19th Annual Anesthesia Winterlude Symposium

Improving Patient Safety & Outcomes & Anesthesia in Austere Environments

The Westin Hotel, Ottawa, ON
February 2 & 3, 2013

(http://www.anesthesia.org/winterlude)
Foreword

Welcome!
As the Chair of the 19th Annual Anesthesia Winterlude Symposium and on behalf of the University of Ottawa, Department of Anesthesiology, it is my privilege to welcome you to our annual anesthesia meeting to be held on the 2nd and 3rd of February 2013. This meeting is a great opportunity to meet up with old friends, make new ones and listen to some great speakers.

The theme of this year’s meeting is Improving Patient Safety & Outcomes & Anesthesia in Austere Environments. Once again we have a nice mix of topics- all contemporary, most cutting edge and some even controversial. There are plenary sessions dedicated to Trauma & Regional Anesthesia, Teaching and Training Overseas, Improving Patient Safety, and Improving Patient Outcomes. I hope that you will find the lectures; Problem based learning sessions and workshops stimulating and rewarding.

I would like to thank our eminent guest speakers, Ottawa faculty members and industry sponsors. It would not be possible to plan and run a meeting of this size without the support and contribution of these key players. This meeting is also result of a team effort and hard work of many people behind the scenes. Thanks are due to them and the other members of the Winterlude Planning Committee.

Finally, Winterlude is also one of most spectacular times of the year to visit Ottawa with the skating on the canal, ice sculptures and other festivities. I hope you will enjoy our meeting and welcome you to Ottawa.

Naveen Eipe, MD.
Winterlude Anesthesia Symposium Chair
Acknowledgements

This meeting was a result of a team effort and hard work from many people behind the scene. I would like to thank the following people for the extraordinary efforts, creativity and time:

Lynne McHardy, Meeting Coordinator and her support team;
Amber Belair
Michelle Fortier
Julie Ghatalia
Elaine Stinson
Tara Fuller
Leanne McHardy
Dr. Ian Zunder; who maintains the database.

I would like to thank our guest speakers for their work and time, as well as all University of Ottawa faculty members who participated in this event.

I am also grateful to our industry partners who graciously donated their equipment to be used during the workshops. We also recognize that our industry partners continue to provide unrestricted financial support during a recession. This type of support makes the running of this type of symposium affordable.

Finally, I would like to thank the members of the Winterlude committee for their support help and ideas.

Please complete the online evaluations as we use these to evaluate the current symposium and plan future meetings.

Hopefully, we will have a successful meeting and look forward to welcoming you back in 2014!

Naveen Eipe, MD.
Winterlude Anesthesia Symposium Chair
Planning Committee

Naveen Eipe
(Committee Chair)
John Earl Wynands
(Professor Emeritus)

Homer Yang
(Chair, Anesthesiology, University of Ottawa)
Mrs. Lynne McHardy
(Meeting Coordinator)

Viren Naik
Ashraf Fayad

Desiree Persaud
Patti Murphy

Gregory Bryson
Ian Zunder

Lucie Filteau
Chris Hudson

Ms. Amber Belair

Meeting Administration:

Winterlude Anesthesia Symposium
C/o Lynne McHardy
Department of Anesthesiology
University of Ottawa
C/o The Ottawa Hospital, Civic Campus
1053 Carling Avenue, B309 (Mail Stop 249C)
Ottawa, Ontario K1Y 4E9
Tel: 613-761-4940 Fax: 613-761-5032
Goals and Objectives for 2013 Anesthesia Winterlude Symposium

Conference Objectives:

The mandate of this conference is to focus on current peri-operative challenges and controversies encountered by anesthesiologists. The main objectives are to improve patient safety and outcomes and to study the practice of anesthesia in austere environments. The meeting aims to promote the introduction of cutting edge research, review standards of practice and facilitate learning needs of delegates.

Specific Objectives

Lectures:

- To review practice standards relating anesthesia in austere environments.
- To reflect on the challenges in providing anesthesia and critical care during natural disasters.
- To evaluate the anesthetic services in under-developed health care systems.
- To critically appraise clinical experience with the use of regional anesthesia in trauma
- To familiarize clinicians with the recent developments in patient safety
- To be able to appreciate the role of education and training in outreach
- To review the role of leadership in improving patient safety and outcomes
- To describe how ultrasound evaluations may influence peri-operative management
- To review the benefits of technological advancements in patient monitoring
- To critically appraise perioperative pain management
- To appraise clinicians of controversies in perioperative management of high cardiac risk patients

Problem Based Learning:

- To discuss the management of some challenging pediatric patients
- To discuss the principles of transfusion therapy in trauma
- To discuss the management of high risk obstetric cases
- To discuss management of Malignant Hyperthermia
- To discuss challenging acute pain scenarios

Workshops:

- To undertake difficult airway management
- To undertake FOCUS ultrasound examinations
- To learn and practice neonatal resuscitation
- To learn and practice ultrasound guided regional blocks
- To learn advanced intravascular access techniques
Winterlude 2013 Faculty:

University of Ottawa Faculty:

Dylan Bould,  
Assistant Professor, Anesthesiology

Edward Crosby,  
Professor, Anesthesiology

Catherine Gallant,  
Assistant Professor, Anesthesiology

John Penning  
Associate Professor, Anesthesiology

Anne Lui,  
Assistant Professor, Anesthesiology

Rob Johnston,  
(Maj.) Canadian Forces

Leilani Doyle  
(Maj.) Canadian Forces

Kevin Nolan  
Assistant Professor, Anesthesiology

Victor Neira  
Assistant Professor, Anesthesiology

George Dumitrascu  
Assistant Professor, Anesthesiology

Ashraf Fayad  
Associate Professor, Anesthesiology

Guest Faculty:

Mark Ansermino MBBCH, MMed, MSc, FFA (SA), FRCPC  
Associate Professor, Anesthesiology  
University of British Columbia

Spencer Liu, MD  
Professor, Anesthesiology  
University of Washington

Chester C. Buckenmaier, MD  
Associate Professor, Anesthesiology  
Uniformed Services University of Health Sciences

Anahi Perlas, MD FRCPC  
Associate Professor, Anesthesiology  
University of Toronto

Thomas Coonan MD, FRCPC  
Professor, Anesthesiology  
Dalhousie University

Tim Sveinbjornson, MD, CCFP, FRCPC  
Clinical Instructor, Anesthesiology  
University of British Columbia

PJ Devereaux, MD, PhD, FRCPC  
Associate Professor, Clinical Epidemiology and Biostatistics  
McMaster University

Michelle White, MB, ChB DCH, FRCA  
Honorary Consultant, Anesthesiology  
Bristol University, UK

Dafydd Williams, MD  
Assistant Professor, Surgery  
University of Toronto
Declaration of Potential Conflict of Interest:
Speakers are requested to disclose to the audience any real or apparent conflict(s) of interest that may have a direct bearing on the subject matter of this program.

Accreditation:

“This event is an Accredited Group Learning Activity (Section 1) as defined by the Maintenance of Certification program of the Royal College of Physicians and Surgeons of Canada. This program has been reviewed and approved by the University of Ottawa, Office of Continuing Medical Education”.

“This program meets the accreditation criteria of the College of Family Physicians of Canada and has been accredited by the University of Ottawa for Mainpro M-1 Credits”.

Total credits 9.25

Feedback, Evaluation and Certificate of Attendance

To improve our future programs, we have designed a web based survey that will allow delegates to evaluate the Winterlude Symposium. The link to the survey will be available online and on the Winterlude webpage. After attending the Symposium, the delegates will be able to complete the evaluation and obtain their Certificate of Attendance.
## Saturday Morning

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>0700-0745</td>
<td>Registration and Breakfast</td>
</tr>
<tr>
<td>0750-0800</td>
<td>Welcome and Opening Remarks</td>
</tr>
<tr>
<td><strong>Plenary Session 1:</strong> On Land, at Sea and in the Air</td>
<td></td>
</tr>
</tbody>
</table>
  **Moderator:** Dr. Edward Crosby  
  Each speaker will have a 30 minute time-slot. At the end of the 2-lecture session there will be a moderated question period where all speakers are invited to answer questions from the floor. We will provide a system for written questions to be forwarded to the moderator from the delegate floor during the session for delegates that wish to ask questions in this way.  
  | 0800-0830 | Onboard the Hospital Ship, *Africa Mercy*  
  *Dr. Michelle White*  
  • Recognize the role anesthesia plays in helping low income countries achieve Millennium Development Goals and WHO objectives for Safe Surgery  
  • Classify the types of health care required and identify the different methods delivery in low income countries  
  • Discuss the anesthetic management of common maxillofacial conditions encountered in low resource settings, namely massive tumors, noma and ankylosis release  
  | 0830-0900 | Critical Care Aeromedical Evacuation in the Canadian Forces  
  *Dr. (Lt Col.) Tim Sveinbjornson*  
  • Understand the physiological stressors of flight  
  • Recognize how physiologic stressors of flight impact the critically ill patient during air evacuation  
  • Appreciate the measures CF medical personnel employ to safely transport critically ill patients on transcontinental flights  
  | 0900-0910 | Panel Discussion/Questions                  |
| **Plenary Session 2:** Trauma & Regional Anesthesia |  
  **Moderator:** Dr. Rob Johnston  
  This speaker will have a 40-minute time-slot. At the end the lecture there will be a 10-minute moderated question period to answer questions from the floor. We will provide a system for written questions to be forwarded to the moderator from the delegate floor during the session for delegates that wish to ask questions in this way.  
  | 0910-0950 | Improving the Management of Pain in Trauma  
  *Dr. (Col.) Chester C. Buckenmaier*  
  • Participant will be able to describe the challenges of providing pain management within a modern military evacuation system.  
  • Participants will define the impact innovations like regional anesthesia have had on managing pain in austere military environments.  
  • Participants will be able to outline a short history of military pain management.  
  | 0950-1000 | Panel Discussion/Questions                  |
1000-1030 COFFEE BREAK & EXHIBITS

1030-1130 Westin PBL’s Round One

**Alberta**  
PBL A: New Solutions to some Difficult Acute Pain Service Problem Patients  
*Dr. John Penning*  
• Explain how to estimate the degree of opioid tolerance in the chronic pain patient  
• Be able to order appropriate PCA opioid parameters in the opioid tolerant patient  
• Define the roles of anti-pronociceptive drugs such as ketamine, gabapentinoids and lidocaine

**Nova Scotia**  
PBL B: Obstetrics  
*Dr. George Dumitrascu*  
• Discuss the incidence and diagnosis of placenta percreta  
• Review obstetric and anesthetic implications of placenta percreta  
• Review preparation and treatment of peripartum haemorrhage.

**Confederation III**  
PBL C: Trauma and Transfusion Therapy  
*Dr. Leilani Doyle*  
• Will better understand coagulopathy in trauma and how these patients are different from other bleeding patients  
• Will have tools to predict which trauma patients are at risk of require a massive transfusion  
• Will have a better understanding of current best practices in the treatment of coagulopathy of trauma

**New Brunswick**  
PBL D: Malignant Hyperthermia  
*Dr. Kevin Nolan*  
• be familiar with the management of a possible MH crisis  
• know how and where to get assistance with MH related patient issues  
• be clear that the management of a possible MH crisis and the diagnosis of MH susceptibility are two separate issues

**Newfoundland**  
PBL E: Pediatric Cases for the Occasional Pediatric Anesthesiologist  
*Dr. Dylan Bould*  
• Will better understand challenging pediatric cases that anesthesiologist with a mostly adult practice may have to undertake  
• Will know how to assess and treat pediatric crises during anesthesia  
• Discuss common problems with general pediatric practice
1030-1130 Westin Workshops Round One

**Provinces II**

**Workshop F: Regional Anesthesia**
*Dr. Anne Lui*
- To acquire ultrasound skills for performing regional blocks
- Discuss the relevant sono-anatomy
- Practice ultrasound guided needle placement

**Governor General I**

**Workshop G: Vascular Access**
*Dr. Victor Neira*
- Prioritize sites of vascular access for different clinical circumstances
- Identify and compare surface landmarks and sono-anatomy for central and peripheral catheterization
- Practice intra-osseous cannulation and punctures in ultrasound task training models

**Governor General II**

**Workshop H: FOCUS Ultrasound**
*Dr. Ashraf Fayad*
- To review the indications for FOCUS exam in the perioperative setting.
- To acquire ultrasound skills to obtain basic views.
- To practice ultrasound scanning techniques on live models

**Quebec**

**Workshop I: Neonatal Resuscitation**
*Dr. Catherine Gallant*
- Be familiar with the recent changes in the NRP algorithms
- Have the opportunity to practice, hands on, the sequence of the NRP algorithm on a simulated neonatal patient including bag and mask ventilation and endotracheal intubation
- Have the opportunity to practice, hands on, UVC placement on a simulated neonatal patient

**Governor General III**

*Dr. Edward Crosby*
- Identify benefits of new airway technology
- Recognize pitfalls related to new technology
- Make the right choice in clinical situation

1130-1230 LUNCH & EXHIBITS
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1230-1330</td>
<td><strong>Westin PBL’s Round 2 (Same as 1030-1230 Sessions)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Westin Workshops Round 2 (Same as 1030-1230 Sessions)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Plenary Session 3: Teaching and Training Overseas</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Moderator: Dr. Dylan Bould</strong></td>
</tr>
<tr>
<td></td>
<td>Each speaker will have a 25 minute time-slot. Each speaker will speak for 25 minutes. At the end of the 2-lecture session there will be a moderated question period where all speakers are invited to answer questions from the floor. We will provide a system for written questions to be forwarded to the moderator from the delegate floor during the session for delegates that wish to ask questions in this way.</td>
</tr>
<tr>
<td>1330-1355</td>
<td><strong>There's a Hole in the Bucket: Knowledge Translation across the Cultural Divide</strong></td>
</tr>
<tr>
<td></td>
<td>Dr. (Maj.) Rob Johnston</td>
</tr>
<tr>
<td></td>
<td>• Learn common pitfalls in knowledge translation in a third world country</td>
</tr>
<tr>
<td></td>
<td>• Learn some strategies that may affect organizational change in a tribal society</td>
</tr>
<tr>
<td></td>
<td>• Provide recommendations on how to prepare for participation in a reconstruction effort</td>
</tr>
<tr>
<td>1355-1420</td>
<td><strong>Supporting Anesthesia Providers in difficult Environments: The Course</strong></td>
</tr>
<tr>
<td></td>
<td>Dr. Tom Coonan</td>
</tr>
<tr>
<td></td>
<td>• An overview of the realities of anesthesia practice in austere environments and its many challenges</td>
</tr>
<tr>
<td></td>
<td>• The limitations of using resource rich world equipment in austere environments, especially in the face of unavailability of compressed gas, electrical power, skilled equipment maintenance and sterilization.</td>
</tr>
<tr>
<td></td>
<td>• The imperative of protecting one’s patients and oneself in hostile environments.</td>
</tr>
<tr>
<td></td>
<td>• Common clinical challenges: inexpensive older anesthesia agents, overwhelming obstetrical and pediatric conundrums, ineffective pain management, transfusion practice in the absence of a blood bank, airway management in the absence of a bronchoscope, regional anesthesia in the absence of sterility, and disaster management in the absence of experience and training</td>
</tr>
<tr>
<td>1420-1430</td>
<td><strong>Panel Discussion/Questions</strong></td>
</tr>
<tr>
<td>1430-1500</td>
<td><strong>COFFEE BREAK &amp; EXHIBITS</strong></td>
</tr>
<tr>
<td>1500-1555</td>
<td><strong>J. Earl Wynands Lecture</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Moderator: Dr. Homer Yang</strong></td>
</tr>
<tr>
<td></td>
<td>The J Earl Wynands Lecture will be introduced by the Chair of the Department of Anesthesia; Dr Homer Yang. He will provide background into the role, mandate and importance of the lecture. The speaker will speak for 45 minutes. There will be 10 minutes for questions from the floor.</td>
</tr>
<tr>
<td></td>
<td><strong>Topic: Leadership in Patient Safety and Outreach</strong></td>
</tr>
<tr>
<td></td>
<td>Dr. Dave Williams</td>
</tr>
<tr>
<td></td>
<td>• Recognize the role of Anesthesiologists in leading a culture of patient safety</td>
</tr>
<tr>
<td></td>
<td>• Discuss the influence of education, training and teaching in developing healthcare resources</td>
</tr>
<tr>
<td></td>
<td>• Identify personal and organizational approaches to medical outreach</td>
</tr>
</tbody>
</table>
Sunday Morning

Plenary Session 4: Improving Patient Safety- The Role of Technology  
*Moderator: Dr. Kevin Nolan*

Each speaker will have a 40 minute time-slot. Each speaker will speak for 35 minutes. At the end of each lecture there will be a 5 minute question period to answer questions from the floor. At the end of the 2-lecture session there will a moderated question period where all speakers are invited to answer questions from the floor. We will provide a system for written questions to be forwarded to the moderator from the delegate floor during the session for delegates that wish to ask questions in this way.

0800-0840  
**What can monitoring technology do to improve safety and outcomes?**  
*Dr. Mark Ansermino*

- Describe the historical impact of monitoring technologies on safety in anesthesia.
- Highlight the limitations of current monitoring technology and human performance.
- Propose possible solutions to enhance safety and optimize outcomes following surgery and anesthesia.

0840-0920  
**Ultrasound for Vascular, Regional, Airway and More**  
*Dr. Anahi Perlas*

- Identify three areas of anesthesia practice in which ultrasound guidance can improve safety by reducing complications
- Discuss how bedside ultrasound can be used to assess an airway anatomy
- Discuss how bedside ultrasound can be used to assess peri-operative aspiration risk

0920-0930  
**Panel Discussion/Questions**

0930-1000  
**COFFEE BREAK**
### Plenary Session 5: Improving Patient Outcomes

**Moderator: Dr. Ashraf Fayad**

This speaker will have a 40-minute time-slot. At the end the lecture there will be a 10-minute moderated question period to answer questions from the floor. We will provide a system for written questions to be forwarded to the moderator from the delegate floor during the session for delegates that wish to ask questions in this way.

**1045-1125  Perioperative cardiac Morbidity following Non Cardiac Surgery**

**Dr. PJ Devereaux**

- Review the role for monitoring troponin measurements after non cardiac surgery
- Identify the prognostic relevance of myocardial injury after non cardiac surgery
- Discuss treatment options and the MANAGE trial

---

**1000-1040  Winterlude Pain Lecture**

This speaker will have a 40-minute time-slot. At the end the lecture there will be a 10-minute moderated question period to answer questions from the floor. We will provide a system for written questions to be forwarded to the moderator from the delegate floor during the session for delegates that wish to ask questions in this way.

**Recuperative and Perioperative Pain Management**

**Dr. Spencer Liu**

- **Goal:** Recognize and effectively treat perioperative pain in a systems based fashion
  - Understand a systems based model to provide perioperative analgesia, especially post Acute Pain Service
  - Understand metrics for tracking performance of perioperative analgesia
  - Understand advantages and disadvantages of specific analgesic modalities for perioperative analgesia

---

**1130  Closing Remarks and Wrap Up**
The 19th Annual Anesthesia Winterlude Symposium 2013 has been made possible by the generous support of the following sponsors:

Platinum Sponsor:

GE Healthcare
The 19th Annual Anesthesia Winterlude Symposium 2013 has been made possible by the generous support of the following sponsors:

**Gold Sponsors**

3M

Fresenius Kabi

STORZ

KARL STORZ—ENDOSKOP

ZONARE
The 19th Annual Anesthesia Winterlude Symposium 2013 has been made possible by the generous support of the following Silver Sponsors:

AbbVie
Baxter
CardioMed
Draeger Medical
Dynamedical Corporation
Health Canada-Canada Vigilance
Hospira
Investors Group
Masimo Canada ULC
Mda Inc.
Medco
SonoSite Canada Inc.
Spacelabs
19th Annual Anesthesia Winterlude Symposium
Saturday February 2, 2013

MORNING LECTURES
Onboard the Hospital Ship, *Africa Mercy*

*Dr. Michelle White*

**Learning Objectives:**

- Recognize the role anesthesia plays in helping low income countries achieve Millennium Development Goals and WHO objectives for Safe Surgery
- Classify the types of health care required and identify the different methods delivery in low income countries
- Discuss the anesthetic management of common maxillofacial conditions encountered in low resource settings, namely massive tumors, noma and ankylosis release
Aboard the Hospital Ship, the *Africa Mercy*

**Background**

Mercy Ships is an international charity which operates the world’s largest hospital ship (6 operating theatres, 4 wards of 78 beds including 3 ICU beds). Mercy Ships visits the world’s poorest countries (as defined by the United Nations Health Development Index) at the invitation of the host nations government. Spending 10 months docked in their main port city, we work with the Ministry of Health and Ministry of Foreign Affairs to deliver surgical services and assist with capacity building projects (teaching and training). The delivery of surgical services and capacity building are often undertaken in partnership with other NGO’s, charities, and funding agency’s. The main surgical specialties we offer are: maxilla-facial, plastic and burns reconstruction, obstetric fistula, orthopaedics, general, ophthalmic and dental. We have spent the last 14 years investing in the following 5 West African countries: Guinea, Liberia, Sierra Leone, Benin and Togo.

**The role anaesthesia plays in helping low income countries achieve Millennium Development Goals and World Health Organisation objectives for Safe Surgery**

The Millennium Development Goals (MDGs) are eight development goals that all 193 United Nation member states and many international organisations have agreed to achieve by the year 2015. The goals are:

1. eradicating extreme poverty and hunger
2. achieving universal primary education
3. promoting gender equality and empowering women
4. reducing child mortality rates
5. improving maternal health
6. combating HIV/AIDS, malaria, and other diseases
7. ensuring environmental sustainability
8. developing a global partnership for development

Anaesthesia has a role to play in MDGs no. 4 and 5. 20% of childhood deaths are preventable by surgical intervention, and not only is surgical care lacking but paediatric anaesthesia services are virtually not existent in the poorest countries. Neonatal resuscitation and critical care facilities are also lacking. Only 5% of pregnant women who require a caesarian section will get one, and post partum haemorrhage is the commonest cause of maternal death, making obstetric anaesthesia and resuscitation skills essential. Furthermore, since the number of major operations globally now out numbers the number of new cases of malaria per year, safe surgery has become a global public health care concern. And there is discussion as to whether ‘Safe Surgery’ should now become a MDG in its own right, since the level of harm of surgical complications is approaching that of malaria & TB & other traditional concerns.

The WHO Guidelines for Safe Surgery (Safe Surgery Saves Lives) significantly improve surgical outcomes in resource poor setting: 47% reduction in surgical mortality; 36% reduction in major complications; and 50% reduction in infection rates. The guidelines use a checklist to ensure that the following six specific safety steps occur in every surgery:

1. timely delivery of antibiotics
2. use of working pulse oximeter
3. completing formal risk assessment for placing an airway tube
4. verbal confirmation of patient identity and procedure
5. appropriate placement of iv lines for patients who develop severe bleeding
6. complete accounting for sponges at end of procedure

Four out of six of these relate specifically to anaesthesia, making the anaesthetist ideally placed to help improve surgical outcome.

**The types of health care required and different methods delivery in low income countries**

a. Primary Health Care

b. Emergency Surgery, including Caesarian Section. 10% of adult deaths and 20% of childhood deaths could be prevented by surgical intervention. Only 5% of pregnant women in Africa would get a caesarean section if they needed one.

c. Elective Surgery. All areas of surgery are important for economic development, eg general (young men with hernias unable to do manual work); maxfac (children with cleft lip excluded from school and families shunned); ophthalmic (cataracts as a cause of blindness); orthopaedic (clubfoot corrections); plastics (burns contracture release to restore limb function)

Mercy Ships utilises direct surgical services and capacity building partnerships to address (b) and (c). With reference to economic and healthcare outcomes, the best method of delivering health care aid in development work has yet to be determined. But, in general, most organisations adopt one of the following three models:

a. Short term +/- repeat investment (eg 1-2 week trips)

b. Medium term +/- repeat investment (eg Mercy Ships)

c. Long term (eg build a ‘mission hospital’ and stay for 20 years)

Additionally, different models have varying degrees of influence at the government and local level.

**Anaesthetic (perioperative) management of common maxillofacial conditions encountered in low resource settings, namely massive tumours, noma and ankylosis release**

Key features in management:

a. Communication

b. Nutrition

c. Equipment (radiology, fibreoptic scopes, drugs, blood transfusion)

d. Difficult airway plan (adult v child)

e. Appropriate surgical technique *for Africa* (eg rotational v free flap; ICBG v fibula graft)

f. Appropriate follow-up (physio / OT, diet eg NO RICE)
Learning Objectives:

- Understand the physiological stressors of flight
- Recognize how physiologic stressors of flight impact the critically ill patient during air evacuation
- Appreciate the measures CF medical personnel employ to safely transport critically ill patients on transcontinental flights
While the movement of patients via air transport began as early as the late 19th Century with the evacuation of the injured via hot-air balloon, the 1990s witnessed a paradigm shift in the management of critically ill soldiers in overseas conflicts. Military anesthesiologists and intensive care physicians have been at the vanguard of Critical Care Aeromedical Evacuation (CCAE), which enables the rapid movement of the severely injured to higher levels of care while continuing stabilization efforts enroute. This presentation will reveal the unique challenges of CCAE providers when faced with the physiologic stressors of flight in the relatively austere environment of military air transport.
Improving the Management of Pain in Trauma

Dr. (Col.) Chester C. Buckenmaier

**Learning Objectives:**

- Participant will be able to describe the challenges of providing pain management within a modern military evacuation system.
- Participants will define the impact innovations like regional anesthesia have had on managing pain in austere military environments.
- Participants will be able to outline a short history of military pain management.
Treating Pain on the Battlefield: A Warrior’s Perspective

Chester C. Buckenmaier III · Hisani Brandon-Edwards · David Borden Jr · John Wright

Published online: 19 January 2010
© Springer Science+Business Media, LLC 2010

Abstract The current conflicts in Afghanistan (Operation Enduring Freedom; commenced October 2001) and Iraq (Operation Iraqi Freedom; commenced March 2003) have been remarkable due to the more than 90% survival rate among wounded warriors. Although this statistic is a historic achievement by the military’s medical services, other medical issues have taken on greater emphasis as more casualties from war survive than ever before. Pain management of United States wounded, in particular, has been a medical issue of increasing importance, as modern understanding of the detrimental effects of pain on recovery and rehabilitation becomes clearer. In this review, a warrior’s perspective of military pain management is explored and potential for improvement discussed.

Keywords Battlefield analgesia · Pain · Regional anesthesia · Acute pain

Introduction

War and the physical and psychological trauma it causes has been part of the human condition from earliest recorded history. As the weapons of war have improved throughout the conflicts of the 20th century, there has been a concomitant improvement in the survival of wounded soldiers. US military casualties from Afghanistan (Operation Enduring Freedom [OEF]; commenced October 2001) and Iraq (Operation Iraqi Freedom [OIF]; commenced March 2003) currently have a 90% survival rate compared with only 76% during the Vietnam War (1961–1973), 67% during the Civil War (1861–1865), and 58% during the Revolutionary War (1775–1783) [1]. The dramatic improvements in casualty survival can be attributed to many factors, including advances in body armor, improvements in forward trauma surgical and resuscitation techniques, improved battlefield hemorrhage control, enhanced blood product availability, and rapid evacuation to higher medical capability [2, 3]. Unfortunately, as survival rates in the current conflicts achieve new heights, improvements in the management of pain in wounded warriors have been far less dramatic.

Historically, the American military has emphasized opioid-based pain management [3]. Although the success of opioid medications in pain management is without question, their use includes significant side effects that can be lethal in the austere combat environment [4, 5]. The reasons for the delayed development of pain management on the modern battlefield can be categorized into cultural biases and current limits to medical knowledge. Most warriors are familiar with the euphemism, “Pain is weakness leaving the body.” The military culture encourages stoic acceptance of pain as a mark of strength and courage in the face of adversity. Even after the discovery of ether, many surgeons considered anesthetic agents unnecessary, or even detrimental, to a patient’s recovery [6]. For many military physicians practicing under the harsh realities of combat medicine throughout history, the treatment of pain must have seemed an unrealistic luxury.
Improved understanding of the pathophysiology of pain and its associated morbidity has only recently begun to alter physician attitudes. There is an evolving awareness that poorly managed pain can develop into a disease of the nervous system with the potential for lifelong disability and disability consequences for the patient [7]. Perhaps the most significant change that is occurring within military pain medicine is the realization that pain management must begin at point of injury, extend across the care continuum from battlefield to military medical center in the United States, continue through the Veteran’s Administration or civilian rehabilitation facility, and stretch into the rest of the veteran’s life if necessary [8].

In this review, the state of pain care is examined utilizing the five levels of care, also known as “roles of care” (Table 1). Levels of care denote the progressive medical capability that a casualty transitions through from point of injury on the battlefield back to the United States [9]. In an effort to convey the reality of this extreme medical environment, a fictional account of a casualty experience, based on actual wounded warrior reports, accompanies the description of pain management at each level of care.

### Levels of Care

**Note:** The casualty story used in this article is a work of fiction based on personal accounts by wounded warriors and the author’s experience. It is for illustration purposes only. Any resemblance of characters to actual persons, living or dead, is purely coincidental.

**Level I**

One of the local police had expressed concern about insurgent activity in front of my camp. Random firing could be heard in my sector all day. I was on patrol, dismounted, with my squad. My squad leader, two other warriors, and I moved onto the objective. My squad leader was hit first and fell with a bullet wound to the face. Another insurgent rushed the squad and detonated himself about 15 feet from my position, this despite having emptied my weapon’s magazine into the insurgent. The blast killed the warrior to my left and shredded my left lower leg. The insurgent’s vest had been filled with small black ball bearings, which peppered my body. Fortunately, my helmet, goggles, and body armor prevented the ball bearings from hitting vital organs or my eyes. I remember the blast knocking me back and onto my stomach. I tried lifting myself up off the ground but could not; both my arms were broken. I actually started to laugh with shock and disbelief. What was happening?

The medic seemed to arrive instantly. He was very confident and reassured me as I tried to express some last words to my family. The medic would have none of that. He calmed me and gave me some morphine for pain control out of a case he carried. I remember the case because the medic did weekly checks on the contents. The medic stopped the bleeding from my left leg with a tourniquet and started an IV. That medic saved my life.

One of the single most important advances in military medicine leading to improved survival of combat wounded throughout the 20th and into the 21st century has been the combat medic. Bringing greater capability and skill to the point of wounding, these medic warriors are a primary reason for improved survival of American wounded. Tasked, under combat conditions, with initial assessment and stabilization of a wounded warrior’s airway, breathing, and hemorrhage control, the management of pain in this setting becomes secondary.

There are situations when effective management of trauma pain can significantly enhance the effectiveness of the medic in supervision of casualties in the chaotic combat environment. Fear, disorientation, and the inability to focus beyond the pain experienced following trauma can incapacitate a warrior’s ability to assist in his/her extraction from the battlefield. Pain and fear, in the most extreme cases, can even cause wounded warriors to become a danger to themselves and the casualty evacuation mission.

<table>
<thead>
<tr>
<th>Level</th>
<th>Capabilities</th>
<th>Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Selfaid, combat medic, battalion surgeon, advanced trauma life support</td>
<td>Battalion aid station</td>
</tr>
<tr>
<td>II</td>
<td>Reanimation/stabilization surgery</td>
<td>Forward surgical teams</td>
</tr>
<tr>
<td>III</td>
<td>Full operating rooms and specialty care</td>
<td>Combat support hospital</td>
</tr>
<tr>
<td>IV</td>
<td>Full service hospital</td>
<td>Regional medical center</td>
</tr>
<tr>
<td>V</td>
<td>Reconstructive and restorative care</td>
<td>Tertiary medical center</td>
</tr>
</tbody>
</table>

*Levels I to III are located within a war or disaster operational zone. Levels IV and V are typically located outside the war or disaster operational zone. (Data from Lounsbury and Bellamy [9])

---

© Springer
Since the Civil War, morphine and other opioids have been the standard battlefield pain medications, with morphine remaining the Level I pain medication of choice today. The preeminence and success of opioid medications in the management of combat trauma is without question. However, the exclusive use of opioids for pain care of the wounded has not been without complications. During World War II, a landmark study on combat trauma pain was undertaken from 1943 to 1944. It was observed that increasing numbers of casualties were manifesting signs of morphine overdose that, in many cases, resulted in warrior deaths [10]. Not only did this study heighten awareness of the dangers of opioids in austere medical environments, it also focused attention on the issue of pain following wounding. Unfortunately, pain care was essentially reserved for hospitalized wounded, and further development in forward pain management remained unchanged until the present conflicts.

In previous American conflicts, wounded warriors were static and cared for within the theater of war until they had recovered from wounds and were sufficiently stable for transport. Many days to weeks might pass before a wounded warrior could be safely transported back to the United States. This reality has changed dramatically in the current conflicts, in which rapid evacuation to higher levels of care capability outside of the war theater has saved many lives. In some cases, a soldier is flown out of the country of confrontation in less than 24 h. This rapid pace of evacuation has rendered conventional battlefield pain care obsolete, as long-established opioid monotherapy fails in the challenging air evacuation environment [11].

Significant enhancements to Level I pain care have been achieved in the present conflicts. The management of pain is now an integral part of the combat medic’s curriculum, with specific recommendations that often de-emphasize early and exclusive use of opioids [12]. Some units have explored the use of “wound packs” containing acetaminophen, a cyclooxygenase 2 inhibitor, and a thromboxane synthetase that the warrior is instructed to consume following a penetrating extremity wound [13]. Although this approach is too new for comment on efficacy, the concept of prepackaged pain medications for use under defined conditions during war or disaster warrants further research and development. Parenteral preparations of NSAIDs are also available that further the potential utility of these medications in field medicine.

There is a trend in forward (Levels 1 through 3) medicine to use ketamine as a primary medication for the management of trauma pain [14]. Ketamine produces rapid analgesia, is opioid sparing, reduces nausea and vomiting, and typically does not further reduce blood pressure in hypotensive patients [15]. The dissociative state typical of analgesic doses of ketamine can be a particular advantage as a chemical restraint in combat patients in the confined air evacuation environment. The military is currently in the final stages of testing nasal ketamine delivery devices for use forward on the battlefield. Nasal delivery of pain medications precludes the need for IV access and enhances the speed of drug bioavailability.

The recognition that poorly managed acute pain can lead to chronic pain syndromes [16] has led to the recent enhanced focus of military medicine on forward pain management. Combat medics understand that casualties relieved of pain can better assist with medical mission objectives and often be active participants in their own evacuations.

Level II

I was loaded into a vehicle and driven to the forward operating base. The medical facility was run by Canadians. They removed all my clothes, started another IV, bandaged wounds, and splinted fractures. I do not know what I was given, but I did not have much pain. I was awake but somewhat groggy. I was being packaged for a plane ride to the combat support hospital. I recall my Sergeant Major being there. He wished me farewell, but I don’t actually remember leaving. I remember screaming at the medic as we headed for the helicopter, “Don’t take off until the other guys get on!” I kept worrying about my squad mates. What had happened to them? I was going in and out of consciousness, I do not recall much before being loaded on the helicopter.

Forward surgical teams (FSTs) are an established component of the military medical response to war. FSTs are designed to provide advanced trauma life support and forward lifesaving surgical procedures aimed at patient stabilization and packaging for rapid evacuation to the next level of care. A typical FST has two operating rooms, four intensive care beds, and are staffed with 20 health care providers (4 surgeons, 2 anesthesia providers, and support personnel) [17]. Casualties requiring resuscitation and/or damage control surgery to contain hemorrhage and protect against metabolic injury (coagulopathy, hypothermia, and metabolic acidosis) are often anesthetized, mechanically ventilated, and unconscious during Level II care. Pain care principles remain similar to those used by the medic for hemodynamically stable casualties, with particular attention to splinting, bandaging, and padding of injuries for transport. Exacting attention is given to protecting the patient from hypothermia during transport, which can be a problem even in hot-climate battlefields.
Level III

As I was being loaded onto the Blackhawk helicopter, my shredded left leg fell off the stretcher and I screamed out in excruciating pain. The flight medic quickly re-secured my leg and gave me something through my IV that really eased the pain. I was aware of other casualties on the flight, but everything seemed distant and the flight seemed to pass by quickly. When I arrived at the combat support hospital, there was much activity. I was wheeled into an area with bright lights and many people in gowns, gloves, and masks. It seemed many things were happening to me at once as people stuck me with more needles and handled every inch of my body. I remember being rolled, which was very painful with my injured leg. I was asked about my pain and given something, which again took the edge off. I was moved to another room with a large X-ray to scan my body. I was then told I was going to the operating room to clean up my wounds and splint my fractured arms. The anesthesiologist kept telling me what was happening, and a nurse was holding my hand, which helped. I was placed on a hard, narrow table, and they said I was going to sleep.

The next thing I remember I was in a bed, on a ward, with many other wounded. My arms were in casts and I couldn’t feel my left leg, which was a blessing. They told me I had lost my left foot. The nurse said I had been given two nerve blocks in the operating room, one in my bottom and one in my thigh. She taught me about the bright orange pumps that were infusing local anesthetic to my leg and how I could push a flashing green button on the pump if my leg started to hurt. Later, the anesthesiologist visited and explained which pump served which part of my leg and labeled the pumps so I could remember. I was told I could have oral morphine if I needed it, but I was very comfortable with the nerve blocks and the other medications I was getting through my IV. The one close of morphine I did ask for made me feel sick. I was pretty comfortable and able to call my family in the States that evening. My mom was upset but happy to hear my voice. That phone call really helped.

The combat support hospital (CSH) is where the first restorative and rehabilitative surgery is performed on the wounded warrior. These facilities are located near major airfields and focus on preparing casualties for evacuation out of the war theater. The CSH has capabilities that are very similar to those of a moderately sized community hospital in the United States with emphasis on trauma management. Fully staffed and equipped operating suites, modern anesthesia machines, full-service blood bank, digital X-ray, CT, fluoroscopy, and ultrasound, among other technologies, are usually present at these facilities. From a pain perspective, this is the first facility where definitive pain management plans can be implemented and managed.

With the prevalence of extremity wounds that have defined the current conflicts in Afghanistan and Iraq, the introduction of continuous peripheral nerve blocks (CPNBs) to battlefield medicine in 2003 has greatly enhanced the pain management capabilities of providers far forward [18, 19]. During these initial efforts to bring the relatively advanced technology of CPNBs to the battlefield, it was recognized that pain management far forward was inconsistently practiced and based almost exclusively on the use of IV morphine. The use of morphine while the patient is static at the CSH was mostly effective, and side effects associated with opioid-based pain management could be handled by CSH health care personnel. Regrettably, morphine as the sole option for pain management on evacuation flights out of the war zone has been found. Evacuation flights are crowded with patients, light conditions are low, vibration and noise are high, monitoring resources are constrained, and health care personnel are limited. Morphine, as the sole option for pain control in this environment, was inadequate and possibly dangerous [20]. The requirement for new pain management technologies and strategies, which could safely treat pain in this austere environment without further burdening flight health care personnel, was recognized early in the OIF and OEF conflicts [21*].

In response to this need, the tri-service Defense and Veterans Pain Management Initiative (DVPMI, formally MARAA [Military Advanced Regional Anesthesia and Analgesia]; www.DVPMI.org) was formed. This organization has improved interservice communication and decision making for battlefield and evacuation pain control. DVPMI has been instrumental in coordinating the efforts of the Air Force, Army, and Navy in improving pain management for wounded warriors. The DVPMI is directly responsible for the establishment of battlefield CPNB, epidural, and patient-controlled analgesia (PCA) infusion pump technology on evacuation flights. Most recently, the DVPMI organization published the first handbook on military pain management in the field and air evacuation environments (Military Advanced Regional Anesthesia and Analgesia Handbook; www.bordeninstitute.army.mil). In collaboration with the DVPMI, the Army has developed a pain management equipment set, designed for the CSH, which has been fielded in Afghanistan.

Despite these advances in the pain care of American wounded warriors, the management of pain within the theaters of war remains inconsistent and fragmented. At the CSH level, there is no medical officer responsible or...
specifically tasked with pain management. Pain care is
often thought of as an assumed or implied duty of CSH
anesthesia providers who are often unavailable due to
other casualty responsibilities or not trained in acute pain
medicine. Recently, the author (C. C. Buchanan) deployed
to Afghanistan with the British hospital at Camp
Bastion, Helmand Province, to determine the advantages
and feasibility of having a pain physician asset at Level III.
The pain service that was established with this deployment
became an integral part of the CSH involved in more than
40% of the trauma cases during a 4-month period. The pain
service physician serves as a consultant for pain issues and
a proponent of multimodal analgesic approaches (Table 2)
that de-emphasized opioid-based analgesia [22]. The
consistent availability of a fellowship-trained acute pain
consultant quickly resulted in enthusiastic support from
surgeons. Data from this field experience demonstrated
profound improvements in verbal analogue pain scores and
will serve as a basis for establishing pain service require-
ments for CSH field operations in the near future.

Air Evacuation

The flight medics came that evening and bundled me
up on a stretcher. They were very efficient and they
explained everything about the coming flight. I was
going to have to make one stop before I left country
for the military hospital in Landstuhl, Germany.
Movement was still pretty uncomfortable for my leg,
but I was able to push the buttons on my pump for
added medication, which eased any pain in a few
minutes. I was also given a third pump with
morphine. I could push that button too if I needed
more pain medicine.

I was taken by ambulance to the airfield and loaded
on a C-130 aircraft. The plane engines never stopped;
it was very loud and hard to hear the flight nurse and
her instructions. I had my pain pumps, and the flight
was uneventful. When we briefly stopped at the next
hospital in country, I was examined again by another
doctor. There was confusion at this facility about the
catheters to my leg, and the doctor said they had to be
removed. This was fine at first, but then the block
wore off and my amputated foot really began to hurt.
The morphine pump was not cutting it. The remaining
flight to Landstuhl was very painful and an experi-
ence I will not soon forget. I was confused why one
plan for my pain that was working was rejected for
another that didn’t work.

Inconsistency in the management of pain throughout the
evacuation chain continues to be a problem plaguing
transportation of wounded warriors. Although techniques
and technologies to manage pain have improved greatly
since the beginning of the current conflicts, there remains
no consistent policy for pain management throughout the
continuum of care. Congress has recently acted to rectify
the problem with the passage of the National Defense
Authorization Act for 2010, which includes pain manage-
ment language under subtitle B, Health Care Administra-
tion section 711. Not later than March 31, 2011, the
Secretary of Defense shall develop and implement a
comprehensive policy on pain management by the military
health care system. With the establishment of this public
mandate, the need for a comprehensive strategy for pain
management at all levels of care now carries the force of
United States law.

Levels IV and V

When I got to Landstuhl, I had to go back to surgery.
I was offered nerve blocks again, and I readily
accepted. I was comfortable after surgery at Landstuhl
and on the flight back to the United States since I had
my continuous blocks and infusion pumps back. I
have needed so many operations on my left leg. It is
hard to imagine having to withstand all those
operations without the nerve blocks and the pain
control they provided between operations. The ability
to manage your own pain with nerve block infusions
or PCA is important. There is considerable anxiety in
knowing that a short-acting pain medication is going
to wear off soon and having to ask, and then wait, for
more medication.

I have been to multiple major military hospitals in
the States. Walter Reed Army Medical Center
(WRAMC, Washington, DC) stands out because they
have an acute pain service with pain nurses who are
available any time to deal with pain issues that arise.
It really helps to have someone available to come to

<table>
<thead>
<tr>
<th>Table 2 Elements of multimodal analgesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local anesthetics: epidural, spinal, continuous/single injection orbital nerve block</td>
</tr>
<tr>
<td>NSAIDs: cyclooxygenase enzyme blockers</td>
</tr>
<tr>
<td>Acetaminophen</td>
</tr>
<tr>
<td>N-methyl-D-aspartate receptor antagonists: ketamine</td>
</tr>
<tr>
<td>α2-Adrenergic agonists: clonidine, dexmedetomidine</td>
</tr>
<tr>
<td>Antiepileptics: gabapentin, pregabalin</td>
</tr>
<tr>
<td>Antidepressants</td>
</tr>
<tr>
<td>Glucocorticoids: dexamethasone</td>
</tr>
<tr>
<td>Opioid medications: morphine, hydromorphone</td>
</tr>
<tr>
<td>Panaceform (IV acetaminophen), among others</td>
</tr>
</tbody>
</table>
your room immediately and not have to worry about waiting for an anesthesiologist to come out of the operating room. The pain nurses take the time to explain the medications and equipment, and they listen to your issues. My family and I never mind a daily visit by the pain team. Other facilities lack acute pain nursing and the acute pain service. The difference is apparent and not positive.

One of the key features of any successful pain management program is available and trained pain personnel who are motivated to aggressively treat pain. From the patient's perspective, timely access to acute pain services in the perioperative period is vital. At WRAMC, skilled acute pain nurses are available to respond to calls for pain issues immediately. These nurses are backed up by an acute pain medicine physician who is available for consultation and adjustment of pain care plans. WRAMC acute pain nurses also serve as a central educational link between the pain physician, nursing service, the patient's family, and the patient. They provide one-on-one pain teaching for the patient, family, and ward staff; ensuring full understanding of pain management goals established by the pain team with the patient. Although pain physicians can formulate excellent pain care plans for patients, pain nursing makes these plans successful through explanation of treatments to patients and family members and management of patient expectations for pain relief and care. Pain nursing also serves a critical role as the sentinels of the service, alerting the team when treatment plans are failing or a patient's status is changing adversely. Possibly most significantly they are the gentle touch, the empathetic ear, and the compassionate voice whose impact is resistant to objective measure but whose significance to overall pain management is constantly reaffirmed by the patients. The importance of pain nursing to the overall success of an acute pain service cannot be overestimated.

Conclusions

Poorly managed or untreated pain is maladaptive, detrimental to recovery, and can quickly become a disease process as debilitating as the inciting surgery or trauma [23]. On this key point, civilian and military medicine is not different, and both can benefit from the pain management experience of the other.

The importance of acute pain management services following trauma and surgery is recognized as a fundamental part of modern medical care [24–26]. Acute pain management plans are necessary as unique as the patients who require these services. Complex trauma or surgical patients cannot be managed with “one size fits all” protocol-driven pain programs. On the battlefield, during evacuation, and back at major military hospitals in the United States, effective pain care throughout the continuum requires dedicated health care professionals at all levels that are specifically trained, tasked, and responsible for the management of pain. America's military wounded deserve no less for their sacrifice.

Disclosure Departmental support: Walter Reed Army Medical Center, Department of Anesthesia. Congressional grant: John P. Murtha Neuroscience and Pain Institute. No other potential conflicts of interest relevant to this article were reported.

Disclaimer The views expressed in this article are those of the authors and do not reflect the official policy of the Department of the Army, the Department of Defense, or the United States Government.

References

Papers of particular interest, published recently, have been highlighted as:
- Of importance
- Of major importance

19th Annual Anesthesia Winterlude Symposium
Saturday February 2nd, 2013

AFTERNOON LECTURES
There's a Hole in the Bucket: Knowledge Translation across the Cultural Divide

Dr. (Maj.) Rob Johnston

Learning Objectives:

- Learn common pitfalls in knowledge translation in a third world country
- Learn some strategies that may affect organizational change in a tribal society
- Provide recommendations on how to prepare for participation in a reconstruction effort
There’s a Hole in The Bucket: Knowledge Translation Across the Societal Divide

Johnston, RS

ABSTRACT: The NATO Training Mission-Afghanistan is intended to provide the Afghan National Security Forces with the training required to be self-sustaining following the withdrawal of ISAF personnel in 2014. The Canadian contribution includes a medical advisory group deployed to both central and regional ANSF corps-and-above medical facilities. Examples abound of how well-intentioned agencies have attempted to modernize Afghan practices by introducing Western approaches. Such efforts uniformly fail as they do not address the more fundamental differences in education, infrastructure, governance, and cultural values that impede implementation. Examples can be found, however, of positive changes implemented through effective leadership and organizational oversight. It is recommended that future rebuilding efforts focus on enabling leaders to create and achieve a strategic vision for their organization, and that emphasis be placed on societal fundamentals rather than advanced technologies.
Supporting Anesthesia Providers in difficult Environments:
The Course

Dr. Tom Coonan

Learning Objectives:

• An overview of the realities of anesthesia practice in austere environments and its many challenges
• The limitations of using resource rich world equipment in austere environments, especially in the face of unavailability of compressed gas, electrical power, skilled equipment maintenance and sterilization.
• The imperative of protecting one’s patients and oneself in hostile environments.
• Common clinical challenges: inexpensive older anesthesia agents, overwhelming obstetrical and pediatric conundrums, ineffective pain management, transfusion practice in the absence of a blood bank, airway management in the absence of a bronchoscope, regional anesthesia in the absence of sterility, and disaster management in the absence of experience and training
A Course For Those Volunteering in Austere Environments.

TJ Coonan

Abstract

Thankfully, many anesthesiologists agree to travel to low income countries to teach and provide service. The need is immense: mortality rates from anesthesia in many parts of the world run at levels of 1:500 or worse, and there is ample evidence that this can be lowered by effective education. Eighty percent of the world lives in low and middle income environments, and the WHO estimates that the world faces a shortage of 4.3 million health professionals required for delivering essential health care services to populations in need.

There is a very wide gamut of opportunities for the prospective anesthesia volunteer. Many important missions will provide facilities and equipment that are comparable to what any of us would experience in Canada - well within anyone’s comfort zone. And this is absolutely what many of us would choose to do. On the other hand, the majority of the world lives in an environment that cannot guarantee oxygen, a functioning anesthesia machine, consistent and safe electrical power, a secure blood supply, usual anesthesia agents and adjuvants, and advanced airway technologies. Volunteers in many countries will have to deal with personal risks from trauma, infectious disease and psychological adaptation. There will be medical challenges that they would seldom see at home, such as advanced eclampsia, burns, disasters and culturally sensitive ethical dilemmas.

It is absolutely true that every well-trained Canadian anesthesiologist can handle these conundrums. Courses exist, however, to assist the prospective volunteer in anticipating challenges, and to provide helpful tips. This twenty-minute talk at Winterlude can only touch the surface of what is offered in a four-day course. It will succeed if volunteers can be persuaded to investigate, a bit more deeply, what they very well may be asked to address overseas.
SPEAKER: Dafydd Williams, MD
President and CEO of South Lake Regional Health Centre

TOPIC:
“Role of Leadership in Developing Strategies for Patient Safety and Anesthesia in Austere Environments”

LOCATION: Confederation III

TIME: 3:00-3:45
Dr. Wynands is a Professor Emeritus in The Department of Anesthesia at The University of Ottawa. He was born in Montréal on December 10, 1929. He graduated from McGill University with an M.D. C. M. in 1954 and married Mary Grant in the same year. They have six children and 13 grandchildren. He received his anesthesia training in the McGill Anesthesia Diploma Course and obtained his Royal College Certification in 1969 and Fellowship in 1972. Dr. Wynands was a member of the Attending staff at The Royal Victoria Hospital from 1961 to 1988. Dr. Wynands was appointed Professor and Chairman of The Department of Anesthesia at the University of Ottawa and Chief of Anesthesia at the Civic Hospital and University of Ottawa Heart Institute in 1988 and retired in 1996.

Dr. Wynands made an outstanding contribution to the clinical, research, teaching and administration responsibilities of the departments of anesthesia at The University of Ottawa and McGill University. He subspecialized in anesthesia for cardiac surgery where he did considerable clinical research and teaching. He published a seminal article on anesthesia for patients with coronary artery disease having revascularization surgery of the heart in 1967 which attracted international attention: Wynands JE, Sheridan CA, KelkarK: Coronary artery disease and anesthesia. (Experience in 120 patients for revascularization of the heart). Can Anaesth Soc J, 14, 382-98, 1967.

His ongoing research led to the publication of more than 80 papers in peer-reviewed journals. He also contributed chapters to 16 textbooks of anesthesia. He was a visiting professor or invited speaker on more than 120 occasions to university departments and anesthesia meetings in Canada, The United States, England, Scotland, Ireland, Switzerland, Belgium, Hungary, Turkey, Germany and Japan.

Dr. Wynands is a past president of the Canadian Anesthesiologists’ Society, The Society of Cardiovascular Anesthesiologists, the Founding President of The Cardiovascular and Thoracic Section of the Canadian Anesthesiologists’ Society. Upon his retirement in 1996, he was the tireless driving force behind the founding of the Ottawa Simulation Centre, a multi-disciplinary simulation centre & the second simulation centre in Canada. From those visionary beginnings, the University of Ottawa Skills & Simulation Centre was recently established, the largest in Canada.

He has received many awards some of which are: The Order of Canada; The Distinguished Service Award of The Society of Cardiovascular Anesthesiologists; the Gold Medal of the Canadian Anesthesiologists’ Society; a Living Legend Award, World Society of Cardiothoracic Surgeons, and an Honorary Ph.D. from the University of Montreal.

Homer Yang, MD CCFP FRCPC,
Professor Chair and Chief, Anesthesiology
University of Ottawa and The Ottawa Hospital
Role of Leadership in Developing Strategies for Patient Safety and Anesthesia in Austere Environments

Dr. Dave Williams

Learning Objectives:

• Recognize the role of Anesthesiologists in leading a culture of patient safety
• Discuss the influence of education, training and teaching in developing healthcare resources
• Identify personal and organizational approaches to medical outreach
UNIVERSITY OF OTTAWA
DEPARTMENT OF ANESTHESIOLOGY

19th Annual Anesthesia Winterlude Symposium

PBL’S
Saturday February 2nd, 2013
1030 and 1230 Hours
New Solutions to some Difficult Acute Pain Service Problem Patients

Dr. John Penning

Learning Objectives:

• Explain how to estimate the degree of opioid tolerance in the chronic pain patient
• Be able to order appropriate PCA opioid parameters in the opioid tolerant patient
• Define the roles of anti-pronociceptive drugs such as ketamine, gabapentinoids and lidocaine
"New Solutions" to some challenging problems with Acute Pain Service patients

John Penning MD  FRCPA
Medical Director, APS
Dept. Anesthesiology
The Ottawa Hospital

Disclosures
- I have received honorarium for the following:
  - CME lectures where celecoxib, pregabalin, tramadol, tapentadol have been discussed
  - Participated in Advisory Board for Wyeth
- I have no continued financial interests in any drugs discussed

Objectives
- Be able to determine an estimate of the degree of opioid tolerance in the chronic pain patient
- Explain a simple way to convert common opioids from one to the other and PO to IV
- Describe the process to establish appropriate IV PCA setting for the opioid tolerant patient
- List three classes of drugs useful as anti-hyperalgiesics

Objectives
- State the appropriate dose of ketamine when used as an anti-hyperalgiesic in the opioid tolerant patient
- Explain the role of preferential unilateral epidural and list the three manoeuvres used to achieve it
- Describe how to manage peri-operative analgesia for the patient on buprenorphine.
  - Compare tapentadol with tramadol and classic opioids

Uncontrolled pain after TKA in a Fibromyalgia patient

It is 19:09 hrs, you are on call and PACU is calling you about problems controlling pain in a 58 yr female who had a TKA under spinal anaesthesia at 15:00 hrs. by your colleague, Dr. I.M. Orthopaedic Patient is rating her pain at 15/10. Nurses have given her 400 mcg IV Fentanyll on top of her IV PCA hydromorphone (1 mg) that she has been using incessantly since spinal began wearing off at 15:00.

Uncontrolled pain after TKA in a Fibromyalgia patient – some history?

- Uncomplicated TKA for OA under uninfused spinal of 0.8% mepivacaine + 150 mcg PTX morphine at 15:00 hrs. Bladder began wearing off at 15:00 hrs.
- Past medical history
  - Severe chronic pain due to Fibromyalgia (shoulder pain)
  - She was started on escalating doses of opioids in 1995.
  - Opioid load has been stable for yrs.
  - Her medical history includes:
    - Fentanyl patch 200 mcg/hr
    - Oxycodone (80 mg PO QID)
    - Hydromorphone 81 mg PO QID (taken 4 per day)
    - Naproxen 250 mg PO QID (max D/C seven days ago)
Uncontrolled pain after TKA in a Fibromyalgia patient – what now?

- Fentanyl patch 250 mcg/hr left on patient but no PO drugs given
- IV PCA was started at 15:00
  - PCA bolus 0.2 mg – Lock-out 6 min. – No continuous – 1 hour limit of 2 mg.
  - 8 mg IM so far, plus 400 mcg fentanyl by nurse and patient wide awake, in agony.
- Ketamine 30 mg IV
- Ketamine IV, but what dose??
- Ketamine 2 mg IV bolus Q2 min. to 10 mg, then follow with infusion 5 mg per hour

Ultra-Low Dose Ketamine and Memantine Treatment for Pain in an Opioid-Tolerant Oncology Patient

What is this?

The Naked Mole Rat

What is its significance?

A New Dawn In Analgesia

Hyperalgesia

Nociceptive Stimuli

Pro-nociceptive modulation

Anti-nociceptive modulation

Pain

Analgesia
Analgesic Drugs that act by Nociceptive Modulation

- Pro-antinociceptive
  - **Augments** inhibitory modulation of nociception i.e. opioids
- Anti-nociceptive
  - **Inhibits** the facilitatory modulation of nociception i.e. ketamine, gabapentin and pregabalin, lidocaine

But how to set up the IV PCA?

- We need to have some idea of this patient's level of opioid tolerance.
- The Opioid Dose Response Shift!

**Convenient Opioid Conversions (Daily Total PO Dose)**

- Tramadol 500 mg
- Tapentadol 250 mg
- Morphine 100 mg
- Oxycodone 50 mg
- Hydromorphone 20 mg
- Fentanyl Patch 25 mcg/hr

**Convenient Opioid Conversions – Single Dose**

- Tapentadol 50 mg
- Morphine 20 mg
- Oxycodone 10 mg
- Hydromorphone 4 mg

- SIMILAR ANALGESIC EFFICACY WITH REDUCED OPIOID S/E
Calculating the Opioid Dose Response Shift

- Key Principle – total daily amount of opioid used by a healthy opioid naive patient for mild/severe to severe pain.
  - Morphine 300 mg
  - Oxycodone 90 mg
  - Hydrocodone 20 mg
  - Fentanyl patch 25 mcg/hr
  - Divide patient's daily total by this amount.

Calculating the Opioid Dose Response Shift

- Our patient
  - Fentanyl patch 200/25 = 8
  - Oxycodone 240/50 = 4.8
  - Hydromorphone 32/20 = 1.5
  - Total is factor of 14.3
  - However, start with using 50% of this, especially if co-administration of ketamine.

Using the ODRS factor to make a reasonable estimate for initial PCA settings

- Our patient ODRS factor is 14.3, let's use 7 to start and then re-evaluate. Expect requirement of 2 – 4 mg per hour via PCA pump.
  - 0.2 mg/Hr PCA bolus X 7 = 1.4 mg
  - Same (call-out or increase to 10 if it makes you feel better –)
    - 4/7/14/15 – patient should be able to maintain analgesia:
      - max. of 3 boluses per hour
  - Continuous to replace oral drugs?? Optional
    - 360 mg/day = 24 HR IV
    - 50 mg/Hr = 6 - 8 hour IV
    - Total of 32 mg IV Morphine per day = 1.33 per hour
  - 1 hour limit
    - 1.0 mg X 7 = 7.0 mg

Combining ketamine with IV PCA

- Stand alone infusion?
  - Security? Need special pump.
  - At THI we combine in same PCA bag with HM – keep ketamine < 10 mg/hr
  - 0.5 mg/ml HM with 2 mg/ml Ketamine for cases of modest opioid tolerance (expected to use < 2.5 mg/hr HM)
  - 1.0 mg/ml HM with 2 mg/ml Ketamine for cases where > 2.5 mg/hr HM anticipated

Further management

- Gabapentin 100 mg PO, then 200 mg Q12H for 5 days, then 260 mg per day
- Consider pregabalin or gabapentin
- Pregabalin 50 mg Q8H, not TID
  - be wary of altered sedation
  - May require for several weeks
- Resume oral opioids when stable analgesia and tolerating normal diet
- Consider replacing at least some of oral opioid with tapentadol – 560 mg tapentadol will replace > 100 mg oxycodone

A better way?? Let's start over!

- Chronic pain consultation –
  - Get off the opioids as much as possible before surgery – (she is 7 times the “matchable dose”)
  - Switch to methadone, butrans patch
  - Tapentadol – has noradrenergic mechanism as well as opioid actions
  - Gabapentinoids, especially pregabalin
  - Nortriptyline at hs
A better way?? Let's start over!
- Pre-op Anesthesia consultation
  - Regional anesthesia/analgesia options
    - Continuous epidural analgesia
    - Continuous femoral nerve block catheters
  - Perioperative mention
- Brief Pain Inventory
- Discuss realistic expectations
- If nephrology or DJC, start colestibol 7 days pre-op.
- Intrathecal morphine dose may be increased by factor of 7
- Patient-specific IV PCA settings

Epidural local anesthesia
Down the catheter,
And out through those holes,
Where the block will end up?
Nobody knows!

Or do they??

Unilateral surgery and epidural anesthesia/analgesia
- Unilateral procedures
  - Lower limb ortho and vascular
  - Nephrectomy
  - Thoracotomy
  - Breast
  - Upper limb
  - Caudal
- Who considers the side of the procedure in relation to epidural catheter placement?

Deliberate unilateral epidural?
- Can we really expect our catheters to "stay" mid-line, assuming we can even place it mid-line in the first place?
  - Try running a hose up a tree
  - So where do our catheters go?

Can we control the side to which the epidural catheter tip is placed?
- Does this yield clinically relevant unilateral anesthesia/analgesia?
Lateral Cervical Epidural Catheter Placement
For Continuous Unilateral Upper Extremity Anesthesia and Sympathetic Block

Intentional Unilateral Epidural Placement
- Rotation of Touhy 45 deg.
- Go with the "natural loop" of the catheter
- Subtle angulation of Touhy towards side of intent, 5 degrees, so that tip is 5 mm off midline

Distribution of Solution in the Epidural Space

"Contrary to conventional descriptions and artists' depictions, the course of solution through the epidural space is highly detailed and non-uniform. Solutions typically spread through numerous small channels, "trails", rather than as a unified advancing front. The solution seems to progress through multiple crevices in a path determined by the layering and texture of tissue planes. No barriers restrict flow circumferentially in the epidural space or laterally out the intervertebral foramina."

67 yr. male for Laparoscopic Right Hemicolectomy – Hx of spinal instrumentation
- Chronic LBP – refuses any neuraxial
  - Had spinal instrumentation T11/L5 2008
  - Switched from Midzocain to Butrans 20 wks months ago and doing OK
  - What is Butrans?
  - Do we stop it or continue peri-op?
  - What special considerations?

What is Butrans?
- Transdermal buprenorphine patch
  - 5, 10 and 20 mg/hr – changed Q2days
  - 3 days to ramp up and 3 days to wear off

Buprenorphine considerations
- Partial agonist mu / antagonist Kappa
  - Extremely high affinity at mu opioid receptor
  - Concern was that it would block action of pure mu agonists, and therefore best to O/C pre-op
  - Likely better to just continue with chronic dose since it is apparent that regular opioids still effective
  - If naloxone required use large doses of up to 5 to 12 mg! May require up to 30 minutes to work.
They have to convert to open

- If not already in use, consider starting an infusion of IV lidocaine as a potent analgesic adjunct.
  - 1.5 mg/kg loading dose, 2 mg/kg/hr intra-op followed by 1.3 mg/kg/hr post-op
  - Highly opioid sparing
  - Also inherently promotes bowel motility
  - Safe to use on surgical wards

A review of the “New Kids” on the block and their impact on APS

- Methadone
- Suboxone
- Targin
- Tramadol
- Nucentia (tapentadol)

Table 3. Bowel Function and Duration of Hospitalization

<table>
<thead>
<tr>
<th></th>
<th>Site</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Pass Time (hour)</td>
<td>28 [25-30]</td>
<td>17 [11-28]</td>
</tr>
<tr>
<td>Defecation (hours)</td>
<td>44 [40-46]</td>
<td>26 [24-37]</td>
</tr>
<tr>
<td>Hospital stay (days)</td>
<td>5 [4-6]</td>
<td>5 [4-6]</td>
</tr>
</tbody>
</table>

Data are presented as median [25%-75% interquartile range].

Methadone

- Methadone maintenance therapy and chronic pain
- Metabolism is via oxidative CYP3A4 mechanism
- Variable long half-life and potential for drug interactions makes it tricky
- Methadone 3 mg PO = morphine 1 mg IV (very approx.)
- Keep on PO methadone peri-op if possible
- Regional, adjuncts, ketamine/SEMA PCA

Suboxone

(sublingual buprenorphine/naloxone)

- Indicated for opioid addiction/maintenance
- 2 mg/0.5 mg and 8 mg/2 mg tablets
- Once daily sublingually
- Naloxone has extreme poor bioavailability
- Purpose is to discourage misuse by crushing and injecting or “snorting”
- Continue peri-op, may need to supplement with other opioids
Targin
(Sustained release oxycodone/naloxone)
- Indicated for chronic pain in patients that could benefit from built in "abuse deterrent" and antagonists to constipating effect of opioid
  - 5/2.5, 10/5, 20/10, and 40/20 G12H PO
  - Naloxone is < 3% systemically bioavailable, but has a local effect on opioid receptors in the gut
  - Purdue product monograph states contraindicated for peri-op acute pain
  - If gut still working I can't see any reason to O/C
  - If O/C convert oxycodone to IV opioid, etc.

Tramadol
- Is tramadol a partial agonist/antagonist?
- NO! It is just the opposite
- Poor mu receptor affinity
- Other opioids may be added
- Also analgesia via norepinephrine and serotonin re-uptake mechanisms
- Continue peri-operatively

Tramadol to Tapentadol
- Unreliable mu opioid activity due to requirement for M1 metabolite
- Tapentadol is not a mu drug
- Tramadol has only weak to moderate opioid activity (step 2 drug)
- Tapentadol has greater opioid effect and is a strong analgesic
- Tramadol - risk of serotonin syndrome and nausea common
- Tapentadol does not have clinically relevant serotonin activity

Tapentadol Advantages over Simple Opioid
- Non inferior to oxycodone (5mg Tap vs. 10 mg Oxy)
  - More opioid efficacy than tramadol (schedule 2 controlled drug)
  - 30% less in nausea, vomiting, and constipation
  - Better analgesia in cases with mixed neuropathic pain
  - Much less risk of aberrant prescribing
  - Not a sedative
  - No drug interactions with CYP P450 systems
  - BUT! Not covered by ODB and cost may be a factor (90 cents/30 mg)

Conclusions
- Opioid Conversions
  - 100 – 50 = 20 and 25 for the fentanyl patch
  - Oral to IV is 4:1
  - IV to Oral is 1.2
  - It is conservative and the math just works better
- Calculate the Opioid Dose Response Shift to help estimate PCA parameters and REASSESS.
Conclusions

- Ketamine, the essential adjunct in opioid tolerant patients
- A whole new pharmacology
  - Ultra-low dose ketamine – never > 2 mg as an IV bolus
- The three physical dimensions of analgesia –
  Blocking pro-nociception may well be as important as facilitating anti-nociception in some difficult patients
  - Ketamine, gabapentinoids, lidocaine

Conclusions

- Preferential lateral epidural catheter for unilateral surgical procedures
- Butrans may be continued peri-op
- Nucynta (Tapentadol)
  - First new analgesic molecule in > 25 yrs
  - Dual mechanism of action (MNE and opioid)
  - Less N/V, less constipation
  - Much reduced risk of diversion/abuse

References

Obstetrics
Dr. George Dumitrascu

Learning Objectives:

- Discuss the incidence and diagnosis of placenta percreta
- Review obstetric and anesthetic implications of placenta percreta
- Review preparation and treatment of peripartum haemorrhage.
Trauma and Transfusion Therapy

*Dr. Leilani Doyle*

**Learning Objectives:**

- Will better understand coagulopathy in trauma and how these patients are different from other bleeding patients
- Will have tools to predict which trauma patients are at risk of require a massive transfusion
- Will have a better understanding of current best practices in the treatment of coagulopathy of trauma
Malignant Hyperthermia
Dr. Kevin Nolan

Learning Objectives:

• be familiar with the management of a possible MH crisis
• know how and where to get assistance with MH related patient issues
• be clear that the management of a possible MH crisis and the diagnosis of MH susceptibility are two separate issues
Useful references for MH workshop Winterlude 2013

1) Review of protocols to prepare newer anesthesia machines

Preparation of Modern Anesthesia Workstations for Malignant Hyperthermia–susceptible Patients: A Review of Past and Present Practice
Kim, Tae W. M.D.*; Nemergut, Michael E. M.D., Ph.D.


2) excellent review article by MH expert in UK

Malignant hyperthermia: pharmacology of triggering P. M. Hopkins

http://bja.oxfordjournals.org/content/107/1/48.full?sid=d968b1ad-e534-4437-8f0c-a778e4f45fcc

3) Very interesting case report in the area of MH like events occurring in awake patients

Death in the Emergency Department: An Unrecognized Awake Malignant Hyperthermia-Like Reaction in a Six-Year-Old
1. Wendy A. Lavezzi, MD*, John F. Capacchione, MD†, Sheila M. Muldoon, MD†, Nyamkhishig Sambuughin, PhD†, Salid Bina, PhD†, Deanna Steele, MS, CGC‡ and Barbara W. Brandom, MD

http://www.anesthesia-analgesia.org/content/116/2/420.abstract

4) Useful MH web site reference
Malignant Hyperthermia Association of United States: Healthcare Professionals section
http://www.mhaus.org/healthcare-professionals/#.UQbZQ460LzJ

5) Another useful web site: European Malignant Hyperthermia Group
http://www.emhg.org/
Pediatric Cases for the Occasional Pediatric Anesthesiologist

*Dr. Dylan Bould*

**Learning Objectives:**

- Will better understand challenging pediatric cases that anesthesiologist with a mostly adult practice may have to undertake
- Will know how to assess and treat pediatric crises during anesthesia
- Discuss common problems with general pediatric practice
Regional Anesthesia
Dr. Anne Lui

Learning Objectives:

• To acquire ultrasound skills for performing regional blocks
• Discuss the relevant sono-anatomy
• Practice ultrasound guided needle placement
Vascular Access

Dr. Victor Neira

Learning Objectives:

• Prioritize sites of vascular access for different clinical circumstances
• Identify and compare surface landmarks and sono-anatomy for central and peripheral catheterization
• Practice intra-osseous cannulation and punctures in ultrasound task training models
ULTRASOUND GUIDED VASCULAR ACCESS

Learning Objectives:
1. Prioritize sites of vascular for different clinical circumstances.
2. Identify and compare surface landmarks and sono-anatomy for central peripheral catheterization.
3. Practice intra-osseous cannulation and punctures in ultrasound task training models.

Vascular access is an essential procedure in emergency and peri-operative management. The priority order for vascular access will depend on patient’s clinical condition and emergency status. Algorithmic approaches have been proposed for adult and pediatric patients requiring vascular access in different clinical conditions: 1 cardiac arrest, 2 shock, short and long term central and peripheral inserted central lines.

Current literature and resuscitation guidelines propose the use of intra-osseous (IO) catheterization as an alternative of intravenous access in pediatric cardiac arrest. In emergency situations limited attempts of intravenous cannulation and early IO insertion is recommended.

Once acute resuscitation has been performed, the patient may require peripheral or central venous catheterization. Current guidelines recommend the use of ultrasound to guide central venous catheterization. The evidence does not support the use of ultrasound for peripheral vascular access however the technique has been described and successfully used for peripherally inserted catheters (PICC) in hundreds of patients at CHEO.

An algorithm approach is proposed for patients requiring prolonged intravenous infusions. If the patient requires central venous catheterization for 3 to 14 days mild line central venous catheter (CVC ) is recommended. If the patient requires treatment for more than 14 days PICC should be considered. For patients requiring more prolonged infusions or treatments surgically implanted central catheters (Broviac or Hickman or Port catheters) are better alternatives.

FOCUS Ultrasound
Dr. Ashraf Fayad

Learning Objectives:

• To review the indications for FOCUS exam in the perioperative setting.
• To acquire ultrasound skills to obtain basic views.
• To practice ultrasound scanning techniques on live models
Neonatal Resuscitation

Dr. Catherine Gallant

Learning Objectives:

• Be familiar with the recent changes in the NRP algorithms
• Have the opportunity to practice, hands on, the sequence of the NRP algorithm on a simulated neonatal patient including bag and mask ventilation and endotracheal intubation
• Have the opportunity to practice, hands on, UVC placement on a simulated neonatal patient
Airway Management- New Technology: Problems and Pitfalls

Dr. Edward Crosby

Learning Objectives:

• Identify benefits of new airway technology
• Recognize pitfalls related to new technology
• Make the right choice in clinical situation
UNIVERSITY OF OTTAWA
DEPARTMENT OF ANESTHESIOLOGY

19th Annual Anesthesia Winterlude Symposium
Sunday February 3, 2013

MORNING LECTURES
What can monitoring technology do to improve safety and outcomes?

*Dr. Mark Ansermino*

**Learning Objectives:**

- Describe the historical impact of monitoring technologies on safety in anesthesia.
- Highlight the limitations of current monitoring technology and human performance.
- Propose possible solutions to enhance safety and optimize outcomes following surgery and anesthesia.
What can monitoring technology do to improve safety and outcomes?

Anesthesiologists have been at the forefront of efforts to prevent patient harm. Technological advances in patient monitoring have played a significant role in these efforts. In collaboration with experts from other sectors, especially engineering, many new and improved sensors have been developed over the last 20 years. These have included pulse oximetry, automated oscillotronometric blood pressure measurement, and continuous exhaled gas analysis. Routine monitoring of increasing numbers of physiological parameters, including oxygenation, ventilation, circulation, and temperature, have also been implemented as a minimum standard of care. However, there is still much debate as to whether monitoring devices alone have been able to reduce adverse patient outcomes.  

While it may seem intuitive that more monitoring will enable us to optimize patient care, large outcome studies are required to demonstrate this benefit. In fact, some large studies of monitors, such as pulmonary artery catheters, have shown that these devices may negatively impact outcomes and increase cost. However, newer and less invasive cardiovascular, respiratory and neuromuscular monitors may provide improvement in outcomes.

New monitors alone may not ensure optimal outcomes. Improving the performance of skilled medical professionals is unlikely to be achieved by exhorting them to work more carefully, more cheaply, or more quickly. Anesthesiologists are already likely to make decisions, plan their time, and remember key information to the highest degree human ability will allow. Further advances will require some form of assistance. There is a compelling argument that advances in patient monitoring have actually increased the chances of human error, by adding greater complexity to the anesthesiologist’s workload. In addition, the monitor may become a distraction when things go wrong. One of the main causes of this paradox is that, while a monitoring system is capable of detecting abnormalities, it may not ensure that this information is transferred to the clinician in a meaningful manner. This imperfect linkage and integration between the operating room environment and the clinician’s cognitive awareness must be overcome if advances in monitoring technology are to translate into better patient outcomes.

---


Ultrasound for Vascular, Regional, Airway and More

Dr. Anahi Perlas

Learning Objectives:

• Identify three areas of anesthesia practice in which ultrasound guidance can improve safety by reducing complications
• Discuss how bedside ultrasound can be used to assess an airway anatomy
• Discuss how bedside ultrasound can be used to assess peri-operative aspiration risk
Ultrasound beyond regional Anesthesia practice

Anahi Perlas, MD, FRCPC
Associate Professor
Department of Anesthesia, University of Toronto

This lecture will summarize our current understanding of several point-of-care ultrasound applications in clinical Anesthesia practice. The topics covered will include vascular access, airway assessment, and gastric content and aspiration risk assessment. A summary of the latter topic is included here.

- Aspiration pneumonia is one of the most serious anesthetic-related complications. It is associated with serious morbidity and 5% mortality. It is a causative factor in more than 10% of all Anesthesia-related deaths.
- The presence of gastric content beyond normal baseline gastric secretions is a well recognized risk factor for aspiration. The nature and volume of the aspirate are related to prognosis, with higher volumes, solid particles and high acidity carrying more guarded prognosis.
- A clinician’s ability to assess gastric content on a given patient is currently limited. We have well-established fasting guidelines for elective surgical procedures. However, these guidelines are often not followed properly by patients or are not applicable in some clinical situations (labour, trauma, emergency care)
- Bedside point-of-care ultrasound can provide useful information to the clinician about the TYPE of gastric content (empty, clear fluid or solid) and also the VOLUME of gastric content.
- During this presentation, a systematic approach to scanning the gastric antrum will be discussed. Typical images of an empty stomach and one with fluid and solid content will be presented.
- Three existing mathematical models that allow assessment of gastric volume based on ultrasound assessment will be discussed with particular emphasis on a recently developed model validated with suctioning of fluid under gastroscopy.
- A possible clinical pathway to the application of the new assessment tool will be presented.
- Further research needs to be done on this emerging tool with regards to its reliability, training needs, and guidelines for clinical application.

References
1) Perlas A. Aesthesiology 2009; 111:82-89
2) Bouvet L. Europ J Anaesth 2009; 26:1015-1019
3) Perlas A. Anesth & Analg 2011; 113; 93-97
4) Bouvet L. Anesthesiology 2011; 114:1086-1092
5) Koeing S. Int Care Med 2011; 134:2125-2129
7) Perlas A. Anesth & Analg 2012; accepted for publication
Recuperative and Perioperative Pain Management

Dr. Spencer Liu

Goal: Recognize and effectively treat perioperative pain in a systems based fashion

Learning Objectives:

• Understand a systems based model to provide perioperative analgesia, especially post Acute Pain Service
• Understand metrics for tracking performance of perioperative analgesia
• Understand advantages and disadvantages of specific analgesic modalities for perioperative analgesia
Recuperative Pain Management

Spencer Liu, M.D.
Professor of Anesthesiology
Chief of Regional Anesthesia and Perioperative Pain Medicine

University of Washington
Department of Anesthesiology & Pain Medicine
Seattle, WA

Introduction

Many patients have difficulty with pain control after transition from patient-controlled analgesia modalities to oral analgesics. The creation of the Recuperative or Perioperative transitional pain services was intended to bridge the “hand-off” gap in pain management. One model we have employed is to add a Nurse Practitioner driven pain service to help provide direct medical pain management to patients and also surgical service guidance in treating pain in the in-hospital, post-PCA period.

Results of RPM Implementation

Our primary outcome measure was the Press Ganey patient satisfaction survey (Press Ganey Associates, South Bend, Indiana). The survey is used by multiple hospitals across the USA, is administered to all patients, and contains specific pain management satisfaction questions.

*Table 1* displays the volume of patients evaluated see by the service during the transition from PCA therapy to oral analgesia and treated for pain issues.

<table>
<thead>
<tr>
<th>Year</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>152</td>
</tr>
<tr>
<td>2008</td>
<td>881</td>
</tr>
<tr>
<td>2009</td>
<td>1126</td>
</tr>
<tr>
<td>2010</td>
<td>1332</td>
</tr>
<tr>
<td>2011</td>
<td>1348</td>
</tr>
<tr>
<td>2012</td>
<td>1211</td>
</tr>
</tbody>
</table>
Table 2 displays the results of the Press-Ganey patient satisfaction survey, listing the hospital’s percentile ranking as compared to other institutions, in the in-patient pain management satisfaction category.

HSS: Hospital for Special Surgery


Perioperative cardiac Morbidity following Non Cardiac Surgery

Dr. PJ Devereaux

Learning Objectives:

- Review the role for monitoring troponin measurements after non cardiac surgery
- Identify the prognostic relevance of myocardial injury after non cardiac surgery
- Discuss treatment options and the MANAGE trial
The VISION Study is an international prospective cohort study of a representative sample of patients undergoing noncardiac surgery. In June of 2012, the VISION investigators published a paper in JAMA demonstrating the prognostic relevance of an elevated Troponin T (TnT) measurement in the first 3 days after noncardiac surgery. In this study of 15,133 patients from 5 continents, the authors demonstrated through multivariable analysis that peak TnT values ≥0.02 ng/mL, occurring in 11.6% of patients, were associated with higher 30-day mortality compared to the reference group (peak TnT ≤0.01 ng/mL): peak TnT of 0.02 ng/mL (adjusted hazard ratio [aHR], 2.41; 95% CI, 1.33-3.77); 0.03-0.29 ng/mL (aHR, 5.00; 95% CI, 3.72-6.76); and ≥0.30 ng/mL (aHR, 10.48; 95% CI, 6.25-16.62). Because the majority of patients suffering a prognostically important myocardial injury after noncardiac surgery do not experience ischemic symptoms, monitoring perioperative troponin measurements is necessary to avoid missing these events.

The third universal definition of myocardial infarction was recently published in a 2012 consensus statement of the European Society of Cardiology, American College of Cardiology Foundation, American Heart Association, and the World Heart Federation. In this document the international consensus group added a section for the first time on myocardial infarction in the noncardiac surgery setting. Based on the POISE myocardial infarction data and the VISION troponin data this consensus document states, “routine monitoring of cardiac biomarkers in high-risk patients... after major surgery, is therefore recommended.”

Observational data from the POISE Trial suggests patients suffering a myocardial injury after noncardiac surgery benefit from ASA and a statin. Despite these data, only a minority of these patients receive these drugs. The first large international randomized controlled trial (i.e., the MANAGE Trial) evaluating potential interventions to improve the outcomes of patients suffering a myocardial injury after noncardiac surgery has recently started. This trial is evaluating the effect of a new anticoagulant (dabigatran 110 mg BID) versus placebo and omeprazole 20 mg daily versus placebo. I will discuss all these issues at conference.
SAVE THE DATE!

UNIVERSITY OF OTTAWA
DEPARTMENT OF ANESTHESIOLOGY

The Winterlude Anesthesia Symposium Planning Committee would like to invite you to:

The 20th Annual Winterlude Anesthesia Symposium
February 1 & 2, 2014
Ottawa, ON.