-3.83)
splenic grade 4*	7.24 (6.45-8.13)
splenic grade5*	16.0 (14.1-18.1)
55-74 age group**	1.54 (1.38-1.71)
≥75 age group**	1.53 (1.28-1.82)
associated abdominal injuries, AIS≥ 3	1.56 (1.39-1.74)
associated pelvic/acetabular fracture	1.41 (1.28-1.56)

*referrant is grade 2 **referant is the 13-54 age group

Poster # 82

ASSOCIATION BETWEEN QUALITY INDICATORS AND FUNCTIONAL OUTCOMES IN GERIATRIC TRAUMA PATIENTS

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Introduction: Quality indicators (QI) for geriatric trauma patients developed using the RAND/UCLA Appropriateness Methodology are ideally linked to meaningful outcomes. The association between adherence to inpatient QI and long-term functional outcomes for geriatric patients with traumatic injury is unknown. We hypothesize that increasing adherence to QI results in significantly improved long term functional outcomes in geriatric trauma patients.

Methods: Prospective cohort study of consecutive patients $\geq$65 years admitted to an urban Level I trauma center (2007-2010). Patient care data and adherence to QI were retrospectively abstracted. Functional data [5 activities of daily living (ADL), Vulnerable Elderly Survey-13 (VES-13)] were obtained for pre-injury, 3 months, 6 months, and 12 months after discharge. A mixed-effects multi-level linear regression model estimated the effect of adherence using composite quality score (QI met/QI triggered for each patient) on functional outcome (change in ADL performance) with risk adjustment.

Results: Seventy-seven geriatric trauma patients with mean age 77.4$\pm$8.1 and mean Charlson Comorbidity Index (CCI) 4.7$\pm$2.5 were evaluated. 80% suffered motor vehicle or pedestrian versus vehicle accidents, or fall. Mean Injury Severity Score (ISS) was 13.2$\pm$9, VES-13 1.2$\pm$2.1, median length of stay 6 days (interquartile range 3-14), and 26% experienced inpatient morbidity. Mean composite quality score was 62.9$\pm$0.1%. They experienced a significant and persistent decline in ADL score after injury [pre-injury ADL score 4.7 (95% confidence interval (CI) 4.5, 4.9); 3-month ADL score 3.5 (95% CI 3.2, 3.7); 12-month ADL score 3.9 (95% CI 3.6, 4.1)]. Change in composite quality score from 40% to 90% resulted in a 1-point improvement towards pre-injury ADL score over 12 months [β coefficient 2.03, 95% confidence interval (0.19, 3.87), p=0.03].

Conclusion: There is significant deterioration in functional outcomes for geriatric patients after traumatic injury that persists for up to a year after hospitalization. Better adherence to geriatric trauma QI is associated with significant mitigation of functional decline.

Poster # 83

RACIAL DISPARITIES IN POST-HOSPITALIZATION REHABILITATION AFTER TRAUMATIC BRAIN INJURY

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Introduction: Traumatic Brain Injury (TBI) is a major source of morbidity across the United States, with an annual incidence of 1.7 million, resulting in 275,00 hospitalizations. This results in ~$76.5 billion of direct and indirect costs. Many of these indirect costs are due to loss of functionality after injury. Patients who suffer moderate to severe TBI benefit, in the form of improved function and independence, from intensive rehabilitation after their initial hospitalization. However, there are significant barriers to obtaining intensive rehabilitation. Racial disparities in access to post-hospitalization care have been demonstrated in stroke and hip fracture populations, as well as the general trauma population. It has been unclear the role race and ethnicity play in disparities associated with discharge destination after TBI. We sought to examine predictors for receiving a higher post-injury level of rehabilitation, and identify potential racial disparities in discharge destination among TBI patients. We hypothesize that Hispanic and African-American patients are less likely to receive intensive rehabilitative services following discharge.

Methods: This is a retrospective study using National Trauma Data Bank (NTDB) data from 2007-2010. The study population included TBI incidents, age $\geq$18, who sustained a moderate to severe TBI, as defined by Abbreviated Injury Score (AIS) 2 through 5, and survived to discharge. Discharge destination was defined ordinally by increasing intensity of rehabilitative services (home, home with home health, skilled nursing facility and acute inpatient rehabilitation). Variables included age, gender, race (non-Hispanic white, African American, Hispanic), AIS, Injury Severity Score, mechanism of injury, Glasgow Coma Scale–Motor score on arrival, insurance status and verified trauma center level. In-hospital characteristics included length of stay, ICU days, and ventilator days. Propensity-score weighting was used to balance observable covariates between race categories. Subsequent ordinal logistic regression was used to adjust for in-hospital characteristics and explore racial disparities within discharge destination.

Results: The study cohort included 696,558 TBI incidents, of which 369,477 were included in our propensity weighted analysis. 298,540 (77%) of incidents were classified as non-Hispanic white, 38,533 (9%) were Hispanic, and 48,622 (13%) were African-American. Propensity weighting resulted in covariate balance among our racial groups. After ordinal logistic regression, Hispanic (adjusted OR=0.68 CI=0.66-0.71) and African-American (adjusted OR=0.89 CI=0.86-0.92) populations were less likely to be discharged to a higher level of rehabilitation as compared with non-Hispanic whites.

Conclusion: Hispanic and African-American TBI patients are significantly less likely to receive discharge to intensive rehabilitation than their white counterparts. Members of these communities are less likely to receive intensive rehabilitation, which will affect return to functionality. It is important to identify factors leading to this disparity, and address them to ensure equal access to post-acute care services. It is possible this disparity is rooted in socio-cultural norms and real or perceived expectations on the part of clinician, patient and family. Our growing healthcare system needs to adapt to address these disparities in order to fully serve the patients and communities they treat. Intensive rehabilitation services, as well as education regarding what they engender must be offered to TBI patients meeting functional criteria.

Poster # 84

MEDICATION RISK FACTORS FOR ACUTE RESPIRATORY DISTRESS SYNDROME FOLLOWING TRAUMA

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Introduction: Acute respiratory distress syndrome (ARDS) is a significant cause of morbidity and mortality in trauma patients. Efforts aimed at the prevention of ARDS depend on early identification of at-risk patients. There is limited data on the correlation between individual patient comorbidities present at the time of injury and subsequent ARDS risk. We used detailed information from a statewide collaborative quality initiative (CQI) focused on trauma to assess existing patient medications as a clinical predictor of risk for development of ARDS following injury.

Methods: Our trauma CQI program collected information on trauma patients using the existing trauma registry infrastructure in 23 hospitals from 2008 to 2011. In addition to National Trauma Data Bank data elements, information was collected on patient medications at the time of injury (aspirin, steroids, statins, and beta blockers). Inclusion criteria were age >17, ISS>4, admission to the trauma service, and LOS >0 days. Patients who met no signs of life criteria at presentation to the hospital were excluded. We used bivariate analysis to identify potential predictors of ARDS ($p<0.2$). Stepwise logistic regression was used to create the final model. Co-variates forced into the model included: age, injury severity score, race and gender. We then investigated the contribution of pre-existing medications towards the development of ARDS using our risk-adjustment model. Observed to expected ratios and 95% confidence intervals were calculated for each exposure variable.

Results: 25,113 trauma patients were admitted and 205 were diagnosed with ARDS. Co-variates in the final model were: age, ISS, motor GCS, systolic blood pressure, race, gender, AIS chest>2, AIS abdomen>2, diabetes, chronic alcohol abuse, and blood administration in the first 24 hours. Routine steroid use was associated with an increased risk of ARDS (table). Patient use of aspirin, beta blockers, and statins had neither a negative nor positive effect on risk for subsequent development of ARDS in trauma patients. The area under the ROC for the model was 0.84.

Conclusion: In addition to common risk factors for ARDS following trauma, the presence of routine steroid use on admission substantially increased the odds of developing ARDS. Routine use of common medications such as aspirin, beta blocker, or statin drugs had no association with subsequent development of ARDS in trauma patients. Patient comorbidities identified at the time of admission, as well as injury-related risk factors, should be considered during the management of trauma patients at risk for developing ARDS.

Medication	Observed		Expected		O/E Ratio	95% confidence interval	
	N	%	N	%		Lower	Upper
Aspirin	17	8.3	12.6	6.1	1.35	0.79	2.16
Routine Steroid Use	4	2.0	1.0	0.5	3.96	1.08	10.14
Beta blocker	10	4.9	10.6	5.2	0.94	0.45	1.73
Statin	14	6.8	12.7	6.2	1.10	0.60	1.84

Poster # 85

USE OF PRE-TRAUMA FUNCTIONAL INDEPENDENCE MEASURE (FIM) SCORE TO ASSESS PREDICTION OF SURVIVAL IN GERIATRIC TRAUMA PATIENTS

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Introduction: The geriatric patient represents an increasingly important cohort in the trauma arena, and is challenging because of their multiple co morbidities, unique physiology, and impaired physiologic reserve. It has been suggested a measure that is more specific to geriatric patients is needed for survival prediction since standard scoring models are not reliable in this population. The Functional Independence Measure (FIM) is a measure of disability that combines motor and cognitive parameters to access the level of assistance a patient needs to perform activities of daily living. Widely used in rehabilitative medicine, FIM has been shown to predict discharge outcomes as well as identify patients at high risk for falls. We hypothesized that pre-trauma FIM scores could be used to predict survival in the geriatric trauma population.

Methods: Retrospective analysis of the trauma registry patients age 65 and older admitted to a Level I Trauma Center from July 1, 2006 to July 1, 2012. A total of 1315 patients were identified for model development and regression analysis. Age, ISS, RTS, BMI, and Pre- trauma FIM scores (12 point scale) were studied. The primary outcome variable was survival. Observations with missing data points were excluded from analysis. A total of 941 patients underwent stepwise regression to identify those factors predicting survival. Statistical significance was reached with p-value < 0.05. Multiple logistic regression analysis was then performed. Variables that were significant predictors of survival are reported as adjusted odds ratios with confidence intervals.

Results: The mean age of patients was 78(SD±8.2) and 52% were female. The mean ISS was 13(SD±8.7) and a mean BMI of 26. Overall mortality was 11%, and 58% of patients who died were male. The odds ratio of survival was 3.532 (2.191-5.718, Cl 95%) times greater for every 1 point increase in the pre-admission FIM **expression** score. Although a similar increase in survival was observed with increasing pre-admission FIM **motor** score (OR 1.481, 0.986-2.165, Cl 95%) ($p<0.0001$) this significance was lost when controlling for age, sex, and race ($p=0.0581$). Additionally, the odds of surviving increase 80.5% and 6.8% for every 1 point increase in the RTS and BMI respectively.

Conclusions: Pre-trauma FIM scores, specifically the expression component, were predictive of survival in geriatric trauma victims in this study. The pre-trauma FIM may be useful as a geriatric specific parameter for mortality prediction. Further study of predictive models is needed to determine in geriatric patients the FIM scores impact on standard trauma scoring models.

Poster # 86

THE IMPACT OF ACUTE SOLID ORGAN INJURY ON THE US HEALTH CARE SYSTEM

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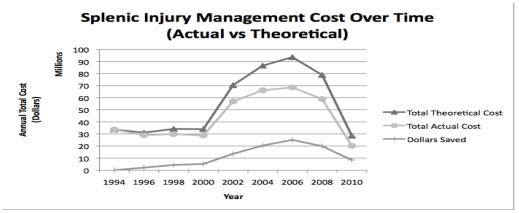
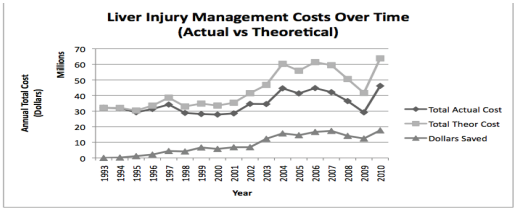
INTRODUCTION: Since the 1980's, there has been a paradigm shift towards non-operative management of stable patients with acute solid organ injury. Historically, evidence of hemoperitoneum or a penetrating injury to the abdomen warranted immediate exploration. These injuries are increasingly being managed nonoperatively. The impact of this practice change on national health care expenditure has not been well characterized.

METHODS: Retrospective trend analysis using data collected from the HCUP Nationwide Inpatient Sample (NIS) spanning 1993-2010 was studied using patients with a primary diagnosis of splenic and liver injury. Cost analysis was performed using cost-to-charge ratios, where actual costs of hospitalization with current management practices were compared to theoretical costs projecting 1994 practice patterns forward.

RESULTS: 29,409 adult patients admitted with primary splenic injury and 84,254 for primary liver injury were analyzed from 1993 to 2010. The proportion of patients undergoing operative management for splenic injury decreased from 60.5% to 32%, and 42% to 19% for liver. Average cost of patient care for splenic injury dropped by $8,421 per patient, a net reduction in total costs per admission of 29.5% ($p<0.0001$), resulting in an average estimated $12 million/year reduction in cost of care. For liver injury, cost has been reduced by $8,822/pt, a 27.7% reduction, with a net $17 million/year savings. Length of stay has been reduced by a mean of 1.7 days per patient for splenic injury ($p=0.0001$) and 2.2 days for liver injury ($p=0.0001$).

CONCLUSION: The trend towards non-operative management of solid organ injury has resulted in a substantial decrease in health care expenditure and length of stay. Advancements in trauma care can have significant impact on the cost of health care in the US.





Poster # 87

A ROBUST PERFORMANCE IMPROVEMENT PROCESS AND THE IMPACT ON VENOUS THROMBOEMBOLISM IN TRAUMA PATIENTS

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Introduction: Venous thromboembolism (VTE) and pulmonary embolism (PE) are well-known complications after trauma and result in significant morbidity and mortality. Many risk factors and prophylactic measures have been identified, however screening and treatment practices vary widely among trauma centers. In 01/2009, we implemented a robust performance improvement (PI) process aimed at evaluating and improving our current prophylaxis measures. This included eight sequential interventions, such as auditing missed doses and patients not on appropriate prophylaxis, adding a "DVT prophylaxis" section to daily progress notes, developing formal chemoprophylaxis guidelines and TEG-based recommendations for placing prophylactic IVC filters in high risk patients.

Methods: We conducted a retrospective review of 25,354 adult patients from a university-based Level-1 trauma center over a six year period (2006-2011). Patients admitted in 2006-2008 (PRE) were compared to those admitted in 2009-2011 (POST) after implementation of our internal PI process. We evaluated both unadjusted and adjusted PE and VTE rates using chi square, t test, and multiple logistic regression.

Results: Of 25,354 adult trauma patients during the study period, 11,690 (46%) were in the PRE group and 13,664 (54%) were in the POST group. Both groups had clinically similar risk factors. The overall PE rate for the study period was 1.09% and VTE rate was 1.99%. In the PRE vs POST group, the unadjusted PE rate was 1.19% vs 1.01% (p=0.17) and unadjusted VTE rate was 2.13% vs 1.87% (p=0.15). After controlling for age, race, trauma mechanism, operative intervention, and injury severity score, no significant change in event rates was detected between groups for either PE (OR 0.91; 95% CI 0.72-1.15) or VTE (OR 0.94; 95%CI 0.79-1.13). Overall mortality decreased from 6.3% to 5.5% (p=0.007).

Conclusion: After implementing several targeted interventions, we did not observe a decrease in PE or overall VTE rates at our institution. While this does not exclude the possibility of a small, undetected change in rates, it is unlikely that any clinically significant change would have occurred. In addition, any potential decrease in rates may be masked by a higher detection rate of clinically insignificant VTE as a result of a lower threshold for screening. Our current PI efforts have focused on identifying ways to improve adherence to current guidelines and increase the intensity of prophylaxis. These findings suggest that future efforts should focus on evaluating the efficacy of the current recommendations themselves and developing evidenced based interventions proven to decrease VTE.

Poster # 88

DAMAGE CONTROL RESUSCITATION INCREASES SUCCESSFUL NON-OPERATIVE MANAGEMENT RATES AND SURVIVAL AFTER SEVERE BLUNT LIVER INJURY

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Introduction: Non-operative multidisciplinary management for severe (AAST Grades IV and V) liver injury has been utilized for two decades. We have previously shown that Damage Control Resuscitation (DCR) employing low-volume, balanced resuscitation improves survival of severely injured trauma patients, however little attention has been paid to organ specific outcomes. We wanted to determine if implementation of DCR has improved survival and successful non-operative management after severe blunt liver injury.

Methods: A retrospective study was performed on all adult trauma patients with severe blunt liver injury who were admitted from 2005 to 2011. Patients were divided into pre-DCR (2005-2008) and DCR (2009-2011) groups. Patients who died before leaving the emergency department (ED) were excluded. Outcomes (resuscitation products used and survival) were then compared by univariate and multivariate analysis.

Results: Between 2005-2011 there were 29,801 trauma admissions, and 1412 (4.7%) patients sustained blunt liver injury. 244 (17%) injuries were AAST grade IV or V, of which 206 patients survived to leave the ED. The pre-DCR group (2005-2008) was comprised of 108 patients whereas the DCR group (2009-2011) had 98 patients. The groups were not different in demographics, prehospital and ED vital signs or ISS. The DCR cohort had an increase in successful non-operative management (54 to 74%, $p<0.01$) as well as a reduction in initial 24-hour PRBC (mean, 12 to 5 units, $p<0.01$), plasma (mean, 12 to 6 units, $p<0.02$) and crystalloids (mean, 7161 to 4565 ml, $p<0.01$) administration. DCR also resulted in improved survival (73% to 94%, $p<0.01$).

Conclusion: In patients with severe blunt liver injury, DCR was associated with less blood product use, a higher successful non-operative management rate and improved survival.

Poster # 89

POSTTRAUMATIC STRESS DISORDER (PTSD) FOLLOWING TRAUMATIC INJURY AT SIX MONTHS: ASSOCIATIONS WITH ALCOHOL USE AND DEPRESSION

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Introduction: Posttraumatic stress disorder (PTSD) is becoming progressively recognized as a psychological morbidity in significant numbers of injured patients. We sought to investigate psychological and behavioral outcomes associated with PTSD following trauma. Participants in a longitudinal outcome study were identified as either PTSD positive or PTSD negative at six months following injury. Risky alcohol use, depression, demographic and injury related variables were explored in each group.

Methods: This prospective cohort study included patients $\geq$ 18 years, admitted to our Level I trauma hospital and voluntarily enrolled in an IRB approved longitudinal outcome study. Baseline measures were obtained using structured interviews with the participants during the initial admission. Follow up data was collected by phone at six months. PTSD was measured using the PTSD Checklist- Civilian Version (PCL-C), risky alcohol use was measured using the Alcohol Use Disorders Identification Test (AUDIT-C), and depression was measured using the Patient Health Questionnaire (PHQ-8). Demographic and injury related variables were also collected.

Results: 118 participants completed measures at baseline and six months were analyzed. 25.4% (n = 30) screened positive for PTSD at six months. There were no significant differences in risky alcohol use between the PTSD positive and PTSD negative groups at six months. However the entire sample showed a significant decline in risky alcohol use at six months (p=.0043). Differences were found in depression among the PTSD positive and PTSD negative group. All PTSD positive participants at six months were also positive for depression (p<.0001). Although there was a 10% increase in the sample from baseline to six months (p = .03), for those participants who were PTSD positive there was a 53% increase in depression from baseline (p = .0002). Statistically significant differences were found between PTSD positive and PTSD negative participants regarding age (40.1 ± 15.9 vs. 50.9±18.2, p = .0047), male (77% vs. 23%, p = .0109), penetrating injury (30% vs. 70%, p <.0001), history of PTSD (83% vs. 17%, p = .0246) or other psychiatric condition (63% vs. 37%, p = <.001).

Conclusion: PTSD was not associated with risky alcohol use at six months. Surprisingly, risky alcohol use declined in both groups. Incidence of PTSD (25.4%, n = 30) and risky alcohol use (25%, n = 29) were equal at six months. All patients with PTSD at six months also scored positive for depression. This research suggests a potential value in screening for PTSD and depression in the trauma population. Further research should explore what factors account for the decrease in risky alcohol use at six months. While the American College of Surgeons-Committee on Trauma requires brief screening and intervention for risky alcohol use due to the societal impact, reinjury rates and cost effectiveness, given the frequency and co-occurrence of risky alcohol use our study suggests that screening for psychological conditions may be equally important.

Poster # 90

UNIVERSITY HEALTHSYSTEM CONSORTIUM EXPECTED MORTALITY OUTPERFORMS TRISS IN THE GERIATRIC TRAUMA POPULATION

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Introduction: The geriatric population, aged 65 and older, is the most rapidly growing segment of the U.S. population, projected to double in the next 20 years. Although this group comprises only 1/10 th of the total population, it accounts for 1/3rd of trauma expenditures and an increasing percentage of trauma admissions. While mortality prediction models have been developed to evaluate trauma care delivery, they have generally not been validated in the geriatric population. One common system, the Trauma and Injury Severity Score (TRISS), utilizes anatomic injury (Injury Severity Score – ISS), physiologic injury (Revised Trauma Score – RTS), and age to estimate risk. This system assigns an age-independent risk to both alterations in GCS and systolic BP below 90 mmHg and does not adjust for comorbidities. A second system, the University Health System Consortium Expected Mortality (UHC-EM), predicts mortality using a proprietary regression model relying heavily on baseline comorbidities and adjusted annually; UHC-EM has never been validated in trauma. We hypothesize that: 1) TRISS would perform less accurately in the geriatric population and 2) UHC-EM would be superior to TRISS in predicting trauma mortality, particularly in geriatric trauma patients.

Methods: We conducted a single-center retrospective analysis of all adult trauma admissions from January 2005 to June 2012 utilizing data collected in real time from our electronic data repository. Geriatric patients were defined as age 65 and older. We selected patients with both TRISS and UHC-EM scores in the data repository for analysis (n = 14,089, geriatric = 1,743, non-geriatric = 12,346). We collected demographic and outcome data and utilized Receiver Operator Curve (ROC) analysis to calculate the area under the curve (AUC) for UHC-EM and TRISS in determining in-hospital mortality for geriatric and non-geriatric trauma patients.

Results: Our trauma observed to expected mortality indices were 0.35 (TRISS) and 0.90 (UHC-EM). Geriatric patients had higher mortality than non-geriatric patients [18.1% (316/1,743) vs. 6.0% (740/12,346), $p < 0.001$ by Fisher's exact test], more ICU days (2.7 [IQR 1.2, 5.4] vs. 1.9 [IQR 0.9, 4.5], $p < 0.001$ by Mann-Whitney U test), and more mechanical ventilation days (3.0 [IQR 2.0, 6.0] vs. 2.0 [IQR 1.0, 5.0], $p < 0.001$). TRISS was less accurate in the geriatric population (ROC-AUC of 0.81 vs. 0.90, $p < 0.05$). UHC-EM out-performed TRISS in both populations (ROC-AUC 0.89 [geriatric] vs. 0.93 [non-geriatric], $p < 0.05$) in predicting mortality, but the difference was higher in geriatric patients (ΔAUC of 0.08 [geriatric] vs. 0.03 [non-geriatric]).

AUC	NON-GERIATRIC	GERIATRIC	ΔAUC
UHC	0.93 [0.92, 0.94]	0.89 [0.87, 0.91]	0.04*
TRISS	0.90 [0.89, 0.91]	0.81 [0.78, 0.84]	0.09*
ΔAUC	0.03*	0.08*	*p < 0.05

Conclusions: UHC-EM is superior to TRISS in predicting mortality in both geriatric and non-geriatric trauma patients, but the difference between UHC-EM and TRISS is accentuated in the elderly. UHC-EM may achieve superiority in geriatric trauma patients by incorporating medical comorbidities that impair the already-diminished physiologic reserve in the geriatric population.

Poster # 91

CAN NON-TRAUMA CENTERS SAFELY PERFORM THE INITIAL MANAGEMENT OF ELDERLY PATIENTS SUSTAINING A GROUND LEVEL FALL?

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Introduction: As the United States population ages trauma centers are more frequently tasked with caring for elderly individuals who have sustained an injury. Ground level falls in the elderly may be associated with severe injuries and have the potential for significant morbidity and even mortality. For this reason, some authors have advocated taking elderly ground level falls directly from the scene to regional trauma centers. We hypothesize that elderly ground level falls can be safely evaluated and initially managed at non-trauma centers and only those patients sustaining injury need to be transferred to trauma centers for definitive care.

Methods: We performed a retrospective study of all elderly (>/= 70 years old) patients who sustained a ground level fall and were admitted to our trauma center from 2005 – 2012. Patients who were transferred from a non-trauma center to our ACS-verified level 1 trauma center were compared to patients who were admitted directly to our trauma center. Transfer patients were compared to non-transfer patients for demographics, admission physiology, as well as injury pattern and severity. The primary outcome was mortality while secondary outcomes included length of stay in the hospital and ICU.

Results: There were 1,066 elderly patients who sustained a ground level fall admitted to our trauma center, 397 (37%) were transferred from a non-trauma center while 660 (63%) were admitted directly to our trauma center. While there was no difference in age (80 years old vs. 80 years old, $p = 0.77$) the transfer patients were more often male (37% vs. 32%, $p = 0.01$) and Caucasian (88% vs. 75%, $p < 0.001$). There was no difference between groups with regards to emergency department physiology including heart rate (81 vs. 83, $p = 0.09$), hypotension (2% vs. 2%, $p = 0.87$), or initial GCS (14 vs. 14, $p = 0.26$). Patients transferred from a non-trauma center had a higher injury severity score (13 vs. 11, $p < 0.001$) and had a higher AIS for the head (2 vs. 1, $p < 0.001$) but lower AIS for extremities (0.7 vs. 1.5, $p < 0.001$) and less often required an orthopedic procedure (13% vs. 33%, $p < 0.001$). Despite a higher injury severity score patients who were transferred from a non-trauma center had a lower mortality (4% vs. 9%, $p = 0.004$) and there was no difference in ICU (1 day) or hospital (5 days) length of stay.

Conclusion: Non-trauma centers can safely perform the evaluation and initial management of elderly ground level falls and subsequently transfer patients with identified injuries to regional trauma centers. Non-trauma centers in the community should be utilized for the initial evaluation, treatment, and stabilization of elderly ground level falls, decompressing trauma centers to care for more severely injured patients.

Poster # 92

THE ASSOCIATION BETWEEN DO NOT RESUSCITATE (DNR) ORDERS AND OUTCOMES IN A PROPENSITY MATCHED TRAUMA POPULATION

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Introduction: The use of Do Not Resuscitate (DNR) orders and outcomes associated with DNR in the trauma setting are not well characterized. The purpose of this study is to compare outcomes related to the presence and timing of a DNR order. We hypothesized that DNR would be associated with worse outcomes, and that patients made DNR in the hospital will have worse outcomes than those with pre-existing DNR status.

Methods: We examined all trauma patients admitted to a level I trauma center between 1/2007 – 9/2012. Propensity score techniques with a caliper distance of 0.0001 were used to match two cohorts: 1) patients with and without a DNR; 2) pre-existing vs. in-house DNR. We matched based on significant differences in the following: age, gender, Charlson Comorbidity Index (CCI), admission service, transfer status, activation status, cause of injury, Injury Severity Score (ISS), ED Glasgow Coma Score (GCS) and ED vital signs [systolic blood pressure, pulse, and respiratory rate]). The following outcomes were examined in the matched populations: death, a major complication, admission to the ICU, and hospital LOS. We examined death, major complications and ICU admission using conditional logistic regression, while LOS was examined using a Wilcoxon signed rank sum test.

Results: There were 10209 patients, of which 1354 (13.3%) had a DNR order; 536 (5.3%) had a pre-existing DNR and 818 (8.5%) had a DNR established in-house. In the overall study population, outcomes were significantly worse for the DNR population compared to those without a DNR, as were outcomes for patients with an in-house DNR compared to those with a pre-existing DNR ($p < 0.05$ for all comparisons). There were significant differences between the DNR and non DNR population, and thus were matched on age, gender, CCI, transfer and activation status, trauma service admission, GCS, and fall injury. The resulting DNR cohort included 2150 well matched patients (1075 DNR patients, or 79.4% of the DNR population). DNR patients had significantly increased odds of mortality, developing a major complication, and admission to the ICU, table 1; there was no difference in hospital LOS with a DNR. There were significant differences between the pre-existing and in-house DNR population, and thus were matched on age, gender, activation status, trauma service admission, GCS, fall injury, and all ED vital signs. The resulting pre-existing vs. in-house cohort included 1058 well matched patients (529 pre-existing DNR patients, or 98.7% of the pre-existing DNR population). A DNR established in-house was significantly associated with increased mortality, developing a major complication, admission to the ICU, as well as increased hospital LOS, table 1.

Table 1. Outcomes by DNR status

Outcome, Odds ratio (95% CI)	DNR vs. no DNR (n=2,150)	*p* value	In-house vs. pre-existing DNR (n=1,058)	*p* value
In-hospital mortality	21.33 (9.4 - 48.4)	< .001	1.67 (1.03 - 2.7)	0.04
Major complication	2.18 (1.5 - 3.2)	< .001	3.15 (1.7 - 5.9)	< .001
ICU admission	1.68 (1.3 - 2.2)	< .001	4.93 (2.8 - 8.8)	< .001
LOS difference, median (IQR)	0.0 (5) days	< .001	1.0 (4) days	< .001

Conclusions: A DNR was highly prevalent in our general trauma population, and was associated with greater mortality, complications, and ICU admission than a matched non DNR population. A DNR established after traumatic injury, compared to a pre-existing DNR, was also associated with worse outcomes. Further research is needed to determine if these findings are related to an in-house DNR being a marker of poor outcome, or if patients with a DNR are treated less aggressively, leading to more complications and higher mortality.

Poster # 93

FULL COMPLIANCE WITH THE BRAIN TRAUMA FOUNDATION TBI GUIDELINES IS NOT NECESSARY FOR MORTALITY IMPROVEMENT

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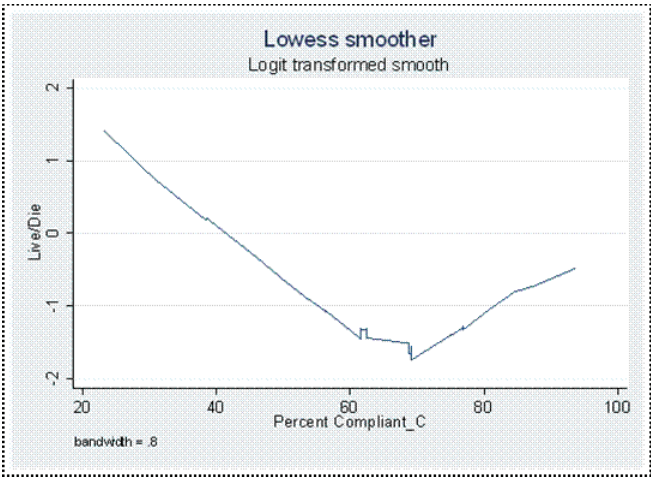
Introduction: Clear, evidence-based guidelines for the care of the severe traumatic brain injury have been available from the Brain Trauma Foundation since 1995. To date, there are 15 recommendations that make up the guideline. Although individually validated, there has been no examination of the effect of strict adherence to the *entire* guideline. We examined the rate of compliance and their impact on mortality.

Methods: In a Pennsylvania-verified mature Level II trauma center, patients with an admission Glasgow Coma Scale (GCS)≤8 from 2007-2012 were queried from the trauma registry. Exclusion criteria included: patients who died in ≤24hours, transferred to a pediatric trauma center, and/or no abnormal findings on head CT scan. Strict adherence to the Brain Trauma Foundation's guidelines (BTFG) was determined in a binary fashion (Yes/No). We then calculated each patient's percent compliance with total number of guidelines. Univariate logistic regression was used to find significant predictors of mortality, including percent compliance with BTFG. Significant factors were added to a multivariate logistic regression model. We looked at the mortality rates across the spectrum of percent compliance. We defined significance as $p \leq 0.05$.

Results:We had a total of 185 patients that met our inclusion criteria. The percent compliance ranged from 23.1% to 93.8%, with a mean of 66.03%. Following adjustment for age and Injury Severity Score (ISS), patients with a compliance rate of ≤60% suffered a 2.81 higher odds of mortality (OR 2.81; 95% CI 1.25-6.33; p=0.013). When the rate of mortality was compared across the spectrum of compliance, the odds of mortality decreased as compliance increased until around 70%.



Conclusion: Full compliance with all 15 TBI guidelines can be difficult to achieve. We have demonstrated a linear relationship between increased compliance and decreased mortality. However, the survival benefit reverses once 70% adherence is reached, suggesting that certain subset of TBI patients will die despite best available trauma care.

Poster # 94

RISKS FACTORS FOR COMPLICATIONS AFTER ESOPHAGEAL REPAIR IN PATIENTS WITH PENETRATING CERVICAL TRAUMA

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Introduction: Penetrating esophageal trauma (PET) is associated with a high incidence of complications and death. Complications after esophageal repair may result in severely compromised quality of life and prolonged hospital course with increased medical costs. We aimed to identify predisposing risk factors for complications of esophageal repair associated with penetrating neck trauma.

Methods: We performed a retrospective review of cervical PET patients treated in a Level I Trauma Center from 1999 to 2012. Subjects who died during the first 24 hours were excluded. A model to identify potential risk factors of esophageal repair complications was developed by univariate and multivariate logistic regression analysis. Additional models were constructed to further analyze the identified risk factors.

Results: One hundred and three PET patients were surgically treated; five died during the first 24 hours. Of the remaining 98, 83.7% were male, and 54.1% suffered stab wounds. Median age was 25 years old (IQR 20-28). Median RTS was 7.11 (IQR 7.08-7.84) and median ISS was 16 (IQR 16-36). Esophageal repair complications occurred in 33.7% of the patients. Infectious complications occurred in 29.6%, fistula in 16.3%, and stenosis in 2%. Overall mortality was 12.2%. Multivariate logistic regression analysis found a preoperative interval of $\leq$ 6 hours (OR 5.29, $p<0.01$), saliva present in the traumatic wound (OR 4.10, $p=0.05$), concomitant tracheal injury (OR 3.56, $p=0.04$), and need to perform an esophagostomy (OR 4.99. $p=0.03$) as independent risk factors for esophageal repair complications. A second model was constructed to explain the $\leq$6 hour preoperative interval identified hypotension (OR 4.11, $p=0.02$), dyspnea (OR 6.4, $p=0.14$), and saliva in the traumatic wound (OR 3.0, $p=0.14$) as associated variables.

Conclusion: In our patient population, early surgical intervention is dictated by the presence of hypotension, dyspnea, and saliva in the wound on initial presentation. Primary esophageal repair performed within six hours or less, dyspnea, presence of saliva in the traumatic wound, concomitant tracheal lesion, and need for esophagostomy were all risk factors associated with a high incidence of complications after esophageal repair.

Poster # 95

A MODIFIED KAMPALA TRAUMA SCORE (KTS) OUTPERFORMS THE INJURY SEVERITY SCORE (ISS) IN TRAUMA MORTALITY PREDICTION IN A DEVELOPED SETTING

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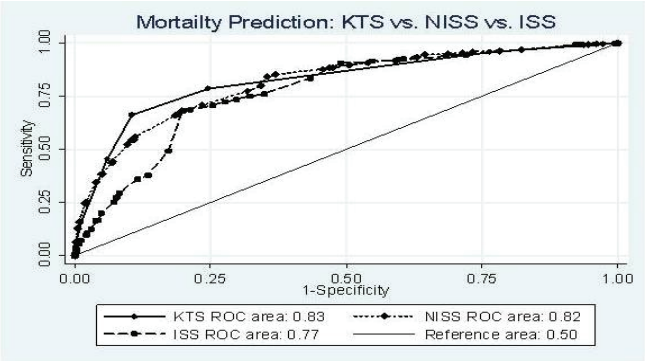
Introduction: Historically, mortality prediction in large trauma studies has relied upon anatomy-based injury severity scoring tools. This study sought to examine whether a simple injury severity scoring system developed for use in low-income settings, which includes the use of physiologic data, performs as well as anatomic injury scores in mortality prediction in a developed setting.

Methods: Using patient-level data collected at 18 Level I trauma centers and 51 non-trauma center hospitals in the US, the anatomy-based Injury Severity Score (ISS) and New Injury Severity Score (NISS) were calculated, as were scores based on a modified version of the physiology-based Kampala Trauma Score (KTS). The dataset did not have consistently reliable data on presenting respiratory rate, therefore, a modified KTS, which excluded respiratory rate, was calculated. Receiver Operating Characteristic (ROC) curves examined predictive ability of the modified KTS compared with the ISS and NISS.

Results: A total of 5,043 injured individuals were included in the study. In this sample, the modified KTS outperformed the ISS (AUC=0.83, 95% CI 0.81-0.84 vs. 0.77, 95% CI 0.76-0.79, respectively) and demonstrated similar predictive ability compared with the NISS (AUC=0.83, 95% CI 0.81-0.84 vs. 0.82, 95% CI 0.80-0.83, respectively).

Conclusion: The modified KTS, which is calculated using data readily available at patient presentation, may represent a useful tool for clinicians assessing trauma mortality risk in real-time, as well as for researchers examining administrative data, when physiologic measures are available. Further examination of the KTS in developed settings is warranted.



Poster # 96

Hospital Outcomes of Patients Receiving Pre-Hospital Cardiopulmonary Resuscitation for Pulseless Electrical Activity After Trauma

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Introduction: While the American College of Surgeons Committee on Trauma does not currently consider injured patients who require pre-hospital cardiopulmonary resuscitation (CPR) for pulseless electrical activity (PEA) to be “dead-on-arrival" to the emergency department, the outcomes of such patients has not been extensively described.

Methods: Retrospective analysis of all patients from a Level I trauma center registry from 2002-2011 who received pre-hospital CPR. Composite hospital survival/organ donation rates stratified by injury mechanism and presence/absence of pre-hospital PEA were assessed. Pediatric patients, inter-hospital transfers, patients suffering burns or drowning, and patients suffering medical arrest prior to injury were excluded from analysis.

Results: 113 patients were admitted to the emergency department after undergoing CPR. The pre-hospital rhythm was reported for 100 of these patients (62 with PEA, 38 without PEA). Basic characteristics and composite hospital survival/organ donation rates for these patients are shown in the Table:

	Blunt Mechanism		Penetrating Mechanism	
	No PEA	PEA	No PEA	PEA
Number of Patients	20	27	18	35
Age (Mean ± SD)	39 ±17 years	47 ± 19 years	32 ± 15 years	34 ± 15 years
Male Gender	5 (25%)	5 (19%)	2 (11%)	4 (11%)
Duration Pre-Hospital CPR (Median, IQR)	16.5 (5-25)	17 (10-30)	12.5 (10-20)	13 (5-20)
ED Thoracotomy	0 (0%)	1 (4%)	5 (28%)	12 (34%)
Survival or Organ Donation	0 (0%)	2 (7%)	0 (0%)	3 (9%)

Conclusions: Combined hospital survival/organ donation rates are not negligible in patients who require pre-hospital CPR for PEA after injury. These findings provide support for the current practice of classifying such patients as alive on Emergency Department admission after blunt or penetrating trauma.

Poster # 97

OUTCOMES FOLLOWING CENTRAL CORD SYNDROME: WHO WALKS?

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Introduction:
Acute traumatic central cord syndrome (ATCSS) is the most common form of incomplete spinal cord injury. The purpose of this study was to identify factors that may affect functional outcomes following ATCCS. The research question was: What clinical characteristics predict disposition after ATCSS?

Methods:
The trauma registry identified all patients admitted for blunt spinal cord injury at our 800 bed, level 1 urban hospital from January 2001 to December 2012. A retrospective review of the medical records of patients who were treated for spinal cord injury was performed and patients having ATCSS were identified from this group. Data collected included age, gender, injury severity score (ISS), admission systolic blood pressure (SBP), admission heart rate (HR), and mechanism of injury (MOI). Information on initial hematocrit, type of treatment; operative or non-operative, location of injury, hospital length of stay (HLOS), disposition, and independence at discharge were also recorded. Logistic regression analysis was conducted to identify probability of disposition. Variables in the equation included age, ISS and admission SBP. A P value of 0.05 was considered significant.

Results:
There were 328 patients with traumatic spinal cord injury of which 57 had ACTSS. Most of the patients were male (78.9%) with a mean age of 57±14 and an average ISS of 19±6. The most common MOI was fall 62%, followed by motor vehicle related 31%, and other 5%. The average GCS on admission was 15±2, average initial hematocrit was 39±4 and mean HLOS was 15±16 days. Overall hospital mortality was 4% (2). Of the 96% (55) of patients surviving to discharge, the majority (59%) was discharged to a rehabilitation facility and 26% were discharged to home. Initial SBP was significantly higher (P = 0.01) (143.4±28) in patients who were independent at discharge as compared to patients who were dependent (121.9±31.1). Patients discharged to home and who were independent for feeding and locomotion had ISS that was significantly lower (P=0.04), (OR: 1.3 95% CI 1, 2). Age and mechanism of injury were not significant predictors of outcome.

Conclusion:
ACTSS is a life altering injury that can be devastating for families and patients. Maintaining an elevated SBP in the peri-injury period has been common practice in maximizing outcome. Admission SBP appears to be an important factor and a predictor of functional independence and patient's ability to return to home. Further studies are indicated to explore this critical issue.

Poster # 98

PREHOSPITAL BLIND INSERTION AIRWAY DEVICE FOR AIRWAY MANAGEMENT OF BLUNT TRAUMA PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY: NOT AS GOOD AS WE MIGHT THINK

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Introduction: There is evidence that prehospital endotracheal intubation is associated with increased mortality for blunt trauma patients with severe traumatic brain injury (TBI). Subsequently, most patients with severe TBI are now managed prehospital with noninvasive airway maneuvers. For a variety of reasons, some blunt severe TBI patients still require more advanced airway interventions in the prehospital setting prior to arrival at a trauma center. Endotracheal intubation remains the standard for definitive airway management in trauma patients. However, some prehospital agencies have transitioned to using a blind insertion airway device (BIAD) as an alternative to endotracheal intubation. We hypothesize that prehospital BIAD is not acceptable as an alternative to prehospital endotracheal intubation for blunt trauma patients with severe TBI. The purpose of this study was to analyze blunt trauma patients with severe TBI and compare outcomes in those managed with prehospital BIAD vs. prehospital endotracheal intubation (ET).

Methods: We performed a retrospective review (2006 – 2011) of all blunt trauma patients with a prehospital GCS $\leq$ 8 who were admitted to our urban, level 1 trauma center. Patients were divided into two groups based on prehospital airway management: ET vs. BIAD (all patients with prehospital BIAD subsequently underwent ET upon arrival to our emergency department). The primary outcome was mortality.

Results: There were 710 blunt trauma patients with a prehospital GCS $\leq$ 8 admitted to our trauma center (40 years old, 60% Caucasian, 74% male gender, prehospital GCS = 4, ISS = 31). A total of 334 (47%) patients were managed prehospital by noninvasive airway maneuvers and were excluded, while 275 (39%) underwent ET and 101 (14%) underwent BIAD. When comparing the ET and BIAD groups there was no difference in admission demographics but the BIAD group had a slightly higher ISS (35 vs. 32, $p = 0.04$). Mortality was higher for patients managed with BIAD (63%) vs. ET (45%), $p = 0.002$. When controlling for all other variables using logistic regression, prehospital BIAD was an independent risk factor for mortality (Odds Ratio = 2.2, $p = 0.02$) while ET was not (Odds Ratio = 1.4, $p = 0.29$).

Conclusion: When compared with endotracheal intubation, the use of prehospital BIAD in blunt trauma patients with severe TBI is associated with increased mortality and prehospital BIAD is an independent risk factor for mortality. BIAD may not be an acceptable alternative to endotracheal intubation for this patient population. Further studies are needed to identify the ideal method of prehospital airway management for blunt trauma patients with severe TBI who cannot be managed by noninvasive airway maneuvers.

Poster # 99

AERODIGESTIVE DYSFUNCTION IN HIGH CERVICAL SPINE FRACTURES IS ACCENTUATED BY THE NEED FOR SURGICAL INTERVENTION

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Introduction: Cervical spine fractures are a common injury in the elderly, ground-level-fall population. These injuries are treated with cervical immobilization with or without surgical fusion. Despite an intact spinal cord, these injuries are frequently associated aspiration pneumonia. Herein, we attempt to discern the etiology of this complication as related to dysphagia and its association with operative intervention

Methods: A retrospective review of all isolated C1 & C2 vertebral column fractures without spinal cord injury during a five year period, at an urban level 1 trauma center and regional model spinal cord injury center was performed. Patient demographics along with operative procedures, speech evaluations, and the incidence of pneumonia and need for tracheostomy were reviewed

Results: 277 patients met inclusion criteria with 44% being male and a mean age of 73.9 years. There were no differences in age, mean ISS, Charlson Comorbidity Score, or mortality between those patients treated with and without surgical intervention. Patients managed operatively had significantly higher rates of dysphagia requiring an altered diet (36.2% vs. 24.4%, $p<0.04$), need for mechanical ventilation and tracheostomy (17.1% vs. 2.9%, $p<0.0001$), pneumonia (6.7% vs. 1.7%, $p<0.04$), length of stay in days (15.0 vs. 6.3, $p<0.0001$), and discharge to a location other than home (76.2% vs. 47.1%, $p<0.0001$) when compared to patients managed without operative intervention.

Conclusion: Isolated cervical spine fractures at C1 and C2 without neurologic spinal cord injury are associated with significant morbidity. The application of operative intervention significantly increases morbidity despite similar demographics and preinjury comorbidity. Further study is needed to determine whether the increased mobidity is related to more severe cervical injuries or to the surgical manipulation itself.

Poster # 100

EARLY TRACHESOTOMY FOLLOWING ANTERIOR CERVICAL FIXATION

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Introduction: Patients with cervical spine injuries often require prolonged ventilator support with tracheostomy, especially when associated with spinal cord injury. Traditionally tracheostomy has been delayed after anterior cervical fusion (ACF) for concerns regarding surgical site infection (SSI). With the advent of percutaneous tracheostomy (PDT) many centers have begun earlier tracheostomy folowing ACF. We compared the effect of timing of PDT on in hospital outcomes in the largest population reported to date.

Methods: We performed retrospective review of all patients with anterior cervical fixation receiving a PDT during a ten year period. The study site is a Level I trauma center with a regional model spinal cord injury center. Outcome variables included the infectious complications, ICU length of stay (LOS) and hospital LOS. Patients were dicotomized into early versus late PDT based on a cut off of 6 days from the time of ACF to PDT.

Results:Two Hundred and seventy nine patients underwent ACF, of which 65 had a PDT. We excluded 7 patients who had a PDT before ACF and 4 who had missing data elements, resulting in a study population of 54 patients. Thirty-one patients had early PDT while 23 had late PDT. Patients were well matched for age, gender, GCS on admission, injury severity score, level of cervical vertebral fracture and Charlson comorbidity index. Patients with late PDT higher rates of atelectasis (26% vs 3.2%, p=0.03) and trends of highr rates of pnemonia (61% vs 39%, p=0.16) and sepsis (56% vs 26%, p=0.08) . Hospital LOS as well as ICU LOS was shorter with early PDT (26.3 vs 33.3 days, p=0.04 and 17.2 vs 23 days, p=0.02, respectively). No patient had a cervical SSI in either group.

Conclusion: In the largest population reported to date, early PDT within 6 days of ACF is associated with reduced hospital and ICU LOS as well as morbidity without an increased risk of SSI. A larger prospective study would aid in establishing the optimal timing for PDT in patients following ACF.

Poster # 101

Expanding Current Guidelines for CT Angiography for Detection of Blunt Cerebrovascular Injury

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Introduction:Early detection and treatment of blunt cerebrovascular injuries (BCVIs) has reduced the number of injury-related neurologic sequelae. Broadening of the screening criteria has recently been advocated; however this may subject patients to unnecessary tests and treatment. We adopted a broad CT angiogram-based BCVI screening algorithm in 2007 based on multiple published indications. The goal of this study was to evaluate current guidelines with recently published national guidelines to identify which criteria result in the highest detection of BCVI.

Methods:From January 1, 2007 to December 31, 2010, we prospectively evaluated patients utilizing a screening algorithm for BCVI based on multiple literature recommendations. CTAs were helically acquired at 1.25mm slice thickness on 64-detector row CT scanners. Results were analyzed using a fisher test to determine correlations between clinical presentations and imaging results. IRB approval was obtained for this study. Our findings were then compared to existing published guidelines.

Results:There were 422 patients that met criteria to receive CTA to assess for BCVI. 48 patients were found to have +CTA for BCVI (Grade 1 = 24, Grade 2 = 16, Grade 3 = 6, Grade 4 = 10, Grade 5 = 2) resulting in an incidence of 11.3%. Cervical spine fracture was present in 35/48 (73%), basilar skull fracture was present in 10/48 (21%), and neurological deficit was present in 11/48 (23%). Cervical spine fracture and basilar skull fracture was statistically correlated with BCVI ($p=0.04$). Neurological deficit was also correlated with BCVI ($p<0.001$). We had 7/35 (20%) patients with cervical spine fractures and BCVI that met our screening criteria but would have been missed utilizing other national published guidelines. None of the 48 patients who presented with BCVI had related infarct seen on head CT or seat belt abrasions of the neck.

Conclusion: The 11.3% incidence of BCVI found utilizing our broad screening protocol is much higher than previously reported. Additionally, we found 7/35 (20%) patients with cervical spine fractures and BCVI that would have been missed with the new recommendations. Our data supports increased risk stratification and shows that blunt cerebrovascular injury is correlated with cervical spinal fracture, basilar skull fracture and neurological deficit. We recommend CTA be performed on patients with any cervical spine fracture, in addition to the current recommendations.

Poster # 102

RISK FACTORS UPPER EXTREMITY VENOUS THROMBOSIS

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Introduction: Numerous studies on lower extremity deep venous thrombosis (LEDVT) have shown significant morbidity and mortality mandating routine preventive measures and prophylaxis. Recommendations on prophylaxis or treatment of upper extremity deep venous thrombosis (UEDVT) are difficult to make because of the limited data on trauma patients. The purpose of this study was to identify risk factors for development of UEDVT and make recommendations on surveillance, prophylaxis and treatment in trauma patients.

Methods: Records of trauma patients admitted to a Level 1 Trauma Center over a three-year period were reviewed. Patients with an upper extremity ultrasound (UEUS) positive for thrombosis were identified from the trauma registry. Only patients with thrombosis in the brachial, axillary or subclavian veins were included. UEUS is done selectively on our trauma service. Patient demographics, prophylactic anticoagulation, Injury Severity Score (ISS), type of central access and incidence of pulmonary embolism were abstracted.

Results: There were 6,605 trauma admissions during the study period. Of these trauma admissions, 384 patients received an upper extremity ultrasound. 56 of the 384 patients (14.6%) were positive for an UEDVT. Of the patients with UEDVT, 39 (69.6%) were men and 17 (30.4%) were female; not significantly different from the general trauma population. The mean age for patients with a DVT was 60±21.1. The mean age for patients with a negative DVT exam was 56.47±21.0 years (p = .29). Twenty-seven patients with a UEDVT were symptomatic (including edema, erythema, and/or pain). Of the 56 patients with a DVT, 42 (75%) patient did not receive prophylactic anticoagulation due to a documented contraindication. Patients with a DVT had an average ISS score of 22.54±8.9. In comparison, trauma patients without a DVT had an average ISS score of 18.88±10.1 (p = 0.012). Fifty patients with a DVT had a peripherally inserted central catheter (PICC), 2 had subclavian or jugular central line, two had neither and two patients had both. On average, an UEDVT was found 7.8 days after a PICC line was placed. Pulmonary embolism was identified in two patients with an UEDVT.

Conclusion: High ISS and presence of a PICC line were found to be risk factors for an UEDVT. Age did not appear to have a strong impact. Pharmacologic prophylaxis decreases the risk of UEDVT and should be given in the absence of a contraindication. Upper extremity duplex ultrasounds should be considered for screening trauma ICU patients due to the frequent absence of symptoms in UEDVT. If central access is required, central lines should be used in place of PICC lines due to their propensity to cause UEDVTs.

Poster # 103

NOVEL PREHOSPITAL MONITOR WITH INJURY ACUITY ALGORITHM TO IDENTIFY PATIENTS WHO REQUIRE LIFE SAVING INTERVENTION

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Introduction: The greatest opportunity for reducing military trauma mortality involves detection and treatment of life-threatening conditions in austere prehospital conditions. A miniature wireless vital signs monitor (MWVSM) has been designed according to the logistic requirements of the United States Special Operations Command. It incorporates a proprietary injury acuity algorithm termed the Murphy Factor (MF), which is a summary alarm based on vital signs and time trends. We test the hypothesis that the MF can identify trauma patients who require a life saving intervention (LSI).

Methods: From December 2011 to date, a prospective trial is being conducted in collaboration with prehospital providers. The MWVSM (mini-Medic, www.athenagtx.com) detects skin temperature, pulse oximetry (SpO_2), heart rate (HR), pulse wave transit time (PWTT), and MF. LSIs included: intubation, tube thoracostomy, central line insertion, blood product transfusion, and operative intervention. Prehospital data and MF from a MWVSM were compared to vital signs (SpO_2, systolic blood pressure (SBP), and HR) from a conventional monitor. Sensitivity (Se), specificity (Sp), negative predictive value (NPV), positive predictive value (PPV), and area under the receiver operating characteristic curve (AUC) were calculated.

Results: 86 patients suffered predominantly blunt trauma (n=72, 84%), were mostly male (n=72, 84%), age 47±19 yrs, and ISS 10(12). Those who received a LSI (n=40) had similar demographics, but higher ISS (15 vs 5) and mortality (21% vs 0%) (all $p<0.05$). MF > 3 during transport was superior to vital signs alone or in combination for identifying need for LSI.

	Se	Sp	NPV	PPV	AUC	p=
HR>100	31	79	74	55	0.549	0.536
SBP<90	12	98	59	80	0.546	0.558
SpO_2<95	14	98	57	83	0.526	0.747
HR>100 or SBP<90 or SpO_2<95	49	76	64	63	0.616	0.142
MF>3	41	88	62	75	0.665	0.038

Conclusion: An injury acuity algorithm has the potential to identify prehospital trauma patients who need a LSI, and is superior to conventional vital signs. New technology combined with algorithms that include trends over time may have the ability to improve prehospital care for both civilian and military populations.

Poster # 104

1:1:1 -A MATTER OF LIFE AND DEATH

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Introduction: The appropriate ratio of blood (pRBCs), fresh frozen plasma (FFP) and platelets (Plts) that optimizes resuscitation of critically injured patients who require a massive transfusion protocol (MTP) remains to be determined. Evidence from the military conflicts in Iraq and Afghanistan indicates that a ratio of 1:1:1 offers the greatest chance of survival in combat casualties but application of this approach to civilian trauma management is only now evolving. We hypothesize that deviation from a 1:1:1 ratio of blood products negatively impacts survival.

Methods: A retrospective cohort study of all trauma patients treated at our urban Level I Trauma Center between late 2008 and 2012 who required an MTP (≥ 10 units pRBC/24 hrs) was conducted. Data on amount of blood products given, mechanism of injury, injury severity score (ISS), patient outcomes and demographic data were collected. We defined a new variable, the average normalized ratio (ANR), that incorporates the relative number of transfused units of pRBCs, FFP, and Plts normalized for Plts transfused. ANR was calculated as follows: [((6*6pack platelets)/pRBC) + ((6*6pack platelets)/FFP) +(6*6pack platelets)/ (6*6pack platelets)]/3. A precise 1:1:1 transfusion ratio resulted in an ANR equal to 1. An ANR was determined for each MTP recipient. Very few patients received an exact 1:1:1 ratio (ANR=1) so the reference group was expanded to include an ANR >0.9 and <1.1. The ANR was then categorized into 0.2 deviations higher or lower than the reference ANR. Logistic regression was used to determine the odds of death associated with incremental ANR deviation from the reference group.

Results: One hundred thirty-seven patients received massive transfusions during the study period and 42.3% survived (n=58). One patient received no Plts or FFP transfusions and was excluded. Patients who died received a significantly greater percentage of pRBCs (units packed red cells/total units received) than patients who survived (51.3% vs 41.0%; p<0.00001). Death was also associated with a significantly lower percentage of FFP units (28.5% vs 32.2%; p= 0.004) and Plts (20.1% v 26.8%; p = 0.001) in relation to total units of blood products received. Logistic regression demonstrated increased odds of death with increasing deviation from the reference ANR range, after adjusting for ISS.

Odds of death associated with ANR, among massive transfusion patients, 2008-2012 (adjusted for ISS)

Deviation <0.1 from ANR=1	(n)	OR	95% CI
None (reference)	22	1.0	
0.1 - < 0.3 deviation	63	2.6	0.9, 7.8
0.3 - < 0.5 deviation	38	5.9	1.8, 19.4
>0.5 deviation	13	27.0	2.8, 258.7

Conclusion: ANR represents an easily calculated parameter that quantitates the mix of blood products transfused. Data from this study suggest that a <0.1 deviation from the reference ANR did not alter patient survival but subsequent deviations were associated with a significant increased risk of death after adjusting for ISS. Our results are consistent with recent military experience and support the use of blood product replacement that best approximates a 1:1:1 ratio. Use of ANR and its predictive characteristics will require additional studies for validation.

Poster # 105

HOW HIGH CAN YOU GET? THE IMPACT OF INVERSE RATIO RESUSCITATION IN DAMAGE CONTROL LAPAROTOMY

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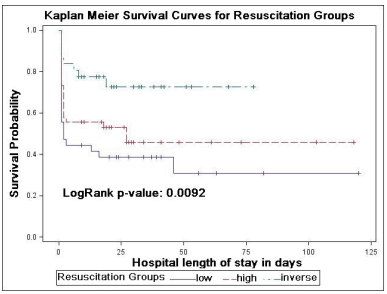
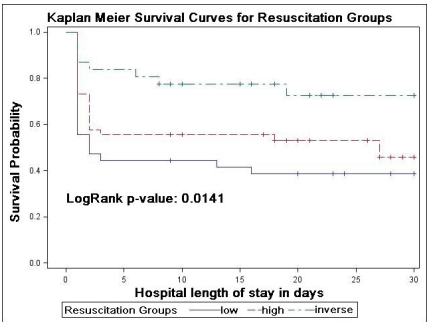
Introduction: In patients with severe hemorrhage, high (1:1-1:2) FFP:PRBC ratio has been widely accepted. Although evidence exists that lower ratios convey similar survival advantages to high ratio resuscitation, no single study has compared them to an inverse ratio FFP:PRBC >1:1. We hypothesize that an inverse ratio (>1:1) when compared to high and low ratios will convey a survival benefit.

Methods: This is a 53-month retrospective analysis of all intra-abdominal injuries requiring damage control laparotomy (DCL). Resuscitation groups by FFP:PRBC ratios: inverse (>1:1), high (1:1-1:2), and low (<1:2). Patients with ≥10 units PRBC were evaluated in each resuscitation group. Survivability Kaplan-Meier (KM) curves were generated.

Results: 113 patients had injuries requiring DCL (low, n=36; high, n=45; inverse, n=32). No difference was noted in patient demographics between groups. As seen in overall and 30-day KM curves, inverse ratio resuscitation conveyed a survival benefit. A dose-dependent survival benefit was noted when controlling for inverse ratios at the 6-hr interval, OR (CI 95%): low 5.0 (1.4-17.3), high 2.3 (0.7-7.9); and at the 24-hr interval: low 5.6 (1.6-19.3), high 2.5 (0.7-8.8).

Conclusion: To our knowledge this is the first study that specifically looks at survival outcomes in DCL patients with severe hemorrhage using inverse FFP:PRBC ratios. Inverse ratio resuscitation showed improved overall and dose-dependent survival when compared to high and low ratio resuscitation.





Poster # 106

DO ALL TRAUMA PATIENTS BENEFIT FROM TRANEXAMIC ACID? THE EXPERIENCE OF AN URBAN LEVEL 1 TRAUMA CENTER

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Introduction: There is strong evidence that Tranexamic Acid (TXA) reduces mortality in hemorrhaging civilian and military trauma patients. However, there are wide variations in transport time, availability of fluids and blood products between battlefield and urban settings and between developed and developing countries. We test the hypothesis that TXA reduces mortality in patients requiring emergency operative intervention (OR) after trauma at a level 1 urban center.

Methods: From 7/09 to 1/13, 778 consecutive patients who required emergent OR after trauma were entered into a registry and retrospectively reviewed. 104 of the sickest patients received TXA, which was administered within 3 hrs (1 g bolus then 1 g over 8 hrs). These patients were matched to controls using propensity scores based on age, shock class, and revised trauma score. Statistical analysis was then performed with parametric or non-parametric tests, as appropriate.

Results: 208 total patients were analyzed. Median age was 37, 81% male, 62% penetrating, 77% laparotomy, 23% thoracotomy, 86% received PRBC transfusions, 15% TBI and 27% mortality. Age, ISS, mechanism and admission vital signs and lab values were similar between groups. Data were similar in the OR and at 24hr.

OR data median or mean	ISS	ER time min	IVF ml	EBL ml	pRBC ml	FFP ml	LOS days	mortality %
NoTxA(n=104)	29±17	26	3443	800	750	0	12	25
TxA (n=104)	27±16	23	4450	1500	2125	1250	12	28
p=	0.566	0.275	0.016	0.020	<0.001	<0.001	0.529	0.667

Conclusion: In trauma patients requiring emergency OR in an urban level 1 trauma center, TXA did not reduce mortality, bleeding, or transfusion requirements. Prospective studies are needed to identify subsets such as these who may not benefit from TXA.

Poster # 107

OXIDATIVE AND INFLAMMATORY RESPONSES IN TISSUES FROM PIGS SUBJECTED TO HEMORRHAGE AND AORTIC BALLOON OCCLUSION

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Introduction: Uncontrolled intracavitary bleeding remains a leading cause of potentially survivable deaths in both military and civilian trauma. Recent evidence and improved surgical techniques suggest that resuscitative endovascular balloon occlusion of the aorta (REBOA) may be a viable means to manage the hemorrhage and improve survival in these patients. The present study further characterized the responses to 30 or 90 min REBOA in a swine hemorrhage model.

Methods: Swine (n=6/gp) were subjected to ~ 24 ml/kg hemorrhage for 30 or 90 min of shock (no treatment) or with REBOA. Animals were then resuscitated with shed blood and additional fluids or vasopressors as needed to maintain MAP to 60 mmHg. After 48 hr, pigs were euthanized and lung, heart, kidney and brain were frozen and stored at -80^{o}C for analysis of indices of oxidative stress (thiobarbituric acid reactive substances (TBARS), antioxidant status (total antioxidants, glutathione (GSH), antioxidant enzymes) and cytokines (IL-1β, IL-6, IL-10).

Results: Hemorrhage reduced central aortic pressure (CAP) to < 40 mmHg and REBOA improved CAP in both groups and cerebral oxygenation in the 90 min group. No significant differences were observed between groups in any of the indices of oxidant stress, antioxidants or cytokines after 30 min shock/REBOA. In lung and kidney from the 90 min groups, TBARS were about 20% lower in REBOA than shock group and GSH levels were better preserved in the lung REBOA group. No significant differences were observed in xanthine oxidase, catalase, NADH or total antioxidants in any tissue from both 90 min groups. Of the cytokines, only IL-1β and IL-6 were significantly lower in the 90 min REBOA group than the 90 min shock group.

Conclusion: These data suggest that REBOA for 90 min followed by resuscitation did not appear to induce any persistent inflammatory responses after 48 hr in this swine hemorrhage model, indicating that the procedure is relatively safe. Additional studies are required to establish the safety limits of this procedure and determine whether it can improve outcomes in severely injured trauma patients.

Poster # 108

COLLOID AND A HIGH FFP/RBC RESUSCITATION DO NOT REDUCE POSTOPERATIVE FLUID NEEDS

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Introduction: Recent data (AAST 2012) suggest that the combination of colloid and a high FFP/RBC resuscitation will reduce postoperative fluid uptake. This was assessed by comparing a high (>0.35) versus a low (<0.35) FFP/RBC resuscitation in both arms of a prospective randomized study of albumin (A) versus no albumin (NA) resuscitation for shock requiring massive transfusion.

Methods: A retrospective review of a prospective randomized data base of 96 patients requiring an average of 13.8 RBC, 8.9 L balanced electrolyte solution (BES), 784 ml FFP during OR; 46 patients, by random selection, received 31 gm A. Admission BP (78 torr), pulse (130), and shock time with BP below 80 (32 min), were similar for A and NA. Measurements during the postop fluid uptake phase included serum albumin (SA), plasma volume (PV), BES infusion (L), inulin space (ECF), interstitial space (ECF-PV), and weight gain (kg).

Results: A was associated with a higher SA, IFS, and weight gain (Table). The higher FFP/RBC in A patients was associated with increased IFS and weight gain versus low FFP/RBC in NA patients (Table).

FFP/RBC (ml/u)	26 N/A 24		20 A 26	
	<0.35	>0.35	<0.35	>0.35
SA (gm/dL)	2.9*±0.01	2.9*±0.7	4.2±0.17	4.4±0.2
PV (ml)	1581±238	1496±266	1504±393	1554±111
BES (ml)	8954±567	8364±1422	10350±1493	9264±140
IFS (ml)	11979**±1306	12304±1583	13014±189	13379±101
Wt Gain (kg)	6.5**±0.7	7.0±0.4	7.8±1.3	8.0±1.1

*P<0.05 vs A groups; **P<0.05 vs >0.35/A group

Conclusion: The combination of A plus a high FFP/RBC resuscitation does not prevent post-shock fluid uptake which is a function of the severity of the shock insult. These findings confirm prior work that all colloid enters the IFS increasing IFS expansion and delaying IFS mobilization.

Poster # 109

NOT AS GOOD AS WE THINK WE ARE: TRAUMA ATTENDING GESTALT IS AN UNRELIABLE PREDICTOR OF MASSIVE TRANSFUSION

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Introduction: Early identification and treatment of trauma patients requiring massive transfusion (MT) is associated with reduced mortality. While numerous risk factors have been demonstrated and many predictive scores proposed, there are no universally accepted systems or algorithms to identify these patients. We hypothesized that even among experienced trauma surgeons, the clinical gestalt of identifying patients who will require MT is unreliable.

Methods: The PRospective Observational Multi-center Major Trauma Transfusion (PROMMTT) study was a prospective cohort study evaluating acute resuscitation patterns at ten US level-1 trauma centers from July 2009–October 2010. MT was defined as $\geq$ 10 units within 24 hours of admission. Clinical gestalt assessments were performed during the acute resuscitation. The primary question ("Is this patient likely to receive a MT?") was asked at ten minutes after arrival. Patients were included in the current analysis if a response to this gestalt question was recorded.

Results: Of 1245 patients, 966 met inclusion criteria and 221 (23%) received MT. 415 (43%) were predicted by faculty physicians to receive a MT. Those predicted by gestalt to receive MT were younger, more likely injured from penetrating mechanism, had higher heart rates, and lower systolic blood pressure (all $p < 0.05$). Those predicted to receive MT also had higher ($p<0.001$) 24-hour (17% vs. 6%) and in-hospital mortality (28% vs. 16%). The sensitivity for clinical gestalt was 65% and specificity was 64%. Positive and negative predictive values were 35% and 86%, respectively, with an AUROC of 0.64. There were no significant differences in AUROC between centers ($p=0.711$).

Conclusion: Data from this large, multicenter trial demonstrates that employing clinical gestalt to predict MT is unreliable. Because of the increased mortality associated with delayed therapy, more reliable systems or algorithms are needed to definitively identify and treat these severely injured patients early.

Poster # 110

GENE EXPRESSION OF SELECTED MEMBERS OF THE TOLL-LIKE RECEPTOR (TLR) PATHWAYS AND SUPPRESSOR OF CYTOKINE SIGNALING 3 (SOCS3) CORRELATE WITH MICRORNAs 146a AND 155 IN TRAUMA PATIENTS WITH HEMORRHAGIC SHOCK

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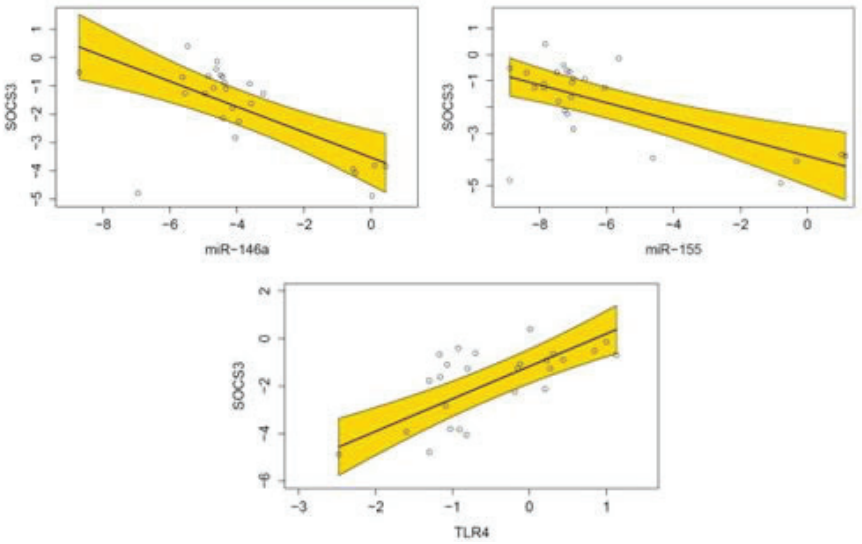
Introduction: Toll-like receptors (TLRs) recognize specific molecular patterns associated with endogenous molecules released from stressed or damaged cells. TLR signaling also requires stringent regulation by suppressor of cytokine signaling 3 (SOCS3) and microRNAs (miRNA) to avoid major detrimental effects to the host. We hypothesized that expression of selected genes and regulators in both the TLR3 and TLR4 pathways following injury and hemorrhagic shock would correlate with clinical parameters.

Methods: Twelve trauma patients in hemorrhagic shock were prospectively enrolled in this IRB-approved study. Peripheral whole blood samples were collected at 0, 12, 24, and 48 hours. Age, ISS, GCS and serial vital signs, pH, BD, crystalloid, blood products, and injury patterns were recorded. Gene expression of SOCS3, STAT3, TLR3, TLR4, MyD88, TRAF6, TICAM1, TRAM1 were measured using custom PCR arrays. miRNA expression was measured by qRT-PCR. Statistical analysis was performed for each possible pair of markers (gene, miRNA, and clinical parameters) using linear mixed models.

Results: Sixteen statistically significant correlations between genes and miRNAs were found changing over time in all patients. SOCS3 gene expression levels correlated directly with TLR4 ($p<0.001$), and indirectly with miRNAs 146a ($p<0.001$) and 155 ($p<0.001$). There were no statistically significant correlations between gene expression levels and any of the clinical parameters. All patients survived to discharge.



Conclusions: The direct correlations between gene expression levels of SOCS3 and TLR4, the indirect correlations between miRNAS 146a and 155 and SOCS3, as well as the correlations between selected members of the TLR pathways are unique findings in trauma patients with hemorrhagic shock. These findings may suggest regulation by miRNAS 146a and 155. Additional studies are needed to elucidate the role of miRNA expression and their potential association with outcome following severe injury.

Poster # 111

MASSIVE TRANSFUSION TRIGGERS AS END POINTS OF RESUSCITATION IN THE MODERN ERA: LEARNING WHEN TO TURN THE MASSIVE TRANSFUSION PROTOCOL OFF

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Introduction: Although progress has been made in ability to identify those most likely to receive a massive transfusion [MT], little work has been done to identify patients who require continued resuscitation at later time points. Prior work has validated individual massive transfusion [MT] triggers obtainable at the time of presentation for prediction of likelihood of MT resulting in a recently proposed MT score [MTS]. We hypothesized that our MTS score would be superior in both prediction of the need for total resuscitation and the need for continued resuscitation at 6 & 12 hours.
Methods: We prospectively enrolled all patients in whom the massive transfusion protocol (MTP) was initiated. Hemodynamic, laboratory, and intervention parameters were determined at defined intervals up to 96 hrs. For each patient, the need for on-going transfusion during a given time interval was defined based upon either an inappropriately low response to transfusion or a hemoglobin decrease of > 1gm/dL if no transfusion was received. Timing and cause of death were utilized to account for survivor bias by grouping early hemorrhagic deaths as needing MT if they died prior to receiving >=10 units of PRBCs within 6 hours or 24 hours, respectfully. Multivariate logistic regression controlling for interaction between variables was utilized to determine independent predictors of outcomes and Receiver Operator Curves were calculated.
Results: A cohort of 228 consecutive MTP activations including 190 trauma and 38 medical/OB patients. 28 day mortality was 37%. Calculated from triggers at initial presentation, a Revised MTS (SBP<90mmHg, BD>=-6, Temp<35.5 C, INR>1.5, Hgb <11g/dL) was superior to the original MTS (including HR>=120bpm, FAST status, mechanism) or the ABC score for determination of MT in trauma patients (TABLE). For those still alive at hour 6 (n=188, 82%), the Revised MTS was highly predictive for future PRBC need (AUC 0.87) in hour 7 to 12 and hours 12 to 24. At hour 6, the model was highly predictive of subsequent 24 hr (AUC 0.97) and 28 day mortality (AUC 0.82). If patients remained with a base deficit >=-6 at hour 6, the RR of death by 24 hours was 7.9 (2.7-23, p=0.0002).
Conclusion: A Revised MTS calculated at time zero is a valid predictor of need for MT. Early end points of resuscitation adopted from the components of the Revised MTS are highly predictive of on-going transfusion needs following hour 6. Failure to normalize these trigger components by hour 6 in the era of 1:1 resuscitation portend a particularly poor prognosis.

Strategy	MT within 6 hrs (AUC)	MT within 24 hrs (AUC)	Independent Predictors of blood product needs at hr 7-12	Adjusted		
				OR	95% CI	p-value
Revised MTS	0.69	0.74	**INR** (for each increase of 0.5 units)	1.5	0.4-5.3	0.50
			SBP (for each 10 mm Hg decrease)	**1.4**	**1.1-1.8**	**0.008**
Original MTS	0.68	0.67	**Hgb** (for each 1g/dL decrease)	**1.8**	**1.3-2.5**	**<0.001**
			Base Deficit (for each 2 unit increase)	**1.3**	**1.0-1.6**	**0.04**
ABC Score	0.58	0.51	**Temperature** (for each 0.5 C decrease)	1.2	1.0-1.6	0.13

Poster # 112

LEAVE NO ONE BEHIND: ANALYSIS OF SEVERELY INJURED PATIENTS WHO RECEIVED DEFINITIVE CARE IN LEVEL 3 AND 4 TRAUMA CENTERS

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Introduction: There has been significant focus on the fate of the patient transferred from a lower level trauma center (LLTC - level 3 or 4) to a higher level of care. However, we know little about severely injured patients who are not transferred. To better understand this population and to inform the development of evidence-based inter-facility transfer criteria, we set out to explore the profile and outcome of this population.

Methods: Retrospective cohort study of adult severely injured (ISS>15) patients cared for in LLTC participating in NTDB (2010-11). Demographic and injury profiles were compared between patients who were transferred to Level 1 or 2 centers and those who received definitive care at LLTC.

Results: We identified 8,356 patients across 151 Level 3 and 305 patients across 40 Level 4 TCs. 8,239 severely injured patients received definitive care at LLTC, with few admissions per center (median 18, IQR 4-59). Elderly patients with falls represented over a third of patients cared for at LLTC (Table). Mortality was 9%, with marked variability across institutions.

	Transferred to Level 1/2	**Level 3 (n=151)**	**Level 4 (n=40)**
N (median, IQR)	N/A	26 (6 - 70)	1 (2 - 5)
Age ≥ 65	38%	40%	43%
MVC	38%	41%	36%
Fall	48%	47%	53%
GSW/stab	4%	4%	3%
Other	10%	8%	8%
ISS (median, IQR)	20 (17 – 25)	18 (17 - 25)	17 (16 - 21)
Head AIS ≥ 3	68%	61%	59%
Chest AIS ≥ 3	29%	34%	34%
Abdomen AIS ≥ 3	8%	7%	6%
Lower extremity AIS ≥ 3	11%	10%	11%
Mortality	10%	9%	9%
Time to death (days/median, IQR)	3 (1 – 7)	2.5 (1 - 7)	1 (1 - 3)

Conclusions: LLTC provide definitive care for a significant number of severely injured patients with a unique case-mix. Deaths occur with considerable frequency. These data suggest a potential opportunity to better identify who requires transfer to higher levels of care to reduce potentially preventable deaths.

Poster # 113

THE AGING OF AMERICA: A COMPREHENSIVE LOOK AT OVER 25,000 GERIATRIC TRAUMA ADMISSIONS TO U.S. HOSPITALS

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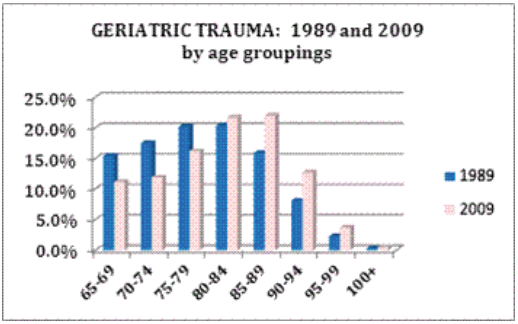
Introduction: A comprehensive report on geriatric trauma by trauma center (TC) status, based on 1989 Medicare data, was last published in 2001. The purpose of this study was to compare 1989 findings with 2009, and to examine recent differences in patient characteristics and outcomes by TC status.

Methods: From 2009 Healthcare Cost and Utilization Project Nationwide Inpatient Sample (HCUP NIS) data, we examined a geographically representative sample (N=25,512) of injured older adults (>/= age 65) admitted to 127 hospitals (Level I [9 hospitals, n=4126], Level II [16, n=6572], Level III/IV [29, n=3849], non-TCs [73, n=10,965]) in 24 states. We examined differences: 1) in age, gender, and mortality between 1989 and 2009; and 2) in 10 patient characteristics and 4 outcomes by TC status.

Results: Higher percentages of patients were in older age groups in 2009 than in 1989, however, mortality declined overall (4.8% vs. 3.4%, $p < .001$), and for all age groups ($p < .001$). Consistent incremental patterns of differences were observed among TC levels ($p < .001$) for all patient characteristics and outcomes. Level I TCs admitted highest percentages of: lower age groups, males, non-white race, motor-vehicle related trauma, intracranial injuries, internal injuries, patients with more than a single injury and highest APR-DRGs. Non-TCs admitted 43% of the sample, and highest percentages of oldest age groups, comorbidities, falls, femur neck fractures, and patients requiring a major OR procedure. Although Level I TCs had higher lengths of stay and total charges, a higher percentage of patients were discharged home as compared to other TC levels and non-TCs.



Conclusion: Despite a growing number of patients in oldest age groups (> 80 years), inpatient mortality declined over 2 decades. Level I TCs are managing patients at highest risk for decompensation and mortality; however, a significant percentage of patients are going to non-TCs. These findings urge the trauma community to organize all-inclusive systems with appropriate resources to support the growing older population.

Poster # 114

EMERGENCY DEPARTMENT TRAUMA SURGERY IMPROVES OUTCOME OF PATIENTS WITH TORSO INJURY AND UNSTABLE VITAL SIGNS

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Introduction: Although patients with severe torso injury should receive surgical intervention in a fully equipped operation room (OR), almost all hospitals in Japan are required to transport patients to the OR via a long corridor. This factor can result in delays in hemorrhage control and potentially increase excess mortality. Therefore, our center has implemented a policy for urgent surgery in the emergency department (ED) when patients with severe torso trauma present with unstable vital sign (UVS).

Methods: This is a retrospective study of patients in which urgent surgical intervention was carried out between January 2007 and December 2012. Patients with cardiac arrest on ED admission were excluded. Demographics, Revised Trauma Score (RTS), Injury Severity Score (ISS), and probability of survival (Ps) were assessed. Surgical intervention was defined as thoracotomy, celiotomy, or retroperitoneal packing, and UVS was defined as RTS <7.84.

Results: Of 194 cases for which urgent surgical intervention for torso trauma was performed, 129 cases had UVS on ED admission. These cases were divided into two groups on the basis of undergoing surgery in the ED (ED group, n=59) or the OR (OR group, n=70). Seventeen cases involved penetration wounds, 76% of patients underwent celiotomy, and 10% received retroperitoneal packing for severe pelvic fracture. Resuscitative thoracotomy was carried out in 37 cases, and damage control surgery was conducted in 40 cases. RTS in the ED group (4.5 ± 2.0) was significantly lower than in the OR group (6.5 ± 1.2) ($p<0.0001$), and ISS was 37.0 ± 15.8 in the ED group vs. 25.1 ± 13.6 in OR group ($p<0.0001$). Nine cases in the ED group (15.3%) had unexpected survival despite Ps score of <0.5.

Conclusion: The present findings suggest that emergency department trauma surgery (EDTS), which can be carried out in less than 10 min, for patients with severe torso trauma, UVS, and ISS >25, might be effective. Although in recent years hospitals have adopted a hybrid ED space with a fully prepared OR, or a trauma resuscitation protocol in the OR that bypasses the ED, hospitals should still consider special layout and facility design. In contrast, the EDTS strategy at our hospital is not dependent on these limitations.

Poster # 115

PREHOSPITAL ABC SCORE ACCURATELY TRIAGES PATEINTS WHO WILL REQUIRE IMMEDIATE RESOURCE UTILIZATION

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Introduction: The Assessment of Blood Consumption (ABC) score has been utilized to identify patients at risk for massive transfusion (MT) immediately after hospital arrival. We recently added FAST capability to our helicopters, allowing for the calculation of a prehospital ABC (pABC) score on all flights. The purpose of this study was to determine if pABC could identify patients that would receive MT or undergo emergent laparotomy.

Methods: Prospective observational study of all trauma patients arriving to our level 1 trauma center by our helicopter and who underwent in-flight FAST exam over a six month period. pABC score was (+) if two or more of the following were present in flight: penetrating trauma, HR >120, SBP <90, or (+) FAST exam. Emergent laparotomy: directly from ED to OR within 2 hours. MT: ≥6 units of RBC in first 6 hours.

Results: 291 trauma patients were reviewed. 28 (9.6%) patients underwent emergent laparotomy and 16 (5.5%) patients received MT. pABC predicted emergent laparotomy with a PPV 43% and NPV of 93% (Sens. 36%, Spec. 95%, AUROC 0.78). pABC predicted receipt of MT with a PPV 35% and NPV of 97% (Sens. 42%, Spec. 94%, AUROC 0.82). Use of pABC of ≥2 to activate the operating room would result in a 57% over-triage and 7% under-triage. Likewise, pABC of ≥2 would result in over-triage of MT protocol activation of 65% with an under-triage of 3%.

Conclusion: Prehospital ABC is an effective early tool for predicting immediate resource utilization of patients after trauma center arrival. Its use in the prehospital setting provides an acceptable over-triage rate and outstanding under-triage rate. In light of these findings, our MT protocol is now activated by pABC ≥2 and we are currently developing a process to mobilize operating room staff and resources based on pABC.

Poster # 116

OUTCOMES AND POTENTIAL IMPACT OF A NEW NETWORK OF TRAUMA CENTERS

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Introduction: Population growth outside of urban areas may leave gaps in the provision of trauma care. We studied the effect of adding new trauma centers in a State with the 3rd fastest growth rate in the US. One existing trauma center and four provisional level 2 trauma centers (TC) were combined to create a large scale trauma network (TN). The new trauma centers were placed in those areas with the lowest ratios of TC to residents based on State data. The aims of this study were to determine the impact of the TN to the trauma patients as well as the overall outcomes of the TN compared to other TC.

Methods: The State Agency for Health Care Administration (AHCA) database from 2005 to 2012 Q1-Q2 was used to compare mortality, length of stay (LOS), and complication rates. To measure the potential effect of the TN on injured patients admitted to hospitals the frequencies of outcomes were measured before and after the initiation of the TN. The TN was then compared to the rest of the TC's in the State. Multivariate logistic regression was used to match and adjust for age, injury status (penetrating versus non-penetrating), gender, race, and injury severity (ICISS). Adult trauma patients were defined as >=16 years with ICD9 800-959.9 excluding: 840-848.9, 905-909.9, 910-924.9, 930-939.9, 820-821.9 who are >64 years.

Results: State trauma volumes demonstrated a consistent and steady growth over the past 5 years from 59,927 patients in 2007 to 67,241 patients in 2012 with greater than 60% of cases discharged from non-trauma centers in all years. After the introduction of the TN, mortality for adult trauma patients who were admitted to any State hospital, (the trauma population as a whole) decreased, aOR 0.84 (95% CI 0.82, 0.87). The TN was also compared to all other TC's. There was no significant difference in mortality between the groups (p-value 0.37). LOS was significantly less (p-value 0.0001) in the TN, and the TN had significantly lower complication rates (24.6% vs. 26.1%, p-value 0.02).

Conclusion: This analysis shows that there was a decrease in inpatient trauma mortality which was temporally associated with the advent of the TN. The TN performed equally to other TC's in terms of mortality but had significantly lower complication rates and lower LOS. The positive impact of the TN is likely due to improved access in areas of very low TC to resident ratio and by capturing trauma patients previously treated in non-trauma centers.

Poster # 117

TQIP RATING USING IN-HOSPITAL VS. 30-DAY MORTALITY

Justin Sobrino MD, Baylor Institute for Health Care Research and Improvement

Introduction:The Centers for Medicare and Medicaid Services, the National Surgical Quality Improvement Program (NSQIP), and other benchmarking programs use 30-day mortality to report quality of care. In contrast, the Trauma Quality Improvement Program (TQIP) uses in-hospital deaths only, and may miss post-discharge deaths occurring within 30 days. We hypothesized that TQIP ratings of trauma center quality would significantly change if 30-day mortality were used.

Methods:Patients treated at an urban level I trauma center (2006-08) were linked with the National Death Index (NDI), a database of death certificates maintained by the Centers for Disease Control and Prevention, to determine their outcome after discharge. All adult patients (age ≥ 16 years) were included in the study. Exclusion criteria were consistent with TQIP and included the following: those reported dead on arrival, gunshot wounds to the head, time from injury to ED arrival ≥ 1 day, and primary injury mechanisms of burns, poisoning, drowning, hanging, submersion or asphyxiation. These criteria identified 3,409 patients who were tracked in the NDI to identify patients who died after discharge. Center's Observed to Expected mortality ratio (O-E) was calculated using in-hospital vs. 30-day mortality.

Results:A total of 199 patients died before discharge. An additional six patients died after discharge but within 30-days. O-E ratio using in-hospital deaths only showed higher than expected mortality indicating a worse than expected performance at this trauma center (O-E ratio 1.11, 95% 1.01 to 1.34). Addition of deaths up to 30 days captured a few more deaths worsening the O-E ratio (O-E ratio 1.22, 95% CI 1.12 to 1.46). However, the difference between the two ratios was statistically not significant.

Conclusion:TQIP rating of trauma center quality would not change significantly if 30-day mortality were used. Hence, trauma centers should not be required to report 30-day mortality.

Poster # 118

DEFINING THE OPTIMAL TIME TO THE OPERATING ROOM MAY SALVAGE EARLY TRAUMA DEATHS

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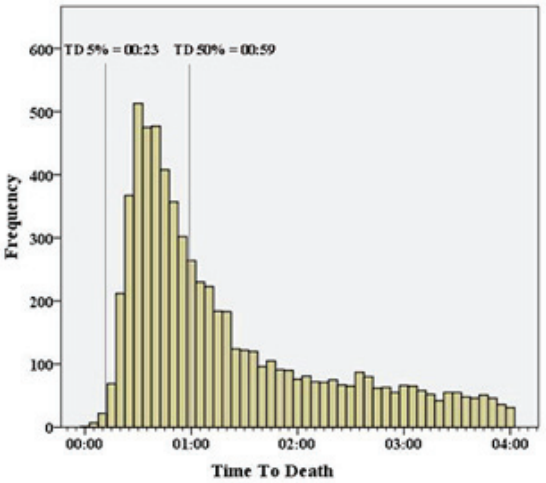
Introduction: Early deaths upon arrival to trauma centers have the potential for salvage if surgery is immediately available. The optimal time from injury to the operating room (OR) is not known. We studied the time from injury to death for this subset of patients to quantify the time to the OR that gives the potential to save the greatest number of these patients.

Methods: The Pennsylvania Trauma Outcomes Study (PTOS) is a comprehensive trauma registry including all Pennsylvania trauma centers. PTOS was queried for all adult trauma patients between 1999 and 2010. Our patient population included all patients with time of injury and death data who died within four hours of injury. The distribution of Time to Death (TD) was examined for the overall group and for subgroups of penetrating versus blunt injury, the presence of hypotension (defined as SBP≤90), death in Emergency Department (ED), and operative groups. The times representing the 5th percentile and the 50th percentile of TD (TD5 and TD50, respectively) were calculated from the distributions. The median times (TD50s) were compared using the Mann-Whitney U Test. We assigned TD5 as a benchmark that identifies the time when 95% of patients are still alive with the potential to be saved by operative intervention.



Results: The PTOS database contained 412,768 patients for the 11 year time interval and 27,479 (6.7%) that died. Death within four hours of injury was our final analysis group of 6,547 (1.6%). The overall population TD5 and TD50 was 0:23(H:MM) and 0:59, respectively. Median penetrating injury times were significantly shorter than blunt injury times (TD5/TD50 = 0:29/1:10 versus 0:19/0:43). Median time was significantly shorter in the overall group for hypotensive versus normotensive patients (TD5/50 = 0:22/0:52 versus 0:43/2:18). TD5/50 for patients who died in the ED was 0:22/0:47. The group of patients reaching the OR had TD5/50 = 0:59/2:22. Operative subgroups had different TD5/TD50: abdominal surgery (n=607) = 1:09/2:26, thoracic surgery (n=756) = 0:47/2:00, and cranial surgery (n=18) = 2:45/3:14.

Conclusion: This study describes a novel approach to quantify benchmark times from injury to the OR that yield the greatest opportunity for survival for early in-hospital trauma deaths. We found significant differences in these times suggesting different time standards be applied based on patient mechanism and physiology. This information should be used to develop optimal time standards to operative intervention in trauma patients.

Poster # 119

AN ANALYSIS OF PRE-HOSPITAL DEATHS: WHO CAN WE SAVE?

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Introduction: Since their inception in the late 1970s, trauma networks have saved thousands of lives in the pre-hospital setting. However, little recent work has been done to evaluate the patients who die in the field prior to transport. Understanding the epidemiology of these deaths is crucial for trauma system performance evaluation and improvement. We hypothesized that specific patterns of injury could be identified and targeted for intervention.

Methods: Medical Examiner reports in a large, urban county were reviewed including all trauma deaths during 2011 that were not transported to a hospital (ie. died at the scene). Age, sex, date of death, mechanism, and list of injuries were recorded. An expert panel reviewed each case to determine primary cause of death, and if the patient's death was potentially preventable, or unpreventable.

Results: A total of 455 patients were included. Patients were 81% males, died mostly from penetrating (46%) and blunt (38%) causes, and included 23% documented suicide. The leading cause of death was neurotrauma (36%), followed by hemorrhage (30%), asphyxia (18%), and combined neuro/hemorrhage (17%). The anatomic regions most frequently injured were neck (61%), chest (51%), and extremities (34%), followed by abdomen (33%). 22% of patient deaths were classified as potentially survivable given current treatment options.

Table. Cause of death and anatomic region injured for all potentially salvageable patients

	Potentially Salvageable Patients (n=100)
Cause of Death	
Hemorrhage	46 (46%)
Neurotrauma	34 (34%)
Hemorrhage + Neurotrauma	13 (13%)
Asphyxia	6 (6%)
Asphyxia + neurotrauma	1 (1%)
Anatomic Region Injured	
Neck	61 (61%)
Chest	58 (58%)
Brain	52 (52%)
Extremities	43 (43%)
Abdomen	36 (36%)
Pelvis	20 (20%)

Conclusion: More than 1 of every 5 trauma deaths in our study area is potentially survivable. In this group, neck injuries and death via hemorrhage were predominant and suggest targets for future pre-hospital interventions. Future research and implementation of pre-hospital interventions should specifically target this subgroup. In addition, efforts targeting suicide prevention are still of great importance.

Poster # 120

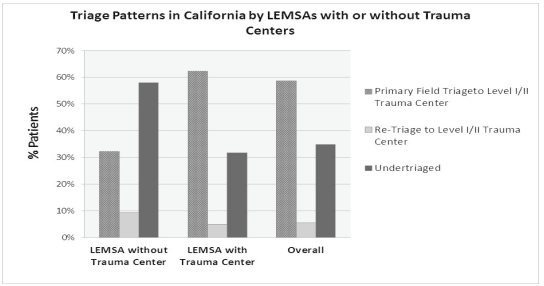
VARIABILITY IN TRIAGE PATTERNS: A POPULATION-BASED LONGITUDINAL STUDY OF SEVERELY-INJURED PATIENTS FROM 2005-2009

Kristan L. Staudenmayer* MD, MS, Feng Lin MS, Robert Mackersie* MD, David Spain* MD, Renee Hsia MD, MSc. Stanford University

Introduction Severely-injured trauma patients have improved mortality when triaged to Level I or II trauma centers. Appropriate triage requires proper identification and routing of patients from the field, as well as re-triage from non-trauma hospitals. We sought to determine variability in triage patterns by creating a longitudinal database of all injured patients for a geographic region. We hypothesized that there would be variability in triage patterns and associated mortality.

Methods Data for all hospital discharges and Emergency Department (ED) visits in the State of California were obtained from the California's Office of Statewide Health Planning and Development Database (OSHPD) from January 1, 2005, through December 31, 2009. Hospital and ED visits associated with injury were identified and linked to create a longitudinal database. Vital statistics data were used to determine long-term mortality. We included all hospitalized patients ≥18 years and excluded patients who died in the ED. Major trauma was defined as having an injury severity score (ISS) > 15. Primary triage was defined as field triage to a Level I/II trauma center, whereas re-triage was defined as field triage to a non-Level I/II center followed by transfer to a Level I/II. Primary outcomes were triage patterns and mortality. Data were analyzed for the entire state and by region (organized into 32 "Local Emergency Medical Services Agencies" or LEMSAs). Univariate and multivariate analyses were performed.

Results: A total of 550,683 adults were admitted during the study period—60,182 (11%) had sustained major trauma. The under-triage rate was 35% (N=20,988) and varied by LEMSA (12% to 87%). Rates of re-triage were low (overall 6%) and varied by LEMSA (1% to 38%). Primary field triage ranged from 7% to 77%. In adjusted analysis, several factors were significantly associated with lower odds of primary triage: age≥55 (OR 0.78, p=0.001), female gender (OR 0.88, p=0.014), greater number of comorbidities (OR 0.92, p=0.000), and fall mechanism vs. motor vehicle collision (OR 0.54, p=0.000). Unadjusted one-year mortality was 25% for under-triage vs. 16% and 18% for primary and re-triage, respectively (p=0.000).



Conclusion: This is the first study to longitudinally link all hospital and ED visits for injury for the most populous state in the United States. Over this 5-year time period, we found highly variable rates of primary and re-triage which were associated with disparities in age and gender. There is opportunity to increase triage to trauma centers by improving re-triage policies and by addressing existing disparities.

Poster # 121

FIREARM-RELATED INJURIES IN PATIENTS ≤18 YEARS OF AGE: U.S. NATIONAL ESTIMATES AND CHARACTERISTICS FROM 2007-2009

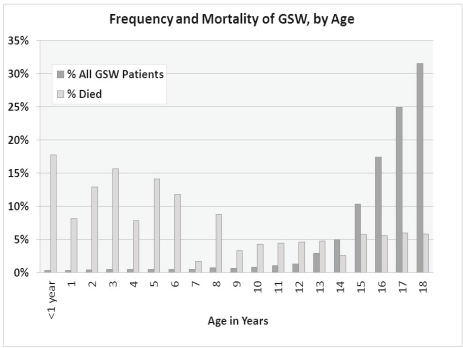
Kristan L. Staudenmayer* MD, MS, Thomas Weister MD,MPH, Paul Maggio* MBA,MD, Lakshika Tennakoon MD, David Spain* MD, Stanford University

Introduction: The characteristics of gunshot wound (GSW) violence in the U.S. pediatric population has not been well described. We sought to determine the incidence and associated patterns of firearm-related injuries for patients presenting to U.S. Emergency Departments (EDs) over a 3-year time period.

Methods: Data from the Healthcare Cost and Utilization Project's Nationwide Emergency Department Sample (NEDS) from years 2007 to 2009 were used. NEDS is a nationally representative sample of all ED visits in the United States. GSWs were determined by matching E-codes to injury and intent using the matrix of E-code groupings for injuries from the Centers for Disease Control. Patients were included if they had sustained a GSW and were ≤18 years of age. Population-based estimates were derived using weights provided by NEDS. All data presented represent weighted numbers.

Results: The number of pediatric GSWs over the 3 year time period was 36,749, representing 18% of all GSWs. Pediatric GSW patients were predominantly male (88%), more often victims of assault vs. unintentional violence (53% vs. 36%), more often in the lowest quartile for income (53%), and were more often located in central metropolitan locations (47%). GSWs increased exponentially with age. (Figure) Overall mortality for the population was 6%, but was higher for children<7 (from 8-16%). There were regional differences noted with the highest rates of GSW violence in the South and lowest in the Northeast (41% vs. 13% of all GSW). However, the South had the lowest rates of assault as the manner of intent, while the Northeast had the highest (47% vs. 62%).

Conclusion: GSW in pediatric patients comprised almost 20% of all firearm injuries treated in EDs in the USA from 2007-2009. Pediatric GSW violence is mostly a disease of poor, urban, teenage boys; however, there is variability. Younger ages were more often associated with unintentional violence, female gender, and higher mortality rates, while regional differences in manner of intent were present. This suggests different prevention and treatment priorities, such as a focus on inner-city GSW violence in the Northeast and on gun safety efforts in the South.



AAST HISTORICAL TIMELINE

AAST Historical Timeline

June 14, 1938	AAST formed as American Association for Traumatic Surgery
May 8, 1939	First Annual Meeting of the Association
1940	Name changed to the American Association for the Surgery of Trauma
1948	Kellogg Speed, MD, AAST's 1st President, presented the Association with a gavel that is a replica of Cotton's hammer.
1959	Proposal to start the *Journal of Trauma* brought to the Board of Managers
	Charles Johnston appointed first editor of the *Journal of Trauma*, but passes away prior to first issue in 1961.
1961	First issue of the *Journal of Trauma* with Dr. Rudolph Noer as Editor
1967	AAST votes to form the American Trauma Society with Dr. Noer to serve on the Board of Directors and AAST to serve as incorporators.
	Dr. William T. Fitts Jr., becomes Editor, *Journal of Trauma* (officially takes over in 1968)
1968	American Trauma Society Incorporated
1969	*Journal of Trauma* becomes monthly instead of six times a year.
1971	The Editor of the *Journal of Trauma* is made a Board of Managers Position
1972	AAST gives $1,000 to the American Trauma Society as they are not a fully functioning organization.
1974	The creation of the Dr. William T. Fitts Lecturer
1975	The first Fitts Orator was given by Dr. Curtiz Artz
	John Davis, MD, becomes Editor, *Journal of Trauma*

1978	AAST holds an International Symposium on Trauma in Washington, DC in May.
	Senior Members are relieved of paying dues
	AAST applies for 501-C-3 tax exempt status
1981	*Journal of Trauma* published in Japanese
1983	AAST archives all AAST materials with the National Academy of Medicine
1984	AAST officers assist in the formation of the Pan American Trauma Society
1985	First Trauma Scholarship offered and sponsored by GM. Scholarship awarded in 1986
	Davis and Geck sponsor a five year $35,000/year scholarship with AAST.
1987	AAST holds a joint meeting with the Trauma Association of Canada
	Winthrop Pharmaceuticals co-sponsor a scholarship with AAST
1989	AAST forms a committee to research an AAST Foundation or Endowment
	A military gavel was presented to AAST from Basil A. Pruitt, Jr., M.D. for its 50th Anniversary
	50th Anniversary Medals were given out to all attendees at the 1989 meeting. The medals were created by the Franklin Mint.
	$400,000 was appropriated for an endowment to "provide support for trauma education and trauma research"
1991	AAST creates the Critical Care Committee
	The Canizaro Award is created for the best paper from a new member at the Annual Meeting

	AAST members vote for professional meeting management of future meetings
1992	AAST strategic retreat is held
	AAST hires professional meeting management starting with the 1994 meeting.
1993	AAST develops student scholarships to the AAST Annual Meeting
	AAST Research and Education Foundation developed
	Basil A. Pruitt, Jr., M.D., selected as the Editor, *Journal of Trauma* beginning January 1995.
	Joint meeting with the Orthopedic Trauma Society is held
1994	AAST Research and Education Foundation has a Board of Trustees, and receives $600,000 from AAST.
	Trauma Fellowship for students developed
	The John H. Davis Fellowship is developed
1999	Wyeth-Ayerst co-sponsors AAST scholarship
2000	Critical Care Committee Chair is made a Board of Managers position
2005	AAST membership votes to hire an Executive Director
	AAST rents space from the American College of Surgeons for two staff members
	Novo Nordisk sponsors a two-year scholarship
	Ethicon/Johnson & Johnson sponsors a five year scholarship
2006	KCI sponsors a three year scholarship
	AAST/ACS/NIGMS sponsor a K08/K23 scholarship
2007	AAST Strategic Retreat is held in Arizona
	AAST's meeting attendance tops 850

2008	First Acute Care Surgery fellowship training site approved
	AAST holds "Acute Care Congress on the Future of Emergency Surgical Care in the United States"
2010	*Journal of Trauma* celebrates its 50th Anniversary
	Meeting attendance tops 1,000
	Ernest E. Moore, M.D. selected as the Editor, *Journal of Trauma,* beginning January 2012
2011	AAST Annual Meeting name is changed to: Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery
	International Relations Committee is made a standing committee
2012	Ernest E. Moore, M.D. becomes Editor of the *Journal of Trauma*
	Journal of Trauma name is changed to: *Journal of Trauma and Acute Care Surgery*
	Acute Care Surgery Research Ad Hoc Committee created
2013	AAST Celebrates 75th Anniversary June 14, 2013

AAST
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ACTIVE AND INACTIVE FELLOWS
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Highland Park
Gould, Steven
Sperling, Richard L.

Joliet
Marshall, Wendy J.

LaGrange Park
Letarte, Peter B.

Maywood
Esposito, Thomas J.
Gamelli, Richard
Luchette, Frederick A.
Santaniello, John

Naperville
Folk, Frank

North Chicago
Acosta, José

Oak Lawn
Doherty, James

Park Ridge
Saletta, John D.

Springfield
Sutyak, John P.
Wohltmann, Chistopher D.
Zook, Elvin G.

Willowbrook
Silver, Geoffrey

Winnetka
Strauch, Gerald O.

City Not Listed
Fry, Donald E.
Wagner, Franklin C.

INDIANA

Fort Wayne
Iskander, Gaby
Reed, Jr., Donald N.

Indianapolis
Anglen, Jeffrey O.
Broadie, Thomas A.
Falimirski, Mark
Feliciano, David V.
Gomez, Gerardo A.
Jacobson, Lewis
Nelson, Paul
Pierce, Jr., Raymond O.
Reed, R. Lawrence
Rozycki, Grace S.
Streib, Erik

South Bend
Thomas, Scott

City Not Listed
Yaw, Peter B.
Fryer, Minot Packer

IOWA

Iowa City
Choi, Kent C.
Kealey, Gerald P.
Latenser, Barbara A.
Nepola, James V.
Skeete, Dionne
Thomsen, Timothy A.

City Not Listed
Krigsten, William M.

KANSAS

Kansas City
Moncure, Michael

Topeka
Baker, Phillip L.

Wichita
Haan, James M.
Harrison, Paul B.

KENTUCKY

Lexington
Bernard, Andrew C.
Boulanger, Bernard
Kearney, Paul A.

Louisville
Cheadle, William G.
Fallat, Mary E.
Franklin, Glen A.
Garrison, Richard N.
Harbrecht, Brian
Kleinert, Harold E.
Polk, Jr., Hiram C.
Richardson, J. David
Rodriguez, Jorge L.
Seligson, David
Smith, Jason

City Not Listed
Miller, Frank B.

LOUISIANA

Baton Rouge
Chapman, Michael W.
Jacome, Tomas
Lee, W. Chapman

Monroe
Johnson, Lester W.

New Orleans
Hunt, John P.
Marr, Alan
McSwain, Jr., Norman
Wright, Mary Johanna

Shreveport
Simpkins, Cuthbert O.

MAINE

Portland
Ciraulo, David Leonard
Cushing, Brad M.
Eddy, Virginia A.
Grindlinger, Gene A.
Sihler, Kristen
Winchell, Robert

MARYLAND

Annapolis
Champion, Howard R.
Ducker, Thomas
Eichelberger, Martin R.

Baltimore
Chiu, William
Cooper, Carnell
Diaz, Jose
Efron, David T.
Fang, Raymond
Gens, David R.
Genuit, Thomas
Haider, Adil
Haller, J. Alex
Haut, Elliott
Henry, Sharon
Lilly, Michael P.
Lipsett, Pamela A.
Lissauer, Matthew
Manson, Paul N.
McQuay, Jr., Nathaniel
Menaker, Jay
Militello, Philip R.
Scalea, Thomas M.
Stein, Deborah M.

Bethesda
Bowyer, Mark W.
Dunne, James R.
Rice, Charles L.
Rich, Norman M.
Seyfer, Alan E.
Westerband, Dany

Cheverly
Ryb, Gabriel E.

Crofton
Myers, Roy A.M.

Elkton
Buckman, Jr., Robert F.

Glen Burnie
Soderstrom, Carl A.

Lutherville
Gann, Donald S.

New Market
Boyd, David R.

MASSACHUSETTS

Boston
Blackburn, George L.
Briggs, Susan M.
Burke, John F.
Burke, Peter
Cahill, John M.
Conn, Alasdair K.T.
de Moya, Marc A.
Gates, Jonathan
Hauser, Carl J.
Hechtman, Herbert B.
Kelly, Edward
Kenney, Pardon R.
O'Donnell, Thomas F.
Rabinovici, Reuven
Sakellarides, Harilaos T.
Sheridan, Robert L.
Tompkins, Ronald G.
Velmahos, George
Wilmore, Douglas W.

Cambridge
Nauta, Russell J.

Gloucester
Salisbury, Roger E.

Lee
Sherman Harold F.

Needham
Boyd, Robert

Newton
Millham, Frederick H.

South Weymouth
Driscoll, Robert

Springfield
Ronald, Gross
Patterson, Lisa

Wayland
Rosenthal, Ronald E.

Worcester
Emhoff, Timothy
Hirsh, Michael P.
Silva, Wayne E.

City Not Listed
Ackroyd, Frederick W.

MICHIGAN

Ann Arbor
Alam, Hasan B.
Anderson, III, Harry
Brandt, Mary-Margaret
Burney, Richard E.
Coran, Arnold G.
Greenfield, Lazar J.
Hemmila, Mark R.
Napolitano, Lena M.
Park, Pauline K.
Raghavendran, Krishnan
Wahl, Wendy Lynn
Wang, Stewart C.

Bear Lake
Wade, Franklin V.

Bloomfield Hills
Lopez, Peter

Detroit
Baylor III, Alfred
Diebel, Lawrence N.
Dulchavsky, Scott A.
Horst, H. Mathilda
Ledgerwood, Anna M.
Lucas, Charles E.
Patton, Joe
Rubinfeld, Ilan
Steffes, Christopher P.
Tyburski, James
White, Michael T.
Wilson, Robert F.

Grand Blanc
Shapiro, Brian S.

Grand Rapids
Scholten, Donald J.

Jackson
Klotz, Jr., Donald H.

Kalamazoo
Plaisier, Brian

Lansing
Kepros, John P.

Royal Oak
Howells, Greg A.

Three Oaks
Roberts, Roxanne R.

West Bloomfield
Robb, Herbert J.

City Not Listed
Buntain, William L.
Glover, John L.
Mackenzie, James R.
Robson, Martin C.

MINNESOTA

Duluth
Eyer, Steven D.

Marine on St. Croix
Strate, Richard G.

Minneapolis
Becker, William K.
Beilman, Gregory
Chipman, Jeffrey G.

Jacobs, Donald M.
Ney, Arthur L.
Peltier, George
Quickel, Robert R.
Richardson, Chad J.
Rockswold, Gaylan L.

Minnetonka
Croston, J. Kevin

Rochester
Jenkins, Donald H.
Schiller, Henry
Zielinski, Martin
Zietlow, Scott P.

St. Cloud
Dorle, Michael J.

St. Paul
Ahrenholz, David H.
Bennett, Bruce A.

Greenville
Love, Jr., Robert T.

Jackson
Ahmed, Naveed
Frei, Lonnie W.
Helling, Thomas S.
Martin, Larry C.
Porter, John M.
Timberlake, Gregory A.

Vicksburg
Hopson, Jr., William Briggs

MISSOURI

Columbia
Barnes, Stephen L.
Mitchell, Franklin L.
Stephenson, Hugh E.

Holts Summit
James, Jr., Paul M.

Kansas City
Bjerke, H. Scott
Hiebert, John M.
Sagraves, Scott

St. Louis
Bochicchio, Grant V.
Brandes, Steven B.
Kirby, John P.
Mazuski, John
Peick, Ann
Schuerer, Douglas J. E.
Srivastava, Anil
Troop, Bryan
Vane, Dennis W.

City Not Listed
Trask, Arthur L.
Wilkins, Harry

MONTANA

Billings
Hurd, Robert N.

Bozeman
Rinker, Charles F.

Columbia Falls
Diamond, Daniel L.

Great Falls
Orcutt, Michael

Missoula
Pickhardt, John B.

City Not Listed
Phillips, Thomas F.

NEBRASKA

Lincoln
Burton, Reginald

Omaha
Cemaj, Samuel
Clancy, Keith
Hodgson, Paul E.
Mercer, David
Stothert, Jr., Joseph C.

City Not Listed
Gillespie, Robert W.

2013 GEOGRAPHICAL LISTING

NEVADA

Henderson
Rutledge, Robert

Las Vegas
Browder, Timothy D.
Coates, Jay E.
Fildes, John J.
Kuhls, Deborah A.
McIntyre, Kenneth E.
Schechter, Frederick G.

NEW HAMPSHIRE

Lebanon
Burchard, Kenneth W.
Gupta, Rajan

NEW JERSEY

Camden
Ross, Steven
Seamon, Mark

Englewood
Siegel, John H.

Freehold
DiGiacomo, Jody

Hackensack
Barbul, Adrian
O'Hara, Kathleen P.

Haddon Heights
Slotman, Gus

Mountainside
Blackwood, James M.

Neptune
Ahmed, Nasim
David, John M.

New Brunswick
Gracias, Vicente H.
Stafford, Perry W.
Trooskin, Stanley Z.

Newark
Anjaria, Devashish J.
Deitch, Edwin A.
Livingston, David
Mohr, Alicia
Mosenthal, Anne
Padberg, Jr., Frank T.
Sifri, Ziad C.
Swan, Kenneth G.

Park Ridge
LoCurto, Jr., John J.

Paterson
Valenziano, Carl P.

Short Hills
Nance, Francis C.

Somerville
Hammond, Jeffrey S.

Trenton
D'Amelio, Louis

City Not Listed
Fallahnejad, Manucher
Geis, W. Peter
Lazaro, Eric J.

NEW MEXICO

Albuquerque
Demarest, Gerald B.

Sante Fe
Schiller, William R.
Wassner, John

NEW YORK

Albany
Leather, Robert P.
Shah, Dhiraj M.

2013 GEOGRAPHICAL LISTING

APO
Zonies, David

Bronx
Agarwal, Nanakram
Axelrad, Alexander
Cayten, C. Gene
Delany, Harry M.
DiRusso, Stephen Michael
Statter, Mindy B.
Yelon, Jay A.

Brooklyn
Duncan, Albert O.
Hirshberg, Asher
Horovitz, Joel H.
O'Neill, Patricia
Ramenofsky, Max L.
Schulze, Robert

Buffalo
Bass, Kathryn D.
Flynn, Jr., William J.
Guo, Weidun Alan
Hassett, James M.
Mindell, Eugene R.
Wiles, III, Charles E.

Cooperstown
Borgstrom, David C.

Larchmont
Stahl, William M.

Manhasset
Bagdonas, Richard

New Hyde Park
Coppa, Gene F.
Stylianos, Steven

New York
Barie, Philip S.
Barlow, Barbara A.
Bessey, Palmer Q.
Cooper, Arthur
Eachempati, Soumitra
Ghajar, Jamshid
Marshall, Gary
Michelsen, Christopher B.
Pachter, H. Leon
Pizzi, Walter
Simon, Ronald
Todd, S. Rob
Velcek, Francisca T.
Yurt, Roger W.

Pittsford
Kluge, David N.

Rochester
Bankey, Paul E.
Cheng, Julius D.
Gestring, Mark L.
Rotondo, Michael F.
Stassen, Nicole
States, John D.

Stanfordville
Madden, Michael R.

Staten Island
Garzon, Antonio A.

Stony Brook
Shapiro, Marc J.
Soroff, Harry S.

Syracuse
Clark, Jr., William R.
Cooney, Robert N.
Hassan, Moustafa
Marx, William H.

Valhalla
Asensio, Juan
Marini, Corrado
Savino, John A.

City Not Listed
Baue, Arthur E.
Connell, Jr.
Harris, Burton H.
Herbsman, Horace
Mahoney, Jesse W.
Sanborn, Earl B.

NORTH CAROLINA

Asheville
Arrillaga, Abenamar
Borzotta, Anthony P.
Thompson, Errington

Chapel Hill
Cairns, Bruce A.
Meyer, Anthony A.
Rich, Preston B.

Charlotte
Bosse, Michael J.
Christmas, A. Britton
Green, John
Huynh, Toan T.
Jacobs, David G.
Kellam, James F.
Sing, Ronald F.
Thomason, Michael H.

Durham
Olson, Steven A.
Shapiro, Mark
Vaslef, Steven

Fayetteville
Flahert, Stephen

Greensboro
Wyatt, III, James

Greenville
Bard, Michael R.
Cunningham, Paul R. G.
Goettler, Claudia E.
Haisch, Carl
Newell, Mark
Rodeberg, David A.
Schenarts, Paul J.
Toschlog, Eric
Waibel, Brett

Raleigh
Rutherford, Edmund J.
Udekwu, Pascal

Wilington
Clancy, Thomas V.

Winston-Salem
Meredith, J. Wayne
Chang, Michael
Hildreth, Amy
Holmes, IV, James
Hoth, James J.
Martin, Robert
Miller, Preston R.
Mowery, Nathan

City Not Listed
Meredith, Jesse H.
Moylan, Jr., Joseph A.

NORTH DAKOTA

Grand Forks
Szlabick, Randolph.

OHIO

Akron
George, Richard
Muakkassa, Farid F.

Cincinnati
Davis, Jr., Kenneth
Falcone, Jr., Richard A.
Johannigman, Jay A.
Kagan, Richard J.
Muskat, Peter
Pritts, Timothy
Robinson, Bryce
Tsuei, Betty
Welling, Richard E.
Wulsin, John H.

Cleveland
Claridge, Jeffrey A.
Como, John J.
Fratinanne, Richard B.
Likavec, Matt J.
Spirnak, John P.
Stallion, Anthony
Treat, Richard C.
Yowler, Charles

Columbus
Bonta, Marco J.
Cook, Charles H.
Falcone, Robert E.
Furste, Wesley
Groner, Jonathan I.
Jones, Larry
Lindsey, David
Miller, Sidney F.

Ruberg, Robert L.
Steinberg, Steven M.

Dayton
Ekeh, Akpofure Peter
McCarthey, Mary C.
Saxe, Jonathan M.
Tchorz, Kathryn M.
Walusimbi, Mbaga S.

Galena
Berggren, Ronald B.

Oregoma
Finley, Jr., Robert K.

Port Clinton
Woodson, R. Donald

Toledo
Williams, Mallory

Youngstown
Dunham, C. Michael
Ransom, Kenneth

City Not Listed
Clare, David W.
Waltz, Robert C.
White, Robert J.
Yashon, David
Zollinger, Jr., Robert M.

OKLAHOMA

Norman
McCullough, Gerald W.

Oklahoma City
Albrecht, Roxie
Bender, Jeffrey S.
Letton, Jr., Robert W.
Tuggle, David W.

Tulsa
Ford, Edward G.
Siemens, Roger A.
Thompson, Lewis W.
Wang, Dennis

City Not Listed
Carter, Phillip L.
Fisher, Jr., Robert G.

OREGON

Portland
Barbosa, Ronald
Cole Jr., Frederic J.
Gubler, K. Dean
Izenberg, Seth D.
Long, William
Malinoski, Darren
Mayberry, John C.
Mullins, Richard J.
Ramzy, Ameen I.
Rehm, Christina G.
Rowell, Susan
Schreiber, Martin
Trunkey, Donald D.
Watters, Jennifer

St. Paul
Livaudais, Jr., West

Tillamook
Martin, Louis F.

PENNSYLVANIA

Allentown
Badellino, Michael M.
Barraco, Robert D.
Pasquale, Michael D.

Altoona
Capella, Jeannette

Bethlehem
De Long, Jr., William
Grossman, Michael D.
Hoff, William S.
Sharpe, Richard P.

Bryne Mawr
Templeton, Jr., John M.

Clarksville
Bergstein, Jack M.

2013 GEOGRAPHICAL LISTING

Collgeville
Tortela, Bartholomew

Danville
Leonard, DiAnne Jo
Scorpio, Ronald J.
Timmons, Shelly D.

Erie
Bales, Charles R.

Glen Mills
Manges, Lewis C.

Hershey
Armen, Scott
Cilley, Robert E.
Indeck, Matthew C.

Johnstown
Dumire, Russell
Rodriguez, Aurelio

King of Prussia
Osterman, A. Lee

Lancaster
Lee, John
Rogers, Frederick B.

Langhorne
Talucci, Raymond C.

Lemoyne
Waldhausen, John A.

Monroeville
Kaufmann, Christoph R.

Philadelphia
Cohen, Murray
Goldberg, Amy J.
Hicks, Barry A.
Kaplan, Mark
Kim, Patrick K.
Lewis, Jr., Frank R.
Malangoni, Mark A.
Martin, Niels
Nance, Michael L.
Pathak, Abhijit S.
Rappold, Joseph
Reilly, Patrick
Rhodes, Robert S.
Rogers, Selwyn O.
Santora, Thomas A.
Schwab, C. William
Sims, Carrie
Wein, Alan

Pittsburgh
Alarcon, Louis
Billiar, Timothy R.
Forsythe, Raquel
Gaines, Barbara A.
Lynch, James M.
Pape, Hans-Christoph
Peitzman, Andrew B.
Philp, Allan S.
Puyana, Juan Carlos
Rosengart, Matthew
Sperry, Jason
Tisherman, Samuel
Wilberger, James E.

Scranton
Shaikh, Khaleel A.

Swarthmore
Holst, Hazel I.

Upland
Cachecho, Riad

Villanova
Kerstein, Morris D.

Wayne
Ernst, Calvin B.

West Chester
Gennarelli, Thomas A.

West Reading
Brigham, Robert
Ong, Adrian W.

Wynnewood
Clarke, John R.

York
Agarwal, Nikhilesh N.

City Not Listed
Marion, Donald W.
Matsumoto, Teruo N.
Murphy, John J.
Ralston, Edgar Lee
Rowe, Marc I.
Simms, H. Hank
Vernick, Jerome J.

RHODE ISLAND

Providence
Adams, Jr., Charles
Born, Christopher T.
Cioffi, William G.
Harrington, David
Hopkins, Robert W.
Trafton, Peter

SOUTH CAROLINA

Charleston
Crookes, Bruce
Fakhry, Samir M.
Norcross, E.
Othersen, Jr., H. Biemann

Columbia
Bell, Richard M.
Bynoe, Raymond
Smith, R. Stephen

Greenville
Gauderer, Michael W. L.
Nelson, Robert M.
Roettger, Richard H.

Spartanburg
Morrow, Jr., Charles E.

City Not Listed
Agnew, Samuel G.
Krantz, Brent E.
Sprague, Bruce L.

SOUTH DAKOTA

Spearfish
Bee, Tiffany K

TENNESSEE

Chattanooga
Barker, Donald Edgar
Maxwell, Robert A.

Johnson City
Browder, William

Kingsport
Hall, John R.
Lasky, Tiffany
Siffring, Corydon
Testerman, George

Knoxville
Daley, Brian
Enderson, Blaine L.

Memphis
Croce, Martin
Fabian, Timothy C.
Luce, Edward A.
Magnotti, Louis J.
MAish III, George
Minard, Gayle
Savage, Stephanie
Schroeppel, Thomas
Weinberg, Jordan
Zarzaur, Ben L.

Nashville
Collier, Bryan R.
Guillamondegui, Oscar D.
Gunter, Oliver
May, Addison
Miller, Richard S.
Morris, Jr., John A.
Nunez, Timothy
O'Neill, Jr., James A.
Sharp, Kenneth W.

Ooltewah
Singh, Iqbal

Rutledge
Kottmeier, Peter K.

2013 GEOGRAPHICAL LISTING

City Not Listed
Barton, Ronald M.

TEXAS

Austin
Brown, Carlos V.R.
Garcia, Nilda M.
Peterson, Hugh D.
Valadka, Alex B.

Corpus Christi
Blow Osbert

Dallas
Dunn, Ernest L.
Forman, Michael L.
Hunt, John
Kashuk, Jeffry L.
Lorenzo, Manuel
Luk, Stephen S.
Megison, Stephen M.
Meyer, Dan M.
Minei, Joseph P.
Minshall, Christian
Morey, Allen
Murphy, Joseph
Phelan, III, Herbert A.
Shafi, Shahid
Thal, Erwin R.
Truitt, Michael
Wolf, Steven E.

El Paso
Bagg, Raymond J.
Tyroch, Alan H.

Fort Sam Houston
Bailey, Jeffrey
Cannon, Jeremy
Martin, Robert
Rasmussen, Todd
Renz, Evan

Galveston
Cushman, James G.
Gore, Dennis C.
Granchi, Thomas
Herndon, David N.
Mileski, William J.

Georgetown
Gonzalez, Ernest

Houston
Andrassy, Richard J.
Cotton, Bryan A.
Cox, Jr., Charles
DeBakey, Michael E.
DuBose, Joseph
Duke, Jr., James H.
Holcomb, John B.
Kozar, Rosemary A.
Mattox, Kenneth L.
Moody, Frank G.
Moore, Laura
Shabot, M. Michael
Wall, Jr., Matthew J.
Wesson, David E.

Kingsbury
Blackbourne, Lorne H.

Lubbock
D'Alise, Mark D.
Griswold, John A.

McAllen
Glorsky, Steven

Round Rock
Craun, Michael L.
Ware, Drue

San Antonio
Cancio, Leopoldo
Cestero, Ramon
Cohn, Stephen M.
Corneille, Michael
Dent, Daniel L.
Eastridge, Brian J.
Mendelson, Janice A.
Myers, John
Pruitt, Jr., Basil A.
Root, H. David
Shirani, Khan Z.
Stewart, Ronald M.

Southlake
Carrick, Matthew M.

Temple
Childs, Ed
Davis, Matthew
Smith, Randall

Tyler
Berne, John D.
Fernandez-Carreno, Luis

City Not Listed
Coln, Charles Dale
Peacock, Jack B.
Bricker, Donald L.

UTAH

Salt Lake City
Barton, Richard G.
Morris, Stephen
Nirula, Raminder
Saffle, Jeffrey R.
Vargo, Daniel J.
Warden, Glenn D.

VERMONT

Burlington
Charash, William E.
Fortune, John B.
Sartorelli, Kennith H.
Taheri, Paul A.

Colchester
Osler, Turner M.

Jericho
Drucker, William R.

VIRGINIA

Charlottesville
Calland, James
Edlich, Richard F.
Schenk, III, Worthington G.
Williams, John G.
Young, Jeffrey S.

Falls Church
Dort, Jonathan M.
Griffen, Margaret Mary
Michetti, Christopher
Reines, H. David
Rizzo, Anne G.
Seoudi, Hani

Fredericksburg
Bilski, Tracy
Kauder, Donald R.
Roberts, Lawrence

Norfolk
Blake, David P.
Britt, L.D.
Collins, Jay N.
Weireter, Jr., Leonard J.

Richmond
Aboutanos, Michel B.
Duane, Therese M.
Gervin, Alfred S.
Ivatury, Rao R.
Malhotra, Ajai
Newsome, Heber H.

Roanoke
Baker, Christopher C.
Ferrara, John J.
Fry, William
Gilbert, Carol M.
Putnam, II, A. Tyler

Winchester
Sinclair, Terry L.
Stanford, Gregory G.

WASHINGTON

Clyde Hill
Condon, Robert E.

Seattle
Arbabi, Saman
Bulger, Eileen M.
Chesnut, Randall M.
Cuschieri, Joseph
Dellinger, E. Patchen
Evans, Heather

Heimbach, David M.
Johansen, Kaj
Ledbetter, Daniel J.
Maier, Ronald V.
Mock, Charles N.
O'Keefe, Grant E.
Wessells, Hunter B.

Tacoma
Jacoby, Robert
Martin, Matthew

Vancouver
Karmy-Jones, Riyad

WEST VIRGINIA

Huntington
Beaver, Bonnie L.

Morgantown
Wilson, Alison

WISCONSIN

LaCrosse
Cogbill, Thomas H.
Patel, Nirav

Madison
Agarwal, Jr., Suresh
Faucher, Lee
Harms, Bruce A.
Kudsk, Kenneth A.

Milwaukee
Brasel, Karen J.
Gourlay, David
Oldham, Keith T.
Quebbeman, Edward J.
Somberg, Lewis B.
Webb, Travis P.
Weigelt, John

Wausau
Larson, Jennine

WYOMING

Gillette
McMurtrey, George B.

NO ADDRESS LISTED

Alexander, J. Wesley
Burd, Randall S.
Cleveland, Henry C.
Conaway, Cass W.
Cramer, Lester M.
Davis, III, Frank E.
Ehrlich, Frank
Flancbaum, Louis J.
Goddard, James L.
Howard, John M.
Knuth, Thomas E.
Oller, Dale W.
Omer, Jr., George E.
Schloerb, Paul R.
Talbert, James L.
Wilson, Mark A.

INTERNATIONAL

ARGENTINA
Neira, Jorge

AUSTRALIA
Balogh, Zsolt J.
D'Amours, Scott
Deane, Stephen
Gruen, Russell
Vijayan, Appasamy

BELGIUM
Leclercq, Pierre

BRAZIL
Camargo, Charly
Fraga, Gustavo
Muller, Michael

CANADA

2013 GEOGRAPHICAL LISTING

Alberta
Ball, Chad
Engels, Paul
Kirkpatrick, Andrew
Van Wijngaarden-Stephens, Mary H.

New Brunswick
Fuller, Frederick W.

Ontario
Ali, Jameel
Derby, A. Campbell
Holliday, Ronald L.
Jeschke, Marc G.
Nathens, Avery
Rizoli, Sandro
Tremblay, Lorraine
Waddell, James
Yelle, Jean-Denis

Quebec
Brown, Rea Arthur
Denis, Ronald
Dontigny, Leon
Hreno, Andrew
Lee, Chen
Martin, Marcel
McLean, A. Peter
Mulder, David S.
Williams, H. Bruce

CHINA
Chen, Ray-Jade
Fang, Jen-Feng
Richard, Tong Wai Chung
Yuen, Wai Key

COLOMBIA
Escallon, Jaime
Ferrada, Ricardo
Moreno, Alejandro

CYPRUS
Charalambides, Demetris N.

CZECH REPUBLIC
Koci, Jaromir

GERMANY
Ertel, Wolfgang K.
Faist, Eugen
Holzheimer, Munich
Tiling, Thomas H.
Waydhas, Christian

GREECE
Androulakis, George A.

FINLAND
Leppaniemi, Ari

ISRAEL
Krausz, Michael M.
Rivkind, Avraham I.

ITALY
Gui, Daniele
Magalini, Sabina

JAPAN
Endo, Yukio
Fujita, Takashi
Ishihara, Satoshi
Ishikawa, Kazuo
Kaneko, Naoyuki
Kawakami, Masato
Kimura, Akio
Kishikawa, Masanobu
Koike, Kaoru
Mashiko, Kunihiro
Mizobata, Yasumitsu
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The American Association for the Surgery of Trauma Research and Education Foundation was established in April of 1994 by the Association's Board of Managers with the objective to sponsor research scholarships in the fields of burns, trauma, and acute care surgery and to foster advances in education.

The Foundation is currently supported by AAST, private industry donors, and contributions from AAST members. This support has afforded the Foundation the ability to fund numerous scholarships and with further support, the Foundation hopes to expand its funding of projects into other areas of interest such as multi-institutional trials.

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**Dr. Thomas M. Scalea*

Platinum Supporter $5,000-$9,999

**Dr. Timothy C. Fabian*
**Dr. Grace S. Rozycki*
& Dr. David V. Feliciano
**Dr. J. Wayne Meredith*
**Dr. Andrew & Debra Peitzman*
**Dr. Dennis Vane*

Gold Supporter $1,000-$4,999

**Ms. Sharon Gautschy*
Dr. Robert C. Mackersie
***Dr. Mark Malangoni*
Dr. C. William Schwab

Silver Supporter $500-$999

Dr. Erwin R. Thal

Bronze Supporter $100-$499

Dr. Karen Butler
Dr. Michael H. Metzler
Dr. David P. Blake
Dr. Therese M. Duane
Dr. Eileen Bulger
Dr. Soumitra Eachempati
Dr. Mark D. Cipolle
Dr. Jay A. Yelon
Dr. Andrew C. Bernard
Dr. Krista L. Kaups
Dr. Ajai Malhotra
Dr. Steven Ross

Friends of the Foundation $1-$99

Dr. Susan M. Briggs

*Donation is cumulative over the next five years
** Donation is cumulative over the next three years

AAST BY-LAWS

AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA

BY-LAWS

AS AMENDED AT THE ANNUAL BUSINESS MEETING, SEPTEMBER 16, 2011 AT THE 70TH ANNUAL MEETING OF THE AAST and CLINICAL CONGRESS OF ACUTE CARE SURGERY, CHICAGO, ILLINOIS

ARTICLES OF INCORPORATI0N
OF
THE AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA

ARTICLE I

The name of the corporation is THE AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA.

Article II

The period of duration of the corporation is perpetual.

ARTICLE III

The address of the initial Registered Office of the corporation in the State of Illinois is 115 S. LaSalle Street, in the City of Chicago, 60603, County of Cook; and the name if its initial Registered Agent at said address is Paul G. Gebhard.

ARTICLE IV

The first board of directors of the corporation, called the "Board of Managers", Shall be eleven (11) In number, their names and address being as follows:

Dr. William R, Drucker
Department of Surgery
University of Rochester School of Medicine
601 Elmwood Avenue
Rochester, New York 14620

Dr. Roger T. Sherman
Department of South Surgery
University of Florida
Tampa, Florida 33620

Dr. Leonard F. Peltier
Arizona Medical Center
Tucson, Arizona 85724

Dr. Robert W. Gillespie
5625 "O' Street
Lincoln, Nebraska 68510

Dr. John A. Boswick, Jr.
University of Colorado
4200 East Ninth Avenue, Box C-309
Denver, Colorado 80262

Continues……

Dr. Alexander J. Walt
Wayne State University
540 E. Canfield
Detroit, Michigan 48201

Dr. Joseph D. Farrington
Box 153
Key Colony Beach, Florida 33051

Dr. John Davis
University Vermont-College of Medicine
Given Building
Burlington, Vermont 05401

Dr. William Blaisdell
San Francisco General Hospital
1001 Potreo
San Francisco, California 94110

Dr. David S. Mulder
Montreal General Hospital
1650 Cedar Avenue, Room 633
Montreal, Quebec, Canada M3G1A4

Dr. Basil A. Pruitt, Jr.
US Army Institute of Surgical Research
Brooke Army Medical Center
Fort Sam Houston, Texas 78234

ARTICLE V

The purpose of this Association shall be to furnish leadership and to foster advances in the surgery of trauma; to afford a forum for the exchange of knowledge pertaining to research, practice and training in the Surgery of Trauma; to stimulate investigation and teaching in the methods of preventing, correcting and treating injuries from all types of accidents; to enhance the study and practice of Surgery of Trauma by establishing lectureships, scholarships, foundations, and appropriate evaluation procedures in the surgery of trauma where appropriate; to afford recognition to those who have contributed to the Surgery of Trauma be extending to them membership in the Association; to do and engage in any and all lawful activities that may be incidental or reasonably related to any of the foregoing purposes; and to have and exercise all powers and authority now or hereafter conferred upon not for profit corporations under the laws of the State of Illinois. Surgery of Trauma is that field of medicine which includes investigation, care and rehabilitation of the injured patient.

Notwithstanding the forgoing or any other provisions of these Articles of Incorporation, the corporation shall not at nay time engage in a regular business

of a kind ordinarily carried on for profit; nor shall any parts of its net earnings or assets inure to the benefit of, or be distributable to , any member, director, officer, or other private person, except that the corporation shall be authorized and empowered to pay reasonable compensation for services rendered and to make other payments and distributions in furtherance of the purposes set forth above; nor shall it carry on any other activities not permitted to be carried on by an organization exempt from Federal income tax under Section 501 (c)3 of the Internal Revenue code of 1954 (the "Code") or the corresponding provision of any future United States revenue statue, as amended from time to time, nor shall it engage in the practice of medicine or render any of the services of a licensed physician.

In the event of the dissolution of the corporation, the Board of Directors shall, after paying or making provision for the payment of all of the liabilities of the corporation, distribute all of the remaining assets to such organization or organizations organized and operated for one or more of the purposes contained in these Articles as shall at the time qualify as an exempt organization or organizations under Section 501(c)(3) of the Internal Revenue Code, as the Board of managers shall determine.

IN WITNESS WHEREOF, the incorporators have here unto set their hands this 20th day of June 1978.

PAUL GEBHARD
WILLIAM F. WALSH Incorporators
W. E. WHITTINGTON, IV

AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA
BY-LAWS

ARTICLE I MEMBERSHIP

SECTION 1. There shall be five (5) classes of membership in the Association: Active Fellows, Contributing Scientists, Honorary Fellows, Inactive Fellows, and Founding Fellows.

SECTION 2. Membership in the Association is a privilege, not a right, and it is contingent upon continuing compliance with the By-Laws of the Association.

SECTION 3. Active Fellows

SECTION 3.1. A person is qualified to be an Active Fellow if he/she (a) is a legally qualified practicing physician who is a Fellow of the American College of Surgeons or a /Fellow of an equivalent international surgical college and active in the field of trauma, burns, surgical critical care, or related surgical specialties. Applicants must meet criteria as established by the AAST Board of Managers. Members previously classified as Corresponding Fellows would automatically become Active Fellows.

SECTION 3.2. Active Fellows may vote, serve on committees, hold office, serve on the Board of Managers, and attend all functions of the Association.

SECTION 4. Contributing Scientists.

SECTION 4.1. A non-surgeon may be elected as a Contributing Scientist if he/she holds an advanced degree in a scientific field related to trauma care or research, and has gained national or international recognition for contributions to the science and/or practice of injury and trauma care. Applicants must meet all criteria as established by the AAST Board of Managers

SECTION 4.2. Contributing Scientists shall not hold office, or serve on the Board of Managers. They may vote, serve on committees and attend all functions of the Association.

SECTION 5. Honorary Fellows.

SECTION 5.1. Honorary Fellows shall be individuals whom the Association deems worthy of special honor because of notable contributions to the field of trauma or because of longstanding service and commitment to the Association.

SECTION 5.2. Honorary Fellows shall not vote, hold office, or serve on the Board of Managers. They may serve on committees and attend all functions of the Association.

SECTION 6. Inactive Fellows.

SECTION 6.1. Active Fellows who are no longer in active practice or are unable to pay dues for reasons acceptable to the Membership Committee and the Board of Managers shall be transferred to Inactive Fellowship.

SECTION 6.2. Inactive Fellows shall not vote, serve on committees, hold office, or serve on the Board of Managers. They may attend all functions of the Association.

SECTION 6.3. Inactive Fellows will be reviewed each year by the Membership Committee, and any Inactive Fellow who no longer meets the criteria for Inactive Fellows shall either be returned to Active Fellowship or dropped from membership by action of the Board of Managers

SECTION 7. Founding Fellows.

SECTION 7.1. Founding Fellows are those surgeons who on June 14, 1938 organized the Association in its unincorporated form in San Francisco, California, and in addition to being Active or Inactive Fellows, are designated Founding Fellows.

SECTION 8. Election of Active Fellows, Honorary Fellows, and Contributing Scientists.

SECTION 8.1. To be a candidate for Active Fellowship, Honorary Fellowship, or Contributing Scientist, a person shall meet all the qualifications for the desired class of membership and shall be sponsored by three (3) Active Fellows. An Active Fellow shall not sponsor more than three (3) candidates for Active Fellowship in any one (1) year.

SECTION 8.2. Each candidate for Active Fellowship, , Honorary Fellowship, or Contributing Scientist shall submit documents in support of their application as determined by the Board of Managers. All application documents shall be submitted by a date designated by the Chair of the Membership Committee.

SECTION 8.3. The Membership Committee shall consider all candidates and shall make a recommendation to the Board of Managers on whether candidates shall be nominated for Active Fellowship, Honorary Fellowship, or as Contributing Scientist. The Board of Managers shall review the recommendation of the Membership Committee and shall make nominations, if any, for Active Fellowship, Honorary Fellowship, and Contributing Scientist membership at the Annual Business Meeting.

SECTION 8.4. Active Fellows, Honorary Fellows and Contributing Scientists shall be elected by the Fellows from the nominations of the Board of

Managers. A three-quarters affirmative vote of the voting fellows present at an Annual Business Meeting shall be required for election.

SECTION 9. The Association shall present to each new Fellow a certificate of membership signed by the President and Secretary-Treasurer at the Annual meeting following his/her election to membership. If a new member fails to attend the Association's meeting after the election to membership, his/her membership shall be withheld until the following year. If he/she fails to attend two (2) consecutive meetings immediately following his/her election to membership without a valid excuse approved by the Board of Managers, his/her membership shall be forfeited. Membership shall become effective when the initiation fees and dues for the year after election have been paid and the certificate of membership has been presented.

ARTICLE II OFFICERS

SECTION 1. The officers of the Association shall be the President, President-Elect, Vice-President, Secretary-Treasurer, Secretary-Treasurer-Elect and Recorder.

SECTION 2. The President, President-Elect, Vice-President, and Secretary-Treasurer-Elect shall serve one 1) year terms commencing at the close of the Annual Business Meeting during which they succeeded or were elected to office and terminating at the close of the following Annual Business Meeting. At the conclusion of those terms, the President-Elect will become President and the Secretary-Treasurer-Elect will become the Secretary-Treasurer. The Secretary-Treasurer and Recorder shall serve a three (3) year term commencing at the close of the Annual Business Meeting during which they succeeded or were elected to office and terminating at the close of the third following Annual Business Meeting.

SECTION 3. Election of Officers

SECTION 3.1. No Fellow shall serve two (2) consecutive terms in the same office except under special extenuating circumstances as determined by the Board of Managers.

SECTION 3.2. At the Annual Business Meeting the Nominating Committee shall nominate a candidate for each office which will become vacant. Additional nominations may be made from the floor.

SECTION 3.3. The voting members present at the Annual Business Meeting shall elect the officers from the nominees by majority vote.

SECTION 3.4. Any officer or agent may be removed by majority vote of the Board of Managers whenever in its judgment the best interest of the Association would be served thereby.

SECTION 3.5. In the event of the death, resignation, incapacity or removal of the President-Elect, Vice-President, Secretary-Treasurer, Recorder, or Secretary-Treasurer-Elect, the Nominating Committee in place at the last Annual Business Meeting shall be reconvened to select a nominee for the vacant office. The Board of Managers may elect the nominee to office, by majority vote, to serve the remainder of the term of the office which is vacant.

SECTION 4. The President (a) shall preside at all meetings of the Association and of the Board of Managers and shall serve as the chief executive officer of the Association, (b) shall appoint members to all committees, and create ad hoc committees not otherwise provided for in these By-Laws, (c) shall deliver an address at the Annual Scientific Meeting, (d) shall choose a speaker to deliver the Fitts lecture at the Annual Meeting and (e) shall act for the Association in the event of any contingency not covered by the bylaws, (f) shall assume other specific responsibilities as determined by the Board of Managers.

SECTION 5. The President-Elect (a) shall preside at meetings of the Association and Board of Managers in the absence of the President or upon request of the President, (b) shall assume the duties of the President in the event of death, resignation, or incapacity of the President, (c) shall succeed to the Presidency at the close of the Annual Business Meeting the year following his/her election to the office of President-Elect, and (d) shall assume other specific responsibilities as determined by the Board of Managers.

SECTION 6. The Vice-President shall preside at meetings of the Association and Board of Managers in the absence of the President and President-Elect or upon their request or incapacity to serve, and shall assume other specific responsibilities as determined by the Board of Managers.

SECTION 7. The Secretary-Treasurer shall oversee the corporate and financial records of the organization, contract and oversee audits of the financial books, keep a record of all formal meetings of the Association, provide an annual financial report at the Annual Business Meeting, shall sign all contracts of the Association and keep a record of all contracts and participate in all meetings and calls as requested by the President. The Secretary-Treasurer shall also assume other specific responsibilities as determined by the Board of Managers.

SECTION 8. The Recorder shall be Chair of the Program Committee, which shall prepare a scientific program for the Annual Meeting and instructions to speakers, shall receive all scientific papers presented to the Association, and shall assume other specific responsibilities as determined by the Board of Managers.

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SECTION 9. The Secretary-Treasurer-Elect (a) shall function as the Secretary-Treasurer at meetings of the Association and Board of Managers in the absence or upon request of the Secretary-Treasurer, (b) shall assume the

duties of the Secretary-Treasurer in the event of death, resignation, removal or incapacity of the Secretary-Treasurer, (c) shall succeed to the Secretary-Treasurer position at the close of the Annual Business Meeting the year following his/her election to the office of Secretary-Treasurer-Elect, (d) shall attend all meetings of the Board of Managers as an ex-officio member but shall not vote, and (e) shall assume other specific responsibilities as determined by the Board of Managers.

ARTICLE III THE BOARD OF DIRECTORS ("MANAGERS")

SECTION 1. Except as otherwise provided, the board of directors, called "Board of Managers", generally shall be thirteen (13) in number, but the Secretary-Treasurer-Elect shall be an additional ex-officio non-voting member of the Board. The voting managers shall be the President, President-Elect, Vice-President, Secretary-Treasurer, Recorder, three (3) most recent Past-Presidents, four (4) Managers-at-Large (one of which will be the Critical Care Manager) and the Editor of the Journal of Trauma.

SECTON 1.1 The Executive Committee of the Association, to which the Board may delegate some of its authority, shall be: President, President-Elect, Vice President, Recorder, Secretary-Treasurer and Immediate Past President.

SECTION 2. Each Past-President shall serve a three (3) year term on the Board of Managers immediately after completing his/her term as President.

SECTION 3. Managers-at-Large.

SECTION 3.1. The Managers-at-Large, including the Critical Care Manager-at-Large shall serve a three (3) year term commencing at the close of the Annual Meeting at which they were elected and terminating at the close of the third succeeding Annual Meeting. Managers-at-Large shall be eligible for re-election.

SECTION 3.2. If the term of a Manager-at-Large will expire at the close of an Annual Meeting, the Nominating committee shall nominate one Active Fellow for such Manager-at-Large position, including the Critical Care Manager-at-Large, at the Annual Meeting, and additional nominations may be made from the floor. The voting members present at the Annual Business Meeting shall elect each Manager-at-Large from among the nominees by majority vote.

SECTION 4. In the event of the death, resignation or incapacity of a Manager-at-Large, the Nominating Committee shall be reconvened to select a nominee for the vacant position. In the event of the death, resignation or incapacity of any Past-President, the Nomination Committee, at its option may select an additional Manager-at-Large to complete the term of the Past-President on the Board or may leave such position vacant. The Board of

Managers may elect the nominee, if any, to office to serve the remainder of the term of the position which is vacant.

SECTION 5. Duties of the Board of Managers.

SECTION 5.1. The Board of Managers (a) shall manage the affairs of the Association and determine its policies and procedures, (b) may invite any member of the Association to participate in its deliberations at any meeting, (c) shall receive and consider the reports of committees and review their activities, (d) shall nominate candidates for Honorary Fellowship to be voted upon by the voting Fellows of the Association at the Annual Business Meeting (e) shall accept, reject, or defer an application for fellowship in the Association, (f) shall determine initiation fees for new Fellows, and the annual dues of Fellows and their method of payment, subject to subsequent approval by the Association fellowship, (e) shall review and approve the annual budget for the Association, and (f) shall review and approve initiatives, programs, expenditures and other Association business as they deem appropriate.

SECTION 5.2. The Board of Managers shall appoint and may dismiss the Editor of The Journal of Trauma, Injury, Infection, and Critical Care and shall be responsible for the Journal's financial activities. The Editor will be appointed for a term of five (5) years. The Board of Managers at its discretion may re-appoint the Editor for two (2) additional five (5) year terms. Prior to appointment of a new Editor, the President and President-Elect will appoint a search committee from the Association Active Fellowship to select worthy candidates to propose to the Board of Managers for final appointment.

SECTION 5.3. The Board of Managers may, at its discretion, contract with an Executive Director for the Association to perform or delegate such functions as the Board of Managers deems appropriate.

SECTION 5.4. The Board of Managers may create new standing committees.

SECTION 6. Any Manager may call a meeting of the Board of Managers by giving thirty (30) days notice thereof, which notice requirement may be waived by the unanimous consent of the Board of Managers.

ARTICLE IV STANDING COMMITTEES

SECTION 1. Program Committee.

SECTION 1.1. The Program Committee shall be responsible for the format and content of the Annual Scientific Program.

SECTION 1.2. The Program Committee shall consist of the President, President-Elect, Secretary-Treasurer, Editor of the Journal of Trauma,

Recorder, the Critical Care Committee Chair, and not less than three (3) additional members who shall each serve a three (3) year term with one (1) such new member each year. The Recorder shall serve as Chair.

SECTION 2. Membership Committee.

SECTION 2.1. The Membership Committee shall consider all completed applications for membership, shall recommend candidates for Active Fellowship, Honorary Fellowship, Contributing Scientist, and Inactive Fellowship to the Board of Managers, and shall review all Inactive Fellows annually and make recommendations concerning their continued eligibility for Inactive status to the Board of Managers.

SECTION 2.2. The Membership Committee shall consist of the President-Elect, Vice President, Secretary-Treasurer, the Critical Care Manager-at-Large and the three (3) other Managers-at-Large. The President-Elect shall serve as Chair.

SECTION 3. Nominating Committee.

SECTION 3.1. At the Annual Business Meeting or as needed the Nominating Committee may make nominations for any of the following offices (a) President-Elect, (b) Recorder, (c) Managers-at-Large and Critical Care Manager-at-Large, and (d) Secretary-Treasurer-Elect.

SECTION 3.2. The Nominating Committee shall consist of the three (3) immediate Past-Presidents, the President, and the President-Elect. The most senior Past-President shall serve as the Chair.

SECTION 4. Scholarship and Awards Committee.

SECTION 4.1. The duties of the Scholarship and Awards Committee shall be established by committee, subject to approval by the Board of Managers, and shall include making recommendations to the Board for scholarship awards, and selecting the Canizaro Award at the Annual Meeting.

SECTION 4.2. The Scholarship and Awards Committee shall consist of the President-Elect, the Vice-President, the Secretary-Treasurer, and the Managers-at-Large including the Critical Care Manager-at-Large who shall serve for their three (3) year term of office, and one member appointed annually who is not a member of the Board of Managers. All actions of the Scholarship and Awards Committee are subject to approval of the Board Managers. The President-Elect shall serve as Chair.

SECTION 5. Critical Care Committee.

SECTION 5.1. The duties of the committee shall be established by the committee, subject to approval by the Board of Managers, Duties shall include

responsibility for the format and content of the critical care portion of the Annual Scientific Program, and recommending to the Board of Managers candidates for positions as officers and committee members of the Association.

SECTION 5.2. The Critical Care Manager-at-Large will be the Chair of the Critical Care Committee and will serve a three (3) year term. The other members of the Critical Care Committee shall be appointed by the President and will consist of (a) six (6) members who are Active Fellows, each of whom shall serve a three (3) year term with two (2) new members each year. The Chair of the Critical Care Committee (Critical Care Manager-at-Large) shall be a member of the Membership Committee, Scholarship and Awards Committee and the Program Committee.

SECTION 6. Committee on Prevention.

SECTION 6.1. The duties of this committee will shall be established by the committee, subject to approval by the Board of Managers.

SECTION 6.2. The Committee on Prevention will be appointed from the roster of Active Fellows by the President and will include the Chair, who will serve a three (3) year term, and six (6) members who shall each serve a three (3) year term, with two (2) new members each year.

SECTION 7. Committee on Injury Assessment and Outcome

SECTION 7.1. The duties of this committee shall be established by the committee, subject to approval by the Board of Managers.

SECTION 7.2. The Committee on Injury Assessment and Outcome will be appointed from the roster of Active Fellows by the President and will include the Chair, who will serve a three (3) year term, and six (6) members who shall each serve a three (3) year term, with two (2) new members each year.

SECTION 8. Multi-Institutional Trials Committee

SECTION 8.1. The duties of the Committee shall be established by the committee, subject to approval by the Board of Managers. Duties shall include oversight of the activities of the multi-institutional trials consortium and the development of multi-institutional research protocols.

Section 8.2: The Multi-Institutional Trials Committee will be appointed from the roster of Active Fellows by the President and will include the Chair who will serve a three- (3) year term and six (6) members who shall each serve a three- (3) year term with two (2) new members each year.

Section 8.3: The Multi-Institutional Trials Consortium shall consist of Active Fellows of the association representing institutions that are committed to conduct multi-institutional clinical trials. Institutional qualification for

membership in the Consortium will be determined by the Multi-Institutional Trials Committee subject to approval by the Board of Managers, and each institution so qualified must be approved by the Multi-Institutional Trials Committee. Continued participation in the Consortium will be contingent upon (1) periodic review of the institution's performance relative to their commitment, and (2) maintenance of the qualifications as set forth by the Multi-Institutional Trials Committee.

SECTION 9. Committee on Publications and Communication

SECTION 9.1 The duties of the committee shall be established by the committee, subject to approval by the Board of Managers.

SECTION 9.2 The Committee on Publications and Communication shall consist of a Chair appointed by the President for three (3) years, the immediate Past-President, and at least five (5) members appointed by the President for three (3) year terms

SECTION 10. Acute Care Surgery Committee

SECTION 10.1. The duties of the committee shall be established by the Board of Managers and will include: managing and overseeing all functions and operations of the Association related to postgraduate training in trauma, surgical critical care, and emergency surgery.

SECTION 10.2. The Acute Care Surgery Committee shall consist of a Chairman, a Vice-Chairman, and at least six members appointed by the President. The Chairman, Vice-Chairman, and all committee members shall serve 3 year terms.

SECTION 11. Military Liaison Committee

SECTION 11.1. The Military Liaison Committee shall be appointed annually. The duties of this committee shall be established committee, subject to approval by the Board of Managers. .

SECTION 11.2. The Military Liaison Committee will be appointed from the roster of Active Fellows by the President and will include the Chair, who will serve a three (3) year term and six (6) members who shall serve a three (3) year terms, with two (2) new members each year.

SECTION 12. International Relations Committee

SECTION 12.1. The International Relations Committee shall be appointed annually. The duties of this committee shall be established, committee goals and projects subject to approval by the Board of Managers.

SECTION 12.2. The International Relations Committee will be appointed from the roster of active fellows by the president-elect and will include the chair, who will serve a three (3) year term, and six (6) members who will serve a three (3) year term, also, two new members each year. In addition, the president or designee of the European Society of Trauma and Emergency Surgery, ESTES, International Association for Trauma Surgery, and Intensive Care, IATSIC, the Pan-American Trauma Society, the Trauma Association of Canada, TAC, will be members for two (2) years. Other International surgical organizations may be invited to serve a two (2) year term.

SECTION 13 Ad Hoc Committees

SECTION-13.1. Ad Hoc Committees dealing with programs and issues of contemporary importance to the Association may be appointed at the discretion of the Association President. Members of an Ad Hoc Committee and the Chair of the Committee shall be appointed by the President as necessary to fulfill the Committee's mandate. Each Ad Hoc Committee will remain in effect for two (2) years, after which it will be automatically disbanded. An Ad Hoc Committee may be renewed for additional two (2) year terms at the discretion of the President.

ARTICLE V ANNUAL MEETING

SECTION 1. The Annual Meeting of the Association shall be held at the time and place designated by the Board of Managers in a written notice sent by mail to all members at least three (3) months prior to the date of the meeting. The Annual Meeting shall consist of a Scientific program, Annual Business Meeting, and social program.

SECTION 2. All elections shall be held at the Annual Business Meeting.

SECTION 3. Papers and Publications.

SECTION 3.1. Members and guests offering papers for presentation at the Annual Meeting shall furnish the Recorder with titles, abstracts, manuscripts or other material in a format and at a time designated by the Recorder.

SECTION 3.2. The official publication of the Association will be the JOURNAL OF TRAUMA, INJURY, INFECTION, AND CRITICAL CARE.

SECTION 4. All meetings shall be conducted according to these By-Laws and parliamentary procedures according to the most recent edition of Roberts Rules of Order.

SECTION 5. The Annual Business Meeting shall include the following:.

A)	Reports by the Association Officers
B)	Report of Minutes of the Board of Managers
C)	Report by the Recorder
D)	Report by the Editor of the Journal of Trauma and Acute Care Surgery
E)	Reports by Committee Chairs
F)	Election of Members
G)	Unfinished Business
H)	New Business
I)	Report by Nominating Committee Chair
J)	Election of Officers and Managers-at-Large
K)	Installation of President and Presentation of President-Elect
L)	Adjournment

ARTICLE VI DUES AND FEES

SECTION 1. The initiation fee for new members shall be determined by the Board of Managers.

SECTION 2. Annual dues for members and method of payment shall be determined by the Board of Managers subject to subsequent approval of the voting Fellows.

SECTION 3. The Secretary-Treasurer shall notify all members in arrears of dues.

SECTION 4. Guest fees for the Annual Meeting shall be determined by the Board of Managers.

SECTION 5. Active Fellows and Contributing Scientists shall pay an initiation fee, annual dues and assessments. Members who attain an age of 65 shall not be required to pay dues, although they must be up to date in all dues and assessments until the age of 65. However, such senior status members shall pay a registration fee in an amount determined by the Board of Managers for meetings they attend.

SECTION 5.1. Any member under the age of 65 whose dues are in arrears for two (2) years shall be notified by the Secretary-Treasurer in writing, and if he/she fails to pay his/her dues within three (3) months thereafter, he/she shall be dropped from membership, unless excused by the Board of Managers.

SECTION 6. Honorary Fellows shall not be required to pay an initiation fee or annual dues and assessments. They shall pay a registration fee in an amount determined by the Board of Managers for meetings they attend.

SECTION 7. Inactive Fellows shall not be required to pay annual dues or assessments. They shall pay a registration fee in an amount determined by the Board of Managers for meetings they attend.

SECTION 8. A special assessment may be recommended by the Board of Managers, and, if approved by a two-thirds affirmative vote of the voting members in attendance at an Annual Business Meeting, shall be levied on the Active Fellows and Contributing Scientist members of the Association.

ARTICLE VII RESIGNATIONS

SECTION 1. Any member may withdraw from the Association after fulfilling all obligations and then giving written notice of such intention to the Secretary-Treasurer. This notice shall be presented to the Board of Managers at the first meeting following its receipt. Resignation becomes effective upon approval by the Board of Managers.

ARTICLE VIII AMENDMENTS

SECTION 1. No part of the By-Laws may be amended, altered or repealed, except at a regular Annual Meeting of the Association in an Annual Business Meeting. The suggested amendment, alteration or repeal in the By-Laws must be sent to all voting members at least ninety (90) days prior to the Annual Meeting by e-mail, web posting, mail, or fax. The adoption of the suggested amendment, alteration or repeal shall be by vote of three-fourths of the voting members at the Annual Business Meeting.

EXHIBITORS

Exhibitor List
72nd Annual Meeting of the
American Association for the Surgery of Trauma and
Clinical Congress of Acute Care Surgery
Hilton San Francisco – San Francisco, CA
As of August 1, 2013

1.	Acell, Inc. Booth #207	Sara Mattingly 6640 Eli Whitney Drive Suite 200 Columbia, MD 21046 saramattingly@acell.com	401-953-8547
2.	Acute Innovations Booth #203	Mary Taylor 21421 NW Jacobson Rd. Suite 700 Hillsboro, OR 97124 mtaylor@acuteinnovations.com	866-623-4137
3.	American College of Surgeons Booth #T2	Alice Rollins 633 N. Saint Clair St. Chicago, IL 60611 arollins@facs.org	312-202-5000
4.	Applied Medical Technology, Inc. Booth #202	Elizabeth Duhan 800 Katherine Blvd Brecksville, OH 44141 eduhan@appliedmedical.net	800-869-7382

BRONZE SPONSOR

5.	ArborMetrix Booth #307	Mike Loney 2929 Plymouth Rd. Ste. 325 Ann Arbor, MI 48105 mloney@arbormetrix.com	248-787-6976
6.	B-Line Medical Booth #204	Lauren Young 1300 19th Street, NW, Suite 100 Washington, DC 20036 lauren.young@blinemedical.com	202-827-0719

7.	Belmont Instrument Group Booth #200	Lisa Kelly 780 Boston Rd Billerica, MA 01824 . sales@belmontinstrument.com	866-663-0212
8.	Canica Design Booth #107	Donna Sloan-Treusch 36 Mill Street Almonte, Ontario K0A 1P0 Canada sales@canica	613-256-0350
9.	CSl Behring Booth #303.	Julia Iris 1020 First Ave King of Prussia, PA 19306 Julia.iris@cslbehring.com	610-878-4669
10.	CSl Behring Medical Affairs Booth #306	Judi Vensak 1020 First Ave King of Prussia, PA 19306 Judith.vensak@cslbehring.com	484-368-4244
11.	Daxor Corporation Booth #201	Tina Lake 350 5th Avenue Suite 7120 New York, NY 10118 clake@daxor.com	865-425-0555
12.	DuPuy Synthes CMF Booth #304	Mary Zabaga 1301 Goshen Parkway Westchster, PA 19308 Zabaga.mary@synthes.com	610.719.5674
13.	Haemonetics Booth #302	Yasmin Khan 400 Wood Road Braintree, MA 02184 ykhan@haemonetics.com	781-848-7100
14.	Hutchinson Technology, Inc. Booth #103	Joseph Ortner 40 West Highland Park Dr., NE Hutchinson, MN 55350 Joseph.ortner@hti.htch.com	320-310-6868
15.	ImaCor, Inc. Booth #205.	Geeta Surti 839 Stewart Ave, Ste. 3 Garden City, NY11530 gsurti@imacorinc.com	516-393-0970

16.	Lippincott Williams & Wilkens/Wolters Kluwers Health Booth #T1	John Ewers Two Commerce Square 2001 Market St. Philadelphia, PA 19103 john.ewers@wolterskluwer.com	215-521-8300
17.	Masimo Booth #304	Kallol Basu 40 Parker Irvine, CA 92618 kbasu@masimo.com	949-297-7000

BRONZE SPONSOR

18.	National Trauma Institute Booth #T1	Ana Guerrero 8000IH 10 West #600 San Antonio, TX 78232 ana.guerrero@NationalTraumaInstitute.org	210-524-7739
19.	Ossur Americas Booth #300	Geneen Spence 27051 Towne Centre Dr. Foothill Ranch, CA 92610 gspence@ossur.com	949-382-3842

SILVER SPONSOR

20.	Siemens Healthcare Booth #104,106,108	Sudhir Kulkarni 51 Valley Stream Parkway. Malvern, PA 19355 sudhir.kulkarni@siemens.com	610-448-1696
21.	Stasys Medical Corporation Booth #T5	Ari Karchin 13608 88th Place NE Kirkland, WA 98034 akarchin@gmail.com	206-427-2705
22.	Southwest Medical Books/McGraw Hill Booth #T7	Kelly Dusenberry 3473 Sitio Borde Carlsbad, CA 92009 southwestmedicalbooks@gmail.com	760-944-9906
23.	Starsurgical, Inc. Booth #105	Michael Deutsch 7781 Lakeview Drive Burlington, WI 53105	888-609-2470

		mike@starsurgical.com	
24.	Synapse Biomedical Booth #101	Steven Annunziato 300 Artino Street Oberlin, OH 44074 sannunziato@synapsebiomedical.com	440-787-0187
25.	TEM Systems, Inc Booth #301	Amanda Bratton 4309 Emperor Blvd Suite 100 Durham, NC 27703 Amanda.bratton@rotminc.com	949-382-3842
26.	Trauma Center Association of America Booth #T3	Jennifer Ward 650 Montana Avenue Suite A Las Cruces, NM 88001 jennifer@traumafoundation.org	575-525-9511
27.	UT Southwestern Medical Center Booth #T6	Kate Rader 6363 Forest Park Rd Suite BLA.302 Dallas, TX 75390 Kate.rader@utsouthwestern.edu	214-648-9859
28.	Vidacare Corporation Booth #206	4350 Lockhill Selmo Road, Suite 150 Shavano Park, TX 78249 info@vidacare.com	866-479-8500

2014 DATES

AAST IMPORTANT DATES 2013-2014

October 16, 2013	AAST Grand Rounds Webcast
November 20, 2013	AAST Grand Rounds Webcast
December 18, 2013	AAST Grand Rounds Webcast
December 31, 2013	Final opportunity to make your tax deductible contribution to the AAST Research and Education Foundation for 2013
January 1, 2014	2014 Membership Dues Deadline. (Late payments will effect online and print *Journal of Trauma and Acute Care Surgery* subscriptions)
January 1, 2014	Abstract system opens
January 22, 2014	AAST Grand Rounds Webcast
February 1, 2014	Final date to submit completed applications for 2014 – 2015 research scholarships to Dr. Martin A. Croce, Secretary-Treasurer *(must be sent electronically)* to the AAST central office
February 19, 2014	AAST Grand Rounds Webcast
March 1, 2014	Final date to submit completed scientific abstracts for 2014 Annual Meeting online
March 19, 2014	AAST Grand Rounds Webcast
April 1, 2014	20th Anniversary of AAST Research and Education Foundation
April 16, 2014	AAST Grand Rounds Webcast
May 1, 2014	Final date to submit online membership applications
May 21, 2014	AAST Grand Rounds Webcast
June 1, 2014	Final date to submit letters of support and CVs for 2014 Medical Student and Resident Scholarships to attend meeting in Philadelphia, PA to AAST central office in Chicago, IL

June 18, 2014	AAST Grand Rounds Webcast
July 16, 2014	AAST Grand Rounds Webcast
August 20, 2014	AAST Grand Rounds Webcast
September 18 – September 21, 2014	73rd Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery at Philadelphia Marriott, Philadelphia, PA
October 15, 2014	AAST Grand Rounds Webcast
November 19, 2014	AAST Grand Rounds Webcast
December 17, 2014	AAST Grand Rounds Webcast
December 31, 2014	Final opportunity to make your tax deductible contribution to the AAST Research and Education Foundation for 2014

IN MEMORY

IN MEMORY

Ronald P. Fisher, M.D., Ph.D.
Houston, TX
(1936—2013)
Member Since: 1975

Eric Frykberg, M.D.
Jacksonville, FL
(1951—2013)
Member Since: 1988

Kirk K. Kazarian, M.D.
Ossining, NY
(1961—2012)
Member Since: 1977

Calvin L. Long, Ph.D.
Birmingham, AL
(1928—2013)
Member Since: 1992

Arthur D. Mason, Jr., M.D.
San Antonio, TX
(1927—2013)
Member Since: 1969

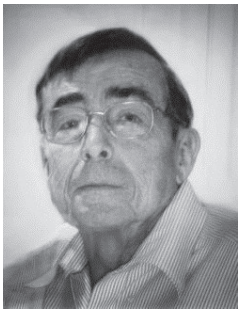
M. Gage Ochsner, Jr., M.D.
Savannah, GA
(1953—2013)
Member Since: 1992

David B. Pilcher, MD
San Francisco, CA
(1934—2012)
Member Since: 1974

Mark W. Sebastian, MD
Hartford, CT
(1957—2013)
Member Since: 2010

George F. Sheldon, MD
Chapel Hill, NC
(1934—2013)
Member Since: 1974

RONALD P. FISCHER, M.D., PH.D.



Dr. Ron Fischer, my mentor and friend, died Friday, January 25th after a long illness. He was born on January 29, 1936 in Philadelphia, PA and grew up in the Cincinnati, Ohio area. Having competed in the hurdles at Mariemont High School and making it all the way to the State Championships, Ron was awarded a full athletic scholarship in track and field from Ohio State where he graduated with a BS in Biology in 1957. He went on to medical school at the University of Cincinnati, during which time he met Nancy, his beloved wife of 51 years. Ronald completed his surgical residency under Dr. Owen Wangensteen at the University of Minnesota, where he also received his PhD in 1967. In 1968, Ron was sent to Vietnam and served as Chief of Surgery at the Saigon 3rd Army Field Hospital, receiving a Bronze Star for his service. While in Vietnam, Ron performed the first U.S. Army organ transplant (kidney). It was also the first to be performed in wartime and the first to be performed in Asia. He was promoted to Lieutenant Colonel while finishing his tour of duty at the Walter Reed Hospital in Washington, D.C.

Ron went on to a distinguished career as a general surgeon in academic medicine, starting as Assistant Professor of Surgery at the University of New Mexico Medical School in Albuquerque, NM. He then became Associate Professor of Surgery at the University of Minnesota Medical School, in St. Paul, MN where he was on the faculty with future WTA President Dr. Earl Young. Ron then served as Chairman of the Surgery Department at University of Arizona Medical School in Tucson, Arizona, where he established the first Trauma center in the state of Arizona. His next position brought him to Houston as Director of Trauma Surgery at University of Texas Medical School, where he worked with Dr. Red Duke to establish Hermann Hospital's Life Flight Program as the country's first and leading helicopter-based trauma center. I had the good fortune to be recruited to Hermann and UT by Ron in 1985, where I served as his assistant, sharing the responsibility for the Trauma Service with him. More importantly to me was his selfless and supportive role as my mentor, helping to shape my early and future academic career. One time, I mentioned how we were having difficulty with sepsis and renal failure in the Surgical ICU, and he sent me off to the St. Paul-Ramsey Hospital in Minnesota to learn about individualized antibiotic pharmacokinetics, which has continued to be a source of interest and investigation for me. He supported our development of a coagulation laboratory where we investigated the interactions of temperature on blood coagulation. And, notably, in 1989, he and Nancy brought Geri and I to Snowbird for our first Western Trauma Association meeting. Ron and Nancy had come to the Western Trauma Association meeting for their first time just one year earlier, and were so taken by the organization that they knew we should enjoy it with them. One of the most notable and influential WTA experiences they had was at that banquet their first year, right after Gene Moore had been elected President at the Business Meeting. Nancy had turned around to some commotion at the table behind them and said, "Ron, those people are having a food fight!" Ron turned around, saw the Moore brothers and friends in the fray and remarked, "Oh, that's the President!" We knew then that this was clearly the kind of organization we would enjoy, and have done so for 25 consecutive meetings. We were later happy to help introduce our other UT Houston colleagues, Dr. Chris Cocanour, Dr. Rosemary Kozar, and Dr. Brent King to the WTA.

Ron went on to become the first Chief of Surgery of the new LBJ Hospital in Houston and served on the Board of Regents of the American College of Surgeons. He retired in 1996, spending a number of years enjoying family and hobbies. At his recent passing, he was lucid toward the end while surrounded by loving family members. He is survived by Nancy, their son Dr. Craig Fischer of Houston, TX, and their daughter Shannon Fischer Ware of Belleair, FL.

R. Lawrence Reed, MD

ERIC R. FRYKBERG, M.D.

It is with great sadness that we inform you of the passing of a longtime friend and colleague on our campus, Eric R. Frykberg, M.D., who died yesterday at the age of 62.

For nearly 30 years Dr. Frykberg was a key leader at Shands Jacksonville Medical Center who played an integral role in all aspects of the Department of Surgery as Professor of Surgery and Chief of the Division of General Surgery at the University of Florida College of Medicine-Jacksonville

Dr. Frykberg received a Bachelor of Science degree from the College of William and Mary followed by medical school at the Medical College of Virginia. His residency in general surgery was at New York University and the Medical University of South Carolina where he trained under the late Dr. Marion Anderson. Following residency, Dr. Frykberg was a staff surgeon at the U.S. Naval Hospital in Jacksonville from 1982 to 1985. He then joined the medical staff at the Shands Jacksonville Medical Center and the faculty of the University of Florida. He was recruited to Jacksonville by the late Dr. Raymond Alexander and Dr. Joseph Tepas and he served in exemplary fashion and was clinically and academically very productive, progressing quickly to tenure as a professor.

Dr. Frykberg was active nationally and internationally particularly in the area of trauma care and disaster preparedness. He was recognized as an expert in his field in the local community, state, nation, and internationally. He was a founding member and Past-President of the Eastern Association for the Surgery of Trauma. He was a Governor of the American College of Surgeons and a member of its Committee on Trauma. He was a member of the American Surgical Association, Southern Surgical Association, American Association for the Surgery of Trauma and other associations.

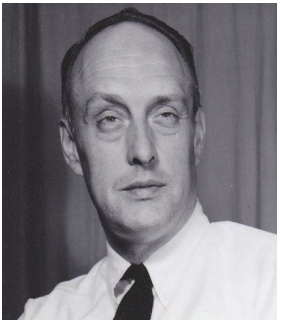
Dr. Frykberg had an ongoing interest in the progress of surgery and in the advancement of science. His academic interests were quite diverse and involved trauma care, disaster management, vascular injuries, general surgical problems, and the management of breast cancer and breast diseases. His broad experience and knowledge were key attributes to his success as a master surgical educator. His foresight saved many lives and his insights forged systems that will save many more.

Generations of students, residents, fellows, and colleagues were profoundly influenced by Dr. Frykberg's passion for surgical teaching. He will be missed by all who had the privilege to know him and to work with him.

Dr Frykberg is survived by his wife of 39 years, Patti, daughter Erica Glass, D.O., son Brett Frykberg, M.D., daughter Jessica Vogel and 5 grandchildren. Services will be held in Jacksonville, FL on Wednesday, April 3, 2013.

Daniel R. Wilson, M.D., Ph.D.

ARTHUR DIXON MASON, JR., M.D.



Arthur D. Mason, Jr., MD, the Biostatistical Consultant and member of the Editorial Board of the Journal of Trauma for seventeen years, who died on March 5, 2013 after a prolonged illness, was born in Muskogee, Oklahoma in 1927, grew up in New Orleans, and chose medicine as a career while an undergraduate at the University of Tulsa. In 1951 he received his medical degree from Washington University School of Medicine, where he was a member of Alpha Omega Alpha, and began his surgical residency at Barnes Hospital.

As a resident, Dick, under the tutelage of C. Barber Mueller, began studies of acute renal failure (ARF) which he continued during his two years of obligated service as a drafted doctor at the U.S. Army Surgical Research Unit, the Army Burn Center. The murine model of acute renal failure which he developed focused attention on the role of globin in the pathogenesis of ARF. After military service Dick returned to Barnes Hospital to continue his residency and research and moved with Dr. Mueller to Upstate Medical Center in Syracuse, New York, where he completed his surgical residency in 1958. He then returned to the Surgical Research Unit as Chief of the Laboratory Division, a position he held until he retired in 1995.

When physiologically based resuscitation markedly reduced the incidence of acute renal failure in burn and trauma patients, Dick refocused his activities on burn injury as the then renamed U.S. Army Institute of Surgical Research (USAISR) expanded to serve as the regional burn center for South Texas as well as the burn center for all the uniformed services. At the USAISR Dick had a major role in virtually all the major advances in our understanding of the pathophysiology of burn injury and the management of severely burned patients. Among the more important were studies defining burn wound sepsis which led to the development of effective topical antimicrobial chemotherapy, studies of resuscitation leading to modification of the original Brooke Formula, studies of inhalation injury that led to improved diagnosis and treatment, and studies characterizing post injury hypermetabolism and defining full spectrum metabolic and nutritional support.
Dick served as a scientific mentor of three generations of surgions and other scientists whose understanding of experimental design, research capabilities and academic credentials he expanded and burnished. Of those investigators with whom he collaborated, many serve as directors of burn centers and others have become Chairmen of Surgery and other departments at medical schools in the U.S. and other countries.

In addition to his Presidency of the American Burn Association in 1980, Dick's accomplishments were recognized by his receipt of the Harvey Stuart Allen Award in 1987, his appointment to the Shriners Hospitals Research Advisory Board, his appointment as a member of the Board of Medical Advisors of the International Association of Firefighters Burn Foundation, and his appointments to the editorial boards of the Journal of Burn Care and Research and the Journal of Trauma. The U.S. Army recognized him with six consecutive annual Senior Executive Service Awards and in 1985 he received the Presidential Rank Award of Meritorious Executive.

Dick's perceptive discussions of presentations at our annual meetings, which often enlightened both presenters and the audience, gave added value to the scientific sessions and will be sorely missed. In the aggregate, Dick Mason's work benefited all of us, patients and colleagues alike.

Basil A. Pruitt, Jr., MD FACS MCCM

MIMS GAGE OCHSNER, JR., M.D.

Mims Gage Ochsner, Jr. was born in New Orleans, Louisiana to his urologist father M. Gage Ochsner and mother Paddy Ochsner on May 10th 1953. He was named for the best friend and colleague of his grandfather Dr. Alton Ochsner one of the founders of the Ochsner Clinic. Gage attended Southern Methodist University in Dallas, Texas and then was graduated from Tulane University School of medicine in 1979. During his medical school years he was awarded the United States Naval Reserve Health professions Scholarship. He completed a surgical internship at the National Naval medical Center in Bethesda, Md. He completed his residency in surgery at the Naval Regional Medical Center in San Diego, Ca. In 1985, Dr. Ochsner then became the Chief of General Surgery and Director of Intensive Care at the Naval Hospital at Subic Bay, Philippines. From 1988-1990, he completed a fellowship in Trauma Critical Care at the Washington Hospital Center under the tutelage of his longtime friend and colleague Dr. Howard Champion. Following his fellowship training he stayed on to become an attending surgeon in trauma critical care and an Associate Professor of Surgery.

In 1994, Dr. Ochsner left the military and moved to Savannah, Georgia to become Chief of Trauma and Surgical Critical Care, a position he still holds. He became a full Professor of Surgery and was then appointed as Academic Chairman of the Mercer University School of Medicine Department of Surgery in 2011.

Dr. Ochsner has served on numerous boards and played a leadership role in many national surgical organizations. He was the president of the Ambrose Pare Society, the president of the Western Trauma Association, the president of the Georgia Surgical Society, the vice president of The American Association for the Surgery of Trauma, the vice president of the Southeastern Surgical Congress, and is currently the Secretary Treasurer of the Georgia Surgical Society. M.Gage Ochsner, Jr. has authored more than 50 peer reviewed scientific publications and has contributed eleven book chapters in major texts on trauma surgery. He has been the principal investigator on four grant funded studies at Memorial Health and has directed fifteen separate educational courses in Savannah.

During his tenure at Memorial Health University Hospital, Dr. Ochsner has grown the Trauma Service from 900 admissions to 2,700 admissions per year, has developed a respected and admired surgical critical care service, developed an Orthopedic Trauma Service, and has taken the full time Trauma Faculty from 3 to 9 surgeons. He has played a major role on the development of the statewide Georgia Trauma System.

He has received many awards and accolades including the Memorial Health Lifetime Achievement Award and the Georgia Medical Society Health Hero Award. A $500,000 grant was donated in his name to develop the M. Gage Ochsner Institute for Injury Research and Prevention.

Gage was married to the beautiful Judy Rochelle in San Diego in 1985 and they have two sons, Mims Gage Ochsner, III known as Trey and Matthew Cousins Ochsner. Trey is a junior at the Mercer University School of Medicine in Savannah and Matt is a sophomore at Emory University School of Medicine in Atlanta, Georgia. A daughter Katie from a previous marriage lives in the San Diego area.

Carl Boyd, MD

DAVID BOGART PILCHER, M.D.

David Pilcher, or "Pilch" to those of us who knew him well, passed away on September 4, 2012. He was born in Boston, the son of a surgeon and the great grandson of Lewis Stephen Pilcher, the founding editor of the *Annals of Surgery*. He grew up in West Newton (Massachusetts), but spent most of his summers in Vermont. He obtained his undergraduate degree from Amherst and his MD from the University of Rochester. He did his surgical internship and residency at the University of Vermont. He then served two years in the United States Army, one of which was spent in Viet Nam. While there he submitted several cases of vascular repair to the Viet Nam Vascular Registry. Upon finishing his service obligation he completed a vascular fellowship at UCLA and was subsequently recruited to the University of Vermont by Dr. John Davis, thus becoming the first fellowship-trained vascular surgeon in Vermont.

Dr. Pilcher had an intense interest in the early care of trauma patients and developed the first EMS system in Vermont and pioneered a system of training prehospital providers, part of which was his innovative "Ambulance Critique". Modeled after surgical morbidity and mortality conference, Ambulance Critique remains to this day a lively monthly exercise where EMS calls are reviewed with the people involved in the call at all levels (EMTs, ED staff, residents and surgeons). His contributions to the EMS in Vermont were memorialized by The Pilcher Lecture, which is given annually at the Vermont EMS Conference. His surgical career spanned 5 decades by the time he retired in 2004. He authored 50 articles and 8 book chapters and was recognized for expertise in both trauma care and vascular surgery. He served as Associate Editor of the Journal of Trauma (when Dr. Davis was Editor) and was a Past-President of the New England Society of Vascular Surgery. He wrote a book on the history of surgery at the University of Vermont entitled, 'Catamount Surgeons'.

Pilch was most proud of his clinical outcomes and his work with students, residents, and colleagues. His teaching style was less the condescending professor and more the self-effacing country doctor. More often than not he relayed to you how he had made the same mistake before and would suggest a way to either avoid the problem or fix it. Pilch was a renaissance man in his own way—sailing, skiing, scuba diving, growing orchids (no easy task in Vermont), photographing birds, and 'sugaring'. His maple syrup was ambrosial and he was always willing to teach a 'flatlander' the art, which usually began by having you tap a pine tree. His capacity for caring about his patients and his family was exemplary. In addition, he was a man of great integrity, honesty, loyalty, wit and dry humor. He is survived by his wife, children and grandchildren—and remembered daily by his many friends, students and colleagues.

Steven R. Shackford, MD

MARK WILLIAM SEBASTIAN, MD, FACS

Dr. Sebastian graduated from the University of Michigan and went on to obtain his medical degree from Rush Medical College in Chicago. He pursued his surgical training in both general and thoracic surgery at Duke University. Following that he completed a research fellowship in cellular immunology. He went on to obtain a fellowship in surgery and critical care and completed his education with a vascular surgical fellowship at the Brigham and Women's Hospital in Boston. His academic career began at Duke University where he was an Assistant Professor of Surgery and an Assistant Professor of Anesthesiology. He went on to become an Associate Professor of Surgery at Duke University and then an Associate Professor of Surgery at the University of Connecticut.

Dr. Sebastian was an excellent clinician. He was a fine technical surgeon and paid exquisite care to the treatment of his patients. He would spend long hours discussing clinical care with patients and their families. He was also a friend and mentor to numerous medical students, residents, and fellows. He would frequently conduct informal rounds in the outdoor gardens of the hospital and hold court with residents and fellows.

His academic interests included general surgery, vascular surgery, trauma, and surgical critical care. He was board certified in general surgery, surgical critical care, and vascular surgery. He became an instructor in the Advanced Trauma Operative Management Course and mentored numerous trainees and colleagues to hone their technical skills in the operating room.

He spent a number of years in the Middle East developing the critical care program and the Level I Trauma Center at Qatar. He was revered by his colleagues in that environment as a tireless teacher, mentor, and clinician. He developed the trauma surgical intensive care unit and developed a trauma critical care postgraduate core curriculum for surgeons in that area. His activities at the Hamad Hospital and Medical Center included being the program director for trauma, the trauma critical care fellowship, and the multidisciplinary trauma improvements committee. The rigor and attention to improving trauma care was significant under his mentorship.

Dr. Sebastian joined the faculty at Hartford Hospital and the University of Connecticut in 2009 and was the Associate Trauma Director. He became the Trauma Director at Hartford Hospital in 2012. He was instrumental in developing and beginning the implementation of the acute care fellowship program. He lectured at the Connecticut Statewide Trauma Conference and participated in ongoing education trauma rounds at numerous hospitals throughout the state.

Dr. Sebastian was a quiet, thoughtful, consummate surgeon who had a wonderful way with patients, residents, and all the families he interacted with. He will be sorely missed.

Lenworth Jacobs, MD, MPH

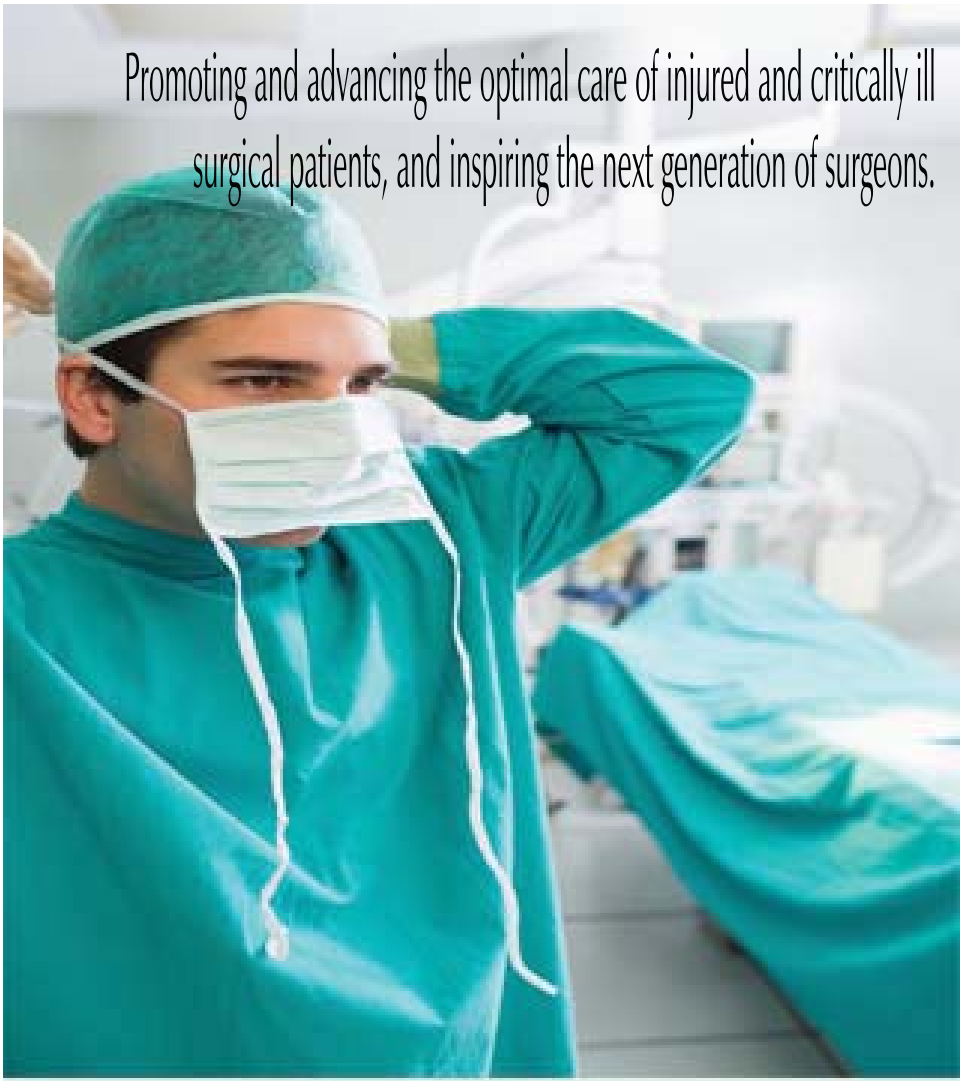
GEORGE F. SHELDON, M.D.

Dr. Sheldon, a graduate of the Kansas University School of Medicine, was Fellow in Internal Medicine at the Mayo Clinic, Resident in Surgery at the University of California-San Francisco, and Fellow in Surgical Biology at Harvard Medical School. He was Professor of Surgery and Chief of the Trauma Service at the University of California-San Francisco prior to becoming the Zack D. Owens Professor and Chairman (1984-2001) of the Department of Surgery at the University of North Carolina at Chapel Hill.

Dr. Sheldon is one of fewer than twenty surgeons in the past one hundred years to be president of all of the major surgical organizations, including President of the American College of Surgeons, President of the American Surgical Association, President of the American Association for the Surgery of Trauma, and Chair of the American Board of Surgery. He is the first surgeon, not a dean, to be Chairman of the Association of American Medical Colleges since 1879. He is a member of the Institute of Medicine of the National Academy of Sciences. He was a Charter Member of the Council on Graduate Medical Education (COGME) when it was founded in 1985 under the Department of Health and Human Services. Dr. Sheldon holds Honorary Fellowships in the Royal College of Surgeons of Edinburgh, the Royal College of Surgeons of England, the Association of Surgeons of Great Britain and Ireland, the European Surgical Association, the British Columbia Surgical Association, and the Colombian Surgical Association. He is an Honorary Fellow of the Society of Black Academic Surgeons. In 2000, he received the Kansas University School of Medicine Distinguished Alumna Award. In 2001 he was recognized by the North Carolina Chapter of the American College of Surgeons, as Honored Surgeon. In 2001 he was awarded the University of North Carolina Medical Alumni Association's Distinguished Faculty Award. In 2003 he was named as the Distinguished Service Member by the Association of American Medical Colleges. In 2008, he was honored with a Distinguished Alumni Award from the College of Arts and Sciences of The University of Kansas. In 2011, he was presented with the prestigious Thomas Jefferson Award by the University of North Carolina at Chapel Hill. In 2012, he was the recipient of the Lifetime Achievement Award by the American College of Surgeons, an honor that has only been bestowed once previously.

Dr. Sheldon was a member of the Faculty Council of The University of North Carolina at Chapel Hill and the Faculty Assembly of the University of North Carolina system. He is a former Director of the American College of Surgeons Health Policy Research Institute and Senior Research Fellow of the Cecil G. Sheps Center for Health Services Research. He is currently Editor-in-Chief of e-FACS.org, the web portal of the American College of Surgeons. He is author of over 400 articles and book chapters. In January 2010, Dr. Sheldon published his newest book entitled *Hugh Williamson: Physician, Patriot, and Founding Father*.

Anthony A. Meyers, MD



AAST

American Association for the Surgery of Trauma

Research and Education Foundation

72nd Annual Meeting of AAST and Clinical Congress of Acute Care Surgery
San Francisco, CA - September 18 – 21, 2013

WED. 9/18/2012	FUNCTION	ROOM
6:30 AM – 5:00 PM	Registration	East Lounge
6:45 AM – 11:00 AM	AAST Research and Education Board Meeting	Union Square 5/6
12:00 PM – 12:50 PM	75th Anniversary Opening Celebration	Continental Ballrooms 4/5/6
12:50 PM – 3:30 PM	Session I: Plenary (Papers 1-8)	Continental Ballrooms 4/5/6
3:30 PM – 4:00 PM	Session II: Master Surgeon Lecture I Jack McAninch, MD	Continental Ballrooms 4/5/6
4:00 PM – 5:00 PM	Session III: Challenging Cases Panel I	Continental Ballrooms 4/5/6
5:00 PM – 7:00 PM	Session IV: Poster Session & Exhibit Hall Opening Reception	Golden Gate (Main Level)
THURS. 9/19/2012	**FUNCTION**	**ROOM**
6:15 AM – 7:30 AM	Resident, Medical Student & In-Training Fellow Breakfast (Ticketed)	Plaza A (Main Level)
6:15 AM – 7:30 AM	Critical Care Committee Meeting	Continental Ballroom 1
6:15 AM – 7:30 AM	Acute Case Surgery Committee Meeting	Continental Ballroom 2
6:15 AM – 7:30 AM	International Relations Committee Meeting	Continental Ballroom 7
6:15 AM – 7:30 AM	Geriatric Trauma Committee Meeting	Continental Ballroom 8
6:15 AM – 7:30 AM	Multi-Institutional Trials Committee Meeting	Continental Ballroom 9
7:00 AM – 8:30 AM	Continental Breakfast	Golden Gate (Main Level)
7:00 AM – 3:00 PM	Exhibits and Posters	Golden Gate (Main Level)
7:00 AM – 4:00 PM	Registration	East Lounge
7:30 AM – 8:00 AM	Session V: Master Surgeon Lecture II Rao Ivatury, MD	Continental Ballrooms 4/5/6
8:00 AM – 9:20 AM	Session VI: Papers 9-12	Continental Ballrooms 4/5/6
9:20 AM – 9:40 AM	Session VII: Scholarship Presentations	Continental Ballrooms 4/5/6
9:40 AM – 10:00 AM	Break	Golden Gate
10:00 AM – 11:20 AM	Session VIII: Papers 13-16	Continental Ballrooms 4/5/6
11:30 AM – 12:30 PM	Session IX: Presidential Address, Robert C. Mackersie, MD	Continental Ballrooms 4/5/6
12:30 PM – 2:00 PM	Lunch Sessions	See Ticket for Location
1:45 PM – 2:00 PM	Break	Golden Gate (Main Level)
2:00 PM – 5:00 PM	Session XA: Papers 17-25	Continental Ballrooms 4/5
2:00 PM – 5:00 PM	Session XB: Papers 26-34	Continental Ballrooms 6
FRI. 9/20/2012	**FUNCTION**	**ROOM**
6:15 AM – 7:30 AM	Military Liaison Committee Meeting	Continental Ballroom 1
6:15 AM – 7:30 AM	Injury Assessment Committee Meeting	Continental Ballroom 2
6:15 AM – 7:30 AM	Publications and Communications Committee Meeting	Continental Ballroom 7
6:15 AM – 7:30 AM	Prevention Committee Meeting	Continental Ballroom 8
6:15 AM – 7:30 AM	Pediatric Committee Meeting	Continental Ballroom 9
6:15 AM – 7:30 AM	Education/CME Committee Meeting	Plaza B
6:30 AM – 7:30 AM	International Attendees Breakfast (Ticketed)	Plaza A
7:00 AM – 8:30 AM	Continental Breakfast	Golden Gate (Main Level)
7:00 AM – 2:00 PM	Exhibits and Posters	Golden Gate (Main Level)
7:00 AM – 3:00 PM	Registration	East Lounge
7:30 AM – 8:100 AM	Session XI: Master Surgeon Lecture III Kenneth Mattox, MD	Continental Ballrooms 4/5/6
8:00 AM – 9:10 AM	Session XII: Advance Techniques Panel	Continental Ballrooms 4/5/6
9:10 AM – 11:10 AM	Session XIII: Quick Shots	Continental Ballrooms 4/5/6
11:10AM – 11:25 AM	Break	Golden Gate
11:25AM – 12:15 PM	Session XIV: Fitts Lecture: Frank Lewis, MD	Continental Ballrooms 4/5/6
12:15 PM – 1:30 PM	Lunch Sessions	See Ticket for Location
1:30 PM – 4:50 PM	Session XVA: Papers 35-44	Continental Ballrooms 4/5
1:30 PM – 4:50 PM	Session XVB: Papers 45-54	Continental Ballrooms 6
4:50 PM – 5:00 PM	Military Awards	Continental Ballrooms 6
5:00 PM – 6:15 PM	AAST Annual Business Meeting	Continental Ballrooms 6
7:30 PM – 8:00 PM	Reception	East Lounge
8:00 PM – 10:00 PM	Banquet (Black Tie) Ticketed Event	Continental Ballrooms 4/5/6
SAT. 9/21/2012	**FUNCTION**	**ROOM**
8:00 AM – 9:30 AM	Continental Breakfast	East Lounge
7:00 AM – 10:00 AM	Registration	East Lounge
7:00 AM – 8:00 AM	New Fellows Breakfast (Ticketed Event)	Continental Ballroom 1
8:00 AM – 12:00 AM	Session XVI: Papers 55-66	Continental Ballrooms 6

ADDITIONAL INFORMATION

Speaker Ready Room Hours:

Tuesday, September 17 – 4:00 PM – 7:00 PM
Wednesday, September 18 – 6:30 AM – 5:00 PM
Thursday, September 19 – 7:00 AM – 5:00 PM
Friday, September 20 – 7:00 AM – 5:00 PM
Saturday, September 21 – 7:00 AM – 10:00 AM