March 3 – 8, 2019
Westin Snowmass Resort
Snowmass, CO

Western Trauma Association

49TH ANNUAL MEETING

FINAL PROGRAM

SAVE THE DATE

Western Trauma Association

50th Annual Meeting

February 23 – 28, 2020

Location to be announced at the Business Meeting

Western Trauma Association

FORTY-NINTH ANNUAL MEETING

March 3 – 8, 2019
Westin Snowmass Resort
Snowmass, CO

Dear Members, Friends and Guests:

The Western Trauma Association is a key part of my life, I consider it family in all aspects. As the president of WTA, it gives me great pleasure to welcome you to the 49th annual meeting in my favorite ski mountain, Snowmass, Colorado, a place where I met often with my family for a number of ski vacations. I hope that you use this time to learn, meet new "family", and spend valuable time with your own family.

New adventures await us at Snowmass this year. Thursday night we will party with the Norse God of Snow — Ullr — with Ullr Nights, a nighttime, winter wonderland at Elk Camp. We are changing up the banquet event to utilize this wonderful new activity center, featuring the "Breathtaker" alpine coaster that covers over a mile of terrain mid-mountain, zooming through the trees. My goal is to provide the best possible environment for quality family time with plenty of winter activities for everyone!

I look forward to skiing with as many of you as possible. I will post my ski destination each morning and hope that you can join me on the slopes.

Jerry (the "A/V Guy") and I look forward to hosting you at this wonderful venue. Let's pray that Ullr rewards our hard work with deep and plentiful snow! Welcome to our WTA family in Snowmass!

Roxie Albrecht, MD
President, Western Trauma Association

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CONTINUING MEDICAL EDUCATION CREDIT INFORMATION

Accreditation

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

AMA PRA Category 1 Credits™

The American College of Surgeons designates this live activity for a maximum of **19.0** *AMA PRA Category 1 Credits*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Of the *AMA PRA Category 1 Credits*™ listed above, a maximum of **16.0** credits meet the requirements for **Self-Assessment**.

Of the *AMA PRA Category 1 Credits*™ listed above, a maximum of **19.0** hours meet the requirements for **Trauma**.*

Of the *AMA PRA Category 1 Credits*™ listed above, a maximum of **1.25** hours meet the requirements for **Critical Care**.*

Of the *AMA PRA Category 1 Credits*™ listed above, a maximum of **0.25** hours meet the requirements for **Palliative Care**.*

Of the *AMA PRA Category 1 Credits*™ listed above, a maximum of **0.50** hours meet the requirements for **Pain Management**.*

Of the *AMA PRA Category 1 Credits*™ listed above, a maximum of **0.25** hours meet the requirements for **Domestic Violence**.*

Of the *AMA PRA Category 1 Credits*™ listed above, a maximum of **0.25** hours meet the requirements for **Pediatric Trauma**.*

**The content of this activity may meet certain mandates of regulatory bodies. Please note that ACS has not and does not verify the content for such mandates with any regulatory body. Individual physicians are responsible for verifying the content satisfies such requirements.*

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DIVISION OF EDUCATION

CME INFORMATION

TO CLAIM CME

You will receive an email with instructions on completing the meeting evaluation, taking self-assessment tests and obtaining your CME Certificate. These instructions will be sent to the email used to register you for the meeting. Instructions will also be posted on the WTA website. The self-assessment tests will be available at the end of each day.

MEETING APP INSTRUCTIONS

Download the WTA Meeting App on your iOS or Android device. The Schedule of Events, Attendee List, Abstracts and Self-Assessment tests can be found on the app.

View the Vimeo video for downloading an app on iOS – first time users – https://vimeo.com/155553890

Downloading the app is easy on iOS and Android! Instructions:

1. Visit http://my.yapp.us/WTAMEETING on your device and follow instructions on the page
2. You'll be asked to install Yapp from the app store. (if you don't have it already)
3. Open Yapp and tap "Download an existing Yapp" and your app will appear.

Don't have an iOS or Android device?

You can view this app from your desktop browser by clicking the my.yapp.us URL above.

LEARNING OBJECTIVES

This activity is designed for physicians of all specialties who are involved in the care of trauma patients.

Upon completion of this course, attendees will be able to:

- Compare VTE rates in TBI and/or solid organ injury patients with vs without early chemo-prophylaxis
- Explain the relationship of pre-existing psychiatric illness on outcomes
- Recognize the link between financial toxicity and long-term outcomes of traumatized patients
- Assess the impact of frailty and sarcopenia on outcomes of traumatized patients
- Recognize the importance of early palliative care evaluation on outcomes following injury
- Create hospital based intimate partner and violence prevention programs
- Discuss early use of plasma and/or whole blood on outcomes of injured patients in shock

DISCLOSURE INFORMATION

In compliance with the ACCME Accreditation Criteria, the American College of Surgeons 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. All reported conflicts are managed by a designated official to ensure a bias-free presentation. Please see the insert to this program for the complete disclosure list.

WTA MISSION STATEMENT

The Western Trauma Association is committed to the improvement of trauma care through research, education, sharing of clinical experiences, and the development of physicians of all specialties who are involved in the care of trauma patients. The goals of the Association are not only the intellectual growth attained through increased knowledge, but also the emotional growth attained through camaraderie and interaction with family and friends in an environment conducive to winter sports.

2018-2019 OFFICERS & COMMITTEE CHAIRS

Officers	
President	Roxie M. Albrecht, MD
President-Elect	David V. Shatz, MD
Vice President	Robert McIntyre, MD
Secretary	Rosemary Kozar, MD
Treasurer	Richard Miller, MD
Historian	Mark Metzdorff, MD
Immediate Past President	Dennis W. Vane, MD

Board of Directors	**Term Ends**
Thomas M. Scalea, MD	2019
Carlos Brown, MD	2019
Enrique Ginzburg, MD	2019
Carl J, Hauser, MD	2020
Bonny Baron, MD	2020
Riyad Karmy Jones, MD	2020
Dennis W. Vane, MD	2021
Rochelle Dicker, MD	2021
Mitch Cohen, MD	2021

Program Chair	**Term Ends**
Ajai Malhotra. MD	2019

Publications Chair	**Term Ends**
Karen Brasel, MD	2020

Multi-Center Trials Chair	**Term Ends**
Carlos Brown, MD	2021

Algorithms Chair	**Term Ends**
Kenji Inaba, MD	2019

Nominating Chair	**Term Ends**
Dennis W. Vane, MD	2019

2018-2019 COMMITTEES

Program Committee
Ajai Malhotra, MD, *Chair*
Roxie Albrecht, MD, *ex-officio*
Karen Brasel, MD, *ex-officio*
Megan Brenner, MD
Bryan Collier, MD
Charles Fox, MD
James Haan, MD
Krista Kaups, MD
Robert Letton, MD
Nirav Patel, MD
Stephanie Savage, MD
Gary Vercruysse, MD
Jordan Weinberg, MD

Publications Committee
Karen Brasel, MD, *Chair*
Marc DeMoya, MD
Alex Eastman, MD
Joseph Galante, MD
Oliver Gunter, MD
Bellal Joseph, MD
Olga Kaslow, MD
Anastasia Kunac, MD
Bob Letton, MD
James McCarthy, MD
Jasmeet Paul, MD
Justin Richards, MD
Mark Shapiro, MD
Jason Sperry, MD
Rob Todd, MD
Jennifer Watters, MD
Ben Zarzaur, MD

Nominating Committee
Dennis W. Vane, MD, *Chair*
Carl Hauser, MD
Thomas Scalea, MD
Oscar Guillamondegui, MD
Jennifer Watters, MD

Multi-Center Trials Committee
Carlos Brown, MD, *Chair*

Algorithms Committee
Kenji Inaba, MD, *Chair*
Hasan Alam, MD
Carlos Brown, MD
Dave Ciesla, MD
Rosemary Kozar, MD, *ex-officio*
Ajai Malhotra, MD, *ex-officio*
Matthew Martin, MD
Anne Rizzo, MD
Jack Sava, MD
Jason Sperry, MD
Gary Verycrusse, MD

WTA PRESIDENTS

Robert G. Volz, MD	1971	Vail
Robert G. Volz, MD	1972	Vail
Peter V. Teal, MD	1973	Vail
William R. Hamsa, MD	1974	Aspen
Arthur M. McGuire, MD	1975	Sun Valley
Lynn Ketchum, MD	1976	Snowmass
Fred C. Chang, MD	1977	Park City
Glen D. Nelson, MD	1978	Steamboat
Gerald D. Nelson, MD	1979	Snowmass
Kevin G. Ryan, MD	1980	Snowbird
David S. Bradford, MD	1981	Jackson Hole
Erick R. Ratzer, MD	1982	Vail
William R. Olsen, MD	1983	Jackson Hole
Earl G. Young, MD	1984	Steamboat Springs
Robert B. Rutherford, MD	1985	Snowbird
Rudolph A. Klassen, MD	1986	Sun Valley
Robert J. Neviaser, MD	1987	Jackson Hole
Robert C. Edmondson, MD	1988	Steamboat Springs
Ernest E. Moore, MD	1989	Snowbird
Stephen W. Carveth, MD	1990	Crested Butte
George E. Pierce, MD	1991	Jackson Hole
Peter Mucha, Jr., MD	1992	Steamboat
David V. Feliciano, MD	1993	Snowbird
R. Chris Wray, MD	1994	Crested Butte
David A. Kappel, MD	1995	Big Sky
Thomas H. Cogbill, MD	1996	Grand Targhee
G. Jerry Jurkovich, MD	1997	Snowbird
James B. Benjamin, MD	1998	Lake Louise
Herbert J. Thomas III, MD	1999	Crested Butte
Barry C. Esrig, MD	2000	Squaw Valley
Steven R. Shackford, MD	2001	Big Sky
James A. Edney, MD	2002	Whistler-Blackcomb
J. Scott Millikan, MD	2003	Snowbird
Harvey J. Sugerman, MD	2004	Steamboat Springs
Scott R. Petersen, MD	2005	Jackson Hole
Harold F. Sherman. MD	2006	Big Sky

WTA PRESIDENTS

Frederick A. Moore, MD	2007	Steamboat Springs
James W. Davis, MD	2008	Squaw Valley
Grace S. Rozycki, MD	2009	Crested Butte
Robert C. Mackersie, MD	2010	Telluride
M. Gage Ochsner, MD	2011	Big Sky
R. Lawrence Reed, MD	2012	Vail
Mark T. Metzdorff, MD	2013	Snowmass
David H. Livingston, MD	2014	Steamboat Springs
Christine S. Cocanour, MD	2015	Telluride
Thomas M. Scalea, MD	2016	Squaw Valley
Carl J. Hauser, MD	2017	Snowbird
Dennis W. Vane, MD	2018	Whistler
Roxie M. Albrecht, MD	2019	Snowmass

NEW MEMBERS

Western Trauma Association Welcomed the Following New Members at the 2018 Annual Meeting

Raeanna Adams, MD
Nashville, TN
Surgical Critical Care
Active Member

Christopher Dente, MD
Atlanta, GA
Surgical Critical Care
Active Member

Casey Dunne, MPH
Denver, CO
Associate Member

Mark Falimirski, MD
Indianapolis, IN
Surgical Critical Care
Active Member

Joseph Galante, MD
Sacramento, CA
Surgical Critical Care
Active Member

Stephanie Gordy, MD
Houston, TX
Surgical Critical Care
Active Member

Bellal Joseph, MD
Tuscon, AZ
General Surgery
Active Member

David Kissinger, MD
Sacramento, CA
Surgical Critical Care
Senior Member

Jennifer Massetti, ACNP
Baltimore, MD
Associate Member

Nelson Rosen, MD
Cincinnati, OH
Pediatric Surgery
Active Member

Dustin Smoot, MD
Spearfish, SD
General Surgery
Active Member

John Sutyak, EdM, MD
Springfield, IL
General Surgery
Senior Member

Desarom Teso, MD
Vancouver, WA
Vascular Surgery
Active Member

Pascal Udekwu, MD FACS
Raleigh, NC
Surgical Critical Care
Senior Member

WESTERN TRAUMA FOUNDATION DONORS

Current lifetime accumulation status based on 2018 year end

Summit
($25,000 and up)

Barry Esrig
Ernest Moore
Thomas Scalea
Robert Volz

Extreme
($10,000-24,999)

James Davis
David Feliciano
David Livingston
Grace Rozycki

Couloir Society
($5,000 – $9,999)

Roxie Albrecht
Christine Cocanour
David Kissinger
Matthew Martin
Robert McIntyre, Jr.
Mark Metzdorff
Andrew Michaels
J. Scott Millikan
Robert Neviaser
Kimberly Peck
Scott Petersen
R. Lawrence Reed
Steven Shackford
Herbert Thomas, III
Dennis Vane

WESTERN TRAUMA FOUNDATION DONORS

Double Black Diamond Club
($2,500 - $4,999)

John Adams
Denis Bensard
Marilu Bintz
Gregory Campbell
Kimberly Davis
George Dulabon
Soumitra Eachempati
Enrique Ginzburg
James Haan
Gregory Jurkovich
David Kappel
Krista Kaups
Robert Mackersie
Steve Moulton
Steven Ross
David Shatz
R. Stephen Smith
Harvey Sugerman

Black Diamond Circle
($1,000 - $2,499)

James Benjamin
Walter Biffl
Karen Brasel
Megan Brenner
Carlos Brown
Miriam Bullard
David Ciesla
Thomas Cogbill
Mitch Cohen
Raul Coimbra
Marc de Moya
Rochelle Dicker
Doreen DiPasquale
Charles Fox
K. Dean Gubler
Carl Hauser
Riyad Karmy-Jones
Natasha Keric
Brent King
M. Margaret Knudson
Rosemary Kozar
Guy Lanzi
Robert Letton
William Long
Manuel Lorenzo
Barbara Mainville
Ajai Malhotra
James McCarthy
Richard Miller
Frederick Moore
Nicholas Namias
M. Gage Ochsner
Patrick Offner
Peter Rhee
Anne Rizzo
Susan Rowell
Martin Schreiber
Harold Sherman
Keith Stephenson
Ali Tabatabai
Michael Truitt
Steven Wald *
Jennifer Watters
Michaela West

WESTERN TRAUMA FOUNDATION DONORS

Blue Trail Associate
($500 - $999)

Hasan Alam
Scott Armen
Bonny Baron
Erik Barquist
Howard Champion
Roy Cobean
Alain Corcos
Clay Cothren-Burlew
James Cushman
Matthew Eckert
Bruce Ferris
Alfonso Fonseca
Richard Gamelli
Rajesh Gandhi
Larry Gentilello
John Hall
David Hoyt
Richard Leone
Alicia Mangram
M. Ashraf Mansour
Alan Marr
John McGill
Frank Nastanski
Raminder Nirula
David Notrica
J. Bradley Pickhardt
Basil Pruitt
Andrew Rosenthal
Henry Sagi
Kevin Schuster
Aaron Scifres
Aaron Scifres
Mark Shapiro
George Testerman
Brian Tibbs
S. Robb Todd
Eric A. Toschlog
R. Christie Wray, Jr.
Ben Zarzaur

Green Trail Associate
(up to $499)

Christopher Baker
Christopher Barrett
Allison Berndtson
Donald Carter
Charles Cook
Todd Costintini
Martin Croce
Matthew Davis
Jody Digiacomo
Julie Dunn
Brian Eastridge
John Fildes
Warren Gall
Ernest Gonzalez
Rajan Gupta
Michael Hauty
James Hebert
Jeff Heisler
Brian Hoey
Kenji Inaba
Jay Johannigman
Laura Johnson
Olga Kaslow
Matthew LaPorta
Barbara Latenser
David Leshikar
Heather MacNew
Charles Mains
Robert Maxwell
Laura Moore
Charlene Nagy
Michael Norman
Robert O'Connor
Keith O'Malley
Jasmeet Paul
Erik Peltz
George Pierce
Bruce Potenza
Nelson Rosen
Edmund Rutherford
Jack Sava
Carol Schermer
Henry Schiller
Chance Spalding
Ronald Tesoriero
Ricard Townsend
Pascal Udekwu
Daniel Vargo
Gary Vercruysse
Charlie Wade
Amy Wyrzykowski

IN MEMORIAM

Earl G. Young, MD
February 27, 1989

Gerald S. Gussack, MD
August 25, 1997

Peter Mucha, Jr., MD
August 9, 2006

W. Bishop McGill, MD
October 14, 2007

Ronald P. Fischer, MD
January 25, 2013

M. Gage Ochsner, MD
April 26, 2013

George Cierny, MD
June 24, 2013

R. Christie Wray, MD
November 18, 2013

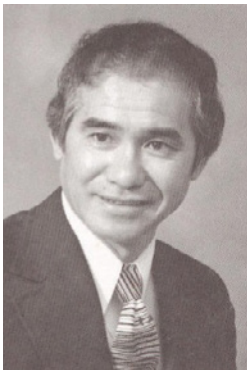
Robert B. Rutherford, MD
November 22, 2013

Doreen DiPasquale, MD
January 7, 2014

Barbara Latenser, MD
June 15, 2015

Matthew L Davis, MD
September 3, 2015

EARL YOUNG AWARD



Earl G. Young, MD
(1928-1989)

EARL YOUNG RESIDENT PRIZE FOR CLINICAL RESEARCH

The Earl Young Resident Prize for Clinical Research was established after the death of one of the Founding members of the Western Trauma Association. This prize is a continuation of Dr. Young's profound interest in the training of residents and his commitment to ongoing research. It is given each year to stimulate resident clinical research. Abstracts eligible for this award are submitted to the Program Committee for resident prize status and presentation at the annual meeting of the Western Trauma Association. A manuscript must be submitted to the Journal of Trauma and Acute Care Surgery in advance of the meeting for consideration of publication. The manuscript and presentation are judged with first and second place cash prizes and recognition given at the annual WTA annual banquet. The 1st place resident's name is listed in the annual meeting program book.

Dr. John Najarian characterizing Earl at a memorial service in his honor at the University of Minnesota:

Dr. Earl G. Young of Minneapolis was a founding member of the Western Trauma Association and its 14th President. He died of a myocardial infarction, Monday, February 27, 1989, while skiing at Snowbird during the 19th Annual Meeting of the Association.

Dr. Young received his medical degree from the University of Rochester, N.Y. and Ph.D. in surgery from the University of Minnesota. He completed advanced training in cancer research at Harvard, a fellowship in cardiovascular surgery at Baylor University in Houston and studied microvascular surgery at the University of California–San Diego.

EARL YOUNG AWARD

He was a clinical professor of surgery at the University of Minnesota Medical School, and a practicing general and vascular surgeon at the Park-Nicollet Clinic in Minneapolis from 1960. He was nationally known and was actively involved in research and education throughout his career. In 1988, one year before his untimely death, he received the Owen H. Wangensteen Award for Academic Excellence from the University of Minnesota Health Science Center. It was awarded by an unprecedented unanimous vote of all 72 surgical residents.

The Residents Paper competition was begun in 1991 as a tribute to Dr. Young's memory and his "spirit of inquiry, love of learning ... and commitment in service to mankind."

EARL G. YOUNG AWARD RECIPIENTS

Resident	Institution	Year
Joseph Schmoker, MD	University of Vermont	1991
Joseph Schmoker, MD	University of Vermont	1992
Charles Mock, MD	University of Washington	1993
Gino Travisani, MD	University of Vermont	1994
Phillip C. Ridings, MD	Medical College of Virginia	1995
David Han, MD	Emory University	1996
Preston R. Miller, MD	Wake Forest University	1997
Geoffrey Manley, MD, PhD	University of California, San Francisco	1998
James M. Doty, MD	Medical College of Virginia	1999
David J. Ciesla, MD	Denver Health/University of Colorado	2000
Ricardo J. Gonzales, MD	Denver Health/University of Colorado	2001
Scott C. Brakenridge, MD	Cook County Hospital	2002
Adena J, Osband, MD	UMDNJ-New Jersey Medical School	2003
Cindy Lee, MD	UMDNJ-New Jersey Medical School	2004
Ernest A. Gonzalez, MD	University of Texas at Houston	2005
Jennifer M. Watters, MD	Oregon Health & Science University	2005
Jennifer J. Wan, MD	University of California, San Francisco	2006
Jennifer J. Wan, MD	University of California, San Francisco	2007
Keir J. Warner, MD	University of Washington	2008
T. W. Constantini, MD	University of California, San Diego	2009
C. Anne Morrison, MD	Baylor College of Medicine	2010
Marlin Causey, MD	Madigan Army Medical Center	2011
Phillip Letourneau, MD	University of Texas at Houston	2011
Gerard De Castro, MD	University of Maryland	2011
Matthew E. Kutcher, MD	University of California, San Francisco	2012
Kimberly Song, MD, MA	UMDNJ – New Jersey Medical School	2013
Lucy Kornblith, MD	UCSF/SFGH, San Francisco	2014
Hunter B. Moore, MD	Denver Health/University of Colorado	2015
George Black, MD	Madigan Army Medical Center	2016
Morgan Barron, MD	Madigan Army Medical Center	2017
John Kuckelman, MD	Madigan Army Medical Center	2018

E. EUGENE MOORE RESIDENT PRIZE

The E. Eugene Moore Resident Prize for Basic Science Research has been established to encourage residents to become surgeon researchers. Dr. "Gene" Moore has been a major factor in the academic growth of the Western Trauma Association by encouraging resident attendance and participation in the program at the Annual Meeting of the WTA. Abstracts eligible for this award are submitted to the Program Committee for resident prize status presentation at the annual meeting of the Weswtern Trauma Association. A manuscript must be submitted to the Journal of Trauma and Acute Care Surgery in advance of the meeting for consideration of publication. The manuscript and presentation are judged with first and second place cash prizes and recognition given at the annual WTA annual banquet. The 1st place resident's name is listed in the annual meeting program book

This is the first year for the E. Eugene Moore Resident Prize for Basic Science Research.

PRESIDENTIAL ADDRESS

DUTY AND WHAT REALLY MATTERS: PROFESSION AND SELF

Tuesday, March 5
5:00 pm – 6:00 pm

Roxie M. Albrecht, MD, FACS, FCCM
Diplomate American Board of Surgery

Roxie M. Albrecht, MD, FACS, FCCM, DABS, Professor, Vice Chair of Quality and Division Chief of General Surgery, Trauma and Surgical Critical Care for the Department of Surgery at the University of Oklahoma. A graduate of the University of Iowa undergraduate and Medical School, she completed a general surgery residency at the Michigan State University – Butterworth Hospital and a surgical critical care fellowship at the University of Miami.

She has been the Director of Trauma at OU Medical Center since 2001. She has been active in the development of the OUMC Level 1 Trauma Center and the trauma System in the State of Oklahoma. She has been

PRESIDENTIAL ADDRESS

a member of the ACS Committee on Trauma and completed a six-year term as Region Chief for Region 6. Since her arrival in Oklahoma she has worked on advocacy for trauma and injury prevention legislation. For her work in patient and system advocacy she has received the HCA Frist Humanitarian Award from OU Medical Center and the Rhinehart Community Service award from the Oklahoma County Medical Society. Additionally, she has been active in a number regional and national association leadership positions for the Southwestern Surgical Congress, Midwest Surgical Association, Society of Critical Care Medicine and the Western Trauma Associations. She is the 2018-19 President of the Western Trauma Association, a past President (2011) of the Midwest Surgical Association and past Chair of the Surgical Section of the Society of Critical Care Medicine. Dr. Albrecht served from 2013-2019 as the Director on the American Board of Surgery representing the Southwestern Surgical Congress.

Dr. Albrecht has interests in clinical patient care for injured and critically ill patients, performance improvement, patient safety and quality and surgical education. She has received awards for medical student and resident teaching from her academic institutions and the Shubin/Weil Master Clinician/Teacher award for Excellence in Bedside Teaching from the Society of Critical Care Medicine.

In addition to her clinical and academic positions Dr. Albrecht is the Adult Safety Medical Director for the OU Physician's medical group. She is a master trainer for TeamSTEPPS a teamwork system for health care professionals and has completed the Armstrong Institutes Patient Safety Certificate Program and the Comprehensive Unit-Based Safety Program. Dr. Albrecht is assisting in the implementation of these programs across the OU Medical System.

Most recently, the OU College of Medicine Alumni Association honored her with the Dean's Award for Distinguished Medical Service in the Oklahoma community.

"PAINT THE CEILING" LECTURESHIP

In 1997, Dr. Gregory "Jerry" Jurkovich delivered his Presidential Address entitled "Paint the Ceiling: Reflections on Illness". This was a personal account of his battle with non-Hodgkin's lymphoma. His deep insights were shared from a patient's perspective, even that of a stained ceiling that he observed while lying on his back. He proposed that future WTA Scientific Programs have some time "dedicated to our patients and to the Art of Medicine".

This lecture has become an annual invited lecture which is integral to the unique identity of the Western Trauma Association Annual Meeting. Unlike the scientific session program, this lecture focuses on the humanistic aspects of medicine and can be attended by all participants, guests, and their families. Past lectures have been personal, local, national, and global, covering topics such as first-person accounts of illness, social and societal aspects that affect all patient care, programs providing relief in troubled or impoverished areas, or personal reflections on delivering care in a humane, holistic fashion. A speaker is chosen annually by the current President of the WTA. The Western Trauma Foundation provides an honorarium and expenses for this lecture.

Presenter	**Year**	**Location**
G. Jerry Jurkovich, MD	1997	Snowbird
John W. McGill, MD	1998	Lake Louise
William T. Close, MD	1999	Crested Butte
Jimmy Cornell	2000	Squaw Valley
Geoff Tabin, MD	2001	Big Sky
James H. "Red" Duke, MD	2002	Whistler
David V. Shatz, MD	2003	Snowbird
Susan and Tim Baker	2004	Steamboat Springs
Alex Habel, MD	2005	Jackson Hole
Andrew Schneider	2006	Big Sky
Ernest E. Moore, MD	2007	Steamboat Springs
Pamela Kallsen	2008	Squaw Valley
Sylvia Campbell, MD	2009	Crested Butte
William Schecter, MD	2010	Telluride
Jeff McKenney, MD	2011	Big Sky
Larry M. Gentilello, MD	2012	Vail
Neil L. Barg, MD	2013	Snowmass
Ziad Sifri, MD	2014	Steamboat Springs
Julie Freischlag, MD	2015	Telluride
Lewis Rubinson, MD, PhD	2016	Squaw Valley
Kenneth Waxman, MD	2017	Snowbird
Steven R. Shackford, MD	2018	Whistler
M. Margaret Knudson, MD	2019	Snowmass

PAINT THE CEILING LECTURE

CARING FOR ALL

Thursday, March 7
5:20 pm – 6:00 pm

M. Margaret "Peggy" Knudson MD
University of California San Francisco,
San Francisco, CA

M. Margaret (Peggy) Knudson MD, FACS attended medical school at the U. of Michigan. After completing her surgical residency there, she joined the surgical faculty at Stanford University where she served as the Assistant Trauma Director. In 1989, Dr. Knudson was recruited to the University of California at San Francisco and has attained the rank of Professor in the ladder series. Her practice is based primarily at the Zuckerberg/San Francisco General Hospital and Trauma Center, where she is an attending surgeon on the trauma/critical care/emergency surgery service. For 20 years, she served as the Director of the San Francisco Injury Center for Research and Prevention, one of the first CDC-funded Centers nationally. Her research focuses on resuscitation, venous thromboembolic disease, and pediatric injury prevention. Dr. Knudson served on the Committee on Trauma for 17 years, including 4 years as the Vice-Chair for the central COT. She was awarded the National Safety Council Award from the COT/AAST for her work in trauma and injury prevention. She has also been on the Board of Managers of both the Western Trauma Association and the American Association for the Surgery of Trauma. She is a member of the editorial boards of the Journal of Trauma and Acute Care Surgery, the Journal of the American College of Surgeons and Shock. She served as the Science Chair for the National Trauma Institute for four years and continues on their Board of Directors. Dr. Knudson has given multiple keynote speeches nationally and internationally. This year she was selected to give the American College of Surgeons Scudder Award on Trauma. Dr. Knudson has traveled widely with the US military including trips into Germany and Iraq and now serves as the Medical Director for the Military Health System Strategic Partnership with the American College of Surgeons. She has recently been appointed as an Adjunct Professor of Surgery at the Uniformed Services University. Dr. Knudson is currently the PI of a multi-center research grant focusing on post-traumatic pulmonary emboli funded by the Department of Defense.

FOUNDERS' BASIC SCIENCE LECTURE

This lecture was established by a founding member (Robert Volz, President 1971 & 1972) of the Western Trauma to enhance the academic mission and provide valuable basic science information that is relevant to the field of trauma. It is a scheduled part of the annual meeting in which an invited speaker is chosen to discuss a specific basic research topic that has clinical relevance to the care of the trauma patient. Honoraria and expenses are paid by the Western Trauma Foundation as part of its mission to support the academic endeavors of the Western Trauma Association. These surgeon/researchers are selected by the program committee for their specific expertise and contributions to the knowledgebase in the field of trauma. This lecture is often a combination of translational as well as basic science research.

Presenter	Year	Location
Raul Coimbra, MD	2009	Crested Butte
Lawrence Diebel, MD	2010	Telluride
Carl J. Hauser, MD	2011	Big Sky
Fred Moore, MD	2012	Vail
Steve Shackford, MD	2013	Snowmass
Hasan B. Alam, MD	2014	Steamboat Springs
Charles S. Cox, Jr. MD	2015	Telluride
Rosemary Kozar, MD	2016	Squaw Valley
Mitchell J. Cohen, MD	2017	Snowbird
Ernest "Gene" Moore, MD	2018	Whistler
Timothy R. Billiar, MD	2019	Snowmass

FOUNDERS' BASIC SCIENCE LECTURE

TRAUMA IMMUNOLOGY – A NEW NAME FOR AN OLD CONCEPT

Wednesday, March 6
8:20 am – 9:00 am

Timothy R. Billiar, MD
University of Pittsburgh, Pittsburgh, PA

Dr. Billiar trained in General Surgery at the University of Minnesota and University of Pittsburgh. This included a four year fellowship in translational research. Over the past 26 years, he has been a practicing Acute Care Surgeon and Surgeon Scientist. His laboratory and research program have long-standing interest in the host response to severe trauma and surgical sepsis. They have worked extensively with human systems as well as small animal models of multisystem injury and sepsis. They have contributed to the understanding of the role of nitric oxide, pattern recognition receptors and damaged associated molecular patterns as regulators of the immuno- inflammatory response to injury and sepsis. They have also carried out extensive studies on inflammatory networks in a large number of severely injured humans and have contributed to the understanding of the differences in circulating biomarkers that coincide with distinct organ dysfunction phenotypes. His laboratory research over the past five years has stressed three strategies. First, they integrate recent basic science discoveries into mechanistic models of sepsis and trauma. Second, they reverse translation of observations made in critically ill patients into our mechanistic models. Third, they test modifiers of promising targets in the mechanistic models to obtain proof-of concept data for research translation.

In addition, Dr. Billiar has been a highly productive physician investigator as supported by the objective evidence of an H index of 129 and nearly 66,000 citations to his work in the biomedical literature. His H-index since 2013 is 66 and there have been nearly 21,000 citations of his work in the past five years. He was awarded the Medallion for Scientific

FOUNDERS' BASIC SCIENCE LECTURE

Achievement from the American Surgical Association (its highest honor) and received the Award for Scientific Achievement from the Shock Society (both in 2015). He previously served on the Surgery, Anesthesiology and Trauma Study Section and continues to chair numerous special emphasis panels for the Center of Scientific Review.

Mentorship and research training: He has served as PI of the Trauma T32 Award for training in trauma and sepsis research since 1998 and has overseen a surgical residency since 1999 that specializes in the training of surgeon-investigators. All of the surgical residents in this program undergo 2-3 years of fulltime research training. He also co-developed a program that brings medical students from two Chinese medical schools (Tsinghua and Xiangya) for a two year research training program at the University of Pittsburgh. For this, he received the Friendship Award in 2016 from the People's Republic of China (the highest award bestowed by the PRC on foreigners for work done in China).

NOTES

SUNDAY, MARCH 3, 2019

5:00pm - 7:30pm	**REGISTRATION OPEN** *Westin Conference Center Lobby*
5:00pm - 7:00pm	**WELCOME RECEPTION** *Westin Conference Center – Salon CDE*
5:00pm - 7:00pm	**KIDS WELCOME RECEPTION** *Westin Conference Center – Cathedral Peak*
6:00pm - 7:00pm	**WTA FOUNDATION MEETING** *Westin Conference Center – The Cirque Boardroom*
7:00pm - 8:00pm	**WTA PAST PRESIDENTS MEETING** *Westin Conference Center – The Cirque Boardroom*

MONDAY, MARCH 4, 2019

6:30am - 9:00am	**REGISTRATION & EXHIBITS OPEN** *Westin Conference Center Lobby*
6:30am - 8:00am	**ATTENDEE BREAKFAST** *Westin Conference Center – Salon CDE*
7:00am - 9:00am	**SCIENTIFIC SESSION 1** **Moderator: Ajai Malhotra MD** *Westin Conference Center – Salon AB* * Indicates Earl G. Young Clinical Research Competition
7:00am - 7:20am go to page 41	HELMET USE ASSOCIATED WITH HIGHER INJURY SEVERITY SCORES FOR ALPINE SKIERS AND SNOWBOARDERS EVALUATED AT A LEVEL 1 TRAUMA CENTER * *Eleah Porter MD, Dartmouth-Hitchcock Medical Center, Lebanon, NH*
7:20am - 7:40am go to page 43	A STITCH IN TIME SAVES CLOTS: A MULTICENTER ANALYSIS OF VENOUS THROMBOEMBOLISM CHEMOPROPHYLAXIS IN PATIENTS WITH TRAUMATIC BRAIN INJURY *Heather Carmichael MD, MPH, University of Colorado-Denver, Aurora, CO*
7:40am - 8:00am go to page 45	PRE-EXISTING MAJOR PSYCHIATRIC ILLNESS IN PATIENTS WITH TRAUMATIC BRAIN INJURY (TBI) INCREASES THE RISK OF POST-TBI SEIZURES * *Faisal Jehan MD, New York Medical College, Westchester Medical Center, Valhalla, NY*
8:00am - 8:20am go to page 47	FINANCIAL TOXICITY IS ASSOCIATED WITH POOR LONG-TERM OUTCOMES AFTER INJURY * *Patrick Murphy MD, Indiana University School of Medicine. Indianapolis, IN*
8:20am - 8:40am go to page 49	THE GERI-RIB SCORE: PREDICTING ADVERSE OUTCOMES WITH READILY AVAILABLE TOOLS * *Bryan Carr, Indiana University, Indianapolis, IN*
8:40am - 9:00am go to page 51	VITAL CAPACITY IS SUPERIOR TO RIBSCORE AT PREDICTING PULMONARY COMPLICATIONS AFTER RIB FRACTURES * *Kelly Boyle MD, Medical College of Wisconsin, Milwaukee, WI*

7:30am - 9:00am	**FRIENDS & FAMILY BREAKFAST** *Westin – Snowmass Kitchen*
3:30pm - 6:00pm	**REGISTRATION & EXHIBITS OPEN** *Westin Conference Center Lobby*
4:00pm - 6:00pm	**SCIENTIFIC SESSION 2** **Moderator: James Haan MD** *Westin Conference Center – Salon AB* * Indicates Earl G. Young Clinical Research Competition ** Indicates EE Moore Basic Science Research Competition
4:00pm - 4:20pm go to page 53	EVALUATION OF THE HEMODYNAMIC EFFECTS OF KETAMINE VERSUS ETOMIDATE DURING RAPID SEQUENCE INTUBATION * *Tasha Martin MD, New Hanover Regional Medical Center, Wilmington, NC*
4:20pm - 4:40pm go to page 55	NOT ALL IN YOUR HEAD (AND NECK): STROKE AFTER BLUNT CEREBROVASCULAR INJURY IS ASSOCIATED WITH SYSTEMIC HYPERCOAGULABILITY * *Joshua Sumislawski MD, Denver Health Medical Center, Denver, CO*
4:40pm - 5:00pm go to page 57	ONE YEAR MORTALITY IN GERIATRIC TRAUMA PATIENTS: IMPROVING UPON THE GERIATRIC TRAUMA OUTCOMES SCORE (GTOS) UTILIZING THE SOCIAL SECURITY DEATH INDEX (SSDI) * *Samuel Ross MD, MPH, UT Southwestern Medical Center, Dallas, TX*
5:00pm - 5:20pm go to page 59	SARCOPENIA SCREENING FOR PREDICTIVE OUTCOMES AMONG INTUBATED BLUNT TRAUMA PATIENTS: COMPARATIVE ANALYSIS OF STERNOCLEIDOMASTOID MUSCLE AND PSOAS MUSCLE USING COMPUTED TOMOGRAPHY * *Michael Johns DO, Christiana Care Health System, Newark, DE*
5:20pm - 5:40pm go to page 61	PALLIATIVE CARE IN TRAUMA: NOT JUST FOR THE DYING * *Michele Fiorentino MD, Rutgers-New Jersey Medical School, Newark, NJ*

5:40pm - 6:00pm go to page 63	COMPARISON OF OPEN ARTERIAL REVASCULARIZATION USING SELF-EXPANDING POLYTETRAFLUOROETHYLENE (EPTFE) STENT GRAFTS VS SEWN EPTFE INTERPOSITION BYPASS IN AN INFECTED FIELD PORCINE (SUS SCROFA) MODEL ** *Anders Davidson MD, University of California Davis, Sacramento, CA*
5:30pm - 7:00pm	**WTA FAMILY NIGHT – SNOWMASS HEROES PRESENTATION** *Westin Conference Center – Castle Peak Auditorium*
6:00pm - 8:00pm	**WTA BOARD MEETING** (by invitation only) *Westin Conference Center – Cathedral Peak*
6:30pm - 7:30pm	**RESIDENT RECEPTION** *Westin - Overlook*

TUESDAY, MARCH 5, 2019

6:30am - 9:00am	**REGISTRATION & EXHIBITS OPEN** *Westin Conference Center Lobby*
6:30am - 8:00am	**ATTENDEE BREAKFAST** *Westin Conference Center – Salon CDE*
7:00am - 9:00am	**SCIENTIFIC SESSION 3** **Moderator: Stephanie Savage MD** *Westin Conference Center – Salon AB* ** Indicates EE Moore Basic Science Research Competition
7:00am - 7:20am go to page 65	PROPRANOLOL ATTENUATES COGNITIVE, LEARNING AND MEMORY DEFICITS IN A MURINE MODEL OF TRAUMATIC BRAIN INJURY ** *Muhammad Zeeshan MD, The University of Arizona, Tucson, AZ*
7:20am - 7:40am go to page 67	DOSE OPTIMIZATION OF VALPROIC ACID (VPA) IN A LETHAL MODEL OF TRAUMATIC BRAIN INJURY (TBI), HEMORRHAGE AND POLYTRAUMA IN SWINE ** *Ben Biesterveld MD, University of Michigan, Ann Arbor, MI*
7:40am - 8:00am go to page 69	FEMALE PLATELETS HAVE INCREASED AND DIFFERENTIAL ACTIVITY TO STIMULI: IMPLICATIONS IN TRANSFUSION PRACTICE AND TREATMENT OF TRAUMA-INDUCED COAGULOPATHY ** *Julia Coleman MD, MPH, University of Colorado-Denver, Aurora, CO*
8:00am - 8:20am go to page 71	IS ALL PLASMA CREATED EQUALLY? THE EFFECT OF INTERDONOR VARIABILITY ** *Amanda Chipman MD, RA Cowley Shock Trauma, University of Maryland, Baltimore, MD*
8:20am - 8:40am go to page 73	PROTECTIVE EFFECTS OF PLASMA PRODUCTS ON THE ENDOTHELIAL-GLYCOCALYX BARRIER FOLLOWING TRAUMA-HEMORRHAGIC SHOCK: IS SPHINGOSINE-1 PHOSPHATE RESPONSIBLE? * *Mark Diebel MD, Wayne State University, Detroit, MI*

8:40am - 9:00am go to page 75	HYPOXIA/REOXYGENATION PRODUCES GREATER ENDOTHELIAL GLYCOCALYX DAMAGE THAN ISCHEMIA ALONE IN A CELLULAR MODEL FOR SHOCK *Jessica Friedman PhD, Tulane Univ School of Medicine, New Orleans, LA*
7:30am - 9:00am	**FRIENDS & FAMILY BREAKFAS** *Westin – Snowmass Kitchen*
3:30pm - 6:00pm	**REGISTRATION & EXHIBITS OPEN** *Westin Conference Center Lobby*
4:00pm - 6:00pm	**SCIENTIFIC SESSION 4** **Moderator: Nirav Patel MD** *Westin Conference Center – Salon AB* ** Indicates EE Moore Basic Science Research Competition
4:00-4:20pm go to page 77	TITRATE TO EQUILIBRATE AND NOT EXSANGUINATE!: CHARACTERIZATION AND VALIDATION OF A NOVEL PARTIAL RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA CATHETER IN NORMAL AND HEMORRHAGIC SHOCK CONDITIONS ** *Dominic Forte MD, Madigan Army Medical Center, Tacoma, WA*
4:20-4:40pm go to page 79	**ALGORITHM 1:** PAIN *Christine Cocanour MD*
4:40-5:00pm go to page 81	**ALGORITHM 2:** PREGNANCY *Anne Rizzo MD*
5:00-6:00pm	**PRESIDENTIAL ADDRESS** *Roxie Albrecht MD, University of Oklahoma, Oklahoma City, OK*

WEDNESDAY, MARCH 6, 2019

6:30am - 9:00am	**REGISTRATION & EXHIBITS OPEN** *Westin Conference Center Lobby*
6:30am - 8:00am	**ATTENDEE BREAKFAST** *Westin Conference Center – Salon CDE*
7:00am - 9:00am	**SCIENTIFIC SESSION 5** **Moderator: Robert Letton MD** *Westin Conference Center – Salon AB*
7:00am - 7:20am go to page 85	KETAMINE INFUSION FOR PAIN CONTROL IN ELDERLY PATIENTS WITH MULTIPLE RIB FRACTURES: RESULTS OF A RANDOMIZED CONTROLLED TRIAL *Thomas Carver MD, Medical College of Wisconsin, Milwaukee, WI*
7:20am - 7:40am go to page 87	FULLY SATURATED: THE FAILURE OF ADDITIONAL AMERICAN COLLEGE OF SURGEONS (ACS) VERIFIED ADULT LEVEL I TRAUMA CENTERS TO IMPACT ADULT MOTOR VEHICLE MORTALITY RATES, 1999-2015 *David Notrica MD, FACS, FAAP, Phoenix Children's Hospital, Phoenix, AZ*
7:40am - 7:50am go to page 89	**CASE REPORT:** NOT ALL HOOFBEATS ARE HORSES: CORONARY DISSECTION FOLLOWING BLUNT TRAUMA *Bradley Wallace MD, University of Colorado School of Medicine, Aurora, CO*
7:50am - 8:20am	**PRO/CON DEBATE:** GUN CONTROL, AS AN INTEGRAL PART OF GUN VIOLENCE PREVENTION, IS MY LANE *Moderator: Ajai Malhotra MD* *Pro: Rochelle Dicker MD / Con: Alex Eastman MD*
8:20am - 9:00am	**FOUNDERS BASIC SCIENCE LECTURE:** TRAUMA IMMUNOLOGY – A NEW NAME FOR AN OLD CONCEPT *Timothy R. Billiar MD, University of Pittsburgh, Pittsburgh, PA*

7:30am - 9:00am	**FRIENDS & FAMILY BREAKFAST** *Westin – Snowmass Kitchen*
10:00am - 11:30am	**NASTAR RACE (PRE-REGISTRATION REQUIRED)** *Spider Sabich Race Arena*
11:00am - 1:30pm	**MOUNTAIN PICNIC** *Base Camp Bar & Grill, Snowmass Village*
3:30pm - 6:00pm	**REGISTRATION & EXHIBITS OPEN** *Westin Conference Center Lobby*
4:00pm - 6:00pm	**WTA BOOK CLUB** *Westin Conference - Overlook*
4:00pm - 6:00pm	**SCIENTIFIC SESSION 6** **Moderator: Krista Kaups MD** *Westin Conference Center – Salon AB*
4:00pm - 4:20pm go to page 95	IS EARLY CHEMICAL THROMBOPROPHYLAXIS IN PATIENTS WITH SOLID ORGAN INJURY A SOLID DECISION? *David Skarupa MD, University of Florida, Jacksonville, FL*
4:20pm - 4:30pm go to page 97	A REFLECTION OF ONE'S SELF IN THE TRAUMA BAY: WHEN THE PATIENT IS THE UNSUSPECTING HEALER *Jennifer Hartwell MD, Indiana University, Indianapolis, IN*
4:30pm - 5:00pm	**PANEL OF EXPERTS** *Presenter: Stephanie Savage MD* *Panelists: Ben Zarzaur MD; Hasan Alam MD; Susan Rowell MD; Jasmeet Paul MD; Bryan Collier MD*
5:00pm - 6:00pm *	**WTA BUSINESS MEETING** Members only
6:30pm - 8:30pm	**WTA FAMILY MOVIE NIGHT – INCREDIBLES 2** *Westin Conference Center – Castle Peak Auditorium*

THURSDAY, MARCH 7, 2019

6:30am - 9:00am	**REGISTRATION & EXHIBITS OPEN** *Westin Conference Center Lobby*
6:30am - 8:00am	**ATTENDEE BREAKFAST** *Westin Conference Center – Salon CDE*
7:00am - 9:00am	**SCIENTIFIC SESSION 7** **Moderator: Gary Vercruysse MD** *Westin Conference Center – Salon AB*
7:00am - 7:20am go to page 103	COLD-STORED WHOLE BLOOD: A BETTER METHOD OF TRAUMA RESUSCITATION? *Joshua Hazelton, Cooper University Hospital, Camden, PA*
7:20am - 7:40am go to page 105	IMPLEMENTION OF A PREHOSPITAL AIR MEDICAL PLASMA PROGRAM: IS IT CURRENTLY FEASIBLE? *Peter Adams, University of Pittsburgh, Pittsburgh, PA*
7:40am - 8:00am go to page 107	THE COMPENSATORY RESERVE INDEX: A CONTINUOUS, NON-INVASIVE METRIC FOR WHOLE BLOOD RESUSCITATION *Ryan Phillips, Children's Hospital Colorado, Aurora, CO*
8:00am - 8:20am go to page 109	PARTIAL ZONE I RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA (REBOA) DOES NOT EXTEND SURVIVAL OR MITIGATE UNCONTROLLED HEMORRHAGE IN A SEVERE SWINE SHOCK MODEL *David Kauvar MD, San Antonio Military Med Ctr, JBSA Ft Sam Houston, TX*
8:20am -8:30 am go to page 111	**CASE REPORT:** A BONE TO PICK: AN UNUSUAL CASE OF TRAUMATIC SMALL BOWEL INJURY *Kayla Watkins MD, University of Oklahoma Health Sciences Ctr Oklahoma City, OK*
8:30am - 9:00am	**PRO/CON DEBATE:** CURRENT STATE OF KNOWLEDGE SUPPORTS DEVELOPMENT OF PRE-HOSPITAL BLOOD PRODUCT PROGRAMS *Moderator: Bryan Collier MD* *Pro: Jason Sperry MD / Con: Jordan Weinberg MD*

9:00am – 9:15am	**NEW MEMBER PRESENTATION** *Roxie Albrecht MD*
7:30am - 9:00am	**FRIENDS & FAMILY BREAKFAST** *Westin – Snowmass Kitchen*
3:30pm - 6:00pm	**REGISTRATION & EXHIBITS OPEN** *Westin Conference Center Lobby*
4:00pm - 6:00pm	**SCIENTIFIC SESSION 8** **Moderator: Jordan Weinberg MD** *Westin Conference Center – Salon AB*
4:00pm - 4:20pm go to page 115	CRITICAL CALL FOR HOSPITAL-BASED DOMESTIC VIOLENCE (DV) INTERVENTION: THE DAVIS CHALLENGE. *Michel Aboutanos MD, MPH, FACS, Virginia Commonwealth University Medical Center, Richmond, VA*
4:20pm - 4:40pm go to page 117	COMPARATIVE EVALUATION OF DIFFERENT FRAILTY SCORES TO PREDICT OUTCOMES IN GERIATRIC TRAUMA PATIENTS *Mohammed Hamidi MD, The University of Arizona, Tucson, AZ*
4:40pm - 4:50pm go to page 119	**FAMILY ABSTRACT:** SORTIE OF THE AVALANCHES: LESSONS LEARNED FROM THE OPERATING ROOM BUT FORGOTTEN ON THE MOUNTAIN *Hunter Moore MD PhD*
4:50pm - 5:20pm	**MILITARY PANEL OF EXPERTS** *Presenters: Mathew Martin and Jennifer Gurney* *Panelists: Michel Aboutanos MD; Krista Kaups MD; Bellal Joseph MD; Roxie Albrecht MD; Peggy Knudson MD*
5:20pm - 6:00pm	**PAINT THE CEILING LECTURE:** CARING FOR ALL *M. Margaret "Peggy" Knudson MD, University of California San Francisco, San Francisco, CA*
6:30pm - 10:30pm	**ULLR NIGHT AT ELK CAMP (aka BANQUET)** *Elk Camp (On Snowmass Mountain)* *Gondola will run continuously from 6:30pm - 10:30pm *Wear snow gear for outdoor activities – bonfire, alpine slide, tubing (coats, hats, gloves, scarves, helmets for tubing) *Pizza, soup/salad bar will be served inside Elk Camp

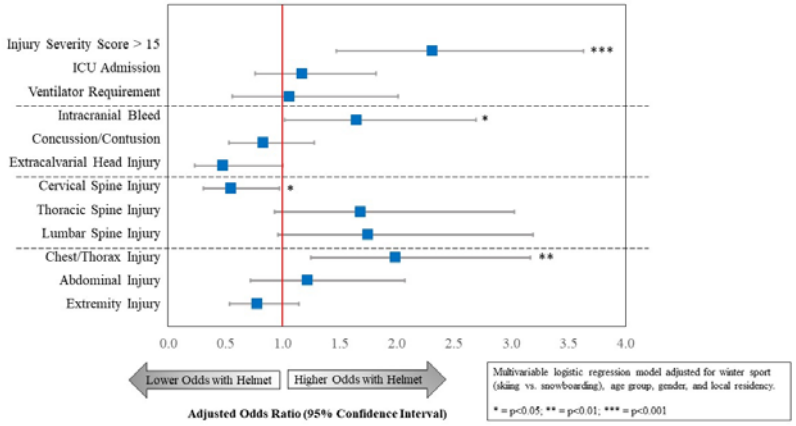
FRIDAY, MARCH 8, 2019

6:30pm - 9:00am	**REGISTRATION & EXHIBITS OPEN** *Westin Conference Center Lobby*
6:30am - 8:00am	**ATTENDEE BREAKFAST** *Westin Conference Center – Salon CDE*
7:00am - 9:00am	**SCIENTIFIC SESSION 9** **Moderator: Charles Fox MD** *Westin Conference Center – Salon AB*
7:00am - 7:20am go to page 125	IT'S ABOUT TIME: TRANSFUSION EFFECTS ON POST-INJURY PLATELET AGGREGATION CHANGE OVER TIME *Lucy Kornblith MD, Univ of California San Francisco, San Francisco, CA*
7:20am - 7:40am go to page 127	DENSE AND DANGEROUS: THE TISSUE PLASMINOGEN ACTIVATOR (T-PA)-RESISTANT FIBRINOLYSIS SHUTDOWN PHENOTYPE IS DUE TO THROMBIN-INDUCED CLOT STRENGTH *Kalev Freeman MD, PhD, FACEP, University of Vermont, Burlington, VT*
7:40am - 8:00am go to page 129	NATIONWIDE BLUNT CEREBROVASCULAR INJURY (BCVI) OUTCOMES IN THE PEDIATRIC POPULATION: BIG PROBLEMS IN LITTLE PATIENTS *Christopher Marenco MD, Madigan Army Medical Center, Joint Base Lewis-McChord, Tacoma, WA*
8:00am - 8:20am go to page 131	VANCOMYCIN DOSING IN CRITICALLY ILL TRAUMA PATIENTS: THE VANCTIC STUDY *Oscar Talledo MD, OUHSC, Oklahoma City, OK*
8:20am - 8:40am go to page 133	**ALGORITHM 3**: PREHOSPITAL RESUSCITATION *Jason Sperry MD*
8:40am - 9:00am go to page 134	**ALGORITHM 4**: AIRWAY *Carlos Brown MD*
7:30am - 9:00am	**FRIENDS & FAMILY BREAKFAST** *Westin – Snowmass Kitchen*

3:30pm - 6:00pm	**REGISTRATION & EXHIBITS OPEN** *Westin Conference Center Lobby*
4:00pm - 6:00pm	**SCIENTIFIC SESSION 10** **Moderator: Megan Brenner MD** *Westin Conference Center – Salon AB*
4:00pm - 4:20pm go to page 137	END TIDAL CARBON DIOXIDE UNDERESTIMATES PLASMA CARBON DIOXIDE DURING EMERGENT TRAUMA LAPAROTOMY LEADING TO HYPOVENTILATION AND MISGUIDED RESUSCITATION: A WESTERN TRAUMA ASSOCIATION MULTICENTER STUDY *Eric Campion MD*
4:20pm - 4:40pm go to page 139	MISSING EXPECTATIONS: TOURNIQUET USE WITHOUT FORMAL TRAINING YIELDS POOR RESULTS *Andrew Dennis DO, FACOS, FACS, DME, Cook County Health and Hospital Systems, Chicago, IL*
4:40pm - 5:00pm go to page 141	RANDOM FOREST MODELING CAN PREDICT INFECTIOUS COMPLICATIONS FOLLOWING TRAUMA LAPAROTOMY *Rondi Gelbard MD, Emory University School of Medicine, Atlanta, GA*
5:00pm - 5:20pm go to page 143	TIME TO DEFINITIVE FIXATION, NOT DEPTH OF SHOCK, IS ASSOCIATED WITH MULTIPLE ORGAN FAILURE IN CRITICALLY INJURED TRAUMA PATIENTS WITH A FEMUR FRACTURE *Justin Richards MD, R Adams Cowley Shock Trauma Center, Baltimore, MD*
5:20pm - 5:40pm go to page 145	REMOVAL OF RETRIEVABLE INFERIOR VENA CAVA FILTERS (RIVCF) BEFORE INITIAL HOSPITAL DISCHARGE: IS IT ASSOCIATED WITH INCREASED VENOUS THROMBOEMBOLISM (VTE) COMPLICATIONS? *Justin Robbins BS, University of Oklahoma, Oklahoma City, OK*
5:40pm - 6:00pm go to page 147	THE HEALTH LITERACY OF HOSPITALIZED TRAUMA PATIENTS: WE SHOULD BE SCREENING FOR DEFICIENCIES *Jordan Weinberg MD, Creighton University School of Medicine Phoenix Campus, Phoenix, AZ*

NOTES

Figure. Adjusted Odds Ratio of Different Injuries For Helmeted vs. Unhelmeted Patients (n=548)



NOTES

Paper# 1
Monday, March 4, 2019 (7:00am – 7:20am)

HELMET USE ASSOCIATED WITH HIGHER INJURY SEVERITY SCORES FOR ALPINE SKIERS AND SNOWBOARDERS EVALUATED AT A LEVEL 1 TRAUMA CENTER

E PORTER, S TROOBOFF, M HAFF, J COOROS, A WOLFFING, K RHYNHART, A CROCKETT
Dartmouth-Hitchcock Medical Center, Lebanon, New Hampshire

Presenter: Eleah Porter MD
Senior Sponsor: M de Moya

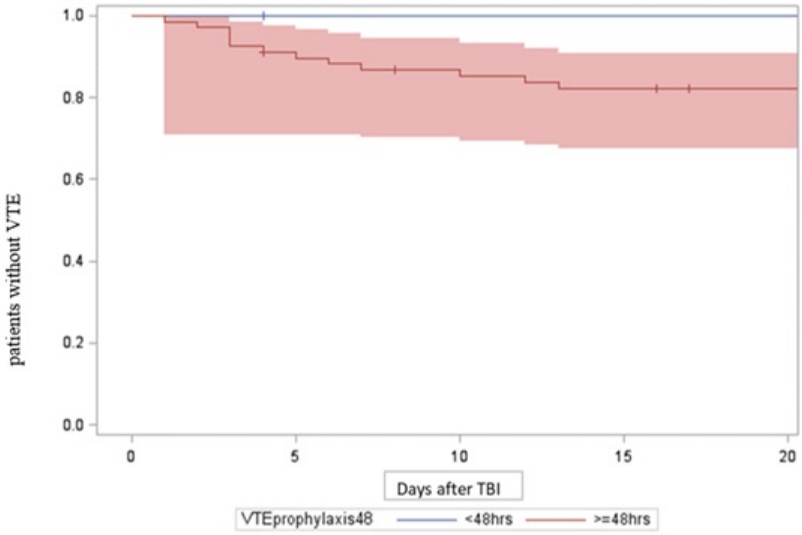
INTRODUCTION: Helmet use in alpine skiers and snowboarders can prevent catastrophic head injury. However, controversy persists on whether helmeted patients exhibit riskier behavior that may counteract this protective effect. We investigated the relationship between helmet use and injury severity among skiers and snowboarders in New England.

METHODS: Retrospective chart review of all skiing and snowboarding related trauma evaluated by our trauma service at a level 1 trauma center from 2010-2016. The primary exposure was helmet use and primary outcome 'severe injury' as indicated by an Injury Severity Score (ISS) >15. We performed univariate analysis of patient characteristics associated with helmet use and multivariable logistic regression to identify injury patterns associated with helmet use.

RESULTS: Our analytic cohort included 548 patients from 35 ski areas (72% skiers, 28% snowboarders). More wore helmets (60%, n=330) than did not (40%, n=218). Pediatric patients <18 years (n=192) were significantly more likely to wear helmets ($p<0.001$). Alpine sport, gender, and local residency were not independently associated with helmet use. On multivariable regression, helmeted patients were more than twice as likely to suffer a severe injury (OR: 2.31, CI: 1.47-3.63) (Figure). They were also more likely to suffer an intracranial bleed (OR: 1.65, CI: 1.02-2.69) and/or chest/thorax injury (OR: 1.99, CI: 1.25-3.17), but were half as likely to experience a cervical spine injury (OR: 0.55, CI: 0.31-0.97).

CONCLUSIONS: Helmeted skiers and snowboarders were significantly more likely to suffer severe injury including intracranial hemorrhage. This reinforces the importance of trauma evaluation after high impact injuries regardless of helmet use.

Figure 1. Time to venous thromboembolism (VTE) diagnosis by early versus late VTE chemoprophylaxis initiation among those who underwent late neurosurgical intervention



VTE=venous thromboembolism, TBI=traumatic brain injury

NOTES

Paper# 2
Monday, March 4, 2019 (7:20am – 7:40am)

A STITCH IN TIME SAVES CLOTS: A MULTICENTER ANALYSIS OF VENOUS THROMBOEMBOLISM CHEMOPROPHYLAXIS IN PATIENTS WITH TRAUMATIC BRAIN INJURY

H CARMICHAEL, JR COLEMAN, T ZANGARA, A SAUAIA, J DUNN, T SCHROEPPEL, E CAMPION, M GOODMAN, O ALNACHOUKATI, M FLOREN, L FERRIGNO
University of Colorado-Denver, Aurora, Colorado

Presenter: Heather Carmichael MD, MPH
Senior Sponsor: J Dunn

INTRODUCTION: Venous thromboembolism chemoprophylaxis (VTE-CHEMO) in traumatic brain injury (TBI) is often delayed due to bleeding concern, however, this poses risk of thrombotic complications. We sought to describe rates and timing of VTE-CHEMO and correlation with VTEs or intracranial hemorrhage (ICH) progression.

METHODS: We include adult patients admitted to five trauma centers between 2014-2016 with head AIS≥2; ≥2 head CTs(CTH); and length of stay(LOS)>72 hours. Outcomes of early(48hrs) VTE-CHEMO were compared. Multivariate analysis(MV) was done with Cox proportional hazards regression, accounting for intra-facility clustering.

RESULTS: 1,803 patients were included, 8% developed VTE. VTE patients were older, with higher BMI(>30, 27% vs 15%, p=0.0002), more severely injured(TRISS 0.9 vs. 0.8, p 30, ISS and pelvic/femur fractures were significantly associated with VTE. We detected a significant interaction between VTE-CHEMO and early(24hrs) or late(>24hrs) neurosurgical intervention(NS). Among late NS, early VTE-CHEMO was associated with lower VTE rate compared to late VTE-CHEMO(HR: 0.76, 95% 0.64-0.91, Figure1). 580(32%) experienced ICH progression: 22% without VTE-CHEMO, 50% before VTE-CHEMO, and 28% after VTE-CHEMO. Of those with ICH progression after VTE-CHEMO, VTE-CHEMO was initiated early in 36% and late in 64%(p=0.59).

CONCLUSIONS: Late VTE-CHEMO was associated with higher VTE incidence in patients not requiring immediate NS. Early prophylaxis with severe injury, obesity, and/or high-risk orthopedic injuries may reduce VTE in TBI. While these data do not suggest harm with early VTE-CHEMO, this merits further investigation in clinical trials.

NOTES

Paper# 3
Monday, March 4, 2019 (7:40am – 8:00am)

PRE-EXISTING MAJOR PSYCHIATRIC ILLNESS IN PATIENTS WITH TRAUMATIC BRAIN INJURY (TBI) INCREASES THE RISK OF POST-TBI SEIZURES

F JEHAN, J CON, M KHAN, K PRABHAKARAN, M ZEESHAN, R LATIFI
New York Medical College, Westchester Medical Center, Valhalla, New York

Presenter: Faisal Jehan MD
Senior Sponsor: B Joseph

INTRODUCTION: The aim of our study was to evaluate the incidence of seizure and overall outcomes in traumatic brain injury (TBI) patients with pre-existing major-psychiatric illness.

METHODS: 2-year analysis(2013-2014) of the ACS-TQIP database. We included all adult patients (age>18) with TBI. Patients were divided into two-groups those with a pre-existing major-psychiatric illness, and those with no psychiatric illness. Primary outcome measure was the incidence of post-traumatic seizures. Secondary outcome measures were ICU-admission, and mortality. Regression analysis was performed.

RESULTS: 87,472 patients with TBI were included in our analysis. Mean age was 46+13 years and 61% were male. 8.6%(16034) had a pre-existing major-psychiatric illness. Patients with pre-existing psychiatric illness had higher incidence of post-traumatic seizures (6.1%vs1.1%, p<0.01) compared to patients with no major-psychiatric illness. Similarly, the ICU admission rate (64% vs.42%, p=0.02), and mortality (8.4%vs.6.4%, p=0.01) was higher in patients with pre-existing psychiatric illness compared to those who did. On regression analysis after controlling for demographics and injury parameters, TBI patients with pre-existing major-psychiatric illness had higher rates of post traumatic seizures (OR 6, CI[3-8],p<0.01), ICU admission (OR:3, CI[1-6], p=0.02) and mortality (OR:3, CI[2-5],p<0.01). On sub-analysis of patient with mild-TBI(GCS13-15), patients with pre-existing major-psychiatric illness had still 8 (OR:8, CI[5-10],p<0. 01) times higher odds of developing a post-traumatic seizure.

CONCLUSIONS: Patients with pre-existing psychiatric illness have worse outcomes after TBI, including higher rates of post-traumatic seizures, ICU admission and mortality. The higher rates of seizure also persist in patient with mild-TBI. Seizure prophylaxis may be warranted even in mild-TBI patients who have a history of major-psychiatric illness.

	No Financial Toxicity	Financial Toxicity	p-value
	n=60	n=440	
SF-36 Physical Component Score – 4 months	44.2 ± 12.9	36.2 ± 11.5	0.0015
SF-36 Mental Component Score – 4 months	50.4 ± 10.1	43.7 ± 10.8	0.0040
SF-36 Physical Component Score – 12 months	46.3 ± 13.7	41.0 ± 12.5	0.0839
SF-36 Mental Component Score – 12 months	55.6 ± 6.9	45.1 ± 11.1	<0.0001
Depression	30%	76%	<0.0001
PTSD	13.3%	50%	<0.0001

NOTES

Paper# 4
Monday, March 4, 2019 (7:40am – 8:00am)

FINANCIAL TOXICITY IS ASSOCIATED WITH POOR LONG-TERM OUTCOMES AFTER INJURY

P MURPHY, S SAVAGE, B ZARZAUR
Indiana University School of Medicine, Indianapolis, Indiana

Presenter: Patrick Murphy MD
Senior Sponsor: B Zarzaur

INTRODUCTION: Increasing healthcare costs and high deductible insurance plans have shifted more responsibility for medical costs to patients. After serious illnesses, financial responsibilities may result in lost wages, forced unemployment, and other financial burdens, collectively described as financial toxicity. Following cancer treatments, financial toxicity is associated with worse long-term health related quality of life outcomes (HRQOL). The purpose of this study was to determine the incidence of financial toxicity following injury, factors associated with financial toxicity, and the impact of financial toxicity on long-term HRQOL.

METHODS: Adult patients with an injury severity score of 10 or greater and without head or spinal cord injury were prospectively followed for 1 year. The Short-Form-36 was used to determine overall quality of life at 4 and 12 months. Screens for depression and post-traumatic stress syndrome (PTSD) were administered. The primary outcome was financial toxicity.

RESULTS: 500 patients were enrolled and 88% suffered financial toxicity during the year following injury (63% reduced income, 58% unemployment, 85% experienced stress due to financial burden). Factors independently associated with financial toxicity were lower age, lower income and lack of health insurance. After risk adjustment, patients with financial toxicity had worse HRQOL, and more depression and PTSD (Table).

CONCLUSIONS: Financial toxicity following injury is extremely common and is associated with worse psychological and physical outcomes. Age, lack of insurance, and lower income are associated with financial toxicity. Patients at risk for financial toxicity can be identified and interventions to counteract the negative effects should be developed to improve long-term outcomes.

Table 1. Geri-Rib Scoring System and Risk Group Classification

Risk Factor	Points Awarded
Age ≥ 70 years	1
Active smoking	1
Chest tube	1
# Ribs fractured	
1-2	1
3-5	2
≥ 6	3
Total	**0-6**
Low Risk	1-2
Moderate Risk	3
High Risk	4-6

NOTES

Paper# 5
Monday, March 4, 2019 (8:00am – 8:20am)

THE GERI-RIB SCORE: PREDICTING ADVERSE OUTCOMES WITH READILY AVAILABLE TOOLS

B CARR, S SEVERANCE, J HILL, S SAVAGE, B ZARZAUR
Indiana University, Indianapolis, Indiana

Presenter: Bryan Carr
Senior Sponsor: B Zarzaur

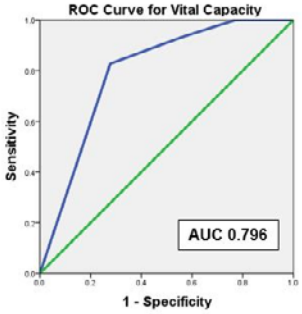
INTRODUCTION: Physiologic differences in older injured patients potentiate the risk for complications from rib fractures. Current risk stratifying tools are cumbersome and do not focus on the geriatric population.

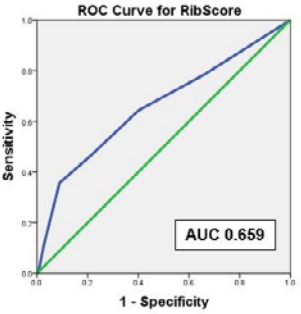
METHODS: Retrospective review of patients ≥ 55 years with blunt chest trauma from 2013 to 2016. Univariable followed by multivariable analysis was performed to predict a composite outcome of unplanned intubation, pneumonia, tracheostomy, and death. Scores were awarded to identified risk factors (Table 1). Predicted probability of complication was used to determine cutoff values. Area under the receiver operating curve (AUC) was used to evaluate the new scoring system.

RESULTS: 558 patients were included (61% male, median age 66 years, median Injury Severity Score 14, median number of ribs fractured 4). Thirty-three (5.9%) patients experienced the composite outcome. Age ≥ 70 (OR 3.095, 95% CI 1.429-6.705), number of ribs fractured (OR 1.875, 95% CI 1.071-3.281), smoking (OR 3.899, 95% CI 1.745-8.710), and chest tube placement (OR 6.983, 95% CI 3.314-14.710) were associated with increased risk. The maximum predicted probability of experiencing the composite outcome was 1.32% (0.60-2.86) in the low-risk group, 4.12% (2.58-6.52) for the moderate risk group, and 58.89% (37.0-77.7) for the high-risk group. Using these categories, the AUC was 0.798.

CONCLUSIONS: The Geri-Rib Score provides quick tool with good predictive value that can be used to help risk stratify older injured patients with rib fractures.

ROC AUC graphs for all patients with pulmonary complications





NOTES

Paper# 6
Monday, March 4, 2019 (8:20am – 9:00am)

VITAL CAPACITY IS SUPERIOR TO RIBSCORE AT PREDICTING PULMONARY COMPLICATIONS AFTER RIB FRACTURES

K BOYLE, C DODGION, S BOU ZEIN EDDINE, J FORD, R DEANGELIS, D MILIA, M DE MOYA, T CARVER
Medical College of Wisconsin, Milwaukee, Wisconsin

Presenter: Kelly Boyle MD
Senior Sponsor: M de Moya

INTRODUCTION: Both vital capacity (VC) and radiographic variables have been used to predict outcomes following rib fractures, but no studies have compared radiographic rib fracture scoring systems to physiologic measures such as VC. Our objective was to assess the utility of both VC and RibScore in predicting pulmonary complications in patients with rib fractures.

METHODS: A retrospective analysis of all rib fracture patients admitted from 1/2015 to 3/2018 with VC assessments within 48-hours of admission was performed. The RibScore was calculated using admission chest CT, and this was compared to the Day 2 VC. The primary outcome was pulmonary complications, defined as pneumonia, unplanned intubation, or transfer to the intensive care unit for respiratory concern. Statistical analysis was performed using $\chi 2$, binary logistic regression, and receiver operating characteristic area under the curve (ROC AUC).

RESULTS: Seven hundred fifty-seven patients had a VC performed within 48 hours, with a median age of 54 years (IQR 36, 69). Forty-seven (4.3%) developed a pulmonary complication. VC <30% was independently associated with pulmonary complications (OR 8.87). RibScore of 4 or 5 showed a significantly increased risk of pulmonary complications (OR 6.27 and 8.06, respectively). While VC and RibScore were significantly correlated with each other ($p = 0.009$), when predicting pulmonary complications, the ROC AUC for VC was 0.796 and for RibScore was 0.659.

CONCLUSIONS: The dynamic physiologic variable VC outperforms the RibScore when predicting pulmonary complications. VC <30% could be used for risk stratification and to determine admission disposition, but this will require prospective validation.

NOTES

Paper# 7
Monday, March 4, 2019 (4:00pm – 4:20pm)

EVALUATION OF THE HEMODYNAMIC EFFECTS OF KETAMINE VERSUS ETOMIDATE DURING RAPID SEQUENCE INTUBATION

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New Hanover Regional Medical Center, Wilmington, North Carolina

Presenter: Tasha Martin MD
Senior Sponsor: C Baker

INTRODUCTION: Etomidate and ketamine are used for rapid sequence intubation (RSI) in the emergent setting. They are ideal drugs for intubation due to their pharmacokinetic properties including quick onset and short duration. Current concerns are that ketamine is more likely to lead to hypotension than etomidate. The objective of this prospective randomized study was to compare the hemodynamic effects of these two drugs during RSI.

METHODS: The hemodynamic response of patients undergoing RSI in the emergency department was studied from 1/2018 - 7/2018. Etomidate (0.3 mg/kg) was used on even calendar days and ketamine (2 mg/kg) was used on odd calendar days. The primary outcome compared the prevalence of hypotension after RSI between the two drugs. Hypotension was defined as a 20% decrease in systolic blood pressure (SBP) measured prior to intubation and during the first fifteen minutes post intubation. Secondary outcomes included absolute change in hemodynamic values, including diastolic blood pressure (DBP), mean arterial pressure (MAP) and stroke index (SI). Data were analyzed using chi-square with a p-value <0.05 considered significant.

RESULTS: Of the 196 patients reviewed, 191 patients (mean age was 57 + 20 years) met inclusion criteria (ketamine n=92, etomidate n=99). The prevalence of hypotension after induction was not significantly different (p=0.42) between ketamine administration (18/92, 19.5%) vs etomidate (15/99, 15.1%). SBP was minimally affected pre- vs post-RSI with ketamine (p=0.16) and etomidate (p=0.3). Changes in hemodynamic values post-RSI hemodynamics (e.g DBP, MAP and SI) were similar between groups.

CONCLUSIONS: This study did not demonstrate a significant difference in the hemodynamic response after RSI between ketamine and etomidate. These data suggest that ketamine can be used safely for RSI in emergency intubations.

	No Stroke (n=37)	Stroke (n=29)	*p*
Activated clotting time (ACT, s)	121 (113, 128)	113 (113, 121)	0.829
Angle (α, degrees)	75.8 (72.8, 77.9)	77.1 (73.4, 80.0)	0.206
Maximum amplitude (MA, mm)	62.9 (59.4, 67.5)	66.9 (63.1, 69.3)	0.022
Shear modulus strength (G, Kd/cm^2)	8.5 (7.3, 10.4)	10.1 (8.6, 11.3)	0.023

NOTES

Paper# 8
Monday, March 4, 2019 (4:20pm – 4:40pm)

NOT ALL IN YOUR HEAD (AND NECK): STROKE AFTER BLUNT CEREBROVASCULAR INJURY IS ASSOCIATED WITH SYSTEMIC HYPERCOAGULABILITY

JJ SUMISLAWSKI, HB MOORE, EE MOORE, ML SWOPE, A SAUAIA, MJ COHEN, CC BURLEW
Denver Health Medical Center, Denver, Colorado

Presenter: Joshua Sumislawski MD
Senior Sponsor: C Cothren Burlew

INTRODUCTION: A recent Western Trauma Association multicenter study found that stroke secondary to blunt cerebrovascular injury (BCVI) most often occurs before initiation of antithrombotic therapy. Earlier initiation, especially in multiply injured patients, could be facilitated with improved risk stratification, and the relationship between BCVI-attributed stroke and hypercoagulability remains unknown. We hypothesized that patients who suffer BCVI-related stroke are hypercoagulable compared with those with BCVI who do not stroke.

METHODS: Rapid thromboelastograms (rTEGs) were evaluated for patients with BCVI-related stroke at an urban Level I trauma center from January 2011 to June 2018. Controls were identified for comparison using propensity-score matching with 15% caliper that accounted for age, sex, injury severity, and BCVI location/grade.

RESULTS: BCVI was identified in 436 patients, of whom 29 (7%, median ISS 41) experienced associated stroke. 37 patients with BCVI who did not stroke served as matched controls. When the last rTEG within 24 hours after injury (representing the end of resuscitation) was compared, stroke patients had elevated clot strength as evident in higher maximum amplitude (66.9 vs 62.9 mm, p=0.022; table) and shear modulus strength (10.1 vs 8.5 Kd/cm2, p=0.023). Activated clotting time was shorter (113 vs 121 s) and angle larger (77.1 vs 75.8 degrees) in stroke patients, consistent with increasing coagulability, but these differences were not significant (both p>0.05).

CONCLUSIONS: Patients who suffer BCVI-related stroke have greater clot strength than those with BCVI who remain asymptomatic. Resolution of trauma-induced coagulopathy should prompt initiation of antithrombotic therapy in patients with BCVI to prevent stroke.

Table 1. Multivariate Analysis for One-Year Mortality			
	Odds Ratio	95% CI	p value
Age (per year)	1.04	1.02-1.06	<0.0001
ISS (per point)	1.02	1.01-1.04	0.005
Sex (Male)	1.53	1.14-2.05	0.005
Initial GCS ≤10	4.21	2.83-6.25	<0.001
24-hour transfusion	1.54	1.08-2.18	0.016
Adverse Discharge*	12.82	9.52-18.18	<0.0001

*Composed of inpatient death, skilled nursing facility, hospice, long-term acute care hospital, in-patient psychiatric facility, Jail

NOTES

Paper# 9
Monday, March 4, 2019 (4:40pm – 5:00pm)

ONE YEAR MORTALITY IN GERIATRIC TRAUMA PATIENTS: IMPROVING UPON THE GERIATRIC TRAUMA OUTCOMES SCORE (GTOS) UTILIZING THE SOCIAL SECURITY DEATH INDEX (SSDI)

S ROSS, F ADEYEMI, M ZHOU, A MINHAJUDDIN, M CRIPPS, H PHELAN
University of Texas Southwestern Medical Center, Dallas, Texas

Presenter: Samuel Ross MD, MPH
Senior Sponsor: K Brasel

INTRODUCTION: GTOS predicts in-patient mortality in geriatric trauma patients, and has been validated in a prospective multicenter trial and expanded to predict adverse discharge (GTOS II). We hypothesized that these formulations actually underestimate the downstream sequalae of injury and sought to predict longer-term mortality in geriatric trauma patients.

METHODS: The Parkland Memorial Hospital Trauma registry was queried for patients age ≥65 years from 2001-2013. Patients were then matched to the SSDI. The primary outcome was one-year mortality. The original GTOS formula (variables of age, ISS, 24-hour transfusion) was tested to predict one-year mortality using receiver operator curves. Significant variables on univariate analysis were then used to build an optimal multivariate model to predict one-year mortality (GTOS III).

RESULTS: There were 3,262 patients who met inclusion. Inpatient mortality was 9.8% (322) and increased each year: 516(15.8%) one, 581(17.8%) two, and 738(22.7%) five years. The original GTOS equation had an area under the curve(AUC) of 0.712 for one-year mortality. Univariate analysis showed that patients with one-year mortality had on average increased age(75.9vs.79.5 years), ISS(11.0vs.19.1), lower GCS(14.3vs.10.5), more likely to require early transfusion(11.5vs.33.3%), and adverse discharge (19.5vs.78.2%; $p<0.0001$ for all). Multivariate logistic regression was used to create the optimal equation to predict one-year mortality (Table 1):[GTOS III=Age+(0.55*ISS)+37.7(if initial GCS≤10)+11.3(if transfused)+67.8(if adverse discharge)]; AUC of 0.883.

CONCLUSIONS: Traumatic injury in geriatric patients is associated with high mortality rates at 1-5 years. GTOS III has robust test characteristics to predict death at one year and can be used to guide patient centered goals of care discussions with objective data.

		SCM Index				Psoas Index			
	Subset	P-value	OR	95% Low	95% High	P-value	OR	95% Low	95% High
Zero Vent Free Days	ALL	0.018	2.074	1.137	3.784	0.183	1.517	0.822	2.797
60 Day Mortality	ALL	0.146	1.663	0.838	3.301	0.517	1.263	0.623	2.560
DC Home	ALL	0.359	0.732	0.376	1.425	0.302	1.383	0.748	2.559
DC Facility	ALL	0.359	1.365	0.702	2.656	0.302	0.723	0.391	1.338
Tracheostomy	ALL	0.942	1.023	0.556	1.881	0.762	1.096	0.604	1.990
Zero Vent Free Days	>60	0.0009	7.300	2.250	23.766	0.103	2.398	0.837	6.866
60 Day Mortality	>60	0.009	4.400	1.460	13.360	0.405	1.569	0.543	4.533
DC Home	>60	0.945	1.083	0.110	10.643	0.608	1.600	0.266	9.633
DC Facility	>60	0.945	0.923	0.094	9.068	0.608	0.625	0.104	3.763
Tracheostomy	>60	0.608	1.524	0.305	7.604	0.630	1.389	0.365	5.285
Zero Vent Free Days	F	<0.0001	13.881	3.902	49.386	0.081	2.800	0.883	8.884
60 Day Mortality	F	0.041	3.714	1.056	13.071	0.884	0.900	0.220	3.682
DC Home	F	0.694	0.750	0.179	3.144	0.432	1.615	0.489	5.340
DC Facility	F	0.694	1.330	0.318	5.589	0.432	0.619	0.187	2.046
Tracheostomy	F	0.128	2.714	0.749	9.828	0.535	1.457	0.444	4.781

NOTES

Paper# 10
Monday, March 4, 2019 (5:00pm – 5:20pm)

SARCOPENIA SCREENING FOR PREDICTIVE OUTCOMES AMONG INTUBATED BLUNT TRAUMA PATIENTS: COMPARATIVE ANALYSIS OF STERNOCLEIDOMASTOID MUSCLE AND PSOAS MUSCLE USING COMPUTED TOMOGRAPHY

MICHAEL S JOHNS DO, RICHARD G WITTMEYER DO,
JASON M WEINBERGER DO, MARK CIPOLLE MD PHD
Christiana Care Health System, Newark, Delaware

Presenter: Michael Johns DO
Senior Sponsor: R Kozar

INTRODUCTION: Sarcopenia measured through computed tomography (CT) has been associated with increased mortality. Most studies utilize psoas muscle assessment; however a majority of trauma patients commonly undergo imaging of the cervical spine without abdominal imaging. The sternocleidomastoid (SCM) is a known accessory respiratory muscle; therefore sarcopenia assessment of SCM may more accurately predict outcomes for intubated trauma patients compared to psoas muscle.

METHODS: Retrospective cohort study at a single tertiary care institution aimed to assess sarcopenia in blunt trauma patients from 2011-2016. Included patients underwent >48 hours of mechanical ventilation, CTA neck, and CT of the abdomen/pelvis. Axial SCM muscle measurements were assessed at level of C5 then adjusted for patient height to create a SCM-Index (mm2/cm2). Similarly, a Psoas-Index was created using axial measurements at the level of L3. Cohorts were compared on the basis of: zero-ventilator free-days, discharge disposition, and 60-day mortality.

RESULTS: 290 patients met inclusion criteria and those in lowest quartiles of each index were labeled "sarcopenic." Comparison of SCM-Index and Psoas-Index revealed the SCM-Index more accurately predicted mechanical ventilation dependence (p=0.018, OR 2.1). Sarcopenia by SCM-Index also predicted increased 60 day mortality in females (p=0.04) and all patients age >60 (p=0.009).

CONCLUSIONS: Obtained opportunistically during assessment of intubated trauma patients, SCM-Index is an objective predictor of 60-day mortality and ventilator dependence, and is more consistently more predictive of outcomes compared to Psoas-Index. This information aids discussion regarding patients' prognosis and goals of care. Future prospective study of this screening tool will further validate and strengthen its prognostic value.

Table: GOC Discussions in Patients with Poor Outcomes

	GOSe 1 (n=32) In-hospital mortality	GOSe 3 (n=44) Lower severe disability at discharge	GOSe 4 (n=204) Upper severe disability at discharge	Death @ 6 Months (n=13)
Rate of GOC Discussion	94%	64%	25%	54%
Median Time to GOC Discussion (Days)	1	3	3	4
Age (Years)	75±12	73±11	73±12	76±14
ISS	23±9	21±12	14±7	16±10

NOTES

Paper# 11
Monday, March 4, 2019 (5:20pm – 5:40pm)

PALLIATIVE CARE IN TRAUMA: NOT JUST FOR THE DYING

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Rutgers-New Jersey Medical School, Newark, New Jersey

Presenter: Michele Fiorentino MD
Senior Sponsor: D Livingston

INTRODUCTION: Palliative care (PC) is indicated for the seriously ill or those with < 1-year life expectancy. Geriatric trauma patients have PC needs due to increased risk of mortality and poor long-term outcomes. We hypothesized that survivors with poor outcomes are not easily identified nor receive PC interventions.

METHODS: Prospective study of trauma patients aged > 55 years (n=516). Patients with a poor outcome that would benefit from palliative care needs were defined as having a discharge Glasgow Outcome Score Extended (GOSe) 1-4 or death at 6 months. The rate and timing of GOC discussion were stratified by Palliative Performance Scale(PPS) (High > 70 vs. Low <70), Injury Severity Scale (ISS), and age. Logistic regression for having a GOC discussion and timing of GOC discussion were performed adjusting for demographics and injury variables.

RESULTS: 282 (55%) patients were identified as having a poor outcome and 38% had a GOC discussion. Percent patients with GOC and median day that discussion occurred are shown (Table). Age, race, ISS, PPS < 70, ventilator dependence and end stage co-morbidity were predictive of having a GOC discussion. No independent predictors of timing of GOC discussion were identified.

CONCLUSIONS: Almost all patients that died in the hospital received PC. Few survivors with poor functional outcomes had GOC discussions, possibly related to the misperception that PC is for the dying. High risk patients should be identified based on PPS and injury burden as all would benefit from PC.

Table: GOC Discussions in Patients with Poor Outcomes

	GOSe 1 (n=32) In-hospital mortality	GOSe 3 (n=44) Lower severe disability at discharge	GOSe 4 (n=204) Upper severe disability at discharge	Death @ 6 Months (n=13)
Rate of GOC Discussion	94%	64%	25%	54%
Median Time to GOC Discussion (Days)	1	3	3	4
Age (Years)	75±12	73±11	73±12	76±14
ISS	23±9	21±12	14±7	16±10

NOTES

Paper# 12
Monday, March 4, 2019 (5:40pm – 6:00pm)

COMPARISON OF OPEN ARTERIAL REVASCULARIZATION USING SELF-EXPANDING POLYTETRAFLUOROETHYLENE (EPTFE) STENT GRAFTS VS SEWN EPTFE INTERPOSITION BYPASS IN AN INFECTED FIELD PORCINE (SUS SCROFA) MODEL

A DAVIDSON, A WISHY, H KASHTAN, C BEYER, G HOAREAU, G JURKOVICH, J SAMPSON, J GRAYSON, L NEFF, T WILLIAMS
University of California Davis, Sacramento, California

Presenter: Anders Davidson MD
Senior Sponsor: G Jurkovich

INTRODUCTION: Autologous interposition reconstruction represents the gold-standard for arterial injuries, but requires time, skill, and conduit availability. Synthetic conduit is an alternative, but is also time-intensive and vulnerable to infection. Direct-site endovascular repair (DSER), a self-expanding ePTFE stent graft deployed across an arterial injury, offers an expeditious alternative to sewn grafts and may tolerate contamination, reducing the risk of arterial hemorrhage/thrombosis. We hypothesized that DSER would demonstrate ease of use, improved patency and less complications compared to sewn ePTFE interposition bypasses.

METHODS: Fourteen Yorkshire-cross swine received controlled bilateral iliac artery transections. One randomly assigned artery was repaired with a hand-sewn ePTFE interposition bypass, with the other undergoing DSER. The devices were contaminated with Methicillin-resistant Staphylococcus aureus and Pseudomonas aeruginosa. Duplex ultrasonography and angiography assessed conduit patency on days 7 and 21. Blood flow, arterial pressure gradients, and samples for histopathology were obtained during the terminal procedure.

RESULTS: All devices were patent at day 7. However, at day 21, all DSER grafts were patent compared to less than half the hand-sewn bypass grafts (14/14 vs. 5/14 respectively, p=<0.001). Time to placement for DSER was faster (24±6 min vs. 62±17 min, p=<0.001). There was no difference in gross infection (10/14 vs. 8/14 respectively, p=0.440) or flow velocities at baseline, placement, or harvest (p=0.921, 0.252, 0.321).

CONCLUSIONS: DSER demonstrated more rapid arterial revascularization, and improved patency despite similar gross infection rates when compared to hand-sewn PTFE grafts in an infected field. DSER may improve outcomes after vascular injury when used as a bridge to definitive vascular repair.

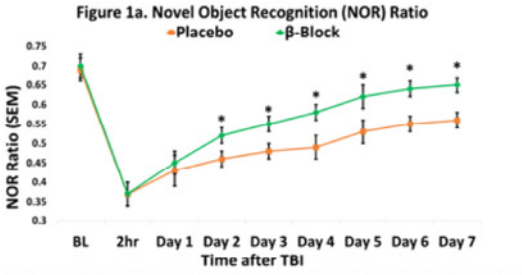


Figure 1a. Novel Object Recognition (NOR) Ratio
Placebo
β-Block
NOR Ratio (SEM)
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
BL
2hr
Day 1
Day 2
Day 3
Day 4
Day 5
Day 6
Day 7
Time after TBI

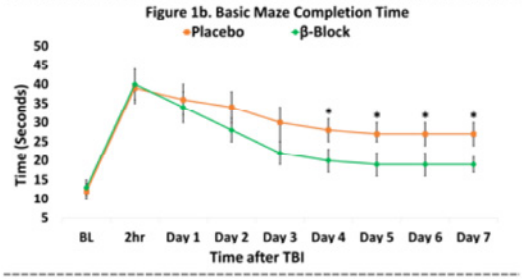


Figure 1b. Basic Maze Completion Time
Placebo
β-Block
Time (Seconds)
50
45
40
35
30
25
20
15
10
5
BL
2hr
Day 1
Day 2
Day 3
Day 4
Day 5
Day 6
Day 7
Time after TBI

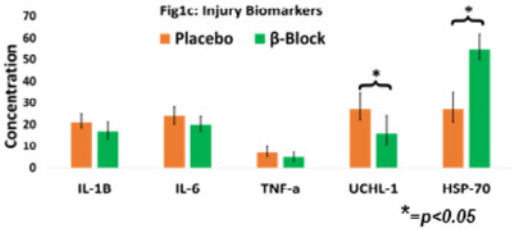


Fig1c: Injury Biomarkers
Placebo
β-Block
Concentration
70
60
50
40
30
20
10
0
IL-1B
IL-6
TNF-a
UCHL-1
HSP-70
*=p<0.05

NOTES

Paper# 13
Tuesday, March 5, 2019 (7:00am – 7:20am)

PROPRANOLOL ATTENUATES COGNITIVE, LEARNING AND MEMORY DEFICITS IN A MURINE MODEL OF TRAUMATIC BRAIN INJURY

M ZEESHAN, T O'KEEFFE, M HAMIDI, K HANNA, R FRIESE, N KULVATUNYOU, ER ZAKARIA, L GRIES, A TANG, B JOSEPH
The University of Arizona, Tucson, Arizona

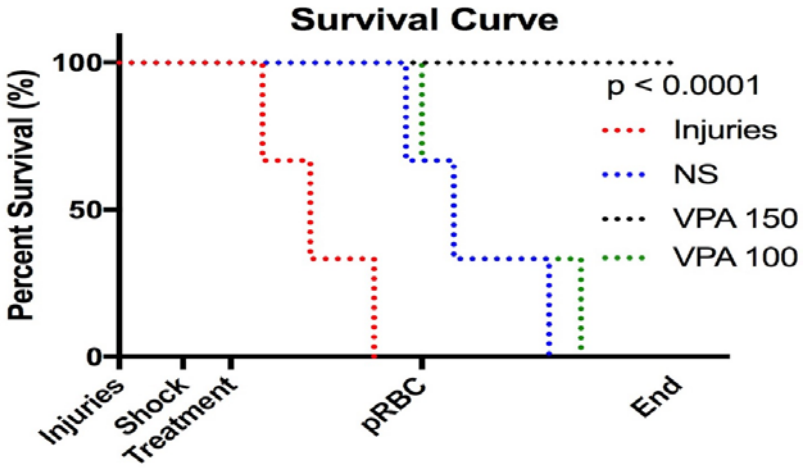
Presenter: Muhammad Zeeshan MD
Senior Sponsor: B Joseph

INTRODUCTION: β-blockers have been shown to improve survival after traumatic brain injury (TBI), however, the impact of β-blockers on cognitive function has not been elucidated. We hypothesized that a daily dose of propranolol can improve memory, learning and cognitive function following TBI in a murine model.

METHODS: 20 male-C57BL-mice were subjected to a cortical-controlled moderate TBI. 2-hours after TBI, animals were randomly allocated to either β-blocker-group (n=10) or placebo-group (n=10). Mice in the β-blocker-group received intraperitoneal 4mg/Kg propranolol every 24-hours for 7 days while the placebo group received 4mg/Kg normal saline. Baseline novel-object-recognition (NOR) and classic-maze-tests were done prior to TBI and then daily from day 1 through 7 after TBI. Animals were sacrificed on day-7. Serum biomarkers were measured using ELISA and brain-sections were analyzed using western-blot and H&E-staining.

RESULTS: Both β-blocker and placebo groups had lower recognition index scores compared to baseline following TBI. β-blocker mice had significantly higher NOR-scores compared to placebo mice after day-2 post-TBI(Figure-1a). The β-blocker group required less time to complete the maze-test compared to placebo-group after day 4(Figure-1b). There was no difference regarding the serum levels of IL-1β, IL-6, TNF-α. The β-blocker-group had lower levels of UCHL-1 and higher levels of Hsp-70 in brain-lysate(Figure-1c). H&E-staining revealed that more neurons in hippocampal-CA1 area underwent apoptosis in the placebo-group compared to β-blocker-group.

CONCLUSIONS: Post-injury propranolol administration results in improved memory, learning and cognitive functions in a murine model of moderate TBI. Propranolol increases the expression of anti-apoptotic-protein (Hsp-70) and decreases cell death in the hippocampal-CA1 area compared to placebo.


Survival Curve
Percent Survival (%)
100
50
0
p < 0.0001
Injuries
NS
VPA 150
VPA 100
Injuries
Shock
Treatment
pRBC
End

NOTES

Paper# 14
Tuesday, March 5, 2019 (7:20am – 7:40am)

DOSE OPTIMIZATION OF VALPROIC ACID (VPA) IN A LETHAL MODEL OF TRAUMATIC BRAIN INJURY (TBI), HEMORRHAGE AND POLYTRAUMA IN SWINE

B BIESTERVELD, A WILLIAMS, N GRAHAM, K CHTRAKLIN, I DENNAHY, U BHATTI, A PAI, R KATHAWATE, R O'CONNELL, H ALAM
University of Michigan, Ann Arbor, Michigan

Presenter: Ben Biesterveld MD
Senior Sponsor: H Alam

INTRODUCTION: Trauma is a leading cause of death, and TBI is the hallmark injury of current military conflicts. VPA administration in high doses (300-400 mg/kg) improves survival in models of lethal hemorrhage, polytrauma and TBI, but effectiveness of lower doses is unknown. This information is critical for designing the upcoming clinical trials. We, therefore, performed the current study to determine the lowest dose at which VPA improves survival in a model of lethal injuries.

METHODS: Swine were subjected to TBI (10mm cortical impact), 40% blood volume hemorrhage and polytrauma (femur fracture, rectus crush and grade V liver laceration). After 1 hour of shock (mean arterial pressure 30-35 mmHg), animals were randomized (n=3-4/group) to: no resuscitation (injuries alone); normal saline (NS) resuscitation; or NS with VPA doses of 150 mg/kg (VPA 150) or 100 mg/kg (VPA 100). 3 hours after the shock phase, packed red blood cells were given, and the animals were monitored for another 4 hours. Survival was assessed using Kaplan-Meier and log-rank test.

RESULTS: 100% of the animals in the injuries alone, NS resuscitation and VPA 100 groups died prior to the end of the experiment, whereas 100% of the VPA 150 group animals survived ($p<0.0001$).

CONCLUSIONS: A single dose of VPA (150 mg/kg) significantly improves survival in an otherwise lethal model of multiple injuries. This is a much lower dose than previously shown to have a survival benefit and matches the dose that is tolerated by healthy human subjects with minimal adverse effects.

Table 1. Median (25-75 IQR) Platelet CD41 Surface Expression, Stratified by Sex

	Male Platelet	Female Platelet	p value
Native, unstimulated CD41 (MFI)	2487 (960-3192)	1699 (1194-2638)	0.69
CD41 After PAF Stimulation (MFI)	4043 (2468-5746)*	1905 (1634-2859)	*<0.01
CD41 After ADP Stimulation (MFI)	2334 (1586-4497)	2302 (1544-3493)*	*<0.01
After Estradiol Pre-Incubation			
Native, unstimulated CD41 (MFI)	3441 (1500-3965)	2443 (1364-3733)	0.51
CD41 After PAF Stimulation (MFI)	3607 (1943-5310)	4324 (3310-6216)*	*0.02
CD41 After ADP Stimulation (MFI)	2205 (1707-3866)	3446 (2379-4609)*	*<0.01

MFI=mean fluorescence intensity, PAF=Platelet Activating Factor, ADP=Adenosine Diphosphate; p values are paired t-test in comparison to unstimulated platelets

NOTES

Paper# 15
Tuesday, March 5, 2019 (7:40am – 8:00am)

FEMALE PLATELETS HAVE INCREASED AND DIFFERENTIAL ACTIVITY TO STIMULI: IMPLICATIONS IN TRANSFUSION PRACTICE AND TREATMENT OF TRAUMA-INDUCED COAGULOPATHY

JR COLEMAN, EE MOORE, MR KELHER, JM SAMUELS, A SAUAIA, A BANERJEE, CC SILLIMAN, E PELTZ
University of Colorado-Denver, Aurora, Colorado

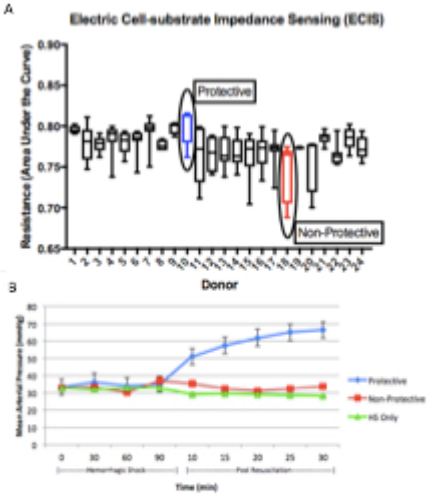
Presenter: Julia Coleman MD, MPH
Senior Sponsor: EE Moore

INTRODUCTION: Females are more hypercoagulable than males, which confers survival benefit in trauma-induced coagulopathy (TIC). The mechanism for this sex-specific hypercoagulability is unknown; however, sex hormone receptors on platelets highlight their potential contribution. Adenosine diphosphate (ADP) and platelet-activating factor (PAF) potentiate platelet activation and aggregation via distinct receptors. We hypothesize that female platelets have increased aggregation and ADP/PAF receptor stimulation compared to males, and estradiol addition to male or female platelets enhances this activity.

METHODS: Apheresis platelets were collected from healthy volunteers (premenopausal-females ≤54yrs, n=8, postmenopausal-females >54yrs, n=8, and age-matched males, n=16). After activation with 20μM ADP or 4μM PAF, platelet aggregation was assessed with Chronolog and fibrinogen binding capacity was assessed with CD41-labeled antibody and flow cytometry. Activation/aggregation were again assessed after pre-treatment with 105pg of estradiol.

RESULTS: Female platelets had increased ADP-induced aggregation (extent shape change [ESC] 34.5% versus 29.0% p=0.01), with no difference with PAF. Females had increased ADP-induced CD41 surface expression, whereas males had increased PAF-induced CD41 surface expression (Table1). In males, estradiol pre-incubation increased ADP-induced aggregation (ESC 34.9% versus 34.7% in females, p=0.64), while abrogating PAF-induced and decreasing ADP-induced CD-41 surface expression.

CONCLUSIONS: Female platelets have increased aggregation, approximated in male platelets with estradiol pre-treatment. Male and female platelets have differential receptor responsivity, suggesting sex-dependent activation and receptor responses. These findings offer potential explanation for sex-based differential performance of platelets in TIC and question whether donor sex of transfused platelets should be considered. Estradiol may also serve as a novel therapeutic adjunct in platelet dysfunction.



A, TEER was measured in real time using ECIS. An increase in TEER indicates a decrease in permeability. B, The plasma units with the greatest (blue) or least (red) effect on EC in A were further analyzed in vivo. Mice underwent HS for 90 min (MAP 35±5 mm Hg), followed by resuscitation with either the protective or non-protective plasma and compared to no resuscitation (HS only).

NOTES

Paper# 16
Tuesday, March 5, 2019 (8:00am – 8:20am)

IS ALL PLASMA CREATED EQUALLY? THE EFFECT OF INTERDONOR VARIABILITY

A CHIPMAN, F WU, S PATI, D POTTER, R KOZAR
RA Cowley Shock Trauma, University of Maryland, Baltimore, Maryland

Presenter: Amanda Chipman MD
Senior Sponsor: R Kozar

INTRODUCTION: The clinical benefits of plasma as an adjunct to the treatment of hemorrhagic shock (HS) have been well-established. However, its use is not without risk. Little is understood regarding the clinical implications of plasma variability. We hypothesized there to be interdonor variability in plasma that would impact physiologic and organ function.

METHODS: VEGF-treated pulmonary endothelial cells (EC) were incubated with plasma from 24 random donors. Transendothelial electrical resistance (TEER) was measured continuously for 24 hours. Plasma units with the most protective and least protective effect on reducing EC permeability were selected for our in vivo model. Mice underwent laparotomy then HS (MAP 35±5 x 90 minutes) followed by resuscitation (1x shed blood) with the selected plasma units and were compared to mice receiving no resuscitation (n=4-5/group). Hemodynamics were tracked and lungs assessed for histopathology.

RESULTS: Plasma from 24 donors revealed variability in the reversal of EC hyperpermeability; TEER for the protective plasma was significantly higher than the non-protective plasma (0.801±0.008 vs 0.744±0.012; p=.002)(Fig A). In vivo, resuscitation with the protective plasma was associated with a significantly higher MAP over time post HS (p=0.047 two-way ANOVA) than after the non-protective plasma which was comparable to mice receiving no resuscitation p=0.75; Fig B). Additionally, the protective plasma mitigated lung histopathologic injury compared to the non-protective plasma (1.4±0.8 vs 2.2±0.29, respectively, p=0.046) which was similarly comparable to no resuscitation (2.8±0.1, p=.071).

CONCLUSIONS: These data demonstrate significant interdonor variability in plasma that affects physiologic and organ specific functions. This has important implications for safety and clinical outcomes.

Results: Mean ± SD, N = 5 for each group. (5% plasma data shown)

	Syn-1 (pg/ml)	HLA (pg/ml)	sTM (pg/ml)	tPA (pg/ml)	PAI-1 (pg/ml)	Ang-2/1
HUVEC control	25.7±3.5	11.9±1.1	26.3±2.8	1685±151	5977±233	0.3±0.5
HUVEC + HR + Epi	92.2±8.2*	84.9±6.4*	100.5±8.7 *	3621±386*	4996±193*	2.4±0.4*
HUVEC + HR + Epi + fresh plasma	21.1±2.9	13.0±2.0	28.3±5.9	1631±67	5990±297	0.3±0.4
HUVEC + HR + Epi + 5% 1 day thawed plasma	32.1±3.9	19.5±3.4*	29.1±3.1	1708±93	5965±295	0.4±0.3
HUVEC + HR + Epi + 5% 5 day thawed plasma	88.5±4.7*#	81.9±7.2*#	89.9±6.6* #	3592±277* #	4880±202*#	2.0±0.9*#
HUVEC + HR + Epi + lyophilized plasma	26.7±3.3	13.8±5.8	26.1±5.5	1731±129	5995±268	0.3±0.1
HUVEC + HR + Epi + 5% 5 day thawed plasma + S1-PO4	28.3±3.1	16.8±4.4	29.1±3.3	1726±157	5905±145	0.4±0.6

*p<0.05 vs. HUVEC control, #p<0.05 vs. 1 day thawed plasma.

S1-PO4 concentrations (ng/ml) in fresh plasma, 1 day thawed plasma and lyophilized plasma showed no statistical difference ($p<0.05$) and were 62.3 ± 6.1, 54.9 ± 3.9 and 52.8 ± 4.2, respectively. S1-PO4 concentration in 5 day thawed plasma was 24.8 ± 4.2 and is statistically different than all other plasma preparations ($p<0.05$).

NOTES

Paper# 17
Tuesday, March 5, 2019 (8:20am – 8:40am)

PROTECTIVE EFFECTS OF PLASMA PRODUCTS ON THE ENDOTHELIAL-GLYCOCALYX BARRIER FOLLOWING TRAUMA-HEMORRHAGIC SHOCK: IS SPHINGOSINE-1 PHOSPHATE RESPONSIBLE?

M DIEBEL, L DIEBEL, D LIBERATI
Wayne State University, Detroit, Michigan

Presenter: Mark Diebel MD
Senior Sponsor: L Diebel

INTRODUCTION: Plasma is an important component of hemostatic resuscitation after trauma and hemorrhagic shock (T/HS). Purported benefits include reversal of coagulopathies, restoration of the endothelial glycocalyx and reduction of pulmonary vascular and intestinal permeability. The specific factors in plasma and the impact of storage conditions on these protective effects are uncertain. We studied different plasma and plasma protein product effects on endothelial glycocalyx (EG) and endothelial barrier function using an endothelialized microfluidic platform.

METHODS: Human umbilical vein endothelial cells (HUVEC) were cultured in the microchannels of microfluidic plates and subjected to flow conditions to establish hemodynamically relevant glycocalyx layers. The microfluidic plates were subjected to control or conditions to mimic the internal milieu of T/HS (hypoxia/reoxygenation (HR) + epinephrine (epi), 10^3 uM) for 1 hour. Plasma products including fresh plasma, one day thawed plasma, five day thawed plasma and lyophilized plasma were then added at 1% and 5% concentrations. In other experiments sphingosine-1 phoshate (S1-PO4) was added at physiologically relevant concentrations. Endothelial glycocalyx integrity was indexed by the syndecan-1(Syn-1) and hyaluronic acid (HLA) component shedding. Endothelial injury/activation was indexed by soluble thrombomodulin (sTM), tissue plasminogen activator (tPA), plasminogen activator inhibitor-1 (PAI-1) and the competitive tie ligands angiopoietin-1 and 2 (Ang1/2).

RESULTS: See attached Table.

CONCLUSIONS: A biomimetic model of the microcirculation following T/HS demonstrated EG and endothelial cellular injury/activation as well as a profibrinolytic phenotype. These effects were abrogated by all plasma products except the 5 day thawed plasma. Plasma thawed > 5 days had diminished S1-PO4 concentrations vs. the other plasma products. Our data suggest that S1-PO4 protein is critical to the vascular barrier protective effect of plasma products following T/HS.

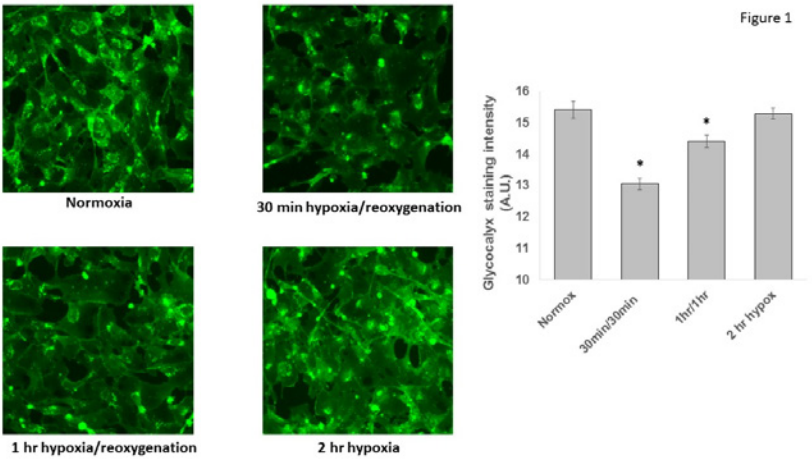


Figure 1

NOTES

Paper# 18
Tuesday, March 5, 2019 (8:40am – 9:00am)

HYPOXIA/REOXYGENATION PRODUCES GREATER ENDOTHELIAL GLYCOCALYX DAMAGE THAN ISCHEMIA ALONE IN A CELLULAR MODEL FOR SHOCK

OLAN JACKSON-WEAVER PHD, JESSICA FRIEDMAN MD, CHRISSY GUIDRY DO, ALISON SMITH MD PHD, MARTIN SCHREIBER MD, JUAN DUCHESNE MD
Tulane University School of Medicine, New Orleans, Louisiana

Presenter: Jessica Friedman PhD
Senior Sponsor: M Schreiber

INTRODUCTION: Damage to the endothelial glycocalyx (EG) occurs following a variety of insults, including sepsis, trauma, and hemorrhagic shock. Ischemia/reperfusion is known to cause EG damage, but the pathophysiologic mechanisms have not been elucidated. Furthermore, it is unclear whether the greater damage occurs during hypoxia, or if reoxygenation and the resultant increase in reactive oxygen species (ROS) and inflammatory mediators is required. Our objective was to determine if EG damage was greater following hypoxia alone or hypoxia/reoxygenation in a cellular model for shock.

METHODS: Hypoxia/reoxygenation decreases EG thickness. This decrease was most prominent in cells exposed to 30 mins hypoxia/reoxygenation, but was also significant in cells exposed to a 1 hr cycle. No difference was seen in EG thickness in cells exposed to 2 hrs of hypoxia without reoxygenation.

RESULTS: Human umbilical vein endothelial cells were cultured to confluence and exposed to 5% O2 for 30 mins, 1 hr, or 2 hrs. Cells exposed to hypoxia for 30 mins and 1 hour underwent reoxygenation (20% O2) for an equal time period. Cells exposed to hypoxia for 2 hours did not undergo reoxygenation. EG was measured using fluorescently tagged wheat germ agglutinin and imaged with confocal microscopy.

CONCLUSIONS: Our results indicate hypoxia alone is insufficient to produce damage to the EG, and that a period of reoxygenation is required. This is in clarification of previous data, with some studies finding damage early in hypoxic exposure and others demonstrating that reperfusion is necessary. Further studies will examine different concentrations of O2 and a greater number of time points.

Figure 1A: Titratability of Aortic Flow using the pREBOA device

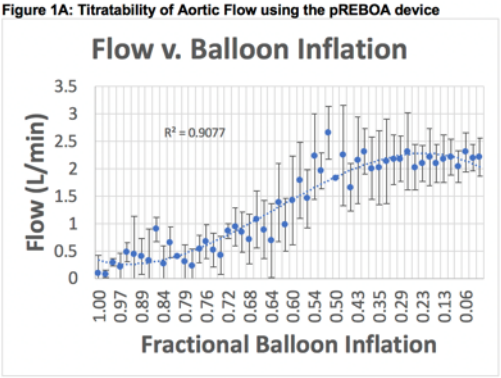
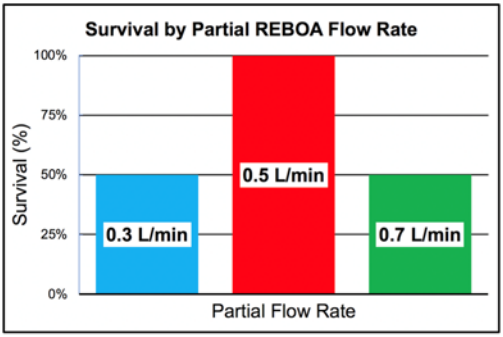


Figure 1B. Survival at distal flow rates using partial REBOA



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Paper# 19
Tuesday, March 5, 2019 (4:00pm – 4:20pm)

TITRATE TO EQUILIBRATE AND NOT EXSANGUINATE!: CHARACTERIZATION AND VALIDATION OF A NOVEL PARTIAL RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA CATHETER IN NORMAL AND HEMORRHAGIC SHOCK CONDITIONS

D FORTE, W DO, J WEISS, R SHELDON, J KUCKELMAN, M ECKERT, M MARTIN
Madigan Army Medical Center, Tacoma, Washington

Presenter: Dominic Forte MD
Senior Sponsor: M Martin

INTRODUCTION: Partial restoration of aortic flow during REBOA has potential to balance hemorrhage control and ischemia, but current devices cannot finely control distal flow. This study validates mechanics, physiology, and identifies optimal partial flow rates using a prototype device (pREBOA).

METHODS: 25 swine underwent placement of aortic flow probes and zone 1 pREBOA. Experiment 1(N=5) had no injury and were used to assess flow titration & control. Experiment 2 (N=10) added 20% hemorrhage plus either solid organ or abdominal vascular injury to assess flow rate vs rebleeding. Experiment 3 (N=10) swine were similarly prepared/hemorrhaged and underwent pREBOA at different partial flow rates for 2hr and complete deflation for 30min.

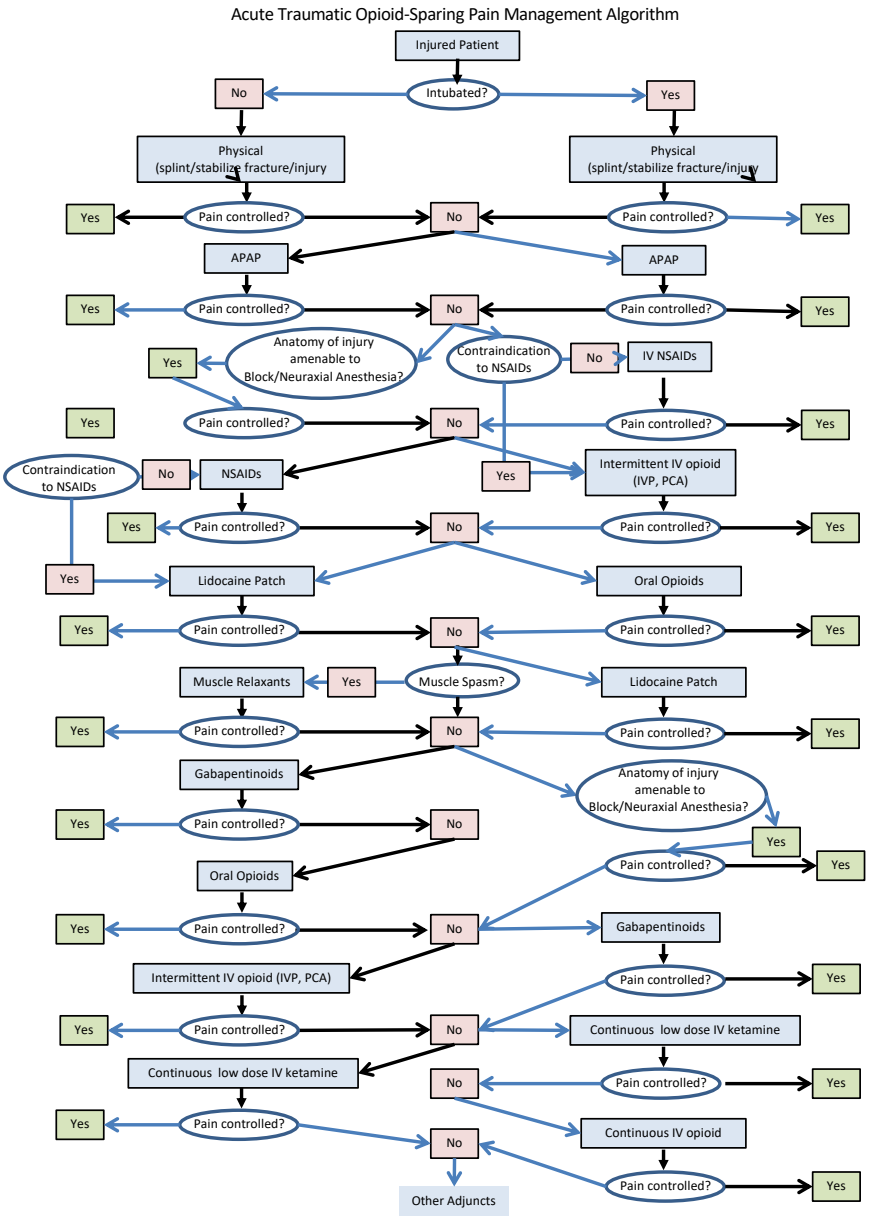
RESULTS: Balloon volume at minimum flow (mean .09 L/min) was 3.5-6.0mL. Half maximal flow was achieved with 56% of maximum balloon inflation. pREBOA allowed very fine titration of flow rates (Figure). Rebleeding occurred at 0.2-0.7L/min. Distal flow of 0.7 L/min had 50% survival, 0.5L/min had 100% survival, and 0.3L/min had 50% survival (Figure) with mean end lactates of 10mg/dL, 12mg/dL, and 18mg/dL respectively. All animals developed hyperkalemia, but a calcium level > or < 8.5 separated survivors from non-survivors.

CONCLUSIONS: The pREBOA device demonstrated a high level of fine control and titratability for restoration of aortic flow. An optimal partial flow of 0.5L/min was very effective at hemorrhage control while limiting the burden of ischemic injury, and extending the tolerable duration of zone 1 occlusion. Aggressive calcium supplementation prior to and during the reperfusion phase may be warranted to prevent hyperkalemic arrest.

NOTES

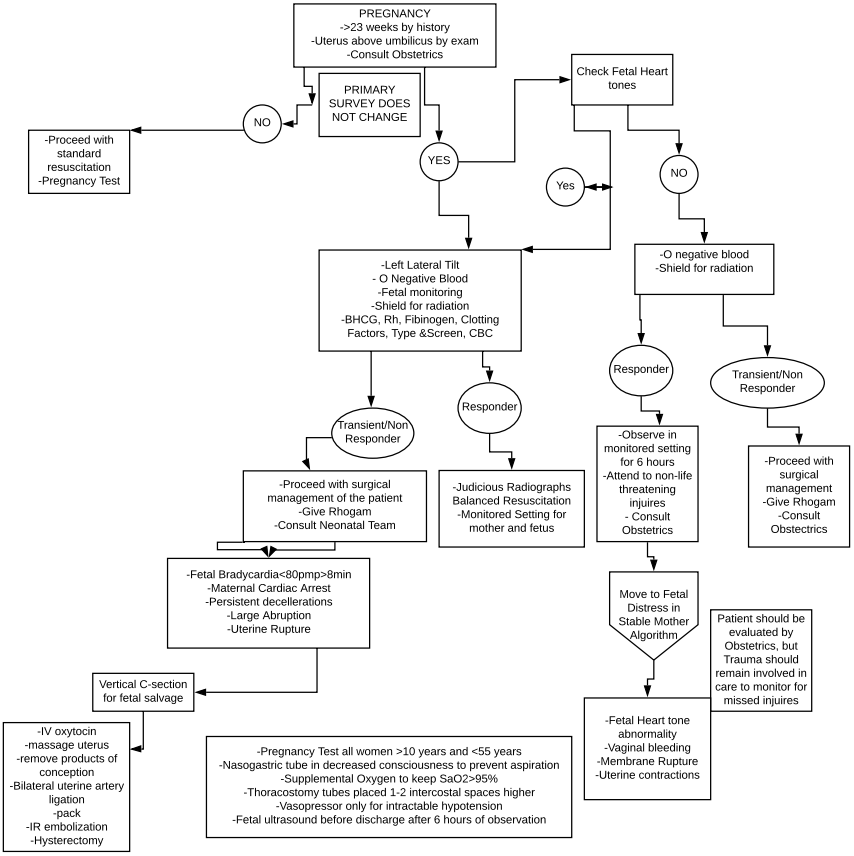
Paper# 20
Tuesday, March 5, 2019 (4:20pm – 4:40pm)

ALGORITHM 1: PAIN



Paper# 21
Tuesday, March 5, 2019 (4:40pm – 5:00pm)

ALGORITHM 2: PREGNANCY



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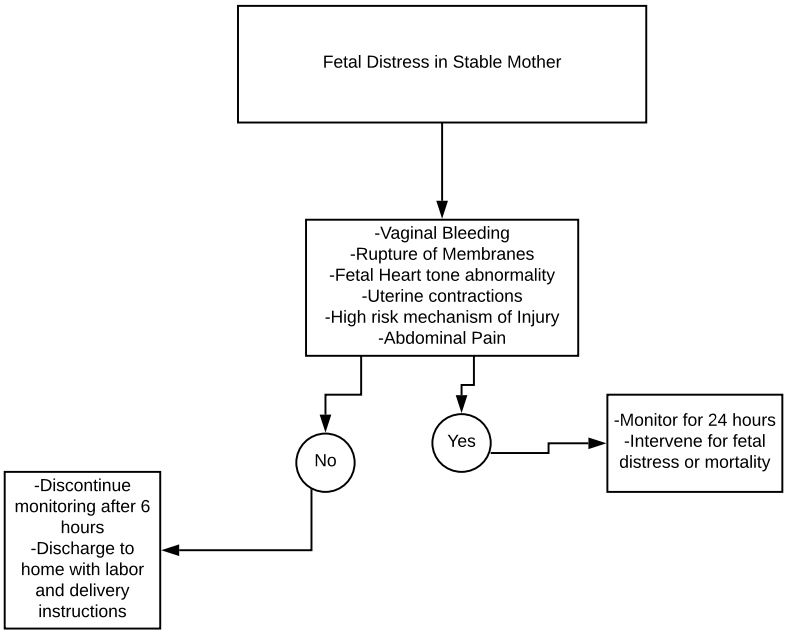
ALGORITHM 2: PREGNANCY



NOTES

Paper# 22
Tuesday, March 5, 2019 (5:00pm – 6:00pm)

PRESIDENTIAL ADDRESS

Duty and What Really Matters: Profession and Self

Roxie M. Albrecht, MD, FACS, FCCM
Diplomate American Board of Surgery
Oklahoma City, Oklahoma

NOTES

Paper# 23
Wednesday, March 6, 2019 (7:00am – 7:20am)

KETAMINE INFUSION FOR PAIN CONTROL IN ELDERLY PATIENTS WITH MULTIPLE RIB FRACTURES: RESULTS OF A RANDOMIZED CONTROLLED TRIAL

NW KUGLER MD, TW CARVER, MD, J JUUL PHARMD, WJ PEPPARD PHARMD, K BOYLE MD, A SZABO PHD, K MADSEN DRESCHER MD, L REIN MS, L SOMBERG MD AND JS PAUL MD
Medical College of Wisconsin, Milwaukee, Wisconsin

Presenter: Thomas Carver MD
Senior Sponsor: J Paul

INTRODUCTION: Rib fractures are associated with increased mortality, particularly in the elderly. While opiate-based pain regimens remain the cornerstone of rib fracture management, issues related to opioids have driven research into alternative analgesics. Adjunctive ketamine use in lieu of opioids continues to increase but little evidence exists to support its efficacy or safety within the elderly trauma population.

METHODS: A prospective, randomized, double-blind placebo-controlled trial of elderly patients (age ≥65) with ≥3 rib fractures admitted to a Level 1 trauma center was conducted. Exclusion criteria included GCS <14, and chronic opiate use. Groups were randomized to either low dose ketamine (LDK) at 2 mcg/kg/min or an equivalent rate of 0.9% normal saline. The primary outcome was reduction in numeric pain scores (NPS). Secondary outcomes included oral morphine equivalent (OME) utilization, epidural rates, pulmonary complications, and adverse events.

RESULTS: Thirty of 59 (50.8%) were randomized to the experimental arm. Groups were similar in makeup. LDK failed to reduce 24-hour NPS or OME totals. Subgroup analysis of 24 patients with ISS >15 demonstrated that LDK was associated with a reduction in OME utilization the first 24-hours (25.6 vs. 42.6mg, p=0.04) but at no other time points. No difference in other secondary outcomes or adverse events was noted.

CONCLUSIONS: LDK failed to affect NPS or OME within the overall cohort, but a decrease in OME was observed in those with an ISS >15. Additional studies are necessary to confirm whether LDK benefits severely injured elderly patients.

Table 1. **Generalized Linear Autoregressive Model estimates for ACS verified trauma centers, state laws associated with time trends in crude fatality rates by age cohort, 1999-2015.**

Variable	Age Group Cohorts N=850 *Unstandardized Regression Coefficient (p-value)*			
ACS verification	16-20	21-55	56-65	Over 65
Level I vATC combined	-0.007(.31)	-0.01(.54)	-0.02(.33)	-0.02(.25)
Level I vATC adult	-0.08(.24)	-0.03(.35)	-0.04(.21)	-0.03(.41)
Level I vPTC	-0.07(.001)	-0.01(.12)	-0.02(.53)	-0.01(.22)
Level II vATC combined	-0.03(.000)	-0.02(.001)	-0.03(.001)	-0.03(.001)
Level II vATC adult	-0.001(.007)	-0.01(.07)	-0.03(.01)	-0.03 (.002)
Level III vATC combined	-0.02(.06)	-0.001(.95)	-0.02(.29)	-0.03(.002)
Level III vATC adult	-0.004(.92)	-0.06(.11)	-0.006(.86)	-0.004(.72)
Level III vPTC	-0.06(.24)	-0.05(.32)	-0.001(.94)	-0.002(.81)
Seat belt Laws	-0.26 (.001)	-0.24 (.001)	-0.43(.001)	-0.07(.19)
Red Light Camera Laws	-0.71 (.02)	-0.07(.02)	-0.06(.007)	-0.07(.09)

NOTES

Paper# 24
Wednesday, March 6, 2019 (7:20am – 7:40am)

FULLY SATURATED: THE FAILURE OF ADDITIONAL AMERICAN COLLEGE OF SURGEONS (ACS) VERIFIED ADULT LEVEL I TRAUMA CENTERS TO IMPACT ADULT MOTOR VEHICLE MORTALITY RATES, 1999-2015

D NOTRICA, L SAYRS, N KRISHNA, L MCMAHON, D ROWE, D JAROSZEWSKI
Phoenix Children's Hospital, Phoenix, Arizona

Presenter: David Notrica MD, FACS, FAAP
Senior Sponsor: D Notrica

INTRODUCTION: Motor vehicle mortalities have been declining while verified ACS adult trauma centers(vATC) have increased. Level II centers now outnumber Level I ATCs. This study looks at changes in vATC/vPTC counts and assesses the impact of level I-III vATC/vPTC growth on fatal MVC rates.

METHODS: Pooled time series analysis was utilized. Prospective data on adult motor vehicle fatalities, crash characteristics, state laws and vATC/vPTCs were collected for 50 US states,1999-2015(N=850). Generalized linear autoregressive modeling was used to assess the relative contribution of Level I-III vATC/vPTC growth, crash characteristics and state laws to the crude MVC fatality rate.

RESULTS: The addition of Level I vATCs made no impact on mortality for any age group. The addition of Level II vATCs was slightly protective for all age groups(B=-0.03[p<.001]); the addition of Level I vPTCs was protective for the 16-20 cohort(B=-0.07[p<.001]), but had no impact on other cohorts. By contrast, DUI laws that lowered the minimum BAC were associated with largest declines for all adult cohorts: 21-55(B=3.8[p<.001]); 56-65(B=3.2[p<.001]); >65(B=4.2[p<.001]). Red light camera laws(B=-0.71[p<.001]) and seat belt laws(B=-0.24[p<.001]) were associated with more significant declines in death than the addition of verified trauma centers.

CONCLUSIONS: The addition of level I and level III vATCs over the last 20 years has had no impact on declines in MVC fatalities. DUI laws had a significant impact on declining rates in the study period. Addition of Level I vPTCs was associated with 7% impact for age 16-20. Level II vATCs were associated with 3% of the decline for all cohorts.

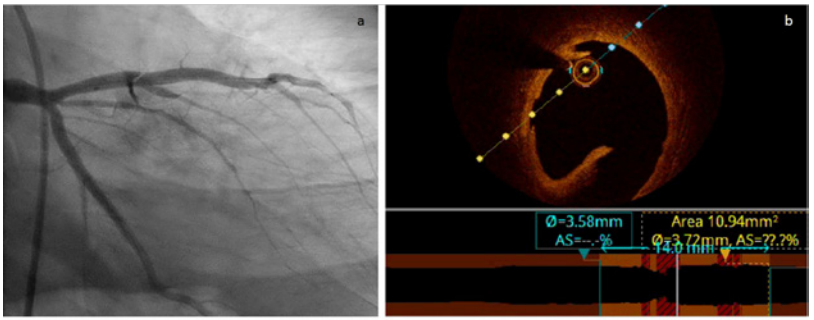


Figure 1. a) RAO caudal left coronary angiogram demonstrating proximal LAD linear dissection b) Intracoronary OCT imaging demonstrating dissection with disruption of the intima and media from the adventitia

NOTES

Paper# 25
Wednesday, March 6, 2019 (7:40am – 7:50am)

NOT ALL HOOFBEATS ARE HORSES: CORONARY DISSECTION FOLLOWING BLUNT TRAUMA

B WALLACE, N WERNER, C BURLEW, M HOLLAND, M COHEN, R LAWLESS
University of Colorado School of Medicine, Aurora, Colorado

Presenter: Bradley Wallace MD
Senior Sponsor: C Burlew

INTRODUCTION: Introduction: Coronary dissection following blunt trauma is a "surgical zebra." Herein we present the case of a 25-year-old male who developed an acute left anterior descending (LAD) coronary artery dissection following a motorcycle collision (MCC). Case Report: A 25 year old man was the helmeted driver of a MCC at highway speeds. He sustained a sternal fracture, anterior mediastinal hematoma, pulmonary contusions, and orthopedic injuries to all extremities. During his evaluation in the ED, he had significant EKG changes (right bundle branch block and left anterior fascicular block) concerning for ischemia; a troponin was checked and was elevated at 15 ng/dL. Echocardiogram revealed a septal abnormality thought to be secondary to conduction blockade without significant wall motion abnormalities. Troponin I values peaked at 32.5 ng/dL and the patient developed a non-sustained ventricular tachycardia. Cardiac catheterization identified a large, flow limiting, LAD dissection. A drug eluting stent was placed with complete resolution of the stenosis and the substernal chest pain. Conclusion:

Coronary dissection is often a fatal complication; therefore, traumatologists must remain vigilant while managing a patient with suspected blunt cardiac trauma. Early diagnosis and interventions for sustained rhythmic and/or hemodynamic instabilities should be paramount for care, and dissonance out of proportion to the more common cardiac contusion should prompt further evaluation.

NOTES

Paper# 26
Wednesday, March 6, 2019 (7:50am – 8:20am)

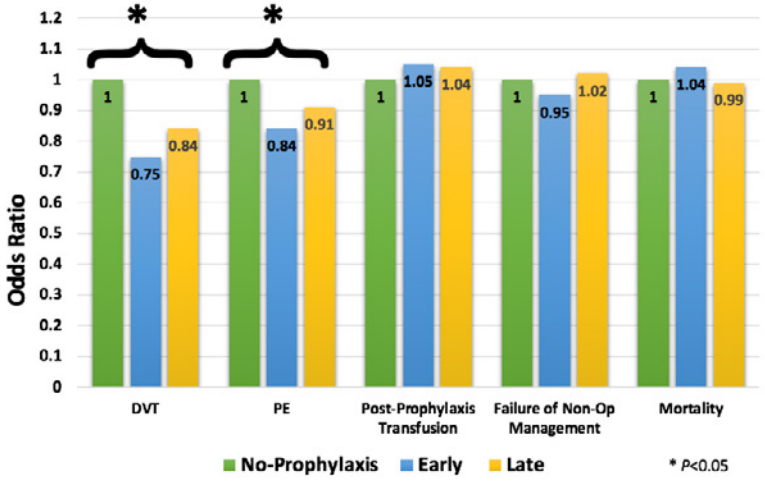
PRO/CON DEBATE: GUN CONTROL, AS AN INTEGRAL PART OF GUN VIOLENCE PREVENTION, IS MY LANE
Moderator: Ajai Malhotra MD
Pro: Rochelle Dicker MD / Con: Alex Eastman MD

NOTES

Paper# 27
Wednesday, March 6, 2019 (8:20am – 9:00am)

FOUNDERS BASIC SCIENCE LECTURE: TRAUMA IMMUNOLOGY – A NEW NAME FOR AN OLD CONCEPT

Timothy R. Billiar MD, University of Pittsburgh, Pittsburgh, PA


Odds Ratio
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
*
*
1
0.75
0.84
1
0.84
0.91
1
1.05
1.04
1
0.95
1.02
1
1.04
0.99
DVT
PE
Post-Prophylaxis Transfusion
Failure of Non-Op Management
Mortality
No-Prophylaxis
Early
Late
* P<0.05

NOTES

Paper# 28
Wednesday, March 6, 2019 (4:00pm – 4:20pm)

IS EARLY CHEMICAL THROMBOPROPHYLAXIS IN PATIENTS WITH SOLID ORGAN INJURY A SOLID DECISION?

D SKARUPA, M HAMIDI, F MADBAK, T O'KEEFFE, M ZEESHAN, K HANNA, A NORTHCUTT, L GRIES, N KULVATUNYOU, B JOSEPH
University of Florida, Jacksonville, Arizona

Presenter: David Skarupa MD
Senior Sponsor: B Joseph

INTRODUCTION: The optimal time to initiate chemical thromboprophylaxis (CTP) in patients who have undergone non-operative management (NOM) of blunt solid organ injuries remains controversial. The aim of our study was to assess the impact of early initiation of CTP in patients with blunt abdominal solid organ injuries.

METHODS: We performed a 2-year (2013-14) retrospective analysis of ACS-TQIP. We included all adult trauma patients (Age>=18 years) with blunt solid organ (liver, spleen or kidney) injuries who underwent non-operative management. Patients were stratified into 3 groups based on timing of CTP (early≤48-hours of injury, late>48-hours of injury and No Prophylaxis group). Primary outcome measures were VTE complications (DVT&PE). Secondary outcomes were rates of failure of non-operative management, rates of pRBC transfusion, and mortality. Multivariate regression analysis was performed.

RESULTS: A total of 36,187 patients met the inclusion criteria. Mean age was 49.5±19y and 36% (n=13027) of patients received CTP (Early: 37% (n=4,819) vs. Late: 63% (n=8,208)). After controlling for confounders, patients receiving early chemical thromboprophylaxis had lower rates of DVT (p=0.03) and PE (p=0.04) compared to the No Prophylaxis and Late CTP groups. There was no difference between the three groups regarding the post-prophylaxis pRBCs transfusions, failure of non-op management and mortality (Figure-1).

CONCLUSIONS: Our results suggest that in patients undergoing non-operative management of blunt abdominal solid organ injuries, early initiation of thromboprophylaxis should be considered. It is associated with decreased rates of DVT and PE, with no significant difference in post prophylaxis pRBCs transfusion, failure of non-op management, and mortality rates.

NOTES

Paper# 29
Wednesday, March 6, 2019 (4:20pm – 4:30pm)

A REFLECTION OF ONE'S SELF IN THE TRAUMA BAY: WHEN THE PATIENT IS THE UNSUSPECTING HEALER

J HARTWELL
Indiana University, Indianapolis, Indiana

Presenter: Jennifer Hartwell MD
Senior Sponsor: J Hartwell

INTRODUCTION: [Patient, (Surgeon)] A 41-year old female (41) presented to the trauma bay after being hit by a truck while on a training run (trains, runs marathons). Her heart rate was 64 bpm (resting HR: 45), blood pressure 102/70. Social history was remarkable for full-time accountant (full-time academic surgeon), married (20th anniversary), and mother to four school aged children (children aged: 18, 16, 11, and 9). She sustained left 10th/11th rib fractures; left scapula, right clavicle, right proximal humerus, and right fibula fractures; grade 3 renal laceration, lumbar transverse process fractures, and multiple pelvic fractures (long standing emotional/professional burnout). Her hospital course was complicated by an ileus (depression/anxiety, disordered eating, and strained personal relationship), resolved by hospital day 7. She was discharged to acute rehab on hospital day 10 (remains committed to ongoing self-care, reflection, relationship investment, and mentorship of colleagues experiencing burnout). This encounter with a patient, strikingly similar to the surgeon herself, provided a unique opportunity to draw parallels between the physical and emotional stresses of trauma and a taxing career. The patient, though unaware, challenged the surgeon to embrace the uncertainty of life. As a result of the encounter, the surgeon increased her involvement in key relationships with colleagues, trainees, mentors, and family; sustained her commitment to self-care and transparent expression of her experience through her blog; and has an improved empathy for her patients and their life-changing traumas. This paradigm shift in understanding surgeon burnout and fatigue can serve as an inspiration to other surgeons.

NOTES

Paper# 30
Wednesday, March 6, 2019 (4:30pm – 5:00pm)

PANEL OF EXPERTS
Presenter: Ajai Malhotra MD
Panelists: Ben Zarzaur MD; Hasan Alam MD; Susan Rowell MD; Jasmeet Paul MD; Stephanie Savage MD

NOTES

Paper# 31
Wednesday, March 6, 2019 (5:00pm – 6:00pm)

WTA BUSINESS MEETING (MEMBERS ONLY)

Table 1: A comparison of patients receiving blood component therapy (BCT) vs cold-stored whole blood (CWB).

	BCT (n=182)	CWB (n=91)	p-value
Injury Severity Score	19.3 ± 13.3	21.4 ± 15.9	0.4323
Shock Index	0.57 ± 0.54	0.45 ± 0.41	0.3674
Initial 4-hr PRBC	10.8 ± 16.7	7.0 ± 9.0	0.0604
Initial 4-hr Plasma	7.6 ± 13.4	5.6 ± 7.7	0.5025
Initial 4-hr Platelets	1.2 ± 2.3	1.0 ± 1.5	0.3217
24-hour Hemoglobin	10 ± 2	11 ± 2	0.0038
Trauma Bay to OR (%)	58.6	65.9	0.0002
Death in Trauma Bay (%)	8.8	2.2	0.0002
30-day Mortality (%)	31.8	26.0	0.3561

NOTES

Paper# 32
Thursday, March 7, 2019 (7:00am – 7:20am)

COLD-STORED WHOLE BLOOD: A BETTER METHOD OF TRAUMA RESUSCITATION?

J HAZELTON, J CANNON, C ZATORSKI, M SEAMON, J SAN ROMAN, S MOORE, A YOUNG, M SUBRAMANIAN, J GUZMAN, F FOGT, A MORAN, J GAUGHAN, J PORTER
Cooper University Hospital, Camden, Pennsylvania

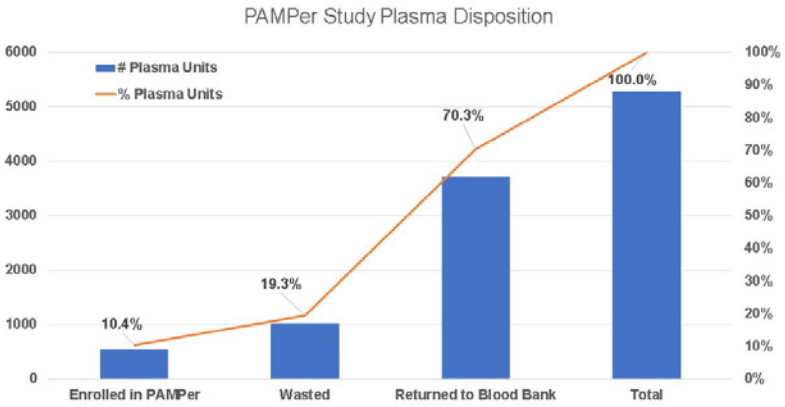
Presenter: Joshua Hazelton DO
Senior Sponsor: S Ross

INTRODUCTION: Cold-stored whole blood (CWB) provides a balance of red cells, plasma, and platelets in a more physiological distribution and concentration than blood component therapy (BCT). We hypothesized that patients receiving CWB during a trauma resuscitation would have improved survival compared to those receiving BCT.

METHODS: We performed a case-match study of trauma patients who received CWB or BCT at two Level-I Trauma Centers. Criteria to receive CWB included age≥18, male gender, SBP<90mmHg, and source of hemorrhage. We performed a 2:1 propensity match against any trauma patient who received ≥1u of packed red cells (PRBCs) between 2013-2018. Endpoints included 30-day and trauma bay mortality, as well as product utilization. Comparisons were made using Wilcoxon-ranked sum and Fisher's exact test with $p<0.05$ being significant.

RESULTS: A total of 107 patients received CWB. Of these, 91 were matched to 182 BCT patients. Mean ISS (BCT 19.3±13.3 v. CWB 21.4±15.9;p=0.4323) and rate of penetrating mechanism (58.8% v. 60.4%;p=0.8961) were identical. CWB patients had a lower rate of Trauma bay mortality (8.8% v. 2.2%;p=0.0002) and a higher rate of going to the OR (58.6% v. 65.9%;p=0.0002). PRBC utilization approached significance with fewer units administered to CWB patients (10.8±16.7 v. 7.0±9.0;p=0.0607). CWB patients had a higher mean hemoglobin at 24 hours (10±2 v. 11±2;p=0.0038). 30-day mortality was not different between the groups (31.8% v. 26.0%;p=0.3561).

CONCLUSIONS: CWB offers a balanced resuscitation with improved trauma bay survival and higher mean hemoglobin at 24 hours. A larger, prospective study is needed to determine whether there is a longer-term survival benefit.


PAMPer Study Plasma Disposition
Plasma Units
% Plasma Units
6000
5000
4000
3000
2000
1000
0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10.4%
19.3%
70.3%
100.0%
Enrolled in PAMPer
Wasted
Returned to Blood Bank
Total

NOTES

Paper# 33
Thursday, March 7, 2019 (7:20am – 7:40am)

IMPLEMENTION OF A PREHOSPITAL AIR MEDICAL PLASMA PROGRAM: IS IT CURRENTLY FEASIBLE?

P ADAMS, F GUYETTE, K DYSON, M YAZER, D TRIULZI, B DALY, R MILLER, B HARBRECHT, J CLARIDGE, H PHELAN, W WITHAM, A PUTNAM, T DUANE, J SPERRY
University of Pittsburgh, Pittsburgh, Pennsylvania

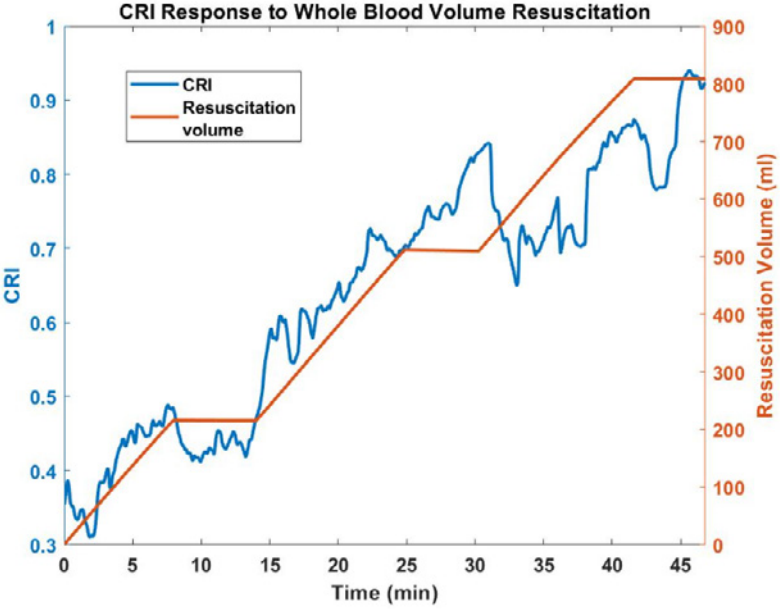
Presenter: Peter Adams BS
Senior Sponsor: J Sperry

INTRODUCTION: The PAMPer trial demonstrated a 30-day survival benefit among hypotensive trauma patients receiving prehospital plasma during air medical transport. We characterized blood bank resources, costs and feasibility of air medical plasma program implementation.

METHODS: We performed a secondary analysis using data from the PAMPer trial. Intervention patients received thawed plasma (5-day shelf-life). Unused plasma units were recycled back to blood bank affiliates, when possible. Distribution method and capability of recycling varied across sites. We determined the status of plasma units deployed, utilized, wasted, and returned. We inventoried and annualized costs for distribution and recovery.

RESULTS: The PAMPer trial screened 7,275 patients and 5,283 plasma units were deployed across 22 air medical bases over 42 months using available site data. Of this total, 548 (10.4%) were used for enrollments (FIGURE), 70.3% of unused units were returned to the blood bank prior to expiration and 1,019 units (19.3%) expired without return. The ability to recycle unexpired units back to blood banks varied widely by site (range 0-82%). At one optimized site, 58.3% of returns were transfused with the remainder expiring unused. Site specific costs for distribution and recovery were $155,195 for 1,895 courier deliveries over 42 months. Estimated annual cost for plasma distribution and recovery was $16,124 per air base.

CONCLUSIONS: A prehospital plasma program utilizing thawed plasma is resource intensive. Waste can be minimized at a significant cost. Products with a longer shelf-life such as liquid plasma or freeze dried plasma may provide a more cost effective prehospital product relative to thawed plasma.


CRI Response to Whole Blood Volume Resuscitation
CRI
Resuscitation volume
CRI
Resuscitation Volume (ml)
Time (min)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
900
800
700
600
500
400
300
200
100
0
0
5
10
15
20
25
30
35
40
45

NOTES

Paper# 34
Thursday, March 7, 2019 (7:40am – 8:00am)

THE COMPENSATORY RESERVE INDEX: A CONTINUOUS, NON-INVASIVE METRIC FOR WHOLE BLOOD RESUSCITATION

G GRUDIC, J MULLIGAN, M SANTORO, K BUI, R PHILLIPS, S MOULTON, D MACLEOD
Children's Hospital Colorado, Aurora, Colorado

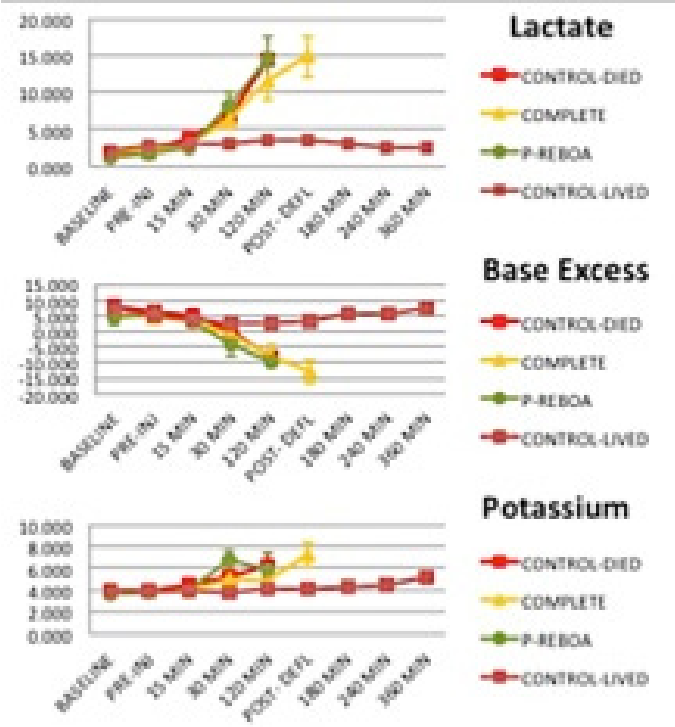
Presenter: Ryan Phillips
Senior Sponsor: S Moulton

INTRODUCTION: Fluid resuscitation in trauma is complicated by the patient's physiology and injuries, and the challenge of measuring the effectiveness of fluids administered. The Compensatory Reserve Index (CRI) is a new, non-invasive hemodynamic parameter ranging from 1 (normovolemia) to 0 (CV collapse), that trends with the individual patient's response to hypovolemia. We hypothesize that CRI will continuously track the reinfusion of whole blood in a controlled blood draw protocol.

METHODS: Adults aged 18-55, underwent stepwise (~333ml aliquot) removal and replacement of 20% blood volume (males 15ml/kg; females 13ml/kg). After blood removal, the entire volume was reinfused. CRI was monitored in real-time using the CipheOx® CRI Tablet (Flashback Technologies, Louisville, CO). Reinfused blood volume was continuously measured with a flowmeter (Transonic, Ithaca, NY).

RESULTS: 42 subjects (24 male) were enrolled in the study. For all subjects, CRI decreased during blood removal and recovered during reinfusion. The absolute drop and recovery of CRI is relative to the subject's ability to compensate for blood loss. During reinfusion, the correlation between the increase in CRI and volume of blood reinfused averaged 0.89 (95% CI 0.88 to 0.90), see image. The average time for CRI to begin trending up after the start of reinfusion was 2.8 minutes (95% CI 2.5 to 3.1 minutes). For all subjects, CRI exceeded 0.6 before 75% of the blood was reinfused.

CONCLUSIONS: CRI is an individual-specific hemodynamic parameter that is strongly correlated with changes in central blood volume. CRI Monitors potentially offer a continuous, noninvasive metric on the progress of resuscitation.


Lactate
CONTROL-DIED
COMPLETE
P-REBOA
CONTROL-LIVED
Base Excess
CONTROL-DIED
COMPLETE
P-REBOA
CONTROL-LIVED
Potassium
CONTROL-DIED
COMPLETE
P-REBOA
CONTROL-LIVED

NOTES

Paper# 35
Thursday, March 7, 2019 (8:00am – 8:20am)

PARTIAL ZONE I RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA (REBOA) DOES NOT EXTEND SURVIVAL OR MITIGATE UNCONTROLLED HEMORRHAGE IN A SEVERE SWINE SHOCK MODEL

D KAUVAR, M PRINCE, IA POLYKRATIS, R DEGUZMAN, B KHIERABADI, M DUBICK
San Antonio Military Medical Center, JBSA Fort Sam Houston, Texas

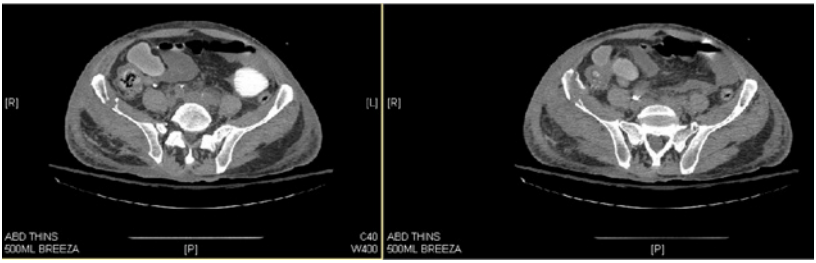
Presenter: David Kauvar MD, FACS
Senior Sponsor: M Dubick

INTRODUCTION: Partial REBOA (P-REBOA) has been suggested as a method to control non-compressible hemorrhage prior to surgical treatment in field settings where large volume resuscitation is not available.

METHODS: In a pilot study, nine (3/group) Yorkshire swine (47-51Kg) were subjected to 22mL/Kg hemorrhage (100mL/min) and closed femur fracture. Open splenic transection was performed and hemorrhage permitted for 15min. Shed blood was measured. CONTROL animals had no REBOA, COMPLETE had 100% Zone I occlusion for 120min, and P-REBOA had 20min complete followed by 100min 50% occlusion. Splenectomy and plasma resuscitation (15 ml/kg) was initiated 30min before incremental deflation. Epinephrine was used as needed to maintain SBP>80mmHg. Blood samples were taken throughout and animals monitored for 6h following splenic injury or until death.

RESULTS: One CONTROL animal survived the entire experiment, others died within 1h of splenic injury (group mean survival 158min). All COMPLETE animals died shortly after deflation (142min). All P-REBOA animals died during partial inflation (90min). Group survival times did not differ statistically. COMPLETE occlusion had less hemorrhage during inflation (0.94±.4mL/Kg) than CONTROL (4.2¬¬±1.5) and P-REBOA (3.9±1.4). Arterial lactate, base excess, and potassium worsened more rapidly during inflation prior to death for PARTIAL than for CONTROL or COMPLETE animals (figure).

CONCLUSIONS: P-REBOA did not result in improved survival or hemorrhage control compared to no or complete aortic occlusion in this severe multisystem trauma uncontrolled hemorrhage model. This suggests limited utility for P-REBOA as a measure for prolonged hemorrhage control.


[R]
[L]
ABD THINS
500ML BREEZA
[P]
C40
W400
[R]
ABD THINS
500ML BREEZA
[P]

NOTES

Paper# 36
Thursday, March 7, 2019 (8:20am – 8:30am)

A BONE TO PICK: AN UNUSUAL CASE OF TRAUMATIC SMALL BOWEL INJURY

K. WATKINS, MD, R. ALBRECHT, MD, A. CROSS, MD
University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma

Presenter: Kayla Watkins MD
Senior Sponsor: R. Albrecht

INTRODUCTION: Blunt trauma (BT) results in a 1-5% incidence of small bowel injury (SBI). SBI attributed to BT is diagnosed not infrequently due to a surgeon's heightened suspicion as CT scan findings are relatively non-specific. Physical exam is of utmost clinical importance as presentation is often delayed. We present the case of a 62-year-old male admitted to the ICU after an auto vs. pedestrian accident. His injuries included rib fractures, blunt solid organ injury, pelvic fractures, and multiple extremity fractures. On hospital day 3, after multiple orthopedic procedures, he developed abdominal distention without vital sign or laboratory abnormality. Abdominal films were consistent with ileus. Treatment included fluid/electrolyte management and placement of a nasogastric tube for decompression. On hospital day 5, a CT scan was performed due to failure to progress and revealed small bowel dilation with a transition point in the right lower quadrant/midabdomen (image 1). Patient was taken to the OR for exploration given heightened clinical suspicion. An abscess was encountered in the pelvis and a 2 cm enterotomy was found in the terminal ileum caused by an iliac wing fracture that had violated the peritoneum (image 2). Small bowel resection and primary anastomosis were completed. Our case report highlights the importance of a heightened suspicion for bowel injury in a patient with pelvic fractures. Adynamic ileus should be a diagnosis of exclusion and patients with an abnormal examination and CT scan findings that are inconsistent with clinical picture should warrant exploration.

NOTES

Paper# 37
Thursday, March 7, 2019 (8:30am – 9:00am)

PRO/CON DEBATE: CURRENT STATE OF KNOWLEDGE SUPPORTS DEVELOPMENT OF PRE-HOSPITAL BLOOD PRODUCT PROGRAMS
Moderator: Bryan Collier MD
Pro: Jason Sperry MD / Con: Jordan Weinberg MD

NOTES

Paper# 38
Thursday, March 7 2019 (4:00pm – 4:20pm)

CRITICAL CALL FOR HOSPITAL-BASED DOMESTIC VIOLENCE (DV) INTERVENTION: THE DAVIS CHALLENGE.

M ABOUTANOS, MD, MPH, FACS, AVINCENT, MSW, M ALTONEN, MA, K MAHER, PHD, N THOMSON, PHD,UKPC, CPC
Virginia Commonwealth University Medical Center, Richmond, Virginia

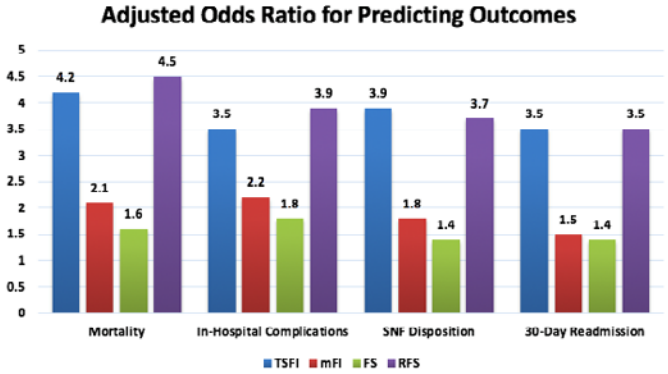
Presenter: Michel Aboutanos MD, MPH, FACS
Senior Sponsor: M Aboutanos

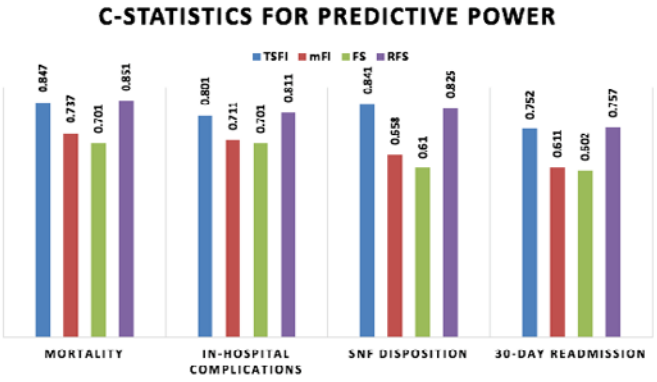
INTRODUCTION: 50% of women killed in DV were seen by a health care provider within a year of their death. As guest speaker to the trauma center (VCU-TC), Dr. James Davis (WTA past president) challenged VCU-TC to develop an integrated and sustainable hospital-based DV program. VCU-TC surveys confirmed > 80% of providers do not screen for DV. 76.5% had no training. In response, an integrated program – EMPOWER was developed. It consists of staff education, patient screening, victim crisis fund (VCF), and interdisciplinary sexual/DV intervention team. This research examines the impact and feasibility of an integrated hospital/VCU-TC based DV program.

METHODS: Between 2015-2017, patients admitted with a DV consult to EMPOWER were entered into a secure database capturing demographics, mechanisms, income data and social determinants of risk. Program feasibility was evaluated on patient engagement via screening and case management (CM). Program impact was evaluated on crisis intervention (CI), safety planning (SP) and community referral (CR).

RESULTS: DV survivors (N=754; M age=34) were women (91%), unmarried (82%) and African-American (61%). Primary mechanism were firearm (44%) or stabbing (34%). Survivors were perpetrated by a cohabiting (47%) or dating partner (17%). Monthly income averaged $622. 40% had no health insurance. Intake required 2-8 hours with each patient. 25% received VCF (M=$104). Advocates provided 53% CM. Survivors received SP (68%), CI (77%), sexual/DV education (82%), and CR (85%).

CONCLUSIONS: Critical call for hospital-based DV intervention programs as a priority for trauma centers to adopt cannot be underestimated but can be answered in a comprehensive model.


Adjusted Odds Ratio for Predicting Outcomes
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
4.2
2.1
1.6
4.5
3.5
2.2
1.8
3.9
3.9
1.8
1.4
3.7
3.5
1.5
1.4
3.5
Mortality
In-Hospital Complications
SNF Disposition
30-Day Readmission
TSFI
mFI
FS
RFS


C-STATISTICS FOR PREDICTIVE POWER
TSFI
mFI
FS
RFS
0.847
0.737
0.701
0.851
0.801
0.711
0.701
0.811
0.841
0.658
0.61
0.825
0.752
0.611
0.502
0.757
MORTALITY
IN-HOSPITAL COMPLICATIONS
SNF DISPOSITION
30-DAY READMISSION

NOTES

Paper# 39
Thursday, March 7, 2019 (4:20pm – 4:40pm)

COMPARATIVE EVALUATION OF DIFFERENT FRAILTY SCORES TO PREDICT OUTCOMES IN GERIATRIC TRAUMA PATIENTS

M ZEESHAN, M HAMIDI, T O'KEEFFE, K HANNA, R FRIESE, L GRIES, ER ZAKARIA, A TANG, N KULVATUNYOU, B JOSEPH
The University of Arizona, Tucson, Arizona

Presenter: Mohammed Hamidi MD
Senior Sponsor: B Joseph

INTRODUCTION: Different frailty scores and indices have been developed and validated in the literature. The aim of our study was to compare the predictive ability of different frailty scores in terms of complications, mortality, discharge disposition and 30-day-readmission.

METHODS: We performed a 2-year(2016-2017) prospective analysis of all geriatric >65 trauma patients. The different frailty scores calculated were: the trauma-specific-frailty-index (TSFI), the modified frailty index (mFI), the Rockwood frailty score (RFS), and the International Association of Nutrition and Aging 5-item frailty scale (FS). Predictive logistic models were created for each outcome.

RESULTS: A total of 341 patients were enrolled. Mean age was 76±9years, median ISS was 13[9-18], and median GCS score was 15[12-15]. Both the TSFI and the RFS had comparable predictive power, as indicated by their c-statistics whether the model was adjusted or unadjusted. In terms of predicting mortality the adjusted c-statistics were: TSFI: (0.847vs. RFS: 0.851), for in-hospital complications: (TSFI:0.801vs. RFS:0.811), for SNF disposition: (TSFI:0.841 vs. RFS:0.825) and for 30-day readmission: (TSFI:0.752vs. RFS:0.757). Both TSFI and RFS models show strong predictive ability for all outcomes. The adjusted mFI and FS models had strong predictive ability for predicting mortality (mFI:0.737vs. FS:0.701) and in-hospital complications (mFI:0.711vs. FS:0.701). However, they had lower predictive ability for SNF disposition (mFI:0.658vs. FS:0.610) and 30-day readmissions (mFI:0.611vs. FS:0.602).

CONCLUSIONS: The 15-variable TSFI is an equally effective predictor of mortality, in-hospital complications, SNiF disposition and 30-day readmission compared to the comprehensive RFS. The TSFI is a strong and better predictor of outcomes compared to the mFI and FS in trauma patients.

NOTES

Paper# 40
Thursday, March 7, 2019 (4:40pm – 4:50pm)

SORTIE OF THE AVALANCHES: LESSONS LEARNED FROM THE OPERATING ROOM BUT FORGOTTEN ON THE MOUNTAIN

H MOORE, P MOORE, B MOORE, E MOORE
University of Colorado, Denver, Colorado

Presenter: Hunter Moore MD PhD
Senior Sponsor: EE Moore

Skiing is the pillar of work-life balance in our family during the winter. The weekend escape to the mountains brings rejuvenation after long stretches in the hospital managing critically ill patients. However, this is not a time for rest and relaxation. The objective is to ski the deepest and steepest powder. Resort skiing has become a backup plan for poor weather or marginal snow conditions. With light back country gear and snowmobiles, there are endless adventures to share with family and friends in terrain that one would only encounter in a Warren Miller movie. Taking on these weekend adventures requires careful planning. Many of the key components of working in the operating room are applicable to venturing out into the precarious backcountry. One mistake or miscalculation can be fatal. Over the past decade, our family has experienced three separate avalanches associated with prolonged downhill tumbles. From each of these episodes, there were several critical decisions (or lack of) that led to triggering of the avalanches, which can be paralleled to mistakes in the operating room. The three misjudgments that precipitated these avalanches were: 1) not having back up when approaching a technical challenge; 2) misjudgment of the consequences of what appeared to be nebulous move; and 3) overconfidence in what appeared to be a straight forward ski slope. None of these avalanches were lethal. However, all were associated with broken equipment, minor injuries, and bruised egos, which are reminders of how fortunate we were to survive each of these incidents.

NOTES

Paper# 41
Thursday, March 7, 2019 (4:50pm – 5:20pm)

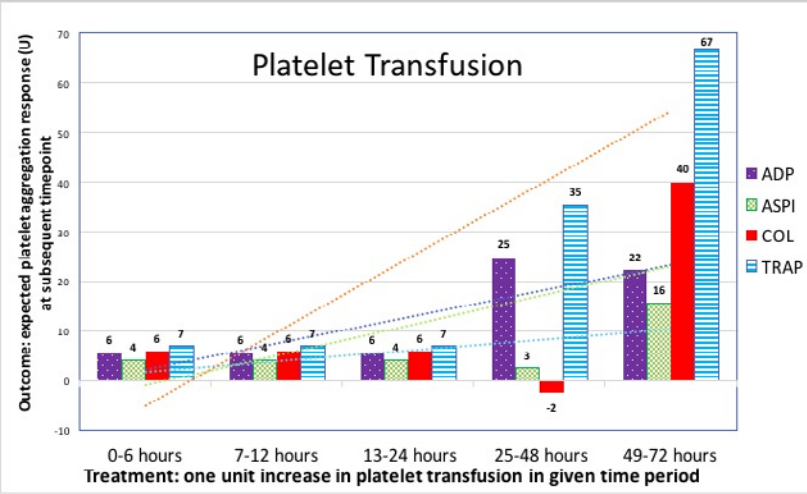
MILITARY PANEL OF EXPERTS
Presenters: Mathew Martin and Jennifer Gurney
Panelists: Michel Aboutanos MD; Krista Kaups MD; Bellal Joseph MD; Roxie Albrecht MD; Peggy Knudson MD

NOTES

Paper# 42
Thursday, March 7, 2019 (5:20pm – 6:00pm)

PAINT THE CEILING LECTURE: CARING FOR ALL

M. Margaret "Peggy" Knudson MD, University of California San Francisco, San Francisco, CA


Platelet Transfusion
Outcome: expected platelet aggregation response (U) at subsequent timepoint
70
60
50
40
30
20
10
0
-10
6
4
6
7
6
4
6
7
6
4
6
7
25
3
-2
35
22
16
40
67
ADP
ASPI
COL
TRAP
0-6 hours
7-12 hours
13-24 hours
25-48 hours
49-72 hours
Treatment: one unit increase in platelet transfusion in given time period

NOTES

Paper# 43
Friday, March 8, 2019 (7:00am – 7:20am)

IT'S ABOUT TIME: TRANSFUSION EFFECTS ON POST-INJURY PLATELET AGGREGATION CHANGE OVER TIME

L KORNBLITH, A DECKER, A CONROY, A FIELDS, A ROBLES, R CALLCUT, M COHEN
University of California San Francisco, San Francisco, California

Presenter: Lucy Kornblith MD
Senior Sponsor: M Cohen

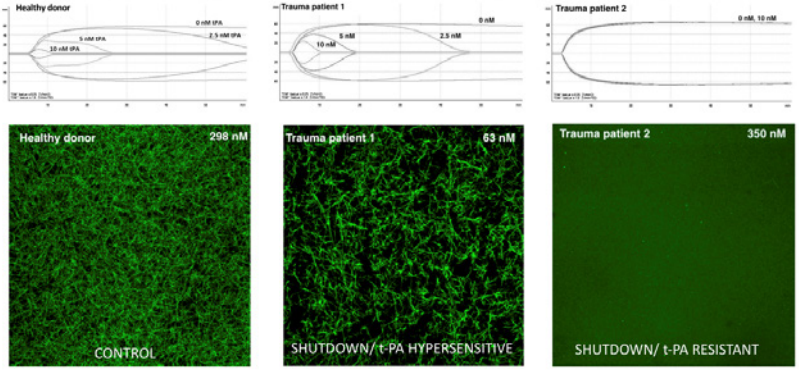
INTRODUCTION: Impaired post-injury platelet aggregation is common and the effect of transfusion on this remains unclear. Data suggests platelet transfusion may not correct impaired platelet aggregation and impaired platelet aggregation may not predict the need for platelet transfusion. We sought to investigate platelet aggregation responses to transfusions, hypothesizing that aggregation responses increase over time from injury.

METHODS: Serial (0-96h) blood samples were collected from 393 trauma patients. Platelet aggregation was assessed by impedance aggregometry response to adenosine diphosphate (ADP), arachidonic acid (ASPI), collagen (COL), and thrombin receptor-activating peptide-6 (TRAP). Using causal inference, transfusion exposure was modeled against platelet aggregation at each subsequent timepoint and adjusted for confounders (ISS/INR/base deficit/platelet count/interval transfusions).

RESULTS: The 393 patients were moderately injured (median ISS13, IQR1-35), with normal platelet counts (median 267x109/L IQR185-350), and 41% were transfused in 24h. The independent effect of transfusions on subsequent platelet aggregation over time was modeled with observed platelet aggregation under hypothetical treatment of one unit transfusion of blood, plasma, or platelets (FIGURE). Transfusions had increasing expected effects on subsequent platelet aggregation over time, with the maximal expected effects secondary to platelet transfusion and occurring late (96h; ADP22U, ASPI16U, COL40U, and TRAP67U).

CONCLUSIONS: Controversy exists on whether transfusions improve impaired post-injury platelet aggregation. Using causal inference modeling, we identified that expected transfusion effects on subsequent platelet aggregation are maximal with platelet transfusion, and late after injury. This is critical for tailored resuscitation, highlighting the overall benefit of transfusions, while identifying an early period of resistance to platelet transfusion that resolves by 96h.

Figure 1. Representative examples of tPA-challenged thromboelastometry (top panels) and confocal microcopy of clots formed with labeled fibrinogen (bottom panels), from a healthy donor and two trauma subjects with fibrinolysis shutdown. Trauma patient 1 exhibited tPA hypersensitivity, with low TG (63 nM) and an irregular, loosely-formed fibrin clot structure. In marked contrast, trauma patient 2 was highly resistant to tPA and showed increased TG (350 nM) and an abnormally dense fibrin clot.



NOTES

Paper# 44
Friday, March 8, 2019 (7:20am – 7:40am)

DENSE AND DANGEROUS: THE TISSUE PLASMINOGEN ACTIVATOR (T-PA)-RESISTANT FIBRINOLYSIS SHUTDOWN PHENOTYPE IS DUE TO THROMBIN-INDUCED CLOT STRENGTH

K FREEMAN, N DOW, A OLSON, JR COLEMAN, HB MOORE, EE MOORE, S BUTENAS
University of Vermont, Burlington, Vermont

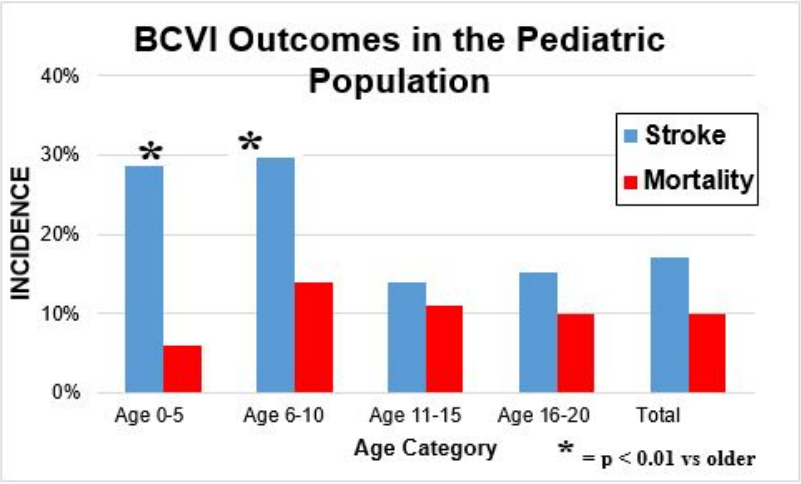
Presenter: Kalev Freeman MD, PhD, FACEP
Senior Sponsor: EE Moore

INTRODUCTION: Two sub-phenotypes of fibrinolysis shutdown exist early after injury based on patient's sensitivity to tissue plasminogen activator (t-PA). In patients resistant to t-PA, fibrinolysis shutdown is associated with fivefold increased mortality. The contribution of thrombin generation (TG) and fibrin clot structure to tPA sensitivity in shutdown has not been evaluated. We hypothesized that the t-PA resistant sub-phenotype of fibrinolysis shutdown will exhibit increased TG and clot strength.

METHODS: Whole blood samples were collected from trauma patients and clot formation measured via thromboelastometry in the presence or absence of t-PA. Endogenous thrombin potential was quantified using a calibrated automated thrombinoscope. Plasma clots were created with fluorescent fibrinogen and imaged using confocal microscopy to obtain 3-dimensional images for measurement of clot architecture using particle analysis.

RESULTS: We again observed two sub-populations of fibrinolysis shutdown: one responsive to 10 nM tPA (LI30 0%-2.5%), and a t-PA-resistant group (LI30 86%-100%). TG correlated with thromboelastometry measures. Microscopy images of clots formed from tPA-resistant fibrinolysis shutdown trauma patients showed an abnormal, densely-packed fibrin network. These clots were markedly different from the clot structure seen in tPA-hypersensitive fibrinolysis shutdown trauma patients or in controls (Figure 1).

CONCLUSIONS: Trauma patients with fibrinolysis shutdown have increased endogenous. thrombin potential. The sub-phenotypes of shutdown patients differ in fibrin clot structure; both groups are dissimilar to controls. The dense fibrin network in the t-PA resistant group may prevent access to plasmin, suggesting a mechanism for persistent microvascular thromi and multi-organ failure after trauma.


BCVI Outcomes in the Pediatric Population
40%
30%
20%
10%
0%
INCIDENCE
Stroke
Mortality
*
*
Age 0-5
Age 6-10
Age 11-15
Age 16-20
Total
Age Category
* = p < 0.01 vs older

NOTES

Paper# 45
Friday, March 8, 2019 (7:40am – 8:00am)

NATIONWIDE BLUNT CEREBROVASCULAR INJURY (BCVI) OUTCOMES IN THE PEDIATRIC POPULATION: BIG PROBLEMS IN LITTLE PATIENTS

C MARENCO, W DO, D LAMMERS, M ECKERT, C ECKERT, D BENSARD, M MARTIN
Madigan Army Medical Center, Joint Base Lewis-McChord, Tacoma, Washington

Presenter: Christopher Marenco MD
Senior Sponsor: M Martin

INTRODUCTION: Blunt cerebrovascular injuries (BCVI) are uncommon but potentially devastating. The epidemiology, outcomes, and screening criteria are well described in adults, but data in pediatric patients is extremely limited. The purpose of this study was to characterize pediatric BCVIs in a large nationwide sample.

METHODS: Retrospective review of the Kids' Inpatient Database for pediatric BCVI from 2000-2012. Epidemiology, associated injuries, outcomes (including stroke and mortality), and the utility of standard screening criteria were analyzed.

RESULTS: 1182 cases of BCVI were identified, yielding an incidence of 0.21%. Patients were predominately male (69%), mean age 15±5years. Injuries were 59% carotid, 13% vertebral, and 28% unspecified, with 15% having bilateral or multivessel BCVI. Although younger patients (<11 yo) had significantly lower ISS and decreased severe associated injuries (all $p<0.01$), they had a similar mortality rate (10%) versus the older & more severely injured cohort. Additionally, the stroke rate was significantly higher among the two younger age brackets versus the older brackets (Figure, 29% mortality for <11yo vs. 15% for >/=11yo, $p<0.01$). Only 4 of 7 commonly utilized risk factors were associated with BCVI overall, but NONE were significantly associated with BCVI in younger children (age<11).

CONCLUSIONS: This represents the first nationwide assessment of BCVI in the pediatric population. Pediatric BCVIs carry considerable mortality and stroke rate. Despite being less severely injured, younger age groups (<11) had similar mortality rates and approximately double the stroke rate versus older pediatric patients. In addition, commonly utilized adult screening criteria had little utility in the younger cohorts.

NOTES

Paper# 46
Friday, March 8, 2019 (8:00am – 8:20am)

VANCOMYCIN DOSING IN CRITICALLY ILL TRAUMA PATIENTS: THE VANCTIC STUDY

O TALLEDO, MD, A CELLI, MD, A CROSS, MD, B WHITE, PHARMD, S NEELY, MPH, R VILLANUEVA, PHARMD, R KENNEDY, MD
OUHSC, Oklahoma City, Oklahoma

Presenter: Oscar Talledo MD
Senior Sponsor: R Albrecht

INTRODUCTION: Rates of initial therapeutic vancomycin troughs have ranged from 17.6 – 33% using intermittent infusions (i.e. 15 – 20mg/L) and approximately 60% using continuous infusions (i.e. 15 – 25mg/L) in critically ill trauma patients. We hypothesize that our dosing protocol will achieve higher rates of initial therapeutic troughs vs. previously published reports due to more aggressive loading doses.

METHODS: Retrospective study of all critically ill trauma patients admitted to a level one trauma ICU treated with vancomycin per the pharmacy to dose protocol and an appropriately drawn steady state trough level. The primary outcome is the rate of initial therapeutic troughs defined as 14.5 – 20.5mg/L.

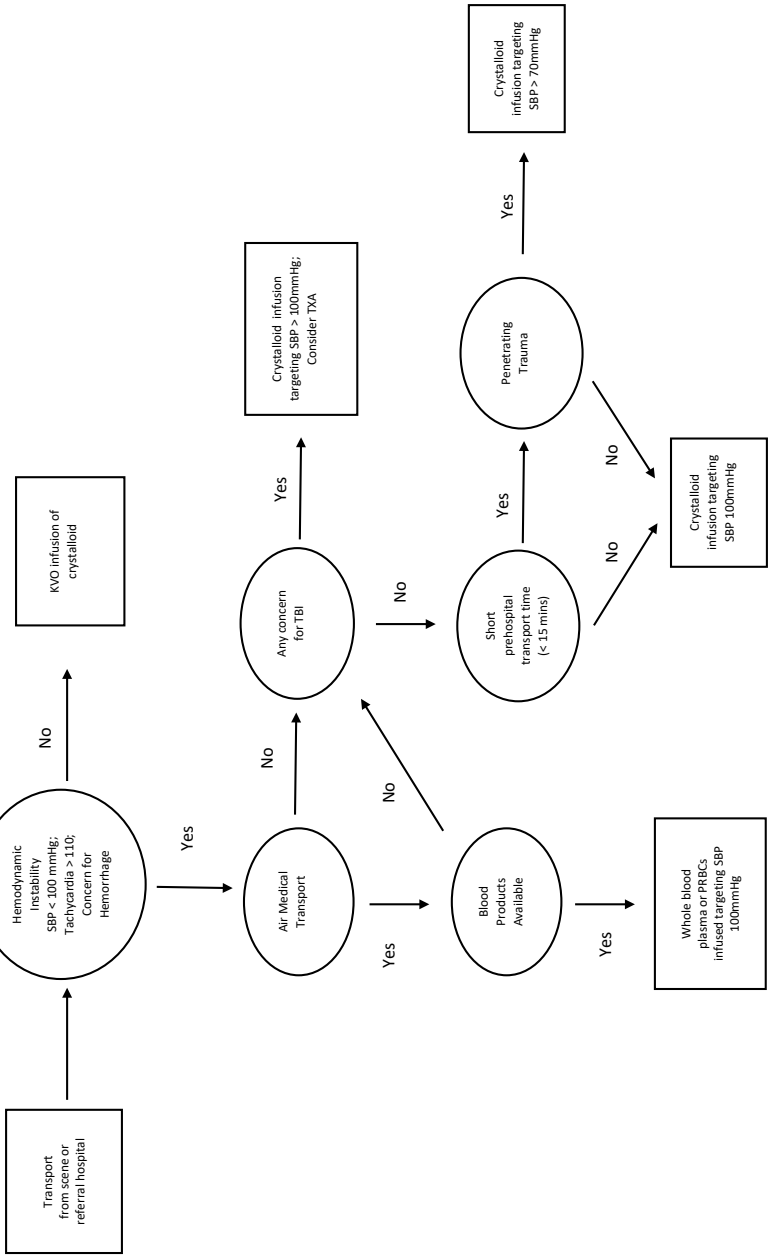
RESULTS: 70 patients met inclusion/exclusion criteria with median age 47.5 years, median injury severity score 28. The overall cohort had a median creatinine clearance of 159.1ml/min and a median ARCTIC score of seven. Median vancomycin loading dose was 24.6mg/kg with an initial maintenance dose of 17.71mg/kg and an initial total daily dose of 3750mg; 47.14% and 45.71% were initially started on q8hr and q12hr dosing interval, respectively. Only 15.71% achieved an initial therapeutic trough; 42.86% were 20.5mg/L. Acute kidney injury (AKI) occurred 10% and 11.4% based on the ASHP vancomycin guidelines and AKIN criteria.

CONCLUSIONS: Our rates of initial therapeutic troughs were slightly below previously reported studies and is only slightly above the AKI rate. Based on our results, in conjunction with previous literature, it appears time to abandon intermittent infusions of vancomycin in critically ill trauma patients.

NOTES

Paper# 47
Friday, March 8, 2019 (8:20am – 8:40am)

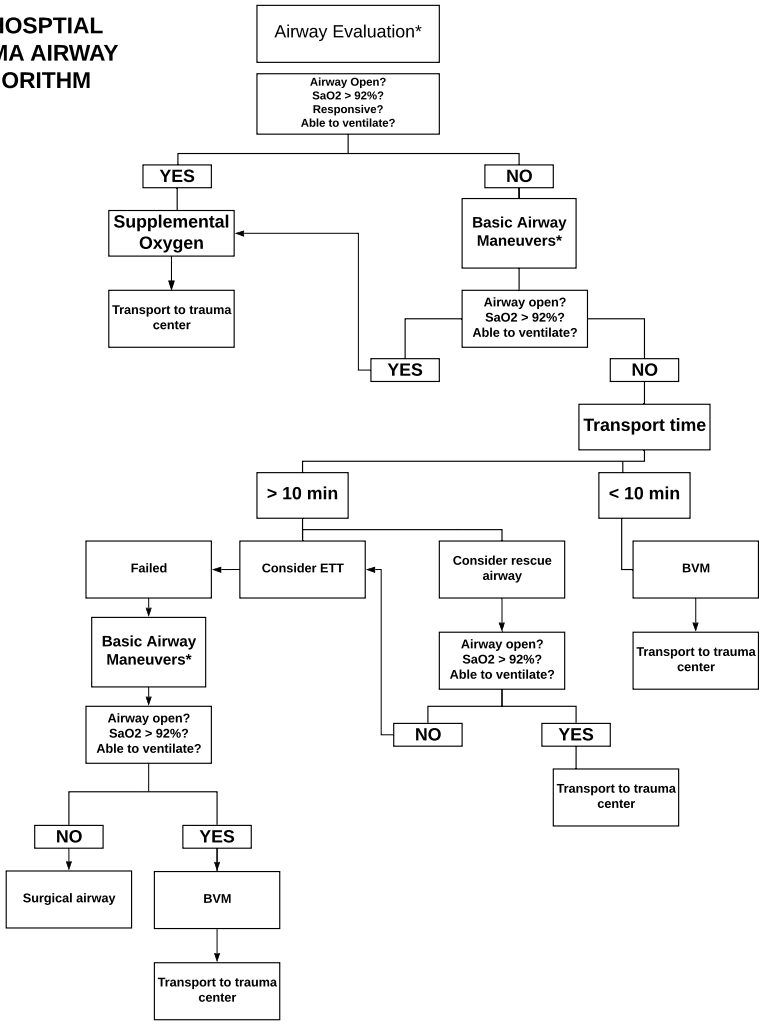
ALGORITHM 3: PREHOSPITAL RESUSCITATION



Paper# 48
Friday, March 8, 2019 (8:40am – 9:00am)

ALGORITHM 4: AIRWAY

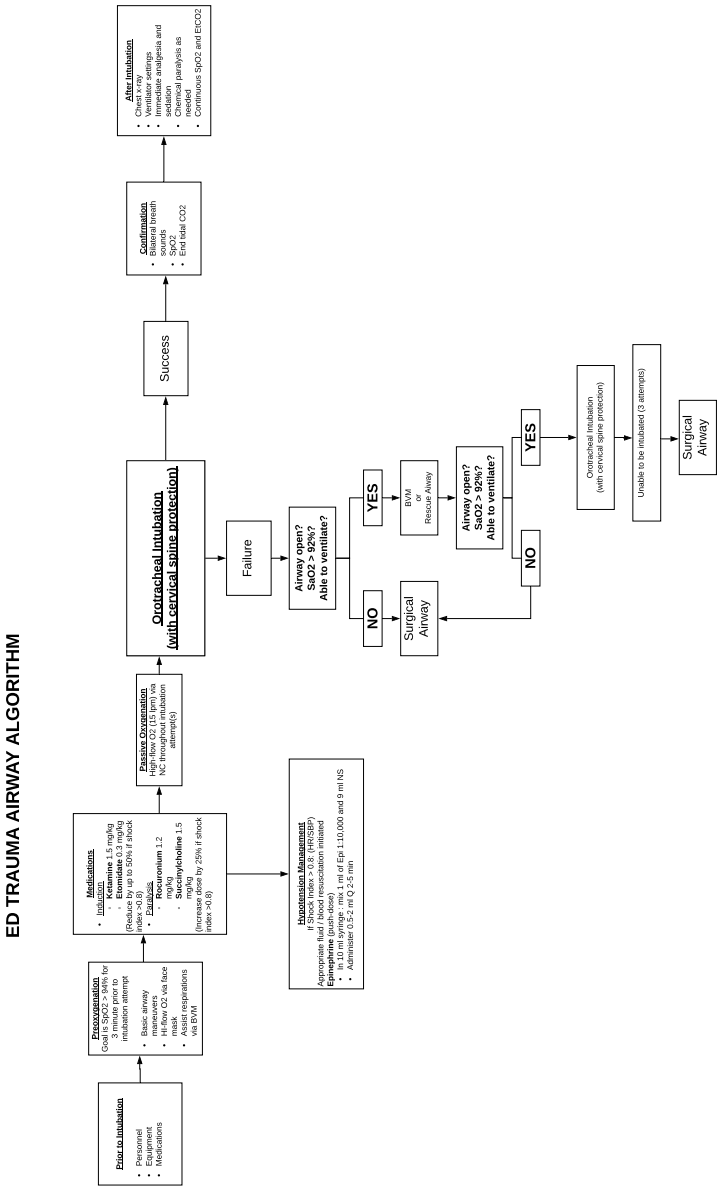
PREHOSPTIAL TRAUMA AIRWAY ALGORITHM



NOTES

Paper# 48
Friday, March 8, 2019 (8:40am – 9:00am)

ALGORITHM 4: AIRWAY



NOTES

Paper# 49
Friday, March 8, 2019 (4:00pm – 4:20pm)

END TIDAL CARBON DIOXIDE UNDERESTIMATES PLASMA CARBON DIOXIDE DURING EMERGENT TRAUMA LAPAROTOMY LEADING TO HYPOVENTILATION AND MISGUIDED RESUSCITATION: A WESTERN TRAUMA ASSOCIATION MULTICENTER STUDY

E CAMPION MD, C ROBINSON BS, N BRANT BS, L FERRIGNO MD, R MCINTYRE MD, B BIESTERVELD MD, H ALAM MD, R CALLCUT MD, S MISHRA MD, B PLATT MD, M MOORE MD, J NAHMIAS MD, A GRIGORIAN MD, S DANCE MD, L BRITTON RN, T SCHROEPPEL MD, J RODRIQUEZ C
Denver Health Medical Center, Denver, Colorado

Presenter: Eric Campion MD
Senior Sponsor: H Alam

INTRODUCTION: End tidal carbon dioxide(ETCO2) is frequently used to assess ventilation in the operating room(OR). Decreased cardiac output can lower ETCO2 without a corresponding decrease in arterial carbon dioxide(pCO2) levels. We hypothesize that ETCO2 in severely injured patients underestimates pCO2, and reliance on this monitoring results in hypoventilation and persistent acidosis resulting in under-resuscitation.

METHODS: Demographic, transfusion, ventilator, and lab data was collected on patients from 12 trauma centers undergoing emergent trauma laparotomy over a 6 month period. ETCO2 data was correlated to pCO2 data obtained within 5 minutes. Descriptive, univariate and multivariate analysis(MVR) were performed.*=P<0.05

RESULTS: The study population of 248 patients was 70.3% male with a median age of 34 years. Penetrating injuries accounted for 52.7% with a median ISS of 24; the overall mortality was 20.9%. Poor correlation was observed between ETCO2 and pCO2 with 48% of initial OR ETCO2 values >10mmHg different and 18% >20mmHg different from corresponding PCO2. 41% of patients were acidotic with pH 45 on initial OR ABG indicating hypoventilation. Massive transfusion (RR 1.2*) and initial OR pH 20mmHg on MVR. MVR indicated an ETCO2 to pCO2 gradient of 10mmHg(RR4.0*) and 20mmHg(RR2.7*) were both independently associated with mortality.

CONCLUSIONS: ETCO2 underestimates pCO2 in severely injured patients and should not be relied on to assess adequate ventilation. Overreliance on ETCO2 can lead to persistent acidosis and under-resuscitation. Earlier and more frequent blood gas measurement during operative trauma resuscitation is warranted to guide resuscitation.

Table by Tourniquet Type

Variable	SOFT	SAM	CAT	P-value
Male Gender	32/55 (58%)	23/49 (47%)	20/49 (43%)	0.2954
OMM Year 1	31/55 (56%)	26/49 (53%)	24/46 (52%)	0.9036
OMM Year 2	22/55 (40%)	22/49 (45%)	21/46 (46%)	0.8194
Training: Subjects opinion on further training needs				
First Time Use and OK	28/55 (51%)	20/49 (41%)	25/46 (54%)	0.3841
First Time Use and want more training	19/55 (35%)	23/49 (47%)	16/46 (35%)	0.3499
Patient Status				
Stable	36/55 (65%)	30/49 (61%)	33/46 (72%)	0.5542
Dead	19/55 (35%)	17/49 (35%)	13/46 (28%)	0.7641
Prior Experience	8/55 (15%)	5/49 (10%)	3/46 (7%)	0.4255

NOTES

Paper# 50
Friday, March 8, 2019 (4:20pm – 4:40pm)

MISSING EXPECTATIONS: TOURNIQUET USE WITHOUT FORMAL TRAINING YIELDS POOR RESULTS

A DENNIS, F BAJANI, K IVKOVIC, A LI, T PICKETT, A IMPENS, V SCHLANSER, M.KAMINSKY, F STARR, F BOKHARI
Cook County Health and Hospital Systems, Chicago, Illinois

Presenter: Andrew Dennis D.O., FACOS, FACS, DME
Senior Sponsor: A Dennis

INTRODUCTION: Despite significant attempts to educate civilians in hemorrhage control, the majority remain untrained. We sought to determine if laymen can successfully apply one of three commercially available tourniquets; two are endorsed by the United States Military and the American College of Surgeons.

METHODS: 150 orienting first and second-year medical students were randomly assigned a commercial windless tourniquet (SAM- XT, CAT, or SOFT-T.) Each was given one minute to read the instructions. The tourniquet was applied to the HapMed® Leg Tourniquet Trainer. Application continued until successful pressure was achieved or exsanguination occurred. Survival, time to stop bleeding, tourniquet pressure, and blood loss were recorded and statistically analyzed.

RESULTS: Overall success and survival was less than 66% (avg). (SAM-XT, 61%, CAT, 72%, SOFT-T, 65% (p=0.554)). Simulation 'death' occurred when inadequate pressure resulted in exsanguination. Of survivors, all three tourniquets performed similarly in pressure (319 mmHg, 315 mmHg, and 329 mmHg p=0.546), and time to stop bleeding (91 sec, 70 sec, 77 sec p=0.278). There was a statistical difference in blood loss volume favoring SOFT-T. (686 ml SAM XT, 624 ml CAT, 433 ml SOFT-T p=0.025).

CONCLUSIONS: No one should die of extremity hemorrhage and civilians are our first line of defense. We demonstrate that when a laymen is handed a commonly accepted TQ, without prior training, failure is unacceptably high. This highlights that current devices are not intuitive and require some training beyond the enclosed instructions. Plans to further evaluate this cohort after formal "stop the bleed" training are underway

NOTES

Paper# 51
Friday, March 8, 2019 (4:40pm – 5:00pm)

RANDOM FOREST MODELING CAN PREDICT INFECTIOUS COMPLICATIONS FOLLOWING TRAUMA LAPAROTOMY

R GELBARD MD, H HENSMAN, S SCHOBEL PHD, V KHATRI PHD,
C DENTE MD, T BUCHMAN MD PHD, A KIRK MD PHD, E ELSTER MD
Emory University School of Medicine, Atlanta, Georgia

Presenter: Rondi Gelbard MD
Senior Sponsor: C Dente

INTRODUCTION: Clinical and biomarker profiles of trauma patients may enable creation of models that help predict postoperative complications. We sought to determine the utility of modeling for predicting severe sepsis (SS) and organ space infections (OSI) following laparotomy for abdominal trauma.

METHODS: Clinical and molecular biomarker data were collected prospectively from patients undergoing exploratory laparotomy for abdominal trauma at a Level 1 trauma center between 2014 and 2016. Machine learning algorithms were used to develop models predicting SS and OSI. Random forest (RF) was performed and features were selected using recursive feature elimination (RFE). The SS model was trained on 77 records and validated using the leave-one-out method on the remaining 10 records. The OSI model was trained on 71 records and validated on the remaining 16. Models were assessed using areas under curve (AUC).

RESULTS: Eighty-seven patients were included (mean age 34.4, 64.4% penetrating injury, mean ISS 21.1). Of these, 10.3% (9/87) developed SS and 17.2% (15/87) developed OSI. The final RF model resulted in seven variables for SS (APACHE score, total platelets transfused, serum EGF, HGF, MIP-1b, RANTES, and VEGF) and three variables for OSI (Penetrating Abdominal Trauma Index (PATI), serum EGF and MCP-1). The models predicted SS and OSI with AUCs of .802 and .847, respectively.

CONCLUSIONS: Random forests with RFE can help identify clinical and biomarker profiles predictive of severe sepsis and organ space infection after trauma laparotomy. Once validated, these models could be used as clinical decision support tools for earlier detection and treatment of infectious complications after injury.

NOTES

Paper# 52
Friday, March 8, 2019 (5:00pm – 5:20pm)

TIME TO DEFINITIVE FIXATION, NOT DEPTH OF SHOCK, IS ASSOCIATED WITH MULTIPLE ORGAN FAILURE IN CRITICALLY INJURED TRAUMA PATIENTS WITH A FEMUR FRACTURE

J RICHARDS, A MEDVECZ, O GUILLAMONDEGUI, R O'TOOLE, W OBREMSKEY, S GALVAGNO, T SCALEA
R Adams Cowley Shock Trauma Center, Baltimore, Maryland

Presenter: Justin Richards MD
Senior Sponsor: J Richards

INTRODUCTION: Early femur fixation is thought to improve clinical outcomes. However, the stress of fracture repair may challenge physiologic reserves producing multiple organ failure (MOF), particularly in early shock.

METHODS: Retrospective investigation from two trauma centers. Inclusion criteria: age 16-89 years, Injury Severity Score (ISS) > 15, femoral shaft fracture requiring operative fixation, and admission to the ICU > 2 days. Lactate was collected during first 24-hours of hospital admission (Lacadm) and as time-weighted lactate at 24-hours (Lac24hrTW). Primary outcome was MOF. Early definitive fixation was <48 hours after admission. Hazard ratios (HR) were calculated to evaluate the effect of lactate and early definitive fixation on MOF. Interaction terms tested effect modification between lactate and early fixation.

RESULTS: 40/280 (14.3%) patients developed MOF. After controlling for age and ISS, a Cox proportional hazard model demonstrated early definitive fixation was associated with a decreased likelihood of MOF (HR: 0.43, 95% CI: 0.22-0.86), while admission lactate was not associated with MOF (HR: 1.04, 95% CI 0.92-1.12). In a separate model, there was no association between Lac24hrTW and MOF (HR: 1.12, 95% CI 0.91-1.37) while early definitive fixation decreased the risk of organ dysfunction (HR: 0.44, 95% CI 0.23-0.87). Lack of interaction with lactate and early fixation indicates lactate had no significant effect on timing of definitive fixation and subsequent MOF.

CONCLUSIONS: Early fracture fixation was associated with a decreased risk of MOF in critically injured trauma patients.

NOTES

Paper# 53
Friday, March 8, 2019 (5:20pm – 5:40pm)

REMOVAL OF RETRIEVABLE INFERIOR VENA CAVA FILTERS (RIVCF) BEFORE INITIAL HOSPITAL DISCHARGE: IS IT ASSOCIATED WITH INCREASED VENOUS THROMBOEMBOLISM (VTE) COMPLICATIONS?

JM ROBBINS, R GONZALEZ, T GARWE, Z SARWAR, RM ALBRECHT
University of Oklahoma, Oklahoma City, Oklahoma

Presenter: Justin Robbins BS
Senior Sponsor: R Albrecht

INTRODUCTION: The removal rate of rIVCFs is variable in trauma centers, including our previous published rate of 50 – 89%/year. A significant number of patients discharged with rIVCF are lost to follow up. A guideline to consider removal prior to hospital discharge was designed. We hypothesized that once patients could receive appropriate pharmacologic antithrombosis, rIVCF could be removed without impact on future VTE/Pulmonary embolus complications.

METHODS: All trauma patients with rIVCF placed and removed between 1/2006- 8/2018 were reviewed. Data collection included demographics, rIVCF indication, type and dwell time, placement and removal complications, antithrombosis medications and timing, VTE and location, discharge disposition, and length from rIVCF removal to last seen. Exposure of interest was timing of filter removal: before (BEF) or after (AFT) initial hospitalization discharge. The outcome of interest was whether the patient had a documented PE (Y/N) within 6 months of filter removal.

RESULTS: A total of 286 rIVCFs were placed, 154 (53.8%) removed of which 63.6% (98/154) were BEF. The filter duration was 25 and 100 days for the BEF and AFT groups respectively. No differences ($p > 0.05$) were noted between the two groups in the distribution of demographic and clinical factors except for filter indication (VTE indication, 95% in AFT vs 78% in BEF, $p=0.0173$). Post-removal PE rates were 1% (one patient) BEF and 0% AFT (Fisher's Exact $p=1.000$).

CONCLUSIONS: Our results suggest that early removal of rIVCFs, once the patient can receive appropriate pharmacologic antithrombosis, prior to initial hospitalization discharge is a safe strategy to improve retrieval rates.

NOTES

Paper# 54
Friday, March 8, 2019 (5:40pm – 6:00pm)

THE HEALTH LITERACY OF HOSPITALIZED TRAUMA PATIENTS: WE SHOULD BE SCREENING FOR DEFICIENCIES

J WEINBERG, M SHEHADA, K CHAPPLE, S ISRAR, M JONES, J JACOBS, J BOGERT
Creighton University School of Medicine Phoenix Campus, Phoenix, Arizona

Presenter: Jordan Weinberg MD
Senior Sponsor: J Weinberg

INTRODUCTION: Introduction: Although the impact of health literacy (HL) on trauma patient outcomes remains unclear, recent studies have demonstrated that trauma patients with deficient HL have poor understanding of their injuries, are less likely to comply with follow-up, and are relatively less satisfied with physician communication. In this study, we sought to determine if HL deficiency correlated with comprehension of discharge instructions.

METHODS: Methods: In this prospective study, hospitalized trauma patients underwent evaluation of HL at bedside prior to discharge home. Newest Vital Sign (NVS) instrument was used to score HL as deficient, marginal, or proficient. 3 days post discharge, patients were administered a 6-point scored questionnaire by telephone regarding comprehension of discharge instructions. HL was correlated to performance on questionnaire via linear model with questionnaire score as the dependent variable, HL category (deficient, marginal, proficient) as the fixed factor, and age and education as covariates.

RESULTS: Results: Fifty-six trauma inpatients were administered both NVS and follow up questionnaire. 16% of cohort was HL deficient and 23% marginal. In linear model, HL proficiency significantly predicted follow up score with increasing proficiency associated with higher scores ($P = .019$). Adjusted mean scores (± SE) on 6-point questionnaire for deficient, marginal, and proficient patients were 3.0 ± 0.5, 3.3 ± 0.5, and 4.6 ± 0.3.

CONCLUSIONS: Conclusions: Among trauma inpatients, performance on bedside test of HL predicted ability to comprehend instructions following discharge from hospital. This study supports the value of HL screening prior to discharge. HL deficient patients may benefit from a transitional care program to improve comprehension of discharge instructions after leaving the hospital.

NOTES

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SAVE THE DATE

50TH ANNUAL MEETING

February 23 – 29, 2020