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NSC Mobile App

Get the App on your Phone

The NSC web app is now live for viewing on your smart phone, tablet or desktop.

There’s no need for an appstore. There’s no need for any downloads. This is a web app that works from your device’s browser whether it’s an iPhone, Blackberry, Android, Windows, and even a tablet, laptop, or desktop computer.

The app is extremely user friendly and allows for enhanced delegate engagement at the Congress through features such as live poll-taking at plenaries.

The app also offers great onsite services such as real live updates, personal scheduling functionalities and the ability to take and save notes on a particular session and send them to a preferred email address.

This guide will walk you through some of the great features and how to use them.

The first thing to do is to open the app. To do this, open up the browser on whatever device you are using and type in http://eventmobi.com/asa-nsc/.

This is the home screen of the app where you can access all the different sections the app has to offer.

If you want quicker access to the app, press the Download App button and save to your home screen. Remember this step is slightly different depending on what device you’re using.

Programme

In the Programme section, view all the event sessions by time, by tracks (lectures, workshops, small group discussions etc.) or by day. Can’t find what you’re looking for? Press the magnifying glass to search for a session.

Press the arrow on the right to view more details about a session. See where it is, what it’s about, and even take notes while you’re there, which are saved for future reading.

Create a Personalised Schedule

For your convenience, plan your days at the conference with your custom schedule. To save a session to your schedule, click the star on the left.

If it’s yellow, it has been added successfully. If a login screen appears, login or register for a new account.

Now to view your schedule, press the star on the top right corner of the screen. Here you have all the sessions you have saved, a personalised schedule just for you.

If you would like to remove a session from your schedule, simply press the yellow star to make it grey, press refresh, and it’s gone from your schedule.

Speakers

In the Speakers section, view all the speakers at the event. To learn more about each one, press the arrow on the right. You can view a PDF abstract of the speaker’s presentations during the Congress.

Maps

The Maps is your source for the location of each session rooms and the offsite functions.

Polls/Surveys

Want to have your voice heard? Take part in polls and surveys relating to the conference by choosing your answers and pressing submit. More details will be available closer to the conference.

Alerts

Stay up to date with any live conference updates in the Alerts section. You’ll be the first one to know.

Internet Access

All delegates have wireless internet access on the Mezzanine level of the Hotel Grand Chancellor. Select the network asa2012 and enter the password invivo2012.
President’s Welcome

Welcome to the 2012 National Scientific Congress (NSC) of the Australian Society of Anaesthetists. We are privileged to have exceptional international speakers including, Kelly McQueen and Warren M Zapol from the United States, Prof. Pierre Diemunsch from France and the Australasian Speaker, Assoc. Prof. Simon Mitchell from New Zealand complementing a great local line-up.

The 2012 NSC is themed ‘Pushing the Boundaries’. With this in mind, the NSC Convenor, Dr Cameron Gourlay, together with the Scientific Convenor, Dr Andrew Ottaway, and the NSC Organising Committee, have assembled an excellent and broad scientific program. Cameron and his team will ensure boundaries are pushed not only academically but also in a range of other exciting activities outside of the lecture theatre.

Our social program will deliver ample opportunity to meet and catch up with your colleagues. It has been designed to optimise your visit to the exciting Hobart environment especially for those taking advantage of school holidays and long weekends to make it a ‘family affair’. There are many opportunities for you to explore Hobart and indulge in what Tasmania does best: the finest foods, exciting wines, cultural experiences and, of course, our beautiful pristine environment, before, during or after the Congress.

I look forward to meeting you during the Congress and particularly encourage you to attend the Annual General Meeting on Monday 1 October.

I urge you to participate in the scientific programme and enjoy the social activities including a fabulous themed Gala Dinner on Monday 1 October. I welcome you to Hobart for what I believe will be a most exciting, educational and memorable Scientific Congress.

Dr Andrew Mulcahy
President
Australian Society of Anaesthetists

Convenor’s Welcome

As the Convenor of the Australian Society of Anaesthetists’ 71st National Scientific Congress (NSC), it is my pleasure and great privilege, on behalf of the entire NSC Committee to welcome you to Hobart from the 29 September to 2 October in 2012.

The theme for the 2012 NSC is ‘Pushing the Boundaries’, and we will be challenging you to push the boundaries to becoming a better anaesthetist. The 2012 NSC will provide an extensive programme of workshops, small group discussions, invited international speakers, national speakers and panel discussions, including a Q&A session facilitated by Tony Jones. The NSC will offer sessions relevant to anaesthetists in both public and private practice. The 2012 NSC social programme will push your artistic and gastronomic boundaries with events including a cocktail reception at the Museum of Old and New Art (MONA) and the Gala Dinner featuring a degustation-style menu complemented by Tasmanian wines.

We welcome you to Hobart to not only take advantage of the NSC and all it offers for professional development, but to indulge in what Tasmania does best: the finest foods, exciting wines, cultural experiences and, of course, nature. Tasmania has a range of world-class experiences for all delegates: enjoy the outdoors in 7-star comfort at Saffire on the Freycinet Peninsula, push your artistic boundaries at MONA, immerse yourself in sustainable cooking at the Agrarian Kitchen or explore the pristine beaches of Maria Island and much more.

If you are unable to extend your stay, the social programme will let you ‘taste’ Tasmania with each function showcasing our unique food and wines. We will also be offering an extensive range of tours during the meeting for partners and children.

On behalf of the NSC 2012 Organising Committee, I welcome you to Hobart in 2012.

Dr Cameron Gourlay
Convenor
71st ASA NSC 2012

Organising Committee

Cameron Gourlay (Convenor) Andrew Ottaway (Scientific Convenor)
David Brown Stuart Day
Anna McDonald Savas Totonidis
Richard Waldron Peter Wright
Mathew Yarrow Piers Robertson (Federal ASA)
David Elliott (Federal ASA) Robert Campbell (Federal ASA)

Join the NSC Conversation
Stay updated with Twitter by following #ASA_NSC
Scientific Convenor’s Invitation

Welcome to Hobart and to the 2012 National Scientific Congress of the Australian Society of Anaesthetists.

It has been the aim of our local organising committee to develop a scientific programme that is outside the ordinary and unlikely to resemble anything you have come across at an anaesthetic conference before.

We will open the NSC with the traditional Kester Brown Lecture, this year given by Prof. Don Chalmers from the University of Tasmania. Prof. Chalmers is Distinguished Professor of Law and has been involved in the ethics of the human genome and embryo stem cell research. His address on the promise of personalised medicine in the future will be thought-provoking and challenging.

Our International Invited Speakers will then deviate from the traditional topics to deliver addresses on global health; respiratory physiology and fatal respiratory failure while cave diving at extreme depth; translational research from seals in the Antarctic; and future research in obstetric anaesthesia.

In addition to updating your contemporary anaesthetic practice, our concurrent sessions will also attempt to push your boundaries with further presentations on global health; questioning what it means to be an anaesthetist in modern practice; the Euthanasia debate and choices at the end of life; and non-medical science in our ‘Beyond the Fringe’ session on Monday morning.

Supported by a wealth of challenging SGD’s and workshops, the programme will culminate in a ‘Q&A’ session on Tuesday hosted by ABC journalist Tony Jones. This will be an interactive and highly engaging way to conclude the NSC.

Once again welcome to Hobart. I hope you enjoy the scientific programme we have prepared for you, and I trust it will push your boundaries.

Dr Andrew Ottaway
Scientific Convenor
71st ASA NSC 2012
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<td>The global burden of surgical disease</td>
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<td>Changing the playing field  Federation Concert Hall  Chair: Dr Richard Waldron</td>
<td>W10: 1400–1600 Harbour View 1 Trunk and spine ultrasound-guided nerve blocks</td>
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<td>CVP SIG  Grand Ballroom 1  Chair: Dr David Daly</td>
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<td>Clinical Refresher Lectures  Grand Ballroom 3  Chair: Dr David Elliott</td>
<td>W12: 1400–1600 Menzies Centre Anatomy of the upper and lower limbs</td>
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<td>The anaesthetist as perioperative physician  Dr Vanessa Beavis</td>
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<td>Registrar training in private practice  Dr Andrew Mulcahy</td>
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<td>Changing the playing field  – conscious sedation?  Assoc. Prof. Douglas Stewart</td>
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<td>Not enough doctors? Lessons from the transformation of health workforce in the past 20 years  Prof. Guy Ludbrook</td>
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<td>Stored blood, hemoglobin based oxygen carriers (HBOC) and inhaled nitric oxide (NO)  Prof. Warren Zapol</td>
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<td>Point of care platelet monitoring  Dr Neville Gibbs</td>
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<td>OPCAB surgery – what do we know now?  Mr Ashutosh Hardikar</td>
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<td>Update on preeclampsia  Assoc. Prof. Alicia Dennis</td>
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<td>Update on malignant hyperthermia  Dr Robyn Gillies</td>
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<td>Update on anaphylaxis  Dr Michael Rose</td>
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<td>An ECG refresher for the anaesthetist  Dr Warrick Bishop</td>
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<td>The presentations for the Gilbert Troup ASA Prize are listed below.</td>
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<td>Can we limit the transition from acute to chronic pain?  Prof. Stephan Schug</td>
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<td>Life at the frontier  Prof. Warren Zapol</td>
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<td>Fatal respiratory failure at extreme depth: A poignant example of applied respiratory physiology  Assoc. Prof. Simon Mitchell</td>
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- Airway management

### W17: 1115–1315
- Harbour View 1
- Transthoracic echocardiography – more advanced

### W18: 1230–1630
- Baskerville Raceway
- Mercedes-Benz Driver Training

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### Regional SIG (1)
- Federation Concert Hall

**Regional anaesthesia for abdominal surgery – rectus sheath blocks**
- Dr Katrina Webster

**How I provide regional anaesthesia for abdominal surgery – transabdominis plane blocks**
- Dr Myles Conroy

**Continuous peripheral nerve blockade in paediatrics**
- Asst. Prof. Grant McFadyen

**Principles of catheter insertion using ultrasound guidance**
- Prof. Stuart Grant

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### GASACT
- Grand Ballroom 2
- Chair: Dr Shaun O’Brien

**Top 10 papers in anaesthesia & intensive care 2011**
- Dr Neville Gibbs

**ANZCA curriculum 2013 – an overview**
- Dr Simon Martel

**Leadership in crisis**
- Cdr Peter Edwards

**The GASACT lunch to follow at the Henry Jones Art Hotel**
- Dr Flavio de Araujo

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### ODEC
- Grand Ballroom 3
- Chair: Dr Haydn Perndt

**The challenges of Cambodia**
- Dr Suzi Nou

**The establishment of primary trauma care in Myanmar**
- Dr Stephen Swallow

**Africa – did it change my life?**
- Dr Iain Wilson

**A positive Pacific sabbatical**
- Dr Shiva Malekzadeh

**Anaesthesia in East Timor**
- Dr Flavio de Araujo

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### History SIG
- Harbour View 2
- Chair: Dr Mike Hodgson

**Reporting anaesthetic morbidity: An Australian story**
- Dr Pat Mackay

**Brunel’s Crimean War hospital**
- Dr George Merridew

**Walking with Dr Pugh from Hobart to Launceston in 1836**
- Dr John Paul

**AGM**
- Retired Anaesthetists lunch to follow in Chancellor 4.

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### Lunch
- Exhibition Area, Federation Ballroom

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  - Harbour View 2
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  - Assoc. Prof. Kelly McQueen

**SGD 07**
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  - Dr Colin Chilvers
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<td>1730–1740 The utilisation of the end-tidal carbon dioxide detector and laryngeal mask airway by paediatrics as recommended resuscitation equipment for the newborn infant Dr Annlynn Kuok, Dr Dick Ongley</td>
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<td>1740–1750 A retrospective audit of blood product use in post partum haemorrhage Dr Adam Badenoch</td>
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<td>1750–1800 A large retrospective review of patients with multiple rib fractures and analgesic management at a major trauma centre Dr Helena Choi</td>
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<td><strong>1100</strong></td>
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<td><strong>CPD Booth, Mezzanine Level</strong></td>
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<td>Back to Index</td>
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<tr>
<td>TIME</td>
<td>SESSIONS</td>
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<tr>
<td>1115–1315</td>
<td><strong>End of Life Choices</strong> Federation Concert Hall Chair: Dr John Paull</td>
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<td></td>
<td><strong>Diving &amp; Hyperbaric SIG</strong> Grand Ballroom 1 Chair: Dr Margaret Walker</td>
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<td><strong>Wealth in Health</strong> Grand Ballroom 2 Chair: Mr James Brooks</td>
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<td><strong>Paediatrics</strong> Grand Ballroom 3 Chair: Dr Tom Mohler</td>
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<td><strong>W27: 1115–1315 Harbour View 1</strong> Lower limb ultrasound-guided regional anaesthesia</td>
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<td><strong>W27: 1115–1315 Harbour View 1</strong> Lower limb ultrasound-guided regional anaesthesia</td>
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<tr>
<td>1315–1430</td>
<td><strong>Lunch Exhibition Area, Federation Ballroom</strong></td>
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<td></td>
<td><strong>CPD Demonstrations 1330 &amp; 1400 CPD Booth, Mezzanine Level</strong></td>
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<td></td>
<td><strong>SGD 15: Chancellor 5 Anaesthesia in unco-operative adults Dr Michael Bremner</strong></td>
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<tr>
<td>1430–1650</td>
<td><strong>PLENARY SESSION 3 FEDERATION CONCERT HALL</strong></td>
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<td>Chair: Dr Richard Grutzner</td>
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<tr>
<td>1430–1515</td>
<td><strong>Geoffrey Kaye Oration</strong> Dr Andrew Mulcahy</td>
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<tr>
<td>1520–1650</td>
<td><strong>ASA Annual General Meeting</strong></td>
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<tr>
<td>1650–1730</td>
<td><strong>Pre-Gala Dinner Drinks Exhibition Area, Federation Ballroom</strong></td>
</tr>
<tr>
<td>1900–Midnight</td>
<td><strong>ASA Annual Gala Dinner Black Tie Dinner, Princes Wharf 1, Sullivans Cove</strong></td>
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<td>Time</td>
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<tr>
<td>0700–0830</td>
<td>Light breakfast served in the Exhibition Area</td>
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<tr>
<td>0730–0815</td>
<td><strong>Morning Session</strong></td>
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<td><strong>Federation Concert Hall</strong></td>
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<tr>
<td></td>
<td>Pushing the boundaries in parallel worlds</td>
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<tr>
<td></td>
<td>Assoc. Prof. Simon Mitchell</td>
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<tr>
<td>0745</td>
<td><strong>Registration</strong></td>
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<tr>
<td>0830–1030</td>
<td><strong>SESSIONS</strong></td>
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<td><strong>EEG. Its place in clinical practice</strong></td>
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<td><strong>New Boundaries in Crisis Management</strong></td>
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<td><strong>Chair: Dr Greg Deacon</strong></td>
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<td><strong>New boundaries in crisis management</strong></td>
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<td><strong>Dr Greg Deacon</strong></td>
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<td><strong>Bow-tie diagrams for crisis management</strong></td>
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<td><strong>Prof. Martin Culwick</strong></td>
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<td><strong>Respiratory crisis management</strong></td>
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<td><strong>Dr Antonio Grossi</strong></td>
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<td><strong>The resilient anaesthetist – a novel way of thinking about what we do and why we do it</strong></td>
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<td><strong>Dr Stavros Prineas</strong></td>
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<td></td>
<td><strong>Panel Discussion</strong></td>
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<td><strong>Session Abstracts</strong></td>
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<td></td>
<td><strong>This session will discuss new methods to analyse and to manage Anaesthetic Crises. The audience will be able to participate throughout using smart devices or microphones, and this session will be eligible for Category 3, Level 1 credits.</strong></td>
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<tr>
<td></td>
<td><strong>AIC Best Paper Award – presentation</strong></td>
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<td></td>
<td><strong>Researchers behaving badly</strong></td>
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<td></td>
<td><strong>Dr Richard Waldron</strong></td>
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<td><strong>Evidence? What evidence?</strong></td>
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<td><strong>Dr Neville Gibbs</strong></td>
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<td><strong>The Reverend Bayes and the modern doctor</strong></td>
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<td><strong>Dr Tim McCulloch</strong></td>
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<td><strong>Setting up a paediatric regional team</strong></td>
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<td><strong>Asst. Prof. Grant McDaiden</strong></td>
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<td><strong>Spinal ultrasound for neuroaxial procedures in anaesthesia</strong></td>
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<td><strong>Dr Nico Terblanche</strong></td>
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<td></td>
<td><strong>Ultrasound-guided paravertebral blockade – anatomy, approaches and techniques</strong></td>
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<td><strong>Dr Myles Conroy</strong></td>
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<td><strong>Interscalene brachial plexus block – how I do it</strong></td>
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<td><strong>Prof. Stuart Grant</strong></td>
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<td><strong>Images</strong></td>
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<td><strong>How I provide regional analgesia for shoulder surgery</strong></td>
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<td><strong>Dr Darcy Price</strong></td>
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<td><strong>Panel Discussion</strong></td>
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<tr>
<td>W33: 0830–0930</td>
<td>Management of acute pain that doesn’t follow the normal course</td>
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<tr>
<td>W34: 0830–1030</td>
<td>Property, shares or gold? Followed by panel Q&amp;A forum: To invest or not to invest?</td>
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<tr>
<td>SGD 16: 0830–1000</td>
<td>ECMO: rescue from the periphery</td>
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<tr>
<td>SGD 17: 0830–1000</td>
<td>Sharing an airway</td>
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<td>Time</td>
<td>Morning Tea</td>
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<tr>
<td>1030–1115</td>
<td>Morning Tea</td>
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<td>Exhibition Area, Federation Ballroom</td>
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<td>1115–1305</td>
<td>Q&amp;A: The Cost of Healthcare – Pushing the Boundaries Too Far?</td>
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<td>Facilitator: Mr Tony Jones, ABC</td>
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<td>Panel: Prof. Don Chalmers (Distinguished Professor, University of Tasmania)</td>
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<td>Dr Richard Bartlett (Department of Health and Ageing)</td>
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<td>Dr Andrew Miller (MDA National)</td>
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<td>Ms Angela Jackson (Health Economist)</td>
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<td></td>
<td>Dr Richard Grutzner (Vice-President, Australian Society of Anaesthetists)</td>
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<td></td>
<td>Dr Iain Wilson (Past-President, Association of Anaesthetists of Great Britain and Ireland)</td>
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<td>Dr Mark Warner (Immediate-Past President, American Society of Anesthesiologists)</td>
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<td>Dr Patricia Houston (President, Canadian Anesthesiologists’ Society)</td>
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<tr>
<td>1305–1315</td>
<td>NSC Close</td>
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<tr>
<td></td>
<td>Dr Andrew Ottaway, NSC Scientific Convenor, Federation Concert Hall</td>
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<tr>
<td>1315–1430</td>
<td>Lunch &amp; Farewell Drinks</td>
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<td>Exhibition Area, Federation Ballroom</td>
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</table>
## Gilbert Troup ASA Prize

### Saturday, 29 September 2012, Grand Ballroom 2. Presenters are listed below.

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
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</thead>
<tbody>
<tr>
<td>1400–1415</td>
<td>Use of intermittent pneumatic compression to the lower limbs to prevent venous thromboembolism in postoperative and critically ill patients: A stratified meta-analysis</td>
<td>Assoc. Prof Kwok-Ming Ho</td>
</tr>
<tr>
<td>1415–1430</td>
<td>Influence of acute postoperative pain on markers of sympathetic stress response in children: Haemodynamics, cardiac autonomic control and skin sympathetic activity</td>
<td>Prof Thomas Ledowski</td>
</tr>
<tr>
<td>1430–1445</td>
<td>A survey of practice and attitudes of Australasian anaesthetists to neuromuscular transmission monitoring in 2011</td>
<td>Dr Stephanie Phillips</td>
</tr>
<tr>
<td>1445–1500</td>
<td>Validity of using central venous pressure as a resuscitation target after major surgery: A prospective cohort study</td>
<td>Assoc. Prof Kwok-Ming Ho</td>
</tr>
<tr>
<td>1500–1515</td>
<td>Comparison of electromyography at abductor digiti minimi with acceleromyography at adductor pollicis during recovery from non-depolarising neuromuscular blockade</td>
<td>Dr Paul Stewart</td>
</tr>
<tr>
<td>1515–1530</td>
<td>Use of a non-invasive near infra-red spectroscopy tissue oxygen monitor to detect tissue hypoperfusion: a simulation study on volunteers</td>
<td>Assoc. Prof Kwok-Ming Ho</td>
</tr>
<tr>
<td>1530–1545</td>
<td>Haemodynamics in morbidly obese pregnant women</td>
<td>Dr Alicia Dennis</td>
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<tr>
<td>1545–1600</td>
<td>Cardiac function in women with severe preeclampsia</td>
<td>Dr Alicia Dennis</td>
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</tbody>
</table>

## Smiths Medical/ASA Best Poster Session

### Sunday, 30 September 2012, Poster Area. Presenters are listed below. Chair: Dr David Elliott.

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1430–1440</td>
<td>Is acute postoperative pain reflected by a change in parasympathetic cardiac tone? Evaluation of the analgesia nociception index (ANI)</td>
<td>Prof Thomas Ledowski</td>
</tr>
<tr>
<td>1440–1450</td>
<td>Audit of patients admitted with fractured neck of femur</td>
<td>Dr Ping Han Chia</td>
</tr>
<tr>
<td>1450–1500</td>
<td>Post traumatic stress disorder in relatives of patients admitted to an intensive care unit</td>
<td>Dr Krishnaswamy Sundararajan</td>
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<tr>
<td>1500–1510</td>
<td>The utilisation of the end-tidal carbon dioxide detector and laryngeal mask airway by paediatricians as recommended resuscitation equipment for the newborn infant</td>
<td>Dr Annlynn Kuok</td>
</tr>
<tr>
<td>1510–1520</td>
<td>The effect of passive leg raising on haemodynamics in healthy term pregnant women</td>
<td>Dr Alicia Dennis</td>
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<tr>
<td>1520–1530</td>
<td>A retrospective audit of blood product use in post partum haemorrhage</td>
<td>Dr Adam Badenoch</td>
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<tr>
<td>1530–1540</td>
<td>A large retrospective review of patients with multiple rib fractures and analgesic management at a major trauma centre</td>
<td>Dr Helena Choi</td>
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<tr>
<td>1540–1550</td>
<td>Pain scores versus comfort scores after caesarean section: A randomised trial</td>
<td>Dr Allan Cyna</td>
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<tr>
<td>1550–1600</td>
<td>Comparison of noninvasive measurement of blood pressure in the upper arm, forearm and calf in patients undergoing general anaesthesia</td>
<td>Dr Shedleyah Dhuny</td>
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<tr>
<td>1600–1610</td>
<td>Operative delay in hip fractures – dispelling a myth</td>
<td>Dr Ronald Cheung</td>
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<td>11</td>
<td>Timing of pre anaesthetic consultation in relation to booking and operating times – an audit in a busy public hospital</td>
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<td></td>
<td>Dr Kate Blatchford</td>
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<td>12</td>
<td>Hypnosis for pain in childbirth: A cochrane systematic review</td>
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<td></td>
<td>Dr Allan Cyna</td>
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<td>13</td>
<td>The application of maternal transthoracic echocardiography during caesarean birth in women with preeclampsia</td>
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<td></td>
<td>Dr Jennifer Dixon</td>
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<td>14</td>
<td>The use of dexmedetomidine and ketamine for sedation in a 96 year old patient undergoing a painful procedure</td>
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<td></td>
<td>Dr Ong Ee Teng</td>
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<td>15</td>
<td>An observational study of epidural analgesia in labour: Five more years’ experience</td>
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<td></td>
<td>Dr Jeremy Field</td>
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<td>16</td>
<td>Current effectiveness of post operative pain in surgical patients at Cabrini Health</td>
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<td></td>
<td>Dr Chantal McNally, Mrs Jenny Norman</td>
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<td>17</td>
<td>The circumstances surrounding the first administration of a general anaesthetic for a surgical operation in Australia</td>
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<td></td>
<td>Dr John Paull</td>
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<td>18</td>
<td>The effect of perioperative ketamine on the risk of longer term postoperative pain: A literature review</td>
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<td>Assoc. Prof. Phillip Peyton</td>
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<td>19</td>
<td>Tobacco ask-advise-refer practice management in the pre-admission unit</td>
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<td>Dr Chris Pysyk</td>
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<td>20</td>
<td>The laryngeal mask airway supreme versus the tracheal tube as a ventilatory device in elective laparoscopic cholecystectomy a prospective randomised trial</td>
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<td>Dr Kelvin Quek, Dr Chee Yong Choo, Dr E Lin Ooi</td>
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<td>21</td>
<td>Blaming the balloon: Aetiology of post-intubation tracheobronchial rupture</td>
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<td></td>
<td>Dr Jennifer Reilly</td>
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<td>22</td>
<td>How do patients rate their experiences following regional anaesthesia results from the AURORA study</td>
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<td></td>
<td>Dr Gloria Seah</td>
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<td>23</td>
<td>Modelling perioperative decisions</td>
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<td></td>
<td>Mr Richard Seglenieks</td>
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<tr>
<td>24</td>
<td>Measurement of angle of tilt for elective caesarian section for three different BMI groups</td>
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<td></td>
<td>Dr Jitin Sharma</td>
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<tr>
<td>25</td>
<td>Dexmedetomidine sedation in an 11-year old child for electrophysiologic study and radiofrequency ablation</td>
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<td>Dr Yoong Chuan Tay</td>
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<tr>
<td>26</td>
<td>Ventricular wall motion assessed during the post anaesthetic induction period using transgastric left ventricular short axis view observation and strain analysis relatively underestimates the severity of wall motion abnormality</td>
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<td>Dr Kosaku Toyota</td>
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<td>27</td>
<td>Comparing of intrathecal diamorphine and fentanyl as adjuncts in spinal anaesthesia for caesarean section</td>
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<td>J Sharma</td>
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GASACT

GASACT is the Group of ASA Clinical Trainees. It was formed in September 2000 and held its inaugural meeting in October 2001. As part of the 71st NSC in Hobart GASACT will be organising scientific sessions and a social evening specifically for trainees.

GASACT members receive significant discounts on the NSC registration fees; if you are interested in joining GASACT please visit the ASA web site www.asa.org.au

GASACT Local Organising Committee

- Shaun O’Brien (Convenor)
- Shona Bright (Co-convenor)
- Mark Alcock
- Anders Bown
- Joey Walsh
- Tin Win

GASACT Social Evening

A social evening for GASACT members will be held on Sunday evening at The Observatory Bar from 1930. Come and spend a relaxing evening with your colleagues while sampling a fine selection of signature Tasmanian dishes and beverages.

This is FREE event for current MDA National members* and an additional cost of $50 for non-members.

*MDA National members will be reimbursed with a $50 pre-paid VISA card on the night.

See the registration desk if you haven’t already booked a ticket.

Programme

Sunday 30 September

Grand Ballroom 2, Hotel Grand Chancellor Hotel

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>0830 - 1030</td>
<td>NSC Plenary Session</td>
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<tr>
<td>1030 - 1115</td>
<td>Morning Tea</td>
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<tr>
<td>1115 - 1315</td>
<td>GASACT Programme</td>
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<tr>
<td>1315 - 1430</td>
<td>GASACT Trainee Luncheon</td>
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<tr>
<td>1430 - 1630</td>
<td>Transthoracic Echocardiography – For Anaesthetic Registrars (GASACT)</td>
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<tr>
<td>1630 - 1730</td>
<td>Fellowship Forum</td>
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<tr>
<td>1730 - 1800</td>
<td>Smiths Medical/GASACT Poster Session</td>
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<tr>
<td>1930 - Late</td>
<td>GASACT Social Evening</td>
</tr>
</tbody>
</table>

*MDA National members will be reimbursed with a $50 pre-paid VISA card on the night.

See the registration desk if you haven’t already booked a ticket.
This workshop is available for registrants, accompanying persons and healthcare industry representatives. You can purchase multiple tickets.

Your team of professional instructors will guide you through this half-day driving event in a comprehensive range of Mercedes-Benz vehicles. You can expect to experience a range of dynamic handling exercises that have been specifically developed to test the driver and show the technology and handling capabilities of the range. Simulated emergency situations will provide the necessary experiences to improve the driving skills of even the most proficient driver. ABS and BAS braking systems will be highlighted through a range of exercises and ESP will be demonstrated and experienced. This half-day driving event has been designed to provide motorists with skills and experiences to help them drive safely and confidently in the modern world.

All tickets will be sold on a ‘first come, first served’ basis and there is no limit on the number of tickets you may purchase.

<table>
<thead>
<tr>
<th>Date</th>
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<tbody>
<tr>
<td>W01 Friday 28 September</td>
<td>0800—1200</td>
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<tr>
<td>W02 Friday 28 September</td>
<td>1230—1630</td>
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<tr>
<td>W03 Saturday 29 September</td>
<td>0800—1200</td>
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<tr>
<td>W08 Saturday 29 September</td>
<td>1230—1630</td>
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<tr>
<td>W13 Sunday 30 September</td>
<td>0800—1200</td>
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<tr>
<td>W18 Sunday 30 September</td>
<td>1230—1630</td>
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<tr>
<td>W23 Monday 1 October</td>
<td>0800—1200</td>
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<tr>
<td>W31 Monday 1 October</td>
<td>1230—1630</td>
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</tbody>
</table>

Location: Baskerville Raceway

Cost: $300

Max: 25
Social Functions

Registration and Welcome Reception
Date: Friday 28 September
Time: 1700–1900
Venue: Mezzanine Level, Hotel Grand Chancellor
Cost: Inclusive for full delegates and registered accompanying persons
      $30 for additional tickets
Dress: Smart Casual
Welcome to Hobart! The Welcome Reception is an ideal opportunity to catch up with your interstate and international colleagues and to meet delegates who are attending an NSC for the first time. After you register and collect your Congress materials, drinks and canapés will be served on the mezzanine level at the Hotel Grand Chancellor.

MONA Cocktail Reception
Date: Saturday 29 September
Time: 1900–2300
Venue: MONA
Cost: Inclusive for full delegates, weekend delegates and registered accompanying persons
      $145 for additional tickets
Dress: Cocktail Dress, Suit and Tie
The 2012 NSC will include a private cocktail reception and viewing in the spectacular Museum of Old and New Art, MONA, described by owner David Walsh as ‘a subversive adult Disneyland.’ Artworks at MONA include antiquities, such as coins, flints and sarcophagi, paintings by Sir Sidney Nolan and an array of controversial modern art. All delegates will find MONA to be an ‘experience,’ for better or for worse.

Healthcare Industry Reception
Date: Sunday 30 September
Time: 1630–1800
Venue: Exhibition Area, Hotel Grand Chancellor
Cost: Inclusive for full delegates, weekend delegates and registered accompanying persons
      $55 for additional tickets
Dress: Smart Casual
Catch up with delegates and healthcare industry representatives in the exhibition area. You can see the latest from the industry, discuss the AFL result and contemplate the NRL grand final.

ASA Annual Gala Dinner
Date: Monday 1 October
Time: 1900–Late
Venue: Princes Wharf 1, Sullivans Cove
Cost: Inclusive for full delegates and registered accompanying persons
      $180 for additional tickets
Dress: Formal, Black Tie
The ASA Annual Gala Dinner is the premier function on the anaesthetic calendar. The 2012 dinner on Hobart’s waterfront will feature Tasmania’s finest food and wine. Local chef, Waji Spiby, will prepare a degustation style menu with Tasmanian wines.

If you would like a ticket for the MONA Cocktail Reception or the Gala Dinner please see the staff at the registration desk.
International Invited Speakers

Assoc. Prof. Kelly McQueen
Kelly McQueen is an Associate Professor at Vanderbilt University in the Department of Anesthesiology, Affiliate Faculty at the Vanderbilt Institute for Global Health (VIGH) and the Director of Vanderbilt Anesthesia Global Health and Development. Assoc. Prof. McQueen is also a Fellow at the Harvard Humanitarian Initiative (HHI). She is the Past-President of the Arizona Society of Anesthesiologists, and Chairs the ASA Committee on Global Humanitarian Outreach. She co-directs the Alliance for Surgery and Anesthesia Presence, an international group committed to improving global surgical access, delivery and outcome evaluation, and the Founder and President of The Global Surgical Consortium, a public charity committed to improving safe anesthesia and surgery in low income countries.

Prof. Warren M Zapol
Warren M Zapol is the emeritus Anesthetist-in-Chief at Massachusetts General Hospital and the Reginald Jenney Professor of Anesthesia at Harvard Medical School. He is currently the Director of the MGH Anesthesia Center for Critical Care Research. A graduate of MIT and the University of Rochester School of Medicine, Dr Zapol’s research efforts include studies of acute respiratory failure in animals and humans.

Prof. Pierre Diemunsch
Pierre Diemunsch is head of the Anesthesia Department at the University Hospital of Hautepierre in Strasbourg, France. Until June 2010 he was president of the European Society of Airway Management and is currently head of the Experimental Anesthesia Unit at the Institute for Research on Cancers of the Digestive Tract.

Q&A Facilitator

Mr Tony Jones
One of the ABC’s most experienced radio and television current affairs journalists, Tony Jones has reported for Four Corners, Foreign Correspondent, and other TV and radio current affairs programs. He has collected respected awards for reports such as ‘Horses for Courses’ on the Waterhouse racing dynasty (Walkley) and ‘My City of Sydney’ on the city’s development boom (Penguin). Tony will host a ‘Q&A’ style session discussing the cost of healthcare now and into the future.

Australasian Speakers

Assoc. Prof. Simon Mitchell
Simon Mitchell is an Anaesthetist and diving physician, and is Head of the Department of Anesthesiology at the University of Auckland. He is widely published in both his fields of interest, and his book chapters include contributions to current editions of Harrison’s Principles of Internal Medicine and the American Physiological Society Handbook of Physiology.

Kester Brown Lecturer

Prof. Don Chalmers
Donald Chalmers is Distinguished Professor of Law and Director of the Centre for Law and Genetics at the University of Tasmania. He is a Foundation Fellow of the Australian Academy of Law. Prof. Chalmers is Chair of the Gene Technology Ethics and Community Consultative Committee, and Deputy Chair of the National Health and Medical Research Council Embryo Research Licensing Committee.

Sponsored Speakers

Prof. Medge D Owen
Medge D Owen is a Professor of Obstetric Anaesthesia and Director of Maternal and Infant Global Health Programs at Wake Forest School of Medicine. Dr Owen was a Fulbright Scholar to Turkey in 1997-99 and is the founder and president of Kybele, Inc. (www.kybeleworldwide.org), a non-profit organisation to improve maternal and newborn safety worldwide through innovative educational partnerships.

Tasmanian Committee Invited Speaker

Prof. Stuart Grant
Stuart Grant is a Professor of Anesthesiology at Duke University In North Carolina. He is Director of medical student education in the department and also was awarded the Golden Apple Award for best educator in the medical school. Prof. Grant has recently published a textbook on ultrasound guided regional anesthesia and has been awarded a Coulter Research grant along with co-investigators in the Department of Biomedical Engineering at Duke to investigate innovative ultrasound technologies for imaging nerves, needles and local anesthetic. His clinical and research interests include ambulatory peripheral nerve catheters, ultrasound guided regional anesthesia and improving clinical outcomes.
Dr Philip Nitschke

Philip Nitschke has been the face of the voluntary euthanasia debate in Australia and around the world for more than a decade. Dr Nitschke came to prominence after becoming the first doctor in the world to administer a legal lethal voluntary injection to four terminally ill patients in 1996 under the Northern Territory’s Rights of the Terminally Ill Act. He is Director of Australia’s national peak Voluntary Euthanasia advocacy group, Exit International, and is recognised internationally for this work. Dr Nitschke has written and advocated extensively on the issue of end of life rights. He holds a PhD in applied physics from Flinders University and is a graduate of the Sydney Medical School. Dr Nitschke is a seven-time nominee for Australian of the Year and is the recipient of many awards including Australian Humanist of the Year.

Rev. Prof. Michael Tate

Michael Tate was Dean of the Faculty of Law at the University of Tasmania before being elected to the Senate of the Australian Parliament where he served from 1978 to 1993. Rev. Prof. Tate served as Minister for Justice from 1987-93, in addition to other portfolios. He was Ambassador to the Netherlands and the Holy See from 1993-96. While residing in The Hague he appeared as co-agent and counsel for Australia before the International Court of Justice and was a keen observer of the initial operations of the War Crimes Tribunal for the former Yugoslavia. Rev. Prof. Tate received an Order of Australia in 1996 and was ordained a priest in the Roman Catholic Church in May 2000.

Other Speakers

Dr Tara Anderson
Prof. Michael Ashby
Dr Jeff Ayton
Mr Michael Bailey
Dr Vanessa Beavis
Dr Warrick Bishop
Dr Jim Bradley
Dr Pierre Bradley
Dr Katrina Brede
Dr Michael Bremner
Dr Justin Burke
Dr George Chalkiadis
Dr Colin Chivers
Asst. Prof. Paul Claus
Prof. Mike Coffin
Dr Myles Conroy
Dr David Cooper
Dr David Costi
Dr Phil Cowlishaw
Prof. Martin Culwick
Assoc. Prof. Andrew Davidson
Dr Stuart Day
Dr Greg Deacon
Assoc. Prof. Alicia Dennis
Dr Sasanka Dhara
Cdr Peter Edwards
Dr Angela Enright

Dr Neville Gibbs
Dr Robyn Gillies
Dr Sarah Green
Dr Antonio Grossi
Mr Ashutosh Hardikar
Prof. Ken Hillman
Prof. James Isbister
Dr Margaret Kay
Mr Rohan Kile
Mr James Kirby
Mr Simon Lester
Prof. Guy Ludbrook
Dr Tim McCulloch
Asst. Prof. Grant McFadyen
Dr Pat Mackay
Dr Shiva Malekzadeh
Dr Simon Martel
Dr Flavio de Arauj
Dr John Mercer
Dr George Merridew
Dr Tom Mohler
Prof. Michael Morgan
Dr Trevor Mudge
Dr Andrew Mulcahy
Dr Ainslie Murdoch
Dr Louise Nash
Dr Suzi Nou

Dr William Osler
Prof. Michael Paech
Dr John Paull
Dr David Pescod
Dr David Platts
Dr Darcy Prize
Dr Stavros Prineas
Dr Adrian Reynolds
Dr Ian Richardson
Dr Michael Rose
Dr Marty Russnack
Prof. Jamie Sleigh
Assoc. Prof. David Smart
Dr Peter Smith
Assoc. Prof. Douglas Stewart
Dr Tim Strong
Dr Stephen Swallow
Dr Nico Terblanche
Dr Steve Tisch
Dr Richard Waldron
Assoc. Prof. Robyn Wallace
Dr Kate Wearne
Dr Katrina Webster
Dr Iain Wilson
Assoc. Prof. Richard Wood-Baker
Assoc. Prof. Greg Woods

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### Workshops

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<td>Trunk and spine ultrasound guided nerve blocks</td>
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<td>Management and assessment of nerve injury</td>
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<td>Transthoracic echocardiography – basic</td>
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<td>Transthoracic echocardiography – more advanced</td>
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<td>Transthoracic echocardiography – for anaesthetic registrars (GASACT)</td>
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<td>Psychological factors for safe practice</td>
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<td>Introduction to ultrasound guided regional anaesthesia and vascular access</td>
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<td>Property, shares or gold followed by panel Q&amp;A forum – to invest or not to invest</td>
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<td>The pathway to settlement</td>
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<td>Field anaesthesia</td>
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<td>Field anaesthesia</td>
<td>W38 Tuesday 2 October</td>
<td>1030–1200</td>
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<td>Strategies for the final exam</td>
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## Small Group Discussions

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<td>SGD06</td>
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## Additional Activities

Push your physical boundaries with the committee members. These activities are available for registrants and accompanying persons.

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<tr>
<th>ACTIVITY</th>
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<tbody>
<tr>
<td>Mountain biking with the NSC Scientific Convenor</td>
<td>Friday</td>
<td>1300–1600</td>
<td>$20</td>
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<tr>
<td>Basic Life Support for the Non-Anaesthetist</td>
<td>Saturday</td>
<td>1400–1600</td>
<td>$55</td>
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<tr>
<td>Digital Photography</td>
<td>Saturday</td>
<td>1400–1600</td>
<td>$30</td>
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<tr>
<td>Road bike with ASA President</td>
<td>Sunday</td>
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<tr>
<td>Run with the NSC Convenor</td>
<td>Sunday</td>
<td>0630–0730</td>
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<tr>
<td>Basic Life Support for the Non-Anaesthetist</td>
<td>Monday</td>
<td>0900–1100</td>
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ASA Business Meetings

The following ASA business meetings are scheduled during the NSC.

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<td>29/09/2012</td>
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<td>Communications Working Party</td>
<td>Hotel Grand Chancellor Lobby Boardroom</td>
<td>0900-1030</td>
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<tr>
<td>PPAC</td>
<td>Hotel Grand Chancellor Lobby Boardroom</td>
<td>1030-1230</td>
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<td>GASACT Lunch</td>
<td>The Henry Jones Art Hotel Jones &amp; Co Room</td>
<td>1230-1400</td>
<td>30/09/2012</td>
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<tr>
<td>History of Anaesthesia SIG AGM</td>
<td>Hotel Grand Chancellor Harbour View 2</td>
<td>1305 - 1315</td>
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<tr>
<td>RA SIG AGM</td>
<td>Hotel Grand Chancellor Federation Concert Hall</td>
<td>1315-1330</td>
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<td>RAG Luncheon</td>
<td>Hotel Grand Chancellor Chancellor 4</td>
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<td>ODEC</td>
<td>The Henry Jones Art Hotel Shades Row Board Room</td>
<td>1430-1730</td>
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<tr>
<td>ANZCA SIG AGM (Cardiothoracic, Vascular &amp; Perfusion)</td>
<td>Hotel Grand Chancellor Grand Ballroom 3</td>
<td>1630-1715</td>
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<td>ACECC</td>
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<td>GASACT</td>
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<td>NSC 2013</td>
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Opinions expressed by authors in their abstracts and during their presentations are personal and do not necessarily reflect the opinions of the NSC Organising Committee members or the ASA.

Insurance
The registration fees do not include insurance of any kind. Participants are advised to take out personal insurance, including cover for travel, accommodation and personal possessions. Neither the ASA or Conference Design Pty Ltd covers individuals against the cancellations of bookings for any reason including cancellation or postponement of the NSC or for theft or damage to belongings.

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The members of the Committee and Conference Design Pty Ltd do not accept any liability for losses incurred in the event of the conference being cancelled or postponed due to an unforeseen event or any other event that renders performance of this conference inadvisable, illegal, impracticable or impossible. An unforeseen event shall include, but shall not be limited to: an Act of God; infectious disease outbreak, industrial disruptions, service provider failures, governmental restrictions and/or regulations; war or apparent act of war; terrorism or apparent act of terrorism; disaster; civil disorder, disturbance, and/or riots; curtailment, suspension, and/or restriction on transportation; or any other emergency.

In the event the conference is cancelled no refunds will be issued. All available funds, after cancellation expenses, will be credited towards a future conference held by the hosting organisation.

Baby Sitting
Please contact your chosen hotel to arrange a baby-sitting service.

Messages
A message board will be located near the Registration Desk.

Parking
Limited undercover parking is available at the Hotel Grand Chancellor at a cost and a number of commercial car parks are located nearby.

Contact Phone Numbers
Police – Emergency 000
Police – General Assistance 131 444
Royal Hobart Hospital
48 Liverpool Street (03) 6222 8308
Hobart Private Hospital
Cnr Collins & Argyle Streets, Hobart (03) 6244 3000
Taxi Hobart 131 008
Taxi – Taxi Combined Services 132 227
Hobart Water Taxi 0407 036 268
Maxi Taxi 131 008 or 6274 3140
Airporter Bus (City Hotels Shuttle) 1300 38 55 11
Qantas 131 313
Virgin Blue 136 789
Jetstar 131 538
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### Exhibition Floor Plan

[Exhibition Floor Plan Image]

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POST-OP REGIONAL ANALGESIA SOLUTIONS

A flexible addition to your multimodal approach for post operative pain management
The promise of personalised medicine – hope or hype?

Prof. Don Chalmers
Faculty of Law, University of Tasmania, Hobart, Tasmania

Francis Collins – one of the chief architects of the Human Genome Project and now director of the National Institutes of Health in the USA - in his book *Language of Life: DNA and the Revolution in Personalized Medicine* presents a hopeful vision of the future of medicine contrasted with the disorder of our current health-care system. His vision is of personalised medicine where most people have their whole genome sequenced (WGS) and their results integrated with their personal decisions about diet, lifestyle, healthcare and treatments.

There have been many recent reports on personalised medicine such as the US President’s Council on Advisors on Science and Technology, *Priorities for Personalized Medicine* (2008) and the UK Nuffield Council for Bioethics *Personalised Healthcare* (2010).

Personalised medicine has a number of themes. In the pharmaceutical area, personalised medicine aims, based on an individual’s genetic profile, to develop new drugs, to better match drugs to individual patient and to minimise adverse drug reactions for individual patients. In genetic testing, there is an increasing range of direct-to-customer (DTC) tests available, which have raised concerns amongst other national regulatory authorities. A *Phg Foundation Research Report* in 2008 concluded that a failure to improve clinical evaluation of genetic tests will undermine the development of personalised medicine.

This address will discuss the hopes and hype in personalised medicine and whether the future of personalised medicine may depend on developing new ethical and legal standards to ensure public trust and confidence in personalised medicine.
The global burden of surgical disease

Assoc. Prof. K A Kelly McQueen

Director of Graduate Medical Education, Valley Anesthesiology Consultants; Phoenix, Arizona, USA
Clinical Associate Professor of Anesthesiology, University of Arizona
Clinical Assistant Professor, Mayo Clinic
Fellow, Havard Humanitarian Initiative

It is estimated that more than 2 billion people worldwide have no access to emergency or essential surgery. This reality has contributed significantly to premature disability and death, especially in low and middle income countries. With cardiovascular disease, trauma and cancer contributing to global mortality rates, the contribution of surgical disease to the global burden of disease may be as high as 15%.

As many as 85 countries qualify as 'low income' and many of these countries in Africa, Southeast Asia and the Pacific, also experience a majority of the natural disasters and humanitarian crises. Chronic unmet surgical need is often revealed when disaster response and mission teams arrive to treat the acute medical and surgical needs. Understanding the magnitude of this surgical crisis is only beginning to occur. Contributors to this global health crisis include lack of infrastructure, few surgical, anesthesia and nurse providers, and limited access to medications, equipment and supplies.

Anesthesia is at the center of this crisis, and even where anesthesia is available, it is often delivered without adequate monitoring, without oxygen and with a provider with limited education and training. Anesthesia related death rates are difficult to collect and track, but where they have been reported, they have been as high as 1/140 anesthetics.

The global burden of surgical disease is an urgent and growing public health concern. The provision of safe anesthesia is the foundation of addressing surgical disease, and must be included in the global health agenda.
OB anesthesia and intensive care: An update a propos of 2 CRTs

Pierre Diemunsch and Julien Pottecher

University of Strasbourg, France.

1. Prevention of maternal hypotension during spinal anaesthesia for elective caesarean delivery

Incidence of hypotension during spinal anaesthesia for elective caesarean delivery is high (70-80%) when pharmacological prophylaxis is not used. Physical methods as leg wrapping and thromboembolic stockings, as well as the prevention of aorto-caval compression are useful but of limited efficacy. Combining a prophylactic vasopressor regimen with intravenous volume loading is the most efficient approach. Ephedrine has been the vasopressor of choice in obstetrics for decades but phenylephrine is now the preferred agent, used either alone or in combination with ephedrine. Volume preloading with cristalloids is ineffective. Crystalloid coloading started at the onset of spinal anaesthesia is better but its efficacy depends on the volume infused and the speed of administration. Preloading with hydroxyethylstarch is more consistently effective in reducing the incidence and severity of hypotension and hydroxyethylstarch coloading appears equally effective. Dextran and gelatin use is discouraged or banned by most experts and some national agencies since the changes associated with an allergic reaction are particularly detrimental for the fetus. The allergic risk with hydroxyethylstarch is much lower in incidence and severity. A recent large (n=167), multicentre, randomised, double-blind study comparing 500 ml of 6% hydroxyethylstarch (130/0.4) followed by 500 ml of Ringer Lactate solution with 2 x 500 ml of Ringer Lactate solution preloading in association with iv boluses of phenylephrine (50 to 150 μg) as soon as the 1-min systolic blood pressure recording was < 95% of baseline, found the incidence of hypotension to be significantly lower in the hydroxyethylstarch group (37% vs. 55%, p=0.02) with no difference in total phenylephrine requirements. The incidence of nausea and vomiting tended also to be lower (12% vs. 22%, p=0.09). There was no detectable placental transfer of HES in any of the 6 umbilical cord blood samples tested in the HES group. No clinically significant bleeding was observed, in accordance with the very mild coagulation impairment associated with the 500 ml 6% hydroxyethylstarch (130/0.4) preloading.

Preoperative tests and new monitoring modalities are available to predict or permit early detection of hypotension during spinal anaesthesia for elective caesarean delivery but their worth and reliability in routine clinical practice is not yet established.

2. Urapidil for hypertension control in severe preeclampsia: Comparison with nicardipine

Control of blood pressure is crucial in patients with severe preeclampsia. Currently approved treatments include nicardipine and dihydralazine; however, these medications have drawbacks including uterine relaxation and risk for severe hypotension. Since hypertension in preeclampsia is associated with increased sympathetic activity, urapidil, a peripheral alpha 1 antagonist, has potential for blood pressure control in this setting. However, there are no controlled, randomized comparisons of urapidil with nicardipine. This preliminary randomized controlled trial was designed to compare the efficacy and safety of urapidil and nicardipine in treatment of preeclampsia-induced hypertension.

Methods

After IRB approval and written informed consent, 30 women with severe preeclampsia not on previous antihypertensive therapy were randomized to receive either urapidil or nicardipine for blood pressure control. The therapeutic goal was to achieve a mean blood pressure between 105 and 125 mmHg. In the urapidil group, patients received 6.25 mg boluses every 5 minutes until the mean blood pressure was below 105 mmHg, followed by a 4 mg/hour infusion adjusted as needed. In the nicardipine group, patients received 1 mcg/kg/min infusion until a 15% reduction in mean blood pressure, followed by a nicardipine 0.75 mcg/kg/ min infusion adjusted as needed.

Noninvasive blood pressure was assessed every 5 minutes during treatment titration and then every 15 min thereafter. Time needed to reach the therapeutic goal was registered. Main endpoint was the achievement of the blood pressure goal in two hours or less. The number of episodes of hypotension (defined as mean blood pressure below 100 mmHg) and other side effects were assessed. Severe hypotension, defined as mean blood pressure below 80 mmHg or two episodes of hypotension, was considered as treatment failure and led to exclusion. Further assessment was limited to safety, amount of oxytocin used and neonatal evaluation by paediatricians until discharge from paediatric ICU. Results were compared using analysis of variance and chisquare test where appropriate.
Results

16 and 14 patients were included in the nicardipine and in the urapidil groups respectively. One patient in the urapidil group was excluded from the efficacy assessment due to a protocol violation. The main endpoint was reached in all the 29 patients, after 50 minutes in both groups. During the first two hours, needed treatment adjustment median value was 1 [0-10] in the urapidil group and 1 [0-13] in the nicardipine group. Side effects attributable to the study treatment were observed in 10 of the 16 cases in the nicardipine group and in 2 of the 14 cases in the urapidil group (p<0.01). There were no severe side effects in the mothers or the neonates.

Conclusions

No differences in efficacy between urapidil an nicardipine could be shown in this preliminary series. Both drugs were easy to titrate. However, fewer side effects were recorded in the urapidil group. Further studies are needed in order to compare urapidil and nicardipine in severe preeclampsia.
Anaesthetists as perioperative physicians

Dr Vanessa Beavis

Director, Anaesthesia and Operating Rooms, Auckland DHB Anaesthesia, Auckland City Hospital

For most people surgery is a life changing event. There are numerous examples in the literature where early intervention can change outcome for the better. For example, the multicentre trial REASON study, reported on the outcomes of over 4000 patients over 70 years of age, having non cardiac surgery and who were expected to stay in hospital one night or more. They showed that by day five, 1 in 5 patients had a major complication, 1 in 10 was in critical care and by, 30 days, 1 in 20 patients was dead.

A BJA editorial elegantly describes the concept that harm attributable to anaesthesia itself is rare (perhaps 1:50 000) but there is an ‘epidemic’ of avoidable harm after major surgery. While successful surgery is necessary for good postoperative outcomes, technical proficiency alone is not sufficient. It follows that there is an unmet need of care necessary to avoid harm in the immediate postoperative period. Further, interactions with doctors from different disciplines provide a unique opportunity to initiate treatments that may have long term benefits eg treatment of hypertension, cessation of smoking etc. The role of the perioperative physician is to fill that unmet need.

We need to define the need, (the problem), measure the size of it and then intervene, to avoid adverse events and improve patient outcomes.

Scoring systems have been developed that make it easy to identify which patients are at risk and would benefit from additional care. There are both pre op scores (such as described in the REASON study, though there are many others) as well as various early warning scores for the post op period.

Standardised definitions of co-morbidity, surgical procedures, complications and interventions would be a good first step towards defining the problem and the extent of it. It would prevent disparities influencing public perception of care. Lack of standardisation makes comparisons between institutions and (personal) practice audit extremely difficult. It also means there is much work to be done.

Perioperative medicine has been defined by the ANZCA (Perioperative Medicine) task force of 2006 as ‘the continuum of patient care involving pre-operative evaluation and preparation, pre-anaesthetic assessment, intra-operative care and the management of systems and personnel supporting these activities’. This definition was supported by over 90% of Fellows who were surveyed as part of the research undertaken by the task force.

If the aim of a perioperative physician is to deliver the best possible pre, intra and post op care during the most critical parts of the Perioperative process, Anaesthetists are the natural perioperative physicians. We are almost unique in medicine, in that we treat all groups of patients – young, old, sick and fit. We also are the ultimate ‘risk stratifiers’ – consider the ASA grading or Mallampati scores which have been used by anaesthetists for decades. Because of our electronic records, we have many thousands records which can be interrogated to look for adverse events and then provide an intervention to avoid harm. This is a great adjunct to formalised studies. For example it is unlikely that we are going to get ethical consent to deliberately induce hypotension and measure its effects on post operative confusion, but hypotension is a frequent occurrence during anaesthesia and we have many records. (Please sign up for Webairs!)

At present anaesthesia is principally practised and resources prioritised to intra-operative care (not always in the operating room). Two-thirds of Fellows surveyed supported in principle of the role of Anaesthetists in the preoperative and postoperative phases.

Anaesthetists already work in pre-assessment clinics, ICU and pain medicine, so what reason is there for the nervousness and reluctance to take on routine post operative care? One reason is that perioperative medicine is resource intensive and requires 24 hr cover. Until we can demonstrate that an anaesthetist led perioperative model improves outcome, administrators and politicians won’t want to pay for something they don’t value. Unfortunately some anaesthetists are disinclined to spend time on non revenue generating activities.

There is an attendant medicolegal risk in expanding outside our traditional ‘scope of practice’ and the potential political issues with our surgical and medical colleagues. Compared with intra-operative care, there is a self perceived inadequacy of knowledge and skills in post-operative care and perioperative medicine.

Perioperative Medicine must be a multidisciplinary subspecialty, since no single group will have all the skills needed to make a difference. Prof. David Story recently presented at the Periop SIG meeting in 2012, on this subject. He suggested the skills...
involved to manage a surgical patient postoperatively would commonly involve 5 areas: surgical site management, acute pain medicine, general medicine adapted to the perioperative period, rehabilitation and resuscitation.

No single speciality has the skill set to manage the full spectrum:

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At the SIG meeting a 6th category was added, systems/pathway management. Each group could manage this area, though anaesthetists usually would have the best experience in it.

Anaesthetists are defined as the individuals administering the anaesthesia. Any extension of this narrow scope extends into the perioperative physician role. Therefore anaesthetists are already practicing perioperative medicine to a greater or lesser degree. Some are confident and skilled practitioners, some are not. It is a perceived/real lack of knowledge in ‘medicine’ that makes anaesthetists forget they are doctors too. No single training scheme or college covers the full scope of the role.

There are non anaesthetists who wish to take care of our patients. If we as anaesthetists do not step up and take the challenge, we cannot complain if someone else does. Perioperative medicine offers anaesthesia and patients an opportunity to flourish.
Many patients equate dentistry with pain, and this leads to quite a poor attendance at the dental surgery for regular check-ups. This in turn results in many patients presenting in acute pain but still not comfortable with intra-oral procedures due to dental phobias or pain-related fear. Conscious sedation has become a viable alternative to general anaesthesia to enable treatment of these otherwise untreatable groups of patients.

Dentists have been dabbling in sedation and anaesthesia since 1844 when Horace Wells had his own tooth extracted under the influence of nitrous oxide. Indeed, after 1844 many dentists in the United States followed Horace Wells’ example, using nitrous oxide for reducing the pain of tooth extractions. The gas was made by heating ammonium nitrate and delivered to the patient at 100% and this resulted in unconsciousness within the minute!

Conscious sedation has come a long way since Wells’ demonstrations, and safety improved when in 1868 Edmund Andrews had the ingenious idea of adding 20% oxygen to the nitrous. The use of ether became popular followed by chloroform which had undesirable side-effects. The drugs that revolutionised anaesthesia were barbiturates via the intravenous route.

‘Sedation’ in dentistry via the intravenous route became popular in the UK when in 1957 Stanley Drummond-Jackson founded the ‘Society for the Advancement of Anaesthesia in Dentistry’ (SAAD). The demand for SAAD courses was enormous and the ‘incremental methohexitone’ technique was predominantly taught. Realistically this was a form of light general anaesthesia and due to a number of mishaps in the dental surgery strict guidelines were introduced in the early nineties.

In Australia the combined Colleges ANZCA and RACDS developed guidelines on ‘Sedation for Dental Procedures’ P21 1990. This caused quite a bit of consternation amongst some dentists, but the Dental Board’s promoted these guidelines in the name of patient safety. P21 was further refined in 2003 and became ‘PS21’. This document further defined staffing, equipment and training. In 2010, ANZCA published a joint guideline on sedation with the Faculty of Pain Medicine, the Gastroenterological Society, the Australasian College for Emergency Medicine, the College of Intensive Care Medicine, the College of Dental Surgeons and the College of Radiologists. This document is current and is referred to as PS9 (‘Guidelines on Sedation and/or Analgesia for Diagnostic and Interventional Medical, Dental or Surgical Procedures’).

Currently, conscious sedation administered in the dental surgery is regulated by the Dental Board of Australia (DBA). The DBA refers to PS9 and further defines staff training, techniques and mandatory annual continuing education in advanced life support. This training must be undertaken in a recognised facility offering resuscitation and medical simulation in the dental environment.

In order to administer conscious sedation dentists must have completed a recognised postgraduate course and then be accredited by the DBA. The only recognised course in Australia is the Graduate Diploma in Clinical Dentistry (Conscious Sedation and Pain Control), University of Sydney, which is taught at Westmead Hospital. There are a number of other courses that are recognised including programmes in the United Kingdom and USA.

During this talk I will expand upon techniques and responsibilities of dentists administering conscious sedation.
Not enough doctors? Lessons from the transformation of health workforce in the past 20 years

Prof. Guy Ludbrook

Professor of Anaesthesia, University of Adelaide and Royal Adelaide Hospital, Adelaide, South Australia

Accurate forecasting of healthcare workload, and the required workforce, is increasingly challenged by variability and uncertainty. Sources include generational approaches to work, feminisation of the workforce, working hours regulation, retirement planning, economic conditions, migration and accreditation policies, technological and pharmaceutical advances, impacts of chronic disease, and birth rates.

Planning to scale up existing workforce is essential to address increased workloads, accepting that long lead times for training, and the above variables, require complex analysis. Misjudgement risks reduced access to services, cost escalations due to highly priced workforce and the self-generating nature of healthcare, or the growth of alternate unproven forms of healthcare. However, the realisation that simply scaling up existing workforce is impractical, due to capacity or cost, has driven new approaches to healthcare providers, and innovative means to support existing workforce1.

Adjusting the scope of practice of existing health practitioners, such as nurses, paramedics, and other allied health practitioners, can have an impact. Some limitations of expanded roles can include challenges from established groups, limited impact due to low uptake, and shifting workforce shortages (‘robbing Peter to pay Paul’). Regardless, well-structured and regulated models are much preferable to those that emerge without definition2,3, and formal evaluation of capacity and cost (training and practice), along with identification of the target activities, roles and outcomes, are important keys to identifying genuine benefits.

Lastly, innovative models of care, using new and existing workforce, new workflows, and often IT solutions, provide some important lessons for optimising care. Remote data collection and management, such as in medical and preoperative call centres4, and systems which provide advanced screening, triage and streaming for back pain5, provide examples of solutions which optimise use of available workforce, and can enhance the capacity to deliver sustainable high quality healthcare.

4. www.nhsdirect.nhs.uk
5. Grant C, Ludbrook G et al., Anaesth Intens Care 2012; 40: (in press)
Stored blood, hemoglobin based oxygen carriers (HBOC) and inhaled nitric oxide (NO)

Prof. Warren M. Zapol1, Prof. Reginald Jenney2

1 Director, Anesthesia Center for Critical Care Research, Massachusetts General Hospital, Massachusetts, USA
2 Professor of Anaesthesia, Harvard Medical School, Boston, Massachusetts, USA

For the past 30 years scientists have prepared and tested heme based oxygen carriers, (HBOC) comprised of polymers of human, porcine, or bovine blood for use as a blood substitute. Unfortunately recent clinical trials of HBOC have reported an increased rate of myocardial infarction and death. In parallel studies, Koch, C.G., et al., (N Engl J Med, 2008;358:1229-39) reported that heart surgery patients who received human blood stored for over two weeks had an excess rate of death during hospitalization. We and others believe that hemoglobin in plasma (both free and in microparticles) scavenges NO produced by endothelial NOS3 and produces vasoconstriction, inflammation and platelet activation. Therefore we have studied mice, sheep and humans to learn the cause of these adverse effects of HBOC and stored blood transfusions. Our studies have demonstrated that animal models with endothelial dysfunction (such as occurs clinically in atherosclerosis and diabetes) are sensitised to the adverse effects of plasma hemoglobin. Breathing NO before and during transfusion of stored blood or HBOC prevents many of these adverse effects. Inhaled NO should be tested in clinical trials, especially for patients with vascular disease requiring transfusion with stored blood.
POC platelet monitoring

Dr Neville Gibbs

Department of Anaesthesia, Sir Charles Gairdner Hospital, Perth, Western Australia

There are three categories of Point Of Care (POC) platelet monitoring tests. 1. Tests involving a global assessment of coagulation (e.g. standard thrombelastography, ROTEM). These are not specific for platelet function, and are insensitive to the effects of cyclooxygenase (COX) inhibitors (e.g. aspirin, other NSAIDS) and ADP $P_{Y_{12}}$ receptor antagonists (e.g. clopidogrel). 2. Tests involving a global assessment of platelet function (eg Platelet Function Analyser, PlateletWorks). These are more specific for platelet function, but remain insensitive to COX inhibitors, and only PlateletWorks is sensitive to ADP $P_{Y_{12}}$ receptor antagonists. 3. Tests involving assessment of specific antiplatelet agents (eg VerifyNow, TEG Platelet Mapping, Multiplate). These appear to be more sensitive to COX inhibitors and ADP $P_{Y_{12}}$ receptor antagonists, but may be affected by other aspects of coagulation, and are rarely as accurate as laboratory platelet aggregometry. All three categories are sensitive to GpIIb/IIIa inhibitors (eg abciximab, tirofiban). The difficulties in assessing platelet function, whether at the POC or in the laboratory, include the absence of an agreed definition of platelet function, the extremely wide interpatient variability, and the complex interaction between platelets and other aspects of coagulation. Interpretation of POC platelet monitoring requires an appreciation of the physiology of platelet function, the pharmacology of the antiplatelet agent being assessed, and the strengths and limitations of the test being used.

Reference
OPCAB surgery: What do we know now?

Mr Ashutosh Hardikar
Department of Cardiothoracic Surgery, Royal Hobart Hospital, Hobart, Tasmania

Since the introduction of coronary artery bypass surgery (CABG) as the definitive therapy for atherosclerotic coronary artery disease, this procedure has become the most extensively studied and scrutinized operation in the history of medicine. It is also, perhaps, the most common elective surgical procedure performed worldwide. Till, the mid 90s, conventional on pump CABG (ONCAB) had no competitors on the field. Since then, the exponential growth of interventional cardiology in the form of angioplasties has not found effective answers from the surgical teams. Off pump CABG (OPCAB), popularized by Buffalo and others has come up as an alternative in the last 2 decades. OPCAB, complimented by minimally invasive incisions (MICAS) and the use of total arterial revascularisation (TAR) has created its own niche in the treatment options of coronary artery disease.

In my talk, I would like to take you all on a tour of the evolution of OPCAB surgery from the preliminary era to the present day. I would like to group the development of OPCAB into the evolving stage of the late nineties, the technological innovations stage in the early half of last decade and the later years of application during MICAS and robotic or port access surgery. We would also be looking at how the classical curve of enthusiasm about any new technique goes through some classical stages of apprehension, enthusiasm, adventure, criticism and mature application.

Since the last decade, we have seen that the rates of CABG have plateaued and the rate of OPCAB has also been stable. There have been interesting geographic variations in the incidence of OPCAB surgery across the world.

The OPCAB surgery would be discussed under the following headings:

1. Brief review of current treatment options for coronary artery disease
2. Discussing the drawbacks of the gold standard ONCAB treatment
3. Need for OPCAB
4. Innovations which made OPCAB possible
5. Anesthetic considerations
6. Technical aspects of OPCAB surgery
7. Various terminologies associated with OPCAB
8. Categories of surgeons
9. Indications and contraindications for OPCAB
10. Concerns and caution with OPCAB
11. Comparative studies and trials: OPCAB versus ONCAB as well as OPCAB versus PTCA and medical treatments. A detailed analysis of the Rooby trial would be presented.
12. Economics and market predictions and expectations
13. Quality control for OPCAB surgery
14. Current guidelines on myocardial revascularization and how OPCAB fits into that role
15. Special scenarios with OPCAB.

The talk would then conclude with an overview of the OPCAB surgery in the current era. OPCAB surgery has gone through a complete cycle of evolution and has plateaued in the western world. A balanced outlook of application of OPCAB should be taken. Neither strategy is applicable entirely to the population in general. The extent to which a particular surgical team would use OPCAB in its armamentarium would depend on the level of expertise, their evolving experience, the kind of patient population that they deal with, peer pressure and market pressure.
Update on preeclampsia

Assoc. Prof. Alicia Dennis

Director of Anaesthesia Research, Department of Anaesthesia, The Royal Women’s Hospital Parkville
Clinical Associate Professor, Department of Pharmacology, The University of Melbourne, Victoria

Preeclampsia is a life-threatening hypertensive disease of pregnancy. Early and accurate diagnosis of the disease is important so that it allows treatment to commence and plans for birth to be made. 1,2

Key issues:

1. Early involvement of the obstetric anaesthetist in the multidisciplinary management of these high risk women is crucial.
2. Complications should be recognised and managed by the multidisciplinary team:
   - Hypertensive emergencies – systolic blood pressure > 180 mmHg
   - Seizures – eclampsia
   - Antepartum haemorrhage
   - Haematological complications – thrombocytopenia, haemolysis, coagulopathy
   - Hepatic complications – hepatic rupture, elevated liver enzymes
   - Cardiac complications – acute pulmonary oedema secondary to diastolic heart failure
   - Renal complications – acute renal failure
   - Gastrointestinal complications – epigastric pain
   - Intrauterine growth restriction.

3. Accurate monitoring and recording of observations is important.
4. Systolic blood pressure > 180 mmHg should be immediately treated.
5. Parenteral magnesium sulphate should be administered to women with severe preeclampsia.
6. Intravenous fluids should be closely monitored.
7. Ergometrine should not be used for the management of the third stage of labour.
8. In the absence of the usual contraindications, neuraxial analgesia and anaesthesia is safe.
9. If general anaesthesia is necessary, vigilance is required to ensure that the hypertensive response to intubation is ablated.
10. Transthoracic echocardiography offers advantages in these women as systolic, diastolic and structural information can be obtained which can assist with the diagnosis of complications and the response to treatment interventions. 4

References

Update on malignant hyperthermia

Dr Robyn Gillies
Royal Melbourne Hospital, Armadale, Victoria

In the past 10 years there have been some major advances in MH research. These include a greater understanding of the pathophysiology of MH and of calcium channel function in general. Extensive development in our understanding of genetics of MH has lead to improvements in diagnostic capability.

Technology in the form of the anaesthesia workstation has introduced new challenges in providing a trigger free anaesthesia. New formulations of drugs are moving the focus of the intermediate clinical management away from drug dissolution.

Disappointingly, while MH diagnosis and treatment improve with time, deaths still occur. Clinical features and genetic analysis may hold the key to greater understanding of these fatal outcomes.

The aim of this update is to outline the latest clinical and research advances with a hope to provide current and accurate advice to our patients and colleagues, improve clinical diagnosis and further decrease mortality.
Update on anaphylaxis

Dr Michael Rose

Royal North Shore Hospital Anaesthetic Allergy Clinic, Sydney, New South Wales
Chair, Australian and New Zealand Anaesthetic Allergy Group (ANZAAG)

Perioperative anaphylaxis is one of the most feared complications that may be encountered by anaesthetists. It remains an area that is surrounded by myth and legend but little level one evidence.

This lecture will focus on some recent developments and controversies in the area.

1. Formation of an Australia/NZ wide collaboration of anaesthetic testing centers and professionals.
   This Group, the Australian and New Zealand Anaesthetic Allergy Group (ANZAAG) has been set up to allow sharing of information on testing methods, incidence of reactions and the development of new treatment guidelines for perioperative anaphylaxis. The group has membership of more than 60 professionals from almost 50 testing locations across the two countries. A new website with information about perioperative anaphylaxis, contact details for testing centres and newly developed treatment guidelines is expected to be live from May 2013.

2. Chlorhexidine
   Perioperative chlorhexidine allergy appears to be increasing. This is probably due to a true increase in incidence as well as an improvement in detection. The cause of chlorhexidine anaphylaxis in the perioperative setting is often from urethral gel, but may be from central lines, swabs, preps and other sources. If caused by transmusoclar exposure, the anaphylaxis is often delayed and this may lead to the diagnosis of anaphylaxis being delayed or missed.

3. Pholcodine
   This structurally altered opioid is present in the community in antitussive solutions and lozenges available over the counter. A substituted ammonium moiety on this molecule is also present on neuromuscular blockers. There is some evidence that exposure to this compound may result in antibodies that cross-react with neuromuscular blockers. This drug has been withdrawn from the market in Norway and been restricted to prescription only in France. The Therapeutic Goods Administration (TGA) in Australia is reviewing the evidence for its withdrawal in this country.

4. Route of administration of adrenaline
   Many guidelines aimed at community or other non-anaesthetic related anaphylaxis recommend the use of adrenaline given intramuscularly. Anaesthetic related anaphylaxis is different in that the reaction can be more sudden, dramatic and occurs when the patient is in a physiologically challenged state. The patient is also usually well monitored and in the hands of professionals used to titrating vasopressors. For these reasons intravenous use of adrenaline is often appropriate, but the dose needs to be adjusted accordingly.
An ECG refresher for the anaesthetist

Dr Warwick Bishop
Cardiologist, Hobart, Tasmania

This session will aim to briefly cover the basics of ECG interpretation as a refresher for the practising anaesthetist, and then move through some interactive cases aimed at (putting attendees on the spot and) encouraging general discussion.
Use of intermittent pneumatic compression to the lower limbs to prevent venous thromboembolism in postoperative and critically ill patients: A stratified meta-analysis

Ho KM 1,2, Tan JA 1

1 Department of Intensive Care, Royal Perth Hospital, Western Australia
2 School of Population Health, University of Western Australia, Western Australia

Aims: Intermittent pneumatic compression (IPC) is an alternative to anticoagulation to prevent deep vein thrombosis (DVT) and pulmonary embolism (PE) in patients who are at risk of bleeding. Whether IPC is as effective as pharmacological thromboprophylaxis or adding pharmacological prophylaxis to IPC can improve its effectiveness remains uncertain. This meta-analysis assessed the roles of IPC in preventing DVT and PE in postoperative and critically ill patients.

Methods: Randomised controlled trials comparing IPC with either placebo, pharmacological thromboprophylaxis, or combining IPC with pharmacological thromboprophylaxis from the MEDLINE, EMBASE and PUBMED databases, between 1966 and 2012 without language restrictions, were considered. Outcomes were summarised as relative risk (RR) using a random-effects model.

Results: 55 trials involving 14,044 patients met the inclusion criteria and were subject to meta-analysis. IPC was more effective than placebo or graduated compression stockings in reducing DVT (RR 0.45, 95% confidence interval [CI] 0.36-0.55; I²=41%) and possibly PE (RR 0.57, 95%CI 0.32-1.01; I²=0%). IPC was as effective as pharmacological thromboprophylaxis in preventing DVT (RR 1.05, 95%CI 0.72-1.55; I²=53%), PE (RR 1.01, 95%CI 0.52-1.99; I²=0%) and was associated with a reduced risk of major bleeding (RR 0.40, 95%CI 0.23-0.68; I²=0%). Adding pharmacological thromboprophylaxis to IPC reduced the risk of DVT (RR 0.52, 95%CI 0.36-0.74; I²=0%) and PE (RR 0.41, 95%CI 0.26-0.66; I²=0%) compared to using IPC alone.

Conclusions: IPC is effective in reducing DVT and PE in postoperative and critically ill patients and combining pharmacological thromboprophylaxis with IPC further reduces the risk of DVT and PE compared to using IPC alone.
Influence of acute postoperative pain on markers of sympathetic stress response in children: Haemodynamics, cardiac autonomic control and skin sympathetic activity

Thomas Ledowski¹², Sara Loetz³, Bastian Dierck³, Italo Zamudio-Villaroel⁴, Neil Chambers⁴, Britta von Ungern-Sternberg¹⁴

¹ University of Western, Level 2 RPH MRF Building, Rear 50 Murray St., Perth WA
² Royal Perth Hospital, Dept. of Anaesthesia, Perth WA
³ Christian-Albrechts-University, Ohlshausenstrasse, 24105 Kiel, Germany
⁴ Princess Margaret Hospital for Children, Roberts Road, Subiaco

Background: Markers of sympathetic stress response (eg heart rate) are frequently used as surrogates in the struggle to quantify acute pain in young children. We prospectively investigated the influence of acute pain on parameters of stress response in children and their suitability for the assessment of pain.

Methods: After institutional approval, acute postoperative pain was repeatedly assessed in 150 children (50 each in group: 1-3 yrs, 4-7 yrs, 8-16 yrs) via age-adequate scales (1-3 yrs: FLACC scale; 4-7 yrs: revised faces scale; 8-16 yrs: numeric rating scale; all 0-10). Simultaneously, mean arterial pressure, heart rate, respiration rate as well as parameters of heart rate variability (low frequency, high frequency, LF/HF ratio, ultra-short entropy) and skin sympathetic activity (number of skin conductance fluctuations per second (NFSC)) were measured.

Results: A total of 386 pain measurements were obtained from 150 children. Pain scale data was dichotomized into 0-3 (no- mild) and 4-10 (moderate-severe). NFSC showed significant differences between pain 0-3 and 4-10 across all age groups (0.15 vs. 0.21; P < 0.01). However, sensitivity and specificity of NFSC were too low (approx. 50%) to be considered clinically useful. Pain associated differences in all other parameters were inconsistent and found to be of limited or no use, especially in children < 8 yrs.

Conclusion: Our results contradict the often assumed strong influence of acute postoperative pain on markers of sympathetic stress response. Our findings re-emphasise that the absence of signs of sympathetic stress response does not guarantee the absence of significant acute pain.
A survey of practice and attitudes of Australasian anaesthetists to neuromuscular transmission monitoring in 2011

Stephanie Phillips¹, Ayse Bilgin², Paul A Stewart³

¹ Sydney Adventist Hospital Clinical School, Sydney Medical School, 185 Fox Valley Rd, Wahroonga, NSW
² Department of Statistics, Macquarie University, NSW
³ Sydney Adventist Hospital Clinical School, Sydney Medical School, 185 Fox Valley Rd, Wahroonga, NSW

International editorials have called for routine quantitative neuromuscular function monitoring (NMFM) and ensuring full recovery from muscle relaxation before patients are extubated. Although Australasian anaesthesia has an enviable safety record, in 1986 the incidence of residual neuromuscular blockade (RNMB) was reported at 21% has recently been shown to be still as high as 31% ¹. We assessed current practice and attitudes of Australasian anaesthetists to NMFM for recovery at the end of surgery.

Methods: An invitation to complete an internet survey was sent to all members of the ASA and NZSA in 2011. Questions to determine observations and attitudes to RNMB, availability and use of NMFM, and safe tracheal extubation criteria were developed based on a similar international study by Naguib with permission⁴.

Results: Overall response rate 43.5% in Australia and 25% in NZ.

Only 2.5% of anaesthetists reported seeing RNMB on a daily basis although 63% believed it to be a significant problem. Despite 69% believing that routine monitoring of NMFM would reduce the incidence of RNMB, only 17% of anaesthetists routinely and 23% frequently monitor NMF.

Over 60% of hospitals do not have quantitative NMF monitors.

Over 70% of anaesthetists could not identify the safe NMT criteria for excluding RNMB before extubation.

Discussion: The frequency of RNMB is underestimated by Australasian anaesthetists. The majority of patients having NMB do not have objective assessment of their recovery at the end of anaesthesia. This is partially due to the lack of availability of quantitative NMFM, which is currently inadequate, lack of knowledge about its use or lack of confidence in its reliability.

References

Validity of using central venous pressure as a resuscitation target after major surgery: A prospective cohort study

KM Ho¹,², E Litton ¹

¹Department of Intensive Care, Royal Perth Hospital
²School of Population Health, University of Western Australia

Aims: Central venous pressure (CVP) is commonly as a resuscitation target, but its validity remains uncertain. This study assesses the associations between CVP and other haemodynamic parameters in patients after major surgery.

Methods: This prospective cohort study aims to recruit a total of 200 patients within 24 hours after major elective or emergency surgery who have a central venous catheter in situ. Spearman’s correlation coefficient (rs) was used to assess the associations between simultaneous CVP, plethysmographic variability index, perfusion index, brain natriuretic peptide concentrations, urine output, central venous oxygen saturation, global oxygen delivery, arterial lactate concentrations and noradrenaline requirements. Bonferroni adjustment was used to adjust for multiple comparisons.

Results: The mean CVP of 88 patients recruited to date was 11cmH₂O (range 2-25). CVP had no significant associations with plethysmographic variability index (rs 0.09, 95% confidence interval [CI] -0.12 to 0.30), perfusion index (rs -0.22, 95%CI -0.43 to 0.01), brain natriuretic peptide (rs 0.11, 95%CI -0.10 to 0.30), hourly urine output (rs -0.03, 95%CI -0.24 to 0.18), central venous oxygen saturation (rs -0.21, 95%CI -0.01 to -0.43), global oxygen delivery (rs -0.47, 95%CI -0.06 to 0.99), arterial lactate concentrations (rs -0.09, 95%CI -0.12 to 0.30) and noradrenaline requirements (rs -0.06, 95%CI -0.15 to 0.27). Restricting the analyses to patients who were either breathing spontaneously or mechanically ventilated also did not change the results.

Conclusions: Our preliminary results suggested that CVP was not related to other haemodynamic parameters. Targeting a certain CVP threshold for resuscitation in patients after major surgery appeared invalid.
Comparison of electromyography at abductor digiti minimi with acceleromyography at adductor pollicis during recovery from non-depolarising neuromuscular blockade

Sophie Liang¹, Stephanie Phillips², Paul A Stewart²

¹ Sydney Medical School, Sydney University, NSW, Australia,
² Sydney Adventist Hospital Clinical School, Sydney Medical School, 185 Fox Valley Rd, Wahroonga, NSW, 2076.

Introduction: Residual neuromuscular block (train-of-four ratio below 0.90) puts patients at risk of serious post-operative complications. Expert consensus is that objective neuromuscular function monitoring should be used whenever a non-depolarizing neuromuscular blocking agent is administered. While acceleromyography (AMG) and electromyography (EMG) are commercially available for clinical use, there is a need for well-designed and sufficiently powered studies comparing these two techniques with respect to applicability, precision, and accuracy. Furthermore, among the intrinsic hand muscles commonly monitored using EMG, the abductor digiti minimi (ADM) is the most reliable in clinical settings.

Objectives: The aim of our study was to compare EMG at ADM with AMG.

Methods: During recovery from neuromuscular blockade, TOF ratio was measured alternately on the same arm using EMG and AMG. Bland-Altman analysis was performed on TOF ratios between 0.80-0.99 to evaluate the repeatability coefficient, bias and 95% limits of agreement during late recovery.

Results: When late recovery AMG and EMG TOF ratios were compared (n=74), AMG overestimated EMG by 0.135 (95% CI: 0.108, 0.161). The 95% limits of agreement were (-0.095, 0.365). Spontaneous recovery accounted for a negligible amount of the total bias. The repeatability coefficient for AMG and EMG were 0.082 (95% CI: 0.072, 0.091) and 0.045 (95% CI: 0.040, 0.050), respectively.

Conclusions: The agreement between AMG and EMG during late recovery from neuromuscular blockade is clinically unacceptable. RNMB cannot be excluded at an AMG TOF ratio of 0.90 because the corresponding EMG TOF ratio is below 0.80.

References
2 Brull SJ, Murphy GS. Residual neuromuscular block: lessons unlearned. Part II: methods to reduce the risk of residual weakness. Anesthesia and Analgesia 2010; 111: 129-40
3 Donati F. Neuromuscular Monitoring: What Evidence Do We Need to Be Convinced? Anesthesia & Analgesia July 2010; 111: 6-8
5 Miller RD, Ward TA. Monitoring and Pharmacologic Reversal of a Nondepolarizing Neuromuscular Blockade Should Be Routine. Anesthesia & Analgesia July 2010; 111: 3-5
10 Bland JM, Altman DG. Measuring agreement in method comparison studies. Statistical methods in medical research 1999; 8: 135
Use of a non-invasive near infra-red spectroscopy tissue oxygen monitor to detect tissue hypoperfusion: A simulation study on volunteers

B Kyle¹, E Litton¹, KM Ho¹,²
¹Department of Intensive Care, Royal Perth Hospital
²School of Population Health, University of Western Australia

Aims: Inadequate tissue perfusion is the main pathophysiological consequence of different causes of shock, but the optimal haemodynamic target to achieve adequate tissue perfusion remains uncertain. This study assessed whether a non-invasive near infra-red spectroscopy tissue oxygen (StO₂) monitor, InSpectra™ tissue spectrometer, can detect peripheral tissue ischaemia and whether hyperoxia may confound the StO₂ measured by this device.

Methods: StO₂ and arterial oxygen saturations of 30 healthy volunteers were measured continuously during a 18-minute period of progressive increase in inspired oxygen concentrations, and two 8-minute periods of limb ischaemia induced by a tourniquet inflated at 20mmHg below diastolic blood pressure (low-pressure ischaemia) or mean arterial pressure (high-pressure ischaemia).

Results: The mean baseline StO₂ of participants was 73.9% (95% confidence interval [CI]: 71.7-76.1) and the StO₂ was slightly lower in the female participants than the male participants (70.1% vs. 76.2%, 95%CI: 2.1-10.1). Increasing inspired oxygen concentrations was associated with a small increase in StO₂ of 5.3% which reached a plateau at 30% inspired oxygen. StO₂ reduced progressively with the increased duration of limb ischaemia while the arterial oxygen saturations were maintained. The rate and magnitude of the decrease in StO₂ was more significant during the high-pressure ischaemia phase than the low-pressure phase (trough at 47.3% vs. 58.7% respectively, p<0.01).

Conclusions: StO₂ had a dose-related association with duration or magnitude of limb ischaemia and was not substantially affected by high inspired oxygen concentrations. StO₂ may be useful as a haemodynamic monitor of peripheral tissue perfusion during the resuscitation of patients with shock.
Haemodynamics in morbidly obese pregnant women

S Griffiths¹, A Dennis²

¹ Department of Anaesthesia, Royal Women’s Hospital, Parkville, Australia
² The University of Melbourne, Parkville, Australia

Aim: Obese pregnant women (body mass index (BMI)>35 kg.m⁻²) represent a significant health issue. It is recommended that morbidly obese women are reviewed by an anaesthetist antenatally. Close monitoring of haemodynamics is important when these women become unwell. Transthoracic echocardiography (TTE) for haemodynamic assessment offers advantages, however morbid obesity may make TTE scanning difficult. This study’s aim was to determine haemodynamics and assess applicability of TTE in obese pregnant women.

Methods: After institutional ethics approval/informed written consent, fifteen obese pregnant but otherwise healthy women (BMI ≥ 35 kg.m⁻²) were compared with 40 healthy pregnant non-obese controls. After resting for at least 10 min, blood pressure(BP) with correct cuff size, was obtained and a standardised TTE examination, was performed. Statistical analysis used the General Linear Model and unpaired t-test comparisons with Welsh’s correction, between groups.

Results: Haemodynamic data was obtained in all women. Obese weight range was 92–143 kg.

<table>
<thead>
<tr>
<th></th>
<th>Non-obese (n=40)</th>
<th>Obese (n=15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>32 ± 3.9</td>
<td>31 ± 5.0</td>
</tr>
<tr>
<td>Gestation (weeks)</td>
<td>36 ± 4.5</td>
<td>34 ± 5.1</td>
</tr>
<tr>
<td>BMI (kg.m⁻²)</td>
<td>28 ± 4.1</td>
<td>43 ± 5.3*</td>
</tr>
<tr>
<td>MAP (mmHg)</td>
<td>81 ± 8.3</td>
<td>83 ± 10.8</td>
</tr>
<tr>
<td>CO (ml.min⁻¹)</td>
<td>4109 ± 594.5</td>
<td>4664 ± 523.2*</td>
</tr>
<tr>
<td>HR (beats.min⁻¹)</td>
<td>78 ± 9.6</td>
<td>85 ± 9.7*</td>
</tr>
<tr>
<td>SV (ml)</td>
<td>51 ± 7.9</td>
<td>55 ± 7.2</td>
</tr>
<tr>
<td>SVR (dyne.sec.cm⁻⁵)</td>
<td>1613 ± 315.4</td>
<td>1437 ± 246.2*</td>
</tr>
<tr>
<td>FAC (%)</td>
<td>57 ± 9.2</td>
<td>58 ± 10.7</td>
</tr>
<tr>
<td>LVEDA (cm²)</td>
<td>17 ± 2.7</td>
<td>17 ± 4.0</td>
</tr>
<tr>
<td>Septal e¢ (cm.s⁻¹)</td>
<td>11.5 ± 2.3</td>
<td>10.5 ± 2.0</td>
</tr>
<tr>
<td>MV E/A</td>
<td>1.5 ± 0.2</td>
<td>1.3 ± 0.2</td>
</tr>
<tr>
<td>MV E/septal e¢</td>
<td>6.7 ± 1.3</td>
<td>7.2 ± 1.6</td>
</tr>
<tr>
<td>LV mass (g)</td>
<td>130.8 ± 21.0</td>
<td>179 ± 36.8*</td>
</tr>
</tbody>
</table>

Data are mean± SD. MAP=mean arterial pressure, CO=cardiac output, HR=heart rate, SV=stroke volume, SVR=systemic vascular resistance, FAC=fractional area change, LVEDA = left ventricular end diastolic area, MV = mitral valve, LV=left ventricle * p < 0.05

Conclusions: Increased CO in morbid obesity is due to increased HR without changes in SV or LVEDA left ventricular end diastolic area. Diastolic function is preserved. TTE determined key haemodynamic variables in all obese women and therefore can be used to assess haemodynamics in obese women antenatally.

References:
3. Dennis AT. IJOA 2011;20:160-8
Cardiac function in women with severe preeclampsia

A Dennis

Department of Anaesthesia, Royal Women's Hospital, Parkville, Victoria; The University of Melbourne, Parkville, Victoria

Aim: Preeclampsia is a life-threatening hypertensive disease of pregnancy. Morbidity and mortality from preeclampsia has not decreased in the last decade. Regardless of the gestation, preeclampsia is often stratified into mild and severe disease. Anaesthetists frequently manage women with severe preeclampsia and an understanding of haemodynamics in this group of women is important. This study’s aim was to examine the haemodynamics in women with both treated and untreated severe preeclampsia using transthoracic echocardiography (TTE).

Methods: After institutional ethics approval/informed written consent, haemodynamics were assessed using TTE in 34 pregnant women with severe preeclampsia. If stable, women were scanned prior to treatment interventions; if unstable women were scanned immediately after treatment interventions. Groups were compared using unpaired t-tests. Proportions were compared using Fisher’s exact test.

Results

Table 1

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Untreated severe preeclampsia</th>
<th>Treated severe preeclampsia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 19</td>
<td>n = 15</td>
</tr>
<tr>
<td>Age (years)</td>
<td>30 ± 6.1</td>
<td>31 ± 4.2</td>
</tr>
<tr>
<td>Gestation (weeks)</td>
<td>35 ± 4.9</td>
<td>32 ± 5.1</td>
</tr>
<tr>
<td>BMI (kg.m-2)</td>
<td>32 ± 7.4</td>
<td>32 ± 7.2</td>
</tr>
<tr>
<td>MAP (mmHg)</td>
<td>113 ± 4.9</td>
<td>111 ± 14.7</td>
</tr>
<tr>
<td>CO (ml.min-1)</td>
<td>4847 ± 1413.1</td>
<td>5690 ± 1708</td>
</tr>
<tr>
<td>HR (beats.min-1)</td>
<td>80.8 ± 14.1</td>
<td>82 ± 15.2</td>
</tr>
<tr>
<td>SV (ml)</td>
<td>60 ± 14.0</td>
<td>69 ± 14.0</td>
</tr>
<tr>
<td>SVR (dyne.sec.cm-5)</td>
<td>2060 ± 741.5</td>
<td>1716 ± 631.1</td>
</tr>
<tr>
<td>FAC (%)</td>
<td>63 ± 11.3</td>
<td>62 ± 12.0</td>
</tr>
<tr>
<td>MV E/A</td>
<td>1.3 ± 0.3</td>
<td>1.2 ± 0.3</td>
</tr>
<tr>
<td>MV E/ septal e¢ ≥ 14</td>
<td>11.0 ± 2.2#</td>
<td>12.6 ± 4.1#</td>
</tr>
<tr>
<td>LV mass (g)</td>
<td>192 ± 42.7#</td>
<td>189 ± 57.6#</td>
</tr>
</tbody>
</table>

Data are mean ± SD, or number (%). BMI=body mass index, MAP=mean arterial pressure, CO=cardiac output, HR=heart rate, SV=stroke volume, SVR=systemic vascular resistance, FAC=fractional area change, MV = mitral valve, LV=left ventricle.

# = abnormal values compared to pregnant and non-pregnant adults. * = P < 0.05 for the comparison

Conclusions: Women with severe preeclampsia have increased LV mass, and significant diastolic abnormalities (MV E/septal e¢ > 14). These abnormalities are greater in women with treated severe preeclampsia. Ejection fraction (FAC) is preserved. TTE can be used to measure individual haemodynamics in women prior to and after responses to interventions which may enable haemodynamically tailored drug therapy.

References

Life at the frontier

Prof. Warren M. Zapol¹, Prof. Reginald Jenney²

¹ Director, Anesthesia Center for Critical Care Research, Massachusetts General Hospital, Massachussetts, USA
² Professor of Anaesthesia, Harvard Medical School, Boston, Massachusetts, USA

In this lecture the speaker will describe his personal experiences spent in translational medical research. Dr Zapol’s research career began in 1967 at the National Institutes of Health in Bethesda, MD by working with Dr Theodor Kolobow, a pioneer in the design and application of membrane artificial lungs. In 1970, Dr Zapol moved to Massachusetts General Hospital and Harvard Medical School in Boston, MA (USA) where he completed his residency in anesthesiology and remained on the staff since 1970. His studies, both in his laboratory and in the ICUs have focused upon improving the therapy of acute respiratory failure including the use of membrane oxygenators, developing nitric oxide inhalation for the treatment of newborns with hypoxic respiratory failure and the acute respiratory distress syndrome in adults, and free-diving physiological studies of the Weddell Seal in Antarctica using microprocessor controlled devices.
Fatal respiratory failure at extreme depth: A poignant example of applied respiratory physiology

Assoc. Prof. Simon Mitchell
Department of Anaesthesiology, University of Auckland, Auckland, New Zealand

There would be few more illustrative examples of the applied respiratory physiology taught to our anaesthetic trainees than the extraordinary case of Australian cave diver David Shaw. In 2005 Shaw undertook a 264m dive in a South African cave in an attempt to recover the body of another diver. He was using a diving rebreather; a life support device based on a circle circuit analogous to those used in anaesthesia. He failed to return, though several days later his body floated to a shallow portion of the cave and he was recovered. Shaw wore a helmet – mounted camera which had recorded the circumstances of his death. Analysis of the video revealed a progressive dyspnoea which ultimately ended with characteristic ‘coughing exhalations’ and respiratory arrest, despite a conspicuous absence of significant external work. Illustrative extracts will be shown in this presentation. Forensic examination of the rebreather revealed several modifications that would have increased the work of breathing. A physiological interpretation of this accident will be presented, and contains the following elements. Early in the dive, the increased work of breathing imposed by increased gas density and the resistive load of the rebreather caused perturbation of respiratory control and a degree of ‘voluntary’ CO₂ retention. At the maximum depth, maximum voluntary ventilation was markedly impaired, primarily by a dramatic reduction in the expiratory flow rate at which dynamic airway compression occurred. This was exacerbated by the wearing of a back-mounted counterlung and the consequent imposition of a negative static lung load; effectively a form of ‘negative end-expiratory pressure/NEEP’. With commencement of mild exercise on the bottom, the exercise ventilation for maintenance of normocapnia exceeded maximum voluntary ventilation. There followed a spiralling crisis of increased respiratory drive with inadequate response because of dynamic airway compression on expiration. Futile attempts to respond resulted in a vicious cycle of wasted work and production of more CO₂. The coughing or gasping exhalations recorded in the video were a subconscious attempt to overcome expiratory flow limitation. Once established, this cycle would have been hard to break without reducing inspired gas density, abolishing the ‘NEEP’, and perhaps imposing PEEP. Hypercapnia ultimately caused loss of consciousness and drowning. The case provides a tragic but timely reminder to deep divers that there are physiological limitations that must be understood and considered in planning dives to extreme depths. There are anecdotal reports suggesting that efforts to educate divers about this problem may have helped save others from the same fate.
The use of regional anaesthesia techniques to manage acute pain: An evidence-based approach

Dr Phillip Cowlishaw
Mater Hospital, Sydney, New South Wales

Regional anaesthesia and analgesic (RA) techniques have been used to manage pain since their inception in 1882 when William Stewart Halstead first injected the brachial plexus with cocaine. With the rapid growth of ultrasound-guided procedures RA is experiencing a renaissance and anaesthetists are re-examining the roles of RA in pain management. In this evolving field previous published data may not reflect current practice. Therefore, a review of recent literature was undertaken to establish the current utility and efficacy of RA for the management of acute pain following surgery. Only prospective randomised controlled trials with outcome measures of analgesia efficacy were included. One hundred and two randomised controlled trials were identified involving 6720 patients. RA techniques for the management of abdominal (28%), knee (27%) and shoulder (11%) surgery were most frequently studied. The review provides further evidence that RA can offer excellent analgesia with acceptable side effects for the treatment of post surgical pain. In addition, the results support the use of ultrasound to locate nerves and continuous catheter techniques to prolong analgesia.
Regional analgesia for abdominal surgery – rectus sheath blocks

Dr Katrina Webster
Royal Hobart Hospital, Hobart, Tasmania

The benefits of analgesia after major surgery have been well demonstrated. Effective analgesia offers advantages in patient satisfaction as well as improved surgical outcomes and early discharge from hospital. Rectus sheath catheters are an effective method of analgesia and a very useful analgesia technique after midline laparotomy surgery.

Ultrasound technology has allowed anaesthetic techniques to advance and created new opportunities in regional anaesthesia. The rectus sheath block is a technique that has been improved considerably with use of ultrasound for placement. Blind placement of injectate into the rectus sheath is notoriously inaccurate, leading to variability in efficacy of the block. Ultrasound guided placement of catheters into the posterior rectus sheath allows accurate deposition of local anaesthetic, and significantly improves the reliability of the technique.

The abdominal wall has a sensory nerve supply derived from the thoracic spinal nerves T7-T12, and the first lumbar spinal nerve. Rectus sheath catheters reliably achieve somatic sensory blockade of the midline abdominal area. This technique is therefore very effective when used for post-operative analgesia after midline laparotomy.

This presentation will describe ultrasound guided placement of rectus sheath catheters. The surface anatomy and sonoanatomy will be demonstrated, and the location of needle and catheter placement will be outlined. Equipment used for the procedure will be described.

Dosing of local anaesthetic through the rectus sheath catheters can be performed as bolus dosing every 4-6 hours, or as a continuous infusion. My current practice is to connect a small portable continuous infusion pump to the catheters, with an infusion of 0.2% ropivacaine running at a rate of 8ml/hr through each catheter. No additional bolus doses are required. I have previously used an intermittent bolus dosing technique, which was equally effective.

Endpoints in assessing sensory blockade are numbness to ice from T7-T12 dermatomes. This is consistently achieved with ultrasound guided catheter placement.

One major advantage in using rectus sheath catheters for analgesia after major abdominal surgery is the vast clinical suitability of patients for this technique. Unlike other analgesia options available, rectus sheath catheters have very few contraindications or unwanted side effects. Rectus sheath catheters can be placed pre-operatively or post-operatively. They can be placed in either an awake or an anaesthetised patient. The benefits of rectus sheath catheters will often outweigh the risks of placement in the setting of sepsis, coagulopathy, or challenging body habitus. These catheters can also be placed after emergency laparotomy prior to emergence. As no special positioning is required rectus sheath catheters are technically easier to place than an epidural in patients who are unable to sit up or lie on their side (or who are unconscious when the procedure is to occur).

Rectus sheath catheters can be easily and safely positioned using ultrasound guidance in almost any clinical situation. Their safety advantages, clinical utility and reliable analgesia make this technique extremely beneficial for patients after abdominal surgery.
Ultrasound-guided transversus abdominis plane blockade

Myles Conroy
Geelong Hospital, Victoria

The application of ultrasound in regional anaesthesia has created renewed interest in peripheral nerve blocks for surgery on the thorax and abdomen. This has coincided with a decline in epidural use over the last decade. This trend has resulted from a lack of proven mortality benefit (MASTER trial), a move toward fast track surgery and early mobilisation, reduced access to high dependency beds and specialised care, and growing concerns about the risk of neuraxial complications both in the medical and lay community.

Rather than identifying specific nerves, ultrasound can be used to clearly identify fascial planes, bony landmarks and patterns of local anaesthetic spread to provide effective analgesia while minimising potential complications like vascular puncture or damage to underlying viscera.

TAP blocks have gained widespread use in Australia with the availability of ultrasound. They are useful to provide analgesia for the incisions of abdominal surgery. Local analgesia specific to the incision appears to provide good conditions for mobilising postoperative patients without motor block or hypotension. As the visceral component of postoperative pain is not reliably covered, they should be used as part of a multimodal analgesia regimen including an opioid.

The main approaches to this neurovascular plane of the abdomen are posterior and oblique subcostal. Posterior TAPs are useful for incisions below the umbilicus, usually performed as bilateral single-shot injections. The oblique subcostal approach is often associated with bilateral catheter insertion for ongoing analgesia with supra-umbilical or full length midline incisions.

Anatomy

The TAP is the neurovascular plane of the abdomen, continuous with the thoracic paravertebral space. It contains loose fascia, blood vessels, and the multiple branches of the anterior rami of the spinal segmental nerves from T7 to L1. Nerve plexuses are concentrated around the main vessels, the deep circumflex iliac artery and the superior and inferior epigastric arteries.

The transversus abdominis is the innermost muscle layer of the abdominal wall. The TAP plane is located immediately superficial to this muscle and its aponeurosis. The internal and external oblique muscles and aponeuroses are located superficial to the TAP plane. It is worth noting the surface anatomy of these muscles and their aponeurotic continuations, predicting what is visualised on the US screen. In particular note the lip of transversus abdominis muscle following below the costal margin and extending deep to the rectus muscle; this is the key to the subcostal approach. The oblique aponeuroses join to form the linea semilunaris, which attaches to the rectus sheath. The best appreciation of this anatomy is gained by scanning whole abdomens, as it is a consistent pattern.

Near the midaxillary line the nerves give off a lateral branch which penetrates the overlying muscle to supply the skin of the lateral abdominal wall. The anterior branches continue forward to pierce the lateral rectus sheath to supply this muscle and the skin overlying it. Blocks performed anterior to the midaxillary line would only be expected to anaesthetise the anterior branches, TAP blocks to encompass the flank region need to be performed more posteriorly.

The nerve runs a variable length deep to the rectus sheath before piercing it; the nerves of T7-9 may run only a short course in the TAP – thus the oblique subcostal approach should be performed close to the costal margin and begin deep to the lateral part of the posterior rectus sheath.

It is worth noting the course of the ilioinguinal nerve in the TAP plane is variable. Branches of L1, the ilioinguinal and iliohypogastric nerves, may remain deep to the transversus abdominis and iliac crest and enter the TAP plane after the mid axillary line. TAP blocks intended to include the ilioinguinal nerve should be performed anterior to this line. Beyond the ASIS, these nerves may pierce the internal oblique and run between the oblique muscles. The nerves can often be identified in the plane with an accompanying blood vessel, so colour flow helps. TAP/ilioinguinal blocks for hernia repair and Pfannensteil incisions may be best placed just cephalad to the ASIS.
Posterior TAP block

These are usually performed as a single shot blocks for lower abdominal surgery. Unilateral blocks can be used for inguinal hernia repair and appendicectomy, with midline and Pfannensteil incisions requiring bilateral injections. Correctly placed posterior TAPs should provide analgesia from the umbilicus to symphysis pubis. While catheters can be used, studies have demonstrated a duration of action from a single injection beyond 24h. (1)

While originally described as a ‘double-pop’ technique without the use of ultrasound (2), the availability of quality ultrasound systems has greatly increased their popularity in Australia. Ultrasound has been shown to improve the accuracy of injection and may reduce the risk of visceral injury (3,4). There is some debate about which approach is more efficacious. There is some evidence from MRI studies that TAP injectate spreads to the paravertebral space; McDonnell postulates that this explains why TAPs performed more anteriorly may be less efficacious (5). On the other hand, if the inguinal area needs to be covered, placement closer at the anterior axillary line will perhaps more reliably account for the course of the ilioinguinal nerve.

Most anaesthetists get plenty of opportunity to perform these in anaesthetised patients, distant to major vascular/neural structures and viscera – making them an ideal beginner’s block. Time to practice the in-plane technique! Once the learning curve is conquered it should only take a couple of minutes each side.

Ergonomics are important. I stand on one side of the patient with the US machine on the opposite side. While both sides can be blocked from the one approach, it is less ergonomic so while learning, swap sides – it will probably be faster.

I use a high frequency 50mm linear probe set at 8-10MHz. Utilising harmonics/THI (tissue harmonic imaging) often makes the fascial planes more apparent. Angling the probe and using variable probe pressure will also help identify the anatomy. I use a 100–120mm short bevel needle. Sonographic needles such as the Pajunk sonoplex often help as the tip needs to be seen at a depth of >3cm. To help with needle visibility, insert the needle at least 2-3cm away from the probe, allowing a flatter trajectory. ‘Heeling’ the probe or using a beam steer function, so the US waves are more perpendicular to the needle, is another useful trick.

Aim to fill the plane between the deeper two muscle layers from the costal margin to the iliac crest around the mid axillary line, distending it with at least 20mls of local anaesthetic solution, 0.375 or 0.5% ropivacaine depending on what I consider a safe dose for my patient.

When imaging this area, a few simple rules will help you find the correct plane:

1. Transversus abdominis is the deepest muscle layer. It is thinner and appears darker than the obliques. Occasionally a fat layer may separate the TA from the peritoneum and should be distinguished form muscle.
2. If uncertain, image more anteriorly to identify the linea semilunaris at the edge of the rectus muscle below the umbilicus. As you scan laterally from here you will note the three muscle layers arising from this structure.
3. Subcutaneous fat compressed beneath the probe may appear as another muscle layer. The above manoeuvre and varying the pressure applied to the probe will help you to identify this.
4. If using a short bevel needle, you should appreciate a subtle pop as you traverse from external into internal oblique muscle. There is another subtle pop as you leave internal oblique and enter the TAP plane. Because the fascia is dragged by the blunt needle tip, you may need to advance the needle further beyond the level of the plane to feel it. On occasion you will not feel a pop but observe tissue recoil on the screen.

5. Pay careful attention to the pattern of spread of the initial injection. If in the TAP plane you will observe spread of injectate along the plane in a lentiform shape. Injecting into muscle causes a more diffuse swelling and highlights muscle fibers. This is usually internal oblique – advance the needle under vision, look and feel for the pop, and try again. If in TA, withdraw slightly while injecting and observe for the change in pattern of spread. While learning it may help to inject saline initially and to local anaesthetic when the desired spread is observed.

Oblique Subcostal TAP catheter insertion

This technique is better suited to midline incisions that extend above the umbilicus or upper midline incisions compared to posterior TAP block. Compared to epidural, lower limb motor block, hypotension, urinary catheterization, and concerns about neuraxial complications and anticoagulation are avoided – gaining approval with ward nurses and surgeons as well as anaesthetists. In addition, this is a useful technique when a planned laparoscopic procedure has evolved into a midline incision, as the catheters can be safely inserted under anaesthesia. Unilateral subcostal incisions, such as open cholecystectomy, are better suited to paravertebral analgesia.

To date there is one prospective study comparing epidural infusion to subcostal catheter boluses for upper abdominal incisions, demonstrating no difference in pain scores(6), and at least 5 randomised placebo-controlled trials currently underway examining their efficacy for midline abdominal incisions(7).

This is a more advanced technique than posterior TAP block, and can provide a large area of coverage. Hydrodissection-distending the plane with injectate, advancing the needle to the leading edge, and injecting again to open up the plane, allows broader coverage and creates a space for catheter insertion and subsequent injections. It requires a degree of dexterity with probe and needle. I usually insert a catheter, aiming to extend the block for 3-5 days, requiring proper sterile technique.

I usually perform this injection in anaesthetised patients at the end of surgery. It is preferable that the patient be mechanically ventilated, as spontaneous ventilation movements tend to make the procedure more difficult. I request the surgical drapes be left on (if not contaminated) and the surgical dressing not applied (this avoids inserting the catheter through the dressing – with predictable results should the dressing be later changed!). Stoma bags can be a nuisance, depending on their position (gentle skin traction by an assistant may help).

Remember to stay close to the costal margin, this is where you will find transversus below the rectus sheath. The upper nerves only have a short course in the plane in this region before penetrating the rectus sheath. Use colour flow before you begin to identify the superior epigastric artery.

I use a long (11cm) 18G Tuohy needle. Ideally, a 13-20cm needle would provide longer hydrodissection and potentially better coverage. It is helpful to impart a ~20 degree angulation in the distal third of the needle to control the tip on advancement, as it can be difficult to direct the needle anteriorly in the plane once the needle has traversed the abdominal wall.

I introduce the needle from medial to lateral through rectus muscle, close to the costal margin and xiphisternum where transversus can be seen. Upon reaching the posterior rectus sheath, I usually inject a few mls of local anaesthetic solution (thus combining a lateral rectus sheath block to hopefully catch the uppermost nerves) before advancing through it. Once a pop is felt, or the layer recoils on the sonogram, begin injecting again. Spread along the TAP should be seen (if transversus swelling occurs, withdraw the needle while injecting to observe for the characteristic spread), then begin hydrodissection along the costal margin. Take care not to enter the plane between the oblique muscles. To extend the block to the lower abdomen, advance along the costal margin and towards the anterior superior iliac spine. Sometimes needle withdrawal and resiting into the plane more distally can help.
Sterile setup for subcostal catheter insertion. Note insertion point and assistant to provide injection.

Diagram of correct plane for subcostal oblique block. Top right diagram shows direction of needle on abdomen. Lower diagram shows incorrect spread between oblique muscles. Note curve on needle – initially faces up then down.

RA (rectus abdominis) TA (transversus abdominis) A (aponeurosis/linea semilunaris) IO (internal oblique) EO (external oblique) IC (iliac crest) LA (local anaesthetic) X=incorrect spread
TAP catheters should be utilised as part of a multimodal analgesic regimen. Patients need an oral or PCA opioid and adjuvants to provide visceral analgesia in the early postoperative period. After the first postoperative day, somatic analgesia becomes more relevant to aid mobilization and the opioid-sparing effect becomes apparent.

Local anaesthetic delivery via bilateral TAP catheters deserves some consideration.

The two options are continuous infusion or intermittent bolus. There are advantages and potential problems with each. To date there is no comparative data as to which delivery technique is optimal.

Intermittent bolus has the advantage of providing the patient with minimal attachments, reducing the risk of dislodgement and improving mobility. Spread through the plane is likely more extensive when it is distended by a bolus, potentially offering more complete coverage. The main disadvantage of this approach is the potential for inadvertent intravenous injection and systemic toxicity. While education and hospital protocols help reduce the risk, this concern can be addressed by using unique local anesthetic delivery connectors (such as the Correct Inject from Portex, Smith Medical), recently arrived on the market, with matching pre-filled syringes supplied from pharmacy. Resistance to injection of 20ml down an 18G epidural catheter has been overcome using the Springfusor device (Go Medical).

At Geelong Hospital ward nurses have delivered intermittent bolus for more than 250 patients with TAP catheters, after completing an education package. Patients receive 20mls 0.2% ropivacaine to each catheter, 6 hourly (i.e. 320mg ropivacaine over a 24h period). Most patients report reduced pain, especially with movement, following a bolus. A few selected patients have received 4 hourly injections to improve their analgesia. The results of an audit of these patients are available in poster form at this conference.

Continuous infusion via electronic or balloon infusor devices have been adopted by some other institutions. While the safety concern of inadvertent intravenous bolus is addressed, most have used two local anaesthesia pumps to deliver the infusions (0.2% ropivacaine @ 5-7ml/h each side). This has cost implications as well as increased risk of dislodgement and nursing complexity.

Acknowledgement & References

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Continuous peripheral nerve blockade in paediatrics

Asst. Prof. Grant McFadyen
Seattle Children’s Hospital

Peripheral nerve blocks are increasingly being employed in paediatric anaesthesia practice worldwide. A limitation of single injection peripheral nerve blocks is the relatively short duration of postoperative analgesia they provide. Continuous peripheral nerve blocks (CPNBs) prolong the duration of analgesia considerably. They consistently provide better analgesia than traditional systemic opioid-based analgesia.

In this lecture I review the literature pertaining to the efficacy and complications of CPNBs. A review of the literature shows that CPNBs prolong site-specific local anesthetic delivery in the outpatient setting, allow optimal analgesia, have minimal side effects, and avoid premature regression of an analgesic block. Furthermore, an improvement in patients’ health related quality of life or outcome benefits has been demonstrated.

A review of the Pediatric Regional Anesthesia Network (PRAN) data in the US shows that the majority of adverse events after CPNB placement are catheter related – 50% of adverse events in upper limb catheters and 67% of adverse events in lower limb catheters.

I also review the literature that addresses different techniques of nerve localization and catheter insertion. Is it better to use nerve stimulator guidance or ultrasound guidance. Are long axis or short axis ultrasound views of nerves better?

Lastly, I share the lessons that we have learned during the last few years at Seattle Children’s, where we have been placing CPNBs for ambulatory surgery for the last two years.
Principals of catheter insertion using ultrasound guidance

Stuart Grant
Professor of Anesthesiology, Duke University Medical Center, Durham North Carolina

This lecture will discuss the principles of catheter placement and how to improve your success using ultrasound and also how to overcome some of the usual errors and problems encountered during insertion.

The lecture will not discuss the decision making process about placing a catheter in individual patients for different surgeries.

When placing peripheral nerve catheters with ultrasound place the needle around the nerve, just as a single injection block. The catheter can be fed in either ‘blindly’ – without using the ultrasound or the catheter can be placed under ultrasound guidance.

i. Blind feeding: After the needle is positioned around the nerve, let go of the ultrasound probe, use one hand to hold the needle, and feed the catheter with the other hand, not visualizing catheter insertion with ultrasound. After feeding the catheter in 1-2 centimeters, image the nerve, needle, and catheter and then give a test-dose (1-5mL local anesthetic) under ultrasound. This should reveal good peri-neural spread of local anesthetic and confirm the catheter tip is in the correct place. This technique may be necessary if working alone.

ii. Ultrasound guided catheter placement:

1. Assistant: Have an assistant hold the ultrasound probe. Usually, the assistant has less ultrasound experience, so guide the probe over the needle and then have them hold the probe still. (Remind them to rest their hand down so it is stable.) Once a good view is obtained, feed the catheter under direct vision and place the tip peri-neural. Confirm the tip with a test injection (1-5mL of local anesthetic).

2. Alone: Continue to hold the probe in one hand. With the needle hand, place the needle between the 4th and 5th fingers. Use the thumb and index finger to feed the catheter. This way, the catheter can be advanced under direct vision, without any assistance. This technique takes some practice and good coordination.

Confirming local anesthetic spread:

Look for a dark (anechoic) mass of local anesthetic spread whenever injecting through a needle (Figure 1.30). If no local anesthetic spread is visible the needle may be: 1) out of plane. 2) in a blood vessel. If local anesthetic spread is not visualized during injection, immediately stop injection and re-confirm needle tip location.

For catheters it is sometimes difficult to find the tip of the catheter. To locate the catheter, use a test dose of local anesthetic. If a dark (anechoic) area is not visualized on injection, use color doppler. Color Doppler will help to visualize flow of local anesthetic out of the catheter and help to confirm the tip location. If Doppler does not help, consider injecting a small amount of air (1cc) or local anesthetic with bubbles in it with doppler on. This will also make the Doppler more likely to visualize flow. Alternatively, under normal 2D imaging, air can be injected and will usually appear bright (hyperechoic) between the interface of the air and tissue. Another alternative is to mix air with dextrose, saline, or local. Connect a 3 way tap and have 2 syringes connected to ports and the catheter or needle extension tubing to the third port (Figure 1.31). Syringe 1 contains fluid and syringe 2 contains 1-2cc of air. With the 3 way tap turned off to the catheter and open between to 2 syringes quickly force the fluid back and forwards between them. This should agitate the fluid until it appears cloudy with small micro-bubbles. At this point turn the tap to open the catheter and inject the fluid. The micro-bubbles should make the fluid easier to visualize under ultrasound.

The text and images in this abstract are from Ultrasound Guided Regional Anesthesia and new textbook published by Oxford University Press. Editors Grant and Auyong.
Considerations of the physiology during brain AVM surgery

Prof. Michael Morgan
Australian School of Advanced Medicine, Macquarie University and Cerebrovascular Neurosurgeon, Macquarie University Hospital, Sydney, New South Wales

Of critical significance to the risks involved in surgery for brain arteriovenous malformations (AVM) is the physiological consequence of the abolition of the arteriovenous shunt and the impact this has on the vasculature of the surrounding brain. The long-standing AVM is characterised by significantly dilated feeding arteries, a low resistance arteriovenous shunt and a markedly dilated venous drainage system. On excision of the AVM the dilated arterial and venous systems are subjected to a rapid reduction in shear stress to below normal with a rapid rise in side-wall pressure in the arteries. Over the subsequent 7-10 days remodelling of the abnormal calibre artery back towards normal occurs with down-regulation of eNOS and the increased release of endothelin. This potent vasoconstrictor influence takes considerable time to produce a response due to the initial inadequate musculature in the walls of the arteries and vein.

The changes in the pressure profile can be readily understood by the following schematics:

The normal pressure within the vascular bed in the absence of an AVM tends to drop along its length. Although most of the drop in pressure occurs within the vessels less than 300μ, there is a pressure drop within the larger vessels proximal to the microcirculation. The pressure in the arteries on the cortex are normally 60-70% that of the internal carotid artery. In the presence of the low resistance arteriovenous shunt, the pressure gradient to the fistula drops towards the broken straight line, indicated on the above figure, and the pressure is lower in the arterial feeders than it would be in the absence of the fistula. Similarly, the pressure within the draining veins is higher than it would otherwise be in the absence of the fistula. On removing the fistula, the resistance increases dramatically and the pressure is increased within the arterial feeding system. This increase is to a level above the normal pressures due to the dilated arterial feeding tree. These physiological changes can be responsible for a number of catastrophic consequences if not checked.

The pressure within the small arteries branching from this dilated arterial feeding system may lead to rupture of the arteries and microcirculation surrounding the resection bed. Furthermore, stasis within the venous drainage system can lead to thrombosis. This can compound the pressure rise within the microcirculation and small arteries by compromising normal brain venous outflow. This combination of events is known as arterio-capillary-venous hypertensive syndrome and can produce postoperative haemorrhage and venous haemorrhagic infarction.

The incidence and severity of the arterio-capillary-venous hypertensive syndrome can be reduced with careful perioperative management. By aggressively controlling blood pressure, but defending the cerebral perfusion pressure, can reduce the risk of haemorrhage. This will be discussed in context of the more than 600 AVM resected by the author.
Intraoperative Monitoring Modalities for Carotid Endarterectomy Under General Anaesthesia

Tim McCulloch
Dept Anaesthetics, Royal Prince Alfred Hospital, NSW

Stroke is the most significant perioperative risk for patients undergoing carotid endarterectomy (CEA). Patients are accepting a greatly increased short-term risk of stroke in return for a reduced risk over the subsequent years. The causes of perioperative stroke are multiple and include emboli, technical problems such as intimal flap, intraoperative cerebral ischaemia during clamping, and postoperative hyperaemia. Despite a large number of clinical studies over many decades, no particular intervention has been shown to reduce the risk of perioperative stroke.1,2 Due to the low rate of perioperative stroke (overall risk <3%) and the multiple different causes, very large trials would be needed to detect a benefit from any particular monitoring technique.

Intraoperative monitoring potentially provides prompt detection of:

- Ischaemia
- Emboli
- Hyperaemia.

Although ischaemia during internal carotid artery (ICA) clamping is not necessarily the commonest cause of perioperative stroke, it is the focus of much attention because it is potentially avoidable by insertion of a bypass shunt. Most patients do not suffer significant ischaemia with ICA clamping, therefore not every patient requires a shunt. Furthermore, inserting a shunt is not benign. Shunts increase the technical difficulty of the operation, can dislodge emboli, and can cause intimal damage. Shunt insertion is not always technically possible.

Practice varies markedly from centre to centre and surgeon to surgeon. Some surgeons choose to shunt every patient. The majority shunt selectively but the criteria for shunting is highly variable. Some teams shunt based on preoperative information such as vascular investigations (e.g. disease of the contralateral ICA) or history (e.g. previous stroke). Others teams base the decision to shunt on intraoperative assessment of the adequacy of collateral cerebral blood flow (CBF) during ICA clamping. CBF can be assessed either by detection of symptoms in an awake patient or by various monitoring modalities during general anaesthesia. It is beyond the scope of this presentation to explore the relative merits of local versus general anaesthesia, other than to note that outcome evidence does not support either approach over the other.3 As the wide variability of practice attests, definitive evidence for any particular shunting practice is lacking.4

Some comments on the vascular anatomy

The terminal ICA divides to form the middle and anterior cerebral arteries (MCA and ACA). Monitoring that specifically targets the MCA territory may be preferable for the following reasons. The MCA is the dominant branch of the circle of Willis, carrying 50% – 70% of the total cortical blood flow, and large MCA territory strokes are particularly devastating. A not-uncommon abnormality of the circle of Willis is absence or hypoplasia of the first part of the ACA, causing the anterior part of the circle of Willis to be deficient and both ACAs to be supplied by one carotid artery.5 In this situation, monitoring the ACA territory could be falsely reassuring because loss of supply to the ipsilateral MCA will go undetected while the ACA continues to be supplied by the contralateral carotid artery.

Stump Pressure

The simplest method of assessing adequacy of collateral supply during carotid clamping is measurement of ICA blood pressure. Once clamped, flow along the ICA effectively ceases and stump pressure is equal to the pressure at the origin of the middle cerebral artery (MCA). Hence, stump pressure provides a direct measure of the arterial pressure supplying the largest and most at-risk cerebral vascular territory.

Limitations: As with systemic arterial pressure during hypotensive anaesthesia, there is no threshold stump pressure which defines a safe lower limit in all patients. Multiple studies have found stump pressure to be very poorly predictive of cerebral ischaemia as defined by EEG changes and other criteria. Nevertheless, if no other monitoring modality is available, it may be reasonable to
measure stump pressure. A low stump pressure, e.g. < 40 mmHg, indicates a higher risk of cerebral ischaemia; albeit with a significant rate of false positives and false negatives.

Electroencephalography (EEG)

Cerebral ischaemia causes well-defined EEG changes. Moderate ischaemia causes loss of high frequency activity. More pronounced ischaemia causes large amplitude, low frequency activity and severe ischaemia completely obliterates EEG activity. Older studies demonstrated a correlation between the severity and duration of EEG changes and the risk of post-operative neurological deficit. Ideally, multiple EEG channels should be monitored simultaneously to maximise the chance of detecting ischaemia and to allow comparison with the contralateral side.

Limitations: An EEG channel is derived from a pair of scalp electrodes and each channel only detects ischaemia in the vicinity of the electrodes. Furthermore, if only one of the electrode-pair is overlying the ischaemic territory, the EEG changes will be partially obscured by activity under the other electrode. EEG evidence of ischaemia can be quite subtle, requiring vigilance, experience, and properly adjusted signal processing to detect.

EEG-based monitors such as BIS and Entropy can detect cerebral ischaemia. Under general anaesthesia, a sudden reduction in the monitor score following ICA clamping would be highly suggestive of cerebral ischaemia. However, these devices only monitor the frontal area supplied by the ACA and could miss isolated MCA ischaemia. Decreased BIS has been reported in awake patients requiring a shunt, although the BIS did not fall in a patient who developed a pure motor deficit with no change in level of consciousness.

Somatosensory Evoked Potentials (SSEPs)

Technique: SSEPs are produced by electrically stimulating a peripheral sensory nerve and recording over the appropriate region of the sensory cortex. Because the evoked potential is about one hundredth the amplitude of the spontaneous EEG, it is necessary to average recordings from multiple stimulations to extract the SSEP. For monitoring during CEA, median nerve SSEPs are used because they are reliable and relatively easy to obtain and the relevant sensory cortex is within the MCA vascular territory.

Advantages: Median nerve SSEPs are reasonably sensitive and specific for cerebral ischaemia. Unlike EEG monitoring, SSEPs can also detect subcortical ischaemia involving, for example, the internal capsule. A common criteria for diagnosing ischaemia is a ≥50% reduction in SSEP amplitude, although one study found a 30% reduction yielded optimal correlation with symptoms in awake patients. Comparison of SSEPs with onset of clinical symptoms during awake CEA have yielded sensitivities of 85 – 89% and specificities of 89 – 90%.

Limitations: SSEPs are impaired by inhalational anaesthetics (including N₂O). Electrophysiologic systems capable of acquiring SSEPs are expensive. However, the disposable electrodes for each patient are inexpensive. Setting up the monitoring system is usually performed after induction of anaesthesia and therefore adds to the procedure time. Typically, institutions that monitor SSEPs use the services of an electrophysiologist. However, in our institution we have found it possible for the anaesthetist to set up and run the SSEPs. The crucial time to monitor is at the commencement of ICA clamping. We do not find it difficult for the anaesthetist to attend to the monitor while also managing the anaesthetic care of the patient.

Transcranial Doppler (TCD)

Technique: Pulsed wave Doppler signals can be obtained from the major intracranial arteries via the temporal window: an area of thin skull above the zygomatic arch in front of the ear. MCA signals are identified as a characteristic waveform arising from blood flowing towards the probe at a depth of around 45 to 55 mm from the skin. TCD equipment outlines the peak velocity envelope of the Doppler spectrum and calculates a time-average of the peak velocity; usually expressed in cm/sec. Providing the diameter of the insonated vessel remains constant, changes in the average velocity have been found to be proportional to changes in actual blood flow.

TCD continuously and non-invasively monitors MCA blood velocity (Vmca). On carotid clamping, it is usual to see an immediate decrease in Vmca followed by a partial recovery over the next 15 seconds as autoregulatory vasodilatation attempts to restore flow. A commonly accepted criterion for intervening is a ≥40% reduction in Vmca.
In addition to monitoring adequacy of cerebral blood flow, TCD is useful for detecting cerebral emboli. Manipulation of the carotid arteries during the dissection phase can occasionally dislodge emboli. Solid emboli detected during dissection or during wound closure are predictive of stroke. If emboli are detected during dissection, the surgeon can adjust their technique in an attempt to minimise disturbance to the plaque or they may choose to protect the brain by clamping the ICA before completing the dissection. Emboli detected during wound closure or in the immediate postoperative period can be treated with anti-platelet therapy such as dextran. Detection of gaseous emboli is not uncommon after release of the vascular clamp. The incidence of gaseous emboli depends on surgical technique and it has been noted that the audible feedback from the TCD monitor causes surgeons to modify their technique, leading to fewer emboli in subsequent patients. With the aim of sending any embolic material to the facial circulation rather than the brain, it is standard practice to release the external carotid artery before the ICA. However, we have sometimes detected emboli in the MCA immediately on release of the external carotid clamp; presumably due to the presence of ophthalmic artery collateral flow carrying blood from the external circulation in to the circle of Willis.

Advantages: TCD is non-invasive and can monitor cerebral blood flow with a better time-resolution than any other technique. After purchase and maintenance of the equipment, there are no additional per-patient costs. In addition to monitoring for ischaemia during clamping, TCD can detect emboli and can detect problems during the closing stage of the surgery such as hyperaemia or sudden loss of flow (e.g. due to an intimal flap).

Limitations: The major limitation of TCD is the difficulty obtaining signals in some patients and the difficulty maintaining a robust intraoperative signal in others. Around 10% of patients do not have a temporal window because their bone is too thick to transmit the ultrasound signal. Considerable practice is required to acquire the skills to reliably obtain a TCD signal. Monitoring probes must be firmly held in position and the fixation device needs to be secure enough to minimise movement during surgery. The time taken to locate a signal and secure the probes can add significantly to the procedure time. If the signal is lost during the procedure, attempts to access the probe and regain the signal can be disruptive to the surgeon.

Near-Infrared Spectroscopy (NIRS)

Light in the near-infrared spectrum can penetrate the skull and some of the light reaching the brain is scattered back to the surface where it can be detected by a photocell. By utilising multiple wavelengths with differential absorbance by oxygenated and de-oxygenated Hb, NIRS monitors can estimate Hb saturation. The majority of blood in the cerebral tissue is venous, therefore NIRS measurements are closer to cerebral venous saturation (typically 55 - 70%) than arterial saturation. Monitoring venous saturation is useful because venous oxygen content rises and falls depending on the ratio of cerebral blood flow to cerebral metabolism.

Unfortunately, no threshold NIRS values to indicate cerebral ischaemia have been established. Different authors recommend either responding to a decrease relative to the pre-clamp saturation (e.g. >20% fall) or a decrease below an arbitrary saturation (e.g. <60%). In carotid surgery, using bilateral NIRS probes allows comparison with the non-operated side, possibly improving the specificity of the monitor.

Advantages: NIRS monitoring is very simple to use and requires no significant training or experience. Adhesive probes are applied to the skin of the forehead. The probes are designed to minimise impingement of extraneous light.

Limitations: The main difficulty with NIRS monitoring is that falls in saturation are common but there is no defined threshold to indicate the need for shunting. NIRS probes are placed on the forehead and therefore suffer from the limitation of monitoring the ACA rather than the MCA territory. NIRS probes cost several hundreds of dollars per patient, particularly if bilateral monitoring is used.

Some comments on studies comparing monitoring modalities.

The most compelling studies attempting to evaluate the reliability of monitors for detecting ischaemia are those performed in patients undergoing awake CEA. These studies assess a monitor’s ability to distinguish patients who develop neurological symptoms on clamping. Unfortunately, most of the published studies include only a small number of patients with ischaemic symptoms, making firm conclusions difficult.

It is often stated that neurological assessment of the awake patient is the gold standard for detecting ischaemia during CEA; an assertion that is, in the opinion of this author, open to question. The rate of shunting in awake CEA is around 15%.
this author’s series under general anaesthesia we have shunted <4% of cases with a <2% rate of new neurological deficit on emergence (unpublished data). Furthermore, similarly low rates of intraoperative stroke have been achieved in large series of CEA under general anaesthesia with a policy of not shunting any patient. Clearly, most patients who develop symptoms when awake would not suffer a stroke if they were operated under general anaesthesia without being shunted. The explanation for this discrepancy is uncertain. Ischaemia may be less frequent under general anaesthesia; perhaps due to effects of anaesthetic agents or effects of blood pressure and CO2 management. Alternatively, undetected ischaemia may be occurring under general anaesthesia without progressing to clinically apparent infarction. Regardless of the explanation, it is at least arguable that awake CEA leads to an unnecessarily high rate of shunting and that symptoms in awake patients are not really a gold standard when evaluating monitoring techniques intended for use with general anaesthesia.

For some monitors, studies in awake patients may not be a realistic test of their reliability in anaesthetised patients. For example, there are reports of patients who deteriorated neurologically, recovered when a shunt was inserted immediately, and who showed no change of SSEP amplitude. As SSEPs take time for acquisition, it is possible that the SSEPs would have changed over time if the shunt had not been placed so promptly. In the case of EEG monitoring, the baseline EEG is clearly different in awake versus anaesthetised patients. Therefore, the results of EEG and BIS in awake patients may not be directly relevant to patients receiving a general anaesthetic.

Conclusions
No monitoring modality has been shown to be completely reliable in determining the need for a shunt during CEA under general anaesthesia. TCD appealing because it not only provides information relevant to adequacy of collateral blood supply but also provides information on other causes of stroke such as emboli and hyperaemia. However, TCD has not gained popularity due to the skill and time required and due to the significant number of patients in whom a reliable signal cannot be obtained. Given the various monitors each have their strengths and weaknesses, a strategy of using two or more monitors seems reasonable. This author’s current preference is to use median nerve SSEP combined with TCD.

References


An evidence based update in traumatic brain injury

Dr Ian Richardson

Department of Anaesthesia and Perioperative Medicine, Alfred Hospital, Melbourne, Victoria

Knowledge of basic neurophysiology and a firm grasp of the pathophysiology of Traumatic Brain Injury (TBI) underpins both current management paradigms and the potential therapeutic targets of the future.

The mechanism underlying TBI is classically described as occurring in 2 phases. The primary insult, resulting from the initial trauma, and the secondary insult, that evolves as a consequence of the primary insult. This is potentially modifiable and is the result of processes initiated by the primary insult. Once occurred, the primary insult cannot be modified. Current therapy of TBI therefore revolves around limiting the extent of the secondary insult through manipulation of physiological parameters to ensure ongoing matching between the cerebral metabolic requirement and the delivery of oxygen and nutrients. This includes the avoidance of hypoxia and hypercarbia, and the defense of an appropriate cerebral perfusion pressure.

During this presentation, an up-to-date snapshot of our current understanding of the pathophysiology of TBI will be reviewed. This will be used as a platform to explore the therapeutic rationale of clinical trials, which have appeared in the recent literature including ‘Decompressive Craniectomy in Diffuse Traumatic Brain Injury’ (DECRA) and the Randomised Evaluation of Surgery with Craniectomy for Uncontrollable Elevation of Intra-Cranial Pressure ‘Rescue ICP’. In particular, we examine the DECRA study and what lessons may be drawn from it.

DECRA has undoubtedly added to our expanding knowledge of the area. When comparing decompressive craniectomy with standard care, the trial groups were able to demonstrate a significant reduction in measured intracranial pressure. Though, surprisingly this did not equate to a functional improvement as defined by the Extended Glasgow Outcome Scale. The authors in fact have postulated their data indicates worse outcomes at the 6 month assessment interval.

This conclusion has been recently questioned in the academic literature for a variety of reasons. These have included small numbers and patient selection. In particular, failing to assess for pupillary signs, and the exclusion of certain patient populations such as those with space occupying lesions, which had undergone surgical manipulation. It has been argued that these factors may have masked improvements in function that may have led to more favorable conclusions.

Evidently, there remain many unresolved questions that will continue to dictate ongoing research and further trials. The Cambridge group with their Rescue ICP trial may go some way to elucidate the answers we seek and therefore decompressive craniectomy may well still have a role to play in the future management of TBI especially if it is applied to specific patient populations. Further large-scale studies will have to be performed before any definitive conclusions may be drawn.
Practical approaches to the head injured patient

Dr Justin Burke

Department of Anaesthesia and Perioperative Medicine, Alfred Hospital, Melbourne, Victoria

The early management of Traumatic Brain Injury (TBI) can have a profound impact on patient survival and long-term disability. This presentation outlines the important anaesthetic interventions that can improve outcomes for head injured patients.

Basic trauma management principles (‘ABCD’) apply to all patients with traumatic brain injury, but with additional considerations aimed at reducing secondary brain injury. Treatment is time-critical, with prompt surgical intervention for intracranial haematomas significantly improving survival.1

Adequate oxygenation is essential, with even a single hypoxic episode associated with a doubling of mortality in severe traumatic brain injury.2 Give supplemental oxygen and have a low threshold for intubation and ventilation. Hypercarbia increases cerebral blood flow and Intracranial Pressure (ICP) and should be avoided. However routine hyperventilation impairs brain tissue oxygenation and may worsen cerebral ischaemia.3 Aim for normocarbia (PaCO2 35 – 45 mmHg) with short-term hyperventilation reserved for the emergency treatment of imminent brainstem herniation or to allow surgical exposure.4

Even brief episodes of systemic hypotension increase mortality and long-term disability after head injury.5 In multi-trauma settings, controlling sources of blood loss and restoring circulating volume are critical. Although international guidelines recommend maintaining Cerebral Perfusion Pressure (CPP) between 50 and 70mmHg, the higher end of this range should be targeted in the first 24 hrs.6 Use isotonic fluids and vasopressors to achieve your goals. The choices here are up-to the clinician, but analysis of the SAFE study data indicates albumin containing fluids should probably be avoided.7

Simple methods to reduce intracranial pressure (ICP) remain the most effective. Tilt the patient 15 degrees head up and ensure no jugular venous obstruction by tracheal ties or ill-fitting cervical collars. If intubated, sedation should be adequate to avoid coughing and straining. Intravenous mannitol and hypertonic saline are both effective in reducing ICP acutely, but neither have proven outcome benefits.6, 8 High-dose corticosteroids should not be used.9

No induction agent or opiate has been shown to be superior to others, so use what you know best. Suxamethonium may be used safely as its effect on ICP is transient and inconsequential. While propofol maintenance has potential benefits, sevoflurane in concentrations < 1.5 MAC has negligible effects on autoregulation.10 Avoid Nitrous Oxide which increases cerebral blood flow and ICP.

Hyperglycaemia has repeatedly shown to worsen outcomes, so maintain blood glucose ≤ 10mmol/L. Stricter glycaemic control has not proven beneficial.11 Induced hypothermia (cerebral or systemic) probably improves ICP control but this has not translated into improved outcomes.12 What is certain is that hyperthermia is harmful and should be actively avoided.

Increasing arterial oxygen tension with high-inspired oxygen concentrations or hyperbaric oxygen has theoretical benefits for cerebral mitochondrial function. However hyperoxia has known complications (especially pulmonary) and clinical benefits have not yet been proven. Tranexamic acid has been shown to reduce mortality in trauma patients but the impact on patients with traumatic brain injury is not as clear.13 Other promising therapies and advances in cerebral monitoring will be discussed.

Most of the benefit in the initial management of traumatic brain injury is in the vigilant avoidance of hypoxia and hypotension; maintenance of normocarbia, normoglycaemia and normothermia; and simple manoeuvres to reduce ICP.

Although novel therapies hold hope for the future, most impact in improving outcome will come from attentiveness to these basic principles.

References


Top 10 Papers in anaesthesia and intensive care 2011

Dr Neville Gibbs
Chief Editor, Anaesthesia and Intensive Care

Ranking papers is a subjective process. Considerations include their overall educational value, the amount of innovation or novelty, and the validity of the methods and conclusions. I will discuss 10 papers from 'Anaesthesia and Intensive Care’ in 2011 that highlight one or more of these aspects.
ANZCA curriculum 2013 – an overview

Dr Simon Martel

The revised curriculum will be implemented in 2013. This is after extensive consultation, as well as fellow and trainee involvement in its design. The ANZCA Curriculum review, which began in late 2008, resulted in a new ANZCA Curriculum Framework and Recommendations for Curriculum Change.

Beginning in 2010, the Curriculum Revision Project, developed these recommendations into a new training program. Many fellows and trainees, including the Curriculum Redesign Steering Group, Curriculum Authoring Groups, educational committees of the College, and College staff played a pivotal role in completing this enormous task. The result is a curriculum that all fellows and trainees should be proud of.

The training program remains a five year program, however now divided into four periods: introductory, basic, advanced and provisional fellowship training. The first three of these periods are underpinned by the clinical fundamentals:

• General anaesthesia and sedation
• Airway management
• Regional and local anaesthesia
• Perioperative medicine
• Pain medicine
• Resuscitation, trauma and crisis management
• Safety and quality in anaesthetic practice

Alongside the core units are specialised study units that cover the knowledge and skills required for the anaesthetic management of patients in specific contexts. These may be completed anytime prior to provisional fellowship training, with only Intensive Care requiring a specific time component. The rest are completed through specified volume of practice, and in some cases workplace based assessments.

Anaesthetic practice is more than just knowing the required knowledge, but rather requires other important roles. These are reflected in the ANZCA roles in practice, which comprise medical expert, communicator, collaborator, manager, health advocate, scholar and professional. The new curriculum will have increased emphasis on these roles, which will be reflected in increased teaching and assessment of these areas.

Specified volumes of practice will be required for many elements of the curriculum. These will include procedures, specific cases, specific patients, teaching, presentations, attendance at courses and meetings as well as other requirements. A College developed online logbook will be utilized by trainees to record this volume of practice. It will form a part of a larger information technology program that will record training requirements including clinical time, workplace based assessments, courses completed, and formal assessments.

There are significant changes to assessment of the revised curriculum. The Primary and Fellowship Exam will remain, although there are some significant changes to the primary. The primary will be a single exam, with statistics removed, and the addition of some anatomy and anaesthetic equipment. It will, however, remain predominantly an exam of the basic sciences that underpin clinical anaesthesia. Importantly, the exam cannot be attempted till after successful completion of the first 6 months of clinical anaesthesia, or 3 months with acceptable prior anaesthetic experience.

Workplace-based assessments will form an important new component of the curriculum, providing useful formative assessment for trainees. Four types have been developed: mini clinical evaluation exercise (mini-CEX), direct observation of procedural skills (DOPS), case-based discussion (CbD) and multi-source feedback (MsF).

The Initial Assessment of Anaesthetic Competence will be completed prior to progressing to basic training and sitting the primary exam. It will include a local assessment of knowledge and a suite of workplace-based assessments. The formal project will be replaced by a number of requirements under the heading of scholar role activities.

The revised curriculum represents a significant body of work that strives to build upon and improve the current training program. It will present challenges, but more importantly, it will deliver a superior training experience for trainees and the fellows that teach and mentor them.
Leadership in crisis

Cdr Peter Edwards

A crisis can effectively be defined as an impromptu audit of management competence, highlighting as it so often does the management of the crisis rather than ineffectiveness in operational practices. It provides, therefore, an environment that comprises both danger and opportunity, the opportunity to learn and grow, both organisationally and personally. In times of crisis, leaders so often determine the outcomes, and are required to be visible, composed, vocal and resilient if they are to be effective. Leadership requires giving up the luxury of demonstrating how you feel, but rather exhibiting positive attributes and behaviours. Effective leadership in crisis does not just happen; it requires a training investment.
The establishment of primary trauma care in Myanmar. My involvement with the healthcare services of Myanmar from 2009 to the present

Dr Stephen Swallow
Royal Hobart Hospital, Tasmania

Dr James Kong, a surgeon working in Hong Kong, who had been born in Myanmar, was visiting friends in Yangon on 1 May 2008. This was the day that Cyclone Nargis made landfall on the Irrawaddy Delta and devastated the area. The official death toll of 135,000 is almost certainly an underestimate.

A few months later, James made a presentation to the Australasian College of Surgeons about Cyclone Nargis. The President of the College wanted to make a contribution from the College of Surgeons to the recovery effort following Cyclone Nargis. By this time, it was too late for direct humanitarian aid. An agreement was made that Royal Australasian College of Surgeons (RACS) would fund a capacity building exercise. AusAid would administer a series of Primary Trauma Care (PTC) courses and PTC Instructor courses over a four to five year period.

James had two friends in Hong Kong, Dr Tai Wai Wong and Dr TW Lee who had both been involved in PTC in China since 2002, when I led a group of 16 Hong Kong specialists to Xian, Shanghai, Beijing and Kunming. T.W. Lee invited me to join the second group of overseas specialists teaching PTC in Myanmar in November 2009.

Primary trauma care in Myanmar 2009 until the present
My main involvement with the medical services of Myanmar has been as an educator, teaching both the PTC course and the PTC Instructor course.

The PTC course is a 2 day course teaching a systematic medical approach to managing one or more injured patients following, for example, a motor vehicle accident. The course is specifically directed to a resource poor rural or remote setting.

The PTC Instructor course aims to teach educational process that will allow the new PTC teacher to confidently instruct in the lectures, workshops, discussions and scenarios, that make up the PTC course.

On receipt of a request to provide PTC courses, the organisers raise funds to pay for the expenses of the instructors. In the case of Myanmar, the initial funding came from RACS. Subsequently, some Hong Kong instructors paid their own way. Australian and New Zealand doctors used their training, education and research allowances to cover their costs.

I have visited Myanmar on three occasions. These have been November 2009, November 2010 and January 2012. I will be a member of the international faculty teaching PTC in Myanmar in November 2012. On each occasion, we have taught two PTC courses to approximately 20 doctors per course and one instructor course to around 12 doctors.

The Ministry of Health in Myanmar has enthusiastically embraced the programme. Doctors attend PTC courses during paid time and their travel and accommodation expenses are met.

The 56th Annual Myanmar Medical Association Meeting and Trauma Symposium
In January 2012, our visit coincided with the 56th Annual Myanmar Medical Association Meeting. I was an invited speaker at the Trauma Symposium on 18 January. My topic was ‘Pre hospital care’.

The Emergency Medicine Development Consensus Conference
On 19 January 2012, I attended the Emergency Medicine Development Consensus Conference. The purpose of the meeting was to formerly initiate a process leading to the establishment of the speciality of Emergency Medicine in Myanmar.

The meeting was attended by the academic faculty of the School of Medicine of the University of Myanmar. The meeting was opened by Dr Win Myint, Deputy Minister of Health.

The keynote speakers for the meeting were Professor Zaw Wei Soe, Professor of Orthopaedics and Director of Trauma for the Yangon General Hospital; Professor Peter Cameron, Past President of the Australasian College of Emergency Medicine; Dr Tai Wai Wong, Accident and Emergency Department, Pamela Youde Nethersole Eastern Hospital, Hong Kong and Professor David Watters, Geelong Hospital and Chairman of the Royal Australasian College of Surgeons Overseas Aid Committee.
The Australian Ambassador in Myanmar

In January 2012, James Kong, David Watters, Peter Cameron, Tai Wai Wong and I met with the Australian Ambassador to Myanmar, Ms. Bronte Moules and briefed her on the progress of our work in Myanmar.

The recent past and the immediate future

In June 2012, a conference was held, during which lectures and workshops were delivered as the beginning of a two year programme to train the first specialists in Emergency Medicine. In the interim, 20 established medical specialists will be grandfathered into the speciality from other specialist areas.

The people of Myanmar are clearly in need of a specialist led medical service in Emergency Medicine. A secondary driver to the establishment of good emergency services is the 6th Asian Games which will be hosted by Myanmar in December 2013.

As Ambulance Service Medical Officer to the Southern Region of Tasmania, I have an interest in pre hospital care. At present, there is no effective ambulance service in Myanmar. I have been in discussions with Dominic Morgan, CEO Ambulance Tasmania; Alan Moses, former CEO of The Byron Group, who manufacture ambulances in Australia; Associate Professor Chris Curry, Director of Emergency at Royal Perth Hospital, Professor Zaw Wei Soe and Dr. James Kong. We will lobby the Minister of Health and encourage him to allocate funding for a network of ambulance stations with appropriate infrastructure.

The intention, in Myanmar, is to put PTC trained doctors into the ambulances. We would like to see training for ambulance drivers, police and other first responders. We are currently looking at the Ambulance Tasmania Volunteer Officer handbook as a possible template.

Summary

A six-year programme to lead Myanmar to self sufficiency in Emergency Medicine and Emergency Medical Services is well established. By the end of 2014, the first locally trained Emergency Medicine Specialists will be in practice. There will be sufficient local PTC Instructors to ensure continuity of the programme. An Ambulance Service should be in existence and pre hospital care should be a reality for the citizens of Myanmar.
Africa – did it change my life?

Dr Iain H Wilson

Past-President, The Association of Anaesthetists of Great Britain and Ireland, London, United Kingdom

Moving to work as a Lecturer in Anaesthesia at the University Teaching Hospital, Lusaka, Zambia from an NHS registrar post in 1986-8 was a life-changing experience.

For the first time I learned the real importance of universal healthcare (in particular the NHS in UK), the vital place of education and training, the value of colleagues, the theatre team, good management and regular supply systems.

Providing an anaesthesia and ICU service was a challenge which I found hard, but rewarding. Thinking on my feet, teaching eager students (medical students, post grads in surgery and clinical officer anaesthetists) and being involved at a senior management and political level gave me opportunities which have proved invaluable for the next 25 years.

The place of good local research and decent educational literature set me on a path of writing and editing which I have continued to enjoy to this day, although I still find it hard!

In summary – without doubt, the two most influential years in my career. I set out to teach, but in the process learned far more from my Zambian colleagues than I contributed.
A positive Pacific sabbatical

Dr Shiva Malekzadeh

Austin Health, North Carlton, Victoria

In late 2011, I spent 3 months of my sabbatical at Suva’s Colonial War Memorial Hospital. Given the opportunity, I have always wanted to spend a few months working in the Pacific. I had no, and still have no delusions for the reasons. I wanted a change of scenery, I wanted to be challenged, and I wanted to meet new people. I had no expectation to change things, but I wanted to make a difference.

So when my sabbatical came around, I already knew what I wanted to do with it. What I did not know was that the challenges would rise from unexpected quarters. The change of scenery would involve various contrasts and contradictions and the people I would meet would be far more diverse than I would have imagined. I would like to think that I made at least one difference, however, the biggest change was in me - the way I see the world, the way I see people in it and the way people interact with each other and the world. This multi-dimensional interaction of the persons, deeds and place that change with time.

I say challenges from unexpected quarters because it first started when I had to justify why working in the Pacific was worthwhile for me and my hospital. It did not end even when my trip back home was delayed with Melbourne’s Christmas hail storm. I met very wonderful people and I saw that anywhere around the world family is of utmost importance.

Colonial War Memorial Hospital is the largest hospital in Fiji and it is associated with the Fiji School of Medicine. The hospital is a tertiary referral centre for south eastern Fiji and the school of medicine is responsible for medical education of the entire South Pacific. As such, people come from as far as Samoa, Cook Islands, Kiribati, Tuvalu, East Timor and Tonga for both medical undergraduate and postgraduate training. The hospital also oversees operation of a decompression chamber, which is used for both decompression sickness treatment, as well chronic diabetic wounds. The Intensive Care of the hospital can provide care for both ventilated and unventilated patients. The hospital has just commissioned four new operating rooms, which are built to Australian standards. At the time of my visit, “the septic theatre” with the 4 new theatres, where the anaesthetising locations on site.

I was involved in both undergraduate and postgraduate teachings, assisting with exam preparation, examining, and project writing as well as practical teaching.

I returned home with mixed feelings.
Anaesthesia in East Timor

Dr Flavio de Araujo
Hospital Nacional Guido Valadares, Dili, East Timor

After 24 years the occupation of Timor Leste by Indonesia ended in 1999 and after three years of an interim UN government the country became independent on 20 May 2002. Before departing, Indonesian troops and Timorese militia destroyed much of the infrastructure including the health service. For 24 years Timor almost only had Indonesian doctors although there was never an anaesthetist in the country. After the Indonesian doctors left, the health service relied entirely on international staff. With the assistance of the Australian, Cuban and Chinese governments, the International Red Cross, the UN and international non-governmental organisations, the human resource gap was filled. In 2002 there were a handful of Timorese doctors, but none of them was a specialist. Over the last 10 years the number of doctors has steadily increased and for the last five years there are also a few Timorese specialists including, since 2011, the first anaesthetist trained in part in Timor and partly in Fiji.

Now after 10 years of independence it is time to develop an approach to optimize patient care and safety, and improve satisfaction with the health care system in East Timor.

Building anaesthesia’s role in this real situation had several challenges; improving communication and understanding between members of hospital staff, how to provide a common platform for staff who come from different countries and training backgrounds to increase safety, minimise risk and improve satisfaction with the health care system.

There are three main factors that challenges building anaesthesia in East Timor

1. **Manpower**
   
   For many years Nurse Anaesthetists, working independently, have administered all anaesthesia at district hospitals with limited knowledge and equipment.

2. **Resources**

   Inadequate and poorly functioning pulse oximeters, anaesthetic monitors, anaesthesia machines, ventilators, as well as lack of infusion pumps, blood warmer, warming blankets, sevoflurane, propofol and other drugs.

3. **Education and Training**

   Inadequate political and financial support for continued medical education from government leading to stagnation in professional development.
The first 100 years following the introduction of general anaesthesia saw almost exclusive attention to reports of mortality, the majority associated with chloroform. After World War 1 anaesthetists did achieve some enhancement of status and single case reports of morbidity were reported in local medical journals but there was no systematic collection. Major reports such as by Geoffrey Kaye in 1929 and 1937 and notably by Gilbert Brown in 1937 were all related to mortality although Gilbert Brown provided for the first time a detailed qualitative analysis of cause of mortality with recommendations for future avoidance. In 1938 Brown also attempted to introduce morbidity reporting through the Newsletter of the newly formed ASA but World War 2 intervened. It was early in the 1950s before interest in reporting adverse events revived, particularly stimulated by the publication of Beecher and Todd of a review of 600,000 anaesthetics in university hospitals in the USA. Australian anaesthetists were then encouraged to send case reports of unusual morbidity to international rather than local journals, which proved to have far reaching consequences on later anaesthetic practice worldwide. Notable were the initial reports of deleterious effects of Nitrous Oxide, anaphylaxis to anaesthetic agents, malignant hyperthermia and cardiac arrest associated with use of Suxamethonium in burns.

The 1960s saw the introduction of government support for mortality reporting, first in New South Wales and later in all other States. However in Victoria in 1976, due to powerful lobbying by Kevin McCaul, probably influenced by Geoffrey Kaye, terms of reference of the Victorian Consultative Council on Anaesthetic Mortality and Morbidity (VCCAMM) included evaluation of morbidity as well as mortality and still is the only organisation with State Government support for systematic morbidity reporting. Referrals were slow at first but, as anaesthesia related mortality has significantly fallen, evaluation of morbidity has become an essential exercise in light of the many new techniques in surgery and anaesthesia. Evaluation of morbidity now constitutes the major proportion of work of VCCAMM.

A major shortcoming has been that until recently voluntary reporting resulted in incomplete data for numerator and denominator. In Victoria the 2009 Health and Wellbeing Act now mandates reporting of significant morbidity and access to hospital records although the response so far has been variable.

A critical issue is confidence in the provisions for confidentiality and the management of the data. Information on mortality is frequently in the public domain but reporting anaesthetists are more concerned about medico-legal implications associated with morbidity and for this reason some surveys have never been published. However direct feedback and external peer review is considered by VCCAMM to be an essential component of the program. In addition to direct communication with the anaesthetist, 10 reports have been distributed widely and an article on a 15 year review published.

In the 1980s pursuit of quality was finally recognised worldwide and Australia continued to lead with the development of the Anaesthesia Incident Monitoring Study (AIMS) which collated problems arising from critical incidents, resulting over the next 20 years in many publications and in the development of a crisis management manual. However morbidity was not specifically studied. By 1990 anaesthetists worldwide recognised the importance of study of anaesthesia related morbidity and many publications identified specific issues or reported closed claims studies.

The 21st century has seen an enormous proliferation of quality assurance and risk management programs in specialist medical organisations, hospitals, coronial services and in government. The Royal College of Anaesthetists has conducted landmark studies in airway management and epidural analgesia and there are many reports of individual hospital surveys.

In 2009 the Australian and New Zealand College of Anaesthetists and the corresponding Anaesthetic Societies have undertaken an ambitious program of data collection which is still in its infancy and outcome data is yet to be revealed. Duplication of data with so many simultaneous programs is a possibility. Of greater concern is the proliferation of hospital quality assurance programmes that exclude anaesthetists in discussion of relevant issues. Thus it is critical for the specialty to continue to maintain complete independence in all future programmes.

However our specialty can remain proud that it was a leader of the field of adverse event analysis for over 50 years.

References
Brunel’s Crimean War hospital

George Merridew
Launceston General Hospital, Launceston, Tasmania

The Crimean War hospital located in Turkey at Renkioi Bay on the South coast of the Dardanelles was designed at short notice and pre-fabricated in England for urgent transport and assembly in Turkey, near the site of ancient Troy. It was easily the best military hospital ever and the first portable one. The designer was the great Victorian engineer, IK Brunel, who had even incorporated flushing toilets (with instructions) among many other adaptive innovations. The Renkioi Hospital had a high patient survival rate, unlike Florence Nightingale’s dismal institution at Scutari in Constantinople.

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Walking with Dr Pugh from Hobart to Launceston in 1836

Dr John Paull
School of History and Classics, University of Tasmania

Early 19th century diaries reveal that a number of Van Diemen’s Land immigrants arriving in Hobart walked to Launceston. Conserving capital was important and meeting settlers and graziers along the way informed the traveller about opportunities in the new colony. Dr Pugh was no exception. After finding no opportunities to begin medical practice in Hobart or in Sydney he returned to Hobart and walked, with a companion, to Launceston in February 1836. Many of the homesteads at which he stayed on the month long journey are still standing, though somewhat modified in many cases.

The isolated settlers welcomed travellers, bringing news and company and on one occasion sought from Pugh tuition in chess for their daughters.

At almost every property at which he stayed the owners told him that there were no prospects for medical practice in the colony and encouraged him to take up sheep farming. Fortunately for anaesthesia he resisted these offers and set up his successful surgical practice in Launceston.

This presentation will introduce the audience to the properties at which Pugh stayed and the people he met. Your next trip between Hobart and Launceston may be more interesting as a consequence.
Artificial reproductive technology – what women want: What anaesthetists need

Dr Ainslie Murdoch
Royal Women’s Hospital, Victoria

At times the boundaries are definitely being pushed. A presentation discussing points of interaction between the anaesthetic department at the Royal Women’s Hospital (Melbourne) and patients utilising the services of the Reproductive Services Unit. Issues discussed will include: egg collection, embryo transfer, fertility preservation in oncology patients, ovarian hyperstimulation syndrome and ultimately obstetric anaesthetic services.
Anaesthetic issues in morbidly obese pregnant women

Prof. Michael Paech
Professor of Obstetric Anaesthesia, The University of Western Australia, Perth, Western Australia

Obesity in pregnancy has a number of definitions, based on pre-pregnancy body weight or body mass index (BMI), or weight gain during pregnancy. Morbid (severe or extreme) obesity is generally considered to be BMI > 35 with co-morbidities or > 40 (class 3, W.H.O.), with higher categories of BMI termed super (extreme morbid) obesity. There is no information on the incidence of morbid obesity or higher BMI in pregnancy Australia, but in 2001 35% of pregnant women were overweight or obese (and rates in the general population have increased substantially); in 2011 about 2 in 1000 were super obese and at my tertiary maternity unit 8% of women were at least morbidly obese. Obese pregnant women are more likely to produce large babies who grow into obese children and adults.

Anaesthetists rightly express concern about dealing with morbidly obese women, who appear over-represented in recent triennial mortality reports from the UK and in high quality maternal morbidity data such as that from Scotland. Increased rates of co-morbid disease are well demonstrated, including in recent Australasian data through AMOSS (Australasian Maternity Outcomes Surveillance System). Gestational diabetes, hypertension, ischaemic heart disease, thromboembolism, obstructive sleep apnoea (OSA) and increased rates of obstetric complications (induction of labour, failed progression of labour, shoulder dystocia, perineal injury, caesarean delivery [CD]) or critical illness (severe preeclampsia, postpartum haemorrhage [PPH]) result in more prolonged periods of hospitalisation and a very high likelihood of a requirement for anaesthetic services.

The diagnostic difficulties posed in detection of critical illness are another important issue. We are cognisant of the many important physiological derangements in morbidly obese parturients, in particular their predisposition to airway obstruction and difficult airway management (especially bag-mask ventilation), more rapid hypoxaemia, hypertension, poor tolerance of the supine position, malignant arrhythmias, and aspiration risk associated with diabetic autonomic neuropathy and possibly bariatric surgery.

So where should we start in assessing these women? An antenatal visit is really helpful to optimise medical conditions; investigate unexplored problems; and establish management plans for all possible scenarios. In specific cases this will involve multidisciplinary care and planning, including determining the optimal place of care, sorting out occupational health and safety issues (beds, manual handling, patient transfer) and checking that appropriate equipment (long needles, positioning supports) is available. Airway evaluation and plans of management are mandatory, given the likelihood of more difficult ventilation (beware large neck circumference and Mallampati 4 view) and intubation.

What about management? There is general agreement that early epidural analgesia during labour is valuable and that regional anaesthesia for CD is usually preferable, but a number of challenges arise. Technical difficulties include determining the segmental level of neuraxial blocks (does ultrasound have a role?); the increased risk of difficult insertion and unintentional dural puncture; more block failures and earlier catheter dislodgement. The choice of technique for elective caesarean section is interesting – I support combined spinal-epidural (CSE) approaches; consider strategies to prolong the duration of spinal anaesthesia and use of a dual interspace approach (low thoracic epidural); and very occasionally use a spinal catheter for continuous spinal anaesthesia. Other intraoperative challenges include satisfactory venous access; problematic haemodynamic monitoring (arterial cannulation is often invaluable); and safe positioning (to minimise aortocaval compression, nerve compression, optimise respiratory mechanics and preemptively prepare for potential intubation). When general anaesthesia is required, attention to preoxygenation (semi-erect, with delivery of nasal oxygen for apnoeic oxygenation) and ‘ramping’ are critically important.

Postoperative considerations include appropriate prophylaxis against thromboembolism (what dose of low molecular weight heparin?); suitable postoperative analgesia (with non-invasive ventilation and opioid dose-sparing strategies for those with OSA); and good respiratory and general care (is a high dependency setting wise?). Unfortunately, our anaesthetic services may still be required after delivery – returns to theatre due to PPH and wound infection and dehiscence are also significantly more common.

In this presentation I will detail some of the practice points that I believe are particularly important in providing safe anaesthetic and analgesic care.

Reading

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How to make an epidural work better and faster

Prof. Medge Owen

Wake Forest Medical Centre, Winston-Salem, USA

Lumbar epidural analgesia became popular for use in obstetrics in the 1970-1980s. Research and increasing clinical use helped establish reliability, flexibility and safety. In the 1990’s, refinement of the technique prevailed with the introduction of combined-spinal epidural labor analgesia and greater local anesthetic and opioid choices. In this lecture, a review of the literature will be provided in areas that might further optimize epidural catheter function. Topics will include:

1. Does patient position matter during placement: sitting or lateral?
2. Which is better: loss of resistance to air or saline?
3. Is saline pre-distention of the epidural space warranted? Can it really decrease the iv catheter insertion rate? Does it increase the spread or dilute the effect of local anesthetic solutions? If using saline pre-distention, how much should be used?
4. Does epidural needle bevel orientation matter?
5. How much catheter should be inserted?
6. Do single or multiport catheters work better?
7. What are dosing strategies to speed onset and optimize function?
Obesity, weight loss and lap banding: A contemporary psychological perspective

Mr John Mercer
Registered Psychologist
Northern Integrated Care Service, Launceston, Tasmania & Monash University, Melbourne, Victoria

Obesity is being increasingly acknowledged in both clinical literature and health policy, as having an emerging impact on the national health profile and being a significant factor for long-term health spending in this country. Its growing significance demands a sustained strategic response, and a variety of contemporary interventions, ranging from telephone coaching, through to evidence-based psychological interventions and various forms of bariatric surgical intervention, constitute the current spectrum of possibilities used to assist people presenting with obesity problems.

At the biological level, weight gain seems to be a rather simple matter of sustained disproportion between energy in and energy expended, resulting in excess energy being retained and stored in the body. Reduced to this kind of simplicity, however, it is easy to overlook and underestimate that eating is a behaviour. Obesity is increasingly being seen as a health condition in itself, which is the target for intervention, and many health issues are either directly attributable to, or exacerbated by obesity. From a psychological perspective though, obesity is a symptom of a longstanding cluster of motives and entrenched behaviours. Left unidentified or unaddressed, such motives and behaviours can seriously undermine sincere efforts to achieve and maintain health reductions in excess body weight.

This presentation explores the psychological factors which give rise to problematic eating as a behaviour, and the consequent obesity issues. A psychological understanding of weight gain is presented as a background for a contemporary psychological approach to weight loss and management, including understanding the psychological barriers to sustaining successful weight loss. The presentation will also raise some of the current psychological thinking and processes associated with assessment and preparation of Lap Band surgery candidates, highlighting both psychological contra-indications for successful outcome from the procedure, and the behavioural implications of the procedure for psychologically contra-indicated candidates.

The presenter is a psychologist working predominantly with chronic condition patients in an innovative Integrated Care setting in Northern Tasmania. He has been providing psychological pre-assessment and support for bariatric patients in the Northern region prior to Lap Banding surgery since 2010.
Treatment of obesity: The future

Dr William Osler
Gastroenterologist, Hobart, Tasmania

There is a strong push to surgery to help control obesity. Conventional dieting is thought to be ineffective in the long run. Appetite suppressants have been effective but most have been withdrawn due to safety concerns. This talk will look at some of the new appetite suppressants available, compare the safety of the withdrawn drugs to surgery and review some recent community-based lifestyle programs in France which have had encouraging results.
The re-presenting patient with an adjustable gastric band: To deflate or not to deflate?

Dr Tom Mohler
Hobart Anaesthetic Group & Royal Hobart Hospital, Hobart, Tasmania

The patient with an Adjustable Gastric Band (AGB) in place is increasingly common amongst the surgical population. In Australia at least 80000 of the Lap-Band ™ system have been placed since 1994. On a world wide perspective there has been an exponential growth in the use of the AGB, it representing 50 % of all bariatric procedures. Although difficult to confirm due to the reluctance on the part of manufacturers to divulge sales information, the number inserted is approaching or has exceeded 1 million with exponential growth expected to continue for some time yet. Representation for surgical intervention either to treat a complication of the original procedure or an independent condition is now not an uncommon event. There are a number of potential issues related to administration of anaesthesia to these patients foremost being the management of the band perioperatively. The anaesthetic management is not clearly delineated, the literature sparse and a recent ASA survey would suggest there is conflicting practice amongst Australian anaesthetists.

This presentation will attempt to address the following key questions:

- What is the physiology and pathophysiology related to the AGB?
- Should the AGB be let down prior to conduct of anaesthesia?
- If the AGB is deflated for what period prior to the event is desirable?
- What are the disadvantages of deflating the AGB?
- Is anti-reflux prophylaxis warranted?
- Is aspiration more likely in the AGB patient?
- What airway management is reasonable?

References

Conditioning of CO2 insufflation during pneumoperitoneum

Pierre Diemunsch & Eric Noll

University of Strasbourg, France

Conditioning of the carbon dioxide during laparoscopic surgery has been an important research topic in our team since 15 years. The main results of this effort are summarized in this presentation, based on the following papers:


1) The heat loss issue

Even mild perioperative hypothermia defined as core temperatures of less than 36°C can negatively influence perioperative outcome. Hypothermia occurs frequently in patients undergoing laparoscopic surgery. While general anesthesia impairs core thermoregulatory control, a significant part of the heat loss during laparoscopic procedures occurs from insufflation of CO₂ required to establish the surgical pneumoperitoneum. Therefore, humidification of the insufflated CO₂ with or without heating has been used to prevent hypothermia during laparoscopic surgery. This has led to introduction of numerous commercial heating and/or humidification devices that can be integrated with the insufflation systems. However, the performance of these devices can vary significantly.

The Aeroneb ProTM device (Aerogen, Ireland) humidifies the insufflated CO₂ by nebulising water to less than 5 micrometers droplets through a vibrating micro sleeve, but it does not heat the gas. The Fisher & Paykel MR 860 AEA Laparoscopic HumidifierTM system (Fisher & Paykel Healthcare, New Zealand) heats and humidifies the insufflated CO₂ by adding evaporated water to the gas. It also heats the insufflategas to the end of the tubing with a resistor placed in the distal tube that connects the device to the Veress needle or to the insufflation trocar, keeping the wet gas warm.

We compared the heat loss observed with the Aeroneb device and the MR860 device.

With institutional approval 16 experiments were conducted in 4 pigs under standardized general anesthesia (ketamine, azaperone propofol, pancuronium, isoflurane, O₂/N₂O, room temperature: 21.3 ± 1°C). The animals underwent a 4-hours CO₂ insufflation to maintain intraabdominal pressure at 10mmHg. Each animal, acting as its own control, was studied at 8-day intervals in randomized sequence with the following four conditions: 1) control (C): no pneumoperitoneum; 2) Standard (S): insufflation with non-humidified, non-heated CO₂ (mean measured output gas temperature (GT) 24.2°C; mean measured output gas humidity (GH) 2.6%); 3) AeronebTM (A): insufflation with humidified, non-heated CO₂ (GT: 21.1°C, GH: 97.4%), and 4) MR 860 AEA humidifier TM (MR): insufflation with humidified and heated CO₂ (GT 37.1°C, GH 93.8%). Core temperature (CT, esophageal probe Odam Physiogard SM 785TM) was recorded every 10 min. In addition, surgeons were asked to grade the laparoscopic view with respect to fogging. The data were compared with ANOVA (repeated measurements), applied to time effect and insufflation type (C, S, A, MR) and with analysis of contrast method (ACM).

The measured heat loss after 720L CO₂ insufflation over the 4-h was 1.025±0.750°C (mean ± SEM) in Group C; 3.625±0.312°C in Group S; 3.025±0.085°C in Group A; and 1.975±0.085°C in Group MR. The ANOVA showed a significant difference with time (p=0.0001) and with the insufflation technique (p=0.024).

Heat loss in Group C was less than in Group S after 60 min (p=0.03), less than in Group A after 70 min (p=0.03) and less than in Group MR after 150 min (p=0.03). The heat loss in Group MR was less than in Group S after 50 min (p=0.04) and less than in Group A after 70 min (p=0.02). These differences increased with time (p=0.0001).

After 160 min, the heat loss in Group S was greater than in Group A (p=0.03). In Group A, the laparoscopic view was impaired by intraabdominal fog. This did not occur in Groups MR and S.

These results suggest that, as far as heat loss is concerned in this porcine experimental setting, for laparoscopic procedures of less than 60 min, there is no benefit of using any humidification with or without heating. However, for procedures greater than
60min, use of heating along with humidification is superior. This is consistent with the fact that gas has a higher capacity to hold water vapour at higher temperatures. The heating device also prevented the fogging effect observed with constant cold nebulization.

It is not surprising that previous clinical studies reporting lack of benefits from heating and humidification of CO₂ were performed in laparoscopic procedures lasting for less than an hour. In contrast, studies suggesting the benefits of heating and humidification were performed in procedures lasting greater than an hour.

2) The pain control issue
Studies evaluating intraperitoneal local anaesthetic (LA) instillation for pain relief after laparoscopic cholecystectomy have provided conflicting results and one of the factors that might contribute to failure of the instillation technique may be related to inadequate distribution of local anaesthetic throughout the peritoneal surface.

In contrast, nebulisation should provide a uniform spread of local anaesthetics throughout the peritoneal cavity and thus may be beneficial to improve pain relief after laparoscopic procedures: A recent study reported that bupivacaine nebulization significantly reduced pain after laparoscopic cholecystectomy compared with bupivacaine instillation in the gallbladder bed. However, these investigators used a custom-made nebulization system that needs a separate gas source and tubing that is cumbersome and may not be easily available.

We reported that the microvibration-based nebulisation device Aeroneb Pro™ could be used for ropivacaine delivery into the insufflation gas required to create pneumoperitoneum. We hypothesized that intraperitoneal ropivacaine nebulization would provide superior pain relief after laparoscopic cholecystectomy than intraperitoneal ropivacaine instillation and conducted a controlled randomized clinical trial to assess the analgesic efficacy of ropivacaine nebulization using the Aeroneb Pro™ device for laparoscopic cholecystectomy compared with intraperitoneal ropivacaine instillation.

Patients in the instillation group (n = 30) received intraperitoneal instillation of ropivacaine 0.5%, 20 ml (100 mg) on the gall bladder after induction of pneumoperitoneum but before dissection of gall bladder, plus an intraperitoneal nebulization of normal saline 3 ml before the start of gall bladder dissection and again at the end of surgery. Patients in the nebulization group (n = 30) received intraperitoneal instillation of saline 20 ml on the gall bladder after induction of pneumoperitoneum but before dissection of gall bladder plus intraperitoneal nebulization of ropivacaine 1% 3 ml (30 mg) before the start of gall bladder dissection and again at the end of surgery (total dose of ropivacaine 60 mg).

During the postoperative period, there were no significant differences between groups in the respect to static and dynamic abdominal pain scores at all time points but no patients receiving ropivacaine nebulization complained of significant shoulder pain compared with 25 (83%) patients in the instillation group (p < 0.001). Patients receiving ropivacaine nebulization walked without assistance earlier than those receiving ropivacaine instillation. The mean time to unassisted walking after surgery in the instillation group was 13 ± 9 hours (95% CI 10 to 16) compared with 9 ± 7 hours (95% CI 6 to 12) in the nebulization group (p = 0.03). Patients receiving instillation without significant shoulder pain walked earlier (4 ± 1 hours, 95% CI 3 to 5) than patients complaining from shoulder pain on the same group (15 ± 9 hours, p = 0.01).

It is possible that the use of humidified insufflation gas as well as more uniform spread of ropivacaine throughout the peritoneum including the area under the diaphragm may explained the limited incidence of shoulder pain in the nebulization group. Reduced shoulder pain may have allowed earlier ambulation in the nebulization group despite similar pain levels at the incision sites.

In conclusion, pain scores and opioid consumption with intraperitoneal instillation and intraperitoneal ropivacaine nebulization performed before and after laparoscopic cholecystectomy were similar. However, ropivacaine nebulization reduced shoulder pain and time to unassisted walking.

3) Surgical evaporation systems allow for humidification and heating of the insufflated CO₂ in laparoscopic surgery. Nebulisation permits a uniform spread of ropivacaine in the peritoneal cavity. Studies about the combination of both these approaches are in progress.
They are threatening to withdraw my clinical privileges – what can I do?

Dr Jim Bradley
Wesley Anaesthesia and Pain Management Group, Auchenflower, Queensland

Since the advent of National Registration and its associated requirements including ‘mandatory notification’, quite a number of practitioners have found themselves in a quandary, either as those who consider the requirement that they might have to report other practitioners, or as practitioners who are indeed the subject of a notification.

A subtext to this is of practitioners who find themselves subject to other processes, most usually underwritten by a possible violation of institutional bylaws, which could lead to a suspension or withdrawal of clinical privileges. This of course has immediate institutional implications, and also becomes discoverable through applications for privileges or renewals of privileges at other institutions, and in the renewal of medical registration through AHPRA, where one is questioned specifically in relation to a withdrawal or restriction of a right to practise.

Beyond institutional bylaws, professional organisations such as the ASA, ANZCA and the AMA have documents which deal with clinical privileges, their granting, their withdrawal, and the various appeals processes. The ACSQHC also has a position in this area.

The ASA believes that ‘mandatory notification’ has led to a resetting of the ‘height of the bar’ and that administrators in various facilities are scrutinising complaints against practitioners, which may be initiated by members of other health care professions, increasingly closely, aware of the requirement for reporting to AHPRA in some circumstances, but also that their own bylaws are powerful instruments in their own right.

Practitioners need to be more aware than ever of the instruments that determine their right to practice reflected ultimately through the granting or withdrawal of clinical privileges at a local level, and of the action they must take if action against them is canvassed.
The impact of medico-legal matters on the health and practice of Australian doctors

Dr Louise Nash
New South Wales Institute of Psychiatry, Sydney, New South Wales

Objectives: To investigate the frequency and factors associated with Australian doctors’ involvement in medico-legal matters and the impact on their health and practice.

Method: A cross-sectional survey of 2,999 Australian doctors considering their experience of medico-legal matters, their general Health (GHQ), alcohol use (AUDIT) and recall of the impact of the medico-legal matter on their health and practice of medicine.

Findings: Sixty-five per cent of respondents had been involved in a medico-legal matter at some time and 14% were involved in a current matter with claim for compensation and complaint to a Health Care Complaints body the most common. As with international studies, males, long hours and high intervention areas (surgery and O & G) were associated with experiencing a medico-legal matter.

Doctors with current medico-legal matters had higher psychiatric morbidity. Doctors’ recall of the impact of a medico-legal matter found that 73% reported becoming more anxious than usual, 44% became more depressed than usual, 14% reported drinking more alcohol than usual, and 13% reported more medical problems than usual during the medico-legal process.

Forty-three per cent believed they referred patients to specialists more than usual, 55% believed they ordered tests more than usual and 11% believed they prescribed more medications than usual due to medico-legal concerns.

These concerns led 33% to consider giving up medicine, 32% to consider reducing their working hours and 40% to consider early retirement. These proportions were all significantly higher for doctors who had experienced a medico-legal matter compared with those who had not.
Mandatory reporting and the complexity behind doctors accessing care

Dr Margaret Kay

General Practitioner and Senior Lecturer, The School of Medicine, University of Queensland, Brisbane, Queensland

This presentation is an exploration of the many complex issues that surround mandatory reporting. It begins by recognising that mandatory reporting lies at the intersect of professional duty to report colleagues with impairment, concern for doctors with serious health issues who need assistance to seek health care and the responsibility of the medical board to protect the public.

After setting the scene by examining the discourse that surrounded the introduction of mandatory reporting, both before and after it was enshrined in national law. Media representations of stories of public interest and the political atmosphere that preceded the drafting of this legislation are recognised as important contributors to the establishment of this new legal landscape.

The discussion then moves to specifically consider the evidence for the introduction of this legislation. Differences in how this legislation was adopted in different states in Australia are noted. The impact of this legislation on the health of the medical practitioner is discussed and submissions to the Senate Inquiry in 2011 are used to highlight the potential for serious unintended consequences of mandatory reporting. Apprehension related to confidentiality for the doctor-patient and concerns about vexatious reporting are acknowledged.

After raising these concerns, the presentation moves on to actively consider how the profession can respond proactively in this new environment. The issues of doctors' health are reframed in a broader context that extends well beyond the need for mental health care and challenges the profession's current intense focus on impairment. While health issues are personal, there are also overarching organisational issues that can facilitate, or delay, health access for doctors. There are also cultural issues within the profession that impact upon doctors' health access. Drawing upon narratives from history to encourage a more positive engagement with doctors' health, the presentation moves on to consider issues of collegial support, mentoring and medical education in reducing concerns related to mandatory reporting and empowering the profession for the future.
Deep brain stimulation for Parkinson’s disease

Dr Stephen Tisch
Consultant Neurologist, Staff Specialist in Neurology, Conjoint Senior Lecturer UNSW

This year 2012 saw the 25th anniversary of the clinical use of deep brain stimulation (DBS) surgery in the treatment of Parkinson’s disease and movement disorders. DBS provides effective treatment for patients with advanced Parkinson’s disease and disabling motor fluctuations improving both motor function and quality of life. While serious adverse events are rare, DBS in Parkinson’s disease has some potential complications and limitations. The success of DBS hinges on careful patient selection, selection of the most appropriate DBS target, meticulous surgical technique and close follow up with adjustment of DBS stimulation parameters and medications with input from a team of people including the neurologist, neurosurgeon, anaesthetist, movement disorders nurse, neuropsychologist and speech therapist. While there is a strong evidence base for DBS in Parkinson’s disease and protocols for surgical technique and programming have been published, the delivery of DBS to each patient remains individualised. DBS surgery presents several challenges from the anaesthetic perspective including awake craniotomy, the stereotactic frame, the use of imaging during the procedure and restrictions on sedation and other drugs which may abolish clinical signs needed for testing. In patients with established DBS undergoing other surgeries certain safety precautions are followed to minimise risk of patient injury related to the DBS system. In this paper I will provide a comprehensive overview of DBS for Parkinson’s disease and discuss aspects of relevance to anaesthetists involved in the care of DBS patients.
Is blood transfusion a risk factor for adverse clinical outcomes?

Prof. James Isbister
Sydney Medical School, The University of Sydney and Royal North Shore Hospital, Sydney, New South Wales

Until recently, quality and safety in transfusion medicine has predominantly focused on the well understood and reported hazards of transfusion, ie the immunological, technical and infectious. These are generally unifactorial, with a 1:1 causal relationship between the transfused blood component, usually a specific individual unit, and the adverse consequence for the patient. Blood group incompatibility and transfusion related infection transmission, are in this category. These are transfusion complications in which the cause can be clearly established and in most cases prevented. Haemovigilance programs focus on these hazards of allogeneic transfusion. Although rare these are serious and potential fatal complications of blood transfusion of which clinicians must be aware and haemovigilance programs monitor. With good understanding and monitoring of these established potential and preventable hazards of allogeneic blood transfusion, greater attention is now being given to the issue of transfusion, and its relationship to broader questions of adverse clinical outcomes versus benefit.

There are adverse effects of transfusion in which causation may be difficult to establish. There is increasing evidence that some adverse consequences of transfusion result from interaction with other insults, pathophysiology or host factors, in which the contribution of the transfusion may be difficult to specifically identify. The functional quality and post-transfusion efficacy of fresh (labile) blood components is receiving closer attention. Allogeneic transfusion is being associated with increased morbidity, mortality, (sepsis, lung injury and multi-organ failure), and prolongation of intensive care admission and/or length of hospital stay. It is difficult to implicate transfusion directly in an individual case, but strong association has been established in numerous observational studies, but causation can only be confidently identified by large, well-conducted, randomized controlled trials. Accumulating evidence in the absence of such trials supports the likelihood of causation, thus demanding a precautionary approach to allogeneic blood transfusion, examination of alternatives to transfusion, and implementation of methods to improve the quality of transfused labile blood components.

Parallel to this epidemiological evidence there is a wealth of supporting mechanistic in vitro and in vivo data and animal studies, raising concerns that the presence of leucocytes and changes resulting from storage of labile blood components may be less efficacious than assumed and have adverse clinical consequences.

This presentation will focus on the evidence for the storage lesion and transfusion related immunodulation being responsible for adverse clinical outcomes and how causation of patient harm can be addressed when the conduct of randomised controlled trials is problematic and results of trials are awaited. The preparative processes of anticoagulation, fractionation, cooling and preservation all cause changes in stored blood. Additionally, storage over time compounds progressively with increasing storage changes until the date of expiry. The fact that storage of labile blood components causes significant and measurable in vitro and in vivo changes raises concerns regarding efficacy and safety of stored blood components. The clinical significance of these changes in terms of adverse clinical outcomes is now an issue receiving wide attention. There is observational evidence that storage age of labile blood components, especially red cell concentrates, is an independent risk factor for adverse clinical outcomes. Of even greater concern is the dearth of evidence for efficacy of red cell concentrates in anaemic haemodynamically stable patients.

Establishing causation from observational data is fraught with difficulties presenting the challenge of randomised controlled trials to answer the causation question. Such trials are underway and results are awaited with interest and trepidation, as there could be challenging implications for the blood sector. What current actions, on the basis of the precautionary principle, should be implemented to avoid or minimise these problems?
Inhaled agents and the lungs: Drugs, oxygen and their interactions

Assoc. Prof. Richard Wood-Baker
Royal Hobart Hospital

Airways disease remain significant health problems in Australia, and with the prevalence of both asthma and chronic obstructive pulmonary disease (COPD) in adults approximately 10% they are likely to be common co-morbidities encountered in anaesthesia. Approaches to the diagnosis, severity assessment, and treatment for the two diseases have many similarities, but also important differences. Common to both diseases is the emphasis on inhaled drug treatment, mainly bronchodilators and glucocorticoids, with a step-wise approach based on disease severity. Theoretical effects of oxygen on respiratory drive in COPD have long been known, although research support for this has been limited. More recent evidence on the impact of hyperoxia in COPD has provided evidence to support guideline recommendations on exacerbation management, and lessons from these studies are likely to be relevant to peri-operative management.
Is acute postoperative pain reflected by a change in parasympathetic cardiac tone? Evaluation of the analgesia nociception index (ANI).

Thomas Ledowski1,2, Wuen Sze Tiong1, Carl Lee1, Brandon Wong1, Tim Fiori1, Neil Parker2

1 University of Western Australia, Perth, Western Australia
2 Dept. of Anaesthesia and Pain Medicine, Royal Perth Hospital, Perth, Western Australia

Background: The Analgesia Nociception Index® (ANI, Metrodoloris, France) is a 0-100 score which is calculated via the heart rate variability-based assessment of cardiac parasympathetic tone. As the latter is reduced with pain/nociception, ANI could potentially be a tool for monitoring acute postoperative pain. However, the score has not yet been validated for this purpose. Thus it was aim of our trial was to investigate the relationship between ANI and acute postoperative pain.

Methods: After institutional approval acute pain was repeatedly assessed in 50 recovery room patients via a 0-10 point numeric rating scale (NRS). Simultaneously, ANI was measured using a stand-alone Metrodoloris ANI monitor which derived patient ECG data via 2 single use ANI-ECG electrodes applied in V1 and V5 position.

Results: A total of 443 NRS-ANI were obtained from 46 patients (31 ± 14 yrs). ANI and NRS showed a small, but significant negative correlation (Spearman's rho: -0.13; P = 0.017). A trend towards lower ANI readings in higher levels of pain was observed (mean [SEM]; NRS 0: ANI 60.2 [2.2] vs. NRS 6-10: ANI 56.8 [2.1]; not significant). Receiver operating curve analysis for ANI as a detector for severe pain (NRS > 5) did not show a significant predictive value (sensitivity/specificity).

Conclusion: Despite a significant correlation, ANI differences between states of pain were small and unlikely of clinical value. As confounders such as anxiety or agitation cannot be excluded in recovery room patients, any monitor based on sympatho-vagal balance may be more valuable in anaesthetized subjects.
Audit of patients admitted with fractured neck of femur

Ping Han Chia, Linda Gualano, Sheik Yan Wong
Northern Hospital, Epping, Victoria

Introduction: Osteoporotic hip fracture continues to place a huge burden on the Australian healthcare system. However, there is little recent data to reflect the Australian population. The study aims to retrospectively analyse the perioperative characteristics of these patients, and explore the factors influencing both postoperative cardiac complications and mortality.

Methods: The Northern Hospital is a 300 bed metropolitan teaching hospital located in Victoria. Hospital records were analysed to identify patients admitted with a diagnosis of fractured neck of femur during a one year period from September 2009 to September 2010. Mortality data was obtained from the Victorian Registry of Births, Deaths, and Marriages. A total of 185 adult patients were included.

Results: The majority of patients (80.5%) had ASA score of 3-4, with a third (34.4%) of patients requiring preoperative medical intervention for optimisation prior to surgery. Over a third (36.8%) were hypothermic with a temperature of <36.0 °C upon arrival to the recovery room postoperatively. The mortality rates were 8.1% at 30 days and 21.6% at 1 year. Factors predicting 1-year mortality using the multivariate model were ASA score, general anaesthesia, postoperative acute myocardial infarction, and postoperative oliguria. The preoperative clinical feature predictive of postoperative cardiac complications was preoperative hypoxaemia.

Conclusion: Our results confirm the persistently high morbidity and mortality in this group of patients. Efforts should be aimed at medically optimising patients preoperatively and correction of preoperative hypoxaemia. In this study, we found that general anaesthesia is associated with increased mortality.
Post traumatic Stress Disorder in relatives of patients admitted to an Intensive Care Unit

K.Sundararajan1, M. Martin2, T.R.Sullivan3, M.J.Chapman1

1 Discipline of Acute Care Medicine, University of Adelaide
2 Traumatic Injuries Psychology Service, Royal Adelaide Hospital
3 Data Management and Analysis Centre, University of Adelaide.

Background: There is a high risk of Post Traumatic Stress Disorder (PTSD) in relatives of intensive care unit (ICU) patients

Aims: To determine the incidence and predictors of symptoms of PTSD in the relatives of an Australian critically ill population.

Methods: One hundred and eight consecutive patients, staying >48 hours in a mixed, level 3 ICU were identified. Eight were excluded because next of kin contact details were unavailable. On day 3 of admission their next of kin were contacted, consent was sought, and, if given, a phone questionnaire using Hospital Anxiety and Depression Scale, Impact of Event Scale Revised (IES-R), Short-Form General Health Survey, Royal Adelaide Hospital-ICU Family Satisfaction Survey, was performed 90 days post discharge from ICU. An IES-R score of >8.5 was used to define moderate, and >19 was used to define severe PTSD symptoms.

Results: Thirty seven subjects refused to participate. Thus a total of 63 family members were included, 49 of patients who survived. The incidence of PTSD symptoms was 49.21% (CI 36.38%, 62.11% ) for moderate and 7.94% (CI 2.63%,17.56%) for severe. The anxiety score was found to be a significant predictor of moderate PTSD symptoms, with a one unit increase in the anxiety score being associated with a 12% increase in the risk of PTSD (relative risk = 1.12; 95% CI 1.06, 1.19; p = 0.0001).

Conclusion: Many family members of ICU patients had PTSD symptoms. High anxiety scores were a significant predictor for developing moderate but not severe PTSD symptoms.
The utilisation of the end-tidal carbon dioxide detector and laryngeal mask airway by paediatricians as recommended resuscitation equipment for the newborn infant

A Kuok, D Ongley

1 Joondalup Health Campus, Cnr Grand Blvd & Shenton Ave, Joondalup WA 6027, annlynn.kuok@gmail.com
2 Sir Charles Gairdner Hospital, Hospital Ave, Nedlands WA 6009, dickongley@me.com

In Western Australia, resuscitation including airway management of the newborn infant, is normally managed by the paediatrician. Anecdotally, the availability and use of two vital pieces of airway equipment, the carbon dioxide (CO2) detector and laryngeal mask airway (LMA) remain limited amongst the neonatal population.

Aims: The objectives of this study were to evaluate adherence to national Neonatal Resuscitation Guidelines of paediatricians routinely involved in the resuscitation of neonates. As adherence was expected to be low, we also proposed to explore the reasons for this.

Methods: A survey was distributed to all practising paediatricians in Western Australia evaluating their airway experience in neonatal resuscitation, particularly with regards to their use of CO2 detectors and the LMA.

Results: 22 paediatricians with a range of experiences from different hospitals responded.

56% did not routinely use a CO2 detector and 47% had never used one to confirm endotracheal intubation. 27% were unfamiliar with the LMA and 47% would not be comfortable using it in an emergency situation. 38% and 56% did not have ready access to the CO2 detector and LMA at the institutions where they practised.

Conclusions: Despite widespread recommendations, survey results suggest that a significant proportion of paediatricians are not using these standard devices, either because it is unavailable or they are unfamiliar. The next appropriate step would be to explore the reasons for these deficiencies and assist with continuing education where required. In the meantime, since airway management is a fundamental anaesthetic responsibility and skill, anaesthetists should be prepared to provide support to paediatricians during neonatal resuscitation. This requires good communication between the two specialties and a recognition that help is required.
The effect of passive leg raising on haemodynamics in healthy term pregnant women

S Griffiths 1, A Dennis 1,2

1 Department of Anaesthesia, Royal Women's Hospital, Parkville, Victoria
2 The University of Melbourne, Parkville, Victoria

Aim: Transthoracic echocardiography (TTE) provides insights into intravascular volume in non-pregnant adults during passive leg raising (PLR). The effect of PLR in healthy pregnant women is uncertain. This study aimed to use TTE to measure haemodynamic responses to PLR in pregnant women.

Method: After institutional ethics approval/informed consent, 20 healthy term pregnant women were recruited. After 10 minutes rest, heart rate (HR) and blood pressure (BP) were obtained, and a standardised TTE examination was performed (P1). Legs were elevated 15° (P2) and stroke volume (SV), cardiac output (CO) and heart rate (HR) were measured at 1 and 5 minutes. The legs were repositioned to the level position (P3) and SV, CO and HR were measured at 1 and 5 minutes. Statistical analysis used analysis of variance comparing baseline (P1) with P2 and P3.

Results: Haemodynamic data was obtained in all 20 women in each position. Baseline demographics (mean ± SE) were age 30 ± 0.9 years, gestation 39 ± 0.2 weeks and BMI 26 ± 0.5 kg.m⁻². Baseline haemodynamics (mean ± SE) were fractional shortening 38 ± 1.1%, left atrial diameter 3.6 ± 0.09 cm, mitral valve E/A 1.4 ± 0.07, mitral valve E/septal e’ 6.5 ± 0.45, systemic vascular resistance 1961 ± 101.3 dyne.sec.cm⁻⁵. Three women had MV E/septal e’ > 8. All women had fractional shortening > 28%.

Table 1 Changes in haemodynamic variables after postural changes

<table>
<thead>
<tr>
<th>Variable</th>
<th>P1</th>
<th>P2</th>
<th>P2</th>
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<td>After 1 minute</td>
<td>After 5 minutes</td>
<td>After 1 minute</td>
<td>After 5 minutes</td>
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<td>MAP (mmHg)</td>
<td>84 ± 2.5</td>
<td>82 ± 2.3</td>
<td>82 ± 2.6</td>
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<td>CO (ml.min⁻¹)</td>
<td>3553 ± 173.6</td>
<td>3794 ± 211.5</td>
<td>3499 ± 208.4</td>
<td>3814 ± 189.3</td>
<td>3296 ± 158.8</td>
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<td>SV (ml)</td>
<td>49 ± 2.2</td>
<td>52 ± 2.9</td>
<td>47 ± 2.7</td>
<td>52 ± 2.3</td>
<td>43 ± 2.1*</td>
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<td>HR (beats.min⁻¹)</td>
<td>73 ± 1.8</td>
<td>74 ± 2.2</td>
<td>75 ± 1.6</td>
<td>74 ± 1.5</td>
<td>78 ± 2.7*</td>
</tr>
</tbody>
</table>

Data are mean ± SE *P < 0.05 for comparison against study position P1 values. MAP = mean arterial pressure, CO = cardiac output, SV = stroke volume, n=20 in each position

Conclusions: 15° PLR does not alter SV, HR or CO in healthy term pregnant women under resting conditions. SV decreased with a compensatory increase in HR, with no change in CO, when PLR ceased. This method enables examination of PLR under different conditions such as neuraxial anaesthesia, hypertensive disease or suspected hypovolaemia.

Reference

A retrospective audit of blood product use in postpartum haemorrhage

Dr Adam D Badenoch¹, Dr Bill Wilson², Dr Ellen Raghoudi³, Dr Allan Cyna¹

¹ Women's and Children's Hospital, 72 King William rd North Adelaide, South Australia
² Lyell McEwin Hospital, Haydown rd Elizabeth Vale, South Australia
³ Flinders Medical Centre, Bedford Park, South Australia

Introduction: Postpartum Haemorrhage (PPH) is a leading cause of maternal mortality¹. Current Australian and New Zealand Society of Blood Transfusion (ANZSBT) and National Health & Medical Research Council (NH&MRC) guidelines² can be used to guide decision making, but may not be appropriate as they are based exclusively on non-obstetric data.

We aimed to audit current South Australian transfusion practices for PPH and determine whether these were consistent with the ANZSBT and NH&MRC guidelines.

Methods: Data was retrieved from pre-existing electronic databases in South Australian obstetric hospitals between 1/7/2006 and 30/6/2011. Data collected included estimated blood loss, blood products administered and indications for transfusion such as haemoglobin (Hb) <100g/L and INR>1.3. Based on this data we reported the proportion of blood products administered that were consistent with the ANZSBT and NH&MRC guidelines.

Results: We found data on 8342 women diagnosed as PPH out of a total of 34,911 deliveries (23.9%). Of the 8342 women with a PPH 744 (8.9%) were transfused with at least one blood product. Of these transfusions, 709 (95.3%) of these transfusions were consistent the ANZSBT and NH&MRC guidelines.

Conclusions: Transfusion practices for PPH were consistent with the ANZSBT and NH&MRC guidelines for non-obstetric perioperative transfusion practices.

Future research is required to identify whether any modifications to these guidelines are required to meet the specific needs of women having a PPH.

References


A large retrospective review of patients with multiple rib fractures and analgesic management at a major trauma centre.

Helena Choi¹, Henry Cheung², Louise Cope¹, Desiree Sy¹, Richard Halliwell¹

¹ Department of Anaesthesia, Westmead Hospital, Westmead, NSW
² Department of Surgery, Concord Hospital, Concord, NSW

Introduction: Pain from traumatic rib fractures can contribute to significant pulmonary morbidity and mortality, hence adequate analgesia is crucial in the management of rib fractures. There is considerable variation in anaesthetists’ choice of analgesic technique when treating these patients.

Aim: To identify the relationship between analgesic techniques and pulmonary complications or mortality in patients with multiple rib fractures.

Method: A retrospective 7-year analysis of patients admitted to a level 1 trauma centre with 3 or more rib fractures but with minimal head and abdominal injuries. Data collected included patient characteristics, type and details of analgesia used, involvement of acute pain service (APS), pulmonary complications, hospital and intensive care unit (ICU) length of stay, 30 day and 1 year mortality.

Results: 303 patients (74% males) received analgesia for 3 or more rib fractures, but with minimal head or abdominal injuries, between 2004 and 2010 at Westmead Hospital. Of those, 192 received patient controlled analgesia (PCA), 50 received epidural analgesia (EA) and 61 received intermittent opioid analgesia (IOA). All epidural catheters were inserted at a thoracic level, and used an infusion of bupivacaine ± fentanyl. The APS was involved in the management of 84% of patients. Median age was lowest for the PCA group (p < 0.001). Patients with more severe chest injuries with flail segment (p < 0.001), sternal fracture (p = 0.006), pneumothorax (p < 0.001), haemothorax (p = 0.004), pulmonary contusion (p = 0.006) or required intercostal catheter (p < 0.001) were more likely to receive EA and least likely to receive IOA. Patients with a greater number of rib fractures were more likely to receive EA, followed by PCA then IOA. Injury severity score was lowest for the IOA group.

Using univariate analysis, 1-year mortality was significantly higher in the IOA group compared to PCA group (10% vs 1%, p=0.007). No significant differences were demonstrated between the 3 groups for pneumonia rates, days of ventilation, 30-day mortality. Epidural analgesia was associated with a longer duration of hospital admission (p = 0.004) and ICU stay (p = 0.019). Stepwise regression found that patient age and smoking status were the only significant predictors of pneumonia or one-year mortality.

Conclusion: In a large retrospective review of patients having multiple rib fractures, the EA group was not associated with increased mortality despite more severe chest injuries. However, 1-year mortality was found to be higher using IOA compared to PCA techniques.
Pain scores versus comfort scores after caesarean section: A randomised trial

Cheryl SL Chooi 1, Angela M White 2, Suyin GM Tan 3, Kate Dowling 4, Allan M Cyna 5

1 Royal Adelaide Hospital, Adelaide SA
2 Women's and Children's Hospital, Adelaide SA
3 Nepean Hospital, NSW
4 Public Health Research Unit, Women's and Children's Hospital, Adelaide SA
5 Women's and Children's Hospital, University of Adelaide, Adelaide SA

Objectives: Negative words to describe sensations such as, 'sting' and 'pain', have been shown to increase pain. We compared pain scores with comfort scores and investigated whether, different methods of pain assessment affect patient perceptions and experiences post-operatively.

Methods: Following caesarean section, 300 women were randomised prior to post-anaesthesia review. Group P women were asked to rate their pain on a 0-10 point Verbal Numerical Rating Scale (VNRS), where '0' was 'no pain' and '10' was 'worst pain imaginable'. Group C women were asked to rate comfort on a 0-10 point VNRS, where '0' was 'no comfort' and '10' was 'most comfortable'. All women were asked whether the caesarean wound was, bothersome, unpleasant, associated with tissue damage and whether additional analgesia was desired. Relative risks (RR) and 95% Confidence Intervals (CI) are reported.

Results: Median (IQR) VNRS Pain scores were higher than inverted Comfort scores at rest, 2 (1, 4) versus 2 (0.5, 3) P=0.001, and movement, 6 (4, 7) versus 4 (3, 5) P<0.001. Group P women, were more likely to be bothered by their caesarean section, had greater VAS 'Bother' scores, 4 (2, 6) versus 1 (0, 3) P<0.001, perceived postoperative sensations as 'unpleasant' (RR=3.05, 95% CI 2.20, 4.23) P<0.001 and, related to tissue damage rather than healing and recovery (RR 2.03, 95% CI 1.30, 3.18), P=0.001. Group P women were also more likely to request additional analgesia (RR 4.33, 95% CI 1.84, 10.22) P<0.001.

Conclusions: Asking about pain and pain scores after caesarean adversely affects patients' post-operative experiences.
Comparison of noninvasive measurement of blood pressure (BP) in the upper arm, forearm and calf in patients undergoing general anaesthesia (GA)

Dr Shedleyah Dhuny
Dr Shedleyah Dhuny, Launceston, Tasmania

This study was designed to determine if there is any significant difference between blood pressure at these three sites. It involved comparing blood pressure measurement in the upper arm, forearm and calf in patients undergoing General Anaesthesia.

Null Hypothesis
There is no difference between the Systolic, Diastolic and Mean Arterial Pressure at the 3 sites.

Design and Methods
The sample consists of 52 patients. All BP measurements were taken while the patient was under GA. Measurements began 5 minutes from knife to skin time. Automatic noninvasive Oscillometric blood pressure machines (Datex- Ohmeda) was used.

For each patient, two measurements of BP were taken, along with two measures of mean arterial pressure (MAP).

The statistical analysis is a one factor ANOVA, with the site that BP or MAP was taken from as the single factor. Dunnett’s post hoc test for comparing means is used if the ANOVA determines a difference among the means at the 0.05 level of significance. The upper arm BP was used as a reference.

Results
MAP: No significant difference between the three sites.
Systolic: Systolic blood pressure at the calf was found to be significantly higher than that of the upper arm.
Diastolic: No significant difference between the three sites.

Conclusion
Given that there is no significant difference between the MAP at the three sites, either the forearm or the calf may be used when the upper arm is not a suitable site.
Operative delay in hip fractures – dispelling a myth

Ronald Cheung, Tony Chu
Department of Anaesthesia, Gosford Hospital, Gosford, NSW

Introduction: Meta-analyses of surgical delay in hip fractures indicate that delay over 48 hours is correlated with increased morbidity and mortality. However, the effect of operative delay on mortality remains controversial, as those patients who experience delay might be more ill on admission. The objectives of this study were to analyse the incidence and causes of operative delay in hip fractures and search for predictors of delay.

Methods: From January to May 2012, 113 patients admitted with a hip fracture were included. 2 patients were excluded from analysis due to death before reaching theatre. Both 24- and 48-hour delay periods were used. Time from admission to operation and causes of delay were recorded. T-tests were performed to elicit differences in characteristics between delayed and non-delayed groups. Logistic regression was performed to find correlations between patient characteristics and delay.

Results: Mean admission to operation time was 44 hours. No significant difference in patient characteristics (such as ASA score and number of comorbidities) and causes for delay was detected between delayed and non-delayed groups using 24- and 48-hour delay periods. Lack of facilities or theatre space was found to be the main cause of delay (50% in 24-hour delay; 42% in 48-hour delay). Regression analysis revealed no correlations between clinical data and operative delay.

Conclusion: The causes of operative delay in hip fractures are largely system-based. On average, patients who experience delay do not appear to be more ill. System-based solutions such as fast-track admission pathways, protected trauma lists, and multidisciplinary trauma groups may be the answer.
Kybele – for safe childbirth worldwide

Prof. Medge Owen
Wake Forest Medical Centre, Winston-Salem, USA

Kybele, Inc. (www.kybeleworldwide.org) is a 501 (c)(3) humanitarian organization dedicated to improving childbirth safety worldwide through collaborative partnerships. Kybele is a multinational, interdisciplinary organization with teams composed of physicians (in obstetrics, anesthesia, and neonatology), nurses, midwives, engineers, public health practitioners, leadership and organizational specialists. To date, Kybele has had successful operations in countries as varied as Turkey, Mongolia, Croatia, Egypt, Georgia, Romania, Armenia and Ghana. There have been 381 trainers enlisted from 67 institutions from the across the US, Canada, the UK and Australia to conduct 46 medical missions abroad, resulting in sustained healthcare improvements.

Medical teams travel by host country invitation to work alongside physicians and nurses in their home hospitals. Kybele builds relationship, cultural awareness and trust with local healthcare teams that results in collaborative, country-specific programs designed to impact national healthcare standards. Challenges and solutions are jointly identified at the local level to improve healthcare in countries with sufficient infrastructure to sustain progress after training. Programs have included the following domains: quality improvement, clinical guideline development, standard operating procedures, teaching and training in a multitude of advanced techniques, advocacy, research and hands-on, patient centered care. ‘Trainers’ participate in programs in other hospitals and countries promoting cooperation and equality.

Our largest project to date began in January 2007, when Kybele entered a five year agreement with the Ghana Health Service to establish an ‘Obstetric Center of Excellence’ with the goal of reducing by half the number of maternal and neonatal deaths. Ridge Regional Hospital was selected as the center, being a major hospital in the capital city Accra, with over 9,000 annual births. The collaboration addressed many problematic areas including leadership, motivation, knowledge deficits, equipment shortage, patient flow and communication issues resulting in a 34% decrease in maternal mortality and a 36% decrease in stillbirth, despite a 36% increase in patient admission and higher disease acuity. In addition, case fatality rates for the major killers, hemorrhage and pre-eclampsia, was reduced by 89% and 65%, respectively. Kybele has established familiarity with the local medical environment in Ghana and buy-in at the governmental level, resulting in sustained innovation and success. In addition, Kybele has tailored collaboration with Canadian Food for the Hungry, the Ghana International Women’s Club and USAID for various ongoing projects.

Reference
Humanitarian work and disaster relief – is there a need for standards?

Assoc. Prof. K A Kelly McQueen

Director of Graduate Medical Education, Valley Anesthesiology Consultants; Phoenix, Arizona, USA
Clinical Associate Professor of Anesthesiology, University of Arizona
Clinical Assistant Professor, Mayo Clinic
Fellow, Harvard Humanitarian Initiative

Safe anesthesia and surgery are essential during humanitarian crises and disaster relief. Historically, 15% of disaster victims have required surgery and countless numbers of those stranded in areas of conflict and crisis have required emergency surgery. Many organizations and individuals providing this care have done the best possible for these patients in need, while often falling far short of the expected standards within their country of origin for the provision of care.

Many post-response reports and studies have revealed the challenges and ‘costs’ of compromising best practices and safety assurances in these settings. Haiti is one recent and vivid example. Behavior and choices in an emergency must be accepted as the best possible. In urgent situations care should be taken to provide the best possible care, insuring safety and taking into consideration the possible long-term consequences of surgery in austere settings.

The international humanitarian community has recognized the role of training, education and best practices for the delivery of medical care during and following disasters, conflict and other crises. Safe anesthesia and surgery are being considered by several organizations including the World Health Organization, the World Federation of Societies of Anaesthesia, and a coalition of academic institutions for best practice considerations and guidance on additional training suggested for anesthesiologists and surgeons working in Austere settings.
Ten years in the footsteps of Genghis Khan

Dr David Pescod

The Northern Hospital, Epping, Victoria

In 1227, at the time of his death, Genghis Khan had unified the Mongol people and with devastating ruthlessness the Mongols would create the world’s largest empire, which would stretch from the snowy tundra of Siberia to the hot plains of India, from the rice paddies of Vietnam to the wheat fields of Hungary, and from Korea to the Balkans. But Genghis was more than Voltaire’s ‘wild Scythian soldier bred to arms/And practiced in the trade of blood’. He introduced a universal writing system, unprecedented religious tolerance, a legal code, universal education, increased literacy, printing and an international postal system. Genghis established pan-Asian commerce, sharing ideas, culture and technology, which stimulated trade and communication between the East and West, giving birth to the Renaissance.

Modern health services in Mongolia began in 1921, with marked expansion after 1940, directed by the former USSR. The health system in Mongolia is the result of some 70 years of implementation of the Semashko model, common to countries of the former USSR. This system emphasised the provision of health services, mainly through extensive networks of health posts, ambulatory polyclinics and hospitals. The emphasis on narrow medical specialisation and hospital based services continued until 1990 and as result, Mongolia has inherited a vast, inefficient hospital network. The hospital system is over developed with large numbers of poorly trained health personnel operating without any equipment or modern pharmaceuticals.

The first wave (1940s) of Mongolian anaesthetists received only four months, some only 45 days, of very limited training. Anaesthetic resident training had been essentially vertical verbal hand down of information by senior anaesthetists. This contributed to dilution, omissions and errors in anaesthetic training. Subsequent training time has been variable with a maximum period of 18 months. Unfortunately in 2007, due to the shortage of specialists in Anaesthesia and Emergency Medicine, the Minister of Health of Mongolia signed a decree shortening the residency-training program to only six months.

This severely impacted on anaesthesia in Mongolia, accelerating the negative succession. With six months of anaesthetic exposure, trainees experienced as few as 20 general anaesthetics. Expecting inexpert trainees to deliver anaesthesia in isolated, poorly equipped hospitals further diminished the status of anaesthesia and encouraged abandonment of the profession.

It was anticipated that the establishment of an internationally supported, but Mongolian owned anaesthetic training program and ongoing postgraduate anaesthetic education would elevate the status of anaesthesia, accelerate recruitment, reduce abandonment and significantly reduce morbidity and mortality.

2012, and ten years in the footsteps of Genghis Khan, Mongolian anaesthesia and Australian-Mongolian relationships have flourished. Anaesthesia is the favoured medical craft group, morbidity and mortality is diminishing, and Australian assistance is disseminating beyond anaesthesia to strengthen obstetrics, gynaecology, general surgery, intensive care and emergency medicine.
Millennium development goal 5 – can we make a difference?

Prof. Medge Owen
Wake Forest Medical Centre, Winston-Salem, USA

Maternal mortality is considered a basic health indicator that reflects the overall adequacy of a country’s healthcare system. While maternal mortality has dramatically decreased in industrialized nations over the past 80 years, this has not occurred in many low and middle income countries. The disparity between countries is extreme. The MMR is < 25 per 100,000 in Australia, Canada, the US and UK; 640 per 100,000 in sub-Saharan Africa, and 1400 per 100,000 in Afghanistan resulting in a range of lifetime risk of maternal death of 1 in 7600 compared to 1 in 11. Over the past two decades, the absolute numbers of maternal deaths have declined from 550,000 in 1990 to approximately 350,000 in 2008. Gross underestimates of maternal death, however, are likely in countries where death rates are the highest due to poorly developed data collection and death registration systems.

The importance of trained anesthesia providers for achieving MDG 5 becomes apparent when one recognizes the necessity of surgery in managing obstetric emergencies. Obstetric anesthesia as a sub-specialty does not exist in most developing countries, yet hospitals within most countries treat obstetric complications that require surgery, including obstructed labor, ruptured uterus, eclampsia, and hemorrhage. Emergency cesarean delivery remains one of the most common surgical procedures conducted worldwide, although capabilities to perform it are insufficient in many areas. In many parts of Asia and Africa, anesthesia may be administered by the surgeon or inadequately trained non-physician providers working alone. For this reason, it is not surprising that perioperative mortality rates are estimated to be as high as 1-2%. Anesthesia significantly contributes to maternal mortality and is associated with as many as 3-9% of hospital-based maternal deaths each year in developing countries. Considering the high number of maternal deaths in many of those countries, the impact of anesthesia is real. In developed countries, anesthesia providers are leaders in resuscitation and intensive care for patients in peril. In many low-income nations, this skill set is not integral to anesthetic training and anesthesia providers are often scarce, which undoubtedly increases mortality.

Most reported anesthesia-related maternal deaths occur during the administration of GA for cesarean delivery in both healthy and medically compromised patients in both developed and developing countries. Interestingly, even in countries with sufficient numbers of trained anesthesia providers and the availability of regional anesthesia (RA), GA is still frequently preferred. Reasons for this may include fear of RA by patients, reluctance of surgeons to operate on ‘awake’ patients, unfamiliarity of the anesthesiologists with the regional techniques, and/or institutional tradition. Airway complications that accompany GA can be minimized if RA techniques are utilized for cesarean deliveries. Indeed, the use of spinal anesthesia for cesarean delivery in both developed and developing countries has been associated with a reduction of maternal death, although death reported with spinal anesthesia has also increased.

A multitude of organizations send teams to work in underserved areas to help provide surgery and anesthesia. Global health programs are also emerging within many academic anesthesia departments worldwide. It is hoped that research efforts associated with these partnerships can better define and quantify the global anesthesia crisis. It is imperative to strengthen health systems worldwide to improve maternal and newborn outcomes. Global initiatives striving to improve emergency obstetrical services, by necessity, should include a model of safe anesthesia care. Trained anesthesia providers, working individually or collectively through organizations, can and should play a vital role.

Key References

Difficult airway algorithms and management: An update and education

Pierre Diemunsch and Julien Pottecher
Service d’Anesthésie-Réanimation Chirurgicale, Hôpitaux Universitaires de Hautepierre, Strasbourg, France

The need for revised airway guidelines

In an editorial entitled: Evolving challenges and opportunities for difficult airway management guidelines published recently in the Canadian Journal of Anaesthesia [1] our team addressed the question of the contrast between the fast evolving airway management practices in the clinical setting and the apparently obsolete guidelines as provided by most of the National Scientific Societies. This short review is aimed at the analysis of efforts that appeared recently in the literature and were directed towards a minimization of the gap between the paces of the technical and institutional advances in difficult airway management.

After the introduction of the Laryngeal Mask Airway (LMA) and its general widespread, almost all the airway management algorithms ranked the ventilation of the patient through an LMA as the first action when dealing with an unexpected difficult or impossible intubation. Nevertheless, in 2011, airway control problems still represent a major source of anesthesia related death and brain damage, irrespective of this major step forwards patients oxygenation, and even given the introduction of the videolaryngoscopes on the top of the guidelines [1].

The videolaryngoscopes (VL) undoubtedly improved the visualisation of upper airway anatomy and have a very sharp learning curve but, on the other hand, they are associated with some limitations:

1) To make the best choice among the all the ‘me too’ devices that flourish on the market is not obvious. Indeed major differences exist across the different VLs. Some features that seem to be more relevant than others deserve special attention and include a) the readability of the screen; b) the portability, autonomy and immediate use-readiness without complicated connections; c) the characteristics of the blade (availability of single use blades in a range of sizes, shape and thickness of the blade, presence of a channel for the tube); d) the cost per procedure taking in account the acquisition cost of the reusable part and the cost of a disposable blade; and e) the environment friendliness.

2) Some anaesthesiologists may be dazzled by the improvement in the laryngoscopic view provided by the VLs and make too confident an extrapolation in believing the VLs will solve every difficult intubation. Of course, this assumption isn’t true and many failures have been reported, with different types of VLs. Of concern, in 2010, the failure rate with the Airtraq® VL has been reported to be as high as 20%, in two separate series presented at the SFAR meeting, in the paediatric (3 failures over 16 [3]) as well as in the adult (4 failures over 20 [4]) difficult intubation settings respectively. The way to foresee these failures is not well established yet and the known predictive signs for difficult direct laryngoscopy cannot simply be considered while using a VL. Tremblay proposed a difficult direct laryngoscopy; a high upper lip bite test score; and a shorter neck as measured by the sterno-thyroid distance; as predictors for difficult Glide Scope® aided intubation [1]. The El-Ganzouri Risk Index (EGRI, 0-14) has been suggested to be of interest when the laryngoscopy is performed with the Glide Scope® VL rather than with a conventional direct laryngoscope and in the setting of neurosurgery, the EGRI was considered as a decisional tool by the authors [1]: For an EGRI of less than 7, routine Glide Scope® intubation is attempted in paralyzed patients. Should the EGRI reach 7 or more, conscious FOB intubation is decided [1].

<table>
<thead>
<tr>
<th>El Ganzouri Risk Index for difficult intubation</th>
<th>Points (total : 0 – 14)</th>
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<tr>
<td>Criterion</td>
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</tr>
<tr>
<td>Weight</td>
<td>&lt;90 Kg</td>
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<tr>
<td>Head and neck mobility (flexion/extension)</td>
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<td>Mouth opening</td>
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<td>I</td>
</tr>
<tr>
<td>History of Difficult Intubation</td>
<td>no</td>
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3) Independently of the failures, the VLs also bring their own risks and complications. The major concern is related to the need of a rigid guide along with the VLs lacking an endotracheal tube channel: While advancing blind, from the mouth to the larynx, the tip of the tube mounted over the rigid stylet can cause damage to the soft tissues since it is not constantly monitored on the
Finally, the VLs evidently deserve a place in the difficult airway algorithms but cannot simply be cited as a generic class of devices. With time, more evidence based arguments will be available from the literature to help the clinician to implement the right device at its right place. For instance, the Air Way Scope® may prove useful as a rescue as well as a first line device since nearly no setup time is required with this VL. Conversely, when seconds matter, the setup needed with some other VLs may be considered as a drawback.

The future place of the VLs in the algorithms will also depend on the evolution of their choice by the professionals as the first line tool for intubation in every patient, or at least for every patient in pre-hospital medicine [9], code blue cases, or when the involved physician does not intubate on an everyday basis as in the intensive care and emergency departments [10].

Another important point that has to be taken into account is that the VLs have no oxygenation capability and are therefore unlikely to replace the LMA or ILMA in the airway management algorithms.

In a prospective evaluation of an algorithm in 12,225 patients, the Airtraq® and the C-Trach® LMA were used respectively as first and second line rescues in case of failure of tracheal intubation with a Macintosh laryngoscope combined with a gum elastic bougie. The Airtraq® VL was needed in 29 cases and failed in 5 (17%). All of the 5 Airtraq® failures could subsequently be intubated with the combination of a gum elastic bougie (n=3) or through a C-Trach® LMA [11]. This algorithm has been criticized mainly because of the use of succinylcholine in patients difficult to ventilate and because it was associated with hypoxemia (oxygen saturation measured by pulse oximetry [SpO2] <90%) and severe hypoxemia (SpO2 <80%) episodes in 87 and 17 patients, respectively, despite proper preoxygenation (FET O2 > 90%) [11].

Frova advocates the implementation of the VLs in cases of expected as well as unexpected difficult intubation and proposes a modification of the Italian (SIAARTI) difficult airway management algorithm in this sense [11]. The multimodal approach to difficult intubation, rather than opposing the different solutions to control the airway uses their combination in a synergistic manner. Among these combinations, one of the most interesting is the association of VL and FOB that has been described elsewhere [11]. In this setting, the VL facilitates progression of the FOB by keeping the oral airway open and reducing erratic lateral routes. The double-screen set, allows simultaneous vision of 1) the endoscopic view of the laryngeal structures, and 2) the VL control of the position of the fiberscope in the pharynx and the larynx. This multimodal technique has proven successful in many reports where either the FOB or the VL approach failed when first used alone.

Other innovations may well deserve their implementation in the future revised airway management algorithms. They include a better place for the flexible bronchoscopy since the A Scope® made the access to this technology much simpler; the use of totally disposable laryngoscopes since lethal cross contamination hazard through the reusable handles has been recently described [11]; the use of hybrid devices like the Sensascope® associating a rigid S shaped shaft with a steerable bendable tip; a more liberal allowance for the use of nondepolarizing muscle relaxants since Sugammadex® came on the market.

An important trend has been launched by the ESA with the creation of an European Task Force for the production of guidelines on a supranational basis. This effort has already been successful in the production of the ESA guidelines for preoperative assessment in 2011 [11] and a European airway management algorithm would be welcome.

In conclusion, the needed adaptation of the currently available airway management algorithms is a tough enterprise, far more complicated than the simplistic addition of more VLs. It deserves a deep reflection in order to take in account, at their due places, the really new devices; the new concept of their association; the new data in cross contamination hazard; and the new pharmacological advances relevant in the field.

Theoretical and practical teaching programs. All these new insights in the modern management of the airway deserve their implementation in educational plans, targeting all the involved care providers. Clearly, an efficient algorithm includes, as a prerequisite, good initial and continuous teaching programs which are as mandatory as the availability of the difficult airway trolley: every anesthesia department should offer on a regular basis to all its members the opportunity to attend institutional or non institutional airway sessions. In many departments attendance to such sessions is requested for all the physicians and nurse anesthetists on a yearly basis.

Many workshops sponsored by the industry, are available for the interested professional. On the other hand, the American Society of Anesthesiologists (ASA) and the European Society through the European Airway Management Society (EAMS), as well as the Difficult Airway Society (DAS) in the UK and the Society for Airway Management (SAM) in the USA, offer excellent workshops, well recognized worldwide. These workshops feature, without conflict of interest, the up-to-date...
techniques and scenarios for airway management with the advantage of a selection of the devices and their presentation by the experts of the endorsing organisations.

Simulation plays a major role in this teaching context. Two main types of simulation tools can be described i.e. the micro simulation tools designed for the acquisition of the basic skills and the full scale simulators devoted to the integration of the basic skills in the general management of a constructed clinical situation, including the training for the non technical skills as situation awareness and resource management.

Fiberoptic bronchoscopy (FOB) assisted intubation remains a cornerstone of airway management algorithms. However, this complex psychomotor skill is difficult to learn in the clinical setting. The number of patients with predicted difficult intubation is limited and the new airways devices reduce the need for FOB and so the opportunity to practice the procedure. Learning FOB in normal airway patients is ethically questionable. These reasons contribute to explain why many anesthesiologists may complete their board without enough training in FOB, despite it is paradoxically recognized as a core skill for these specialists. The structured six-part program developed in Canada by Cooper and Lee is aimed at faster and more successful FOB teaching but depends on very dedicated and involved experts [18].

The Virtual Fiberoptic Intubation software deserves a special mention since this self training program runs on all modern personal computers (PC or Macintosh® with a compatibility software) and does not mandate neither a teaching room, nor any manikin, light source, fiberscope nor ancillary equipment.

Moreover once the program has been demonstrated to the student, there is no further need for a tutor to assist the learning process. Finally the VFI program, as other tools, represents a simple and reliable way to integrate the complex procedure of FOB in its three main steps (downwards, upwards and downwards again). According to the concept of part task training [19]. FOB can also be considered as the combination of two single-component tasks: the psychomotor task of advancing the bronchoscope, and the cognitive task of recognising the endoscopic landmarks of the upper airway anatomy. VFI training is directed towards the cognitive anatomical task only but it has been shown that focusing on only one out of the two components of the FOB task was sufficient to improve the global performance of the trainees.

After the initial learning process, VFI may also be helpful in assessing proficiency, and later play a key role in the maintenance of the acquired skills through self-directed deliberate practice. This may prove useful for senior as well as for junior healthcare professionals, since FOB is a rather uncommonly occurring event for the vast majority of the practising anaesthesiologists.

Disclaimers

The VFI software was developed by the ‘Institut de Recherche contre les Cancers de l’Appareil Digestif’ (IRCAD), Strasbourg, France in partnership with the Hautepierre Department of Anesthesiology and Surgical Intensive Care, University of Strasbourg, France, without any financial support. KarlStorz GMBH (Tuttlingen, Germany) distributes the VFI CD free of charge. KarlStorz GMBH was not consulted and did not financially support the development of the software. There is no conflict of interest between IRCAD and the Hautepierre Department of Anesthesiology and Surgical Intensive Care, Strasbourg, France.

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Retrograde tracheal intubation

Dr Sasanka S Dhara
Hobart, Tasmania

Intubation of the trachea over a guide introduced in a retrograde manner through a subglottic point and brought out through the mouth or nose is popularly known as retrograde intubation. It is better described as guided blind or trans laryngeal guided intubation as the tracheal tube is still passed through the usual antegrade way.

The first report (Butler & Cirillo, 1960) of retrograde intubation had the description of railroading a tracheal tube over a guide placed through a pre-existing tracheostomy into the trachea.

Numerous modifications to the original technique (DJ Waters, 1963) of guided blind intubation over a thin guide introduced through a needle in the cricothyroid membrane had been practiced with success for almost 50 years. There are many variations to the basic technique to enhance reproducibility of this guided blind procedure.

Retrograde intubation may be done using only the retrograde guide, or over an anterograde guide interposed over the retrograde guide. The technique changes from guided blind to visual when a fibreoptic scope is used as an anterograde guide.

Some of the steps for retrograde intubation like application of local anaesthetics to obtund airway reflexes, conscious sedation, needle cricothyrotomy and guided blind intubation over an introducer are familiar to all trained anaesthetists. The steps that need to be learnt and understood are needle cricothyrotomy in cephalad direction, placing a retrograde guide along the oral or nasal route and making use of the retrograde guide to intubate the trachea.

There are advantages of using a lower point of subglottic puncture at the cricotracheal space or even at the space between the first and second tracheal rings. It allows deeper insertion of the tracheal tube inside the airway, preventing accidental dislodgement during removal of the retrograde guide. More space is also available inside the airway anterior to the retrograde guide helping smooth progress of the tracheal tube down the upper airway.

To be able to place a retrograde guide along a path of choice is central to the technique. Various ways to get it right are simple manoeuvres inside familiar anatomy.

Throughout the procedure close vigilance is necessary for immediate detection of a step not going right. Valuable time may otherwise be lost and the procedure be started all over again. This may be dangerous particularly in patients with compromised oxygenation.

Use of an anterograde catheter over the thin retrograde guide is very useful for guiding a tracheal tube over it. The universal principles of guiding a tracheal tube over an introducer should be strictly followed.

The retrograde intubation technique has been used successfully both in anticipated and unanticipated difficult intubation in adults and in children. It can be done as an awake technique in co-operative adult patients. It has been done in patients with blood or secretions in the airway or with an immobilized neck. Time taken for the procedure is short.

Complications associated with the technique are not life threatening and are self-limiting.

Retrograde intubation has been included in several airway management algorithms and also in the curriculum of RCA and ANZCA. Teaching and training on the technique are not common but when done, confidence to execute and retention of skill are good.

Early application of retrograde tracheal intubation technique may prevent hypoxia, airway trauma, open cricothyrotomy or tracheostomy anywhere in the world.

References
Video-laryngoscopy

Dr Pierre Bradley

Chair of Airway Management Special Interest Group
VMO Specialist Anaesthetist, The Alfred, Melbourne, Victoria, Australia
Adjunct Senior Lecturer, Academic Board of Anaesthesia and Perioperative Medicine, Monash University

Over the last few years’ video-laryngoscopes (VLs) have becoming more readily available in private and public hospitals. There is a vast array of different devices which have different learning curves to be able to optimal use them. The evidence for some is strong, whilst for others the evidence is lacking. However their role in training, difficult airway cases and as rescue devices is becoming more supported in the literature. Certain types of “difficult airway blades” offer benefits over the standard Macintosh or Miller intubation for the difficult airway, whilst other blades are more useful to optimize the learning experience of the trainee or allow the anaesthetic assistance to optimize the view with BURP. It is this author’s view that all difficult intubation trolley’s or intubating areas such as the Emergency Department and Intensive Care should have a videolaryngoscope available to them.

This session will discuss the range of devices available, their role in different situations and provide some guidance about which type of device, an individual or department should consider based on the current literature.
Cardiac CT scanning in anaesthetics

Dr Warwick Bishop
Cardiologist, Hobart, Tasmania

This session will give a brief overview of the technology and ‘appropriate use’ guidelines; there will then be cases, pictures and discussion.
Antibiotic prophylaxis – dispelling the myths

Dr Tara Anderson
Infectious Diseases Physician and Clinical Microbiologist, Department of Infectious Diseases and Microbiology at the Royal Hobart Hospital, Hobart, Tasmania

Surgical antimicrobial prophylaxis (SAP) has become a component of the standard of care for the prevention of surgical site infections for certain surgical procedures. One-third to one-half of antimicrobial use in hospitals is for SAP and studies have shown significant levels of inappropriate SAP particularly in relation to the timing and duration. During this session, an overview of SAP will be provided which will encompass the evidence supporting SAP, current recommendations and contemporary antimicrobial stewardship issues.
What, why, when, who, how and holes of peri-operative medicine: A peri-operative physician’s perspective

Assoc. Prof. Robyn A Wallace

School of Medicine, University of Tasmania, Calvary Health Care Tasmania, Tasmania

Peri-operative medicine is about providing dedicated medical care of the surgical patient, in elective and emergency situations. The process starts with a pre-operative biopsychosocial medical assessment once a need for surgery is indentified. This aspect of the service describes current medical status, optimises pre-operative medical state, and highlights vigilance for possible post-operative medical problems. The evaluation is shared with members of the patient’s team including surgeon, anaesthetist, ward staff, and their general practitioner. Daily post-operative ward rounds diagnosing, managing and preventing medical complications until the patient is medically stable also comprise the peri-operative medical service. An essential component of a peri-operative medical service in the hospital setting is that this is the only focus of the attending physician.

There is an increasing need for peri-operative medical services. As life expectancy has increased, older patients are being referred for surgery electively and also presenting with acute surgical problems. Older patients tend to have more medical co-morbidities, and less reserve to cope with the physiological impacts of surgery. An abundance of published data confirm that these patients, in particular, are prone to increased medical morbidity and mortality as a result of operations. The type of surgery, for example, emergency gastrointestinal or cardiovascular, also contributes to higher medical complications in the post-operative period.

Most studies looking at the impact of peri-operative medicine, across a range of surgical disciplines, show a reduction in peri-operative morbidity and mortality, with no or reduced hospital costs.

Not every patient undergoing surgery needs to be referred to a peri-operative medical service. Younger patients with no medical co-morbidities, or patients having day surgery procedures, for example, generally do not require referral. Common sense plays a role. Unnecessary referrals can increase patient stress, and add an unnecessary element of chaos to their inpatient care.

Any member of the at-risk patient’s team: their GP, surgeon, anaesthetist can make the referral to a peri-operative service. In the hospital setting, the main active co-clinicians with the physician are the surgeon and anaesthetist. Working successfully as a team requires good communication, basic politeness, and respect for one another’s discipline, knowledge of the demarcation where one’s skill starts and finishes. There will be, at times, genuine conflict between these clinicians over what comprises the best interests of the patient. Also having several clinicians looking after a single patient can create logistical difficulties for staff, such as who to call in an emergency. For these reasons, it is likely best to allocate a role of ‘team leader’ to the surgeon.

A dedicated hospital-based peri-operative medical service is sustainable in both private and public hospital settings. This practically means a quicker response to ward events, a familiar medical presence on surgical wards leading to infiltration of good medical practice for all patients, and the concept of ‘disease-specific physician experience’. This latter concept is analogous to the idea that surgeons who perform high volumes of types of operations have better outcomes than those who do low volumes.
Institute for Marine and Antarctic Studies (IMAS), University of Tasmania: A (James) Cook’s tour

Prof. Mike Coffin
Executive Director, IMAS, Hobart, Tasmania

Australia’s marine jurisdiction is the third largest in the world, representing ~4% of the global ocean, and Australia claims 42% of Antarctica. More than 80% of Australia’s population lives within 50 km of the sea and marine economic activity (2008–2009) is valued at $44 billion, 4% of national GDP. It is of vital national interest to understand and sustainably manage our precious ocean resources.

Australia shoulders significant responsibility for environmental stewardship of the Australian marine realm and Antarctica, among Earth’s most pristine areas. The ocean and Antarctica are embedded in the Australian psyche, and the combination of the two nowhere more so than in Hobart, a major world centre of polar and temperate marine science, home to a major aquaculture industry, and the point of departure for many Southern Ocean and Antarctic expeditions since the early 1800s.

The Hobart region’s global eminence in marine and Antarctic science has emerged over the last few decades, despite considerably older roots, through fortuitous colocation of state and Commonwealth researchers. The University of Tasmania (UTAS), established in 1890, is the oldest of the three major entities in greater Hobart pursuing polar and temperate marine research. The Australian Antarctic Division (AAD), a government agency, mostly moved from Melbourne to Kingston, just south of Hobart, in 1981. AAD’s glaciology group transferred from Melbourne to the University of Tasmania in 1992. The predecessors to the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Marine and Atmospheric Research division began moving from Cronulla, New South Wales, to Hobart in 1982. In 2010, UTAS established the Institute for Marine and Antarctic Studies (IMAS).

Together, AAD, CSIRO, and UTAS have approximately 1000 staff and graduate students investigating marine and Antarctic environments, and the three organisations have strong strategic alliances. Such a thematic critical mass exists nowhere else in the Southern Hemisphere, and in only a few places in the Northern Hemisphere. As one example of Hobart’s role at the forefront of some of the most pressing contemporary societal challenges, three coordinating lead authors of the current Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report are based in Hobart, more than from any other city around the world.

Australia’s recent proclamation of the Seas and Submerged Lands (Limits of Continental Shelf) Proclamation 2012 confirms 2.56 million square km of seabed – extended continental shelf – where Australia has exclusive rights to explore and exploit marine resources. This coincides with Commonwealth investments of $387.7 million in marine and climate science, including investments in Hobart of $45 million (IMAS), $120 million for the new blue-water research vessel Investigator that will be based in Hobart, $52 million for Australia’s Integrated Marine Observing System, and $1.8 million for the Australian Ocean Data Network. This new infrastructure is providing data streams that together constitute a quantum leap for the Hobart and greater Australian marine and Antarctic research community.

Environments on Earth are changing, and Australia, Tasmania, the Southern Ocean, and especially Antarctica are in flux, demanding that we prepare for a different future. Researchers in Hobart are working assiduously to address the major questions in marine and Antarctic science, particularly living marine resource research and climate studies, through new collaborations, novel interdisciplinary investigations, and intellectual vigour. In particular, IMAS is poised to place UTAS in the globally distinctive strategic position of being identified as a world leader in temperate marine through Antarctic academic research and education.
Tasmanian poppy industry

Mr Rohan Kile
Head of Crop Supply, GlaxoSmithKline, Tasmania

Poppy has been grown for centuries as a source of pain relief. The Ancient Greeks realised the medicinal properties of the poppy plant via the alkaloids it contained. The word morphine, one of the many opiates found in poppy, derives its name from Morpheus the Greek God of dreams.

Though the Ancient Greeks and primal cultivation of poppy seems a world removed from the modern industry practiced today the medicinal properties of naturally occurring alkaloids found in poppy remain constant. Tasmania now produces approximately half the world’s licit opiate products.

GlaxoSmithKline is a global pharmaceutical company with a large presence in the opiates industry. 100% of opiate primary production for GSK is undertaken in Australia and in particular Tasmania. GSK undertake growing and initial processing of the crop in Tasmania and extraction of different opiates at Port Fairy in Victoria.

Prior to the Second World War, the world demand for legal opiate material was primarily met by production from Turkey.

Post war, British pharmaceutical companies began exploring alternative sources for the supply of opiates, given that the traditional supply arrangements from Turkey had dried up both practically and politically.

The UK was trialled however due to an unsuitable climate failed. Post-war Europe lacked the political and economic stability to establish a secure and reliable opiates industry and thus the wider search began.

British pharmaceutical, The Glaxo Group, embarked on a program to identify the most suitable growing climate, soils and political structure to reliably produce a volume of opiate material.

Mr Stephen King (an agriculturalist employed by the Glaxo Group) came to Australia and New Zealand looking for such a place. Having been turned away by Victorian Government Department of Agriculture, Stephen had a few days in his calendar and decided to visit Tasmania.

Tasmania now produces 50% of the world’s licit narcotic raw material which is used in a wide range of pharmaceutical products for pain relief, cough and anti abuse medications.

From these early days to current, GSK has driven the poppy industry in Tasmania through investment in research and development, improved cultivation techniques and increased productivity. Today GSK supply approximately 25% of the world’s opiate demand from Tasmanian production. During this time GSK have achieved a 5 times increase in alkaloid levels within the poppy plant and continue to lead the industry in genetic research and field based R&D through its own investment and collaborative research projects with York University.

The world demand for traditional opiates, such as morphine, continues to grow with an expanding global middle class, while newly discovered opiate molecules are developing new markets in an ever expanding world of pain relief, anti abuse medication and cough suppression.

The challenge for Tasmania is to continue to meet these new and emerging markets.
How the devil did it happen? The Tasmanian devil facial tumour disease

Assoc. Prof. Greg Woods
Principal Research Fellow, Menzies Research Institute Tasmania, Hobart, Tasmania

The Tasmanian devil (*Sarcophilus harrisii*) is the world’s largest living marsupial carnivore. Devil facial tumour disease (DFTD) was first noticed in 1996. DFTD is a transmissible cancer, which has spread throughout more than three quarters of the state and has killed approximately 80% of the devil population. The devil’s immune system fails to recognise foreign DFTD cancer cells and no devil with DFTD has survived.

Evidence that the tumour cell is the agent of infectivity has been provided by karyotypic, microsatellite and genetic analyses that have demonstrated that the genetic material within DFTD is different from the genetic material of the host devil. In the wild DFTD is transmitted from devil to devil through the process of biting. Devils have the ability to inflict serious bites on the faces of each other and in this process a few DFTD cells from diseased devils can be inoculated into the wound.

Histologically, the DFTD lesion is well vascularised and consists of pleomorphic round cells with a high nuclear to cytoplasm ratio. Metastases are common. Transcriptome and immunohistochemistry analyses indicate that it is a cancer of Schwann cells. Periaxin provides an ideal marker for identifying this cancer from other skin lesions.

Analysis of the devil’s immune system has revealed that the Tasmanian devil has a fully competent immune system that should respond to ‘foreign’ cells. Lack of major histocompatibility complex (MHC) diversity may allow the cancer cells to grow in genetically similar hosts without evoking an immune response to alloantigens. To evaluate the severity of this we conducted mixed lymphocyte reactions and skin grafts. The limited MHC diversity was sufficient to produce measurable mixed lymphocyte reactions between some animals. All of the successful skin allografts were rejected within 14 days after surgery, even though little or no MHC I and II mismatches were found. Extensive T cell infiltration characterised the immune rejection. A lack of functional allorecognition mechanisms in the devil population does not explain the transmission of a contagious cancer. It would therefore appear that there is something unique about the DFTD tumour that allows it to be undetected by the devil’s immune system.

Preliminary results indicate that the DFTD tumour cells down regulate immune recognition genes and are therefore ‘invisible’ to the devil’s immune system.

It is still unknown ‘how the devil it happened’. Incredibly, one cell in one female devil, sometime in the early 1990s, developed into a malignant Schwann cell cancer. This cell has now clonally expanded amongst hundreds of unsuspecting devils and has shown no signs of abating. Without human intervention the only way that DFTD can be eliminated is through the loss of the host species. Extinction of the Tasmanian devil is not an option and the Save the Tasmanian Devil Program has developed a number of strategies to protect this species, including the establishment of a successful ‘Insurance Population’. Our own research is working toward a vaccine and we now have evidence that under the right conditions, the immune cells of the Tasmanian devil can respond to DFTD cancer cells.
Dying safely

Prof. Ken Hillman
Professor of Intensive Care, Liverpool Hospital, University of New South Wales; Director of The Simpson Centre for Health Services Research, affiliated with the Australian Institute of Health Innovation, University of New South Wales

While the majority of Australians express the wish that they would like to die in their own home, most will die in institutions. While acute hospitals are increasingly managing end-of-life (EOL) and many of those patients are admitted to our ICU the reasons why this is occurring are many. They include access to ambulance services which takes the patient to the nearest emergency department (ED); pressures in the ED make it easier to admit patients into the hospital rather than find them more appropriate places of care; the expectations of society about modern medicine are often unreal; there is a reluctance by the medical profession to discuss death and dying; and increasing medical specialisation often means that the big picture is not recognised and the diagnosis of dying not met. Unfortunately, hospitals are dangerous and inappropriate places for caring for patients who are dying. They concentrate on cures rather than EOL care. Increasingly, the dying process has become medicalised and we have not discussed the issues around EOL care in an honest and transparent way with our society. Moreover, many of our medical colleagues do not fully understand what we can and cannot do in intensive care and increasingly refer patients inappropriately when they are dying. It is the responsibility of the medical profession, especially intensive care specialists, to encourage dialogue and debate around these issues.
'Healthy' dying: Better care and decision-making at the end of life?

Prof. Michael Ashby
Royal Hobart Hospital and University of Tasmania, Hobart, Tasmania

There is an ongoing global conversation about death and the process of dying. Despite half a century of clinical, academic and public policy activity by specialist palliative care workers, and by many others including health administrators, academics, artists and writers, it is still common to hear the same issues recycled with the oft-repeated comment that we ‘do not do this well’. Clinicians still struggle with treatment abatement decisions and issues related to causation and responsibility for death. The pathways to death are changing as described in Lynn’s model, with increasing numbers of people dying in old age, slowly over one to two years, with multiple co-morbidities, high incidences of dementia, and more significant medical decision points. The public often have expectations of curative capacity that exceed reality (fed by a technically optimistic health industry) on the one hand, and exhibit widespread concern about bad dying on the other. Kellehear has challenged the over-medicalisation of dying and proposed a health-promoting palliative care approach of community engagement. This paper draws on the author’s experiences in Tasmania of delivering clinical palliative services at the same time as attempting to bring about enduring changes in preparation for death both inside the health sector and in the wider community.

References


The big picture?

Rev. Prof. Michael Tate
Roman Catholic Parish of The Holy Spirit, Sandy Bay, Tasmania

The bedrock social value presently endorsed by Parliament in the Criminal Code is that no person should take the life of another person who is not attempting to lethally harm them. The operation of the Code is modified by various agencies in society such as the DPP exercising the discretion to prosecute, the jury in deciding whether to find the accused guilty, and the Judge in determining the sentence. At each stage, there is capacity to distinguish along the spectrum from spousal compassion to murder masquerading as euthanasia.

Society should not alter the delicate balance between the Parliament, the DPP and the courts in order to deal with wrenching cases. To allow those cases to motivate exemptions in the Code for direct killing or assisting suicide would be to change a core value which is now finding belated recognition in another area of law, namely in the work of the International Criminal Court.
Chronic neuropathic pain syndromes following frostbite injury – successful treatment with hyperbaric oxygen

Dr David Cooper
Royal Hobart Hospital, Hobart, Tasmania

Localised cold injury with tissue freezing (frostbite), once primarily a wartime or military affliction, is increasingly seen in civilian life secondary to the growing popularity of ‘adventure sports’ amongst the affluent, and increasing incidence of homelessness at the other end of the socio-economic spectrum. Chronic sequelae – including sensory changes and chronic pain states – may be present in up to 25% of the population so affected, and may persist for years. The costs to both society and the individual of the resulting disability can be significant.

Although the acute frostbite injury can be safely classified as one of the ‘acute traumatic peripheral ischaemias’ (ATPIs) for the purposes of emergent management with hyperbaric oxygen therapy (HBOT), the pathophysiology of the long-term sequelae appears to be that of chronic microvascular inadequacy. Although never previously investigated this microvascular inadequacy could theoretically benefit from HBOT. A series of four cases with chronic neuropathic pain syndromes persisting years after the initial injury and successfully treated with late HBOT will be discussed. Objective data including transcutaneous oximetry (PtcO2), quantitative sensory testing (QST) and thermography, together with visual analogue pain scores and medication diaries will be presented.

Significant benefit in the measurable objective physiological parameters was observed in three out of four cases, together with improved quality of life. Possible reasons for the lack of apparent benefit in the fourth case will also be discussed.
Treatment options for late soft tissue radiation injury – a systematic review

Assoc. Prof. David Smart
Department of Diving and Hyperbaric Medicine, Royal Hobart Hospital, Hobart, Tasmania

Introduction
Late soft tissue radiation injury (LSTRI) is a distressing complication experienced by a minority of individuals who successfully recover from radiation treatment for cancer. It causes considerable morbidity for affected individuals when healthy adjacent tissue is sometimes damaged in the process of treating cancer with radiotherapy.

Aim
This review aimed to identify the various surgical and non-surgical treatments (including HBOT) for LSTRI and evaluate the evidence for their efficacy, using a hierarchy of evidence as described by the NHMRC.

Methods
A broad search strategy was applied to identify all papers associated with the treatment of LSTRI since April 1984. The search strategy identified randomised and pseudo-randomised controlled trials (RCT’s), comparative trials and prospective case series with consecutive enrolment that compared the effect of any treatment on any form of LSTRI, (as defined below), with any other treatment including placebo. All treatment interventions for LSTRI that satisfied trial design were included in this review. LSTRI was defined as ‘all adverse effects of radiation affecting tissues other than bone, commencing greater than one month after completion of radiotherapy’. HBOT was defined as ‘administration of 100% oxygen in a recompression chamber at pressures of 1.5ATA to 4.0ATA (154–405 kPa) and treatment times between 30 and 120 minutes daily or twice daily’. The following databases were searched: CENTRAL (The Cochrane Library April 2009), MEDLINE (1984 to April 2009), EMBASE (1984 to April 2009), CINAHL (1984 to April 2009), the Database of Randomised Trials in Hyperbaric Medicine (Bennett 2004) and Google Scholar. In addition we made a systematic search for relevant controlled trials in specific hyperbaric literature sources. Hand search also was undertaken of relevant hyperbaric textbooks published since 1984.

Results
The review identified only 28 high-level research studies of soft tissue radiation injury treatment (including surgical intervention), that demonstrated positive outcomes for patients. The treatments included acupuncture, aspiration, fenestration, myringotomy and grommets for LSTRI of middle ear, resistance training for accessory muscle weakness, mechanical massage for chest wall fibrosis, acupuncture, gel products, fluoride and pilocarpine for xerostomia, surgical treatment of carotid blowout syndrome, intravesical placental extract, flavoxate and formalin for radiation cystitis, sucralfate, hydrocortisone, heater probes, argon plasma coagulation, short chain fatty acids, metronidazole and anti-inflammatories for radiation proctitis, alpha tocopherol for cerebral LSTRI, latissimus dorsi flaps for chest wall LSTRI. HBOT showed positive benefit for tooth socket healing, surgical flap repairs in the head and neck, xerostomia, chest wall injury, head and neck radiation injury, pelvic radiation injury, radiation proctitis and cystitis. Meta-analysis and cost-effectiveness analysis of HBOT for radiation proctitis indicated that it is clinically effective NNT = 3, OR 1.45 (Range 1.18-1.78), and cost effective with a saving of $728 AUD per patient treated in the first year.

Conclusions
The paucity of published research indicates the rarity of LSTRI and also how difficult it is to undertake quality research. Treatments tended to be highly anatomically specific and not comparable with each other. The only treatment intervention with sufficient data to allow meta-analysis has been HBOT. A consistent finding when HBOT has been used as a treatment intervention is a positive influence on wound and mucosal healing, and a positive benefit when used in support of other treatments, such as surgical intervention. HBOT has proven a clinically effective and cost effective intervention for STRI.
Screening diving candidates for cardiac disease

Associate Professor Simon Mitchell

Cardiac events are responsible for a significant proportion of recreational diving fatalities. It seems that our current systems for selecting suitable recreational diver candidates and for longitudinal monitoring of diver health are failing to exclude some divers at high risk of cardiac events. Based on review of practice in parallel sporting disciplines and of the relevant literature, a series of recommendations for screening questions, identification of disqualifying conditions and risk factors, and investigation of candidates with risk factors was recently drafted. Recommendations for on-going health monitoring in established divers were also generated. These recommendations were promulgated and debated among experts at a dedicated session of the Divers Alert Network Fatality Workshop held at Durham, USA in 2011. This resulted in a proposal for a modified list of screening questions for cardiovascular disease that can be incorporated into health questionnaires administered prior to diver training. This list is confluent with the American Heart Association (AHA) pre-participation screen for athletes. There was also a consensus that the exercise stress ECG is a relatively cheap and accessible test for inducible cardiac ischemia, and has the added benefit of measuring exercise capacity. It remains the most practical tool for evaluating diver candidates or divers with risk factors for coronary disease. An exercise capacity that allows for sustained exercise at a 6 MET intensity (possibly representing a peak capacity of 11-12 METS) is an appropriate goal for recreational divers.
Iatrogenic arterial gas embolism

Asst. Prof. Paul L. Claus
Mayo Clinic, Rochester, Minnesota, USA

Arterial gas embolism (AGE) in the medical setting unrelated to decompression illness of diving is well recognised. There have been numerous published case reports describing a wide variety of scenarios by which gas has been introduced into the circulatory system with subsequent morbidity primarily due to neurologic sequelae. A large number of these cases are iatrogenic and subsequent to established and widely practiced medical/surgical interventions. This presentation will begin with a discussion of the pathophysiology of AGE and the rationale for its primary treatment with hyperbaric oxygen therapy (HBOT). AGE's features when related to diving vs. occurrence in a medical setting will be contrasted. Mayo Clinic's early experience in treating medical related AGE during its first four years of a newly established hyperbaric medicine program as well as published cases series from other major referral institutions will be presented. Relative incidence in the medical setting as well as factors effecting treatment outcomes will be explored. This will include barriers to: 1) early recognition of AGE in the medical setting, 2) referral of suspected AGE cases for hyperbaric oxygen therapy (HBOT) and 3) hyperbaric medicine facility availability and readiness for delivering rapid treatment to potentially unstable and medically complicated patients.
Don’t be afraid of the stock market!

Mr Michael Bailey
Investment Specialist, Sydney, New South Wales

The stock market turbulence of 2008-12 in Australia and around the world has had the effect of frightening investors both young and old into changing their long-term retirement strategies, often in favour of term deposits or other ‘safe’ cash investments. While this may provide comfort and reassurance during volatile times, it may not be the best strategy for long-term saving.

For many of us however, ‘long-term’ is much longer than is generally appreciated. After all, retired years can typically be 20, 30 or even 40 years. For younger investors, long-term is usually even longer.

In order to accumulate and maintain sufficient capital to provide a desired level of income during these long periods of retired years, our capital must be given the opportunity to grow through time. Only investment portfolios with exposure to growth assets (eg shares) can increase in value – ‘safe’ cash does not grow, but simply maintains its value and pays a modest rate of interest.

Why then do we worry so much about the recent stock market down-turn when research clearly shows that shares fall regularly? Over the past 100 years for example, the Australian stock market has shown a negative one-year return about 1 year in 5 on average – that means shares have appreciated 4 years in 5 (on average)! In more recent times negative years have been slightly more frequent at about 1 in 3 or 1 in 4.

If this 100-year history repeats itself (investors should remember that there have been any number of ‘disasters’ during this period), ‘growth’ portfolios with a diversified mix of assets such as Australian shares, global shares, bonds and property held for the long term will provide very satisfactory above-inflation returns, provided they are given time to do so.

Events such as world wars, oil shocks, recessions, GFCs, currency crises, etc. have all created environments into which investors have been reluctant to invest and yet all these events have been followed by periods of considerable stock market growth.

Stock market movements that are so negatively reported in newspaper headlines are understandably scary when viewed from a short term perspective – the long-term picture is far happier.

Michael Bailey has developed a series of presentations which will provide renewed confidence to nervous long term investors.
Investing in 2012 – the new balance

Mr James Kirby

- Earlier this year AIBM the company founded by James and his colleagues Alan Kohler and Robert Gottliebsen was sold to News Ltd. James is also a regular guest on ABC and Sky Business.

Presentation
James will be speaking on the outlook for private investors in the Australian market in the months ahead. His presentation will particularly focus on the sharemarket and key indicators for residential property prices. James presents an engaging birds-eye-view of the wider investment markets that is accessible to investors at all levels. Among the key themes in his presentation is the impact of China on our economy, the longer term outlook for share prices and the prospects for housing valuations.
The practice of regional anaesthesia in children has broadened considerably in the last 10 years, in respect to both the different types of regional techniques performed in children, and to the age range of children in which blocks are performed. In addition to the many skills required to safely anaesthetize children, having an in-depth understanding of the challenges involved in performing regional anaesthesia in infants and children allows anaesthetists to provide children the benefits that regional anaesthesia offers over systemic methods of intra- and post-operative pain relief.

This presentation will explore the following questions:

What are the benefits of regional anaesthesia in children?
Poorly treated pain has deleterious physiological effects on children, and the psychological trauma of post-operative pain can stay with a child, resulting in long-lasting adverse neuro-behavioural effects. A calm, co-operative child is easier to nurse than a child who is crying and writhing in pain. Modern regional anaesthesia allows many surgical procedures to be performed as day cases, which has obvious economic benefits, as well as avoiding the potentially unpleasant experience to children and their parents of a hospital admission. The placement of peripheral nerve catheters facilitates prolonged analgesia, thus avoiding the limited duration of action of single-shot regional techniques.

Is regional anaesthesia different in children?
Before the advent of ultrasound-guided regional anaesthesia, many regional techniques in adults relied on body surface measurements to mark the insertion point of nerve stimulator needles. This made it difficult to successfully adapt many techniques, as described in adults, for use in children. Ultrasound-guided regional anaesthesia is arguably easier to perform in children, because the nerves lie closer to the skin than in adults.

Neuraxial blocks rarely result in hypotension in children below the age of about six years, allowing large volumes to be administered via a caudal block to achieve good epidural analgesia, often for day-case procedures.

Pharmacologic differences between children and adults necessitate careful dosing of local anaesthetics in order to avoid local anaesthetic systemic toxicity (LAST). Thorough knowledge of the treatment of LAST is a prerequisite for every anaesthetist performing regional techniques in children.

Is it safe to do regional anaesthesia in children?
In choosing regional anesthesia, the risks and benefits of the technique must be weighed against the risks and benefits of other forms of analgesia. Large prospective studies, such as the national epidural audit in the UK1, the ADARPEF survey in France2, and the PRAN in the USA3, have shown that the morbidity related to regional anaesthesia in children is low - approximately 1:1000 overall. Infants and neonates carry a slightly greater risk of complication, and these age groups should therefore remain the domain of practitioners experienced in paediatric regional anaesthesia4. With the advent of ultrasound-guided nerve blocks, together with ongoing improvement in equipment for use in children, meticulous attention to detail, careful monitoring, and regular audit, the safety of regional anesthesia in infants and children will continue to improve and more children should benefit.

References
Acute postoperative pain management in children

Dr George Chalkiadis
Royal Children’s Hospital, Parkville, Victoria

How much pain and for how long?
Anaesthetists are responsible for the prescription of analgesia following surgery. An appreciation for how much pain a child will experience after a certain operation and for how long, is required to prescribe adequate analgesia in the immediate postoperative phase, and for discharge. There is little published evidence to guide this prescription. The evidence for three common procedures, tonsillectomy, inguinal herniorraphy and orchidopexy will be discussed.

Pain assessment
Assessment of pain is important. Young infants and children and those with cognitive impairment are not capable of self-report. Alternatives will be discussed.

Older children with normal cognition are however, capable of self-report. It is important that pain is assessed as the 5th vital sign at rest and after movement. More importantly, the anaesthetist should ensure a plan to address inadequate analgesia is in place.

The timing of analgesia administration prior to physiotherapy is important with regards optimal pain management.

Multimodal analgesia includes the regular administration of paracetamol and ibuprofen. If required an opioid, clonidine, ketamine and tramadol are prescribed. Local anaesthetic techniques including peripheral nerve, epidural or intrathecal analgesia and wound catheters will also be addressed.

Other factors needing consideration include if a child can swallow tablets especially when slow release opioids are indicated.

Development is also an important determinant of whether children are capable of using PCA devices. The timing of analgesia

It is important to prescribe adequate analgesia following discharge. Some ‘tricks of the trade’ to determine this and the negative consequences of not doing so are discussed.
What is emergence delirium?

Assoc. Prof. Andrew Davidson
Royal Children’s Hospital, Melbourne, Victoria

A paediatric recovery room is not always a quiet and peaceful place. In spite of our best efforts, a substantial proportion of children are agitated and distressed after anaesthesia. This may be manifest as crying, screaming, thrashing limbs, throwing off covers, pulling at bandages and generally uncooperative behaviour. Not only is it inherently humane to aim to reduce such distress, it is also important to reduce the agitation to prevent self injury and to allow the child to be monitored.

There are many reasons why children are agitated after anaesthesia. They may be in pain, scared, cold, disoriented, thirsty, hungry, uncomfortable due to dressings or casts, missing their parents or just plain angry. There may be more than one reason. The frequency of such agitation varies. Studies have quoted incidences from 5% to 80%. This variation is due to differences in procedures, ages and how the agitation is measured. A number of different scales have been developed to measure emergence agitation. Determining the cause may also be difficult, particularly in a child that will not, or cannot tell you the cause for their distress. Pain is probably the most common cause for agitation; indeed scales developed to measure emergence agitation are very similar to those that measure pain. A child who scores high on a pain score will score high on an agitation scale, and vice versa.

In some ways, trying to differentiate pain from agitation is an irrelevant exercise. It is obvious when a child is agitated and what is important is that there is a logical approach to the problem that explores all the possible reasons for agitation. For example if the child says they are in pain then give them analgesia, if the child is not coherent and they could be in pain then give them analgesia. At the same time allow the parents to try and console the child, give them a drink if they are thirsty etc.

A small proportion of agitated children have a true delirium. The standard diagnostic criteria for delirium are a disturbance in consciousness or awareness (demonstrated by a reduced awareness of the environment and an inability to focus attention) associated with changes in cognition (such as disorientation) or perceptual disturbances. In the context of post operative emergence delirium the delirium is usually associated with a motor component such as restlessness or thrashing. In some cases it is difficult to determine if the agitated child has a true delirium, though an experienced observer can more often than not make the diagnosis. Typical features are a child that cannot be consoled, a child that does not make eye contact and will not respond. A typical response from the parent is ‘this is not my child’ or ‘I cannot get through to them’. Such delirium may last up to 20-30 minutes and is self limiting. Delirium is important as it is very difficult to treat effectively; analgesia usually is ineffective (see below), consolation is ineffective and sedation may make the delirium worse.

The true incidence of emergence delirium is difficult to determine as scales used to measure it are poor at differentiating delirium from agitation. The PAED scale is the most widely used scale which makes an attempt to specifically diagnose delirium, but even this scale has elements that result in a high score with non-delirious behaviour (such as pain). Recently another scale was developed which has a greater focus on delirium however this scale has yet to be fully validated.

Just as the incidence is unclear, the causes of delirium are unclear. Anecdotally delirium occurs predominantly in preschool children and occurs in perhaps 5% of such cases. There is a great deal of work trying to identify which agents are more likely to cause delirium. It can occur after procedures where there are no painful stimuli; however there is some evidence that in some cases pain may precipitate delirium.

Interestingly emergence delirium has a very similar appearance to night terror. Night terror occurs in preschool children, lasts up to 20-30 minutes, is self limiting and characteristically the child is inconsolable and the parents ‘cannot get through to them’. Night terror occurs when some children are aroused from nonREM sleep. Recently we have found that the EEG pattern in children emerging from anaesthesia that then develop typical emergence delirium is very different to the EEG pattern in children emerging peacefully from anaesthesia. Intriguingly the EEG in those that develop emergence delirium is similar to that of nonREM sleep. Thus it’s possible that true emergence delirium is a diarousal phenomenon that could have underlying mechanisms similar to that of night terror.

Sevoflurane: Taming the agitation

Dr David Costi

Women’s and Children’s Hospital, Adelaide, South Australia

Although the phenomenon of emergence agitation (EA) is widely recognised by those who anaesthetise children, research into the prevention of EA is complicated by numerous factors, particularly the lack of a uniform definition. The term emergence delirium (ED), although frequently used interchangeably, is probably a subset of EA. Recent research would suggest that true delirium occurs in a relatively low proportion of all cases of EA. The incidence of EA in children after sevoflurane anaesthesia is reported to be as low as 5% and as high as 80%. Risk factors for EA in children have been reported to include sevoflurane or desflurane anaesthesia and younger age, however the precise aetiology is unknown.

The use of different measurement scales in randomized controlled trials (RCTs) together with the wide variation in procedure type (various surgeries and MRI), analgesia (minimal/none, potent opioids, regional blocks) and use of premedication complicate this issue further.

Despite these limitations, a group of researchers from our institution have undertaken a Cochrane systematic review of RCTs (with meta-analysis) looking specifically at sevoflurane anaesthesia in children (currently unpublished). Data is presented from our new Cochrane review summarising 160 RCTs published up to December 2011.

Strategies studied to reduce the rate of EA associated with sevoflurane anaesthesia broadly fall into two groups:

1. Substituting sevoflurane for another anaesthetic agent (IV or inhaled) at induction, during maintenance or throughout both phases of anaesthesia
2. Use of an ‘adjuvant’ with sevoflurane anaesthesia.

It is beyond the scope of this abstract to list references to all of the RCTs analysed but a summary of our findings with risk ratios (RR) and 95% confidence intervals for the more common interventions follows.

Substituting sevoflurane:

Halothane (32 RCTs) reduces the rate of EA by about half [RR 0.49 (0.39,0.62)], consistent with the results of another recent metaanalysis which only included 23 studies. Propofol TIVA (9 RCTs) is an even more highly effective alternative to halothane reducing the rate of EA to about one fifth [RR 0.22 (0.13,0.38)]. Sevoflurane induction followed by propofol maintenance (6 RCTs) is also effective compared to sevoflurane throughout [RR 0.50 (0.35,0.72)]. Whilst isoflurane may have cost benefits as a maintenance agent, the 4 RCTs to date do not provide strong support for a lower rate of EA compared to sevoflurane [RR 0.85 (0.49,1.46)]. Desflurane (4 RCTs) may be worse than sevoflurane [RR 1.77 (1.11,2.81)].

Adjuvants

Fentanyl (11RCTs) in a variety of doses and routes is effective in reducing the incidence of EA [RR 0.39 (0.28, 0.56) including 2 mcg/kg intranasally for children having grommets]. Clonidine (10 RCTs) has been effective [RR 0.45 (0.31,0.65)] in a dose-dependent manner via both intravenous and caudal routes and remedication with clonidine 4 mcg/kg is superior to midazolam premedication with respect to EA. The other alpha2 agonist, dexmedetomidine (7 RCTs) is also effective with RR 0.35 (0.25,0.50). The simple administration of a 1mg/kg bolus of propofol (3 small RCTs) at the end of sevoflurane anaesthesia also appears to be effective [RR 0.40 (0.24,0.66)]. Our results are consistent with a recent systematic review of adjuvants for sevoflurane or desflurane anaesthesia which included far less studies.

Please note these preliminary data may be updated in the final published version.

References


Pushing the boundaries in parallel worlds

Assoc. Prof. Simon Mitchell
Department of Anaesthesiology, University of Auckland, Auckland, New Zealand

Australian Hospital Ship Centaur was torpedoed off south east Queensland in 1943 with the loss of 268 Australian servicemen and women, many of whom were medical professionals. In 2002 we completed a 180m dive to the putative wreck. At the time, this was the deepest dive ever conducted to a shipwreck. Central to the success of this undertaking was the use of rebreathers. These devices mix oxygen with a helium-based diluent gas to precisely maintain an optimum inspired PO2, at all depths throughout the dive. They are complex and prone to user error, and there are reasonable grounds for believing that about 1% of those who purchase and use a rebreather die within five years. This presentation will combine the story of the Centaur dive with commentary about the apparent poor safety of rebreathers, the sort of mistakes that are typically leading to fatalities, how these errors have similarities with those occurring in operating rooms, and how the use of checklists is seen as an important strategy for error reduction in both of these ‘parallel worlds’. The dive revealed that the wreck gazetted as that of the Centaur was the wrong ship. A resulting ‘60 Minutes’ exposé on the subject ultimately precipitated a new search for the correct wreck which was found further out to sea and in 2000m in 2010. Now we know where they are.
New boundaries in crisis management

This will be an interactive quality assurance session based around de-identified case presentations and will discuss new ways to analyse and display crisis management data. WebAIRS is the web based anaesthetic incident reporting program from the Australian and New Zealand Tripartite Anaesthetic Data Committee (ANZTADC).

Bow-tie diagrams for crisis management

Prof. Martin Culwick

Bow-tie diagrams have been used in high reliability organisations such as airlines, sea ports and the petro-chemical industry. One advantage of the diagram is that it can be used to both prevent a critical incident and also to manage a critical incident. The first two steps involve identifying hazards and then devising barriers to prevent the critical incident. If the barriers are ineffective then a critical incident may occur. The next two steps involve developing methods to control a critical incident and finally the possible outcomes if the control measures fail. The diagram starts with many hazards and narrows down to the critical incident and then expands again with controls and outcomes. This gives rise to the shape of a bow-tie from which the diagram derives its name.

Respiratory crisis management

Dr Antonio Grossi

This presentation will take data from the WebAIRS incident reporting database and use bow-tie diagrams to analyse the data and work out the risks (hazards) that lead to respiratory crises. Then methods for preventing and controlling the crisis will be discussed in an interactive way. One of the most feared crises is hypoxia developing during anaesthesia. This may develop insidiously as a slow fall in oxygen saturation or it may develop precipitously in association with difficult airway management. An analysis of cases where hypoxia was involved will be discussed interactively and solutions presented.

The resilient anaesthetist – a novel way of thinking about what we do and why we do it

Dr Stavros Prineas

Anaesthetists’ work is often described as ‘90% boredom and 10% panic’; intuitively we know that events often flow from the ‘routine’ to the ‘catastrophic’ in recognisable (and therefore potentially preventable) patterns. These patterns are borne out in formal incident analyses. This presentation offers a way of thinking about anaesthetic practice, correlating the various skills we deploy to avoid routine hazards, monitor abnormalities and errors, mitigate crises, manage emergencies, recover from complications and deal with the aftermath of adverse events. The model offers a way of reinterpreting the ‘bow-tie’ approach to incident analysis (outlined earlier in this session) as a training tool for integrating technical and paratechnical skills: a ‘big-picture’ view of crisis management, and the generic skill set of the ‘resilient anaesthetist’.

Panel Discussion

The session will involve interaction from the audience throughout the presentations and will also involve discussion of quality assurance data. It is therefore eligible for Category 3, Level 1 points at 2 credits per hour.
Researchers behaving badly

Dr Richard Waldron
Hobart Anaesthetic Group, Hobart, Tasmania

Note: This abstract is from an article due to be published in the ANZCA Bulletin September 2012. Please refer to that publication for the full text.

The last few years has seen a dramatic increase in the number of retractions of medical papers, and one of the areas specifically in the spotlight is, unfortunately, anaesthesia. Figure 1 below is from a 2011 article Richard van Noordan, assistant news Editor at the journal Nature.1 Although about half of the retractions are due to ‘honest errors’, there is a disturbing increase in the ‘misconduct’ portion of retractions. Disappointingly, this 50:50 split is not reflected in the field of anaesthesia – it appears that with anaesthesia, retractions of recent years lean significantly more towards the ‘misconduct’ end of the spectrum. Also note the dramatic increase in retractions related to anaesthesia in the last five years.

The aim of this talk is primarily to inform Fellows and trainees of recent retractions resulting from research misconduct which impact on current anaesthetic practice. It is a delicate area and there is very little information available from peer reviewed journals which may not be surprising as many peer reviewed journals have been affected. However, journals such as Anaesthesia1,2,3, Anaesthesia & Analgesia4,5, the European Journal of Anaesthesia7, the BMJ8 as well as the above quoted article from Nature all have editorials addressing research misconduct in recent years. I have attempted wherever possible to use verifiable sources and am very conscious that some of the information in this article comes from press releases and some is web based.

In general terms, research misconduct involves plagiarism, fabrication, falsification or alteration of data or images (including graphs). In 2009, Fanelli9 conducted a meta-analysis of 18 surveys of some 12,000 scientists (including medical researchers) and found that 2% of these researchers admitted to fabricating, falsifying or altering their own data (plagiarism was excluded from the study). On top of this, 15% of the survey respondents indicated that they were also aware of colleagues engaging in such misconduct.

The areas of anaesthesia research misconduct covered in this paper include acute pain (Reuben), fluid resuscitation (Boldt), post-operative nausea and vomiting (PONV - Fujii), and peri-operative management of patients with cardiac conditions (Poldermans). There are three anaesthetists involved with a possible combined total of 284 retractions (21 Reuben + 91 Boldt + 172 Fujii), all within the last five years. One of them will certainly have the record for the most number of retracted medical research papers ever. The 4th person included in this article is Professor Don Poldermans, Professor of Medicine and Head of the perioperative Cardiac Care Unit at Erasmus Medical Center, Netherlands who was dismissed in November 201110. Although not a trained anaesthetist his research impacts significantly on the practice of peri-operative medicine. He is also an honorary member of the Dutch Society of Anaesthesiologists.

The existence of bad research or deliberate scientific fraud should come as no surprise. The journal Anaesthesia & Intensive Care published an editorial on the subject in 1991. There is an editorial from 1983 from the New England Journal of Medicine11 as well as a review article in the BMJ of the same year12. At the ANZCA ASM 2011 in Hong Kong, the editor-in-chief of Anaesthesia, Dr Steve Yentis, one of the invited speakers, addressed delegates on the subject of medical research fraud. The recent June 2012 Euronaesthesia Congress in Paris held a session entitled ‘Fraud or flawed? Which data and recommendations should we trust?’ There is some solace in that it is just not anaesthesia that is affected – other recent significant research eg psychologist Diedereck Stapel (BMJ in 201113), physicist Jan Hendrick Schon (16 articles retracted from Science, Nature, Physics Review all between 2000 and 200114), Dr. Dipak Das (in 2012, a 60,000 page investigation documented 145 counts of fabrication and falsification of data and lists 11 scientific journals affected15).

So, why am I, an ordinary working anaesthetist, concerned about research misconduct? Unfortunately, the impact of research misconduct can be extensive and diverse. The type of research involved here has been used as part of Evidence-Based Medicine (EBM) and the development of clinical guidelines. Some of the recent retractions have resulted in withdrawal of such guidelines. In 2011, the British consensus guidelines on intravenous fluid therapy for adult surgical patients16 were withdrawn as a result of Boldt’s retractions. The 2009 European Guidelines for pre-operative cardiac risk assessment and perioperative cardiac management in non-cardiac surgery17 are currently also under review18 (Poldermans was the Chair of the Task Force).
Research misconduct can also adversely affect clinical practice, putting patients at risk. The peri-operative use of \( \beta \)-blockers and statins is now under review as a result of the issues around Polderman’s DECREASE studies. Perhaps the greatest example is the decreasing rate of Measles, Mumps & Rubella (MMR) vaccination in the community due to the Lancet publication of Dr. Andrew Wakefield’s Lancet paper of 1998. In 2004, 10 of the 13 authors published a ‘Retraction of an Interpretation’ in the Lancet. In 2010 the Lancet Editor’s published a retraction after a five-member statutory tribunal GMC found him guilty of ‘serious professional misconduct’. Wakefield was struck off the UK Medical Register in May 2010. Ultimately, it is patients who may be at risk. Steen in his 2012 paper reviewed 180 retracted primary papers between 2000 to 2010 in which 9,189 subjects were treated. These 180 papers were cited a total of 5,503 times bringing the total number of ‘at risk’ treated patients to 70,501 (excluding controls).

Other impacts include the near cessation of major ongoing clinical research such as the recently completed Colloid versus Hydroxyethyl Starch Trial (CHEST). At a local level, the publication by ANZCA of the 2nd Edition in 2005 of Acute Pain Management: Scientific Evidence includes 7 now retracted Reuben papers. The 2010 3rd Edition has ceased to quote these references. A major Australian scientific meeting in 2008 had the principal author of those retracted papers as a major invited speaker (obviously prior to the retractions being announced).

There is also ‘collateral damage’ ie research based on these now retracted papers. The four cases mentioned have been going for some years. Fuji’s papers go back some 15 years, Reuben’s about 15 years, Polderman’s at least 15 years. These papers have been cited a number of times. For example, of Polderman’s 500 papers, it appears that 16 of his studies have been cited at least 100 times and one over 700 times. Retracted papers can ‘live on’. Van Noorden quotes work done by John Budd. Budd examined 235 retracted articles over a 30 year period between 1966-1996 and found they were cited more 2,000 times after their retraction (<8% acknowledged the retraction).

So, how do I, the ultimate end user of research and EBM, find out about research fraud/misconduct? How has research misconduct been detected/uncovered in the past? Historically, it has not been the institution of the person perpetrating the fraud, his or her colleagues or even his or her co-authors. Whistleblowers are usually lab technicians, statisticians and journalists. For example, it was Camilla Stoltenberg, a physician and medical researcher, picked up Jon Subdo’s 2005 fraud after noticing that 250 of the 908 patients in Subdo’s Lancet paper shared the same exact birthday. Other examples include Phillip Vardy (research scientist) and Dr Norman Swan (medical journalist) in the McBride Debendox case, Brian Deer (journalist) and the Andrew Wakefield scandal. However, there is a recent disturbing trend towards high-level frauds occurring over a prolonged period highlighted by the cases mentioned here.

Firstly, it seems that authors with high rates of publications of clinical trials within a short period of time may be suspect. Examples include Darsee, Schon, Slutsby. In 1985, Dr Robert Slutsky of UC San Diego was found to have published 12 fraudulent papers with another 48 questionable. Slutsky had published 137 articles in seven years (one paper every 10 working days). Schon is another, more recent example. In 2000, he had 5 papers published in Science and 3 in Nature (all as 1st author). In 2001, he was listed as an author on an average of one research paper every eight days.

Secondly, it seems that people with access to raw data are able to assist. The traditional approach of peer review, coupled with software, can usually pick up plagiarism but not data fabrication or subtle data manipulation. Examples of this are Stoltenberg with Subdo, Vardy with MacBride, Lab technicians with Darsee, Walter DeNino with Eric Poehlman (1st US academic to be jailed for falsifying data in a grant application). It may be that journals and/or institutions may have to conduct routine random audits of clinical and laboratory trials. This has been proposed already by a number of editors. Interestingly, Yoshitaka Fujii’s fraud was uncovered following a statistical analysis by Carlisle of a large number of papers.

Thirdly, journals must require evidence of a co-author’s involvement with a paper, not just the lead author. Co-authors have been used in the past (without their knowledge) to cover fraudulent activity. There should be some mechanism to verify a co-author’s intellectual contribution to a paper and familiarity with the raw data.

There are some organisations as well as journals making a concerted effort to address this problem. One of the pleasing aspects of the Boldt and Fujii episodes is the concerted efforts by Journal editors to collaborate and present a united front. One of the outcomes of this collaboration appears to be the Committee on Publications Ethics (COPE - http://publicationethics.org), which is a forum for editors and publishers originally set up in 1997 soon after the Pearce affair. Other institutions include the US Office of Research Integrity (ORI) and the UK Research Integrity Office (UKRIO - http://www.ukrio.org - not the University of Kentucky). There is also another web site which updates regularly on potential research misconduct called Retraction Watch.
AIC EDITOR’S SESSION
Tuesday, 2 October   0830–1030

(http://retractionwatch.wordpress.com). This site was founded in August 2012 by Ivan Oransky (executive editor at Reuters Health) and Adam Marcus (managing editor at Anesthesiology News). As mentioned in Van Noorden’s 2011 article, the site has covered more than 200 retractions in just over 1 year.

Also, on the issue of retracted publications continuing to be cited or ‘living on’, it might be worth considering some better way of notifying readers of when a publication has been retracted. In the past, retraction notices have not been well publicised – I am sure many readers of this article will be unaware of some of the retractions mentioned here. Hopefully, some system can be devised on search engines (eg PubMed) that could notify individuals that a particular article they are viewing has been retracted.

Finally, as Steve Shafer mentioned at the 2009 Sydney ANZCA Annual Scientific Meeting, another element in good research is reproducibility of results at another institution. This would be something like waiting for version 1.1 of a new software program, rather than going out to get version 1.0. It may be that as an end user, I also have some responsibility in this to be more critical in my evaluation of research. And perhaps, as Van Noorden states, that we are seeing ‘the rise of the retractions’, we may also witness ‘the return of the journal club’ or some other forum for rigorous debate of published medical research.

Figure 1
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Evidence? What evidence?

Dr Neville Gibbs
Chief Editor, Anaesthesia and Intensive Care

Clinical decision-making may be either evidence-based (based on direct empirical data) or rationale-based (based on deduction using sound argument and indirect data). We are encouraged to practice evidence-based medicine, which involves tracking down the best available evidence, critically appraising the evidence, and applying the results. However, often there is no supporting evidence for fundamental aspects of our daily practice. For example, the value of physician vs nurse provided anaesthesia, the use of pulse oximetry, and the efficacy of adrenaline for anaphylaxis, are not supported in systematic reviews. In contrast, there may be evidence for practices that are rarely used (eg acupressure for nausea and vomiting). Moreover, it may be claimed that certain practices are based on evidence, but when the evidence is scrutinised, it is mostly expert opinion. Unfortunately, the ‘best available’ evidence is often of low quality, and even high quality evidence may be contradictory or less than definitive. This means that we are forced to return to rationale-based medicine for much if not most of our practice. When we read or hear the term ‘evidence’, we should ask ‘what evidence?’ All evidence is not equal. It may be high quality or low quality. It may be based on a large number of patients or only a few. It may support a large effect size or a small and irrelevant effect size. More importantly, practices that based on an apparent sound rationale should not be automatically devalued because they are not evidence-based. We should pursue high quality evidence wherever possible, but our practice should be ‘evidence-based’, not ‘evidence-biased’. We should ‘critically appraise’ evidence, not ‘uncritically praise’ it.
A defining feature of modern science is scepticism: the philosophical position that nothing can be known with complete certainty. All scientific hypotheses are open to challenge. However, although every hypothesis is uncertain, some are held to be more uncertain than others. Hypotheses and scientific models supported by a vast weight of evidence are considered more likely to represent reality compared to hypotheses with little or no evidence. Is it possible to assign a numerical probability that a particular hypothesis is true?

The Reverend Thomas Bayes (d. 1761) is credited with being the first person to attempt a mathematical approach to determining the likely underlying cause behind a set of observations. By that time, the laws of probability, especially as they applied to games of chance, were well developed. It was understood that if the underlying probability of an individual event is known, it is possible to calculate the probability of the event occurring a certain number of times in a trial. For example, knowing the probability of rolling a six from a fair die is 1/5 allows us to calculate the probability of 3 sixes from three consecutive rolls as 1/216. Bayes' theorem was developed to answer the much more difficult question of inverse probability. For example, if I get 3 sixes from 3 rolls, what is the probability the die is fair? Or, more generally, what was the underlying probability of a six on each roll? Obviously, it's not possible to make a definitive statement about the die based on only three rolls. Bayes showed it may be possible to calculate a range of probabilities within which the true underlying probability is likely to lie.

Suppose you are a member of a group of 100 people on a tour of the Australian Mint. You are each given a freshly minted coin and you are asked to toss your coin 5 times. Three of the group are a little surprised to get 5 heads from their 5 tosses (the probability of 5 heads from 5 tosses is 1/32 so three out of 100 is about the expected rate). What, if anything, can these three individuals conclude regarding whether or not their particular coin is a normal fair coin? Using common sense, they may reason thus: ‘I am in the Mint where I expect the quality-control and the security are very strict, therefore I think it highly improbable anything is wrong with this coin. Five heads is unlikely but, given enough trials, unlikely things happen. All things considered, I am highly confident this coin is fair, despite the unlikely result.’ However, we may be unlucky enough to have a biostatistician in the group who offers this line of reasoning: ‘Under the hypothesis of a fair coin, the probability of 5 heads is less than 5%. Therefore, I reject the fair-coin hypothesis. Furthermore, the probability of 5 heads occurring by chance alone is about 3% so the probability of being wrong when rejecting the fair-coin hypothesis is only 3%. In other words, I am 97% certain there is something wrong with this coin.’

To make it perfectly clear, the common sense answer above is entirely correct. The conclusions of the biostatistician in the final two sentences of the preceding paragraph are illogical and absurd, despite how familiar the logic may sound to those of us who learned statistics over the past few decades. Where did our hypothetical biostatistician go wrong? As I will attempt to explain in this presentation, the problem came when the statistician incorrectly equated probability with inverse probability.

The notation of conditional probability.

The term ‘conditional probability’ refers to the fact that probabilities are calculated on the basis of assumed conditions. The mathematical notation for ‘the probability of A, given B’ is \( P(A|B) \). Using the above example of 5 heads from 5 coin tosses, the calculated probability was conditional on the coin being fair. We could abbreviate this to: \( P(5\text{heads}|\text{fair}) = 1/32 \).

It is a fundamental feature of conditional probabilities that they cannot be inverted. As a simple example, suppose the probability of a 10 year old basket ball player missing a penalty shot is 95%. If I tell you I just saw a basketball player miss a penalty shot, you would not conclude there is a 95% chance the player is 10 years old! These conditional probabilities could be expressed: \( P(10\text{yo}|\text{miss}) \neq P(\text{miss}|10\text{yo}) \). Read this as: the probability a player is 10 years old, given they missed does not equal the probability they missed, given a player is 10 years old. In general terms:

\[
P(B|A) \neq P(A|B)
\]

Two kinds of probability: Frequentist versus Subjective

The word ‘probability’ is used in different ways. The answer to the question, ‘What is the probability of five heads from five tosses?’ is an example of a frequentist probability. The answer (1/32) gives the expected frequency of the event over multiple repeated trials. In contrast, the question, ‘What is the probability this coin is fair?’ does not refer to the frequency of anything. The coin is
either fair or it is not. If someone comes up with an answer to this second question, they are actually giving an estimate of how certain or how confident they are that the coin is fair. Confidence in a hypothesis is dependant on the information available to the person making the estimate. The estimated probability that a hypothesis is true can change dramatically as new information becomes available. This form of probability is termed subjective probability.

The P value: what it is

The familiar P value that pervades the scientific literature is a frequentist probability. When a difference is observed between two groups, the P value answers the question ‘How frequently would a difference this large (or larger) occur by chance, assuming the groups are drawn from the same population?’ In other words, the P value quantifies how unlikely the result would be if the null hypothesis were true.

The P value: what it isn’t

The P value does not give the probability the null hypothesis ($H_0$) is true. The probability a hypothesis is true is an example of a subjective probability. How confident the scientific community is in a particular hypothesis depends on the weight of data supporting the hypothesis and how consistent the hypothesis is with the paradigm of which it forms a part. A set of data (i.e. the results from a particular study) can never be expected to answer the question, ‘What is the probability a hypothesis is true?’

Although not exactly the same, the P value is related to the probability of observing the study data, given the null hypothesis: $P(\text{data} | H_0)$. Remembering that inverse probabilities cannot be equated with each other, we can write $P(H_0 | \text{data}) \neq P(\text{data} | H_0)$. The probability of the null hypothesis, given the data is not equal to the probability of the data, given the null hypothesis. To repeat, the P value does not give the probability the null hypothesis is true.

‘Precognition’: feeling the future

There are countless examples of published data that were unlikely to have occurred under a particular hypothesis and yet the hypothesis stands. Recently, there was controversy in the psychology literature when results were published that appeared to demonstrate a human psychic ability to predict the future (precognition). A group of college students attempted to guess computer-generated outcomes and they turned out to be correct more often than expected by chance ($P<0.01$). This P value tells us that if precognition does not exist we would expect to see a result as impressive as this one in <1% of such studies. What the P value does not tell us is that precognition exists with a certainty of >99%. Publication of this paper generated a flurry of correspondence pointing out that the results do not confirm the existence of paranormal phenomena with any certainty at all. Many writers used this example to recommend that the scientific literature should move away from reliance on P values in favour of a Bayesian approach to hypothesis testing.

One of the greatest proponents of the P value, R.A. Fisher, explained its meaning in this way:

If the P value is small then one of two things is true; either

1. the null hypothesis is false, or
2. something unlikely has happened.

Note that the P value does not decide between these two possibilities and it does not give the probability that one or other is true. In the case of the precognition results, the vast majority of scientists choose option ‘2’. Taken in the overall context of contemporary scientific knowledge, scientists conclude that, despite the small P value, the null hypothesis is true and the results almost certainly occurred by chance; i.e. something unlikely happened.

The Bayesian Approach

It is beyond the scope of this presentation to explain the mathematical complexities of Bayesian statistics. A very brief introduction will be attempted. For simplicity, I will assume we are only comparing two competing hypotheses: the null hypothesis ($H_0$) is there is no real difference between groups and the alternate hypothesis ($H_A$) is there truly is a clinically important difference.

Prior and posterior probabilities

The scientific word-view includes a large number of hypotheses, each of which is held with a greater or lesser degree of certainty depending on the strength of the available evidence. When new evidence becomes available that either supports or opposes a particular hypothesis, our confidence in the hypothesis is adjusted accordingly. In Bayesian statistics, the prior knowledge regarding a hypothesis is condensed into a prior probability $P(H)$; i.e the probability the hypothesis is true based on previously available evidence and scientific opinion. When new data becomes available, Bayesian statistical approaches are used to
incorporate the new information and calculate a posterior probability; i.e. the probability the hypothesis is true after adjusting for the new evidence: \( P(H|\text{data}) \)

Likelihood ratio

The term 'likelihood' has a very specific meaning in statistical terminology. For a given result, the likelihood of that result can be calculated under various competing hypotheses. Likelihood is defined as the probability of observing the result under the hypothesis: \( P(\text{data}|H) \). If a result has a very low probability under a particular hypothesis (low likelihood) then the result constitutes evidence against that hypothesis. When considering only two competing hypotheses, a likelihood ratio is calculated. The degree to which this ratio differs from 1 indicates the strength of the new evidence in terms of differentiating between the two hypotheses.

Bayes' formula

The following is a simplified version of Bayes' formula that applies when evaluating two discrete hypotheses. The formula can be expressed in words as:

\[
\text{Posterior Odds} = \text{Prior Odds} \times \text{Likelihood Ratio}
\]

The odds are calculated as ratios between probabilities:

Below are some illustrations to expand on the concept of calculating the likelihood ratio. In each case, the sample size, and hence the standard error of the mean (SEM) differs but the alternate hypothesis (\( H_a \)) is the same. For these examples, \( H_a \) assumes a real difference of 11 units.

The above figure illustrates the probability of a range of results under two different hypotheses. The left bell-curve assumes the null hypothesis. The right curve represents an alternative hypothesis: assuming a true effect of 11 units. The vertical line represents the result of a study that found a difference of 8 units (\( p < 0.05 \)). The likelihood of this result under the null hypothesis is 0.015 and the likelihood under the alternate hypothesis is 0.07. The likelihood ratio of 4.8 indicates relatively weak evidence in favour of the alternate hypothesis.

In this second figure the sample size of the study is four times as large. Therefore, the likely results under the null hypothesis have become very unlikely under the alternative hypothesis (and vice versa). The vertical line represents the result of a study that found a difference of 4 units (\( p < 0.05 \)). The likelihood of this result under the null hypothesis is around 0.03 and the likelihood under the alternate hypothesis is around 0.0003. The likelihood ratio of 0.01 indicates very strong evidence in favour of the null hypothesis. To summarise, in this example a large study finds an effect that is small, clinically insignificant, but 'statistically significant'.

In this figure the study has a small sample size, giving a SEM of 10 units. The vertical line represents the result of a study that found a difference of 11 units. This observed effect size is equal the minimum clinically significant effect of the alternate hypothesis, but due to the small sample size the result is not statistically significant (\( p >> 0.05 \)). The likelihood of this result under the null hypothesis is around 0.02 and the likelihood under the alternate hypothesis is around 0.04. Because the study is underpowered, the result gives only very weak evidence in favour of the alternate hypothesis (likelihood ratio = 2).

Suppose a study is performed comparing a new drug with an older drug. Prior to performing their study, the investigators carefully evaluate all the available evidence. As it happens, there is little evidence in the way of previous trials but the investigators incorporate expert opinion (including their own) and they decide there is some chance the new treatment has a clinically significant advantage over the older treatment: they estimate the prior odds to be 1/3. This equates to a 25% probability the new treatment is superior. The results of this trial could be similar to one or other of the three examples illustrated above:

a. The first figure illustrates the situation where the study found a benefit that only just reached statistical significance. The likelihood ratio of 4.8 leads to a modestly increased confidence in \( H_a \). The posterior odds of 4.8/3 equate to a posterior probability of 60%. This example demonstrates that a 'statistically significant' result (\( p < 0.05 \)) should not always give us confidence that the observed difference is real. The posterior probability of 60% falls far short of the 95% certainty implied by (an incorrect interpretation of) the P value.

b. In the second figure, the study showed a statistically significant benefit but the effect size was so small that it counts as evidence against \( H_a \). The likelihood ratio reduces the posterior odds to 0.1/3, which equates to a 3% probability that the new treatment is superior. This example demonstrates the well-recognised difference between statistical significance and clinical significance. This problem arose because the P value only relates to the null hypothesis. The current preference for reporting confidence intervals addresses this issue. Bayesian statistics automatically takes this issue into account because it incorporates both the null and the alternate hypotheses in the posterior odds.
c. In the third example, there was a clinically significant effect size but the evidence was weak and only modestly shifted our confidence in the new treatment. The likelihood ratio of 2 shifts the odds from 1/3 to 2/3, i.e. only increasing the probability the drug is effective from 25% to 40%.

How would the Bayesian approach be applied to the examples given earlier in this presentation?

• With the coin in the Australian Mint, the prior probability of the coin being fair would be very high because double-headed coins are rare and, we assume, they are even rarer inside the mint. Let us say we assign a prior probability of 99.99% that the coin is fair (odds of 9,999:1). The probability of 5 consecutive heads is 3% for a fair coin and 100% for a double-headed coin, giving a likelihood ratio of 0.03. Therefore, the posterior odds of the coin being fair are about 0.03 x 9,999 or about 300:1. The common sense answer was correct: odds of 300:1 translate to a probability the coin was fair of 99.7%, which could hardly be more different to the 3% claimed by the biostatistician!

• Similar logic applies to the studies demonstrating precognition. Modern scientific understanding gives us a very high degree of confidence that humans cannot ‘feel the future’. The very low prior probability of precognition means it will take a lot more than one paper with p=0.01 to shake that confidence.

Some lessons from Bayesian statistics

A ‘significant’ P value does not always mean strong evidence. If the prior information in favour of a hypothesis is weak, a study that finds in favour of the hypothesis but only just reaches statistical significance will leave us with considerable doubt (see example (a) above). Recently, a large trial of a renin antagonist in diabetes (the ALTITUDE study) was stopped early, largely because of an increased incidence of stroke in the treatment group. The P value for the excess strokes was marginally less than 0.05. The investigators stated that this result was surprising because antihypertensive treatment usually reduces the risk of stroke. This ought to have set alarm bells ringing: a finding that is opposite to the expected has a low prior probability. If the P value only just reaches significance then it is actually a very weak finding. This finding should have been ignored, despite the p<0.05. As it happened, some data continued to come in after stopping the trial and the difference in stroke rate has fallen and is no longer ‘statistically significant’.

The likelihood ratio differentiates causes of a non-significant P value. If the P value is not <0.05, the common response is to conclude only that the null hypothesis has not been rejected. This rather unsatisfying conclusion may conceal important information. If the study was large, the high P value suggests strong evidence in favour of the null hypothesis. On the other hand, if the study was underpowered then the high P value may simply reflect inadequate data to upon which to draw conclusions. Unlike the P value, the Bayesian likelihood ratio clearly differentiates between these possibilities. In the first case the likelihood ratio strongly favours the null hypothesis while in the second case the likelihood ratio will not be very different to 1 (see example (c) above).

Limitations of Bayesian statistics

The main difficulty with Bayesian statistics is determining the prior probability. Bayes himself adopted the expedient of starting with equal priors; i.e. assuming prior odds of 1. The inclusion of expert opinion and other ‘soft’ sources of information in the derivation of the prior probability is anathema to many scientists and has been a major impediment to adopting Bayesian statistics.

The mathematics of Bayesian statistics becomes formidably complex when applied to real-world problems. The examples in this presentation involved a simple likelihood ratio of two discrete hypotheses applied to single-point estimates of prior probability. In the real world, we are interested in ranges of hypotheses. For example, with respect to a proposed new drug therapy we are not really interested in the probability of the null hypothesis or any other single hypothesis. The crucial question is: ‘Is the true effect of this drug equal to or greater than the minimum clinically useful effect, or is it less than the clinically useful effect?’ Also, the prior probability is best expressed as a probability distribution. If very little is known about the likely effect of the new drug then the prior probability distribution will be relatively flat; i.e. a wide range of possible drug effects may be considered almost equally probable.

Suggested reading.

Introductions and reviews


‘Precognition’

Setting up a paediatric regional team

Asst. Prof. Grant McFadyen
Seattle Children’s Hospital

Seattle Children’s Hospital instituted a paediatric regional anaesthesia team (RAT) in July 2011. The team consists of five anaesthetists who are experts or have a strong interest in paediatric regional anaesthesia. The five regional anaesthetists take turns to do a week of regional anaesthesia, supervising a fellow in the performance of most of the blocks during the day and being on call for the week for regional anaesthesia.

The main goal of setting up a RAT was to improve the quality of regional anaesthesia in our hospital. Prior to the creation of the block team, there were several issues concerning regional anaesthesia in our hospital. Variability in choice, efficacy, efficient placement, management and follow up of regional anesthesia were some of the issues. Why was this a problem? There were not infrequent cases of inadequate pain management. Different blocks were done for the same procedure, causing confusion amongst our surgical and nursing colleagues. Increased operating room (OR) time resulted in OR delays and increased cost to families. This led to surgeon and family dissatisfaction, and increased burden of work for nurses.

There was limited feedback to the anaesthetists doing the blocks, which resulted in limited opportunities for learning. Ultimately, in some instances, patient harm resulted.

A year after the RAT was set up we reviewed the effect that it had affected on regional anaesthesia in our hospital. The total number of regional techniques increased from 2502 to 3407, an increase of 36%. As it had not been a goal of the RAT to increase the number of blocks performed, this came as a pleasant surprise to us! The paediatric anaesthetic fellows performed considerably more blocks than they had in previous years. The average (range) of caudals/epidurals per fellow increased from 11.3 (5-30) to 40 (18-78), while the average (range) of peripheral nerve blocks per fellow increased from 31.6 (10-57) to 79 (30-129). We also started a fellowship in paediatric regional anaesthesia. This fellow spends 24 weeks out of the year on the RAT, and our first fellow performed about 350 blocks during her year.

The complication rate from single injection blocks decreased by 45%, and the complication rate from continuous catheter techniques decreased by 53%. We feel that the RAT has achieved its goal of improvement of the quality of regional anaesthesia at Seattle Children’s Hospital.
Spinal ultrasound for neuraxial procedures in anaesthesia

Nico Terblanche
Royal Hobart Hospital, Tasmania

Background: The development of spinal ultrasonography has been an important step forward for obstetric anesthesia as it has transformed a fundamentally tactile epidural insertion method into an ultrasound-assisted procedure. Ultrasound of the lumbar spine has a potentially important role in teaching epidural placement to anaesthesia trainees. Grau et al. have unlocked some of the teaching potential of ultrasound by demonstrating that trainee learning curves during labor epidural placement are improved when they are provided with pre-puncture information of the sonoanatomy of the lumbar spine. More recently, Vallejo et al. also demonstrated that in the first year anaesthesia residents, prepuncture ultrasound decreases the rate of epidural catheter replacement for failed labor analgesia and reduces the number of epidural attempts. However, none of these studies specified a standardized method for teaching spinal ultrasound in clinical practice.
Ultrasound-guided thoracic paravertebral blockade

Myles Conroy
Geelong Hospital, Victoria

Paravertebral block involves the use of local anaesthetic lateral to the vertebral column to produce ipsilateral anaesthesia and analgesia by blockade of the thoracic segmental nerves. The key advantages over intercostal blocks are broader coverage (can cover multiple dermatomes and include blockade of the posterior primary ramus) and the ability to insert a catheter – avoiding multiple needle insertions. In the lower lumbar region, this constitutes a psoas compartment block.

Single level injection with catheter insertion constitutes my usual approach for analgesia as part of a multimodal regimen for unilateral incisions in thoracic dermatomes, such as thoracotomy and nephrectomy. I have found it particularly useful for management of analgesia for fractured ribs in difficult cases. A bolus dose of 15ml 0.5% bupivacaine can cover a mean of 4 (1-11) thoracic dermatomes (1)

Single shot blocks performed at multiple spinal levels has been described as an anaesthetic technique for breast surgery. There are case reports and prospective studies of bilateral paravertebral blocks being used for obstetric analgesia, and even as an alternative to general anaesthesia for abdominal surgery (2)

Failure to establish paravertebral blockade when a landmark technique is used occurs in approximately 12% cases(1,3). Differing patterns of spread have been observed in contrast studies (4). It is likely that the use of ultrasound to accurately locate the paravertebral space and observing patterns of spread in real time may reduce the failure rate and improve local anaesthetic coverage.

Problems associated with epidural blockade, such as lower limb motor blockade, urinary retention, hypotension, and concerns about neuraxial nerve damage related to haematoma or abscess formation may explain the resurgence in use of the paravertebral block. Recent reports suggest improved long term outcomes, with reduced chronic pain (5) and cancer recurrence (6) after breast surgery, which is now the subject of prospective study. (7)

The blocks may be safely performed in the anaesthetised patient, improving patient acceptability and allowing flexibility with postoperative analgesic plans, for example when a laparoscopic cholecystectomy turns into an open procedure.

Anatomy

The thoracic paravertebral space is a wedge-shaped potential space, its depth greater medially when distended. It communicates with the cervical paravertebral space cephalad, but the psoas muscle probably limits direct communication with the lumbar paravertebral space caudally. Medially it is bound by the vertebral body, intervertebral disc and intervertebral foramen. Its anterolateral border is the parietal pleura and it communicates with the intercostal space laterally, beyond the tip of the transverse process. The posterior border is formed by the transverse process and the superior costotransverse ligament, which forms the most important structure to be traversed by the needle. This ligament joins the inferior aspect of the transverse process above with the superior aspect of the neck of the rib below and may be appreciated by a ‘click’ on advancement of the needle.

The contents include fat and extrapleural fascia, the segmental nerve branching into anterior and posterior primary rami, the sympathetic chain and rami communicantes, and radicular vessels. The nerve at this point may consist of rootlets and is devoid of a sheath, allowing good local anaesthetic penetration. The nerve should lie deep to the transverse process, protecting it from the needle.

The endothoracic fascia, the deep fascia of the thorax, is a fibroelastic structure dividing the paravertebral space into anterior and posterior compartments. It is closely applied to the anterior vertebral body, and laterally it contains the sympathetic chain anterior to it, the segmental nerve posterior to it. Catheter placement relative to this layer may determine the different patterns of spread observed with this block.
Surface anatomy

In the thoracic spine the superior aspect of the spinous process relates laterally to the transverse process of the vertebra below it, due to its steep downwards angulation. The tip of the transverse process is located ~2.5 cm from the spinous process. This is the insertion point for the traditional approach to paravertebral blockade — the needle is inserted perpendicularly to skin until the transverse process tip is contacted, then ‘walked off’ into the paravertebral space.

Sonoanatomy

I usually start imaging with a linear probe at ~8 MHz and change to a low frequency curved probe if imaging is inadequate. The curved probe provides a wider field of view which can help orientate the midline and pleura during transverse scanning, but at less resolution.

The transverse process projects posteriorly, and the costotransverse articulation is on its anterior aspect, forming a step in bony depth and angle to allow identification of the transverse process tip with ultrasound. With a transverse probe orientation, the acoustic shadow of these bony margins becomes deeper at the point where the transverse process joins the rib. It is important to distinguish the pleura from the acoustic shadow of bone – pleura moves with inspiration and some penetration of ultrasound occurs. The pleura can be distinguished from bone more easily on sagittal scanning — it is the deeper hyperechoic structure. Local anaesthetic injected into the paravertebral space should increase the depth between transverse process and parietal pleura.

Identification of the radicular vessels using colour flow while scanning the paravertebral space is difficult because of the depth and size of the vessels, and the presence of acoustic shadow, but can inform the needle approach particularly in thinner subjects.
Fig 2. Note correlation of bone topography of posterior thorax in a spine model with the acoustic shadow of the transverse ultrasound image to the right.

Fig 3. Saggital paramedian scan at tip of transverse process. Cephalad to left of image. Note the rib shadow deep and cephalad to the transverse process in this example. Lateral angulation of probe helps imaging of the pleura as it reflects medially towards the mediastinum.

Needle approaches to the paravertebral space

A number of US-guided approaches to the paravertebral space have been advocated, and no particular approach has been shown superior (8). Proximity to the neuraxis and lung require a good orientation to the anatomy and steep angles of insertion may
make needle visibility difficult. Orientation to the transverse and spinous processes during needle insertion is greatly helped by creating surface markings during your survey scan.

Ultrasound-assisted traditional approach

I would recommend this approach for beginners to ultrasound or paravertebral block, in obese patients, or if there is subcutaneous emphysema making imaging difficult. The traditional approach has a good success rate and low risk of complications(3). A survey scan defines the location and depth of the transverse process tip for marking, and the depth to lung. When measuring distance, only light probe pressure should be used. Proceed with paravertebral blockade in the traditional way, ensuring the angle of needle insertion matches the angle of the ultrasound beam during the survey. I use a 16G Tuohy needle for this approach with the curved surface facing the pleura once the needle is angulated. Once the transverse process is contacted, walk off cephalad (or caudad) to a predetermined distance (10-15mm depending on size of patient/survey scan). Walking the needle cephalad is said to have a higher risk of pneumothorax and a second bone contact onto juxtaposed rib may confuse the approach (see Fig. 3), but is my preferred approach to avoid the nerve root which lies caudal to the transverse process. A “click” may be encountered traversing the superior costotransverse ligament, or loss of resistance can be sought to assist with the endpoint, but these are not always easily appreciated. I deliver a bolus of local anaesthetic to distend the space before placing the catheter.

The advantage of this approach is its simplicity and not having to contend with needle visibility. The disadvantages are that displacement of the pleura from local anaesthetic injection is not observed, and resistance to feeding the catheter into the space (due to the steep angle of approach) is common. Catheter displacement within 48 hours may result. The steep angle of insertion also potentially increases the risk of pneumothorax.

Transverse In-plane approach

This appears to be the preferred approach by other authors (and myself) for both single shot blocks and catheter insertion. Identification of the key landmarks is as described above.

When performing a survey scan, mark the tip of the transverse process and spinous process. It is usually possible to visualize the transverse process and pleura without the rib obscuring it - position the tip of the transverse process in the middle of the image and then rotate the probe slightly. The heel of the hand holding the probe should be resting firmly against the patient to hold this position. The needle insertion point should be at least 2cm lateral to the tip of the transverse process to allow an insertion angle suitable for needle visualization. A sonographic Tuohy needle also helps (such as Pajunk Tuohy Sono). The needle approach is between these structures and injection is performed under vision (by an assistant with extension tubing) to observe pleural displacement, confirming correct position (Fig. 5).

Care should be taken not to advance the needle more than 1cm once it is in the acoustic shadow of the transverse process, as it is pointing in the direction of the intervertebral foramen. It is also possible the catheter fed beyond the needle may enter the neuraxis, although this has not been reported in the published case series(9).

An alternative approach is to slide the probe above or below the transverse process and insert needle tangential to the pleura which is no longer obscured by bone, bevel up, moving the probe intermittently to reference the bony landmarks and ensure injection is deep to the plane of the transverse process. This approach would be less likely to point directly at the intervertebral foramen (personal communication, M Karmakar), and allows better visualization of the needle tip, but requires greater dexterity with probe handling and interpretation of the anatomy.
Fig. 4 Transverse in plane approach. Probe has been rotated from the image obtained in Figure 2 to visualize pleura rather than rib. Needle tip is just deep to transverse process and is obscured by its acoustic shadow. Note local anaesthetic (LA) distending the lateral paravertebral and intercostal space.

Saggital In-plane approach

Positioning the probe in a sagittal orientation 2-3cm lateral to the midline to obtain an image as in Figure 3, clearly distinguishes bone and pleura. Angulating the probe slightly laterally may improve visibility of the pleura which reflects anteriorly toward the mediastinum at this site (see Fig 1). Between the transverse processes are the superior costotransverse and intertransverse ligaments and, deep to these, the paravertebral space. The difficulty I find with this approach is the angle of insertion becomes relatively steep to map a course between the bony landmarks and finish close to pleura, making needle visibility difficult (Fig 6). This may be helped by flexing the patient as much as possible, making the block slightly shallower and the bones further apart, and using a sonographic needle. The advantages are spread can be observed in the adjacent acoustic windows and catheter insertion is not pointing toward the neuraxis.

Figure 6. Saggital in plane needle insertion. Note the small distance between the transverse processes determines the steep angle of insertion. Local anaesthetic can be seen in the paravertebral space at the levels adjacent to the insertion point when a curved probe is used. A small haemothorax is also present, separating the pleura (fractured ribs).

Conclusion

Paravertebral blockade is experiencing a resurgence in interest and use. As regional anaesthetists become more experienced with the use of ultrasound, its application to guide routine paravertebral insertion is inevitable. Although this is challenging, it can be achieved. Further study is required to define the optimal approach and demonstrate improved outcomes with ultrasound guidance.
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Interscalene brachial plexus block – how I do it

Part 1 of a 2 part discussion on technique

Stuart Grant
Professor of Anesthesiology, Duke University Medical Center, Durham NC

Brachial plexus blockade within the interscalene groove involves local anesthetic blockade of the brachial plexus at the level of the roots and can produce complete anesthesia of the shoulder and clavicle. The brachial plexus is most often formed from the C5 to T1 nerve roots. There is a large physical distance between the C5 nerve root and T1 nerve root, resulting in ulnar sparing when local anesthetic is placed in the interscalene groove at the level of C5 or C6. With ulnar sparing, there will be intact motor function and sensation in the 4th and 5th digits. Therefore, the interscalene block is less useful for surgery distal to the mid-humerus.

Anatomy

The interscalene block is performed at the level of the roots. At this level the plexus lies between two muscles: the anterior scalene muscle and middle scalene muscle (Figure 2.1). The most important roots to block for shoulder surgery include the C5, C6, and C7 nerve roots. The C5 and C6 roots form the superior trunk of the brachial plexus. The C7 nerve root forms the middle trunk. There is a natural separation between the C6 and C7 nerve roots as they form the superior and middle trunks, respectively. Each nerve root at this level can appear as a single hypoechoic circle or several hypoechoic circles. Often, novice ultrasound users have the mistaken belief that each individual dark circle is an individual nerve. However, a single nerve root can be comprised of several fascicles that appear as several dark circles per nerve root. In the interscalene groove, the C6 nerve root often appears as two fascicles (dark circles) and the C7 nerve root appears as three or more.

The suprascapular nerve exits from the C5 nerve root or superior trunk. The suprascapular nerve supplies some of the muscles of the rotator cuff and much of the sensory innervation of the shoulder joint. For shoulder surgery, it is important to place a nerve block proximal to the exiting of the suprascapular nerve along the brachial plexus when using small volumes or continuous catheter techniques. With large boluses of local anesthetic and more spread along the brachial plexus, the branching of the suprascapular nerve may be less important.

The phrenic nerve lies in close proximity to the brachial plexus, on the anterior scalene muscle. Most interscalene blocks, even with low volumes of local anesthetic, will result in ipsilateral hemi-diaphragmatic paralysis. Caution should be exercised when performing interscalene blocks on patients with restrictive or severe obstructive lung disease.

Clinical Applications

Blockade of the brachial plexus at the interscalene level can be used for shoulder surgeries including shoulder arthroscopies, rotator cuff repairs, procedures involving the mid to distal clavicle, shoulder manipulations and total shoulder arthroplasty. Continuous catheters can routinely be placed in the interscalene groove to extend analgesia for days.

Technique

Monitors: EKG, NIBP, Pulse Oximeter.
Prep: Chlorhexadine with alcohol

Ultrasound Details

Probe: High frequency linear probe (10-15 MHz). Expected target depth in 80 kg adult 1-3 cm.

Patient Position: The patient is positioned in a sitting position of 45 degrees head up with a pillow under their head but moved away to expose the neck on the operative side. Rotate the patient’s face towards the contra-lateral side. Figure 2.3

Local anesthetic choice. Usually 10-30 ml of local anesthetic is usually required. For anesthesia and long acting analgesia ropivacaine or bupivacaine 0.5% is used. For short duration blocks mepivacaine 1.5% or lidocaine 2% may be employed. If the nerve block is only required for post operative analgesia a lower concentration of local anesthetic can be used e.g. ropivacaine 0.2%.

Needle: 100mm (4 inch) short bevel nerve block needle.
1. Use the supraclavicular ultrasound image to locate the brachial plexus. The close proximity of the plexus to a pulsating artery (subclavian artery) assists in locating the plexus at the supraclavicular level.

2. Place the probe behind the mid point of the clavicle.

3. The probe should be aimed acutely down the neck as if attempting to image deep into the thorax. Do not aim with the probe flat across the neck.

4. Locate the pulsatile subclavian artery. The artery is a hypoechoic or black circle and will appear pulsatile. The artery sits on the hyperechoic line of the first rib or pleura. If the artery is not initially visible slide the probe parallel to the clavicle medially or laterally. Take caution not to mistake the carotid artery for the subclavian.

5. The nerves are located posterior / lateral to the artery or occasionally superior to the artery. The brachial plexus appears as ‘a bunch of grapes’ hypoechoic circles encased in hyperechoic fascia.

6. Once the nerves in the supraclavicular fossa are located, place the nerves in the middle of the screen and slide the probe up the neck. As the probe is moved up the neck, it should tilt to stay almost perpendicular to the skin. The most superficial part of the brachial plexus should be followed on the ultrasound screen as the probe is moved cephalad up the neck.

7. As the probe is moved cephalad, the subclavian artery should drop away. The superior part of the brachial plexus should initially appear as many small dark circles (multifascicular) and then, as the interscalene groove is formed, it should appear as three dark circles. These circles are usually aligned between the anterior scalene anteriorly, and the middle scalene posteriorly.

8. Stop sliding the probe when the brachial plexus appears as the three dark circles surrounded by bright, hyperechoic fascia. The three dark circles, from superior to inferior, are the C5 root, C6 fascicle and the C6 fascicle.

9. Usually, the perfect image of the interscalene groove appears only a few centimeters up the neck from the supraclavicular view. Do not be concerned that the probe may not be very far up the neck. Perform the block where the ultrasound image gives the best representation of the three dark circles within the interscalene groove.

11. Insert the needle in plane starting lateral / posterior and aim medial / anterior.

12. Advance the needle aiming for the plexus, either to the most superficial part of the plexus (C5 nerve root) or the deepest part of the plexus (C6 fascicle).

13. For safety, there is no need to use the needle to puncture between any of the hypoechoic fascicles of the brachial plexus at this level.

14. Ideal spread of local anesthetic for a single injection is anywhere close to the brachial plexus (three circles). Simply deposit the local anesthetic above, posterior, or deep to the three circles.

15. The needle can be redirected if spread around the plexus is not deemed adequate. The final objective is to have the plexus next to the local anesthetic. There is no need to place local anesthetic on both on the anterior and posterior sides.

Alternative techniques

Out of plane approaches have been described with the probe in this same position as described above for the interscalene block. For out-of-plane needle insertion, place the interscalene groove with brachial plexus in the middle of the ultrasound image. Then advance the needle using the techniques described in Section 1.2, starting in the middle of the ultrasound probe.

Catheters

Catheter placement can follow the same steps as above but will involve sterile technique, a larger gauged needle, and both placement and securing of the catheter. For catheters, place the tip of the needle either above C5 or below C6. Again, the needle does not penetrate between the three circles of the interscalene groove. The catheter is then fed within the interscalene groove. Because this area of the body is mobile premature catheter failure can be frequent. Securing the catheter well with surgical glue and well placed dressings will improve longevity.
Time to pre anaesthetic consultation following emergency surgery booking – an audit in a busy public hospital

K Blatchford¹, C Downs², D Wolfers¹

¹ Prince of Wales Hospital, Barker Street Randwick, NSW
² Prince of Wales and Sydney Children’s Hospitals, Barker Street Randwick, NSW

The importance of preoperative anaesthetic consultation has been widely recognised [1] with a paucity of data on the timing of assessment of emergency surgical patients. It is crucial that patients be evaluated early in order to arrange necessary investigations and optimise concurrent medical conditions [2][3]. Failing to do so may result in surgical delay [4][5].

Aims: This audit details the time delay between surgical booking and anaesthetic review for patients of different surgical clinical priorities (ref 6 here), patients with anaesthetic risk stratified as low risk or high risk and patients who are booked “in hours” versus “after hours” or weekends.

Methods: Following ethics approval, this prospective audit examined a period of 14 days at the Prince of Wales and Sydney Children’s Hospital combined operating theatre complex. The surgical bookings were audited every 4 hours with an 8 hour window at night. The data collected included age, gender, clinical priority, American Society of Anaesthesiologists’ (ASA) score, operation performed, booking date and time, anaesthetic review date and time window and operation date and time. In addition, any delays in surgery for anaesthetic reasons were recorded.

Results: A total of 128 true emergency cases were included in the audit. The results revealed that 2/3 of these cases were reviewed within 4 hours of booking time, with the remaining 1/3 of cases reviewed within 24 hours. Patients with a higher surgical clinical priority or urgency were both reviewed and operated earlier than those of low priority. Patients with high anaesthetic risk were not being seen any earlier than those deemed low risk. Emergency cases booked “out of hours” were paradoxically reviewed sooner than cases booked “in hours” when more staff were available.

Conclusions: A working party will be established to find strategies to facilitate earlier anaesthetic review of patients with higher anaesthetic risk as well as to explore and address the discrepancy between cases booked “in-hours” compared to “out of hours”.

[6] different surgical clinical priorities (ref here)

Hypnosis for pain in childbirth: A cochrane systematic review

Kelly Madden¹, Mandy Matthewson¹, Philippa Middleton², Leanne Jones¹, Allan M Cyna⁴

¹ School of Psychology, University of Tasmania, Hobart
² ARCH, Women’s and Children’s Hospital, University of Adelaide SA
³ University of Liverpool, Liverpool Women’s NHS Foundation Trust, Liverpool, UK
⁴ Women’s and Children’s Hospital, University of Adelaide, Adelaide SA

Objectives
To examine the effects of hypnosis for pain management during labour and childbirth.

Methods
The Cochrane Pregnancy and Childbirth Group’s Trials Register and reference lists of primary studies and review articles were searched to 11th January 2012. Inclusion criteria were Randomised controlled trials (RCTs) and quasi-RCTs comparing preparation for labour using hypnosis and/or use of hypnosis during labour, with placebo, no treatment or any analgesic drug or technique. Two assessors independently extracted data and assessed trial quality.

Results
We included seven trials randomising a total of 1213 women. All but one trial involved antenatal preparation for labour using hypnosis: five trials investigated training in self-hypnosis; one trial provided antenatal hypnotherapy and one trial provided hypnotherapy during labour. No significant differences between the hypnosis and control conditions were found in primary outcomes: use of pharmacological pain relief (average risk ratio (RR) 0.63, 95% confidence interval (CI) 0.39 to 1.01, 6 studies, 1032 women); spontaneous vaginal birth (average RR 1.35, 95% CI 0.93 to 1.96, 4 studies, 472 women); or satisfaction with pain relief (RR 1.06, 95% CI 0.94 to 1.20, 1 study, 264 women). Only one trial was assessed as being at low risk of bias across all domains.

Conclusions
There are still only a small number of studies, largely of high risk of bias, assessing the use of hypnosis for labour and childbirth. Although the intervention shows some promise, further high quality research is needed before recommendations can be made regarding its clinical usefulness for pain management in childbirth.
The application of maternal transthoracic echocardiography during caesarean birth in women with preeclampsia

A Dennis¹, J Dixon²

¹ Director of Anaesthesia Research, The Royal Women’s Hospital, Parkville, Australia & Clinical Associate Professor, University of Melbourne, Parkville, Australia
² Anaesthetic Fellow, The Royal Women’s Hospital, Parkville, Australia

Aim
Transthoracic echocardiographic (TTE) is a recommended diagnostic tool in critically ill pregnant women. Obstetric critical illness may occur at any time including intraoperatively during caesarean birth. TTE may provide insights into the haemodynamic instability intraoperatively, however it may be difficult to perform in this setting. This study’s aim was to assess the applicability of TTE intraoperatively in women with preeclampsia.

Methods
After institutional ethics approval/written informed consent, seven women with preeclampsia were examined. Baseline preoperative TTE examination as performed according to the accepted guidelines by a single experienced operator. Women were then scanned intraoperatively in the left lateral tilted position (parasternal long and short axis views, apical-4 and 5-chamber views). The ability to obtain an image and measure haemodynamic variables was recorded as well as patient and surgeon acceptability with the technique. TTE scanning was ceased when the newborn was brought to the woman.

Results
Parasternal long and short axis and apical-4 and 5-chamber views were obtained in all women. Fractional shortening and fractional area change were able to be measured from the parasternal views, and left ventricular inflow velocities, myocardial velocities and left ventricular outflow tract velocity time integral measurements were able to be obtained from the apical-4 and -5 chamber views.

Conclusions
Intraoperative TTE was applicable in this small group of women with preeclampsia. The use of TTE was acceptable to both the surgical team and the woman. Haemodynamic variables were able to be obtained in all women.

Reference
The use of dexmedetomidine and ketamine for sedation in a 96-year old patient undergoing a painful procedure

Ong ET, Thong SY
Department of general anaesthesia, Singapore General Hospital, Singapore 169 608

Introduction
We present a case in which dexmedetomidine in combination with ketamine was used successfully for deep sedation in an extremely elderly undergoing painful percutaneous transhepatic cholecystostomy (PTC) in a remote location.

Methods/results
A 96-year-old patient with hepatobiliary sepsis secondary to cholangiocarcinoma was planned for bilateral PTC insertion in the interventional radiology suite. She was previously healthy.

An infusion of intravenous (IV) dexmedetomidine, 0.2 to 0.6mcg/kg/min was started 20 minutes before the procedure, without a loading dose to keep Ramsay sedation score between 2-3. This was supplemented with IV ketamine 5mg as requested by the patient for deep sedation prior to the procedure. During particularly painful parts of the procedure, such as when the initial 22G needle puncture site was sequentially dilated to allow insertion of an 8F biliary drain, 3 more boluses of IV ketamine 5mg were administered intermittently. Patient remained hemodynamically stable throughout. Respiratory rate was 20-22 per minute and venous saturation 100% on 5L oxygen mask.

We were able to achieve a sedated and cooperative patient with preserved respiratory drive and minimal hemodynamic fluctuations during the 95-minute procedure.

Communication with the interventionist was important to administer ketamine before the painful stimulus to minimize patient discomfort and movement.

Conclusion
Dexmedetomidine and ketamine are good analgesics for one undergoing painful procedure. Both cause minimal respiratory depression, which is safe in a remote location. Dexmedetomidine has been reported to attenuate the cardiostimulatory and postanaesthetic delirium effects of ketamine. This case demonstrates the synergistic effects of both in an extreme elderly.

References
An observational study of epidural analgesia in labour: Five more years’ experience

Dr Jeremy Field, Dr Varun Desai, Dr Richard Halliwell
Westmead Hospital, Westmead, NSW

Aims
To analyse the safety and effectiveness of neuraxial analgesia in labour.

Methods
Neuraxial procedures for labour analgesia were prospectively recorded at two Sydney hospitals. Patients were systematically followed up and assessed for satisfaction and the occurrence of complications.

Several details were recorded about patient, anaesthetist, procedure and outcome. These included patient demographics and health status, and anaesthetist identity and experience level. Procedure details included type (epidural, spinal, combined), posture, antisepsis, difficulty, intervertebral level and depth of insertion, drugs used, time of day, and delay to insertion. Outcome measures included maternal satisfaction ratings, and occurrence of any of several major or minor complications.

Follow-up occurred in person prior to hospital discharge, and patients were provided a card with contact details to notify longer term complications.

Results
11,945 procedures were recorded between May 2005 and October 2011, 99.6% of which were epidural catheters alone. Bloody tap was recorded with an incidence of 5.5%, failure 1.5%, dural puncture 0.5%, post-dural puncture headache 0.4%, and hypotension 0.2%. Five possible nerve injuries were recorded, giving an incidence of 1:2389. No other confirmed serious complication was recorded. Maternal satisfaction was ≥9 (scale 0–10) in 78% and 68% of first and second stage labour respectively. Incomplete data and design shortcomings will be discussed, as will associations between recorded variables.

Conclusions
Prospective collection of detailed procedural and outcome information in a labour epidural analgesia service facilitates accurate informed consent, quality assurance, and the discovery of factors associated with complications and reduced maternal satisfaction.
Current effectiveness of post-operative pain in surgical patients at Cabrini Health Malvern

Chantal McNally, Jenny Norman

Aims
The purpose of the research study was to ascertain current post-operative pain management proficiency at Cabrini Health Malvern. Cabrini Health Malvern is a 508 bed metropolitan tertiary private hospital, with an anaesthetic department consisting of part-time salaried anaesthetists providing quality assurance activities, teaching, research and clinical audit (along with the traditional private model of fee for service anaesthesia for elective surgery). Data for the research study will be re-collected at six monthly intervals, until such time as 18-months has elapsed, and informed conclusions can be reasonably drawn. It will then be tested against the hypothesis That patient and staff satisfaction in relation to post-operative pain management will be improved by the introduction of a formal Acute Pain Service at Cabrini Health Malvern.

Method
Over a two-week period, Cabrini Health Malvern doctors, nurses and adult surgical inpatients completed a total of 424 surveys. Survey monkey provided the electronic means to collect data from the medical staff, whereas the nursing staff questionnaires were distributed in shift ‘handover’ meetings. The collection of data from inpatients was undertaken at each respective bedside, and explicitly assessed their initial 24 hours post-operative.

Results
Unequivocal support for an Acute Pain Service was demonstrated by participating staff members, and current post-operative management was most commonly rated at a ‘good’ or lesser level. In congruence with this, severe post-operative pain was reported by more than half of the patients surveyed, and fewer than one-third achieved a pain-free period.

Conclusion
An Acute Pain Service at Cabrini Health Malvern is a seemingly warranted (and well supported) model of improved care. It is anticipated that enhanced post-operative pain management will facilitate a more expeditious return to functionality, thus potentially reducing post-operative complications and length of stay. With these achieved, patient satisfaction would likely also be enhanced.
The circumstances surrounding the first administration of a general anaesthetic for a surgical operation in Australia

Dr John Paull
School of History and Classics, University of Tasmania, Launena, TAS

William Russ Pugh gave the first general anaesthetic for a surgical operation in Australia on 7 June 1847, in Launceston. The events which led up to this were partly related to Pugh’s medical education and his interest in natural history and chemistry. He was also sufficiently successful in his practice to be able to build a magnificent Georgian residence in Launceston, with a well equipped chemical laboratory. Other circumstances, related to the timely delivery of London newspapers, with news of etherisation, to Launceston, and the fact that Pugh’s wife Cornelia was an avid reader of these periodicals ‘from home.’ It is almost certain that she recognised the importance of the news item and picture of the apparatus and showed them to Pugh.

The availability of the components of the apparatus in his laboratory and his possession of a still allowing the production of ether were also factors. That he had his own private hospital meant he did not have to obtain government permission to initiate anaesthesia. His friendship with the editor of the Launceston Examiner newspaper ensured that the editor attended the first demonstration of etherisation and publicised it widely.

The fact that Pugh was on good terms with the proprietor and editor of the Australian Medical Journal in Sydney ensured the publication of his feat in the July edition of that Journal and finally, Pugh’s scientific training led him to review his experience and write a critical report for the same issue of the journal.
The effect of perioperative ketamine on the risk of longer term postoperative pain: A literature review

Philip Peyton
Dept of Anaesthesia, Austin Health, Melbourne, Australia

Aims
Most studies on postoperative pain management focus on acute postoperative pain (< 48 hours). Few examine longer term pain outcomes. N-methyl D-aspartate (NMDA) antagonists (ketamine, N₂O) block spinal sensitization mechanisms that lead to chronic pain. A two year follow up of 640 patients in the ENIGMA 1 trial found the incidence of severe (VAS>5) post-surgical pain was 9.2% and that the rate was halved after N₂O anaesthesia (Chan et al. Pain. 2011. 152(11): 2514-20). The potential for ketamine to protect against this debilitating complication is unclear.

Methods
A literature review was conducted using PubMed of all prospective randomized controlled studies examining the use of perioperative IV ketamine (intraoperative +/- up to 24 hours postoperative) to influence postoperative pain in comparison with either placebo or a standard of care regime not including an NMDA antagonist. Only those studies which included a measure of pain intensity at five or more days postoperatively were selected for final analysis.

Results
5 studies were found which met the criteria. In four of these (total n = 330 patients), pain after five days was significantly less after perioperative IV ketamine. In two of these studies (n = 194) the difference was still significant at six months. In the fifth study (n = 40) only a borderline effect on pain intensity at seven days was found and this failed to reach statistical significance.

Conclusion
Available data suggests that a large randomised trial of an IV NMDA receptor blocker to prevent chronic post-surgical pain is warranted.
**Tobacco ask-advise-refer practice management in the pre-admission unit**

**Chris Pysyk**
Department of Anesthesiology, The Ottawa Hospital, Ottawa, Ontario, Canada

**Aims**
Expert opinion on management of the perioperative tobacco-using patient recommends a three-step approach: Ask each patient about tobacco product use, Advise cessation as far in advance as possible, and Refer patients to cessation supports. The aims of this quality improvement (QI) initiative include: 1) Identify the frequency Pre-Admission Unit (PAU) patients assessed by an anesthesiologist endorse that Ask-Advise-Refer (AAR) practice was used, and 2) Increase AAR rates by 20% relative to baseline values.

**Methods**
Following vetted approval for a QI initiative by the Research Ethics Board Chair, questionnaires were offered to patients after their PAU visit. A repeat questionnaire was administered after an intervention consisting of 1) An evidence-based Grand Rounds highlighting AAR methodology, the lack of harm and reduction in complications with perioperative smoking cessation, and 2) Placement of referral cards with toll-free smoking cessation telephone support information in each PAU assessment room. Fisher’s exact test compared baseline and post-intervention AAR practice.

**Results**
At baseline, PAU patients endorsed that their anesthesiologists used AAR practice 93%, 78%, and 57% of the time, respectively. Post-intervention, patients endorsed use of AAR methodology 98% (P = 0.17), 100% (P < 0.001), and 71% (P = 0.055) of the time, respectively. The relative increase in AAR practice was 5%, 27%, and 25%, respectively, from baseline to post-intervention.

**Conclusions**
Tobacco Ask-Advise-Refer practice management trended towards an increase in all three domains after an intervention consisting of Grand Rounds and provision of smoking cessation referral cards in PAU.

**Reference**
The laryngeal mask airway supreme™ versus the tracheal tube as a ventilatory device in elective laparoscopic cholecystectomy – A prospective randomised trial

KH Quek¹, CY Choo², EL Ooi³, JW Phoo⁴, T Xu⁵

¹-⁴ Department of Anaesthesia & Surgical Intensive Care, Changi General Hospital, Singapore, 2 Simei Street 3, Singapore 529889
⁵ Singapore Clinical Research Institute, Nanos #02-01, 31 Biopolis Way, Singapore 138669

Aims
We hypothesised that the use of the Laryngeal Mask Airway Supreme™ (LMA-S) in patients undergoing elective laparoscopic cholecystectomy is associated with greater ease of insertion and reduced haemodynamic variability during insertion, compared to endotracheal intubation.

Methods
After ethics approval and written informed consent, 76 ASA 1 & 2 patients aged 21-80 years undergoing elective laparoscopic cholecystectomy were prospectively randomized to receive either LMA-S or endotracheal intubation (40 LMA-S ; 36 ETT). Exclusion criteria included BMI > 30, known GERD, or contraindication to drugs in the standardized anaesthesia protocol. Independent, trained observers recorded all outcomes. Primary outcome was time to effective airway (TTEA), evidenced by end-tidal capnography. Secondary outcomes were number of attempts taken for successful placement of airway device and gastric tube, haemodynamic response to insertion, and incidence of post-operative sore throat.

Results
Baseline characteristics were similar in both groups. There were 2 crossovers from LMA-S to endotracheal intubation due to significant leak at induction. All patients were adequately ventilated. Using intention-to-treat analysis, TTEA in the LMA-S group was faster [31.2 (SD 27.8) vs 71.4 (49.9) seconds, mean difference 40.2 (95% CI 21.3-59.1; p=0.0001)]. First time insertion success rates were higher for the LMA-S (Airway device: 38/40 vs 26/36, p=0.01; Gastric tube: 38/40 vs 24/36, p=0.002). The LMA-S was associated with less haemodynamic changes at 1 & 5 minutes after insertion, and less post-operative sore throat [4/40 (10%) vs 10/36 (27.8%); p=0.046].

Conclusion
The LMA-Supreme is an appropriate alternative to endotracheal intubation in selected patients undergoing elective laparoscopic cholecystectomy.

References
Blaming the Balloon: Aetiology of post-intubation tracheobronchial rupture

Dr Jennifer Reilly

John Hunter Hospital, Newcastle, Australia. John Hunter Hospital, Lookout Road, New Lambton NSW; Lausanne University Hospital, Centre Hospitalier Universitaire Vaudois, Rue de Bugnon 21, 1011 Lausanne, Switzerland

Tracheobronchial rupture may present following trauma, neck or thoracic surgery, airway instrumentation or positive pressure ventilation. Airway instrumentation is a major cause of iatrogenic tracheal rupture, including endotracheal intubation with single or double lumen tubes, tracheal cannulation or rigid bronchoscopy. Procedures performed under emergency conditions pose a particular risk.

We report the case of an 82 year old female intubated in the pre-hospital setting for unconsciousness associated with broncho aspiration and subsequently found to have tracheal rupture. When the over-inflated endotracheal cuff was observed on imaging, the question was asked whether the endotracheal tube cuff had been over-inflated at the time of intubation. It had not, but the patient had been observed to cough on the endotracheal tube connected to a circuit with a closed expiratory valve. The tear was treated conservatively, but despite confirmed healing on bronchoscopy the patient re-developed pneumonia, showed poor neurological recovery and died.

We review the risk factors for post-intubation tracheobronchial rupture, its clinical presentation and classic early radiographic signs. The aetiology of cuff-related tracheobronchial rupture is considered in respect to the properties of early and modern endotracheal tube cuffs. Cuff over-inflation continues to be cited as a cause of tracheal rupture in the literature, but cadaver studies suggest this is unlikely with modern high volume-low pressure cuffs in the healthy trachea. We conclude that in the healthy trachea, modern endotracheal tube cuff over-inflation seen on imaging is more likely to be a consequence of tracheal rupture than its cause.

(Endnotes)

How do patients rate their experiences following regional anaesthesia – results from the AURORA study

Gloria Seah1, Lauren Braam2, Craig Ironfield3, Vesna Stanovic4, Colleen Ward5, Catherine Jowett6, Helen Dye7, David Pirotta8, Susan Shaw9, Halia O’Shea10, Hou Yee Lai11, Leanne Gleeson12, Heather Reynolds13, Angela Schweikert14, Michael Barrington15

1-4 15 St Vincent’s Hospital Melbourne, Victoria
5 Geelong Hospital, Geelong, Victoria
6 Princess Alexandra Hospital, Woolloongabba, Queensland
7 Northern Rivers Anaesthesia, Lismore, New South Wales
8 Wellington Hospital, Newtown, Wellington, New Zealand
9 Lismore Base Hospital, Lismore, New South Wales
10 Gold Coast Hospital, Southport, Queensland
11 University of Malaya Medical Centre, Kuala Lumpur, Malaysia
12 Mater Adult Hospital, South Brisbane, Queensland
13 Royal Brisbane and Women’s Hospital, Herston, Queensland
14 Logan Hospital, Meadowbrook, Queensland

Aims
The Australian and New Zealand Registry of Regional Anaesthesia (AURORA) collects patient-rated outcomes (PROs) following peripheral nerve blockade (PNB).

Methods
We developed a questionnaire to collect PROs during the early post-operative period. Questions were structured from perioperative Leiden and McGill Pain Questionnaires (deemed valid and reliable). PROs also comprised domains previously reported by patients to our registry. The study period was July 2011 to April 2012.

Results
Due to word count constraints, data presented comprised results from three of 11 questions. Of 4002 patients, 2667 (66%) questionnaires were completed. In response to ‘How much did you satisfied about the explanation of the regional anaesthesia procedure’, 74% were satisfied/completely satisfied, 5% were dissatisfied/completely dissatisfied and 19% were unable to answer. In response to ‘How much did you after the operation experience pain’, 56% reported mild/none, 21% moderate, 10% severe and 13% were unable to answer. In response to ‘When the numbness/heaviness of the nerve block wore off, how much pain did you experience?’, 41% reported mild/none, 28% moderate, 15% severe and 16% were unable to answer. In response to ‘How much did your anaesthetist pay attention to complaints like pain and discomfort’, 70% were satisfied/completely satisfied, 3% were dissatisfied/completely dissatisfied and 24% were unable to answer.

Conclusions
Patients reported positively to explanation about the PNB procedure, although postoperatively, 24% of patients could not answer questions regarding their anaesthetists’ involvement. A notable proportion (43%) had significant pain during nerve block recession. Improvements regarding transitional analgesia or use of continuous catheter techniques may be necessary.
Modelling perioperative decisions

Richard Seglenieks¹, Guy Ludbrook¹, Thomas Painter², Arthas Flabouris², Lyell Brougham², Jenny Cain²

¹ The University of Adelaide, SA
² Royal Adelaide Hospital, North Terrace, Adelaide

Introduction
Analysis of key patient data shows potential in facilitating preoperative planning and decision support¹⁻³. This study aimed to determine whether preoperative factors have utility in predicting problems in the early postoperative period, to assist early triage and streaming of surgical patients.

Methods
With ethical approval, data from 1291 cases were collected over 6 weeks. The relationship between patient and surgical factors, and postoperative outcomes, were examined using binomial logistic regression analysis. Predictive mathematical models were developed for specific complications and decisions.

Results
There was a high incidence of postoperative complications, including desaturation (13.6%), hypotension (5.8%) and apnoea (5.5%). Attendance by an anaesthetist was required in 19.9% of cases. Complications occurred with similar frequency in elective and emergency cases. Prolonged stay in recovery for medical reasons was common, with 36% of cases staying >2 hours and 8% >4 hours.

Patient and surgical factors provided a good fit with a number of postoperative outcomes. Predictors of prolonged recovery stay included surgical complexity, ASA grade, BMI, preoperative oxygen saturation, preoperative arrhythmias and previous anaesthetic issues (area under receiver operating characteristics curve (AUC) = 0.80); predictors of postoperative referral to intensive care or high dependency units included surgical complexity, BMI, obstructive airway disease, orthopnoea, cerebrovascular disease and poor exercise tolerance (AUC = 0.84); predictors of hypotension included surgical complexity, ASA grade, preoperative arrhythmias, preoperative blood pressure and opioid tolerance (AUC = 0.79).

Conclusions
Predictive models may have utility in assisting clinicians to determine individual patient risk of early postoperative problems, and hence aid perioperative planning.

References
Measurement of angle of tilt for elective caesarian section for three different BMI groups

Jitin Sharma¹, Ishwinder Suri², Brin Grewal²

¹ Southern Health, Department of Anaesthesia, Monash Medical Centre, Clayton, Victoria
² South Warwickshire NHS Foundation Trust, Warwick, Warwickshire, UK

Introduction
Many studies have looked at haemodynamic changes during surgery with wedge devices. At Warwick Hospital we use inflatable wedge device to manage tilt and rely on visual actuation of the recommended 15degree tilt needed to prevent aortocaval-compression. We studied accuracy of the inflatable device to create a 15degree tilt on 3 groups of patients depending upon their Body-Mass-Index(BMI) and to see if there is correlation with drop in Blood Pressure(BP) with BMI and degree of tilt.

Methods
Prospective audit performed over two month period. 55 women booked for LSCS under Spinal were randomly included. Angle of tilt created after inflating the balloon wedge was measured using protractor device.

Result
Measured angle ranged from 8-20 degree. BMI’s ranged from 16-66. Resulting percentage drop in BP ranged from 0-52%. 13/25 women(45%) had a BP drop greater than 20%, 17(68%) of these had a measured angle of less than 15degrees. Separating the women in 3 groups purely according to BMI showed a difference in percent BP drop from a mean of 18% for group 1(BMI<25) to 22% for the group 2(BMI 25-30) to 24% for the group 3(BMI>30). Mean angle of tilt in-group 3 was 14.3 while in-group 2 and group 1 were 13.8 and 13.9 respectively.

Conclusion
Visual estimation of angle required using inflatable wedge achieved near 15 degree with patients from BMI 16-66. Using Pearson’s Correlation coefficient statistically there is weak correlation with drop in BP with increasing BMI. Percentage BP drop increases with increasing BMI despite achieving a near 15 degree tilt.
Dexmedetomidine sedation in an 11-year old child for electrophysiologic study and radiofrequency ablation

Tay YC1, Hwang NC2

1 Registrar, Anaesthesia and Surgical Intensive Care, Singapore General Hospital, 1 Hospital Drive, Singapore 169608
2 Senior Consultant and Head, Department of Cardiothoracic Anaesthesia, National Heart Centre, 17 Third Hospital Avenue, Singapore 168752

Dexmedetomidine (Precedex®), an α2-adrenoceptor agonist with sedative, analgesic and anxiolytic properties has been widely used in pediatric intensive care units worldwide. Administration of dexmedetomidine for sedation is often associated with bradycardia, hypertension and hypotension. We report our experience of an un-intubated pediatric patient who successfully underwent an electro physiologic study and radiofrequency ablation with co administration of dexmedetomidine and fentanyl for sedation without complications. Synergistic use of fentanyl with dexmedetomidine could possibly have contributed to the lower loading dose of dexmedetomidine (0.343 mcg/kg) used. This combination achieved hemodynamic stability without bradycardia or hypotension, while maintaining adequate rousable sedation. Dexmedetomidine has good potential for sedating paediatric patients safely in the remote setting without affecting electrophysiology studies. We recommend careful consideration of the pharmacodynamics and individualization of the co administered drug doses used in patients, titrated to response and effect.
Ventricular wall motion assessed during the post anaesthetic induction period using transgastric left ventricular short axis view observation and strain analysis relatively underestimates the severity of wall motion abnormality

Kosaku Toyota, Ryosuke Ishida, Yoji Saito

Department of Anaesthesiology, Shimane University Faculty of Medicine, Izumo city, Shimane prefecture

Aim
Preload and afterload alleviation induced by anaesthetic induction may affect the severity assessment of wall motion abnormality using transesophageal echocardiography (TEE). This study is aimed to investigate the discrepancy between the wall motion abnormality assessment obtained by preoperative transthoracic echocardiography (TTE) study and those by two dimensional observation and strain analysis using TEE during the post anaesthetic induction period.

Method
Transgastric left ventricular short axis imaging (LVSAX) digitally obtained immediately after anaesthetic induction for coronary artery bypass grafting surgery were evaluated. Two physicians, who qualified Japanese board of perioperative transesophageal echocardiography examination, and blinded to patient's information, evaluated the wall motion abnormality using following two methods, LVSAX two dimensional observation only (two dimensional evaluation), and two dimensional observation combined with radial strain analysis (two dimensional with strain evaluation). Accumulated mid ventricular 6 segments scores, normal:1, hypokinesis:2, akinesis:3, dyskinesis:4, aneurysm:5, were defined as wall motion score (WMS).

Results
LVSAX of 10 patients diagnosed wall motion abnormality preoperatively were analyzed. WMS using preoperative TTE was 7.5(7-9) [median (inter-quartile range)]. WMS using two dimensional evaluation and two dimensional with strain evaluation were 7.0(6-8), and were significantly lower than that using preoperative TTE (p<0.05, Wilcoxon signed-rank test).

Conclusion
Ventricular wall motion assessed during the post anaesthetic induction period using transgastric left ventricular short axis view relatively underestimates the severity of wall motion abnormality.
Comparing of intrathecal diamorphine and fentanyl as adjuncts in spinal anaesthesia for caesarean section

J Sharma
George Eliot Hospital, College Street, Nuneaton, CV107DJ, UK

Introduction: Use of intrathecal opioids as adjuncts for caesarean section (LSCS) is well documented. Intrathecal diamorphine and fentanyl are two most commonly used agents as adjuncts in UK to provide analgesia after caesarean section. National Institute of Clinical Excellence (NICE) guidelines suggest the use of Diamorphine as it reduces the post operative analgesic requirements in women undergoing LSCS. We conducted audit on postoperative analgesic requirements and time to first analgesic requirement in patients receiving intrathecal diamorphine and fentanyl.

Method: We audited 50 consecutive women scheduled for both elective and emergency LSCS who received diamorphine (28) and fentanyl (22) as adjuncts to spinal anaesthesia. Follow up these patients for post operative requirements of analgesia till the end of 24hrs. The postoperative analgesics that were used were Oromorph, Paracetamol and Ibuprofen. We documented the incidences of Nausea, vomiting and pruritus.

Results: Mean time to require first analgesia was 4 hours in those who received fentanyl and 8 hours in those who received diamorphine. The mean post operative requirement for Oromorph was nearly twice in those who received fentanyl while there was a 50% increased mean consumption of Paracetamol and Ibuprofen in fentanyl group. The incidence of Nausea/vomiting was 1.5 times higher in the fentanyl group. One patient who received diamorphine had pruritus.

Recommendations: We recommend use of diamorphine as adjunct to spinals in women undergoing LSCS as it significantly reduces the need for postoperative analgesia and increases the time to first requirement of analgesia.

Reference:
1. CG13 Caesarean section: NICE guideline 14 April 2004