
SOCCA
28th Annual Meeting
and Critical Care Update
March 20, 2015
Hilton Hawaiian Village®
Waikiki Beach Resort
Honolulu, Hawaii
Society of
Critical Care Anesthesiologists
SOCCA
Syllabus

SOCCA
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Continuing Medical Education (CME) Activity Information

Activity Overview

The Society of Critical Care Anesthesiologists 28th Annual Meeting and Critical Care Update seeks to optimize outcomes for critically ill patients and their families by providing updates and expert discussion on topics of interest to anesthesiologists practicing critical care and perioperative medicine through advancing knowledge, improving competence and enhancing performance of intensive care teams.

Target Audience

The SOCCA 28th Annual Meeting and Critical Care Update is designed for anesthesiologists in the clinical and laboratory setting who desire to improve development of anesthesiology teaching methods by engaging in an interchange of ideas as represented at this meeting.

Accreditation Statement

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the International Anesthesia Research Society (IARS) and the Society of Critical Care Anesthesiologists (SOCCA). The IARS is accredited by the ACCME to provide continuing medical education for physicians.

Credit Designation Statement

The International Anesthesia Research Society (IARS) designates this live activity for a maximum of 6.5 *AMA PRA Category 1 Credits*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Educational Objectives

As a result of participation in this CME activity, learners should be able to:

- Recognize the current state of emerging knowledge and practice patterns and assess the relevance for their professional practice;
- Incorporate new knowledge from advances in anesthesiology practice into their professional practice areas; and
- Recognize gaps in their knowledge, behavior, and patient outcomes that may result in a need for additional education and training.

Disclosure

The IARS and SOCCA make every effort to develop CME activities that are scientifically based, accurate, current, and objectively presented. The IARS and SOCCA have implemented mechanisms requiring everyone in a position to control content to disclose all relationships with relevant commercial interests. The IARS and SOCCA provide these disclosures to learners in the Syllabus and in advance of each session. The IARS and SOCCA resolve any potential conflicts of interest prior to presentation of the activity. Individuals who refuse or fail to provide the required disclosures are disqualified from planning, managing, presenting, and evaluating the activity. Learners are asked to report any perceived commercial bias or lack of objectivity on the session evaluations.

Session Learner Objectives

Acute Infectious Diseases in the ICU

After participating in this activity, the learner will be able to:

- Review and recognize the clinical concerns in patients infected with the Ebola virus.
- Discuss the potential risks to staff members from infectious agents in the critical care setting.
- Describe the design, workflow, and utilization of a biocontainment unit.
- Identify the types/levels, appropriate use, and donning and doffing procedures for personal protective equipment.
- Recognize the challenges of laboratory testing in patients infected with highly pathogenic contagions.
- Recognize the logistical challenges presented by the care of patients infected with Ebola virus and other highly pathogenic contagions and implications for healthcare workers in the biocontainment unit environment.

New Evidence, New Investigators and New Directions

After participating in this activity, the learner will be able to:

- Discuss the key elements of study design, clinical practice and policy implications of the articles and publications presented.
- Recognize the impediments and interferences to daily life caused by the chronic pain that occurs following a chronic illness.

Atrial Fibrillation: An Update You Won't Want to Miss!

After participating in this activity, the learner *will be able to describe* the evidence-based approach for:

- Monitoring of patients at risk of perioperative atrial fibrillation (and flutter),
- The diagnosis, prevention and management of this condition,
- The appropriate use of cardiology and electrophysiology consults.

As well as the best approach to:

- Risk stratification,
- Anticoagulation for the prevention of strokes

Interactive Case Management

After participating in this activity, the learner will be able to:

- Identify and examine controversial management issues in high risk perioperative care.
- Review the evidence and expert opinion regarding controversial clinical management issues in high risk perioperative care.
- Discuss specific clinical decisions that may arise during high risk perioperative care using a combination of audience opinion, literature evidence, and expert opinion.

Program Committee

Patricia Murphy, M.D.
Associate Professor
Department of Anesthesia and Pain Management
Toronto General Hospital
University of Toronto
Toronto, ON, Canada

Daryl J. Kor, M.D., MSc
Associate Professor of Anesthesiology
Department of Anesthesiology
Division of Critical Care Medicine
Mayo Clinic
Rochester, Minnesota

Andrew C. Steel, BSc., MBBS, MRCP, FRCA, FRCPC, EDIC
Assistant Professor
Department of Anesthesiology and Interdepartmental Division of Critical Care Medicine
University of Toronto
Toronto General Hospital
Toronto, ON, Canada

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Mark E. Nunnally, M.D., FCCM

Liza M. Weavind, M.D.

Michael H. Wall, M.D., FCCM

SOCCA 2015 Annual Meeting Program Faculty

Faculty

Philip G. Boysen, M.D.
Medical Director, Patient Safety Education
Co-Director Surgicial ICU
Ochsner Health System
New Orleans, Louisiana

Miguel A. Cobas, M.D., FCCM
Associate Professor of Clinical Anesthesiology
University of Miami
Jackson South Community Hospital
Miami, Florida

Daniel J. Cole, M.D.
Professor of Clinical Anesthesiology
Department of Anesthesiology & Perioperative Medicine
David Geffen School of Medicine
University of California, Los Angeles
Los Angeles, California

Brenda G. Fahy, M.D., MCCM
Professor of Anesthesiology
Chief, Division of Critical Care Medicine
Medical Director, Shands Hospital Critical Care-Anesthesiology Services
University of Florida College of Medicine
Gainesville, Florida

Gyorgy Frendl, M.D., Ph.D, FCCM
Associate Professor of Anesthesia and Critical Care
Brigham and Women's Hospital
Harvard Medical School
Chairman of the AATS AF Taskforce
Boston, Massachusetts

Christina J. Hayhurst, M.D.
Critical Care Fellow
Vanderbilt University Medical Center
Nashville, Tennessee

Erin Hennessey, M.D.
Clinical Assistant Professor
Anesthesia and Critical Care
Medicine Associate Program Director
Anesthesia Critical Care Fellowship
Associate Core Clerkship Director
Department of Anesthesiology, Perioperative and Pain Medicine
Stanford School of Medicine
Stanford University
Stanford, California

Christopher G. Hughes, M.D.
Associate Professor
Department of Anesthesiology, Division of Anesthesia Critical Care Medicine
Vanderbilt University School of Medicine
Nashville, Tennessee

Joseph A. Hyder, M.D., Ph.D.
Assistant Professor of Anesthesiology
Department of Anesthesiology
Division of Critical Care Medicine
Mayo Clinic
Rochester, Minnesota

Steven J. Lisco, M.D., FCCM, FCCP
Chairman
Department of Anesthesiology
University of Nebraska Medical Center
Omaha, Nebraska

Patricia Murphy, M.D.
Associate Professor
Department of Anesthesia and Pain Management
Toronto General Hospital
University of Toronto
Toronto, ON, Canada

Martin I. Sigurdsson, M.D., Ph.D.
Clinical Fellow of Anesthesia and Critical Care
Brigham and Women's Hospital
Harvard Medical School
Boston, Massachusetts

Alissa C. Sodickson, M.D.
Staff Anesthesiologist
Instructor of Anesthesia and Critical Care
Brigham and Women's Hospital
Harvard Medical School
Member of the AATS AF Taskforce
Boston, Massachusetts

Breandon Sullivan, M.D.
Assistant Professor, Anesthesiology
University of Colorado Hospital
Aurora, Colorado

James N. Sullivan, M.D.
Assistant Professor
Department of Anesthesiology
University of Nebraska Medical Center
Omaha, Nebraska

Avery Tung, M.D., FCCM
Professor of Anesthesiology and Critical Care
Quality Chief for Anesthesia
Department of Anesthesia and Critical Care
The University of Chicago
Chicago, Illinois

Disclosures

Program Committee

Each program committee member is required to disclose the existence of any financial interest and/or other relationship(s) (e.g. employee, consultant, grant recipient/research support) he/she might have with either the manufacturer(s) of any commercial product(s) to be discussed during his/her presentation and/orthe commercial contributor(s) of the activity.

The following program committee members have no relevant financial relationships to disclose:

Patricia Murphy, M.D.

Daryl J. Kor, M.D., MSc

Andrew C. Steel, BSc., MBBS, MRCP, FRCA, FRCPC, EDIC

Key

1=Salary
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Faculty	Disclosure
Brenda G. Fahy, M.D., MCCM	4 - Aspect Medical
Gyorgy Frendl, M.D., Ph.D, FCCM	4 - Parexel International
Avery Tung, M.D., FCCM	9 - A&A Section Editor

The following faculty members have no relevant financial relationships to disclose:

Philip G. Boysen, M.D.
Miguel A. Cobas, M.D., FCCM
Daniel J. Cole, M.D.
Christina J. Hayhurst, M.D.
Erin Hennessey, M.D.
Christopher G. Hughes, M.D.
Joseph A. Hyder, M.D., Ph.D.
Steven J. Lisco, M.D., FCCM, FCCP
Patricia Murphy, M.D.
Martin I. Sigurdsson, M.D., Ph.D.
Alissa C. Sodickson, M.D.
Breandon Sullivan, M.D.
James N. Sullivan, M.D.

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Poster Moderator	Disclosure
Gyorgy Frendl, M.D., Ph.D, FCCM	4 - Parexel International

The following poster moderators have no relevant financial relationships to disclose:

Karsten Bartels, M.D.
Jean Charchaflieh, M.D.
Miguel Cobas, M.D.
Gyorgy Frendl, M.D.
Horst Rieke, M.D.
Nicholas Sadovnikoff, M.D.
David Shimabukuro, M.D.
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Joel Zivot, M.D.

Disclosures

Poster Presenters

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Poster Presenters	Disclosure
Vitaly Herasevich, M.D., Ph.D.	3, 9 - Ambient Clinical Analytics
Arthur W. Wallace, M.D., Ph.D.	4, 7, 9 - ECOM, Nihon Kohden

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The following poster presenters have no relevant financial relationships to disclose:

Jason Alexander, M.D.
Rebecca A. Aslakson, M.D., Ph.D.
Hina Aslam, M.D.
Harish Bangalore Siddaiah, M.D.
David Barbara, M.D.
Cassandra L. Barry, M.B., Ch.B.
Hersimren Basi, M.D.
Travis L. Behrend, M.D.
Hannah Bell, M.D.
James M. Blum, M.D.
Philip Boysen, M.D., M.B.A.
Jason Brainard, M.D.
John F.P. Bridges, Ph.D.
Gaurav Budhrani, M.D.
David Cabeza, M.D.
Louanne Carabini, M.D.
Mark E. Caridi-Scheible, M.D.
Joyce Chang, M.D.
Mohammed Chaudhry, M.D.
Richard Chou, M.D.
Christopher G. Choukalas, M.D., MS
Kari Christie, M.D.
Darrick Chyu, M.D.
Miguel Cobas, M.D.
Catherine Cook, M.D.
James Crouch, M.D.
A. Dagal, M.D.
Laurie Daste, M.D.
Vincent DeAngelis, M.D.
John T. Denny, M.D.
Amy DiLorenzo, M.S.
Ashley R. Donaldson, M.D.
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Leslie K. Hale, M.D.
Michael Hansen, M.D.
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Christina J. Hayhurst, M.D.
Jessica L. Hobbs, M.D.
Christopher G. Hughes, M.D.
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Olafur S. Indridason, M.D., M.H.S.
Natalia Ivascu, M.D.
Ryan Ivie, M.D.
Thomas Jan, M.D., MPH
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Mary K. Matyi, M.D.
William Mauermann, M.D.
Erik C. McClure, D.O.
Daniel A. Medel, M.D.
Judith Miller, AIA, CDT
Teresa Mulaikal, M.D.
Hani Murad, M.D.
Brett C. Norman, M.D., MPH
Theresa Northern, M.D., DO, MPH
Andres Ocampo, M.D.
Pratik P. Pandharipande, M.D., MSCI
Mayur B. Patel, M.D., MPH
Arpit Patel, M.D.
Matthew W. Pennington, M.D., Ph.D.

Brian Pickering, M.B., B.Ch.
Ashley Quan, M.D.
Sean Quinn, M.D.
Andrew L. Ray, M.D.
Jessica M. Reardon, D.O.
Jessica Reardon, DO
Annette Rebel, M.D.
Christopher Rice, M.D.
Justin Sandall, D.O.
Randall M. Schell, M.D., MACM
Gretchen A. Schultz, M.D.
Anne Schuster, MS
Josianna Schwan, MSIV
Shahriar Shayan, M.D.
Erica R. Shea, RN, MSN
David W. Shimabukuro, M.D., CM
Martin I. Sigurdsson, M.D., Ph.D.
Gisli H. Sigurdsson, M.D., Ph.D.
Paul A. Sloan, M.D.
Julia Sobol, M.D.
Sophie Socaris, M.D.
Alann Solina, M.D.
Andrew Springer, M.D.
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James Stotts, Ph.D.
Helen Stutz, M.D.
Mary C. Sullivan, RN, MS, CNS
JE Sunshine, M.D.
Kristin A. Swygert, Ph.D., DPT
Sheida Tabaie, M.D.
Steven Takemoto, Ph.D.
Julin Tang, M.D., M.Sci.
Ezekiel B. Tayler, DO
Margaret Tejani, M.D.
Jennifer L. Thompson, MPH
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Erica Wittwer, M.D., Ph.D.
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N.D. Yanez, Ph.D.
Relin Yang, M.D.
Joel Zivot, M.D.



Awards

Lifetime Achievement Award

Attendees of the SOCCA 28th Annual Meeting will honor **Philip G. Boysen, M.D.** as this year's Lifetime Achievement Award recipient. This award recognizes Dr. Philip G. Boysen's distinguished service and outstanding contributions to critical care medicine. Dr. Philip G. Boysen's presentation is entitled *"Eyewitness to Leadership: Examining Our Past, Forecasting Our Future"*

Young Investigator Award

This award is presented annually to the individual whose research exemplifies the Society's mission to educate anesthesiologists in the care of critically ill patients and to foster the knowledge and practice of critical care medicine by anesthesiologists. The recipient of the Young Investigator Award will make an oral presentation of their work at the SOCCA 28th Annual Meeting. SOCCA is proud to announce the 2014 Young Investigator Award recipient as **Christina J. Hayhurst, M.D.,** Vanderbilt University Medical Center for her paper entitled "*Chronic Pain Interference of Daily Life Following Critical Illness".*

Program Schedule

Friday, March 20, 2015

7:00 a.m. – 5:00 p.m. **Registration**

7:00 – 7:30 a.m. **Coffee with Exhibitors**

7:30 – 8:00 a.m. **Continental Breakfast**

8:00 – 8:05 a.m. **Welcome and Introduction**
Patricia Murphy, M.D.
Andrew C. Steel, BSc., MBBS

SESSION I – Acute Infectious Diseases in the ICU

Patricia Murphy, M.D. – Moderator

8:05 – 10:00 a.m. **Care of the Ebola Infected Patient in the Critical Care Unit, What You Need to Know**
James N. Sullivan, M.D.

Infectious Risks to Healthcare Personnel in the ICU
Patricia Murphy, M.D.

Disaster Management in the ICU: Are We Ready for the Next Pandemic?
Steven J. Lisco, M.D., FCCM, FCCP

10:00 - 10:30 a.m. **Break with Exhibitors**

SESSION II – New Evidence, New Investigators and New Directions

10:30 – 11:30 a.m. **Important Publications You Might Have Missed**
Joseph A. Hyder, M.D., Ph.D. – Moderator
Panelists: Erin Hennessey, M.D.
Christopher G. Hughes, M.D.

11:30 – 11:45 a.m. **Young Investigator Award and Abstract Presentation**
"Chronic Pain Interference of Daily Life Following Critical Illness"
Christina J. Hayhurst, M.D.

11:45 a.m. – Noon **ASA Address**
Daniel J. Cole, M.D.
ASA President-Elect

Noon – 1:15 p.m. **Lunch**

SESSION III – Atrial Fibrillation: An Update You Won't Want to Miss!!

Gyorgy Frendl, M.D., Ph.D., FCCM – Moderator

1:20 – 2:25 p.m. **Perioperative Atrial Fibrillation: Its Incidence, Impact and Effective Prevention Strategies**
Alissa C. Sodickson, M.D.

Recommended Management of Perioperative Atrial Fibrillation
Gyorgy Frendl, M.D., Ph.D., FCCM

Genetics of Perioperative Atrial Fibrillation – The Hope for Personalized AF Care
Martin I. Sigurdsson, M.D., Ph.D.

Discussion

2:30 – 3:00 p.m. **Lifetime Achievement Award Presentation**
"Eyewitness to Leadership: Examining Our Past, Forecasting Our Future"
Philip G. Boysen, M.D.

3:00 – 3:30 p.m. **Moderated Poster Session**

3:30 – 3:45 p.m. **Break with Exhibitors**

SESSION IV – Interactive Case Management

3:45 – 4:55 p.m. **Interactive Case Management**
Avery Tung, M.D., FCCM – Moderator
Panelists: Miguel A. Cobas, M.D., FCCM
Brenda G. Fahy, M.D., MCCM
Breandon Sullivan, M.D.

4:55 – 5:00 p.m. **Closing Remarks**

5:00 – 5:45 p.m. **SOCCA Annual Business Meeting**

5:00 – 6:00 p.m. **Resident/Fellow Program**

5:45 – 7:00 p.m. **Reception with Exhibitors**

SESSION I

Acute Infectious Diseases in the ICU

Moderator: Patricia Murphy, M.D.

Care of the Ebola Infected Patient in the Critical Care Unit, What You Need to Know
James N. Sullivan, M.D.

Infectious Risks to Healthcare Personnel in the ICU
Patricia Murphy, M.D.

Disaster Management in the ICU: Are We Ready for the Next Pandemic?
Steven J. Lisco, M.D., FCCM, FCCP

Care of the Ebola Infected Patient in the Critical Care Unit, What You Need to Know

James N. Sullivan, M.D.

Notes:

Infectious Risks to Healthcare Personnel in the ICU

Patricia Murphy, M.D.

Notes:

Disaster Management: in the ICU: Are We Ready for the Next Pandemic?

Steven J. Lisco, M.D., FCCM, FCCP

Notes:

SESSION II

New Evidence, New Investigators and New Directions

Important Publications You Might Have Missed

Moderator: Joseph A. Hyder, M.D., Ph.D.

Panelists: Erin Hennessey, M.D.; Christopher G. Hughes, M.D.

Important Publications You Might Have Missed

Moderator: Joseph A. Hyder, M.D., Ph.D.
Panelists: Erin Hennessey, M.D.; Christopher G. Hughes, M.D.

The purpose of this panel is to provide participants with an overview of carefully selected articles from among the vast published literature in critical care medicine over the past year. Our focus is to discuss the scientific and clinical merits of these papers as they may affect practice.

These are the articles each of the curators have selected for discussion:

Medical Education

Erin Hennessey, M.D.

Patient safety, resident well-being and continuity of care with different resident duty schedules in the intensive care unit: a randomized trial.

Parshuram CS, Amaral AC, Ferguson ND, Baker GR, Etchells EE, Flintoft V, Granton J, Lingard L, Kirpalani H, Mehta S, Moldofsky H, Scales DC, Stewart TE, Willan AR, Friedrich JO; for the Canadian Critical Care Trials Group.
CMAJ. 2015 Feb 9. PMID: 25667258

Changes in medical errors after implementation of a handoff program

Starmer AJ, Spector ND, Srivastava R, West DC, Rosenbluth G, Allen AD, Noble EL, Tse LL, Dalal AK, Keohane CA, Lipsitz SR, Rothschild JM, Wien MF, Yoon CS, Zigmont KR, Wilson KM, O'Toole JK, Solan LG, Aylor M, Bismilla Z, Coffey M, Mahant S, Blankenburg RL, Destino LA, Everhart JL, Patel SJ, Bale JF Jr, Spackman JB, Stevenson AT, Calaman S, Cole FS, Balmer DF, Hepps JH, Lopreiato JO, Yu CE, Sectish TC, Landrigan CP; I-PASS Study Group. N Engl J Med. 2014 Nov 6;371(19):1803-12. PMID: 25372088

Quality

Joseph A Hyder, M.D., Ph.D.

Hospital factors associated with discharge bias in ICU performance measurement.

Reineck LA, Pike F, Le TQ, Cicero BD, Iwashyna TJ, Kahn JM.
Crit Care Med. 2014 May;42(5):1055-64. PMID: 24394628

Effectiveness and safety of the awakening and breathing coordination, delirium monitoring/management, and early exercise/mobility bundle.

Balas MC, Vasilevskis EE, Olsen KM, Schmid KK, Shostrom V, Cohen MZ, Peitz G, Gannon DE, Sisson J, Sullivan J, Stothert JC, Lazure J, Nuss SL, Jawa RS, Freihaut F, Ely EW, Burke WJ.
Crit Care Med. 2014 May;42(5):1024-36. PMID: 24394627

Delirium

Christopher G. Hughes, M.D.

The attributable mortality of delirium in critically ill patients: prospective cohort study.

Klein Klouwenberg PM, Zaal IJ, Spitoni C, Ong DS, van der Kooi AW, Bonten MJ, Slooter AJ, Cremer OL.
BMJ. 2014 Nov 24;349:g6652. PMID: 25422275.

Rapidly reversible, sedation-related delirium versus persistent delirium in the intensive care unit.

Patel SB, Poston JT, Pohlman A, Hall JB, Kress JP.
Am J Respir Crit Care Med. 2014 Mar 15;189(6):658-65.
PMID: 24423152.

Young Investigator Award and Abstract Presentation

"Chronic Pain Interference of Daily Life Following Critical Illness"

Christina J. Hayhurst, M.D.

Poster 16

Young Investigator Award

Chronic Pain Interference of Daily Life Following Critical Illness

Christina J. Hayhurst, M.D.; Kristin A. Swygert, Ph.D., DPT; Jennifer L. Thompson, MPH; Chris G. Hughes, M.D.
Vanderbilt University Medical Center

Introduction: With improvement in ICU survival rates, increasing interest is being placed on post-ICU quality of life and long-term outcomes(1,2). Recent studies have shown high rates of cognitive impairment and depression in survivors of critical illness (3,4). Chronic pain symptoms have been shown in previous cohorts of ICU survivors to occur in patients up to 11 years after ICU admission (5-7), likely impacting quality of life. We tested the hypothesis that chronic pain is common after critical illness and is associated with interference of daily life.

Methods: This prospective cohort study was nested within a larger multicenter prospective cohort study evaluating long-term cognitive impairment in survivors of critical illness. We enrolled adult ICU patients at a community and university hospital within 72 hours of respiratory failure or shock. At 3 and 12 months post-hospital discharge, we assessed pain levels using the Brief Pain Inventory (BPI) (score 0-10 with 10 indicating pain as bad as you can imagine.) The overall impact of pain on daily life was also assessed using the BPI interference score, with additional focus on pain interference with normal activities, work, or enjoyment of life (0-10, 10 being completely interferes). We categorized both pain levels and pain interference into mild (1-4), moderate (5-6), and severe (7-10).

Results: BPI outcomes were obtained in 194 patients at 3 months and in 253 at 12 months. The median (interquartile range) pain intensity score was 3 (IQR) at both 3 and 12 months. 31% had moderate to severe pain 3 months after their ICU stay and 35% had moderate to severe pain 12 months after their ICU stay. The median pain interference score was 2.1 (IQR) overall, with 2 (IQR) for normal activities, 2 (IQR) for work, and 0 (IQR) for enjoyment of life. Pain interfered with their daily life moderately to severely (interference score of 5-6 or 7-10) in 24% of patients at 3 months and in 22% of patients at 12 months.

Conclusions: In this cohort of critically ill patients, a significant proportion had chronic pain following their ICU stay. Nearly a quarter of patients had chronic pain that interfered with their ability to work, do normal activities, and enjoy life. Additionally, these deficits did not improve from 3 to 12 months. Further studies are needed to elucidate modifiable risk factors for chronic pain after critical illness.

References:

1. Critical Care Medicine 2006, 34(1),15-21.
2. Critical Care 2010, 14:R6.
3. Lancet Resp Med 2014, 2: 369-379.
4. NEJM 2013, 369 (14):1306-16.
5. Critical Care 2006, 10(5):R134.
6. Intensive Care Med 2006, 32:1115-1124.
7. Critical Care 2013, 17(3):R101.

	3 month	12 month
N	194	253
BPI Average pain		
No pain (0)	22% (43)	26% (65)
Mild pain (1-4)	46% (90)	39% (99)
Moderate pain (5-6)	20% (39)	23% (59)
Severe pain (7-10)	11% (22)	12% (30)
BPI overall pain intensity		
No pain (0)	27% (53)	30% (76)
Mild pain (1-4)	51% (98)	43% (109)
Moderate pain (5-6)	15% (30)	20% (51)
Severe pain (7-10)	7% (13)	7% (17)
N	192	253
BPI Interference		
No interference (0-0.9)	41% (78)	38% (97)
Mild interference (1-4.9)	35% (67)	40% (100)
Moderate interference (5-6.9)	12% (24)	13% (34)
Severe interference (7-10)	12% (23)	9% (22)

Table 1: BPI scores at 3 and 12-month followup.

SESSION III

Atrial Fibrillation: An Update You Won't Want to Miss!!

Moderator: Gyorgy Frendl, M.D., Ph.D., FCCM

Perioperative Atrial Fibrillation: Its Incidence, Impact and Effective Prevention Strategies
Alissa C. Sodickson, M.D.

Recommended Management of Perioperative Atrial Fibrillation
Gyorgy Frendl, M.D., Ph.D., FCCM

Genetics of Perioperative Atrial Fibrillation – The Hope for Personalized AF Care
Martin I. Sigurdsson, M.D., Ph.D.

Perioperative Atrial Fibrillation: Its Incidence, Impact and Effective Prevention Strategies

Alissa C. Sodickson, M.D.

Notes:

Recommended Management of Perioperative Atrial Fibrillation

Gyorgy Frendl, M.D., Ph.D., FCCM

New 2014 AATS guidelines for the prevention and management of atrial fibrillation and flutter for thoracic surgery patients (www.aats.org).

In September 2014 The American Association for Thoracic Surgery has released new evidence-based guidelines for the prevention and treatment of peri-operative and post-operative atrial fibrillation (POAF) and flutter for thoracic surgical procedures. The guidelines are published in *The Journal of Thoracic and Cardiovascular Surgery* (http://www.sciencedirect.com/science/article/pii/S0022522314008356), and are the result of a one year review by the task force the society created to develop the guidelines.

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia, occurring in one to two percent of the general population. Many studies show an increase in mortality in patients with POAF although it is not clear to what extent the arrhythmia itself contributes to mortality. POAF is also associated with longer intensive care unit and hospital stays, increased morbidity, including strokes and new central neurologic events, as well as use of more resources. Patients who develop POAF tend to stay two to four days longer in the hospital. Patients with preexisting AF represent a high-risk population for stroke, heart failure, and other POAF-related complications. Some may present with valvular heart disease. The management of their anti-arrhythmic medications and their peri-operative anticoagulation may pose a challenge.

A task force of sixteen experts, including cardiologists, electrophysiology specialists, anaethesiologists, intensive care specialists, thoracic and cardiac surgeons, and a clinical pharmacist examined evidence and developed these evidence-based guidelines. They adapted a standard definition for POAF. These recommendations include guide for how to:

- define and diagnose POAF,
- use physiologic (ECG) monitoring of patients at risk for POAF
- best manage and treat POAF
- use rate control and anti-arrhythmic drugs, considering their mechanism of action, side effects and limitations
- best manage the patient with preexisting AF
- manage anticoagulation for new-onset POAF
- manage (long-term) and how to follow patients with persistent new-onset POAF

Among the task force's main recommendations are:

- Both electrophysiologically-documented AF and clinically diagnosed AF should be included in the clinical documentation and reported in clinical trials/studies.
- Patients at risk for POAF should be monitored with continuous ECG telemetry postoperatively for 48 to 72 hours (or less if their hospitalization is shorter) if they are undergoing procedures that pose intermediate or high risk for the development of postoperative AF or have significant additional risk factors for stroke, or if they have a history of preexisting or periodic recurrent AF before their surgery.
- In patients without a history of AF, who show clinical signs of possible AF while not monitored with telemetry, ECG recordings to diagnose POAF and ongoing telemetry to monitor the period of AF should be immediately implemented.

The most salient components of these guidelines will be presented and discussed as well as the rationale for their implementation.

References:

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2. January CT, Wann LS, Alpert JS, et al. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. *Circulation*. 2014. Apr 10 [Epub ahead of print].
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4. Vaporciyan AA, Correa AM, Rice DC, et al. Risk factors associated with atrial fibrillation after noncardiac thoracic surgery: analysis of 2588 patients. *J Thorac Cardiovasc Surg*. 2004;127:779-786.

Genetics of Perioperative Atrial Fibrillation – The Hope for Personalized AF Care

Martin I. Sigurdsson, M.D., Ph.D.

The genetic background of atrial fibrillation (AF) is both complex and rapidly advancing as high-throughput sequencing become more cost-effective.

Earlier analysis utilized genome-wide association (GWAS) that detects the association between common variants (generally single nucleotide polymorphisms (SNPs) with more than 2.5% population frequency) distributed throughout the genome and atrial fibrillation. These studies have highlighted thee regions in the human genome associated with AF, and two of those have been confirmed in post-operative surgical patients [1-4]. The strongest association exists in the 4q25 region that contains the *PITX2* gene involved in development of cardiac vasculature and the 1q21 region that includes the KCNN3 gene that codes for a potassium channel [3]. While the identification of these common variants has been helpful to further the understanding the multifocal origin of atrial fibrillation, the variants are generally not within coding regions and it is difficult to imply causality. Furthermore, as they are common they can only include a modest effect on the phenotype (OR 1-2), and therefore explain only a small proportion of the AF risk (i.e. their presence is neither necessary nor sufficient to result in the phenotype). Adding a panel of 10 common SNPs associated with AF to a clinical risk model only marginally increased the predictability of the model for AF in the validation cohort, from 69% to 72% [5].

As high-throughput sequencing allows whole genome and exome sequencing, the discovery of low frequency and rare variants (<2.5% frequency in the population) is now possible. These variants are more often causative (i.e. code for a change in amino acid sequence of a protein) and have a much larger effect size (OR 3-100)[6]. These methods have identified multiple mutations within the coding sequence for several genes coding for sodium and potassium channels that are associated with AF [3]. Several of these mutations have been shown to alter the electrophysiology of the cell membrane in vitro, indicating causality [7].

Additionally studies are emerging describing the pharmacogenomics of the receptors for agents commonly used in treatment of AF. For example, variants within gene coding for the β1 receptor are associated with response to rate-control of AF [8], and other variants in the same gene were found to be associated with success of beta-blocker prophylaxis against AF [9].

These novel methods, i.e. screening for common and especially rare variants that are associated with AF to assess risk of AF and subtype of AF and genotyping variants that predict pharmacodynamics of commonly used agents for preventing and managing AF provides hope that adding genetic analysis will become beneficial addition to the multimodal prevention and management of AF.

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2. Ellinor PT, Lunetta KL, Albert CM, et al.: Meta-analysis identifies six new susceptibility loci for atrial fibrillation. Nat Genet. 44:670-675, 2012.
3. Olesen MS, Nielsen MW, Haunso S, et al.: Atrial fibrillation: the role of common and rare genetic variants. Eur J Hum Genet. 22:297-306, 2014.
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Lifetime Achievement Award Presentation

"Eyewitness to Leadership: Examining Our Past, Forecasting Our Future"

Philip G. Boysen, M.D.

Lifetime Achievement Award Presentation

"Eyewitness to Leadership: Examining Our Past, Forecasting Our Future"

Philip G. Boysen, M.D.

I. Leaders: some definitions and opinions

II. Followers: especially the concept of the "first follower"

III. Leadership is **Influence**

IV. Leaders vs. Managers: there IS a difference

V. Function of Leaders
- Have a vision
- Recruit and retain the team (but make room for individual talent)
- Mentoring vs. coaching: there IS a difference

VI. The State of the Academy: participation in mission/vision/values

VII. Threats to our place or position in the academy

VIII. RVU's which drive our colleague's behavior
- School of Medicine/College of Medicine, Deans
- The "C-suite", especially the CEO
- Product Lines, Service Lines
- Multimillion Dollar Consultants
- Millennial Behaviors: there are now 5 generations in the workforce

IX. Where we can have an impact
- Patient safety and team training
- End of life issues and ethical issues in general
- Productivity vs. availability
- Fellowships: the model and the purpose
- Start with **WHY**

Annotated Bibliography

Keegan J. (1988). The Price of Admiralty: the Evolution of Naval Warfare. Viking –Penguin, Inc. NY

The author is a highly regarded and well published military historian who details events, but also analyzes circumstances and leadership decisions, beginning with Admiral Lord Nelson's crushing defeat of the combined Spanish Armada and French navies. Nelson was the first to differentiate strategy from tactics, and speed from quickness. Constant drilling kept him away at sea for two solid years before the engagement at Trafalgar.

Strategy: blockade Colon and Toulouse, but lay off the coast so as to be unseen from shore. Employ his newly devised communication system using flags that could be seen 40 miles away in the open sea, five ships could blockade 200 miles.

Tactic: lure the combined navies into the Atlantic Ocean and out of the Mediterranean, into open sea with no safe harbor. His highly trained seamen could fire cannons at twice the rate of his enemy, and move from port to starboard guns within two minutes, and vice versa. Rather than engage broadside he "crossed the T", upper guns took down the rigging, lower guns hit the water line. Enemy guns were useless using this tactic.

Maxwell J. (1998). The Twenty-one Irrefutable Laws of Leadership. Thomas Nelson, Inc. Nashville TN.

A pastor and prolific author, his book is both easy reading and thought provoking. Law #2 is the law of influence. Law #21 is the law of legacy. A leader's lasting value is measured by succession.

Covey SR. (2009). The 8th Habit: From Effectiveness to Greatness. The Free Press, NY. Expanding on his "7 Habits" series he was the first to insist that many organizations had "leaders without titles" who achieved and led by influence (well, I think Lao Tzu was the first to propose this). He quite specifically separated **leadership** from **management**, he discusses "the humble, courageous, and great ones that exemplify how leadership is a **choice** not a **position.**

Sinek S. (2014). Leaders Eat Last: Why Some Teams Pull Together and Others Don't. Portfolio Penguin NY Sinek also wrote "Start With Why: How Leaders Inspire Others to Action". His T.E.D. talk on YouTube, on the same topic, is their most viewed entry. This title was inspired by two other books on leadership, written by two CDR, USN who captained ships of the line. His book gives many examples of successful and unsuccessful leaders and analyzes their behaviors and decisions. He also comments on generational differences; he is particularly hard on "boomers".

Taylor P. (2014). The Next America: Boomers, Millennials, and the Looming Generational Showdown. Pew Research Group. Introducing Millennials as "highly educated, unemployed, and in a hurry", this book is loaded with data, most of which deserves consideration. He takes no sides but warns of a conflict between generations heretofore unseen.

Meister JC, Willyard K. (2014). The 2020 Workforce: How Innovative Companies Attract, Develop, and Keep Tomorrow's Employees Today. Harper Business, NY. Two academics provide a research base to make predictions.

Key points:

- There are now FIVE generations in the work place
- By 2020 millennial generation employees will predominate
- By 2020 offices will be everywhere and nowhere, team members will be half way around the world, mentors/ protégés will never meet face to face
- A social learning ecosystem will include 1.) Competency based learning 2.) Context based learning, with a system 3.) Created and designed by the organization, and 4.) Created and designed by users
- Organizations will have to change to work with the "uber-connected" employees

Babiak P, Hare RD. (2006). Snakes in Suits: When Psychopaths Go To Work. Harper Collins, NY.

The authors ask: do you have a colleague that:

- Values people only if useful to them?
- Successfully shifts blame for mistakes to others?
- Is cold, insensitive, and unfeeling?
- Gets promotion and recognition that others deserve?
- Emerges unscathed from attempts to stop power grab?
- Lies about credentials and expertise?

Bodiak and Hare maintain that "yes" answers to these questions indicate that you are dealing with a psychopath, that such people often achieve great power and position, and……they have proof! These academic researchers conducted studies with functional imaging that is different from most people and it accounts for a personality that has no bonds, no conscience, no anxiety, an interspecies predator. Make a list. We all know a snake in a suit!

Kotter JP. (2014). Accelerate: XLR8. Harvard Business Review Press. Kotter is a highly respected business consultant. His original 4 books are the basis for the AHRQ TeamSTEPPS program to achieve transformational change. To implement sustainable change, he proposes a dual operating system with a corporate hierarchy and a second, agile, network-like structure. In the latter is where influence and non-titled leaders have an impact.

Patterson K, Grenny, J. Maxfield D, MacMillan R. Switzler A. (2011). Change Anything: the New Science of Personal Success. These authors have sequential publications leading to this latest book. I have personal experience with Joe Grenny and Al Switzler and underwent their training program for Master Trainer Influencer Course. They propose a six cell model that leads to change in an identified change in vital behavior(s) that then lead to specific, measurable, and time based results. This as a result. This as a result of studying individuals that produced lasting change.

Cameron K, Dutton J, Quinn R, (Eds.) (2003). Positive Organizational Scholarship: Foundations of a New Discipline. Berrett Koehler, San Francisco. Individuals can learn, organizations can learn. Individuals can show virtue, organizations can show virtue. Organizational behavior is an ascendant curricular element of Executive MBA programs Par I of this book discusses Platonic virtue as applied to organizations, especially courage and transcendent behavior.

Peterson C, Seligman MED. (2004). Character Strengths and Virtue: a Handbook and Classification. Oxford Press and American Psychological Association. Both academic PhD's (Peterson at U Michigan, Seligman at Penn) this is an example of translational research in social science. There are 40 contributing authors: backed by the Values in Action (VIA) initiative. This book has changed the way I view "word" and organizations, and the way I operate in same. It has prompted us to develop a short course for our medical students called "Virtue ina Medicine". To me, this is the answer to commoditization and corporatization in medicine.

Quotations on Leardership by Selected Categories with Attribution

Leadership Defined

- **A leader is best when people barely know if he exists, when his work is done, his aim fulfilled, they will say, "we did it ourselves".**
  Lao Tzu
- **The first responsibility of a leader is to define reality. The last is to say thank you. In between the leader is a servant.**
  Max DePree
- **Leadership is the capacity to translate vision into reality.**
  Warren Bennis
- **Before you become a leader, success is about growing yourself. When you become a leader, success is about growing others.**
  Warren Bennis
- **All great leaders have one characteristic in common; the willingness to confront unequivocally the major anxiety for the people in their time.**

  John Kenneth Galbraith

Recruit and Retain People

- **The best leader is the one with the good sense to pick good people, and the self restraint not to meddle in their work.**
  Theodore Roosevelt
- **Lead from behind, put others in front. Take the front line when there is danger.**
  Nelson Mandela
- **Leadership is solving problems. When your people stop bringing you problems your leadership has failed.**
  Colin Powell
- **We live in a society obsessed with public opinion. Leadership has never been about popularity of the leader.**
  Marco Rubio
- **The final test of a leader is that he leaves behind him in other men, the conviction and the will to carry on.**
  Walter Lippman

Have a Vision: But Learn to say "no"

- **The essence of leadership is to have a vision. You cannot blow an uncertain trumpet.**
  Fr. Hesburgh
- **The art of leadership is saying no. It is easy to say yes.**
  Tony Blair
- **Vision comes from PASSION, not POSITION.**
  John Maxwell
- **I cannot give you the formula for success, but I can give you the formula for failure. Try to please everybody.**
  Hillary Swope

Leaders and Managers: Differences

- **You manage things, you lead people.**
  Admiral Grace Murray Hooper
- **So much of what is called management consists of making it difficult for people to do their work. *Pete Drucker***
- **Effective leadership is putting first things first. Effective management is discipline to carry it out**
  Unknown
- **Management is efficiency in climbing the ladder of success. Leadership determines if the ladder is leaning against the right wall.**
  Steven Covey
- **Advice to graduating class of an executive MBS program:**
  -- Control is not leadership
  -- Management is not leadership
  -- Spend 50% of your time leading and managing yourself
  -- Spending 20% of your time leading and managing your boss
  -- Spend 15% of your time leading and managing your peers
  -- the rest will take care of itself.
  Dee Hock, founder of VISA

PGBII: March , 2015

SESSION IV

Interactive Case Management

Interactive Case Management

Moderator: Avery Tung, M.D., FCCM

Panelists: Miguel A. Cobas, M.D., FCCM; Brenda G. Fahy, M.D., MCCM; Breandon Sullivan, M.D.

Interactive Case Management

Moderator: Avery Tung, M.D., FCCM
Panelists: Miguel A. Cobas, M.D., FCCM, Brenda G. Fahy, M.D., MCCM, Breandon Sullivan, M.D.

A 75 yr M is scheduled for gastric tumor resection. His PMHx is notable for HTN, prior stroke, Atrial fibrillation, CHF, OSA, and chronic renal insufficiency due to chemotherapy. He has had several uncomplicated general anesthetics in the past without complications, including a L knee scope, UGI endoscopy, and a cholecystectomy. Medications include ASA, Metoprolol 25mg PO BID, Enalapril 5 mg POqd, and Lasix 20mg PO qd.

His tumor was initially diagnosed 1 year ago with a GI bleed after 6 months of Lovenox treatment for a LLE DVT. Over the last 6 months, he has lost 20 lbs and notes difficulty swallowing due to his tumor. Labs in the preop clinic: Hb 8.7, Na 136, Cr 1.8, K+ 3.8, Plt 101, INR 1.6

On the day of surgery he alert, oriented, and cheerful. He reports that he can climb a flight of stairs without difficulty but his wife disagrees, telling you that he is "pretty short of breath" when he reaches the second floor of their home. He has no positional dyspnea and denies residual weakness from his stroke. 72kg, 5'9", 108/60, and HR 52. "I'm looking forward to being able to eat again!", he tells you. "Especially my award winning barbecued ribs!"!

As you finish your evaluation, the preop nurse (who is being shadowed by a nurse student) shows you his EKG. "Should we cancel?", she asks. "It looks like he is in atrial fibrillation". You explain that since the surgery is for cancer and he has a history of atrial fibrillation, little preoperative optimization is possible. But as you fill out your preoperative evaluation, you also overhear the surgical PA confirm that the patient has been off aspirin for a week. "Dr. Rivers (the surgeon) will like that", the PA tells the patient. "She's worried about bleeding from the tumor".

1. Would you cancel the case because this patient has not taken ASA for a week?

Due to a history of stroke, DVT, and atrial fibrillation, this patient is at increased risk from perioperative thromboembolic complications. Having been off aspirin for a week also exposes him to aspirin withdrawal syndrome. In addition, although this patient's coronary artery disease risk is not known, he has at least 3 RCRI factors for a major cardiac event. While oncologic surgery is rarely completely elective, delaying for a week to restart ASA therapy may make the difference between a functional and limited recovery due to a second neurological event. On the other hand, some studies do find increased bleeding with perioperative ASA use.

You page the surgeon to discuss the case. "Oh we can't cancel!", she tells you. We have a chance to cure this patient today! Moreover, from looking at the scans the bleeding could be massive…and didn't that recent New England trial find that it doesn't matter what we do perioperatively with ASA?"

You discuss the case with the patient and surgeon, and highlight the twin risks of bleeding and perioperative thromboembolism. The patient agrees with the surgeon to go ahead. "I trust you guys", he says. "Especially because you'll be using goal directed management!!"

As you head back to the OR for one final check, you glance at the surgeon and raise an eyebrow. "Yeah", she says "I was going to mention this part". I was at a meeting in Prague last week and they presented this great study on goal directed hemodynamic optimization. Less inflammation, shorter stays, quicker return of bowel function, fewer infections & deaths, better postop renal function" Would you mind putting in a CVP catheter and measuring a SvO2 before we get started?

Since she asked nicely, you agree. Induction and intubation are uncomplicated. BP falls to 90/50 and HR rises to 70. To your surprise, the patient converts to sinus rhythm. You place an arterial and central line, and position the patient. Because of his history of stroke you place NIRS electrodes bilaterally. You send a venous blood gas: pH 7.42, pCO_2 45mmHg, PO_2 32mmHg, SvO_2 = 62%. CVP = 12 mmHg. Hct = 28.

"See'", she says excitedly. "That's EXACTLY what they were talking about in Europe. Asymptomatic but clearly his oxygen delivery is subpar. She pulls out a laminated card. "Let's see…if the CVP is 12 and the Hct > 26…then we should start some dobutamine!"

2. Would you start dobutamine?

Many goal directed perioperative care protocols target SvO2 as a proxy for adequate cardiac output and find improved outcomes of the type described by our surgeon. However, diversity in algorithms used by different studies, and the existence of large negative trials suggest that any benefit may not be easily achieved. In addition, this patient has a history of atrial fibrillation, and starting dobutamine raises the risk of recurrent fibrillation events (and by extension possibly myocardial ischemia)

You mention the episode of atrial fibrillation this morning and the surgeon says 'yeah, but he has a history of atrial fibrillation. Asymptomatic, right?" You concur and she says "Can you just try it? If the heart rate gets too high we can always stop the dobutamine!" You start 5 mcg/kg/min dobutamine, wait 30 minutes, and obtain another venous blood gas: 7.37, PCO_2 43, PO_2 40, SvO_2 71%. K+ = 4.8

"See!" the surgeon says when you tell her. "That's exactly what they said would happen. This guy's gonna do great!"

It does appear to be going well…and the surgeons work their way down to the tumor itself without complication. However, you note only 10cc urine over the last 90 minutes. BP 110/50 (MAP 57), HR 90, CVP 14, Is/Os so far: 3000cc in/600cc out. You talk it over with the surgeon, who (surprisingly) suggests norepinephrine. "Did you see that New England sepsis trial?", she asks. "They found a 24% reduction in renal failure when the mean pressure was 80 rather than 60. They used Norepinephrine, and found no difference in adverse events!

3. Would you start Norepinephrine?

Although perioperative urine output does not correlate with postoperative renal function, low urine output intraoperatively remains a concern for most perioperative physicians. The patient is hemodynamically adequate, but does have a history of chronic hypertension. In the trial the surgeon describes, chronically hypertensive patients with sepsis had a lower incidence of renal replacement therapy when managed at a mean BP of 80 mmHg (using norepinephrine) vs 60mmHg. But the surgeon is not quite right regarding complications…the group managed at 80mmHg had a higher incidence of atrial fibrillation…to which this patient is prone. And, the patient is already on dobutamine at 5 mcg/kg/min!

You agree to try norepinephrine. At 0.03 mcg/kg/min, the patient's BP increases to 150/60 and his MAP rises to 85mmHg. His urine output picks up to 60 cc/hr over the next hour. 'Now THAT'S evidence based medicine!", the surgeon says.

The remainder of the case goes smoothly. Over the 6 hours you have been working, total IV fluids = 4500cc, U/O 700cc, EBL ~400cc, and you have given 1 U each of PRBC and FFP. BP 155/90, HR 90 (sinus), CVP 8mmHg. PO_2 = 105 on 40% FiO_2 and PIP = 24 cm H_2O. You insert a NG tube, reverse, extubate the patient and bring him to the PACU.

All is well for the first 30 minutes. The dobutamine is still running per the surgeon's (nicely stated) request, and the norepinephrine has been weaned off. However, over the next hour the patient becomes progressively more agitated and tachycardic. His BP rises to 180/80, HR 120, RR 28. His saturations are 98% on 40% facemask. He pulls out his NG tube and the nurses ask for restraints. Fentanyl boluses do not seem to help. A blood gas is unremarkable: 7.45 / 32 / 145. The surgeon stops by and suggests some Versed. "I know it's a benzodiazepine", she says "but its always worked for me!" The wife chimes in: "Yes", she notes, "The last time he had surgery on his knee he was wild afterwards and they gave him something that worked great!" You confer with the nurse (who is writing a review of acute care delirium for her nursing Ph.D.). She argues for Haldol IV. "It's time tested", she says "and avoids all the excess mortality of giving a benzodiazepine"

4. Would you use midazolam to treat this patient's postoperative delirium?

The bulk of recent data suggest that one of the strongest modifiable risk factors for ICU delirium is benzodiazepine use. However, the causes and epidemiology of perioperative delirium may be different. Both types of delirium, however, correlate with worse outcome after surgery. Regardless of what delirium subtype this patient has, some therapy to control this patient is needed as the nurses can no longer care for him. And, since he has already pulled out his NG tube, an oral agent is not feasible.

Over the concerns of the nurse you give 2mg midazolam. It doesn't help. He continues to be agitated. You give a 5 mg dose of Haldol IV and 2 minutes later he develops ventricular tachycardia with a Torsades pattern and loss of pulse. You reintubate him (successfully), and after 2mg magnesium, 6 minutes of CPR and 2 cardioversion attempts, he reverts to sinus rhythm. HR 80, BP 140/60, CVP 16, SpO_2 98%. ABG 7.31 / 32 / 240 on 100%.

The surgeon arrives and thanks you for resuscitating her patient. She asks if you plan to use therapeutic cooling. "I know the hospital has a protocol", she says, "but cooling impairs immune function, leads to infection, and worsens bleeding and wound healing. And, I don't think it works, either!"

The hospital's "Dr. Cool" team disagrees. "We cool everybody after cardiac arrest", Dr. Cool notes "and we've done plenty of patients after surgery. It's recommended by the AHA!

5. Would you cool this patient?

Although cooling after cardiac arrest is the only therapy recommended by current ACC/AHA guidelines to facilitate neurologic recovery after arrest, considerable debate rages regarding how to cool: duration, target temperature, cooling method, etc. And, recent data suggest that the potential benefit of cooling may be limited. The surgeon also has a point…hypothermia has been associated with poor wound healing and infection after surgery.

You agree to support the surgeon in her argument with Dr. Cool. After a tense standoff in the hallway and a note in the chart declaring your unwillingness to pursue therapeutic hypothermia, the cooling team agrees to leave.

Fortunately, the patient wakes up 30 minutes later, is following commands, and moving all 4 extremities. He is successfully extubated 45 minutes later, and transferred to the ICU later in the afternoon. 4 weeks later, the surgeon stops you in the hallway to show you a picture of the patient on his back porch, an apron on, and tending his grill.

Poster Presentations

Poster 1 **Acute Subdural Hematoma Following Coronary Artery Bypass Grafting: A Case Report**
Sheida Tabaie, M.D.; Natalia Ivascu, M.D.
New York Presbyterian Weill Cornell

Poster 2 **Ketamine as a Treatment for Depression in the ICU**
Jean M. Wheeler, M.D., MS; Joel Zivot, M.D.
Emory University Hospital

Poster 3 **Role of Surgery Requiring Anesthesia in Postoperative Cognitive Impairment**
Christopher G. Hughes, M.D.; Mayur B. Patel, M.D., MPH; Timothy D. Girard, M.D., MSCI; Sunil K. Geevarghese, M.D., MSCI; Brett C. Norman, M.D., MPH; Pratik P. Pandharipande, M.D., MSCI
Vanderbilt University School of Medicine

Poster 4 **Apnea Testing For Brain Death: Arterial Versus Venous PCO2**
Ezekiel B. Tayler, D.O.; Helen Stutz, M.D.; Sophie Socaris, M.D.; Raymond Walsh, M.D.; Michael Gruenthal, M.D.; Paul Feustel, Ph.D.
Albany Medical Center

Poster 5 **Use of Perfluorocarbon for Bronchoalveolar Lavage in Case of Severe Pulmonary Hemorrhage and Extracorporeal Membrane Oxygenation**
Mark E. Caridi-Scheible, M.D.; James M. Blum, M.D.
Emory University Hospital, Department of Anesthesiology and Critical Care Medicine

Poster 6 **Identifying ICU Patients at High Risk for Cardiac Arrest: A Retrospective Analysis of the Visensia Algorithm**
Christopher G. Choukalas, M.D., MS; Steven Takemoto, Ph.D.; James Stotts, Ph.D.; Arthur W. Wallace, M.D., Ph.D.
University of California San Francisco, San Francisco VA Medical Center

Poster 7 **Flash Pulmonary Edema in Preeclampsia: BIPAP is a Viable Alternative to Intubation**
Leslie K. Hale, M.D.
Stanford

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Matthew W. Pennington, M.D., Ph.D.; Aaron M. Joffe, D.O.
Department of Anesthesiology and Pain Medicine, University of Washington, Harborview Medical Center, Seattle, WA

Poster 1

Acute Subdural Hematoma Following Coronary Artery Bypass Grafting: A Case Report

Sheida Tabaie, M.D.; Natalia Ivascu, M.D.
New York Presbyterian Weill Cornell

Intracranial bleeding complications are infrequently reported following cardiac surgery. Despite its relative rarity, early recognition is of paramount importance as there are emergent interventions that can markedly improve outcomes.

A 70 year-old female with no history of a bleeding disorder or head trauma presented to an outside hospital with a NSTEMI. She received a 300 mg clopidogrel load prior to cardiac catheterization, which demonstrated 3-vessel CAD. The patient was started on a heparin drip and was transferred to our hospital five days later for definitive treatment. The heparin drip continued until the night prior to surgery. She remained supratherapeutic on the heparin drip despite appropriate decreases in the dose, with PTT >150 for two days. She was started on aspirin 325 mg daily. Three days after admission, the patient underwent 3-vessel CABG without complication. Conventional CPB was used, including heparinization and protamine reversal. There were no intraoperative complications. Her post-operative course was unremarkable, with no episodes of bleeding or hypotension. She was started on prophylactic SQ heparin twice a day on POD #1, and the aspirin 325 mg was continued daily. The platelet count fell to 88,000 immediately post-operatively, after which it remained above 100,000. All other coagulation labs were consistently within normal limits. On the morning of POD #3, the patient presented with a moderate to severe expressive aphasia and a right hemiparesis. A stat contrast head CT revealed a large L hemispheric subdural hemorrhage with midline shift consistent with a hyperacute subdural hematoma. There was no known head trauma during the hospitalization or prior to the hospitalization. The patient underwent a L craniotomy for evacuation of the subdural hematoma. The post-operative course was unremarkable, and the patient made a full recovery with no residual deficits.

Acute subdural hematomas are generally precipitated by head trauma. With no evidence of head trauma in this case, the etiology remains unclear. A literature search of subdural hematomas following cardiac surgery reveals several case reports.2,3,4,5,6,7 A possible etiology includes the pre-operative anticoagulation regimen combined with heparinization for CPB leading to a bleed from tearing of the dural bridging veins secondary to rapid intra-operative cerebral fluid shifts.2 However, given the acuity of the subdural hematoma, it is less likely to have begun while on CPB with delayed presentation until POD #3. Interestingly, the adult case reports identified in the literature had a wide range in timing of presentation from POD #2 to POD #42. Based on the limited data, it appears that intracranial hemorrhage following cardiac surgery does not commonly occur in the immediate post-operative period. Thus, it is critical to establish a neurological baseline in the immediate post-operative period and to consider intracranial hemorrhage in the differential when there is an acute change from the neurological baseline.

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Poster 2

Ketamine as a Treatment for Depression in the ICU

Jean M. Wheeler, M.D., MS; Joel Zivot, M.D.
Emory University Hospital

A 41 year old African American female with history of bipolar disorder presented to the emergency department after a suicide attempt where she ingested a combination of opiates,diphenhydramine, acetaminophen, alcohol, hydrochlorothiazide and salicylates. She was previously taking escitalopram with minimal improvement in depressive symptoms. She had four prior admissions with similar presentations which were treated with observation and admission to outside psychiatric hospitals. Because of concern for hypotension and metabolic derangements she was sent to the ICU. Her vital signs were within normal limits and initial labs were significant for an elevated acetaminophen level of 115 mcg/mL (normal <30mcg/mL). Her chemistries and coagulation tests were unremarkable. Patient was medically cleared from the ICU after N-acetylcysteine treatment and while waiting for an inpatient psychiatry bed was given ketamine infusion for her refractory depression. Her treatment consisted of premedication with 0.5 mg of IV lorazepam followed by a 0.5 mg/kg IV infusion of ketamine in 100 mL of normal saline over 40 minutes. Prior to this a Quick Inventory of Depressive Symptomatology (QIDS) was completed with a score of 19 (range 0-27) indicating severe depression. Her mood and depressive symptoms improved and she was sent to an outpatient psychiatric facility. Inpatient psychiatric beds are becoming increasingly scarce and patients will be waiting longer in ICUs for placement. There are few options for initiation of depression treatment in the ICU. Two large meta analyses support ketamine as an effective treatment for major depression in outpatient settings. Further studies are necessary to determine the ideal dose and the long term efficacy of this therapy in the ICU.

Poster 3

Role of Surgery Requiring Anesthesia in Postoperative Cognitive Impairment

Christopher G. Hughes, M.D.; Mayur B. Patel, M.D., MPH; Timothy D. Girard, M.D., MSCI; Sunil K. Geevarghese, M.D., MSCI; Brett C. Norman, M.D., MPH; Pratik P. Pandharipande, M.D., MSCI
Vanderbilt University School of Medicine

Introduction: Emerging data have called into question whether postoperative cognitive dysfunction is attributable to surgery and general anesthesia vs. baseline patient characteristics or the hospital course.(1-5) We tested the hypothesis that exposure to surgery requiring general anesthesia is an independent risk factor for long-term cognitive impairment.

Methods: In this multicenter prospective cohort study conducted in university, community, and Veterans Administration hospitals, we enrolled adult ICU patients within 72 hours of respiratory failure or shock. Demographic and hospital course data were collected up to 30 days after enrollment. We tracked the occurrence of surgery requiring general anesthesia from hospital admission to 30 days post-enrollment. At 3 and 12 months post-hospital discharge, we assessed global cognition with the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS: mean population adjusted score of 100Â±15 with lower scores indicating worse global cognition) and executive function with the Trail Making Test, Part B (Trails B: mean population adjusted score of 50Â±10 with lower scores indicating worse executive function). Multivariable linear regression was used to study the associations of surgery requiring general anesthesia with global cognition and executive function outcomes in 2 separate models: 1) after adjusting for only baseline covariates (age, Charlson comorbidity index, education years, Informant Questionnaire on Cognitive Decline in the Elderly score, and Framingham stroke risk score) to evaluate the role of surgery requiring general anesthesia and baseline factors on cognitive outcomes independent of the subsequent hospital course and 2) with the addition of in-hospital covariates (coma duration, delirium duration, severe sepsis duration, hypoxemia intervals, Sequential Organ Failure Assessment score, and doses of analgesics, sedatives, and antipsychotics) to study the role of in-hospital factors on cognitive outcomes.

Results: Of the 1,041 patients enrolled, the median age was 62, median APACHE II score was 24, and 402 (39%) had surgery requiring general anesthesia. After accounting for death (n=329) and loss to follow-up or withdrawal (n=177), 534 patients had testing at 3 and/or 12 months, 219 (41%) of whom had surgery. Median RBANS global cognition scores were similar at 3 and 12 months in patients who had surgery requiring general anesthesia vs. those who did not (79 vs. 80 and 82 vs. 82, respectively), approximately 1.5 standard deviations below the population mean (Figure 1). Median Trails B executive function scores were also similar in those who had surgery requiring general anesthesia vs. those who did not (41 vs. 40 and 43 vs. 42, respectively), approximately 1 standard deviation below the population mean (Figure 1). Surgery requiring general anesthesia was not associated with global cognitive or executive dysfunction at 3 or 12 months in multivariable models incorporating baseline covariates with and without in-hospital covariates. Increasing age, lower education years, and longer delirium duration were independently associated with worse global cognitive function at 3 and 12 months (all $p<0.02$), and longer delirium duration was independently associated with worse executive function at 3 and 12 months ($p<0.01$).

Conclusions: In this cohort of patients with critical illness, surgery requiring general anesthesia was not a risk factor for long-term global cognition or executive function deficits. Such deficits were common and associated with baseline patient characteristics and in-hospital delirium.

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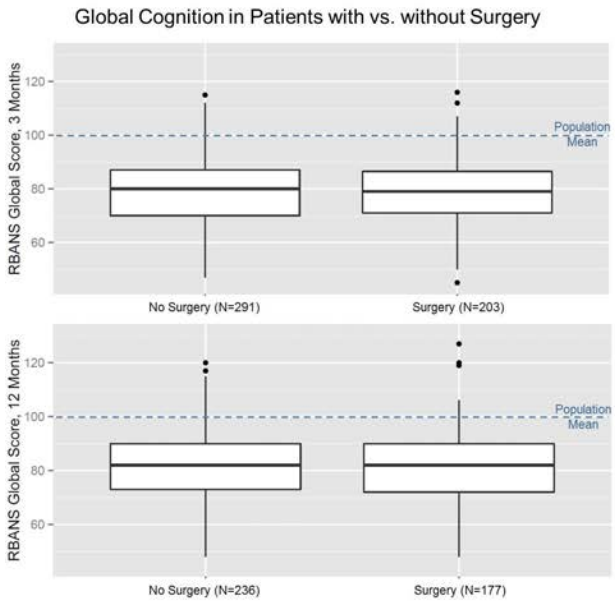
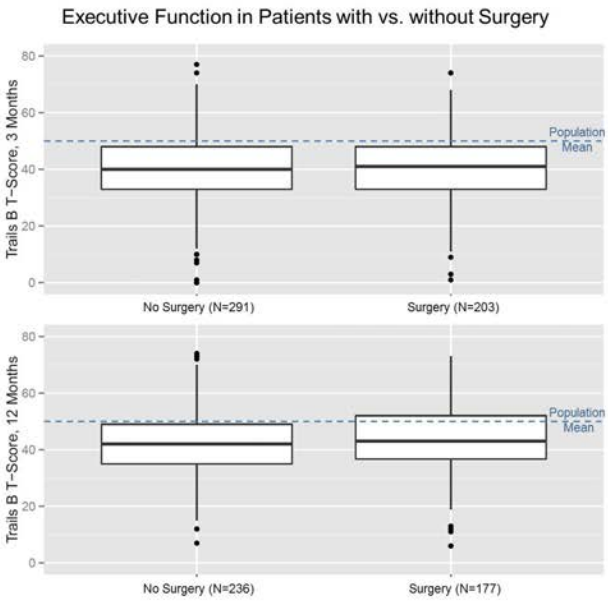

Global Cognition in Patients with vs. without Surgery
RBANS Global Score, 3 Months
120
100
80
60
Population Mean
No Surgery (N=291)
Surgery (N=203)
RBANS Global Score, 12 Months
120
100
80
60
Population Mean
No Surgery (N=236)
Surgery (N=177)


Executive Function in Patients with vs. without Surgery
Trails B T−Score, 3 Months
80
60
40
20
0
Population Mean
No Surgery (N=291)
Surgery (N=203)
Trails B T−Score, 12 Months
80
60
40
20
0
Population Mean
No Surgery (N=236)
Surgery (N=177)

Poster 4

Apnea Testing For Brain Death: Arterial Versus Venous PCO2

Ezekiel B. Tayler, D.O.; Helen Stutz, M.D.; Sophie Socaris, M.D.; Raymond Walsh, M.D.; Michael Gruenthal, M.D.; Paul Feustel, Ph.D.
Albany Medical Center

Introduction: According to the Center for Disease Control, 1.7 million traumatic brain injuries occur each year in the United States with about 30.5% of these events leading to death.1 Clinical determination of brain death includes several neurological tests including an apnea test. The apnea test determines if the brain areas mediating the drive to breath are viable. Once it has been determined that a patient is hemodynamically stable, normothermic and without metabolic derangements, a baseline arterial blood gas (ABG) is drawn, the ventilator is disconnected and oxygenation is maintained by passive diffusion. After 8 to 10 minutes without evidence of respiratory effort, a second ABG is drawn and evaluated for a PaCO2 rise of >20 or a value of > 60 mmHg indicating a positive apnea test.5 Prior studies comparing the PaCO2 to the venous carbon dioxide partial pressure(PvCO2) in the setting of respiratory failure, including use of regression equations 6,10,12 have been performed. 6,7,8,9,10,11,12 However, no study to date has compared the PaCO2 level changes between the venous and arterial circulation during the apnea test of brain death determination. We propose obtaining both arterial and venous blood samples for baseline and post-apnea test comparison to determine the correlation in PaCO2 rise between the two systems.

Methods: Analysis will focus on arterial and venous PCO2 levels during the apnea test. PvCO2 will be compared to Pa CO2 before and after the apnea test by multiple linear regression where the before to after test change in PvCO2 is a function of the change in PaCO2 and venous site. Participants will also be evaluated based on the presence of comorbidities that may alter tissue perfusionand therefore affect venous C02 values.

Results: We report statistical interpretations of our data assuming the measures are drawn from a normally distributed population. This cannot be reliably determined from the collected data because of the low number of patients. Using a paired t-test, the two tailed P value when comparing pre-apnea PaCO2 and PvCO2 values is 0.0125, t=8.86 (95% CI, -11.784 to -4.082). When comparing the post-apnea PaCO2 and PvCO2 values, the P value is 0.9432, t=0.0804 (95% CI, -14.540 to 14.006). Although the pre-apnea values show a statistically significant difference, the post-apnea values do not. See images.

Conclusions: We believe with more subjects in the study, both pre- and post-apnea values will not show a statistically significant difference. This research could significantly benefit future patients. Often in performing an apnea test, there is significant difficulty in obtaining an arterial sample either before (baseline ABG) or after the time interval. However, venous access, including both peripheral and central catheters is usually obtained with less difficulty. This study may demonstrate that venous blood gas samples are comparable to arterial blood gas samples during apnea testing.

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Patient	58 y/o White female	52 y/o White male	53 y/o White male	45 y/o Asian female
Comorbidities	COPD, tobacco abuse	Left pneumothorax	Tobacco abuse	Hypothyroidism
Infusions	Norepinephrine 20 mcg/min	Norepinephrine 62 mcg/min Phenylephrine 70 mcg/min	Norepinephrine 10 mcg/min	Norepinephrine 70 mcg/min Vasopressin 0.03 units/min Dobutamine 2.5 mcg/kg/min
Pre-Apnea P_aCO_2 (mmHg)	46.4	42.3	39.1	40.6
Source	Left radial artery	Right radial artery	Right radial artery	Left radial artery
Post-Apnea P_aCO_2 (mmHg)	85.7	96.5	63	71.9
Source	Left radial artery	Right radial artery	Right radial artery	Right brachial artery
Pre-Apnea P_vCO_2 (mmHg)	55.9	48.7	47	44.8
Source	Left subclavian vein	Left subclavian vein	Right femoral vein	Left femoral vein
Post-Apnea P_vCO_2 (mmHg)	81.7	94.5	69.8	72.4
Source	Left subclavian vein	Left subclavian vein	Right femoral vein	Left femoral vein

Poster 5

Use of Perfluorocarbon for Bronchoalveolar Lavage in Case of Severe Pulmonary Hemorrhage and Extracorporeal Membrane Oxygenation

Mark E. Caridi-Scheible, M.D.; James M. Blum, M.D.
Emory University Hospital, Department of Anesthesiology and Critical Care Medicine

Introduction: Perfluorocarbon (PFC) compounds have been studied in animal models as lavage medium to clear the lung of pulmonary edema and alveolar debris and to improve alveolar recruitment in models of lung injury since the 1970s.(1) In the 1990s, studies were extended to humans with the FDA approval of medical grade perflubron (perfluoro-octyl-bromide) for use in ventilation research. Since then they have been studied for total or partial liquid ventilation, but little has been reported on intermittent use for lavage and recruitment.(2) There are no reports to our knowledge of utility in clearing clot burden in pulmonary hemorrhage. In theory, the high density should enable PFCs to penetrate into dependent alveoli and float products of hemorrhage into the upper airway. Additionally, PFCs do not reduce surfactant levels as saline will,(3) and in fact behave like surfactant to reduce surface tension and allow alveolar opening.(4,5)

Case Report: We report a 62 year old female patient with severe pulmonary hemorrhage and failure to wean from cardiopulmonary bypass after open pulmonary embolectomy. This required extracorporeal membrane oxygenation (ECMO) to be initiated in the operating room. ECMO was sustained without the use of anticoagulants. Despite many attempts at bronchoscopy with saline lavage and cryotherapy, airways remained occluded with clot to level of mid-trachea. Mechanical debridement stimulated fresh bleeding and x-ray consistently demonstrated complete opacification. On ECMO day 5, we trialed perfluorodecalin (a radiolucent alternative to perflubron) in order to more gently dissolve and free clot. An emergency investigational new drug approval was obtained from the Food and Drug Administration and informed consent obtained from the healthcare proxy. A total of 250ml was instilled by bronchoscopy in aliquots of 50-100ml. Positive pressure breaths were applied manually for 10 minutes between administrations before suctioning out fluid and debris. Image 1 displays the pre- and post-procedure chest xrays and demonstrates clearing of airways and recruitment of alveolar spaces. However, bleeding resumed the next day and airways re-occluded. Again, mechanical debridement failed, and another trial of PFC lavage was later made with less effect. It became clear that the bleeding was ongoing, and supportive care was withdrawn on ECMO day 11.

Conclusions: In this case of severe pulmonary hemorrhage, perfluorodecalin was able to clear airways of clot and reopen alveoli more effectively than saline lavage, cryotherapy or mechanical debridement. This use has not been previously described in the literature. We believe that it may be very effective in clearing airways and alveoli of clot and products of hemorrhage. It may also reopen damaged, atelectatic alveoli and improve gas-exchange. This may hasten time to separation from extracorporeal support.

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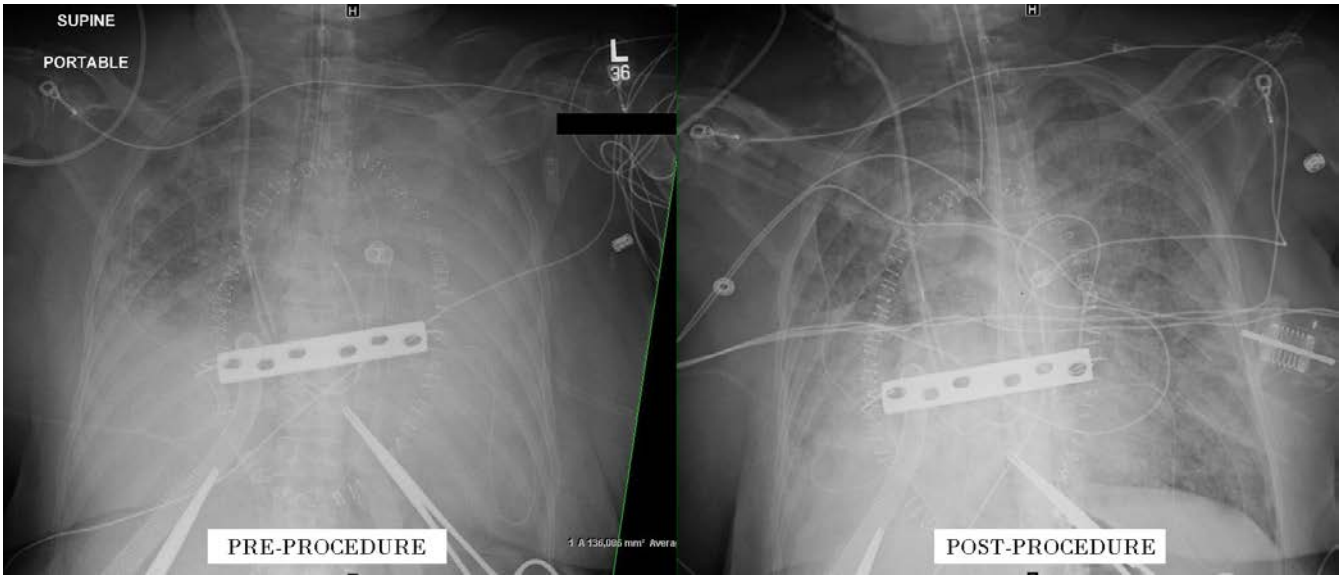
SUPINE
PORTABLE
L
36
PRE-PROCEDURE
POST-PROCEDURE

Poster 6

Identifying ICU Patients at High Risk for Cardiac Arrest: A Retrospective Analysis of the Visensia Algorithm

Christopher G. Choukalas, M.D., MS; Steven Takemoto, Ph.D.; James Stotts, Ph.D.;
Arthur W. Wallace, M.D., Ph.D.
University of California San Francisco, San Francisco VA Medical Center

Background: Cardiac arrest in critically ill patients carries a high mortality, but is rarely unanticipated. Patients frequently demonstrate alterations in mental, respiratory, and cardiac status in the hours leading up to these events. Much attention has been paid to identifying such decompensating patients, and data in emergency department and step-down patients suggests severity of illness scales1,2 or vital sign-based algorithms may have a role.3,4 Data are lacking for patients in intensive care units (ICU), presumably because they are monitored closely. We used a third-party algorithm-based software program (Visensia, OBS Medical, Oxford, UK) to identify retrospectively instability in a sample of adult ICU patients who suffered cardiac arrest and time-matched controls.

Methods: The study took place in a large, urban, academic teaching hospital with 18 ICU beds. We extracted data sufficient to calculate a Visensia Stability Index (VSI) at one-minute intervals for the 24 hours prior to arrest for patients undergoing cardiac arrest in the ICU between 2005 and 2011 as identified by a hospital quality improvement database. Control patients were all patients in the ICU during the 24 hour periods which defined cases. Repeated measures t-tests defined the difference in hourly average VSI between the two groups.

Results: Data from a total of 790 patients (61 who experienced cardiac arrest and 729 controls) were examined. Hourly average VSI was calculated. The VSI was similar for cases and controls at the beginning of the observation period, but diverged significantly as early as 10 hours prior to the arrest. Figure 1 shows the hourly average VSI for the cardiac arrest and control groups, with 95% confidence intervals.

Discussion: Preventing cardiac arrest depends in part on early recognition of clinical instability. The VSI alert signaled clinical instability 10 hours prior to arrest, an amount of time that could reasonably be expected to allow assessment and stabilization, which may be sufficient to prevent arrest. Further analysis will describe performance characteristics of the VSI (predictive value, sensitivity, specificity).

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Poster 7

Flash Pulmonary Edema in Preeclampsia: BIPAP is a Viable Alternative to Intubation

Leslie K. Hale, M.D.
Stanford

Introduction: Preeclampsia is characterized by widespread endothelial dysfunction and hypertension. Pulmonary edema may occur, given leaky capillaries, low oncotic pressures,and the relative volume overload of pregnancy. Recent echocardiographic studies show that diastolic dysfunction/ decreased lusitropy is common in preeclamptic patients. I present a case of flash pulmonary edema during delivery in a woman with sudden onset preeclampsia.

Case Report: A 35 year old G4P0 with 38-week twin gestation, and PMH significant for miscarriages and cholestasis of pregnancy, presented for labor induction. She had no previous gestational hypertension. She had no proteinuria and her CBC was normal.
Intravenous oxytocin was administered and she underwent an uncomplicated L3-4 epidural placement for labor analgesia. Hypertension, requiring treatment with labetalol, developed during labor.

While pushing, she experienced sudden onset dyspnea, tachypnea, and tachycardia and her oxygen saturation dropped to 88% on room air. Blood pressure was noted to be 185/112. Oxygen was administered via non-rebreather mask and saturation improved to 91%. Fetal monitoring of both twins showed no distress. Lung exam had crackles and wheezes. The patient was treated aggressively with intravenous labetalol for blood pressure management. CXR demonstrated pulmonary edema. Fluid balance at this time was + 4 L.

Given that she was awake, without evidence fetal distress, she was placed on BIPAP ventilation with PEEP of 10. This resulted in improvement in oxygen saturation to 98%. She was emergently transferred to the OR for a trial of vacuum/forceps vaginal delivery, which ultimately failed. A bedside TTE performed by the anesthesia team, out of concern for peripartum cardiomyopathy, showed normal systolic function,no significant MR, and a full IVC with no respiratory variation. She was given 40 mg of furosemide. Her epidural was bolused with 2% lidocaine in preparation for cesarean section, providing both afterload reduction and a surgical block.

She remained on BIPAP and underwent successful cesarean delivery, maintaining BP <140/90. Post-operatively she was transferred to the ICU. Serial CXRs showed improved pulmonary edema and repeat TTE was normal. Within 24 hours she was weaned to room air.

Conclusions: This is a case of flash pulmonary edema likely triggered by an acute increase in afterload during valsalva, in the setting of pulmonary capillary leak, high SVR secondary to preeclampsia, as well as a positive fluid balance.- It is unclear what role diastolic dysfunction may have played.

BIPAP is highly effective at improving oxygenation in pulmonary edema. BIPAP reduces afterload and increases functional residual capacity, augments tidal volume, decreases dead space and improves alveolar ventilation. In patients with preeclampsia, it may mitigate the risks associated endotracheal intubation- including intracranial hemorrhage.

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Poster 8

Decreased Incidence of Hypo-magnesemia in the Surgical ICU

Andres Ocampo, M.D.; Arpit Patel, M.D.; Tom Jan, M.D.; John T. Denny, M.D.; James Tse, M.D., Ph.D.; Mohammed Chaudhry, M.D.
Rutgers Robert Wood Johnson Medical School Anesthesia

Introduction: Hypo-magnesemia is a common laboratory abnormality encountered in hospitalized patients. It is found in as many as 20% of medical floor patients.[1] It has been described to occur in as many as 65% of patients in Intensive Care Units (ICU)2 Magnesium's importance as an essential nutrient has been realized since the effects were described of acute Mg deficiency in rats. It is the second most plentiful intracellular cation, and the fourth most occurring cation in the body.[3] Estimates of Mg deficiency range from 20% to 61%.[4,5] Rubeiz found that reductions in total serum Mg found at hospital admission are associated with increased mortality.[6]

Methods: We reviewed patient records for 2001 and 2011. The last three months of each year was selected to compare similar times. Mg levels less than 2.0 were abnormal and noted.

Results: Please see Table One. Differences analyzed using Chi Square.

Discussion: Our results show that in our hospital SICU sample, there was a significantly lower incidence of hypo-magnesemia (25.20%) in 2011 than in 2001. (42.36%) $P<0.001$.

There are several non-mutually exclusive explanations possible for these results. One is the improved understanding of the importance of magnesium in hospitalized patients. In the decade since the first sampling, it is possible that Magnesium is being monitored more regularly in ICU patients. One reason for this might be the increased prevalence of ICU fellowship training among practitioners in the ICU.

Causes of hypo-magnesemia are diverse. Diuretic therapy is the leading cause of magnesium deficiency. Diuretic induced inhibition of sodium resorption will also interfere with magnesium resorption. Urinary magnesium excretion is most with the loop diuretics (furosemide and ethacrynic acid).

Antibiotics promoting magnesium depletion are the aminoglycosides and amphotericin.[7] Antibiotic associated diarrhea can also be accompanied by significant magnesium stool losses.

Other drugs associated with magnesium depletion include digoxin and epinephrine which shift Mg into cells. 8 In contrast, the chemotherapeutic agents cyclosporine and cisplatin promote renal magnesium excretion.[8]

Since Magnesium concentration is high in lower gastrointestinal secretions, a secretory diarrhea can lead to Mg depletion.[9] A change in any of these presciptives could affect the incidence of hypo-magnesemia observed.

Alcohol is associated with perturbations in magnesium. Hypo-magnesemia is seen in 30% of hospital admissions for alcohol abuse, and in 85% of delirium tremens admissions.[9,10]

Hypo-magnesemia may be a common laboratory clue towards alcohol abuse in a hospitalized patient who is non-communicative (for example: an unconscious trauma patient, in whom a medical history is unobtainable).

The incidence of alcohol abuse was not measured in our study, so we cannot comment on this influence.

Conclusion: In our hospital Surgical ICU sample, there was a significantly lower incidence of hypo-magnesemia (25.20%) in 2011 than in 2001. (42.36%) $P<0.001$. This is encouraging that magnesium is more often within normal range a decade later. The exact causes remain to be elucidated.

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Results: Magnesium levels in ICU patients
Differences analyzed using Chi Square.

	Mg<2	N	Mg Not Mea.	Mg Normal
2001	133 (42.36%)	314	34 (10.83%)	147 (46.82%)
2011	93 (25.20%)	369	14 (3.79%)	189 (51.22%)
P<	0.001			

Poster 9

The Use of Video Laryngoscopy for the Diagnosis and Treatment of Epiglottitis

Mary K. Matyi, M.D.; James Crouch, M.D.; Hersimren Basi, M.D.; Christopher Rice, M.D.; Michael Hansen, M.D.; Christopher Troianos, M.D.
Allegheny Health System

Epiglottitis is a rare and serious condition in the adult population with a prevalence as low as 0.6 in 100,000. Most of the literature has been presented in ENT and ID journals, with little focus on diagnosis and airway management. Here, we present a case, discussing the use of video laryngoscopy with this objective.

A 43 year old woman presented with acute respiratory distress, a temperature of 103 Fahrenheit, bilateral wheezing, excessive salivation, and was sitting with her trunk and chin thrust forward and her neck extended. A visual oropharyngeal exam was normal. A lateral neck x-ray showed the classic â€˜thumb print' sign. Albuterol, racemic epinephrine, and methylprednisolone, were given, but over the next hour, she continued to deteriorate, and was taken to the OR for airway management. Surgery was present if a surgical airway became necessary, and general anesthesia induced using glycopyrrolate and propofol. She was easy to mask ventilate, rocuronium given, and video largyoscopy attempted. The tissue was severely erythematous and edematous. The patient was successfully intubated on the second attempt with a 6.5 ETT, each time using a pediatric fiberoptic scope to evaluate placement. During the process, the patient maintained a SpO2 of 97-99%. A video and pictures were taken of the supraglottic tissue by video laryngoscopy during intubation.

In the ICU, the patient was sedated and treated with vancomycin, ampicillin/sulbactam, and dexamethasone. Each day following intubation, the patient's supraglottic tissue was examined by video largyoscopy, and the images compared. On the third day, edema had decreased by 50%, and the patient was extuabated with an exchange catheter left in place until it was certain she could protect her airway. After extubation, she had no complications, and was discharged home two days later.

Here, we demonstrate the usefulness of video largyoscopy to determine the severity of the airway and to guide management. The accepted gold standard for epiglottitis diagnosis is direct supraglottic visualization as the oropharynx is notoriously misleading. While not all adults require intubation, literature has recommended that in severe airway distress defined as: more than 50% obstruction of the largyngeal lumen, drooling, strider, cyanosis, presence of an epiglottic abscess, or sitting in the \'tripod\' position, the patient should be immediately intubated, as the majority of mortality of epiglottitis occurs from hypoxia. We also demonstrate that in epiglottitis, fiberoptic techniques can be successfully used in conjunction with video largyoscopy for airway management. Finally, we show that video largyoscopy daily offers a clear comparative tool in monitoring edema remission, and determining an appropriate time to extubate in this population. A large number of complications are shown in literature to be secondary to prolonged hospitalization and intubation. By comparative analysis, we were able to extubate quickly in order to reduce our patient's risk for these complications. We propose video largyoscopy is an objective way to diagnose, intubate, and follow the course of treatment by comparing daily edema in epiglottitis.

Poster 10

Perioperative Management of Patients with Left Ventricular Assist Devices Undergoing Repair of Hip Fracture

Jason Alexander, M.D.; Ryan Ivie, M.D.; Robert Maniker, M.D.; Julia Sobol, M.D.
Columbia University Department of Anesthesiology

Introduction: Thousands of patients have received left ventricular assist devices (LVADs) as therapy for heart failure, with an increasing number designated as destination therapy (1). A growing number of patients are surviving with their LVADs and require noncardiac surgery unrelated to their device. While a number of single-center studies have detailed individual experiences with noncardiac surgery in patients with LVADs (2, 3), none has examined a homogeneous population undergoing one type of noncardiac surgical procedure. Our aim was to illustrate the unique concerns and perioperative management of patients with LVADs undergoing hip fracture repair at our institution.

Methods: After Institutional Review Board approval, we used electronic medical records to retrospectively examine the perioperative care of four patients undergoing surgical repair of hip fractures after LVAD placement at our institution.

Results: Four patients with a history of ischemic cardiomyopathy requiring continuous-flow LVAD placement underwent open reduction and internal fixation (ORIF) of hip fractures between January 2004 and June 2014. The average age of these patients was 72.7 years (range 59 â€“ 83 years). LVAD devices were placed on average 1124 days (range 164 â€“ 3038 days) prior to the hip ORIF. All patients were admitted to an outside hospital on the day of their fracture and were transferred to our institution the following day, with subsequent ORIF 2 â€“ 5 days post-fracture. Three of the four patients were on warfarin preoperatively, which was stopped on admission. The International Normalized Ratio (INR) immediately prior to surgery was 1.3-1.4 in all patients. Preoperatively, three patients received an ultrasound-guided femoral nerve block. All cases were staffed with a noncardiac anesthesiologist, and all patients received general anesthesia with an endotracheal tube after placement of a pre-induction radial arterial line. There were no major intraoperative events and no major hemodynamic instability in the operating room. All patients received phenylephrine intraoperatively, but no other vasopressors or inotropes were administered. Estimated blood loss ranged from 100 to 400 ml; two patients received intraoperative blood transfusion. Postoperative complications were common, with infection occurring in three patients (urinary tract infection in two patients, and tracheobronchitis in one patient). One patient also exhibited signs of right ventricular dysfunction and volume overload on postoperative day 2. Postoperative hospital stay ranged from 8 â€“ 25 days, and all patients were subsequently discharged to rehabilitation facilities.

Conclusions: While multidisciplinary care is essential for patients with LVADs, general anesthesiologists should broaden their knowledge of the distinct challenges these patients present in the perioperative period. With these considerations in mind, management of hip ORIF in this patient population can be relatively straightforward.

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Poster 11

Emergency Spine Surgery in a Patient with Left Ventricular Assist Device

Sabine E.M. Kreilinger, M.D.; Louanne Carabini, M.D.
Northwestern University Feinberg School of Medicine

Introduction: An increasing number of heart failure patients with ventricular assist devices (VAD) are presenting for non-cardiac surgery[1]. Limited number of case reports have been published discussing perioperative risk factors associated with noncardiac surgery in the prone position in patients with VADs[2]. We describe the case of a patient with a leftVAD for destination therapy presenting for emergent thoracolumbar spinal decompression and fusion highlighting the perioperative considerations and challenges.

Case Description: A 78 year old male with a history of ischemic cardiomyopathy status post AICD and LVAD placement as a destination therapy 10 months prior, on anticoagulation, was admitted to the ICU after a fall with progressive paraplegia. Imaging revealed acute L2 burst fracture with severe spinal cord compression. A multidisciplinary preoperative evaluation allowed to discuss risks and benefits of surgery and the decision was made to proceed emergently with T12-L4 posterior spinal fusion with L2 decompression. Preoperative INR was subtherapeutic at 1.2 and did not require reversal. Following uneventful induction and intubation with continuous intra-arterial monitoring, central access was obtained and a pulmonary artery catheter placed without issue. A Perfusionist was present to manage the LVAD parameters throughout the perioperative course. Defibrillator pads were applied and a magnet was positioned to deactivate the AICD. The magnet and driveline of the LVAD were thoroughly padded and a colloid fluid bolus was administered in anticipation of prone positioning. The patient was then turned prone on to an open Jackson Table, while protecting the drive line from any compression, kinking or traction. The patient tolerated positioning without any hemodynamic instability or changes in flow or pump power. Speed of the LVAD was decreased to stimulate an increase in Pulsatility Index and flow. CVP and PAP remained stable throughout the case. General anesthesia was maintained with 0.5 Mac of Isoflurane and infusions of Propofol and Remifentanil, while SSEP monitoring was performed. EBL of 1200ml was replaced with 4 units of PRBCs. The patient remained intubated and was transported to the ICU in stable condition. He was extubated on POD1 and anticoagulation was restarted on POD3 with bivalirudin infusion as a bridge to warfarin given a history of Heparin Induced Thombocytopenia and regained motor function in his lower extremities.

Discussion: Emergency noncardiac surgery in patients with LVADs in the prone position poses a unique challenge. A multidisciplinary preoperative is recommended to ensure appropriate selection of surgical candidates and safe handling of the LVAD[3]. Placing a patient prone can alter the position of the inflow and outflow cannulas to the VAD in addition to altering the preload and afterload mechanics for the right and left ventricles. In order to minimize the hemodynamic effects of proning, it is imperative to optimize intravascular volume, assure adequate RV function and avoid large tidal volumes, PEEP, dysrhythmias and systemic vasodilation often associated with general anesthesia. Invasive hemodynamic monitoring with intra-arterial line, pulmonary artery catheter and cardiac output monitor is often necessary to diagnose and treat acute changes in preload and RV performance. TEE is another valuable tool, however may be difficult to utilize in the prone position.

Additional considerations are choice of OR table, such as the Jackson table which minimizes intra-abdominal pressure and the resultant decrease in venous return. Postoperatively anticoagulation should be initiated as soon as surgically permitted to decrease the risk of thromboembolic complications. These perioperative risks and challenges warrant careful patient selection and multidisciplinary planning and discussion.

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[H]
[F]

Poster 12

Transition of Care Process by Graduating Medical Students in a Simulated Crisis Situation Using a Cognitive Aid

Brooke A. Ginter, M.D.; Annette Rebel, M.D.; Amy DiLorenzo, M.S.; Faith Lukens, M.D.; Jeremy Dority, M.D.; Zaki-Udin Hassan, M.B.B.S.
University of Kentucky

Introduction: Correct, complete, and effective communication during transition of care (ToC) is essential since loss of important information can compromise patient care, especially in crisis situations.1 In a patient simulation (PS) scenario assessing the quality of the ToC process, significant loss of information and poor report quality was noted.2 To address this issue, the authors developed a cognitive aid. The aim of this project was to assess: (1) 4th year medical students' ability to retrieve and report essential patient information under pressure, and (2) whether the use of a cognitive aid improves the quality of the ToC process.

Methods: A PS crisis scenario was developed by the authors. 4th year medical students were enrolled after IRB approval, divided into groups of 3, and assigned roles (team leader, respiratory therapist, nurse). Participants viewed a video demonstrating a correctly performed ToC. After randomization, half of the teams were given a cognitive aid (History and Physical outline) to use during the scenario. The teams then participated in a scenario where they assumed care of an unstable patient. After a bedside nurse provided essential patient information, the patient deteriorated, allowing the team to run an ACLS code. After the participants stabilized the patient, they provided a verbal ToC report to the ICU provider. A video of the ToC scenario was reviewed by 3 expert faculty blinded to the randomization. Each faculty assessed the completeness of the ToC process using a checklist and rated the overall quality of Toc process using a Likert scale (1=unsatisfactory, 5=outstanding). Completeness score is expressed as a percentage of maximum score.

Results: A total of 112 medical students participated. 19 groups completed the PS using the cognitive aid (wCA n=19) and 19 groups did not use the cognitive aid (nCA). Two teams were excluded secondary to incomplete data collection (nCA n=17). ToC information improved significantly when a cognitive aid was used. The overall ToC quality was rated higher in the group with the cognitive aid. (Table 1).

Conclusions: The use of a cognitive aid improved the completeness and quality of ToC process as assessed by expert faculty. Further studies and refinement of the cognitive aid format are needed to optimize the positive impact on ToC during crisis situations.

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Poster 13

The Effectiveness of a Real-Time Electronic Alert to Detect Severe Sepsis in an Intensive Care Unit

Joyce Chang, M.D.; Mary C. Sullivan, RN, MS, CNS; Erica R. Shea, RN, MSN;
David Shimabukuro, M.D., CM
University of California, San Francisco

Introduction: Early identification and early implementation of a sepsis resuscitation bundle can reduce mortality(1). However, identification of severe sepsis, especially in Intensive Care Unit (ICU) patients with multiple co-morbidities, can be difficult.

At our institution, a real-time screening electronic alert tool was created to identify potential patients with severe sepsis admitted to an adult mixed medical-surgical ICU. The computer-generated alert uses real-time physiologic and laboratory data found in patients' electronic medical records (EMR). For an alert to be generated, there needed to be at least 2 systemic inflammatory response syndrome (SIRS) criteria [1) white blood cell count > 12 or < 4 x 10^9/L, 2) heart rate > 100 beats/minute, 3) respiratory rate > 22 breaths/minute, or 4) temperature > 38.3 or < 35.5 C] and end organ damage (defined by the Surviving Sepsis Campaign). The purpose of this study was to determine the positive predictive value, negative predictive value, sensitivity, and specificity of this alert.

Methods: After receiving approval from the Committee on Human Research, charts for all patients admitted to an adult 16-bed mixed medical-surgical ICU between June 01, 2014 and June 30, 2014 were reviewed for the diagnosis of severe sepsis and to obtain physiological data at time of presentation. This was then compared to a computer-generated list of all severe sepsis alerts. To address variability and accuracy of the diagnosis of severe sepsis, all chart reviews were performed by the same physician; for quality assurance, 10% of the charts were re-reviewed by a senior physician.

Results: During the one-month period, 31 of 91 patients (34.1%) admitted to the ICU had severe sepsis and 41 of 91 patients (45.1%) had an alert. Of the 31 severe sepsis patients, 27 triggered an alert at some time during their ICU admission. Of the remaining 60 patients without a diagnosis of severe sepsis, 14 generated a positive alert. The calculated positive predictive value (PPV) for the alert was 65.9% and the calculated negative predictive value (NPV) was 92.0%. The sensitivity was determined to be 87.1% while the specificity was 76.7%.

Discussion: In this mixed medical-surgical population, the PPV and NPV of our EMR-based alert are higher than that of fecal occult blood testing for colon cancer detection (PPV 41.3%, NPV 78.7%)(2), and the PPV of this alert is similar to mammography for breast cancer detection (PPV 68%, NPV 99.6%)(3). This tool was designed specifically for a mixed medical-surgical intensive care unit, therefore it may be useful in other hospitals with ICUs that have similar patient populations, but test characteristics may be different in institutions with separate surgical and medical intensive care units. A major limitation to our study is the sample size. However, at this point, our findings suggest an EMR-based sepsis alert may be useful as a screening tool to automatically identify potential patients with severe sepsis.

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Poster 14

An Evaluation the Learning Styles of Incoming Faculty and Housestaff: A Multidisciplinary and Multigenerational Approach

Theresa Northern, D.O., MPH; Laurie Daste, M.D.; Philip Boysen, M.D.
Ochsner Clinic Foundation

Introduction and General Purpose of the Study: Due to limits of resident's workhours, it is necessary to improve the quality of resident education. We investigate the learning styles of incoming housestaff and faculty as a start in answering an important question as to whether training can be improved by evaluation of learning styles. Kolb described four learning styles: Converging, Accommodating, Diverging and Assimilating. Convergers are detail-oriented, preferring to practically trial new ideas. Accommodators are able to pull out important details of complex situations and prefer learning actively. Divergers ask "why» when learning and prefer to work in groups. Assimilators aim for vast knowledge, preferring passive learning.

Methods: We used a learning style inventory adapted from Kolb and McCarthy to determine the learning style of incoming housestaff (n=95), consisting of Medicine (37), fellows (20), Surgery (19) and Anesthesiology (19); as well as incoming faculty, including Medicine (27), Surgery (8), Anesthesiology (8)and Pediatrics (7).

Results and Major Findings: The learning styles amongst housestaff showed a variety of all types with a fairly even spread of Converging, Assimilating and Accommodating. The results for incoming faculty were drastically different than the incoming housestaff. Internal Medicine and Pediatrics faculty demonstrated the greatest distribution, with the majority being either Diverging or Accommodating. Surgery and Anesthesiology faculty showed a preponderance of Divergers.

Conclusions: Our findings demonstrate diversity in learning styles amongst incoming housestaff, contrasted to faculty that was primarily Divergers and Accommodators. Most doctors do not have formal training in education, yet are charged with providing critical teaching to the next generation. As residency training transitions from a primarily apprenticeship to a problem-based learning didactic with limited workhours, it is necessary to self-evaluate the quality of resident training. It may prove helpful for residents to understand their own preferred learning style.

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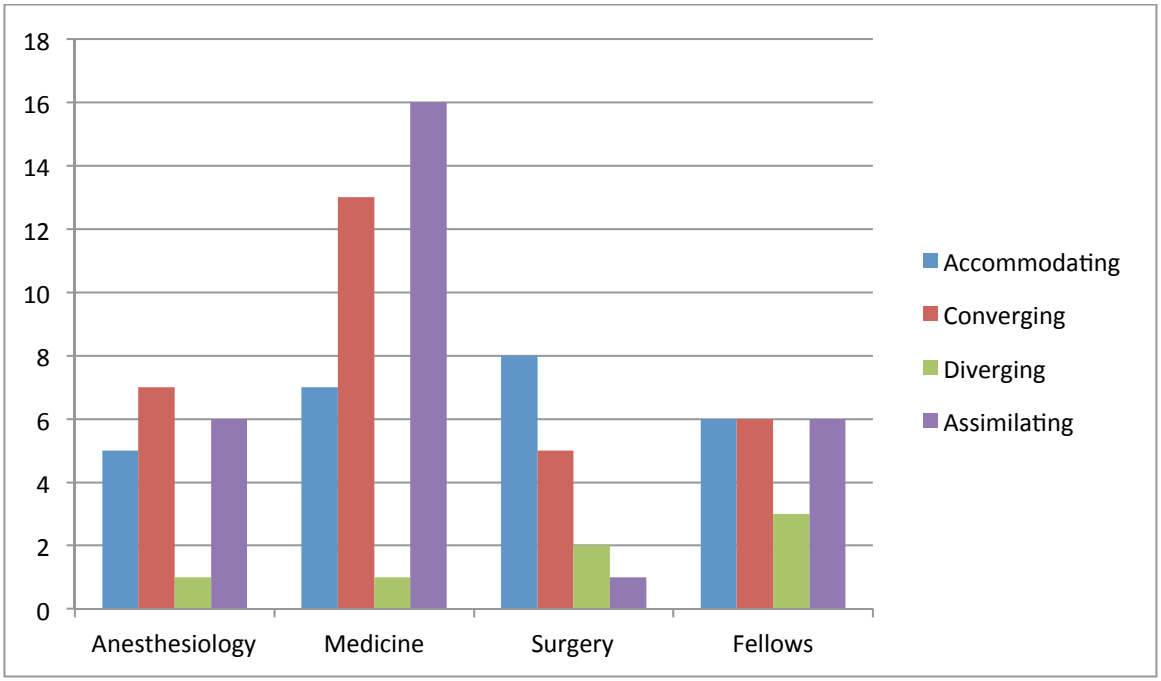
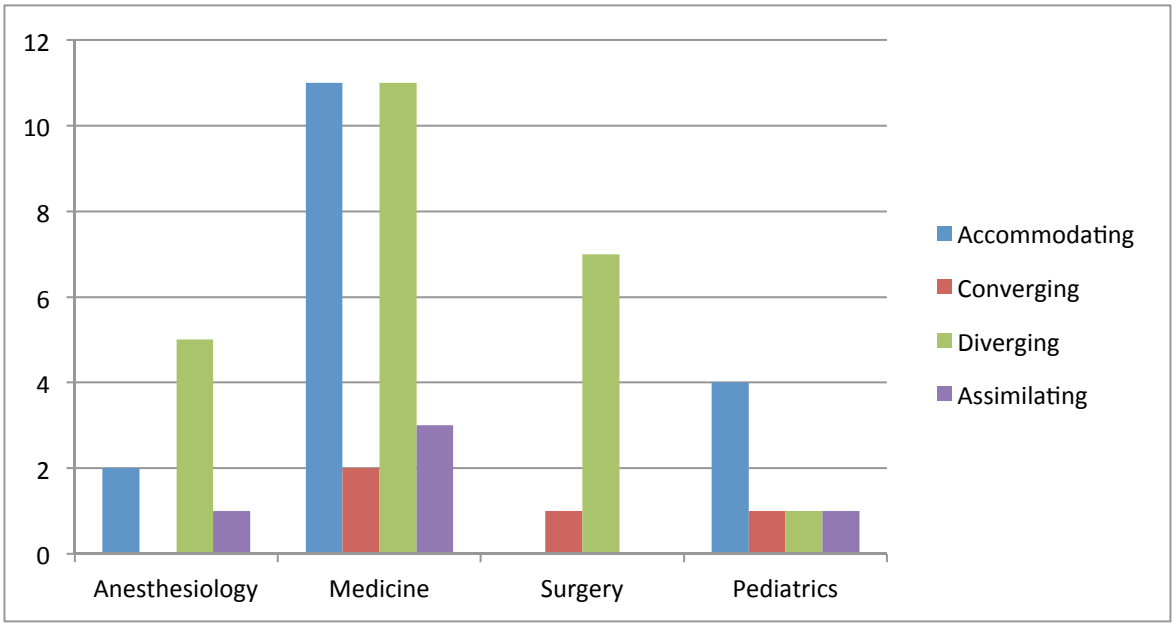
Housestaff Learning Styles



Faculty Learning Styles



Poster 15

Mandatory Hospital Sepsis Screening and Improved Sepsis Bundle Compliance Lead to Decreased Sepsis-Related Mortality in a Tertiary Care Academic Medical Center

Paul D. Weyker, M.D.; Mary C. Sullivan, RN, MS, CNS; Erica R. Shea, RN, MS;
Christopher Fee, M.D.; David W. Shimabukuro, M.D.
University of California San Francisco

Early diagnosis and treatment of sepsis has lead to substantial improvements in patient survival rates over the past decade. In 2001, Rivers and colleagues reported an in-hospital mortality rate of 46.5% in a cohort of septic patients assigned to standard sepsis therapy, while patients in the early goal directed therapy group had a mortality rate of 30.5%.1 The results of this trial led to a paradigm shift in the early detection and treatment of sepsis. The Surviving Sepsis Campaign, an international collaboration between the Society of Critical Care Medicine and the European Society of Intensive Care Medicine was formed in 2002 and has subsequently published 3 editions of their evidence-based sepsis guidelines to help clinicians make treatment decisions for management of septic patients. Their most recent guidelines published in 2013 recommend "campaign bundles" which should be completed within recommended time frames. Specifically they recommend measurement of lactate levels, blood cultures, antibiotics, and administration of 30 ml/kg of crystalloid within 3 hours of diagnosis.2 Subsequently, if the patient's mean arterial blood pressure is below 65 mmHg, they recommend application of vasopressors, measurement of CVP and ScvO2, and rechecking lactate levels within the next 6 hours.2 Targets of these measures include resuscitation to a CVP > 8, and ScvO2 >70%, as well as normalization of the lactate.2 The recent ARISE and ProCESS trials sought to determine if protocol-based resuscitation lead to better outcomes than usual care.3,4 Both trials found no mortality benefit to protocol directed treatment over usual care.3,4

Our hospital is a tertiary care, academic medical center with 560 hospital beds and 80 adult intensive care unit beds. In 2011, a hospital-wide quality improvement project was initiated to decrease sepsis-related mortality by improving early detection of sepsis, as well as sepsis bundle compliance within the hospital, including the emergency department. The goal was to achieve a bundle compliance rate of >50% for the sepsis resuscitation bundle by the end of fiscal year 2013. Before this initiative, sepsis bundle compliance was noted to be about 30%. The sepsis bundle at our institution is a modified version of the recommendations from the Surviving Sepsis Campaign. The bundle includes measurement of lactate within 6 hours from the time of presentation, blood cultures drawn before antibiotic administration, antibiotic administration within 1 hour from the time of presentation on the floor (within 3 hours if in the emergency department), fluid resuscitation of 20-30 ml/kg crystalloid administered within 6 hours, and the use of vasopressors as needed to treat hypotension unresponsive to fluid administration. Importantly our sepsis bundle does not include the protocolized use of central venous catheter administration, CVP monitoring, or ScvO2 guided fluid resuscitation. Utilizing computerized mandatory sepsis screening of all patients within our institution, as well as an improvement in sepsis resuscitation bundle compliance from 30% to 80%, hospital-wide sepsis-related mortality has decreased from greater than 20% to less than 15% during a two year time period. Table 1.

References:

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Poster 16

Young Investigator Award

Chronic Pain Interference of Daily Life Following Critical Illness

Christina J. Hayhurst, M.D.; Kristin A. Swygert, Ph.D., DPT; Jennifer L. Thompson, MPH; Chris G. Hughes, M.D.
Vanderbilt University Medical Center

Introduction: With improvement in ICU survival rates, increasing interest is being placed on post-ICU quality of life and long-term outcomes(1,2). Recent studies have shown high rates of cognitive impairment and depression in survivors of critical illness (3,4). Chronic pain symptoms have been shown in previous cohorts of ICU survivors to occur in patients up to 11 years after ICU admission (5-7), likely impacting quality of life. We tested the hypothesis that chronic pain is common after critical illness and is associated with interference of daily life.

Methods: This prospective cohort study was nested within a larger multicenter prospective cohort study evaluating long-term cognitive impairment in survivors of critical illness. We enrolled adult ICU patients at a community and university hospital within 72 hours of respiratory failure or shock. At 3 and 12 months post-hospital discharge, we assessed pain levels using the Brief Pain Inventory (BPI) (score 0-10 with 10 indicating pain as bad as you can imagine.) The overall impact of pain on daily life was also assessed using the BPI interference score, with additional focus on pain interference with normal activities, work, or enjoyment of life (0-10, 10 being completely interferes). We categorized both pain levels and pain interference into mild (1-4), moderate (5-6), and severe (7-10).

Results: BPI outcomes were obtained in 194 patients at 3 months and in 253 at 12 months. The median (interquartile range) pain intensity score was 3 (IQR) at both 3 and 12 months. 31% had moderate to severe pain 3 months after their ICU stay and 35% had moderate to severe pain 12 months after their ICU stay. The median pain interference score was 2.1 (IQR) overall, with 2 (IQR) for normal activities, 2 (IQR) for work, and 0 (IQR) for enjoyment of life. Pain interfered with their daily life moderately to severely (interference score of 5-6 or 7-10) in 24% of patients at 3 months and in 22% of patients at 12 months.

Conclusions: In this cohort of critically ill patients, a significant proportion had chronic pain following their ICU stay. Nearly a quarter of patients had chronic pain that interfered with their ability to work, do normal activities, and enjoy life. Additionally, these deficits did not improve from 3 to 12 months. Further studies are needed to elucidate modifiable risk factors for chronic pain after critical illness.

References:

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5. Critical Care 2006, 10(5):R134.
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	3 month	12 month
N	194	253
BPI Average pain		
No pain (0)	22% (43)	26% (65)
Mild pain (1-4)	46% (90)	39% (99)
Moderate pain (5-6)	20% (39)	23% (59)
Severe pain (7-10)	11% (22)	12% (30)
BPI overall pain intensity		
No pain (0)	27% (53)	30% (76)
Mild pain (1-4)	51% (98)	43% (109)
Moderate pain (5-6)	15% (30)	20% (51)
Severe pain (7-10)	7% (13)	7% (17)
N	192	253
BPI Interference		
No interference (0-0.9)	41% (78)	38% (97)
Mild interference (1-4.9)	35% (67)	40% (100)
Moderate interference (5-6.9)	12% (24)	13% (34)
Severe interference (7-10)	12% (23)	9% (22)

Table 1: BPI scores at 3 and 12-month followup.

Poster 17

Use of a Cognitive Aid Improves Resident Transition of Care Process Quality in Simulated Crisis Situations

Annette Rebel, M.D.[1]; Amy Dilorenzo, M.S.[1]; Paul A. Sloan, M.D.[1]; Rana Latif, M.D.[2]; Kari Christie, M.D.[2]; Faith Lukens, M.D.[1]; Randall M. Schell, M.D., MACM[1]
University of Kentucky Medical Center[1]; University of Louisville[2]

Background: Communication during transition of care (ToC) must be correct, complete and efficient since loss of important information can compromise patient care. The need is magnified in crisis situations. We developed patient simulation (PS) scenarios to assess and improve the quality of the ToC process of anesthesiology residents. The aim of this PS project was to assess whether the use of a cognitive aid (CA) improves the quality of the ToC process in crisis.

Methods: Rapid response PS scenarios were developed by the authors. After IRB approval residents were randomly assigned to scenarios in which he/she assumed care of an unstable patient. A bedside nurse provided essential patient information and remained available to answer questions. Following this report, the patient deteriorated further allowing the team leader to guide the team through an ACLS code. After stabilization, he/she provided a verbal ToC report to the intensive care unit provider. The resident performance during the scenario was video recorded. Completeness and quality of the ToC process were assessed by seven expert faculty from two institutions using checklists and Likert scales. The completeness score is reported as percentage from the maximum score. Leadership, organization and communication skills were assessed by a point system, with the score expressing the percentage from the maximum score. Intervention measurements (with CA) were taken 8 months after baseline measurements (without CA) to avoid participant recall. Statistical analysis was performed using mean Â± SD, and paired t-test with statistical significance set at $p<0.01$ to compare ToC at baseline and Toc with cognitive aid. A linear mixed model was utilized to account for the nested structure of the data and investigate the associations between all data collected

Results: Completeness scores increased with the use of CA. The scores for communication, organization and leadership also benefitted from use of the CA, suggesting that the CA might provide a structure for the ToC process. (Table 1). The linear mixed model analysis indicated that there were no differences in scores from the training versus the non-training institution.

Discussion: The use of a cognitive aid improved the completeness and quality of ToC process of anesthesiology residents when assessed by expert faculty from different institutions. Further studies and refinement of the cognitive aid are needed to optimize the impact and format of the tool, and to assess its impact on both individual and team performance during ToC in crisis situations.

Table 1

	ToC baseline N=14	ToC with CA N=14
Completeness score	0.67 Â± 0.16	0.87 Â± 0.08*
Communication score	0.76 Â± 0.13	0.85 Â± 0.14*
Organization score	0.77 Â±0.17	0.85 Â± 0.14*
Leadership score	0.77 Â± 0.15	0.85 Â± 0.13*

Data of faculty assessment from the training institution (UK) are shown as mean Â± SD . ToC Baseline = ToC without cognitive aid. Toc with CA = ToC with cognitive aid.
* $P<0.05$ (paired t-test)

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Poster 18

Cardiac Arrest at Emergence – the Utility of Perioperative Bedside Echocardiography

Erik C. McClure, D.O.; Justin Sandall, D.O.
University of Kansas School of Medicine--Wichita

Introduction: The benefits and effectiveness of bedside echocardiography in acute cardiovascular collapse or as a preoperative evaluation tool are not well defined. This unusual case outlines the utility of bedside anesthesiologist-performed echocardiography in diagnosis and management of a cardiac arrest during emergence from general anesthesia.

Case Presentation: A 44 year-old female with end stage renal disease, MRSA bacteremia, sepsis, and purulent cholecystitis status post percutaneous cholecystostomy presented to the operating room for laparoscopic versus open cholecystectomy.

Induction and maintenance of anesthesia proceeded uneventfully with judicious use of IV fluids and vasopressors as needed to offset the apparent vasodilation and relative hypovolemia produced by general anesthesia and sepsis. Upon completion of the procedure, reversal of vecuronium was accomplished using standard doses of glycopyrrolate and neostigmine. Several minutes after reversal, bradycardia, followed by hypotension and hypoxemia was noted, with eventual development of pulseless electrical activity. CPR was initiated and continued for three minutes prior to the return of spontaneous circulation. Bedside echocardiography by the anesthesiologist revealed a large circumferential pericardial effusion with systolic collapse of the right atrium, diastolic collapse of the right ventricle, a plethoric inferior vena cava, and a hyper-dynamic left ventricle.

A pericardial drain was placed under ultrasound guidance, yielding frank pus with subsequent hemodynamic stabilization upon removal of approximately 30 mililiters of purulent pericardial fluid. Emergent cardiothoracic surgery consultation was obtained and a pericardial window was performed expeditiously without further intra-operative incident.

Discussion: The use of perioperative echocardiography has been associated with decreased mortality in surgical patients. Although increasingly used in the emergency department and intensive care unit, bedside echocardiography is likely underutilized in the perioperative environment. This case illustrates the importance of available equipment and appropriate training of anesthesiologists in bedside echocardiography and highlights its potentially life-saving benefits with minimal risk to the patient.

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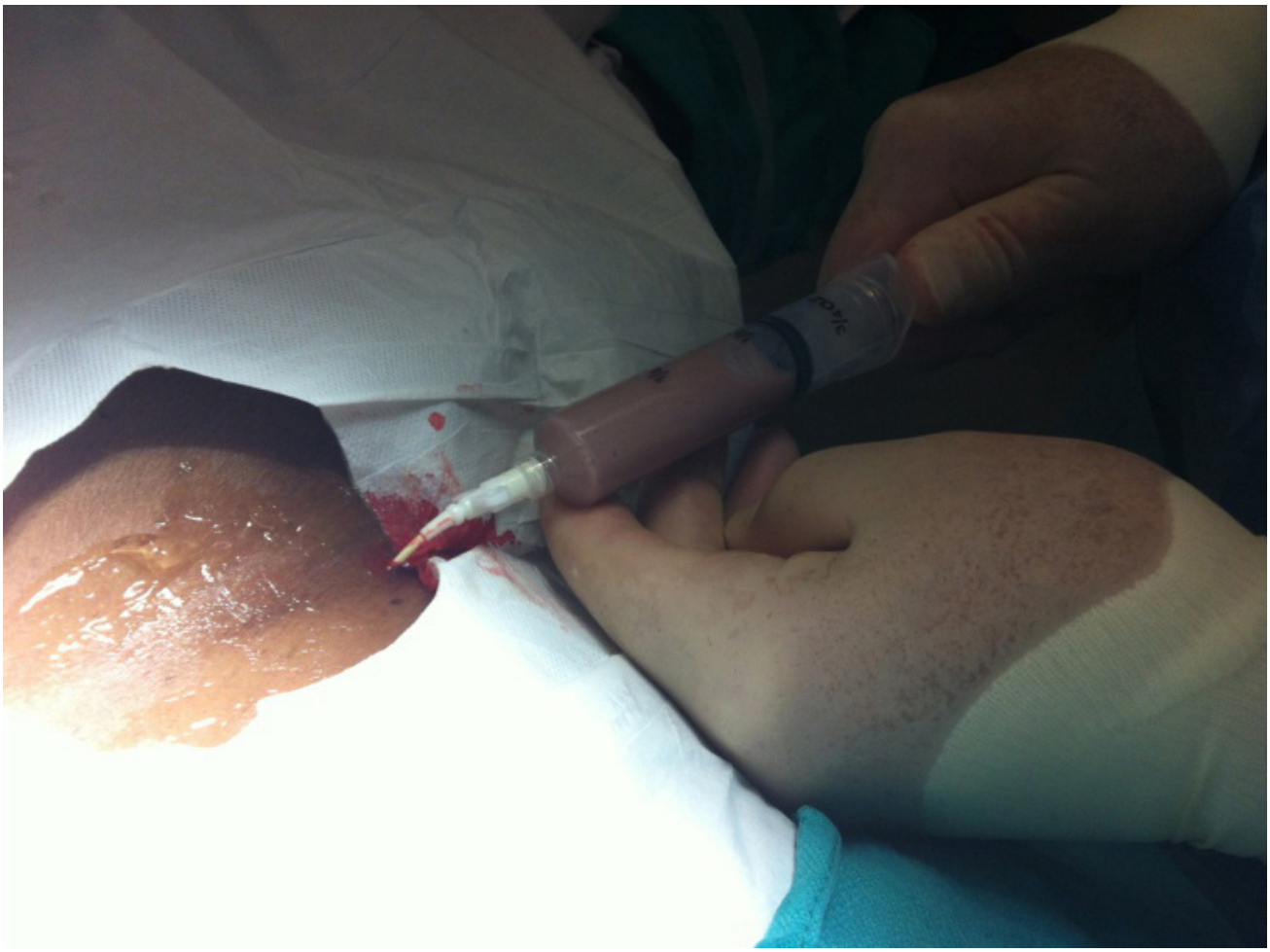

Poster 19

Disseminated Intra-abdominal Mucormycosis in an Immunocompromised Patient

Jessica M. Reardon, D.O.; Pamela A. Lipsett, M.D., M.H.P.E.
The Johns Hopkins Hospital

Mucormycosis is a rare yet life-threatening fungal infection often occurring in immunocompromised populations. A key characteristic of mucormycosis infections is that of profound angioinvasion which can ultimately result in tissue infarction and necrosis.

A 70-year-old woman with a history of hypertension and tobacco use presented to the hospital with concern for leukemia. In the months prior to admission, she traveled to Turkey, California and then Texas. In Texas, she developed a severe nosebleed necessitating a visit to the emergency department for evaluation. Blood work revealed a white blood count of 28.3k, hemoglobin of 10.4 g/dl, platelets of 15k with 70% blasts. She was started on allopurinol, given a platelet transfusion and transferred to our hospital.

Upon arrival, the patient was admitted with an absolute neutrophil count of 0.00 k. Neutropenic prophylaxis was begun and she was started on norfloxacin and valacyclovir. A bone marrow biopsy was completed which confirmed acute myeloid leukemia revealing hypercellular marrow along with the marrow being replaced largely by immature cells. Chemotherapy was started with daunorubicin and cytarabine. Her antibiotics were broadened to piperacillin/tazobactam. She continued to spike fevers and vancomycin along with voriconazole was added on day 8.

Decreased oral intake and diarrhea began on day 13. Stool sample was negative for Clostridium difficile toxin. On day 17 the patient had worsening abdominal pain in the right lower quadrant. CT scan of the abdomen and pelvis revealed inflammatory changes of the cecum and terminal ileum, concerning for typhilitis. Antibiotics were changed to meropenem; metronidazole was added; patient was made strict NPO; and surgery was consulted. She was conservatively managed with serial abdominal x-rays. On day 26, repeat CT scan showed new moderate right hydronephrosis, the inflamed cecum and terminal ileum, along with moderate ascites. Infectious disease was consulted and amphotericin B added to cover resistant fungi on day 27. Amphotericin was stopped given rising creatinine levels.

Patient continued to be mild to moderately symptomatic with abdominal pain and occasional diarrhea. On day 40 repeat CT scan of the abdomen showed mild pneumoperitoneum, increased ascites, pockets of extraperitoneal air layering along the anterior abdominal wall. Given concern for perforation, the patient was emergently taken for exploratory laparotomy finding necrotic distal small bowel, necrotic cecum and 3 liters of succous. She was transferred to the surgical intensive care unit intubated with an open abdomen, left in discontinuity after a right hemicolectomy and small bowel resection.

The next day she went back to the OR for an abdominal washout and was found to have new frank necrosis of rectum and splenic flexure necessitating total colectomy. She also had necrotic right psoas muscle with diffuse fibrinous exudate. OR cultures revealed disseminated angioinvasive mucormycosis. The patient was restarted on amphotericin B. After two days, the patient went back to the OR where she had a frankly necrotic bladder and uterus. Given the degree of necrosis, the family decided to limit further resection, close the abdomen and return back to the SICU. The patient was weaned from the vent and extubated. A family meeting, with the patient participating, occurred and it was decided that the patient would go home with home hospice. She expired at home.

This case illustrates the importance of recognizing rare fungal infections in immunocompromised patients. Neutropenic patients, as opposed to diabetic patients, typically will present with either pulmonary or disseminated mucormycosis infections. Within the gastrointestinal tract, the stomach, colon, and ileum are the most commonly involved sites, as was seen with this patient who initially had involvement of the ileum and colon.

Poster 20

Postoperative Rhabdomyolysis; Easy Diagnosis, Unclear Etiology

Arnaldo R. Vera, M.D.; Hani Murad, M.D.; Relin Yang, M.D.; Miguel Cobas, M.D., FCCM
University of Miami / Jackson Memorial Hospital

Introduction: Rhabdomyolysis is a serious condition resulting from destruction of skeletal muscle. Presentation of rhabdomyolysis can range from asymptomatic elevation of creatine phosphokinase (CPK) to life threatening elevation of CPK. Manifestations include kidney injury, acute renal failure, electrolyte disturbances, cardiac arrhythmias and DIC1. It is multifactorial and can be seen postoperatively following bariatric2, spinal3 and laparoscopic surgeries. Some risk factors include obesity, positioning, and duration of surgery.

Case Report: A 46-year-old male underwent rapid sequence induction for dental restoration surgery with succinylcholine and maintained with inhaled anesthetics for approximately 6 hours. History was significant for a BMI of 44, hypertension, obstructive sleep apnea (OSA), depression, and serotonin syndrome. Surgery was uneventful. Admission to the ICU was recommended for postoperative airway observation due to his history of OSA. Upon arrival, he complained of upper extremity pain. Examination revealed bilateral upper extremity weakness, hyperalgesia, increased tone, limited range of motion, diminished reflexes, and intact pulses. Vitals were within normal limits except for mild hyperthermia. A CPK level was sent, which resulted in >25,000 U/L.

The differential diagnosis included malignant hyperthermia (MH), neuroleptic malignant syndrome (NMS), and idiopathic rhabdomyolysis. Immediate management included aggressive intravenous fluid administration, a sodium bicarbonate infusion, active cooling measures, adequate analgesia, and consultation with psychiatry and the MH hotline, which excluded the diagnoses of NMS and MH respectively. The diagnosis of exclusion was idiopathic rhabdomyolysis, possibly from succinylcholine administration. Serial lab work monitored serum creatinine and CPK levels. Over the following 3 days, his symptoms improved and serum creatinine returned to preoperative levels and CPK to 2249 U/L. Follow up 4 weeks later showed resolution of his symptoms, normal serum creatinine and CPK levels.

Discussion: Presentation of post surgical rhabdomyolysis in the ICU warrants consideration of a variety of differential diagnoses including but not limited to neuroleptic malignant syndrome, malignant hyperthermia, and succinylcholine induced rhabdomyolysis. Additionally, surgical risk factors predisposing patients to rhabdomyolysis include obesity, intraoperative positioning, and the duration of surgery. Although the management of rhabdomyolysis is mainly supportive, its rapid diagnosis is key to improved morbidity and mortality4.

References:

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2. Chakravartty, S., et al. Rhabdomyolysis in Bariatric surgery, a systematic review. Obes surg 2013. 23;1333-1340
3. Dakwar, E., et al. Rhabdomyolysis and acute renal failure following minimally invasive sine surgery. J Neurosurg spine 2011. 14:785-788
4. Holt SG, et al. Pathogenesis and treatment of renal dysfunction in rhabdomyolysis. Intensive Care Med 2001. 27(5): 803â€“11

Poster 21

Application of Portable Ultrasonic Echocardiography in Hemodynamically Unstable Patients

Julin Tang, M.D., M.Sci.; Richard Chou, M.D.
UCSF/San Francisco General Hospital and Trauma Center

Introduction: The use of handheld cardiac ultrasound has become a powerful tool in the trauma, critical care and perioperative setting in the hands of noncardiologist that can provide non-invasive, real-time information that will transform the practice of medicine in time-critical situations. We present a case series of six cases of findings using handheld ultrasound that affected perioperative management.

Case Presentations: In the first case, a 58 year old male developed post-induction hypotension during bilateral quadriceps tendon repair. Ultrasound exam revealed inadequate intravascular volume and thus the patient was treated with crystalloid instead of inotropic agents. In the second case, a 58 year old female with history of pulmonary hypertension also developed post-induction hypotension during laparoscopic cholecystectomy and ultrasound revealed greater than 50% collapsed inferior vena cava during inspiration. Without any prior cardiac echo, preoperative handheld transthoracic echo (TTE) revealed trace tricuspid regurgitation with mild pulmonary artery systolic pressure (PASP) elevation. The patient was treated with crystalloid without inotropic support. In the third case, a 45 year old male developed post-induction hypotension during bilateral ankle incision and drainage. Ultrasound exam revealed low systolic function with normal heart chamber sizes and the patient was treated with a norepinephrine infusion instead of crystalloids. In the fourth case, a 48 year old female was found down in the restroom following breast reduction procedure. CPR was initiated by code team and EKG monitoring showed ventricular fibrillation. Ultrasound exam showed dilation of right ventricular chamber. The patient received tPA and ultimately had return of spontaneous circulation. In the fifth case, a 68 year old male who was undergoing CPR during trauma resuscitation, cardiac ultrasound revealed ventricular fibrillation and the patient was shocked. Following defibrillation, EKG leads came off due to patients' sweating. The patient was shocked under ultrasound visualization of ventricular fibrillation. Normal sinus rhythm eventually returned with EKG confirmation. In the final case, a 48 year old male with a psychiatric history had a self-inflicted upper abdominal knife wound. The patient had stable hemodynamics and ultrasound demonstrated no pericardial effusion.

Discussion: In this case series we attempted to demonstrate the value handheld cardiac echocardiogram (Vscan) and its value as an adjunct to conventional monitors in the critical care and perioperative settings. A well-trained attending physician with board certification in transesophageal echocardiography conducted the image acquisition and interpretation. In our first three cases we demonstrated the usefulness of handheld echocardiography in treating the case of post-induction hypotension with either inotropes or fluid. In our final three cases, we demonstrated the use of handheld echocardiography as an adjunct in the trauma and critical care settings to provide real-time, non-invasive qualitative assessments to effect patient outcomes. This portable ultrasonic echocardiography potentially can be utilized in the acute care medicine for improving patient care. However, this is a presentation from a single institution. A well-designed prospective study is needed to validate our findings and improve patient's outcome.

References

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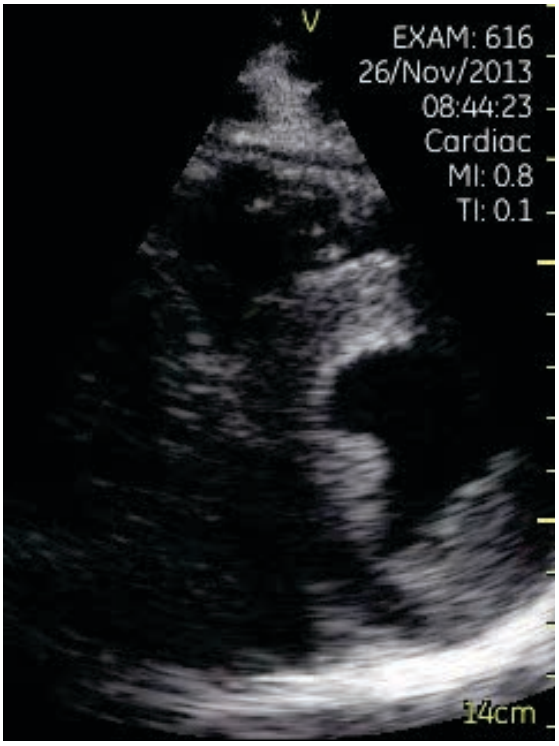
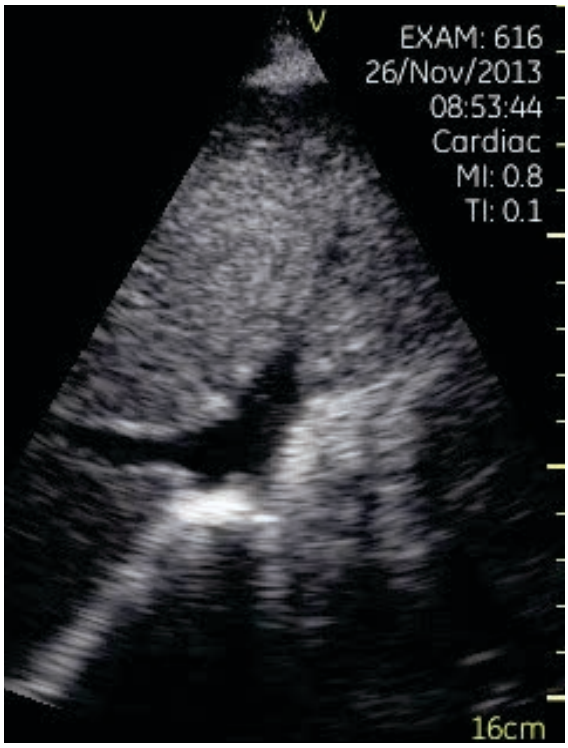
2. McConnell MV, et al. Regional Right Ventricular Dysfunctiion Detected by Echocardiography in Acute Pulmonar

TTE IMAGES

CASE #1





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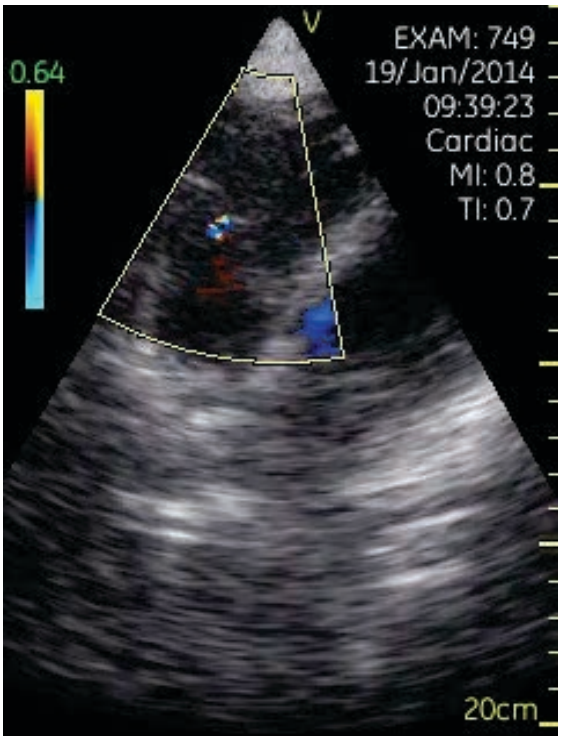

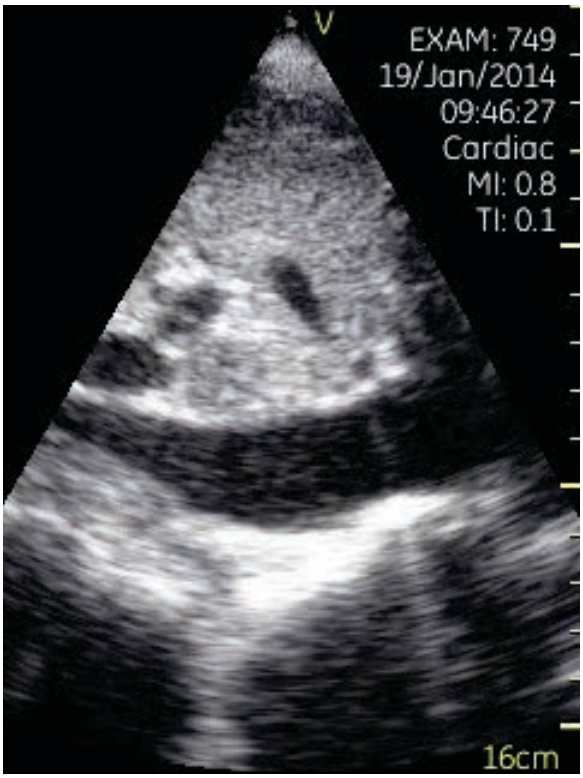

CASE #3


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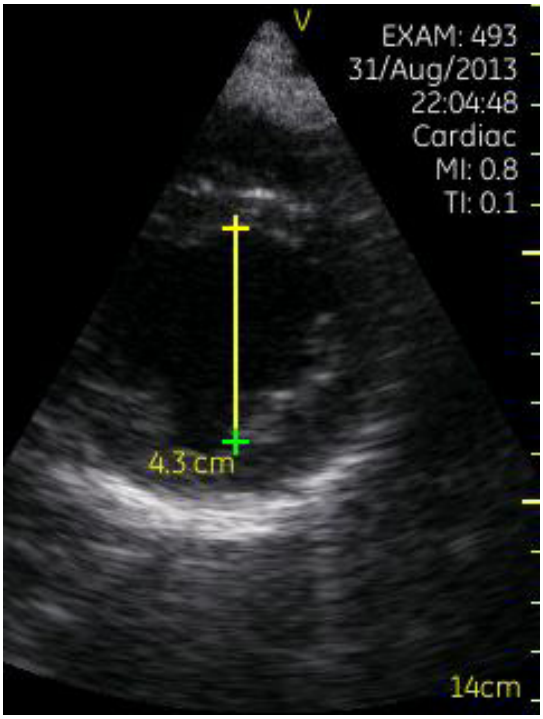
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Cardiac
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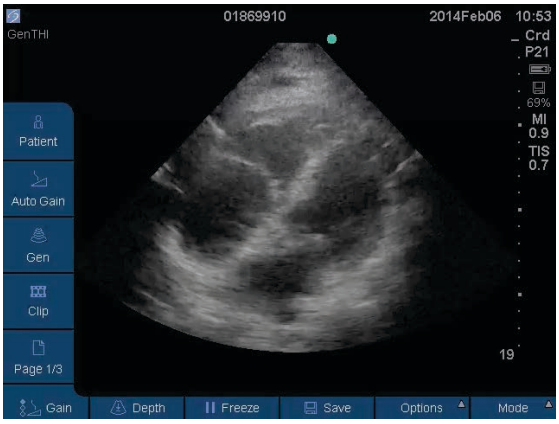
TI: 0.1
4.3 cm
14cm

CASE #4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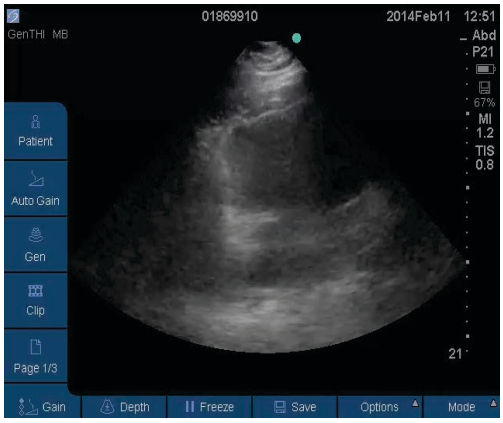
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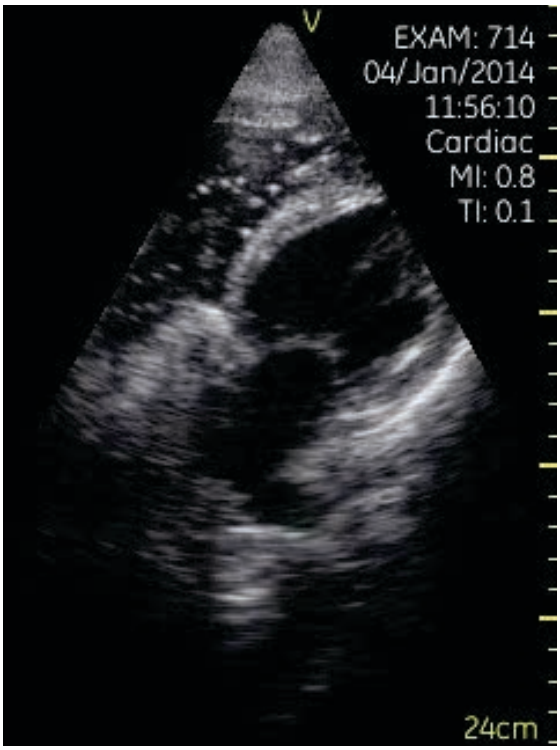
CASE #5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EXAM: 714
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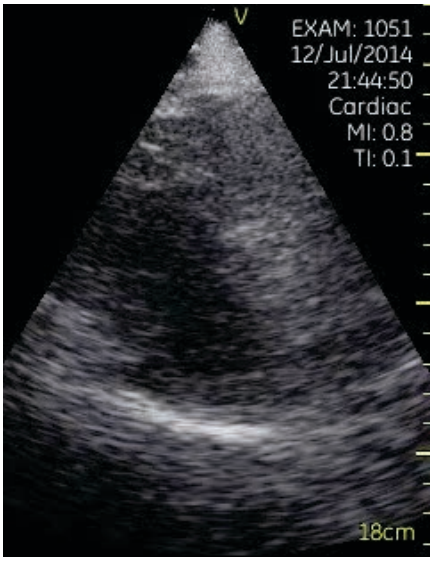
CASE #6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Cardiac
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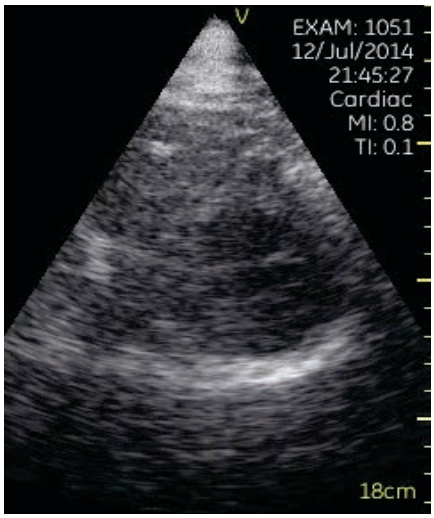
TI: 0.1
18cm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Cardiac
MI: 0.8
TI: 0.1
18cm

Poster 22

Perioperative Complications in a Super Morbidly Obese Patient Undergoing Cardiac Surgery

Jack Louro, M.D.; Alan M. Gaffney, M.D.
Columbia University Medical Center/ New York Presbyterian Hospital

Introduction: Obesity is a known risk factor for cardiovascular disease. However, there appears to be an "**obesity** paradox" whereby cardiac surgery mortality in obese patients is not increased compared to patients with normal body mass index (BMI)(1). In valvular surgery, a BMI<20 is a predictor of increased mortality while obesity is not(2). Despite this, super morbidly obese patients (BMI>50) undergoing valvular surgery pose significant challenges. We describe such a patient who underwent aortic valve and root replacement with multiple, complex, obesity-related, management issues.

Case Report: A 49 year old gentleman (BMI 62) with a history of obstructive sleep apnea, pulmonary artery hypertension, and aortic stenosis presented for aortic valve and root replacement. His preoperative spO2 was 94% on room air with elevated pulmonary pressures. Airway management and vascular access were uneventful despite his body habitus. Intraoperatively, he became significantly hypoxic following cardiopulmonary bypass (CPB) likely due to obesity-related atelectasis, the systemic inflammatory response syndrome from a prolonged CPB time and his premorbid respiratory status. He had low left atrial filling pressures indicating a noncardiac cause for his hypoxemia. On admission to ICU he required 80% inspired O2 and, positive end expiratory pressure (PEEP) of 12cm H20, to maintain an arterial oxygen saturation of 93%.

On postoperative day (POD) 1, oxygen requirements increased to 100% (Image 1). On POD 2 inhaled nitric oxide (iNO) was administered to improve ventilation-perfusion mismatch in the setting of severe hypoxemia with pulmonary hypertension secondary to his obesity-related sleep apnea. Rhabdomyolysis also developed from lying on the OR table during the long procedure, a known complication of obesity. We were unable to alkalinize urine or administer fluid to treat rhabdomyolysis due to his respiratory failure. Without aggressive treatment for rhabdomyolysis with intravenous fluid he went on to develop acute kidney injury.

Hypoxia and high PEEP, despite low transpulmonary pressures in the setting of obesity, precluded extubation of his trachea or the placement of a tracheostomy. Consequently, by postoperative day POD 8 he developed ventilator associated pneumonia. Tracheostomy was performed POD 10 when iNO was weaned off. A CT scan was performed due to persistent fevers on POD 11 showing sternal separation with fluid collection suggestive of wound infection. By POD 12 antibiotics were broadened for wound and pulmonary infections. By POD 22, the patient's oxygenation had improved and he was breathing without ventilator support during the day. He remained severely debilitated and unable to get out of bed. Plans were made for transfer to a long term care facility upon discharge.

Conclusion: The medical literature suggests that obese patients have similar cardiac surgery mortality and morbidity rates. However, most studies group all patients with BMI>35 together and do not emphasize that many may have significant morbidity as experienced in our case. As with our patient, studies have found worsened hypoxia with increasing BMI(3). Similarly, there is evidence of increased pulmonary complications(4), increased risk of mediastinitis(5), and longer hospital stays and costs in the obese patient undergoing cardiac surgery(6). Perhaps epidemiologic studies should emphasize the morbidity outcomes such as ventilator associated pneumonia, wound infection, prolonged intubation, rhabdomyolysis, kidney injury, and discharge to rehab facilities. The risk of perioperative complications must be re-considered when a super morbidly obese patient undergoes cardiac surgery.

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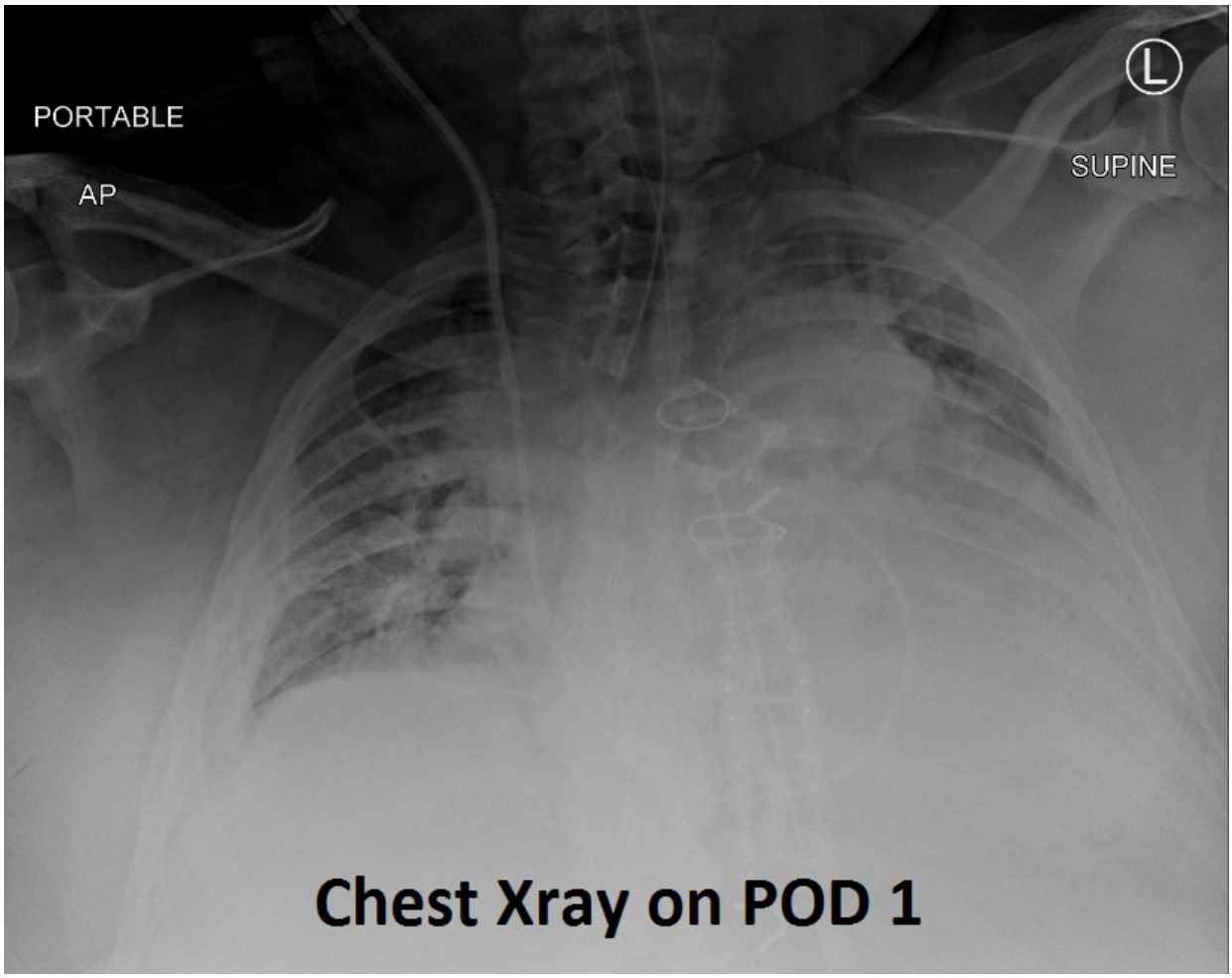
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Chest Xray on POD 1

Poster 23

Improving Adherence to Intraoperative Lung Protective Ventilation Through Education and Implementation of a Departmental Mechanical Ventilation Policy

Gretchen A. Schultz, M.D.; Sean Josephs, M.D.
University of Cincinnati Medical Center

Introduction: Studies have shown that using intraoperative lung-protective ventilation (ILPV) with tidal volumes <8 ml/kg ideal body weight (IBW) can reduce pulmonary complications in patients undergoing abdominal surgery. (1,2) The use of intraoperative lung-protective ventilation at our institution was evaluated and a quality improvement project (QIP) was initiated to improve adherence to ILPV strategies.

Methods: A single-center, retrospective observational pre / post evaluation of ILPV was performed June through October 2014 for patients undergoing major abdominal surgery. Intraoperative tidal volume (Vt) was collected at time out (TO), time out plus 1 hour (TO+1), and at time out plus 2 hours (TO+2). Cases were classified as failures of ILPV if Vt > 8 ml/kg IBW. Tidal volumes and ILPV failure rates were placed on statistical process control (SPC) charts. At each intraoperative time point mean Vt and ILPV failure rate were calculated before and after initiation of the QIP. Change interventions included departmental education about ILPV and creation of an ILPV mechanical ventilation policy. Data were analyzed on statistical process control (SPC) charts. Additionally, mean Vt and ILPV failure rates before and after interventions were compared using the Mann-Whitney and Chi-Squared tests, respectively.

Results: Eighty-seven patients were evaluated, 68 before and 19 after the intervention. Pre-intervention Vt data was missing for 1 case at TO+1 and 6 cases at TO+2. One post-intervention Vt was missing for TO+2. Annotated SPC charts showed non-significant trends with decreasing average tidal volumes. No special cause was seen for ILPV failure rates at TO, TO+1, or TO+2 but failure rates remained below the mean after the intervention. When ordered by IBW, SPC Charts show special cause at lower and higher IBW. At TO, TO+1, and TO+2, pre-intervention mean Vt (ml/kg) (standard error of the mean (SEM)) were 8.07 (0.17), 7.83 (0.16), and 8.05 (0.18), post-intervention means of Vt (ml/kg) (SEM) were 6.83 (0.22), 6.76 (0.18), and 6.74 (0.17) (Figure 1.) Mann-Whitney P values for pre / post comparisons at each time point were 0.0004, 0.0007, and 0.0001. At TO, TO+1, and TO+2 pre-intervention ILPV failure rates were 44%, 42%, and 48%, post-intervention ILPV failure rates were 16%, 5%, and 0% (Figure 1.) Chi-Squared P values for pre / post comparisons at each time point were 0.024, 0.0029, and 0.00024.

Conclusions: Providers in this study often failed to use intraoperative lung-protective ventilation and more frequently used appropriate Vt in patients with higher IBW. This agrees with current literature that suggests many patients do not routinely receive ILPV under general anesthesia and that this trend may be unintentional. (3,4) Departmental education and initiation of a lung protective mechanical ventilation policy was associated with decreased average Vt and decreased ILPV failure rates.

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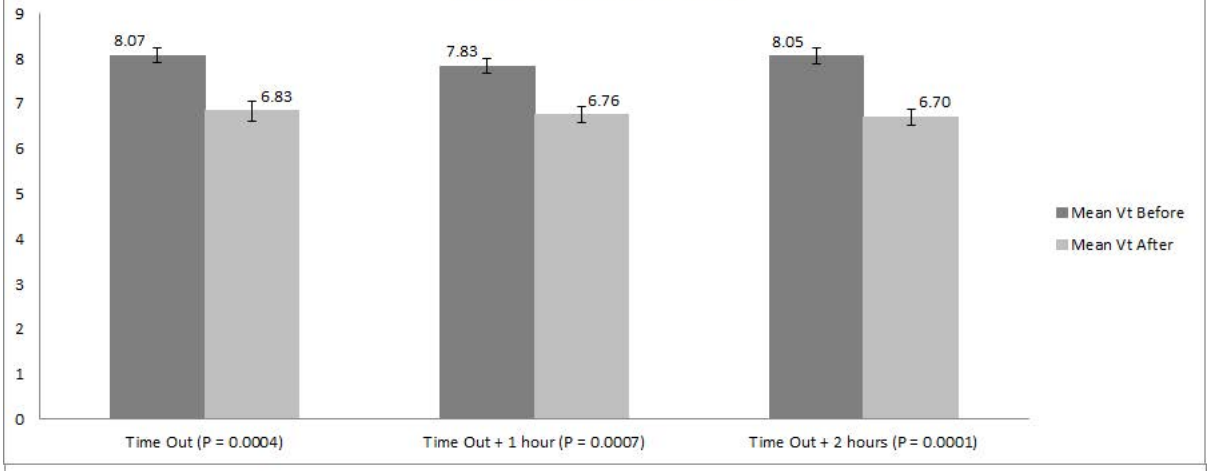
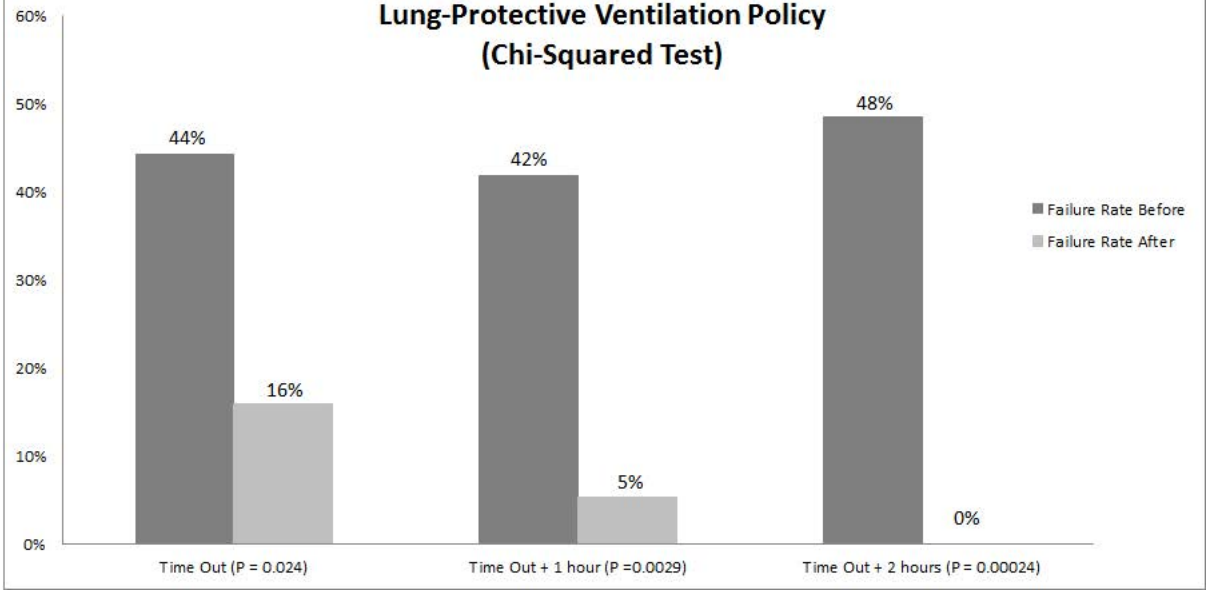
Figure 1: Pre / Post Intervention Statistical Analysis

Mean Intraoperative Tidal Volumes Before and After Departmental Education and Institution of an Intraoperative Lung Protective Ventilation Policy (Mann-Whitney Test)



Rate of Failure of Intraoperative Lung-Protective Ventilation Before and After Departmental Education and Institution of an Intraoperative Lung-Protective Ventilation Policy (Chi-Squared Test)



Poster 24

ICU Management of a Left Atrial Intramural Hematoma

Harish Bangalore Siddaiah, M.D.; David Cabeza, M.D.; Sean Quinn, M.D.; Relin Yang, M.D.; Giri Srikanthan, M.D.; Ricardo Martinez-Ruiz, M.D.
University of Miami/Jackson Memorial

Introduction: A rare complication of coronary artery bypass grafting (CABG) and valve replacement is the development of an left atrial intramural hematoma. Clinically, such hematomas can lead to hemodynamic obstruction of the efferent and afferent blood flow, causing low-cardiac output and cardiogenic shock . This case report describes a patient with severe aortic stenosis who was scheduled for aortic valve replacement and single vessel bypass graft placement. Patient developed a large intramural left atrial hematoma intraoperatively.

Case: 67 yr with past medical h/o transient ischemic attack (TIA), hypertension , hyperlipidemia, coronary artery disease (CAD) and severe aortic stenosis was scheduled for aortic valve replacement
(AVR) and 1- vessel (saphenous vein graft to obtuse marginal) coronary artery bypass graft (CABG).

After uneventful induction, central line and pulmonary catheter were placed. Intra-operative transesophageal echocardiography(TEE demonstrated severe aortic stenosis (valve area of 0.6 cm 2 and peak gradient of 70 mm Hg) and normal left atrial size. The patient underwent CABG surgery (saphenous vein graft to obtuse marginal) and AVR. However while coming off cardio-pulmonary bypass a large left atrial intramural hematoma was detected by TEE. TEE also demonstrated adequate cardiac output and maintained pulmonary vein flow. Patient was hemodynamically stable and after discussing treatment options with the surgeon it was decided to treat the patient conservatively with the assumption that the hematoma will be resorbed overtime. Cardio-pulmonary bypass was discontinued and patient was transferred to surgical intensive care unit (ICU) for close monitoring of hemodynamic status.

A cardiac CT scan was obtained 2 days post-operatively which showed a 7 x 3.5 cm left atrial intramural hematoma with moderately to severe compression of the atrial lumen. Patient remained hemodynamically stable throughout the ICU stay, his cardiac output and other hemodynamic indices were monitored closely.

During the ICU course patient developed bilateral pleural effusions which required drainage. The patient also developed moderate pericardial effusion which was managed conservatively. The patient had one episode of retinal artery occlusion which resolved spontaneously.

A repeat cardiac CT scan was obtained before patient was discharged it showed a decrease in size to 6.3 x 3.2.

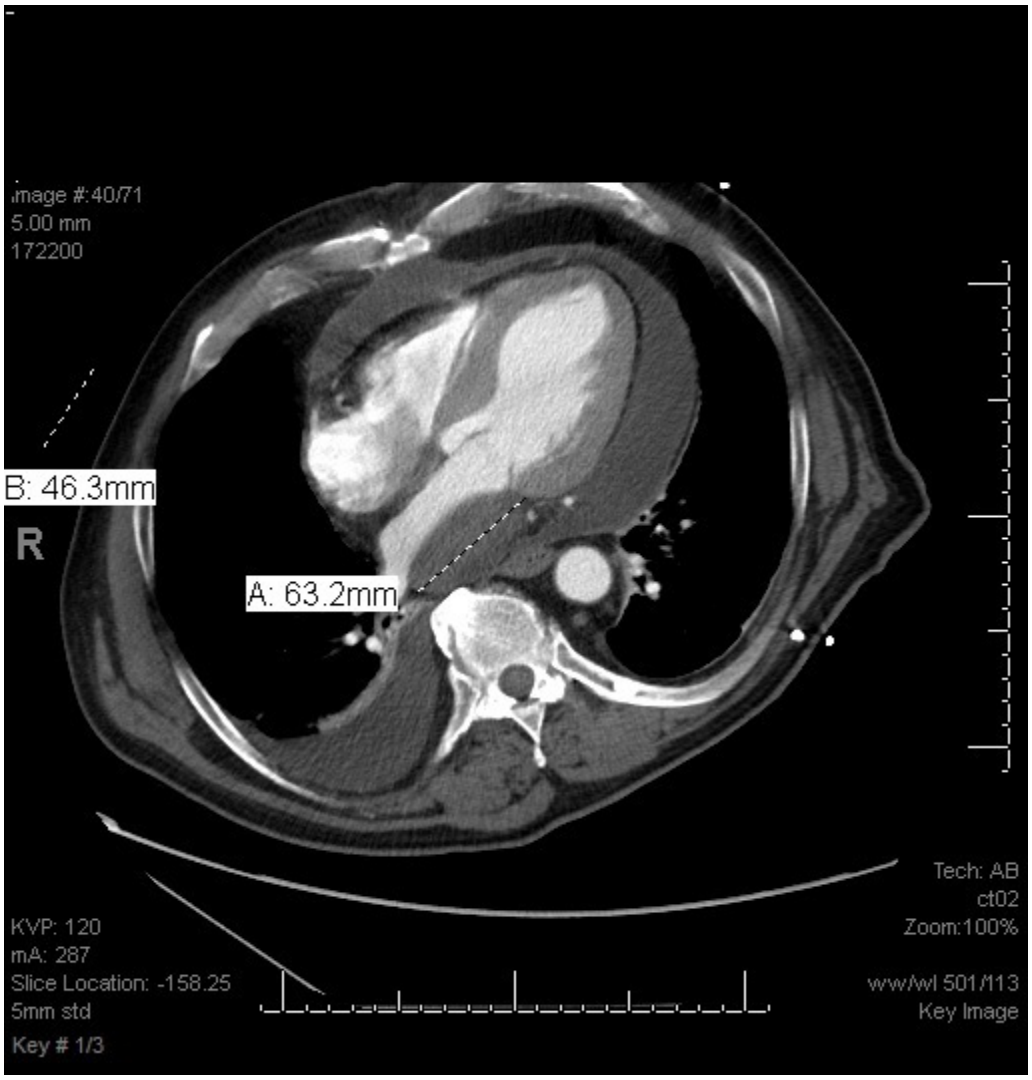
Patient was followed in surgery clinic 2 weeks after discharge and patient was still asymptomatic and doing well.

Discussion: Atrial dissections and hematomas are rare complications of cardiac surgery, and descriptions in the literature are uncommon. Pathophysiologically, left atrial hematoma occurs with an atrial dissection and is described as a complication associated with mitral valve surgery. Predispositions to this condition are rheumatic disease, amyloidosis, endocarditis, myocardial infarction, and a preceding blunt trauma.

We can only hypothesize on the cause of the hematoma in our patient. Indeed, the patient showed no signs of any predisposing condition or myocardial infarction. Furthermore, we cannot exclude an unintended iatrogenic lesion, possibly by a venous rupture resulting from coronary sinus catheter cannulation.

There have been various opinions about management of left atrial intramural hematoma, in patients who were hemodynamically unstable operative management was chosen withfatal consequences in few of them and recurrence of hematoma in others.

However since our patient was hemodynamically stable a conservative management was preferred and eventually our patient had a good outcome. We recommend that patients with a left intramural hematoma should be assessed for hemodynamic instability and surgical intervention planned only if patient is hemodynamically unstable. Patient should be hemodynamically monitored closely in the ICU and promptly identify any significant changes.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Poster 25

Fat Emboli Syndrome Resulting in Severe Intracranial Hypertension

Cassandra L. Barry, M.B., Ch.B.; Gretchen Schultz, M.D.
University of Cincinnati Medical Center

Introduction: Fat emboli syndrome (FES) is an uncommon condition associated with long bone fractures. Its pathophysiology and treatment are poorly understood. Presentation is usually delayed after trauma and patients may be asymptomatic for a period of days. FES manifests as respiratory failure and neurologic decompensation with associated thrombocytopenia resulting in petechiae. Risk factors include multiple fractures, closed fractures and young age. (1)

Case Presentation: 23 year old man presented after a motor vehicle collision with a GCS of 4. Head CT revealed traumatic subarachnoid hemorrhage, subdural and epidural hematomas. He also had a right internal carotid artery dissection, right pneumothorax, grade 1 liver laceration, multiple facial fractures, and bilateral femur, tibia, and fibula fractures. Endotracheal intubation, chest tube placement and resuscitation ensued and his GCS improved to 11T. On day two of admission his neurologic exam acutely deteriorated and he developed profound refractory hypoxia, hyperpyrexia, thrombocytopenia and petechiae. Repeat head CT did not reveal a cause of his acute neurologic decompensation. An intracranial pressure (ICP) monitor was placed and revealed an opening pressure of 30 mmHg. The new onset of symptoms was consistent with fat emboli syndrome. Therapy for the intracranial hypertension was initiated with hypertonic saline, mannitol, chemical paralysis, and euthermia with an intravascular cooling device. Despite aggressive treatment for elevated ICPs, including pentobarbital, he remained refractory to therapy with ICPs as high as 130 mmHg. On hospital day 9 the family elected to make patient comfort care and he died on Hospital Day 10.

Discussion: Long bone fractures always result in fat emboli but rarely FES. The syndrome consists of respiratory and neurologic dysfunction as well as petechiae. Pyrexia, tachycardia, jaundice, retinal changes such as exudates and hemorrhages and renal signs such as oliguria and lipuria may also be present. The symptoms are thought to be from occlusion of blood vessels by the emboli as well as irritation from the free fatty acids. Diagnosis is clinical because laboratory testing lacks sensitivity. FES is often associated with elevated erythrocyte sedimentation rate, thrombocytopenia and reduced hematocrit. Our patient had an asymptomatic period followed by acute deterioration on day 2. The combination of hypoxic respiratory failure, acute neurologic deterioration and dermal findings led to the diagnosis of fat emboli syndrome. Multiple treatments including corticosteroids, aspirin, heparin, and N-acetylcysteine have been studied with inconclusive results and treatment remains supportive. Mortality is estimated at 5-15%. (2)

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Poster 26

Delayed Myocardial Recovery Requiring Isolated Right Ventricular Assist Device after Inferior Myocardial Infarction

Hannah Bell, M.D.; Teresa Mulaikal, M.D.
New York Presbyterian Columbia University Medical Center

Introduction: Isolated right ventricular (RV) failure requiring mechanical support is a rare phenomenon. The median duration of mechanical support is 10 days. This is a case of delayed RV recovery requiring mechanical support for 43 days after an acute myocardial infarction (MI).

Case Description: A 42-year-old male with a history of smoking and hypertension presented with a large inferior MI due to a 100% right coronary artery lesion and spontaneous dissection. The patient developed cardiogenic shock, and multiorgan failure. Echocardiography revealed severe RV dysfunction and a type IA ascending aortic dissection, prompting valve-sparing aortic root and hemiarch replacement, revascularization, and veno-arterial extracorporeal membrane oxygenation (VA ECMO) for persistent shock. On postoperative day (POD) 6 ECMO was exchanged for a CentriMag right ventricular assist device (RVAD). Attempted explant on POD 20 failed. On POD 43, he underwent a successful weaning study and RVAD explant (Table 1). He remains on milrinone and is awaiting transplantation.

Discussion: Only 38 of 12,335 patients with mechanical support devices placed between 2006 and 2013 in the Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS) received RVADs, highlighting the scarcity of isolated RV failure requiring mechanical support. The RV may respond to revascularization, inotropes, vasopressors, and pulmonary vasodilators. When these interventions fail to improve function, outcomes are poor. Those with cardiogenic shock despite medical management have mortality rates as high as 53%. Most RVADs are placed for RV failure after left ventricular assist device (LVAD) implantation. RVADs have also been used after MI, cardiotomy, heart transplantation, and pulmonary thrombectomy. Despite mechanical support, recovery rates for this group remain low, with only 44% of patients surviving to discharge in one study. The median duration of mechanical support reported by INTERMACS is 10 days. In our case explantation took 43 days, illustrating that RV recovery may take weeks. Though the FDA has approved use of the CentriMag for 30 days in cases of cardiogenic shock, there is currently no approved long-term device. Had our patient not been successfully explanted, the HeartWare HVAD would have been the device of choice. Krabatsch et al, describes right-sided circulation modifications for the after-load sensitive HeartWare HVAD and there is a case report of its successful off-label use as destination therapy in isolated RV failure. In conclusion, we report isolated RVAD Centrimag use for extended support of RV failure, and successful explantation after a prolonged period of 43 days.

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Table 1. RVAD Weaning Study on Dobutamine

RVAD Speed	Flow	Mixed VO2	BP	HR	CVP	RV Size	RV Function	TR	RVSP	LV Function	MR
3300	4.5	73.5%	103/57 (76)	81	7	Mod Enlarged	Mod decreased	Mild/ Mod	38	Normal	Trace
3000	4.5	-----	107/57 (77)	81	8	Mod Enlarged	Mod decreased	Mild/ Mod	35	Normal	Trace
2700	4.5	80.1%	105/57 (77)	81	7	Mod Enlarged	Mod decreased	Mild/ Mod	32	Normal	None
2400	4.5	-----	109/58 (78)	81	8	Mod Enlarged	Mod decreased	Mild/ Mod	29	Normal	None
2100	4.5	-----	104/57 (76)	81	8	Mod Enlarged	Mod decreased	Mild/ Mod	32	Normal	None
1800	4.5	-----	103/58 (78)	81	9	Mod Enlarged	Mod decreased	Mild/ Mod	29	Normal	None
1500	4.5	-----	105/58 (76)	81	9	Mod Enlarged	Mod decreased	Mild/ Mod	25	Normal	None
1200	4.5	-----	100/57 (74)	81	10	Mod Enlarged	Mod decreased	Mild/ Mod	24	Normal	None

Poster 27

Noncardiac Surgery in Patients with Hypertrophic Obstructive Cardiomyopathy

Travis L. Behrend, M.D.; David Barbara, M.D.; Joseph Hyder, M.D., Ph.D.; William Mauermann, M.D.
Mayo Clinic

Introduction: With advances in clinical practice, patients with hypertrophic obstructive cardiomyopathy (HOCM) can have nearly normal lifespans[1]. As a result, more of these patients are requiring anesthesia for noncardiac surgery (NCS). The purpose of this study was to examine the perioperative management and outcomes of patients with HOCM undergoing anesthesia for NCS at a single, large tertiary referral center.

Methods: Electronic medical records from January 1, 1996 â€“ January 31, 2014 were retrospectively reviewed to identify patients with HOCM undergoing NCS. Patients were included if preoperative echocardiography demonstrated evidence of obstruction (resting or provoked peak instantaneous left ventricular systolic gradients of >30 mmHg). Patients with apical-variant HOCM or prior surgical correction were excluded. Demographic features, preoperative laboratory and echocardiographic data, intraoperative events and medications, postoperative complications, and 30-day mortality and readmissions were recorded. Rao-Scott testing was performed to identify associations between preoperative echocardiographic characteristics and death as well as emergency surgery and death.

Results: Fifty-seven patients underwent 96 NCS under general anesthesia except for 1 patient who had spinal anesthesia with concomitant sedation. A variety of NCS were performed (Table 1) with eight operations (12%) being emergent in nature. Demographic, preoperative characteristics (including echocardiographic data), and intraoperative findings for 96 NCS are shown in Table 1. Three patients (3%) died within 30 days of NCS, but none of the deaths were attributable to cardiac causes. Of the deaths, two patients aspirated and one patient with septic shock was withdrawn from life support at the family's request. Four patients (4%) were readmitted within 30-days of NCS. One patient was readmitted with worsening heart failure; however, the other three readmissions were non-cardiac related. Statistical analysis revealed only emergent surgery to be significantly associated with death following NCS (P value, 0.0002). Death following NCS was not statistically associated with mean left ventricular ejection fraction (P value, 0.2727) or mean peak instantaneous resting gradient (P value, 0.8826).

Conclusions: In this clinical series, patients with HOCM safely underwent a variety of NCS with few intraoperative and postoperative complications. An observed mortality rate of 3% was lower than the reported mortality in other series (4-9%)[2-3]. Death following NCS was not significantly associated with preoperative echocardiographic findings but was associated with emergent surgery.

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Poster 28

Increased In-Hospital Mortality in Patients Triggering a Severe Sepsis Advisory While in the Intensive Care Unit

Andrew L. Ray, M.D.; Mary C. Sullivan, RN, MS, CNS; Erica R. Shea, RN, MS;
David W. Shimabukuro, M.D.CM
University of California-San Francisco

Introduction: The Surviving Sepsis Campaign recommends routine sepsis screening in all hospitalized adult patients. (1) In institutions with electronic medical records (EMR), screening is performed using real-time patient data with an alert generated after specific criteria are fulfilled. At our institution, an automated sepsis screening system was put in place to aid in the early identification of patients with severe sepsis in the intensive care unit (ICU). An advisory is created in the EMR to alert providers of a possible patient with severe sepsis when there are at least 2 systemic inflammatory response syndrome (SIRS) criteria and at least one other criterion for end organ dysfunction. In this study, we sought to determine if there was an increased mortality in patients receiving such an advisory during their ICU admission over those who did not.

Methods: A retrospective analysis was performed on patients admitted to our academic 32-bed adult medical-surgical ICU over a three-month period between April 01, 2014 and June 30, 2014. Patients were placed into group-A or group-B based on the presence or absence of a severe sepsis advisory during their ICU admission, respectively. Patient records were reviewed for death during their hospital stay and all-cause mortality rates were calculated separately for groups A and B. This study was approved by our Committee on Human Research.

Results: 502 patients were admitted to the medical-surgical ICU during the study period. 253 patients were placed in group-A based on the presence of a sepsis advisory and 249 patients were placed in group-B (no advisory). 20 of the 253 patients in group-A (advisory) died during their ICU admission for a mortality rate of 7.9%. 8 of the 249 patients in group-B (no advisory) died during their ICU admission for a mortality rate of 3.2%. The relative risk of mortality in patients with a sepsis advisory was 2.5 (95% CI, 1.10 to 5.48; P= 0.03).

Conclusions: In our medical-surgical ICU, those patients with a sepsis advisory during their ICU stay had an increased risk of death as compared to those who did not receive such an advisory. Although our alert was specifically created for our institution, it can likely be used in other centers with a similar ICU population. There are several major limitations to our study. First, we used in-hospital mortality instead of 30- or 90-day mortality. Second, we used all-cause death. Therefore, patients who were transitioned to comfort care and then died were included in our analysis. Third, we did not adjust for severity of illness between the two groups.

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Poster 29

Experiential Learning: Applying the Kolb Learning Style Inventory in Anesthesiology Education

Laurie Daste, M.D.; Theresa Northern, M.D.; Philip Boysen, M.D., M.B.A.
Ochsner Clinic Foundation

Introduction and General Purpose of Study: The need for experiential learning is a reality and the raison d'etre in postgraduate medical training. Didactic learning does not translate into a knowledgeable and effective practitioner. We sought to assess and improve learning in anesthesia by utilizing a concept and methodology formulated by David Kolb (1). He described four distinct learning styles associated with preferred styles of learning: Converging (solving technical problems and experimenting with new ideas), Accommodating (hands-on, relying on others for information, acting on instinct), Diverging (watching/ gathering information and working in groups) and Assimilating (interested in ideas and Abstract concepts).

Kolb further theorized that career choices are based on preferred learning styles; as such, physicians and scientists would fall in the converging domain. Our initial hypothesis sought to refute this assertion, at least for anesthesiologists, as a starting point toward improved teaching and learning.

Methods: We administered the Learning Style Inventory (LSI) to faculty and resident volunteers. We enrolled 16 residents and 25 faculty who completed the LSI, then graphically located their position on the LSI chart, thereby identifying their learning style based on which of the four quadrants into which they were placed. These data points are presented in Figure 1.

Results:

1. Our data does not show a preferred learning style for resident or staff anesthesiologists.
2. The diverging learning style is almost an empty cell but for one individual.
3. Only 24% of participants fell above the x-axis, i.e. most people were either convergers or assimilators.

Conclusions: It has been said that experience is the hardest teacher; the test comes first, then the lesson. In anesthesiology experiential learning predominates in the operating room and intensive care unit, yet experience teaches us nothing without reflection and analysis. For effective organizational learning, Kolb proposed that cycling through all four domains is necessary (2), and our data indicates that the same is true for individual learning. Further, quality improvement utilizes the PDSA cycle (Plan->Do->Study->Adapt), and developing run charts is based on the same concept (Figure 2). Experiential learning in the clinical setting predominates in anesthesiology. Supplemental learning using simulation and problem-based learning supports and enhances the clinical experience but cannot effectively replace it.

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Poster 30

Bilateral Endobronchial Intubation by Tracheostomy with Synchronized Independent Lung Ventilation to Allow for Decannulation from VV ECMO After Repair of a Large Tracheogastric Fistula After Esophagectomy

Gaurav Budhrani M.D.[1]; Kenneth Stahl M.D.[2]
Jackson Health System[1]; University of Miami Miller School of Medicine[2]

Introduction: In the ICU, independent lung ventilation (ILV) is rare and is used to treat severe, unilateral lung disease following trauma or asymmetrical lung pathology. It is usually indicated when there is an underlying unilateral air leak or bronchopleural fistula that precludes use of equal ventilator pressure settings. We describe a novel use for ILV in a patient with a tracheogastric fistula who was severely hypoxic and required veno-venous extracorporeal membrane oxygenation (VV ECMO) after attempted surgical repair but suffered a major hemorrhage due to a heparin infusion while on the device.

Case Report: The patient was a 58 year-old male with esophageal cancer, who underwent a transhiatal esophagectomy that was complicated by a tracheal injury and subsequent fistula formation between the trachea and gastric conduit. Attempts at repair with an intercostal muscle flap had failed and he progressed to respiratory failure secondary to chronic aspiration pneumonitis. He was transferred to our facility for definitive surgical repair using the pectoralis major muscle with VV ECMO standby due to his respiratory status. He did not tolerate one-lung ventilation, so VV ECMO was initiated and continued for post-operative support. However, he required a massive intraoperative blood transfusion due to hemorrhage. He was transferred to the Surgical ICU intubated with a single supra-carinal endotracheal tube, on VV ECMO with a heparin infusion. Significant bleeding from multiple chest tubes occurred, and post-operative chest x-ray showed complete opacification of both lung fields. The patient required two additional surgeries to control hemorrhage secondary to the required heparin infusion to sustain VV ECMO. He had placement of a selective right endobronchial tube and was placed on ILV in an attempt to permit healing of the repair site located in the proximal portion of the left mainstem bronchus. An attempt to discontinue heparin to help with hemostasis resulted in an emergency ECMO circuit exchange. Due to ongoing hemorrhage and multiple transfusions, urgent discontinuation of ECMO was required. On post-op day (POD) 5 the patient returned to the OR for tracheostomy and placement of separate endobronchial tubes that were advanced past the site of the repair under fiberoptic guidance. He returned to the SICU with two synchronized Drager Evita 4 ventilators to provide synchronous ILV. Unfortunately, a right endobronchial tube required sacrificing the right upper lobe because inflation of the cuff would consistently occlude it despite attempts at re-positioning through bronchoscopy. However, with the rest of his lungs participating in adequate gas-exchange, on POD 8, ECMO was successfully discontinued. The patient had slow improvement of aeration and chest x-ray appearance and showed slow but steady improvement. Unfortunately he died of other complications 30 days from surgery.

Conclusion: Synchronized ILV through bilateral endobronchial tubes is a good alternative form of ventilation for post-operative patients with major injury to their trachea who are otherwise at high risk of bleeding complications from ECMO.

Poster 31

Extracorporal Membrance Oxygenation as a Rescue Device for Post-Reperfusion Cardiac Arrest During Liver Transplantation

Margaret Tejani, M.D.; Gebhard Wagener, M.D.
Columbia Medical Center, New York Presbyterian

Introduction: Post-transplant reperfusion cardiac arrest is associated with a high mortality if circulation cannot be restored rapidly. We report a case of post-reperfusion cardiac arrest with implementation of extracorporeal membrane oxygenation after unsuccessful conventional cardiopulmonary resuscitation.

Case Report: A 61 year old man with Hepatitis B cirrhosis and heptaocellular carcinoma underwent a deceased donor liver transplantation. His physiologic Model of Endstage Liver Disease (MELD) score was 8. Three months prior, a transthoracic echocardiogram (TTE) demonstrated normal biventricular systolic function with no valvular pathologies, and a stress test was negative for inducible ischemia. Initial intraoperative laboratory values were unremarkable and the dissection phase proceeded without any complications. The patient tolerated clamping of the inferior vena cava and removal of the native liver with only low dose vasopressor support. During the anhepatic phase, the patient remained hemodynamically stable requiring slowly increasing doses of vasopressors. Caval and portal vein clamps were removed. Within 4 minutes after reperfusion, the hemodynamic parameters deteriorated and the patients developed profound hypotension and bradycardia despite multiple epinephrine boluses. Cardiac arrest ensued and cardiopulmonary resuscitation was initiated 24 minutes after reperfusion, initially externally and then internally through an incision of the diaphragm. At this time the patient developed ventricular fibrillation that did not respond to five attempts of internal defibrillation. Throughout the cardiac arrest, internal CPR was effective with good perfusion on the arterial blood pressure tracing. We decided to forgo any further attempts of defibrillation and proceed to VA-ECMO. Cardiac surgery was called and VA-ECMO was initiated through cannulation of the femoral vein and artery. 21 minutes after the cardiac arrest. About 10 minutes on ECMO, the cardiac rhythm spontaneously converted from ventricular fibrillation to slow junctional rhythm. Pacing wires were placed. Transesophageal echocardiography showed an ejection fraction of 5% with moderate to severe left ventricular dilation. A ventricular drainage catheter to decompress the left ventricle and a distal perfusion cannula to ensure leg perfusion were placed. ECMO was maintained for 48 hours after which cardiac function had sufficiently recovered and ECMO could be removed with minimal inotropic support. The further postoperative course was unremarkable. He was extubated 3 days after the transplant and he was neurologically intact. A TTE prior to discharge showed a normal biventricular function. He left the hospital 20 days after the initial surgery, and remains in good health with good graft function 4 months later.

Conclusion: This case report demonstrates that VA-ECMO can be a life-saving modality in patients who experience cardiac arrest during liver transplantation. VA-ECMO is increasingly used as a rescue mode to maintain perfusion during CPR and gain time to correct reversible causes of cardiac arrest, await spontaneous recovery of circulation or allow the placement of a longer-term support system.

Poster 32

3 Lost Airways in a 300 kg Patient: How to Keep Someone Alive

Daniel A. Medel, M.D.; Nicole Martin, M.D.; Miguel Cobas, M.D.
University of Miami Miller School of Medicine

Airway management in the morbidly obese can be challenging. When unknown patient factors lead to complications, the challenge becomes more daunting and even life threating.

A 53 year old, 290kg (638lbs) male presented with increasing shortness of breath. Past medical history included HTN, CAD, DM, OSA, COPD, and renal insufficiency. Initial ABG revealed an acute on chronic respiratory acidosis with pCO2 of 76. Given his moribund state, bariatric surgery was consulted for possible intervention to improve quality of life. After stabilization of his pulmonary status, patient was scheduled for laparoscopic gastric sleeve. Anesthesia evaluation was difficult due to patient's dyspnea and poor recollection of his medical history. On day #8, the patient returned to his baseline state of health and was cleared for surgery.

Once in the operating room, an awake fiberoptic intubation was performed after airway topicalization. A 7.0 ETT was visualized to pass through the vocal cords and into the trachea. After securing the ETT, an audible air leak and drop in tidal volume were noted. The presumptive diagnosis was ruptured ETT cuff and the decision to exchange the ETT was made. Due to the risk of respiratory decompensation, tube exchange was successfully performed using a Cook Airway Exchange Catheter and videolarygnoscope (VLG). The case was allowed to proceed.

At the end of surgery, the anesthesia provider again noted an audible air leak. ETT leak persisted despite further inflation of the ETT cuff. The patient was to remain intubated postoperatively, consequently, the ETT leak was evaluated prior to ICU transfer. A VLG was used to assess the status of the ETT. Upon inspection, ETT cuff was noted to be supra-glottic. Significant laryngeal and epiglottic edema were also noted (see image). The cuff was deflated and multiple efforts to advance the tube through the glottic opening were unsuccessful. Attempts using various devices including Aintree catheter, airway exchange catheter, rigid stylets, and fiberoptic scope were all ineffective. During one of these attempts, ventilation via the ETT became impossible requiring removal of ETT and emergent placement of LMA. A limited degree of manual ventilation was achieved via size 5 LMA. Waking the patient and extubating were not an option, due to his poor pulmonary status and the use of neuromuscular blocking agents. An attempt to intubate via LMA with a fiberoptic scope was also unsuccessful.

With progressing airway edema, ventilation via LMA became more difficult. The decision to perform an emergency tracheostomy was made. His large neck and excess adipose tissue required the use of tape and multiple surgeons to retract skin from the field. Upon further exposure, a surgical scar resembling a prior tracheostomy incision was noted for the first time. During this time, limited manual ventilation was performed via LMA, maintaining saturations in the high 80's. During the tracheostomy, surgeon noted severe tracheal stenosis measuring 4cm in length. A significant amount of tracheal calcification and an irregular luminal wall were also noted. After over an hour tracheal dissection, a 7.0 laryngoflex tube was placed past the stenosis and was sutured in place.

Retrospectively, an adequate seal was not possible with the initial ETT because the tube was not advanced sufficiently due to unknown tracheal stenosis. The combination of positive pressure ventilation and further inflation of ETT cuff likely caused retropulsion of the tube through the glottis. The over-expanded ETT cuff in the supraglottic region likely contributed to worsening laryngeal edema, which was exacerbated by multiple attempts at airway manipulation.

This case illustrates the need for a thorough pre-operative evaluation, as well as the importance of having a failed airway management algorithm in place. Being well-prepared for all possible difficult airway scenarios can make the difference between life and death.


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Poster 33

Hemodynamic and Transfusion Management of a Patient with Biventricular Assist Device Presenting with a GI Bleed in an ICU Setting

Adam B. Kretzer, M.D.; Shahriar Shayan, M.D.
Northwestern Memorial Hospital

Introduction: Non-pulsatile, axial flow Biventricular Assist Devices (BiVADs) are a new form of cardiac support for patients presenting with severe biventricular failure or with predominant right ventricular failure with significant left-sided cardiac disease. The majority of patients that receive mechanical cardiac support will obtain a Left Ventricular Assist Device, with less than 15 percent receiving a BiVAD or a total artificial heart1. In this small but growing patient population unique, device-related complications are arising from these non-pulsatile devices. Among these, bleeding in the perioperative period represents a significant risk2. The sites of bleeding include mucosal surfaces such as the gastrointestinal (GI) tract as a result of arterio-venous malformations in a patient population that, in most cases, requires life-long anticoagulation due to the nature of their indwelling device3.

Case Description: We present the case of a 48 year-old patient who was admitted to the cardiothoracic intensive care unit after BiVAD implantation for severe biventricular failure. His post-operative course was complicated by the development of a GI bleed with hemodynamic instability and postoperative anemia. The patient was also noted to have a supra-therapeutic international normalized ratio (INR) as a result of being placed on long-term anticoagulation. Because the patient was listed 1A for potential heart transplant, careful consideration between transfusion of blood products for optimization of volume status and oxygen delivery had to be weighed against the risk of further antibody development to donor allogeneic transplants, which could preclude his future recipient status. The complex hemodynamic management that had to occur for safe anesthetic administration in our patient during both upper and lower endoscopies for the diagnosis and therapeutic management of his GI bleed was also a consideration. The patient's history of pulmonary hypertension with concomitant hypovolemia and the aforementioned limitations in our ability to transfuse this patient made his case particularly challenging. We discuss the perioperative and critical care management of this complex patient, which warrants careful attention.

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Poster 34

Alemtuzumab and Pulmonary Complications in Renal Transplant Recipients: A Case Series

Katherine Gelber, M.D.; Hina Aslam, M.D.; Gebhard Wagener, M.D.; Robert A. Whittington, M.D.
Columbia University Medical Center

Introduction: Alemtuzumab (CampathÂ®**) is a humanized anti-CD52 antibody that is approved for the treatment of refractory chronic lymphocytic leukemia (CLL), and it is also used at our institution for the induction of immunosuppression during kidney transplantation. The overall safety profile of this immunosuppressant is incompletely understood. In CLL patients, the majority of adverse events were infectious in nature: however, studies have shown up to a 28% incidence of dyspnea and 3% incidence of hypoxia in** awake patients1. Intraoperative complications following alemtuzumab, and specifically pulmonary complications, have rarely been reported but include one case of diffuse alveolar hemorrhage2 and one case of dependent pulmonary edema3. Here we review three recent renal transplant cases at our institution with pulmonary complications following alemtuzumab administration.

Methods: We performed a retrospective review of three cases that took place from December 2013 through September 2014. Details of alemtuzumab administration, arterial blood gases, and specific pulmonary complications were collected from computerized anesthesia records (CompuRecordÂ®**) and electronic medical records.**

Results: The standard dose of 30mg of intravenous alemtuzumab was given intraoperatively as an infusion over 4-6 hours. Fig. 1-3 illustrate that both PaO2 and PaO2/FiO2 (P:F) ratio trended down after alemtuzumab infusion was initiated. The percent decline in P:F ratio ranged from 18.8% to 56.2%. This occurred from 148 minutes to 286 minutes after the start of the alemtuzumab infusion, respectively. On average, the P:F nadir occurred after 214 minutes. Case 1 (Fig. 1) was extubated at the end of the case but suffered a respiratory arrest en route to the PACU. Case 2 (Fig. 2) was also extubated but required BiPAP in the PACU. Case 3 (Fig. 3) developed a P:F ratio consistent with ARDS and remained intubated in the PACU for 15 hours post-op.

Conclusions: Induction immunosuppression with alemtuzumab is potentially associated with acute pulmonary toxicity in renal transplant patients, sometimes resulting in significant morbidity. Therefore, it is important that transplant anesthesiologists be aware of the risk of pulmonary complications with alemtuzumab, especially when making clinical decisions regarding termination of ventilatory support. A larger retrospective review of all patients receiving alemtuzumab intraoperatively is warranted to better understand this phenomenon.

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Fig.1

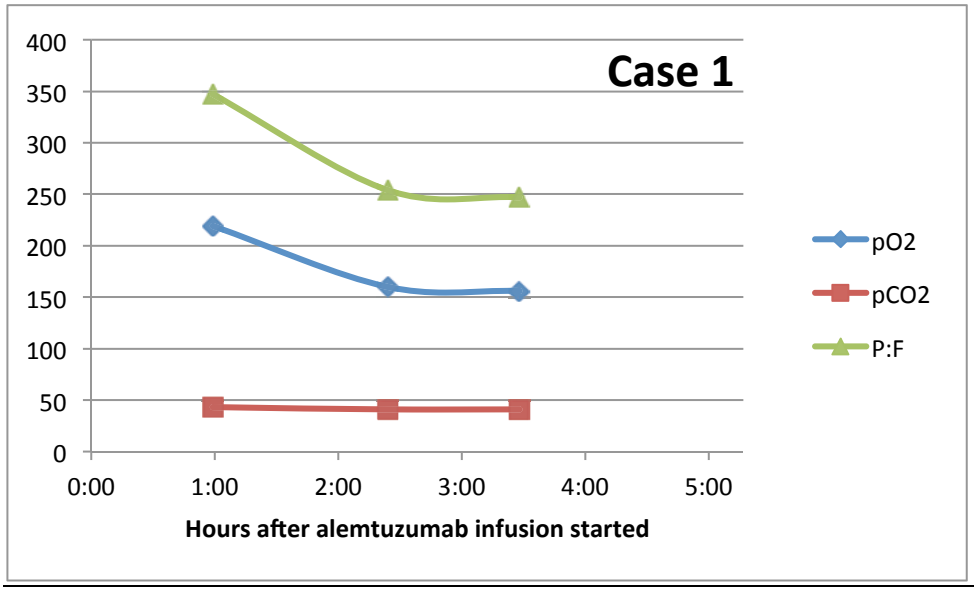
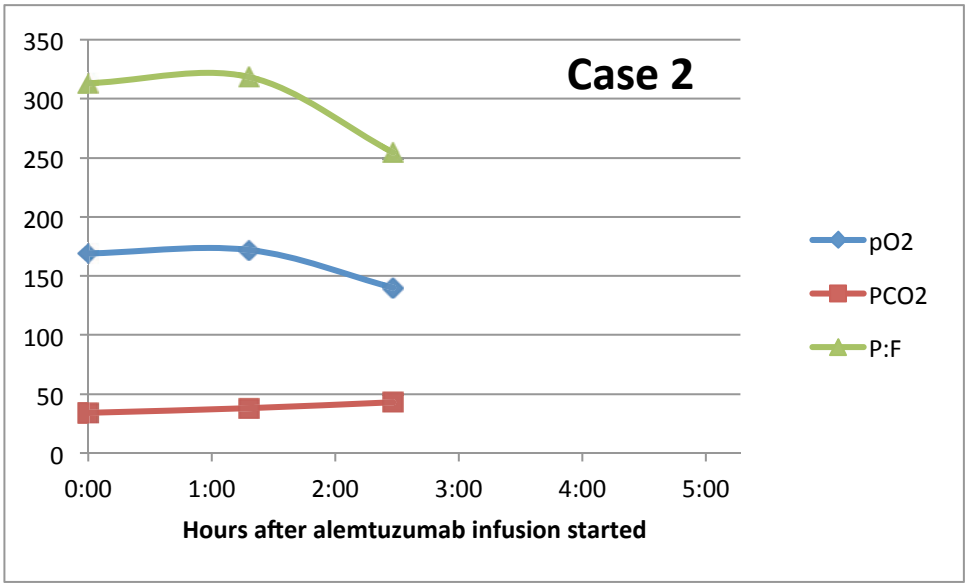

Case 1
400
350
300
250
200
150
100
50
0
0:00
1:00
2:00
3:00
4:00
5:00
Hours after alemtuzumab infusion started
pO2
pCO2
P:F

Fig. 2


Case 2
350
300
250
200
150
100
50
0
0:00
1:00
2:00
3:00
4:00
5:00
Hours after alemtuzumab infusion started
pO2
PCO2
P:F

Poster 35

Improving Nutrition Practices at the Time of Tracheal Extubation in the ICU: The Extubation Safety Quality Improvement Project

David Dorsey, M.D.; A. Joffe, M.D.; N.D. Yanez, Ph.D.; A. Dagal, M.D.; J.E. Sunshine, M.D.; M.M. Treggiari, M.D.
University of Washington

Background: Removal of the endotracheal tube in the intensive care unit (ICU) is commonly associated with undesired events including interruption of enteral nutrition and increased serum glucose variability, as well as failed extubation leading to re-intubation. Re-intubation following planned extubation is independently associated with poor outcomes, including ventilator associated pneumonia, increased length of stay and death. In the context of a quality improvement (QI) initiative in a cohort of mechanically ventilated ICU patients (medical, surgical, and neuroscience) of one large academic medical center, we implemented an extubation safety algorithm to improve extubation safety, reduce the occurrence of re-intubation, enteral nutrition interruptions and glycemic instability.

Methods: Eligible ICU patients were prospectively enrolled into pre and post-intervention cohorts over two consecutive six-month periods separated by a two-week rollout period. The QI intervention consisted of education of designated ICU team leaders who then disseminated the ICU extubation algorithm. We compared frequencies of re-intubation, tracheostomy, enteral feed interruptions and glycemic events in the peri-extubation period between the pre and post-intervention cohorts.

Results: During the study period, 934 patients were included in the baseline period and 799 patients during the QI implementation period. Out-of-operating room re-intubation was required for 20% of baseline patients compared to 18% in the post-intervention group (p = 0.24), with a reduction seen in the occurrence of tracheostomy (Table 1). Among patients receiving enteral nutrition, the interruption of continuous feeds in the 24 hours preceding extubation was 7.9 Â± 2.8 hrs in the baseline period (n=428) and 5.8 Â± 1.6 hrs in the QI implementation period (n=369) (P=0.52). A significant decrease in the use of IV dextrose and a trend toward reduced insulin needs was observed in the QI implementation period. There were no significant changes in post-extubation aspiration events, mean glucose level or hypoglycemic events between the two study periods.

Discussion: The use of an ICU extubation safety algorithm led to similar occurrences of failed extubation and reduced tracheostomy procedures, with an overall increase in the proportion of patients successfully extubated. Although non-significant, nutrition interruption and insulin use tended to be reduced, and use of IV dextrose decreased. These changes were not accompanied by an increase in aspiration or hypoglycemic events. It cannot be determined definitively if these observed changes are due to the QI-intervention or unrelated differences in study cohort characteristics or in clinical practice.

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Table 1: Results

Outcome Variables	**Pre-intervention**	**Post-intervention**	**P value**
Patients requiring re-intubation, n (%)	179 (19.9)	146 (18.3)	0.24
Patients undergoing tracheostomy, n (%)	43 (4.4%)	20 (2.0%)	0.03
Aspiration events, n (%)	4 (0.9%)	1 (0.3%)	0.31
Hours of pre-extubation feed interruption[a], mean (SD)	7.9 (2.8)	5.8 (1.6)	0.52
Pre-extubation IV 5% dextrose use (mL), mean (SD)	1130 (43)	980 (46)	0.02
Post-extubation IV 5% dextrose use (mL), mean (SD)	1230 (49)	1012 (46)	<0.01
Pre-extub. Hypoglycemia[b], n (%)	10 (1.1)	6 (0.8)	0.49
Post-extub. Hypoglycemia[b], n (%)	3 (0.4)	4 (0.5)	0.57

[a]The pre-extubation period is 24 hours prior to extubation and the post-extubation period is 24 hours after extubation.
[b]Hypoglycemic events defined as glucose less than 70 mg/dL

Poster 36

To Bleed or Not to Bleed: The Role of FEIBA in Post-Operative Bleeding Patients

Jessica L Hobbs, M.D.; Samuel M. Galvagno, D.O., Ph.D.
University of Maryland Medical Center

Acquired Factor VIII inhibition presents a dilemma in the bleeding post-surgical patient. While the mainstay of therapy is treatment with high dose corticosteroids, this can be detrimental to surgical healing. An alternative treatment for refractory bleeding in these patients is FEIBA (Factor VIII inhibitor bypassing factor). While the exact mechanism of action is unknown, it is thought the site of action is the prothrombinase complex in which prothrombin is converted to thrombin by FXa. FEIBA has mostly been reported to have been used in patients with known Factor VIII deficiency, but has not often been reported in literature to be advantageous in patients with acquired factor VIII inhibitor. We report its use on a patient with factor VIII inhibitor acquired after renal transplant with bleeding secondary to central line placement refractory to standard treatment.

A 37 year-old man with history of end stage renal disease status post cadaveric renal transplant developed graft infection and underwent a transplant nephrectomy. He was discharged home on antibiotics but was non-compliant and was re-admitted to an outside hospital with MSSA sepsis. There, a subclavian central line was placed traumatically, and during the course of admission the patient developed stridor and shortness-of-breath requiring intubation. A CT of the chest was done showing mediastinal mass. A mediastinoscopy was performed showing evidence of mediastinal hematoma and esophageal perforation, likely secondary to traumatic central line placement, and the patient was transferred to our institution. A repeat CT showed extensive blood in the chest and the patient underwent VATS procedure to evacuate the hematoma and repair the esophagus emergently. Chest tubes were left in place for further drainage.

Post-operatively, the patient developed extensive bleeding from the subclavian site into the thorax. Coagulation studies showed an isolated elevated PTT. Extensive blood products including FFP, HLA matched platelets, and cryoprecipitate were given without resolution of bleeding. Hematology was consulted and mixing studies were sent showing the patient had a probable factor VIII inhibitor, likely secondary to his immunosuppression from his renal transplant. It was recommended that the patient be started on corticosteroids, but secondary to his large incision and recent surgery, the decision was made to defer this treatment.

During the course of his admission, the patient received well over 100 units of FFP, red cells, and platelets, as well as vitamin K without reversal of his coagulopathy. At this time the decision was made to trial FEIBA in conjunction with FFP drip. The patient received 3 transfusions of FEIBA with vast improvement of symptoms despite PTTs that remained elevated. Once chest tube output decreased, they were removed and the patient extubated. He was discharged to home approximately 1 month after admission.

This case illustrates the importance of recognizing rare causes of bleeding in the post-surgical patient. When traditional therapy for hemorrhage fails, it is important to determine the cause for refractory bleeding so specific therapy can be used and unnecessary treatments and transfusions can be avoided.

Poster 37

Use of ECMO as Rescue Therapy for TRALI

Hani Murad, M.D.; Arnaldo Vera-Arroyo, M.D.; Miguel Cobas, M.D.; Ricardo Martinez-Ruiz, M.D.
University of Miami

Transfusion-related acute lung injury (TRALI) is the leading cause of transfusion-related mortality in the United States(2). Management is usually supportive, including supplemental oxygen, intravenous fluids, and mechanical ventilation if necessary. Most patients recover within 72 hours(1). We present a nearly fatal case of TRALI in a patient with non-ischemic cardiomyopathy(NICMP) undergoing left ventricular assist device (LVAD) placement, which was successfully managed with extracorporeal membrane oxygenation (ECMO).

Case: Patient is a 56-year-old male with history of NICMP, EF of 10% as per ECHO, s/p AICD placement in 2010, s/p stem cell transendocardial injection (POSEIDON Trial) in 2012, HTN, CVA anticoagulated with Rivaroxaban, who was admitted for advanced management of heart failure, after episode of ventricular tachycardia and pulmonary edema. Patients condition continued to deteriorate, requiring inotropic support and eventual placement of Impella CP. (NYHA 4, INTERMACS Profile 1) At this time patient was taken to the operating room for placement of LVAD (Heart Ware) device as mechanical cardiac support for bridge to transplant. Intraoperatively in the closing stages of the operation while receiving packed red blood cell transfusions (PRBC) the patient acutely decompensated, becoming hypotensive and hypoxemic. The patient also developed elevated pulmonary artery (PA) pressures, elevated peak inspiratory pressures(PIP), and pink frothy fluid was evident from the endotracheal tube and into the circuit. At this point the right ventricle demonstrated significant dysfunction. Supportive therapy was initiated with inotropic agents, vasopressors, nitric oxide and recruitment maneuvers. Due to the patients limited response as well as diminished LVAD flows the decision was made to initiate ECMO. ECMO cannulas were placed in the pulmonary artery and right atrial appendage. After initiation of ECMO the patient responded with an increase in pulse oximetry, stabilizing hemodynamics, lower PA pressures, and evidence of improving right ventricular function.

In the ICU the patients course was complicated by coagulopathy requiring multiple blood product transfusions to correct, acute renal injury requiring continuous hemodialysis, as well as continued hemodynamic instability requiring inotropic/vasopressor infusions. However lung protective strategies were able to be implemented allowing lung recovery due to ECMO use. Over the next 6 days the patient was able to weened from ECMO and decannulated in the OR, where he also underwent placement of right sided tandem heart (CardiaAssist) due to continued poor right ventricular function.

Discussion: TRALI can be caused by plasma-containing blood products, including PRBC's(1). Laboratory diagnosis in TRALI is unreliable. A high degree of suspicion is necessary to make the early clinical diagnosis. Over 70% of patients with TRALI require mechanical ventilation. Although the optimal method of ventilation has yet to be established, the use of lung protective strategies seems warranted. In this case ECMO was initiated to manage the life-threatening hypoxemia. Since TRALI is usually a self-limiting process, ECMO may be well suited to the management of the most severe cases by providing oxygenation while allowing the lungs to recover. Early use of ECMO enabled reduction of FIO2 and PIP and can prevent ventilator-induced lung injury(3,4).

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Poster 38

Use of Hypothermia after Asystole in a Patient Struck by Lightning

Dheer A. Vyas, M.D.; Andrew Springer, M.D.
The Ohio State University

Introduction: Patient is a healthy 54 year old fire lieutenant who was struck by lightning. EMS found him down in asystole; he was intubated and after 5 minutes of ACLS had return of spontaneous circulation. Upon arrival to the ER, he had a Glasgow coma score of 3T and 1% full thickness burn to his chest. He was admitted to the ICU for further management including hypothermia protocol for neuro-protection.

Presentation: After placing a heat exchange catheter, inducer and administering cold normal saline, the patient was cooled to 33C 5 hours post-arrest. He was placed on continuous electroencephalogram (EEG), which suggested severe encephalopathy. After being rewarmed 24 hours after achieving goal temperature, he remained in a coma without sedation or paralytics. The EEG however showed improvement; his brain/spine MRI were unremarkable. The patient started to open his eyes spontaneously on day 4, but had no other function. Neurology performed somatosensory evoked potential (SSEP) and brainstem evoked potential (BAER) testing. SSEP study showed disruption of somatosensory pathway proximal to the brachial plexus bilaterally and BAER testing suggested intact auditory conduction, pointing to perhaps a peripheral injury. EMG study did not, however, show peripheral denervation.

Patient had no further neurologic progress for the remainder of his hospital course. He received a tracheostomy, feeding tube, and was transferred to an extended care facility on hospital day 25. Three months after discharge, per an anecdotal report from a family member, he has made neurological advances and is able to ambulate on his own.

Discussion: Mortality in patients with out-of-hospital cardiac arrests (OHCA) exceeds 90%; patients who have a non-shockable rhythm have a poorer outcome (versus shockable) (1). The National Weather Service estimates 70 deaths secondary to lightning strikes in the US every year; death is primarily due to cardiac arrest. There are randomized control trial studies that show improved neurologic outcome and reduced mortality in adults resuscitated from OHCAs who were cooled to 32-34C for 24 hours (4). However, these trials were based on patients who had initially shockable rhythms â€“ ventricular fibrillation/ ventricular tachycardia (VF/VT).

VF/VT account for only 25% of OHCAs (1). Two randomized clinical trials showed higher survival rate at 6 months in non-VF/VT arrests that were cooled versus controls (N= 44 patients) (4). There are multiple observational studies as well but have yielded conflicting results. Kim et al.'s meta-analysis using these 2 randomized trials and 12 observational studies concluded that hypothermia was associated with reduced mortality for patients resuscitated from non-VF/VT cardiac arrest, but also warned that the evidence is of low quality and there is substantial bias (2). Pooling observational studies' data showed that hypothermia in this population **"was** associated with a 15 % reduction in hospital mortality and with a minimal, albeit significant improvement in neurological outcome at discharge." (3)

Use of therapeutic hypothermia in non-VF/VT cardiac arrest patients should be evaluated on a case by case basis. Our patient was healthy and had no contraindications to hypothermia (cryoglobulinemia, intracranial hemorrhage, or severe arrhythmias). He survived and improved neurologically.

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Poster 39

Comparison of the Effect of Preoperative MELD and MELD-Na Scores on Outcome After Liver Transplantation

Gebhard Wagener, M.D.; Taryn K. Lai, BA
Columbia University

Introduction: The United Network for Organ Sharing (UNOS) and the Organ Procurement and Transplantation Network (OPTN) recently changed the criteria for allocation of liver transplant graft from the MELD score to the MELD-Na score1. The MELD-Na score is a modification of the MELD score that includes sodium levels and correlates better with waitlist mortality than the traditional MELD score1. Little is known about the effect of preoperative MELD-Na score on outcome after liver transplantation.

Methods: We retrospectively compared the effect of MELD and MELD-Na scores on 90-day and 1-year mortality/graft failure after liver transplantation. MELD-Na was calculated as per UNOS policy: MELD-Na = MELD + 1.32 x (137-Na) â€“ [0.033 x MELD*(137-Na)] for any MELD score >11.

Results: 610 patients undergoing liver transplant from xx to xx were included in this study. The MELD-Na scores were significantly higher than the MELD scores (22.6 +/â€“12.1 vs. 21.21 +/â€“10.5, p<0.0001). In 91 patients MELD-Na was â€“1.5 +/â€“ 0.8 points lower than MELD score and in 285 patients MELD-Na was 2.8 +/â€“ 2.1 points higher than the MELD score (see figure).

MELD-Na and MELD scores were higher in patients who died or required re-transplantation within 90 days (n=41) and 1 year (n=95). The areas under the curve of the receiver operator characteristics curves of MELD and MELD-Na to predict 90-day and 1-year mortality/graft failure were not different (see table).

Discussion: MELD-Na scores were higher than MELD scores. This may impact the availability of grafts, especially for patients who receive exception points for cancer, for example.

The preoperative MELD-Na score did not improve the predictive power of MELD score on post-liver transplant outcome. The definitive impact of MELD-Na on waitlist mortality and outcome after liver transplantation will only be obvious after the introduction of the UNOS rule change.

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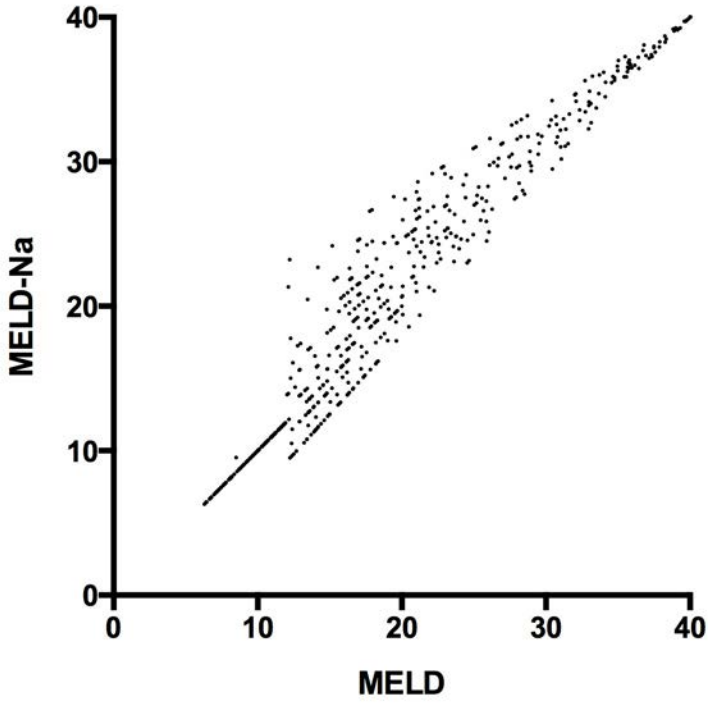
Table
Areas under the curves (and 95% CI) of the ROC curves to predict 90-day and 1-year mortality/graft failure.

	MELD	MELD-Na
90-day Mortality/graft failure	0.671 (0.581 to 0.761)	0.677 (0.590 to 0.765)
1 year Mortality/graft failure	0.615 (0.55- to 0.679)	0.615 (0.551 to 0.680)



Poster 40

The Best Head Angle for Central Line Placement: A New Approach

Thomas Jan, M.D., MPH; Vincent DeAngelis, M.D.; John T. Denny, M.D.; Darrick Chyu, M.D.; Alann Solina, M.D.
Rutgers Robert Wood Johnson Medical School

Introduction: The internal jugular vein (IJV) is frequently utilized for both venous access and monitoring purposes in the perioperative period. Ultrasound guided techniques have improved the efficiency and safety of IJV cannulation. The relationship between head rotation and the relative anatomy of the right IJV and the carotid artery (CA), as it pertains to the safety of IJV cannulation, has not been elucidated. Thus, optimal positioning of the head remains controversial. The aim of this study is to determine the degree of head rotation that creates the maximal anatomical separation between the right IJV and the CA. Cannulation of the IJV in a head position that maximizes its separation from the CA may lead to a decreased incidence of CA puncture or cannulation.

Methods: After IRB approval, informed consent was obtained from 50 patients in 2013-2014. Subjects included in the study were patients over 21 years of age undergoing cardiac surgery. All patients were placed supine, with Trendelenburg positioning at 15Â°. With the patient's neck in neutral position, a Sonosite US probe was placed on the patient's right side of the neck, 3cm above the clavicle, with the probe perpendicular to the bed and in line with the sagittal axis of the patient. The image containing the IJ and CA was captured, and measurements were done using a digital caliper. The distance between the vessel centers, the closest distance between vessel edges, the RIJV diameter, and the CA diameter were measured. In addition, unencumbered vertical distance and horizontal distance were measured, which were defined as length of vein that did not overlap with the CA in the vertical and horizontal plane, respectively. These values were reported as a percent of the IJ exposed. All of the measurements were performed with the patient's head at -15Â°, 0Â°, 15Â°, 30Â°, 45Â°, 60Â°, 75Â°, and 90Â°.

Results: Measurements for all 50 patients were averaged at every head angle and are tabulated in Table 1. With the patient head at 0Â°, the distance between the centers of the RIJV and the CA was 1.19Â±0.04 cm. The distance between the edges of the IV and CA at 0Â° was 0.16Â±0.03 cm. The IJ diameter and CA diameter at 0Â° were 1.31Â±0.07 cm and 0.76Â±0.02 cm respectively. All of the above were not statistically different among different head angles. At 0Â°, 87.2%Â±2.9 of the IJ was unencumbered laterally and 37.2%Â±3.9 of the IJ was unencumbered vertically. There was no statistical difference between the different head angles laterally, but there was a difference between the groups vertically ($p<0.01$). Unencumbered vertical distance was different between 75Â° vs. 0Â°, and 75Â° vs. 15Â°. At 75Â°, 60.3%Â±5.3 of the IJ was unencumbered vertically. It is important to note that only 72% of the patients were able to position their head at 75Â° and 54% of the subjects were able to position their head at 90Â°. All statistical analyses were done using ANOVA with the Tukey test as a post-hoc analysis where appropriate. SPSS (version 21.0) was used.

Conclusion: Our study attempts to determine the optimal head position for inserting right IJ central lines. We did not find a difference between the head angles with regard to IJ to CA distance, IJ diameter, CA diameter, or lateral unencumbered distance. However, we did find that the IJ was more vertically unencumbered at 75Â° versus 0Â° and 15Â°, indicating that the IJ may become more separated from the CA at more extreme head angles. However, we found that patients were less able to position their head at these extreme angles. Our study is notable because it describes a new method of assessing access to the internal jugular vein by ultrasound: describing the unencumbered distance of the IJ, both horizontally and vertically.

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Table 1: Tabulated measurements of all subjects at all head angles

	Degrees								
	-15	0	15	30	45	60	75	90	p-value
Distance from center of artery to vein (cm) (SD)	1.10 (0.04)	1.19 (0.04)	1.18 (0.04)	1.14 (0.05)	1.15 (0.04)	1.12 (0.05)	1.09 (0.04)	1.06 (0.04)	0.455
Distance from edge of artery to vein (cm) (SD)	0.15 (0.02)	0.16 (0.03)	0.15 (0.03)	0.14 (0.02)	0.16 (0.03)	0.11 (0.02)	0.13 (0.02)	0.12 (0.03)	0.849
Carotid Artery diameter (cm) (SD)	0.74 (0.02)	0.76 (0.02)	0.76 (0.03)	0.77 (0.02)	0.72 (0.03)	0.71 (0.03)	0.73 (0.03)	0.71 (0.03)	0.937
Internal Jugular Vein diameter (cm) (SD)	1.28 (0.08)	1.31 (0.07)	1.35 (0.06)	1.36 (0.07)	1.39 (0.07)	1.34 (0.07)	1.26 (0.06)	1.32 (0.09)	0.465
Percent Unencumbered Lateral Distance (%) (SD)	83.1 (3.1)	87.2 (2.9)	86.4 (2.7)	81.7 (3.2)	81.9 (3.4)	81.6 (3.7)	75.3 (4.4)	76.8 (4.1)	0.213
Percent Unencumbered Vertical Distance (%) (SD)	41.5 (4.5)	37.2 (3.9)	40.3 (3.8)	44.4 (3.9)	46.5 (4.3)	45.4 (4.9)	60.3 (5.3)	54.7 (5.2)	0.01

Poster 41

Promoting Perioperative Advance Care Planning: A Systematic Review of Advance Care Planning Instruments

Rebecca A. Aslakson, M.D., Ph.D. [1]; Anne Schuster, MS[2]; Jessica Reardon, D.O.[3]; Judith Miller, AIA, CDT[4]; Matthew Weiss, M.D. [1]; John FP Bridges, Ph.D.[2]
The Johns Hopkins School of Medicine[1]; The Johns Hopkins Bloomberg School of Public Health[2]; The Johns Hopkins Hospital[3]; Patient-family stakeholder co-investigator[4]

Introduction and General Purpose of the Study: As nearly all patients are incompetent to make decisions while receiving anesthesia, perioperative advance care planning (ACP) could be useful, particularly should the patient become incapacitated during the perioperative period. Moreover, perioperative ACP could better empower patients to receive care that is consistent with their goals, entrust surgeons to offer the surgeries that are most appropriate in achieving those goals, and empower anesthesiologists to devise perioperative plans that respect and advocate for those goals. The objective of this study is to identify possible instruments to promote perioperative ACP, to describe research findings, and to discuss further steps in developing an ACP instrument specifically targeted for a perioperative population.

Methods: Using predefined search terms, researchers searched PubMed, EMBASE, Cochrane, SCOPUS, Web of Science, CINAHL, PsycINFO, and Sociological Abstracts for studies that evaluated ACP instruments among perioperative adult and general adult populations. Studies were reviewed against inclusion criteria and data was abstracted and risk of bias was assessed for included studies.

Results and Major Findings: The literature search identified 5,327 articles, 39 of which met inclusion criteria (Figure 1). These studies evaluated video, paper, audio, computer, or multi-component instruments to promote ACP. No instruments were evaluated in a perioperative patient population; the majority of instruments were evaluated in outpatient ambulatory populations (n=28), primarily of older adults (n=19) (Table 1). Over 50 unique outcomes were reported and, through prioritization of outcomes by a designated patient/family member co-investigator, they were conceptualized into four categories (Figure 2): informed treatment choice, ACP status, opinion regarding ACP instrument, and patient-centered outcomes (PCOs). ACP instruments decreased preferences for aggressive interventions (such as cardiopulmonary resuscitation), increased discussion and completion of written advance directives, were universally well-tolerated, and reduced decisional conflict and uncertainty.

Conclusion: No existing instrument-based ACP aids were developed for or evaluated in a perioperative population, although findings from these studies are likely generalizable to perioperative populations and may be used to inform the style and content of a perioperative ACP aid. As instruments were universally tolerated, increased ACP discussions between patients and family members and/or clinicians, and reduced decisional conflict and uncertainty among patients and family members, an ACP instrument specifically designed for a perioperative population is likely both feasible and useful. Further research is needed to develop such an instrument and to evaluate instrument efficacy in a perioperative population.

Table 1. Characteristics of studies assessing instrument-based aids for advance care planning

Characteristic	No. (%) of 39 Articles
Study design	
Randomized controlled trial	22 (56.4)
Nonrandomized controlled trial	4 (10.3)
Pre-post study	13 (33.3)
Country of origin	
USA	31 (79.5)
Canada	6 (15.4)
European Countries	1 (2.6)
Asian Countries	1 (2.6)
Year of publication	
1990 – 1999	11 (28.2)
2000 – 2009	13 (33.3)
2010 – 2014	15 (38.5)
Population	
Cancer	5 (12.8)
Dementia	7 (17.9)
COPD/lung disease	3 (7.7)
ESRD	1 (2.6)
HIV	1 (2.6)
ALS	1 (2.6)
Life threatening illness (not defined)	2 (5.1)
General population	19 (48.7)
Age	
19 – 50	1 (2.6)
50 – 65	16 (41.0)
>65	19 (48.7)
Not reported	3 (7.7)
Race/Ethnicity (where makes up greatest % of population)	
White	24 (61.5)
African American	3 (7.7)
Latino	1 (2.6)
Not reported/collected	11 (28.2)
Setting	
Ambulatory	28 (71.8)
Inpatient	3 (7.7)
Nursing home	4 (10.3)
Senior citizen center	2 (5.1)
Rehabilitation center	1 (2.6)
Not specified	1 (2.6)

Poster 42

Treatment Of Refractory Ventricular Arrythmias With Dexmedetomidine: Two Case Reports

Ashley Quan, M.D.; John H. Turnbull, M.D.
University of California, San Francisco

Introduction: Various sedatives, including propofol, benzodiazepines and opioids, are frequently administered to patients experiencing recurrent ventricular tacchyarrhythmias, a clinical syndrome termed VT storm. Several case reports describe the use of dexmedetomidine, a potent alpha-2 agonist, for termination of tachyarrhythmias in the pediatric population. We describe two cases of termination of recurrent ventricular tachycardia following the addition of dexmedetomidine in adult patients with ischemic cardiomyopathy.

Case Report 1: A 79-year-old man with a history of ESRD on HD, CHF with an EF of 15%, and CAD was admitted to the ICU following a cardiac arrest at home due to an in-stent thrombosis of a recently placed bare metal stent. Following revascularization, the patient developed recurrent episodes of unstable ventricular tachyarrhythmias requiring multiple rounds of ACLS and chemical cardioversion. Despite multiple anti-arrhythmics, the patient continued to have daily episodes of unstable ventricular tachycardia. In attempt to avoid intubation, a dexmedetomidine infusion at 0.4 mcg/kg/min was initiated followed by stabilization of his cardiac rhythm. Despite aggressive medical management, the patient's overall condition worsened and he was transitioned to comfort care.

Case Report 2: A 66-year-old man with severe multi-vessel CAD and ischemic cardiomyopathy with an EF of 15% presented to the ED with >100 ICD discharges in 24 hours. Despite multiple, high dose anti-arrhythmic infusions, recurrent unstable ventricular tachycardias continued. Following the addition of a dexmedetomidine infusion at 0.6 mcg/kg/min, the occurrence of arrhythmic events significantly decreased and allowed the patient to participate in physical therapy. Subsequent weaning of the infusion led to an increase occurrence of unstable ventricular tachycardia. Therefore, the infusion was restarted and continued until the patient received a Heartware LVAD as a bridge to transplant.

Conclusions: We describe two cases of adult patients with ischemic cardiomyopathy and refractory ventricular tachyarrhythmias that responded to the addition of low-dose dexmedetomidine infusions. It is hypothesized that the antiarrhythmic effect is due to a combination of attenuated adrenergic tone via decreased norepinephrine release and prolonged repolarization and refractory period via enhanced vagal activity. Unlike propofol and fentanyl infusions that are administered for recalcitrant tachyarrhythmias, dexmedetomidine provides analgesia, sedation and suppression of adrenergic activity without requiring endotracheal intubation. Such patients avoid the risks of mechanical ventilation while allowing participation in activities such as physical therapy. Further studies and prospective trials are needed to define more clearly the role of dexmedetomidine in the prevention and treatment of malignant arrhythmias.

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Poster 43

Analysis of an Electronic Algorithm for Guidance in Diagnostic Testing of Patients with Suspected Pulmonary Embolism

Ashley R. Donaldson, M.D.; Scott M. Stevens, M.D.; Scott C. Woller, M.D.
Intermountain Medical Center

Background: Pulmonary embolism (PE) is a disease potentially associated with high morbidity and mortality that presents with protean signs and symptoms. Computed tomography (CT) pulmonary angiogram is a frequently ordered diagnostic test for PE and is an invasive procedure that exposes patients to additional risks, including radiation. Recommendations in the choice of diagnostic testing for suspected PE have previously been constructed based on results from the Prospective Investigation of Pulmonary Embolism Diagnosis II trial (PIOPED II). Excessive diagnostic testing may be decreased by assessing individual clinical scenarios using pretest probability of pulmonary embolism and applying them to an algorithm for additional diagnostic testing based on these recommendations. ePE is an algorithmic protocol that determines the pretest probability of PE and guides physicians in selecting further testing. We seek to describe the performance of ePE, report the rate of guideline adherent diagnostic testing using ePE, and assess the safety of ePE as a clinical decision support tool.

Methods: Manual chart review was used to analyze data from 255 patients entered into the ePE system in the emergency department at participating centers from June 25, 2014 to July 28, 2014. The revised geneva score (RGS) of each patient was calculated and compared to that generated by ePE as well as the 30 and 60 day incidence of pulmonary embolism in those patients not diagnosed with PE on initial presentation. Historical data on CT pulmonary angiogram utilization prior to ePE implementation was used for comparative analysis.

Results: A total of 57 of 83 CT pulmonary angiograms (68.7%) followed the recommendations of PIOPED II investigators. The remaining 26 CT pulmonary angiograms were performed on patients with an RGS â‰¤ 10 without a D-dimer (n=24) or after a negative D-dimer test result (n=2). Of the 26 CT pulmonary angiograms which did not follow guidelines, 6 patients had a diagnosis of pulmonary embolism (23.1%). Both the 30 and 60 day incidence of PE among patients for whom the suspected diagnosis of PE was refuted using the ePE protocol was 0%. Historical data collected at the same institutions prior to the development of ePE demonstrated a 45.5% adherence to PIOPED II guidelines. In comparison, ePE has increased PIOPED II guideline adherence by 23.2%.

Conclusions: The implementation of an algorithmic protocol for guiding diagnostic testing in patients with suspected pulmonary embolism increased adherence to PIOPED II recommendations, thus decreasing unnecessary CT pulmonary angiogram utilization, without decreasing diagnostic efficacy or patient safety. Future studies include an ongoing analysis of adherence to diagnostic guidelines using ePE. Given the significant decrease in unnecessary CT pulmonary angiogram utilization, protocol developers may seek to expand ePE with the addition of anticoagulant treatment and disposition guidelines.

Poster 44

Evolving Perceptions of Safety in a Surgical Intensive Care Unit

Jason Brainard, M.D.; Josianna Schwan, MSIV
University of Colorado

Patient safety and quality improvement have been increasingly recognized as important goals for physicians and all bedside providers in the hospital setting.(1) The assessment of provider perceptions of patient safety is especially important as it works to identify the most important site-specific safety issues in a patient care unit. One year ago, we sent an open ended two question electronic survey to all multidisciplinary providers in an academic surgical intensive care unit (SICU). The survey was based on material from the nationally recognized Comprehensive Unit-Based Safety Program(2) and designed to assess perceptions of patient safety specific to the SICU. The initial survey identified inadequate communication as the most common patient safety concern in the unit. Based on these results, a communication tool was developed, and a quality improvement project was launched focused on improving interdisciplinary communication.

This study evaluates the evolving perceptions of safety issues in a SICU one year after the initial survey and following implementation of a multidisciplinary communication tool.

A cross-sectional two-question survey was administered electronically to a multidisciplinary group of bedside providers in the SICU. The survey utilized REDCap(3) database software and was administered over a four week period. Responses were anonymous, with no identifying characteristics collected from respondents with the exception of profession.

A total of 75 surveys were completed electronically by providers in the SICU. 67% of respondents were physicians (intensivists, surgeons, and consultants), 24% were critical care nurses, and 9% were other interdisciplinary team members (PT/OT, pharmacists, respiratory therapists, dieticians, and other staff). In this follow-up survey, inadequate communication was again noted as the most common patient safety concern with 43% of providers listing this response. This was compared to 14% in the previous survey. The most common type of communication concern cited was inadequate communication between the intensivist and surgical teams (50%). The second most common response on the follow-up survey was hospital acquired infection at 13%.

The follow-up survey was administered one year after the initial survey and 6 months after full implementation of the communication tool and quality improvement project. The results demonstrate a further increase in provider perceptions of inadequate communication error as a prominent patient safety concern. Although multiple confounding factors may have influenced this change in perception, we propose that the implementation of a communication tool in the SICU may have increased awareness of inadequate communication as a risk to patient safety. This increased awareness ideally reflects a culture change that empowers providers to prioritize the improvement of communication in the unit, therefore improving patient safety. We further recognize that insufficient communication continues to be a valid concern in our multidisciplinary unit. Although the communication tool and corresponding quality improvement project have made some improvements in patient care, we are planning on further projects to assess this continued concern.

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Poster 45

Long-term Mortality of Individuals with In-Hospital Acute Kidney Injury

Martin I. Sigurdsson, M.D., Ph.D.[1]; Thorir E. Long, B.Sc.[2]; Olafur S. Indridason, M.D., M.H.S.[3]; Gisli H. Sigurdsson, M.D., Ph.D. [3]
Brigham and Women´s Hospital/Harvard Medical School[1]; University of Iceland[2]; Landspitali University Hospital[3]

Background: Acute kidney injury (AKI) complicates a substantial number of hospitalizations. We studied the long-term mortality of individuals with in-hospital AKI (hAKI) and compared trends in mortality and renal recovery over 20 years in a large population-based cohort.

Methods: Using computer scripts we reviewed 1.930.541 serum creatinine (SCr) values from 226.405 individuals measured at Landspitali University Hospital in Iceland between June 1st 1993 and May 31st 2013. For each individual we identified their highest SCr and the lowest SCr (baseline SCr) in the preceding six months. We defined AKI by the creatinine-portion of the RIFLE classification into stages 1, 2 and 3 based on a ratio of highest and baseline SCr of 1.5-2.0, 2.0-3.0 and higher than 3. Individuals with baseline SCr of â‰¥4 mg/dL and rise of more than 0.5 mg/dL were also classified having stage 3 AKI. For this analysis, only individuals with their highest SCr during hospital admission were included. We estimated baseline glomerular filtration rate (eGFR) using the M.D.RD formula and used eGFR to stage chronic kidney disease at baseline. We used ICD9/10 diagnoses to classify comorbidities. We compared survival using both Cox proportional hazard modeling and a Kaplan-Meier comparison of the group with hAKI and a control group based on propensity score matching by age, gender, comorbid diagnoses, eGFR and year of diagnosis. Renal recovery was based on return of SCr to less than 1.5-fold baseline within a year of highest creatinine and by the end of follow-up measurements.

Results: A total of 25.274 individuals had both an available baseline SCr and their highest SCr during hospitalization. Of those, 10.419 (41%) had hAKI, 19%, 11% and 12% with stage 1, 2 and 3, respectively. Individuals with hAKI were significantly older (70 vs. 58 years, $p<0.0001$) and a higher proportion of them had a diagnosis of ischemic heart disease (33% vs. 18%, $p<0.0001$), cancer (29% vs. 11%, $p<0.0001$) and eGFR of less than 60 mL/min/1.73m2 (30% vs. 18%, $p<0.0001$). Survival was significantly worse for individuals with hAKI compared to control individuals ($p<0.0001$). Comparing long-term survival between individuals with hAKi and a propensity score matched control group, survival in the hAKI group was still significantly worse (Figure 1, $p<0.0001$). In a multivariate Cox proportional hazard model, hAKI had higher hazard of long-term mortality (HR 1.55, 2.02 and 2.78 for stage 1, 2 and 3 hAKI, respectively, $p<0.0001$ for all HR). Of those individuals with available SCr data one year after their hAKI, 97%, 91% and 85% achieved renal recovery for stage 1, 2 and 3, respectively. Both long-term survival and renal recovery for stage 3 hAKI improved during the study period.

Conclusions: hAKI is associated with significant mortality and morbidity and is an independent predictor of long-term mortality in this large population-based cohort. Survival and renal recovery have both improved in recent years, possibly indicative of improved treatment.

Poster 46

A Case Report of VV ECMO in a Non-Hodgkin Lymphoma Patient with Severe Respiratory Distress and PJP

Catherine Cook, M.D.; James Blum, M.D.
Emory University School of Medicine

Introduction and General Purpose of the Study: Veno-Veno Extracorporeal Membrane Oxygenation (VV ECMO) is a potentially effective treatment that improves oxygenation in patients that cannot be ventilated. It has been a longstanding treatment modality for severe respiratory failure in the pediatric population. ECMO in the adult population has been traditionally used to treat severe adult respiratory distress syndrome (ARDS). Since the 2009 H1N1 influenza pandemic, ECMO has gained wide acceptance and has been utilized in approximately 400 adult cases annually. Efficacy in the adult immunocompromised population with severe ARDS however remains controversial. We describe the case of an immunocompromised patient that received ECMO therapy and conduct a review of the literature.

Case Report: We reviewed the clinical course of a 42-year-old female with diffuse B-cell Non-Hodgkin lymphoma that was cannulated for VV ECMO and subsequently found to be suffering from Pneumocystis jirovecii pneumonia (PJP). We then conducted a review of the literature using medline to assess the viability of treating cancer patients with PJP with ECMO.

The patient presented one month after a routine, uncomplicated, autologous stem cell transplant with acute respiratory failure. Due to profound hypercarbia and hypoxemia on high ventilator settings, she was cannulated within 48 hours of being intubated. Despite having a low-normal absolute neutrophil count, she was ultimately diagnosed with PJP. Unfortunately her condition failed to improve after 504 hours of ECMO support despite extensive lung rest. She expired shortly after ECMO support was withdrawn. Pathology showed extensive fibrosis and edema of the lung parenchyma.

Conclusion: Review of the literature supports the use of ECMO in HIV patients with PJP. In case reports by De Rosa and Cawcutt, VV ECMO and HARRT therapy decreased the mortality rate in HIV patients with Pneumocystis jirovecii pneumonia (PJP). An analysis of the case studies published by De Rosa and Cawcutt show 75% (6 out of 8 cases) were successfully decannulated and 50% survived to hospital discharge. Data in the adult cancer population is lacking. ECMO therapy in adult immunosuppressed patients with cancer has limited information, but it is reasonable to expect high mortality in this population with failure of lung recovery.

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Poster 47

Comparison of OR Versus ICU Providers' Perception of Importance of Handoff Information at the Time of Patient Transfer

Erica Wittwer, M.D., Ph.D.; Vitaly Herasevich, M.D., Ph.D.; Brian Pickering, M.B., B.Ch.
Mayo Clinic

Introduction: Transfer of patient care (patient handoff) is required in our medical system. During this vulnerable time most medical errors are attributed to communication failures.1 As multiple patient handoffs occur, the accuracy of information decreases2 and in cardiac surgery 2.3 distractions occurred per minute during patient handoff.3 In an American Heart Association statement, patient handoffs had communication errors and many were believed to result in patient harm.4 In our institution the anesthesia provider completes a paper handoff form which is given to the ICU nurse on arrival to the ICU. While revising the form, we determined essential information is unknown and ICU providers may have different information needs than OR providers. This study was performed to gather data on what information is perceived to be necessary in patient handoff by OR versus ICU providers.

Methods: A survey was constructed with current handoff information as well as additional information suggested by providers from the OR and ICU, including 56 potential pieces of information. Study participants included anesthesiology residents, CRNAs, cardiac anesthesiologists, critical care anesthesiologist, ICU nurses, and ICU NPs/PAs. Participation in the survey was voluntary. A Likert scale was used to rank each piece of information with 7 being **"Essential»** and 1 being **"Not** needed".

Results: The survey was sent to 297 individuals with 134 responses (45%). To examine possible differences in perception of information importance the participants' responses were divided into two groups: OR and ICU. The information and average score can be seen in Figure 1. The five most essential pieces of information for OR providers were Procedure performed, Name, Invasive lines, Pacing wires, and Cardiac Index (CI) at closure and for ICU providers were CI at closure, Excessive bleeding, Pacing wires, Intubation difficulty, and Hemoglobin level. The average score given to items in the OR group was 4.6 and in the ICU group was 4.7.

Conclusions: Handoff periods are critical to patient care. Important information needs to be shared with non-critical information eliminated allowing providers to focus on and retain the information. OR and ICU providers have different work environments and priorities. This survey demonstrates that while some information is very important to both groups (CI at closure and Pacing wires) there are also important differences. There was not a significant difference in the average score given by one group versus the other. Using the data from this survey a more concise handoff tool can be developed that provides those working in the ICU with the information they need and eliminating less pertinent information.

Figure Legend

Figure 1: Potential handoff information and average importance as rated by OR providers and ICU providers Blue: OR providers, Red: ICU providers. Values are ratings of importance for inclusion into a handoff form on a scale from 7 (Essential) to 1 (Not needed).

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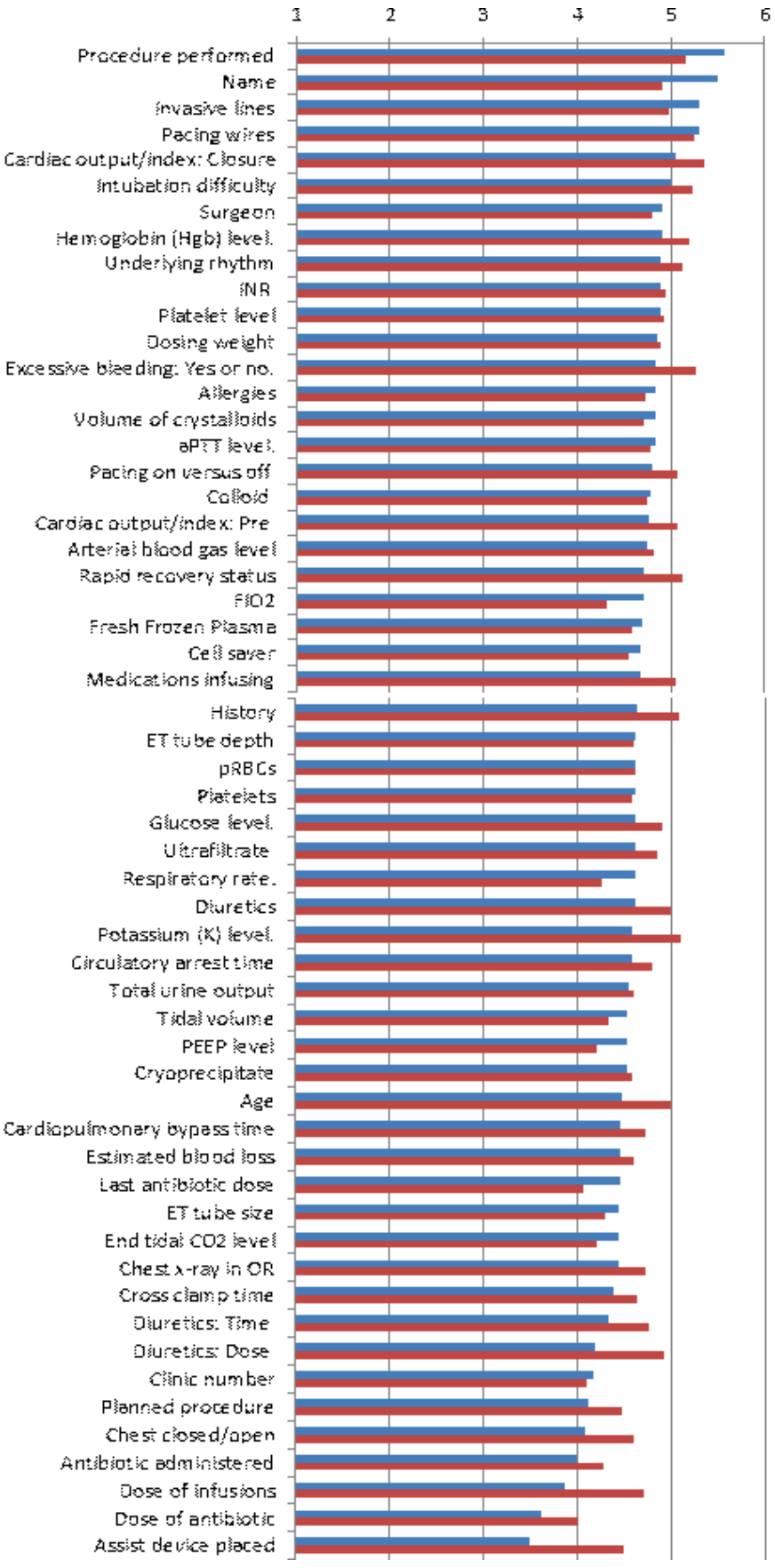
1
2
3
4
5
6
Procedure performed
Name
Invasive lines
Pacing wires
Cardiac output/index: Closure
Intubation difficulty
Surgeon
Hemoglobin (Hgb) level.
Underlying rhythm
INR
Platelet level
Dosing weight
Excessive bleeding: Yes or no.
Allergies
Volume of crystalloids
aPTT level.
Pacing on versus off
Colloid
Cardiac output/index: Pre
Arterial blood gas level
Rapid recovery status
FiO2
Fresh Frozen Plasma
Cell saver
Medications infusing
History
ET tube depth
pRBCs
Platelets
Glucose level.
Ultrafiltrate
Respiratory rate.
Diuretics
Potassium (K) level.
Circulatory arrest time
Total urine output
Tidal volume
PEEP level
Cryoprecipitate
Age
Cardiopulmonary bypass time
Estimated blood loss
Last antibiotic dose
ET tube size
End tidal CO2 level
Chest x-ray in OR
Cross clamp time
Diuretics: Time
Diuretics: Dose
Clinic number
Planned procedure
Chest closed/open
Antibiotic administered
Dose of infusions
Dose of antibiotic
Assist device placed

Poster 48

The Relationship Between Two Bedside Assessments of Circulating Volume and Directly Measured Total Circulating Blood Volume in Patients with Aneurysmal Subarachnoid Hemorrhage

Matthew W. Pennington, M.D., Ph.D.; Aaron M. Joffe, D.O.
Department of Anesthesiology and Pain Medicine, University of Washington, Harborview Medical Center, Seattle, WA

Introduction: Hypovolemia in the setting of moderate or severe cerebral vasospasm in patients with aneurysmal subarachnoid hemorrhage (SAH) increases the risk of delayed cerebral infarction (DCI). Thus, consensus recommendations are to maintain euvolemia. Our primary aim was to examine the correlation between 1) the change in calculated total body solute (an estimate of the extracellular fluid volume) over time and 2) the shock index (SI) at a single point in time with the change in directly measured blood volume (BV) over time and BV status at a single point in time.

Methods: The University of Washington IRB approved this retrospective study. All adult patients in whom a BV was measured while in the neuroscience ICU of a large academic medical center were included. BV was measured as part of routine care using iodinated I131 albumin injection and the BVA-100 (Daxor Corp, New York, NY). Total body solute (TBS) was estimated at the time of BV measurement by multiplying the calculated total body water (TBW) by the sum of the serum Na+ and K+ plasma concentrations. TBW on admit was estimated with Watson's formula (Medcalc) accounting for the patient's sex, height and weight. Daily water balance was estimated using nurse entered daily fluid balances. SI was calculated as heart rate/systolic blood pressure in mmHg. Absolute volumes and numbers representing total solute quantities were normalized as appropriate by dividing by patient mass. Data were analyzed with Excel for Mac 2011 (Microsoft, Redmond, WA). Linear regression was performed relating 1) repeated calculations of total body solute over time to repeated blood volume measurements in the12 patients who had more than one BV measurement, and 2) shock indices and total blood volume for each patient who had at least 1 BV measurement and is reported as a coefficient of variation (r2).

Results: Overall, 56 patients were included. BV ranged from 75-150% of ideal. Shock indices ranged from 0.3 to 1.1 mmHg-1min-1. SI and BV were not correlated ($r^2=0.054$, $p=.09$). Despite this, it appears that at values of shock index exceeding 0.85 mmHg-1min-1, the probability of hypervolemia becomes very small. Linear regression of change in total Na++K+ between measurements was very poorly correlated with change in blood volume between measurements ($r^2=.03$, $p=0.6$)

Conclusion: When used to assess the state of the ECFV, change in calculated TBS and SI did not correlate with total circulating BV. Knowledge of this uncertainty should inform our care plans in the neurosurgical ICU, where relying on these values to direct care could reasonably be expected to lead to unpredictable results.

Future Meetings

SOCCA 29th Annual Meeting and Critical Care Update

May 20, 2016
San Francisco Hilton, Union Square
San Francisco, California

SOCCA 30th Annual Meeting and Critical Care Update

May 5, 2017
Grand Hyatt Washington Hotel
Washington, DC

SOCCA 31st Annual Meeting and Critical Care Update

May 4, 2018
Hyatt Regency Chicago
Chicago, Illinois