AQUA 2023

Annual Queenstown Update in Anaesthesia

Programme & Abstracts

www.aqua.ac.nz

Table of Contents

Welcome back to Queenstown with AQUA 2023!

Dear AQUA Delegate,

We are pleased to bring you another broad-ranging collection of clinically focused updates, providing a much-needed opportunity to connect with friends and colleagues, in such a scenic location.

This year, Dr Courtney Thomas will be speaking about her research on the Māori experience of anaesthesia. Dr Shelia Hart is joining us virtually to update us about the NZ Assisted Dying Programme. Drs Heidi Omundsen, Renee Franklin, and Mr Jeremy Rossaak will inspire us with their work developing a Shared Decision-Making Clinic in Hauora a Toi Bay of Plenty. Then Drs Cathy Caldwell and Jeremy Cooper will ground us with a sobering case series of complications related to central line placement. We have updates from experts in obstetrics, trauma, regional anaesthesia, and research, and are privileged to welcome back Prof van Haren from St Georges Hospital in Sydney to provide updates in intensive care medicine.

As has become the tradition with AQUA, we look forward to yet another unique story to close the meeting, this year from Drs Gareth Andrews and Richard Stephenson, about their impressive unsupported ski expedition to the South Pole.

The 2023 programme includes our inaugural Queenstown POCUS course, which proved very popular, filling up in record time. We have two CPD-compliant ACLS workshops on Friday, and a regional anaesthesia for the chest wall workshop on Saturday afternoon.

The social programme continues to be a strength, including the traditional AQUA BBQ at Coronet Peak Friday evening. This year the AQUA Conference dinner is at Walter Peak High Country Farm, bookended by a magical night cruise cross Lake Wakatipu on the TSS Earnslaw. We look forward to the chance to catch up!

Finally, a special thank you to our sponsors for their continued support of AQUA.

We hope you enjoy the conference.

Dr JeeYoung Kim
Dr Helen Lindsay
Dr Neil MacLennan
Dr Mark Welch
AQUA Organizing Committee 2023

Faculty

Prof Frank van Haren	Director Intensive Care Unit, St George Hospital, Sydney Professor, College of Health and Medicine, Australian National University
Dr David Choi	Specialist Anaesthetist, Counties Manukau
Dr Carolyn Deng	Specialist Anaesthetist, Te Toka Tumai Auckland
Dr Sara Allen	Specialist Cardiothoracic Anaesthetist & Clinical Director, Te Toka Tumai Auckland
Dr Shelia Hart	Specialist Anaesthetist & Deputy Clinical Director, Capital, Coast and Hutt Valley Immediate Past President NZSA
Dr Heidi Omundsen	Specialist Anaesthetist, Hauora a Toi Bay of Plenty
Dr Renee Franklin	Specialist Anaesthetist, Hauora a Toi Bay of Plenty
Mr Jeremy Rossaak	Specialist General Surgeon, Hauora a Toi Bay of Plenty
Dr Courtney Thomas	Specialist Anaesthetist, Waitaha Canterbury
Dr Lauren Kelly	Specialist Anaesthetist, Capital, Coast and Hutt Valley
Dr Richard Stephenson	Specialist Emergency Physician & Clinical Director, Dunedin Hospital
Dr Cathy Caldwell	Specialist Anaesthetist, Private Practice Wellington
Dr Jeremy Cooper	Specialist Cardiothoracic Anaesthetist, Te Toka Tumai Auckland
Dr Gareth Andrews	Specialist Anaesthetist, St Vincent's Hospital, Sydney

ACLS Workshop

Dr JeeYoung Kim	Specialist Anaesthetist, Te Toka Tumai Auckland
Dr Dan Faulke	Specialist Anaesthetist & Deputy Clinical Director, Te Toka Tumai Auckland
Dr Amy Pollard	Specialist Anaesthetist, Waikato
Dr Emma Foster	Anaesthetic Fellow, Waikato
Dr William Law	Anaesthetic Fellow, Te Toka Tumai Auckland

POCUS Workshop

Dr JeeYoung Kim	Specialist Anaesthetist, Te Toka Tumai Auckland
Dr Lora Pencheva	Specialist Anaesthetist, Te Toka Tumai Auckland
Dr Sara Allen	Specialist Cardiothoracic Anaesthetist & Clinical Director, Te Toka Tumai Auckland
Dr David Choi	Specialist Anaesthetist, Counties Manukau
Dr Dan Cochrane	Specialist Cardiothoracic Anaesthetist, Te Toka Tumai Auckland
Dr Dan Faulke	Specialist Anaesthetist & Deputy Clinical Director, Te Toka Tumai Auckland
Dr Nick Harrison	Specialist Anaesthetist, Lakes

Dr Sam Kransingh	Specialist Anaesthetist, South Canterbury
Dr Amy Pollard	Specialist Anaesthetist, Waikato
Dr Vik Singh	Specialist Anaesthetist, Te Toka Tumai Auckland
Dr Willem van der Merwe	Urgent Care Physician, Emergency Care Department Te Toka Tumai Auckland
Dr Abhi Charukonda	Anaesthetic Fellow, Te Toka Tumai Auckland

Regional anaesthesia for chest trauma Workshop

Dr Mark Welch	Specialist Anaesthetist, Te Toka Tumai Auckland
Dr Lora Pencheva	Specialist Anaesthetist, Te Toka Tumai Auckland
Dr Neil MacLennan	Specialist Anaesthetist, Te Toka Tumai Auckland
Dr David Choi	Specialist Anaesthetist, Counties Manukau
Dr Dan Cochrane	Specialist Cardiothoracic Anaesthetist, Te Toka Tumai Auckland
Dr Nick Harrison	Specialist Anaesthetist, Lakes
Dr Sam Kransingh	Specialist Anaesthetist, South Canterbury
Dr Helen Lindsay	Specialist Anaesthetist, Te Toka Tumai Auckland
Dr Bridget Bishop	Anaesthetic Fellow, Te Toka Tumai Auckland
Dr Abhi Charukonda	Anaesthetic Fellow, Te Toka Tumai Auckland

Local Organising Committee

Dr Neil MacLennan	Specialist Anaesthetist, Te Toka Tumai Auckland
Dr Mark Welch	Specialist Anaesthetist, Te Toka Tumai Auckland
Dr Helen Lindsay	Specialist Anaesthetist, Te Toka Tumai Auckland
Dr JeeYoung Kim	Specialist Anaesthetist, Te Toka Tumai Auckland

Event Manager

Joanne Martin	Director, Professional Events Management Ltd

Social Programme

THURSDAY, 24th AUGUST 2023

17:00 – 19:00

Registration & Welcome Function
Exhibitor Area, Pounamu Room, Heritage Hotel, Queenstown

Browns Ski Shop Fitting Service
Icon Foyer, Heritage Hotel, Queenstown

FRIDAY, 25th AUGUST 2023

16:30 – 21:00 approx.

AQUA BBQ Function
Coronet Peak Base Building, Queenstown

16:30	Bus to Coronet Peak departs (for non-skiers) (with a 17:45 bus for POCUS Workshop attendees)	Main Entrance, Heritage
16:30	Function area opens	Coronet Peak Café
18:00	Function commences	Coronet Peak Café
20:30	First bus to Heritage departs	Coronet Peak Car Park
21:10	Bus to the Heritage departs (at the conclusion of night-skiing)	Coronet Peak Car Park

SATURDAY, 26th AUGUST 2023

06:30 – 08:00

Rugby All Blacks v South Africa
Mackenzie's Bar, Heritage Hotel, Queenstown

17:30 – 21:30 (please be at Steamer Wharf no later than 17:45, buses depart the Heritage Hotel at 17:35)

AQUA Conference Dinner (pre-purchase)
TSS Earnslaw (with canapes and drinks) and Walter Peak Station

16:10	Bus from Coronet Peak to the Heritage departs (Arriving back at the Heritage ~16:55)	Coronet Peak Car Park
17:35	Conference Dinner bus departs from Heritage	Main Entrance, Heritage
18:00	TSS Earnslaw departs from Steamer Wharf	Steamer Wharf
18:45	Guests arrive at Walter Peak Station for dinner	Walter Peak
20:45	Guests invited to a farm demonstration	
21:45	TSS Earnslaw departs Walter Peak (Arriving back at Queenstown ~22:00)	Steamer Wharf

Scientific Programme

AQUA - ANNUAL QUEENSTOWN UPDATE IN ANAESTHESIA

Friday 25 August, 2023

0645 - 0745	**Breakfast (Pounamu Room, Exhibitor Area)**	
Session 1 - Chair: Dr Jonathan Pankhurst (Icon Conference Room)		
0755 - 0800	**Welcome and Introduction**	
0800 - 0830	**ICU update**	***Prof Frank van Haren***
0830 - 0900	**Regional anaesthesia update**	***Dr David Choi***
0900 - 0930	**Research in anaesthesia update**	***Dr Carolyn Deng***
0930 - 1000	**Valvular dilemmas for non-cardiac anaesthetists**	***Dr Sara Allen***
1000 - 1030	**Morning Break (Pounamu Room, Exhibitor Area)**	
Session 2 - Chair: Dr Helen Lindsay (Icon Conference Room)		
1030 - 1100	**NZ Assisted Dying Programme**	***Dr Sheila Hart***
1100 - 1200	**Shared Decision Making**	***Drs Heidi Omundsen, Renee Franklin & Mr Jeremy Rossaak***
Close - Lunch packs and fresh fruit available for pick-up (Mackenzies Restaurant)		
1230 - 1235	**Bus to Coronet Peak for skiing/boarding (Main Entrance)**	
Workshop - ACLS [A1] (Icon Conference Room) 1300 - 1445hrs		
1445 - 1515	**Afternoon Break (Icon Foyer)**	
Workshop - ACLS [A2] (Icon Conference Room) 1515 - 1700hrs		

AQUA - ANNUAL QUEENSTOWN UPDATE IN ANAESTHESIA

Saturday 26 August, 2023

0645 - 0755	**Breakfast (Pounamu Room, Exhibitor Area)**	
Session 3 - Chair: Dr Sara Allen (Icon Conference Room)		
0800 - 0830	**Delirium in the ICU**	***Prof Frank van Haren***
0830 - 0900	**Maori experience of anaesthesia in the perioperative setting**	***Dr Courtney Thomas***
0900 - 0930	**Obstetric anaesthesia update**	***Dr Lauren Kelly***
0930 - 1000	**Trauma**	***Dr Richard Stephenson***
1000 - 1030	**Morning Break (Pounamu Room, Exhibitor Area)**	
Session 4 - Chair: Drs JeeYoung Kim & Mark Welch (Icon Conference Room)		
1030 - 1115	**CVL complications**	***Drs Cathy Caldwell & Jeremy Cooper***
1115 - 1200	**Unsupported South Pole Ski Expedition**	***Drs Gareth Andrews & Richard Stephenson***
Close - Lunch packs and fresh fruit available for pick-up (Mackenzies Restaurant)		
1230 - 1300	**Bus to Coronet Peak for skiing/boarding (Main Entrance)**	
Workshop - Regional anaesthesia for chest trauma (Icon Conference Room) 1300 - 1630hrs		

Regional anaesthesia update

Dr David Choi
Specialist Anaesthetist, Counties Manukau

We explore the relevant regional anaesthesia updates in the past few years, and discuss what I hope to be clinically relevant studies and updates. We will travel around the body from head to toe and give large-picture global updates. My aim is that this talk will have something interesting for everyone – from the block masters to those that don't utilise regional anaesthesia in their day-to-day practice.

Here are the following questions that we aim to answer during the update. Come along and join the discussion to find the latest answers to the following questions…

Upper limb:

- How common is rebound pain?[1]
- Who is at most risk of reporting rebound pain?[2]
- What is the satisfaction rate of patient's having blocks, and should you consider this for your next upper peripheral limb surgery?
- How long does dexmedetomidine additive actually "add" to the duration of the block? One day? Two days? And what time frame would you expect the rebound pain to occur?[3]
- What percentage of patients receiving an interscalene block require HFNP or other forms of respiratory support and what preoperative patient factors determine the highest risk? Should you proceed blocking with this patient without a HDU bed?[4]
- In patients that have a documented nerve injury, would you consider a peripheral nerve block? Or is the double-whammy injury a real thing?[5]

Hips and knees:

- What updates are there with the PENG (pericapsular nerve group block) and is there evidence to support their routine use?[6]
- GA vs Regional Anaesthesia: an age-old debate that has recently come to light again
    - We will explore a couple of gold-standard large meta-analysis as well as discussing the two studies that reignited the debate – REGAIN and RAGA trials.[7]
    - Do anaesthetists affect patient outcomes? and if so – by how much?[8]
    - What insights does the ANZ Hip Fracture database reveal?[9]
    - ICAROS group meta-analysis on regional vs general anaesthesia for hip arthroplasty and total knee arthroplasty (TKA) and what do they conclude?[10,11]

Neuraxial anaesthesia / regional anaesthesia for spines

- Does the use of ultrasound improve success when placing a lumbar or thoracic epidural?[12]
- Is there role for regional anaesthesia in spine surgery?
- What does the evolving literature reveal about erector spinae blocks in lumbar spine surgery?[13]

Knees and ankles:

- Are peripheral nerve blocks for ankle fracture surgery useful? And does it add anything to a spinal?[14]
- Where is the optimum placement of a adductor canal catheter (ACC) for TKA?[15]
- What is the best way to secure a catheter to minimise migration? What is the failure rate of ACCs?[16]
- Should we be considering ACC for our TKA patients?[17]

Truncal trauma

- What role does Acute Pain Service play in looking after patients with blunt force trauma of the chest?[18]
- Does their involvement change patient outcomes?
- What does the local data (Middlemore) show after the implementation of the COMBAT protocol for rib fractures?

Interesting but less used blocks…

- We will discuss the use and application of the clavipectoral fascial block for midshaft clavicle fracture surgery.
- What are the benefits of this block vs tried-and-true Interscalene block?[19]

Finally, adjuncts…

- We explore the latest network meta-analysis looking at how various additives for regional anaesthesia affect the mean duration of action.
- What additives are used around the world? What can you use to prolong your block successfully?[20]

I hope you can join me in this upcoming meeting to discuss, debate and answer some of these questions!

Resources

1. Sunderland S, Yarnold CH, Head SJ, et al. Regional versus general anesthesia and the incidence of unplanned health care resource utilization for postoperative pain after wrist fracture surgery: Results from a retrospective quality improvement project. *Reg Anesth Pain Med*. 2016;41(1):22-27. doi:10.1097/AAP.0000000000000325
2. Barry GS, Bailey JG, Sardinha J, Brousseau P, Uppal V. Factors associated with rebound pain after peripheral nerve block for ambulatory surgery. *Br J Anaesth*. 2021;126(4):862-871. doi:10.1016/j.bja.2020.10.035
3. Aliste J, Layera S, Bravo D, et al. Randomized comparison between perineural dexamethasone and combined perineural dexamethasone-dexmedetomidine for ultrasound-guided infraclavicular block. *Reg Anesth Pain Med*. 2022;47(9):554-559. doi:10.1136/rapm-2022-103760
4. Xu L, Gessner D, Kou A, Kasimova K, Memtsoudis SG, Mariano ER. Rate of occurrence of respiratory complications in patients who undergo shoulder arthroplasty with a continuous interscalene brachial plexus block and associated risk factors. 2023:1-7. doi:10.1136/rapm-2022-104264
5. Yin J, Yin W, Kairis E, Thomas S, Montoya M, Orebaugh S. Neurologic outcomes with peripheral nerve blockade in distal upper extremity nerve trauma: A retrospective study. *Reg Anesth Pain Med*. 2022;48(3):141-143. doi:10.1136/rapm-2022-103734
6. Bravo D, Aliste J, Layera S, et al. Randomized clinical trial comparing pericapsular nerve group (PENG) block and periarticular local anesthetic infiltration for total hip arthroplasty. *Reg Anesth Pain Med*. 2023;0(0):rapm-2023-104332. doi:10.1136/rapm-2023-104332
7. Neuman MD, Feng R, Carson JL, et al. Spinal Anesthesia or General Anesthesia for Hip Surgery in Older Adults. *N Engl J Med*. 2021;385(22):2025-2035. doi:10.1056/nejmoa2113514
8. Papachristofi O, Sharples LD, Mackay JH, Nashef SAM, Fletcher SN, Klein AA. The contribution of the anaesthetist to risk-adjusted mortality after cardiac surgery. *Anaesthesia*. 2016;71(2):138-146. doi:10.1111/anae.13291
9. Lin DY, Woodman R, Oberai T, et al. Association of anesthesia and analgesia with long-term mortality after hip fracture surgery: an analysis of the Australian and New Zealand hip fracture registry. *Reg Anesth Pain Med*. 2022;48(1):14-21. doi:10.1136/rapm-2022-103550
10. Memtsoudis SG, Cozowicz C, Bekeris J, et al. Anaesthetic care of patients undergoing primary hip and knee arthroplasty: consensus recommendations from the International Consensus on Anaesthesia-Related Outcomes after Surgery group (ICAROS) based on a systematic review and meta-analysis. *Br J Anaesth*. 2019;123(3):269-287. doi:10.1016/j.bja.2019.05.042
11. Memtsoudis SG, Cozowicz C, Bekeris J, et al. Peripheral nerve block anesthesia/analgesia for patients undergoing primary hip and knee arthroplasty: recommendations from the International Consensus on Anesthesia-Related Outcomes after Surgery (ICAROS) group based on a systematic review and meta-analy. *Reg Anesth Pain Med*. 2021;46(11):971-985. doi:10.1136/rapm-2021-102750
12. Arzola C, Balki M, Gleicher Y, Malavade A, Friedman Z. Comparison of ultrasound-assistance versus traditional palpation method for placement of thoracic epidural catheters: A randomized controlled trial. *Reg Anesth Pain Med*. 2022;47(9):571-572. doi:10.1136/rapm-2021-103296
13. Avis G, Gricourt Y, Vialatte PB, et al. Analgesic efficacy of erector spinae plane blocks for lumbar spine surgery: a randomized double-blind controlled clinical trial. *Reg Anesth Pain Med*. 2022;47(10):610-616. doi:10.1136/rapm-2022-103737
14. Sort R, Brorson S, Gögenur I, et al. Peripheral nerve block anaesthesia and postoperative pain in acute ankle fracture surgery: the AnAnkle randomised trial. *Br J Anaesth*. 2021;126(4):881-888. doi:10.1016/j.bja.2020.12.037
15. Lee B, Park SJ, Park KK, Kim HJ, Lee YS, Choi YS. Optimal location for continuous catheter analgesia among the femoral triangle, proximal, or distal adductor canal after total knee arthroplasty: a randomized double-blind controlled trial. *Reg Anesth Pain Med*. 2022:353-358. doi:10.1136/rapm-2021-103284
16. Fujino T, Yoshida T, Kawagoe I, Hinotsume A, Hiratsuka T, Nakamoto T. Migration rate of proximal adductor canal block catheters placed parallel versus perpendicular to the nerve after total knee arthroplasty: a randomized controlled study. *Reg Anesth Pain Med*. 2023:1-5. doi:10.1136/rapm-2022-104303

17. Hussain N, Brull R, Zhou S, et al. Analgesic benefits of single-shot versus continuous adductor canal block for total knee arthroplasty: a systemic review and meta-analysis of randomized trials. *Reg Anesth Pain Med*. 2022;48(2):49-60. doi:10.1136/rapm-2022-103756
18. Sborov KD, Dennis BM, De Oliveira Filho GR, et al. Acute pain consult and management is associated with improved mortality in rib fracture patients. *Reg Anesth Pain Med*. 2022;47(10):643-648. doi:10.1136/rapm-2022-103527
19. Zhuo Q, Zheng Y, Hu Z, et al. Ultrasound-Guided Clavipectoral Fascial Plane Block With Intermediate Cervical Plexus Block for Midshaft Clavicular Surgery: A Prospective Randomized Controlled Trial. *Anesth Analg*. 2022;135(3):633-640. doi:10.1213/ANE.0000000000005911
20. Schubert A-K, Seneviratne V, Stolz J, et al. The effect of adjuvants added to local anaesthetics for single-injection upper extremity peripheral regional anaesthesia. *Eur J Anaesthesiol*. 2023;Publish Ah:1-19. doi:10.1097/eja.0000000000001860

Research in anaesthesia update

Dr Carolyn Deng
Specialist anaesthetist, Te Toka Tumai Auckland

The Australian and New Zealand College of Anaesthetists has two research networks embedded into its organisation; the Clinical Trials Network (CTN) and the more recently conceived Professional Practice Research Network (PPRN). The ANZCA CTN is a world leading clinical trials network in anaesthesia, pain and perioperative medicine delivering high quality multicentre clinical trial research to improve patient safety and outcomes around the world. The ANZCA PPRN promotes and fosters research in the domains of communicator, collaborator, leader and manager, scholar, health advocate and professional and is aligned with the social sciences and qualitative or mixed-methods research. Both the CTN and PPRN build networks of clinical researchers and aim to foster excellent research.

Large randomised clinical trials remain the gold standard for determining the effectiveness of an intervention. However, traditional multicentre clinical trials are expensive, slow, difficult to conduct, and highly dependent on funding and research infrastructure. Evidence from trials may take years (or decades) to be adopted into clinical practice. Traditional clinical trials are also able to answer only one clinical question at a time, in a specific population of patients which may not be generalisable to different countries, regions or institutions. The trial protocol is fixed, and the scope of evaluation is limited to the interventions selected at the beginning of protocol development, which can become problematic if external scientific discovery or changes to clinical practice outpace trial delivery.

Adaptive platform trials (APTs) have been used in Intensive Care research in the last decade and has the potential to mitigate some of the problems with traditional perioperative clinical trials. APTs are perpetual learning platforms focused on a single clinical condition. Multiple interventions across different domains (treatments with a common mechanism) are evaluated simultaneously, and new treatments can be added to the platform over time. Data are analysed frequently in repeated interim analyses, and treatments discontinued if predetermined thresholds for harm, futility or efficacy are met. The adaptive nature of the platform implies that key features of the trial design are modified during the trial in response to accumulating data, which maximises statistical efficiency. For example, response-adaptive randomisation allows randomisation ratios to be altered to increase allocation to the treatment groups demonstrating efficacy, which accelerates trial conclusions and benefits trial participants. The sample size is not fixed and recruitment to a treatment arm continues until conclusions are reached. The control group is shared amongst the treatment arms, which increases trial efficiency. There is a common master protocol which specifies the study population, enrolment features, outcome measures and standardises procedures.

For example, REMAP-CAP (Randomised, Embedded, Multifactorial, Adaptive Platform trial for Community Acquired Pneumonia) was established by an international group of intensivists and trialists after the 2009-2010 H1N1 influenza pandemic, in response to the lack of research and evidence during the pandemic. Community acquired pneumonia was chosen as an important condition with significant burden of disease and unresolved therapeutic questions. A pandemic arm was written into the original REMAP-CAP protocol and remained dormant until it was activated by the COVID-19 pandemic in February 2020. Recruitment into the COVID-19 population commenced a month later, and within the year, evidence had emerged for hydrocortisone, tocilizumab, and therapeutic heparin, demonstrating the power and efficiency of APTs within a highly organised global network. Although APTs are more cost and time-efficient compared to running multiple individual clinical trials over time, they are operationally challenging and require substantial funding for the initial set up and ongoing maintenance. Very few national health research agencies have the ability to fund APTs. APTs are also statistically complex, and extensive statistical simulations are required during study development. The methods to control for bias due to time (non-concurrent control group), region and multiple treatment interactions are debated.

What are the important unanswered questions in perioperative research? There is increasing emphasis on consumer engagement to determine priorities in clinical research. In Australia, researchers are required to demonstrate rigorous consumer engagement to apply for health research funding through the National Health Medical Research Council. The James Lind Alliance (UK) funded by the National Institute of Health and Care Research (NIHR) was established to bring patients, carers, and clinicians together in Priority Setting Partnerships to identify top priorities for future health research in a variety of areas, including Anaesthesia and Perioperative Care. Funders are encouraged to direct funding towards identified areas of importance. The top 10 questions for Anaesthesia and Perioperative Care from 2019 are listed below:

1. Which factors before, during, and after receiving anaesthesia for surgery are most important to **improve patient outcomes and satisfaction**?
2. What are the impacts of involving patients in **shared decision making** about anaesthesia and care options before, during, and after surgery?
3. What **data** should be collected from patients about anaesthesia care before, during, and after surgery to better understand their outcomes and experiences?
4. How can **errors and patient injuries** in anaesthesia care be prevented?
5. How can outcomes in **frail and/or elderly** patients be improved after receiving anaesthesia for surgery?
6. What is the impact of **reducing opioids** (a type of medication that reduces pain, like morphine) during anaesthesia on patient outcomes and opioid dependence after surgery?
7. What **preparation**, treatment, or assessment before receiving anaesthesia for surgery improves patient outcomes?
8. How can **patients' feedback** about their experiences before, during and after surgery be used to improve anaesthesia care?
9. How can anaesthesiologists improve **pain control** after surgery?
10. What are the common **long-term side effects** of anaesthesia after surgery?

These are not specific research questions, but broadly cover most of perioperative care, and highlight the importance of many types of research methodology in perioperative research (clinical trials, qualitative studies, registry-based studies). There are many strengths of perioperative research in Aotearoa – including our world class national registries, centralised ethics process, strong public health system and our unique position to lead on perioperative health equity.

Resources

1. https://www.anzca.edu.au/research/anzca-clinical-trials-network
2. https://www.anzca.edu.au/research/anzca-professional-practice-research-network
3. Marcucci M, Painter TW, Conen D, et al. Hypotension-Avoidance Versus Hypertension-Avoidance Strategies in Noncardiac Surgery : An International Randomized Controlled Trial. *Ann Intern Med* 2023; 176: 605-614. 2023/04/24. DOI: 10.7326/M22-3157.
4. Devereaux PJ, Marcucci M, Painter TW, et al. Tranexamic Acid in Patients Undergoing Noncardiac Surgery. *N Engl J Med* 2022; 386: 1986-1997. 2022/04/02. DOI: 10.1056/NEJMoa2201171.
5. Myles PS, Yeung J, Beattie WS, et al. Platform trials for anaesthesia and perioperative medicine: a narrative review. *Br J Anaesth* 2023; 130: 677-686. 2022/12/02. DOI: 10.1016/j.bja.2022.10.030.
6. https://www.remapcap.org/covid19publications
7. https://www.jla.nihr.ac.uk/top-10-priorities/

Valvular dilemmas for anaesthetists not in the cardiac operating room

Dr Sara Jane Allen
BHB, MBChB, FANZCA, FCICM, MSt, Specialist Cardiothoracic Anaesthetist, Te Toka Tumai Auckland

Valvular pathologies are common in patients presenting for non-cardiac surgery, and management often presents dilemmas for the anaesthetist – which pathologies are safely managed outside of specialised cardiac centres, when is intensive care required, whether to involve cardiology or cardiac anaesthesia, and what recent updates in management have occurred?

During this presentation, we will discuss clinical issues and possible dilemmas associated with valvular heart disease and dysfunction, using case studies. Updates in the management of anticoagulation and antibiotic therapy for valvular pathologies, and interventional strategies for valvular heart disease will also be discussed.

NZ Assisted Dying Programme

Dr Sheila Hart

Specialist Anaesthetist and Deputy Clinical Director, Capital, Coast and Hutt Valley

Assisted dying (AD) became legal in NZ in November 2021, a year on from a binding referendum that the public voted on the End of Life Choice Act, with 63% voting in favour. NZ has joined the likes of Belgium, Netherlands, Luxemburg, Canada, Portugal, Germany, Australia and a multitude of US states in allowing AD.

Eligibility Criteria:

1. be aged 18 years or over
2. be a New Zealand citizen or permanent resident
3. suffer from a terminal illness that is likely to end their life within 6 months
4. be in an advanced state of irreversible decline in physical capability
5. be experiencing unbearable suffering that cannot be relieved in a manner that the person considers tolerable
6. be competent to make a decision about assisted dying

The process:

The request must be raised by the patient and be voluntary. The process can be stopped at any time and all other cares continue in parallel to this pathway.

1. Eligibility Assessment
    a. Attending Medical Practitioner (AMP) assessment
        i. This practitioner cares for the patient for the entire pathway
    b. Independent Medical Practitioner (IMP) assessment
    c. Psychiatrist assessment if either the AMP or IMP believe there is any concern about the person's capacity
2. Planning
    a. Date selection
    b. Method selection
    c. Discussion around what will happen on the day
3. Preparation
    a. Compliance review by the Registrar to ensure all criteria met, correct paperwork etc
    b. Prescription is sent to the pharmacy and meds are dispatched to AMP
4. Performance of the assisted death
    a. Confirmation of consent and capacity
    b. Complete assisted death
        i. AMP remains with the patient for the duration
    c. Completion of the death certificate and other documentation
        i. 1a is Assisted Death

Oversight:

1. Support for End of Life in NZ (SCENZ) group
    a. Maintain a list of practitioners providing services
    b. Provide standards of care
2. The Registrar
    a. A nominated employee of the MOH
    b. Must check requirements of the Act have been met before an AD takes place
    c. Supported by the AD secretariat
3. End of Life Review Committee
    a. Review AD reports

Who to contact:

- SCENZ 0800 223 852, AssistedDying@health.govt.nz

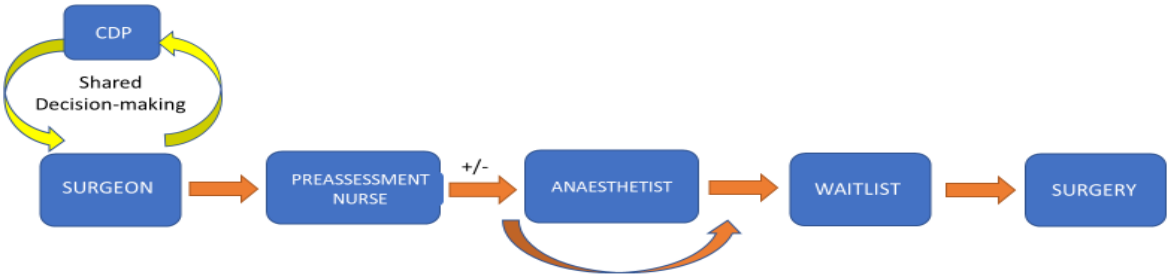
Shared Decision Making

Dr Heidi Omundsen, Dr Renee Franklin, Mr Jeremy Rossaak
Specialist Anaesthetists and General Surgeon, Hauora a Toi Bay of Plenty

Our team will be presenting on the development of our Complex Decision Pathway, a shared decision making pathway for high risk patients contemplating surgery in the Bay of Plenty, New Zealand. The perspective of both anaesthetists and surgeons will be discussed, along with feedback from clinicians and patients, and early audit data. The use of a structured communication guide to facilitate goals of care conversations will be discussed and demonstrated.

The Bay of Plenty is home to a growing and aging population[1]. Reflecting our population change, patients presenting for elective surgery at Hauora a Toi Bay of Plenty are older and more co-morbid than they have ever been in the past. Surgery and anaesthesia are safer than ever before, but as the demographics of our surgical cohort have changed, we have faced new challenges.

In 2017 our multi-disciplinary perioperative team identified a gap in our preassessment processes. Patients were being offered surgery and progressed through streamlined assessment and optimisation pathways, which worked well for most of our patients. However, these pathways were ill-equipped to deal with cases where there was substantial uncertainty about the risk-benefit balance of the patient having an operation. When concerns were raised, these concerns were often at odds with already established patient expectations, and communication between clinicians over these issues was often less than ideal. We recognised the need to introduce a new shared decision-making arm to our preassessment model.



Beginning in 2018 our preassessment team began developing and testing a multi-specialist assessment and shared decision-making pathway for very high-risk patients contemplating surgery. This has culminated in the development of our Complex Decision Pathway

The key features of the Complex Decision Pathway (CDP) are:

1. Initial identification by surgeons of patients for whom the decision to undergo operation is complex, and communication of this to the patient. Uncertainty about surgery can be identified by other clinicians (e.g. primary care physician, geriatrician, or anaesthetist) but this must be directed back to the surgeon, who then discusses this uncertainty with the patient. We have found this to be a crucial step in engaging patients effectively with the CDP.
2. Consultant to consultant referral to the CDP including information on proposed surgery, expected outcome, surgical risks, alternatives, and the likely outcome of not operating.
3. Triage of referrals with investigations and input from multiple specialists as necessary, with clear communication between those specialists.
4. An information leaflet is sent to the patient with examples of questions that will be asked at the clinic appointment. The patient then has opportunity to consider responses with whanau/friends and to identify appropriate support persons to accompany them.
5. Māori patients are offered an appointment that includes support from our cultural advisory service, and a Tikanga Māori framework for their appointment.
6. Patients attend an appointment at the CDP clinic with an anaesthetist and an intensive care specialist. For each patient 30mins is allowed for clinician case-conferencing, 1 hour to meet with

the patient and their whanau, and 30mins for documentation. This appointment is patient-centred and includes a goals of care conversation (facilitated by the Serious Illness Conversation Guide) as well as a standard medical assessment.

7. The patient and surgeon are given a recommendation consistent with the patient's goals. Where surgery is likely to proceed, this recommendation often includes perioperative advanced care planning.

We aim with effective communication and specialist assessment to provide the patient and their whanau with the best possible information about the risks and benefits of surgery, and to support them in shared decision-making that is consistent with their goals. Early feedback suggests that the process is highly valued by patients and staff alike. We have consistently found that a little over half of our patients choose a non-operative course. Early audit data from the Complex decision Pathway was published in Anaesthesia and Intensive Care in 2020[2]. As part of this new pathway, we have piloted using the Serious Illness Conversation Guide (the SICG) to support perioperative shared decision-making, and we have found it a useful tool. The SICG was developed initially by Ariadne Labs[2] and adapted for use in New Zealand by the Health Quality and Safety Commission (HQSC)[4]. It is essentially a checklist that helps clinicians elicit patients' goals and fears and make a bespoke recommendation using this additional information. The SICG provides clinicians with questions and prompts using patient tested language. Feedback from local clinicians using this tool has been positive, and early research results have reassured us that it is also well-received by patients.

As part of our continual efforts to improve this service we want to learn more about our patients' experiences after they progress through this pathway and choose either an operative or non-operative course. In May 2019 we commenced a prospective, observational study following our patients for one year after their assessment in order to better understand their experiences, decisions and outcomes. We recently completed final follow ups of this group of patients and anticipate publishing our findings in 2024.

Resources

1. Bay of Plenty District Health Board. Bay of Plenty District Health Board Annual Report 2018.

2. Omundsen HC, Franklin RL, Higson VL, Omundsen MS, Rossaak JR. Perioperative shared decision-making in the Bay of Plenty, New Zealand: Audit results from a complex decision pathway quality improvement initiative using a structured communication tool. *Anaesthesia and Intensive Care.* 2020, Vol 48(6) 473-476

3. Ariadne Labs. Serious Illness Care. https://www.ariadnelabs.org/areas-of-work/serious-illness-care

4. Aotearoa serious illness conversation guide (SICG), adapted with consumers in New Zealand, August 2018

Delirium in the ICU

Prof Frank van Haren ***MD PhD EDIC FCICM PGDipEcho***
Director Intensive Care Unit, St George Hospital, Sydney
Professor, College of Health and Medicine, Australian National University
Professor (Conjoint), University of New South Wales Medicine and Health
Professor (Adjunct), Faculty of Health, University of Canberra
Honorary Professorial Fellow, Critical Care Division, The George Institute for Global Health
frank.vanharen@anu.edu.au
www.stgeorgeicu.com

Delirium is an acute organic brain dysfunction characterised by disturbances of attention and cognition with a fluctuating course, as a direct consequence of an underlying medical condition. Delirium occurs frequently in intensive care unit (ICU) patients, with a reported incidence of 20-40% in all ICU patients and of >60% in mechanically ventilated ICU patients. Delirium is associated with poor outcome, including increased mortality, duration of mechanical ventilation and length of ICU stay (1, 2). The occurrence of delirium in ICU also has a long-term impact on cognition and psychosocial function (3).

There is strong evidence that age, dementia, hypertension, pre-ICU emergency surgery or trauma, Acute Physiology and Chronic Health Evaluation II score, mechanical ventilation, metabolic acidosis, delirium on the prior day and coma, but not gender, are risk factors for delirium (4). There is low to moderate-quality evidence that Bispectral Index (BIS)-guided anaesthesia may reduce the incidence of postoperative delirium compared to BIS-blinded anaesthesia or clinical judgement (5).

Systematic delirium assessment in ICU patients is important to deliver adequate patient care by allowing clinicians to detect and treat delirium at an early stage (6-8). In a large multinational study, we developed and validated an early ICU delirium prediction model that revealed sufficient validity (9). The model enables the clinician to identify those patients likely to develop delirium following ICU admission using only nine predictors: age, history of cognitive impairment, history of alcohol abuse, BUN at time of ICU admission, admission category, urgent admission, MAP at the time of ICU admission, use of corticosteroids, and respiratory failure. Consequently, the model may allow for early delirium preventive interventions in ICU patients with a high risk of delirium.

Several promising interventions to prevent delirium are available that target cognitive impairment, sleep deprivation, immobility, and visual and hearing impairment (5, 10-13). Multi-component non-pharmacological interventions to prevent delirium have been shown to be effective in reducing delirium incidence and duration (14). Sleep disturbances and delirium appear to have a bidirectional relationship (15). The largest randomised controlled study to date to investigate the effects of prophylactic administration of melatonin to reduce delirium in ICU patients by improving sleep did not show any signal of benefit of this intervention, and routine use of melatonin in ICU patients is therefore not supported (16).

Other modifiable risk factors include minimising the use of benzodiazepines in critically ill patients (17). Surprisingly, the administration of nicotine replacement therapy in critically ill smokers has not shown a reduction in delirium incidence, and several studies have suggested possible harm of the use of nicotine replacement therapy in ICU patients (18-20). Early pharmacological interventions such as the use of prophylactic haloperidol in patients at high risk for delirium have been considered but have not shown to be effective in reducing the incidence of delirium or to improve mortality or long-term outcomes (21-23). There is currently insufficient evidence to provide a strong recommendation regarding the use of second-generation antipsychotics for the treatment of ICU delirium (24). The use of dexmedetomidine is associated with a lower delirium prevalence(4). In patients with agitated delirium receiving mechanical ventilation in the intensive care unit, we showed that the addition of dexmedetomidine to standard care compared with standard care alone (placebo) resulted in more ventilator-free hours and earlier extubation (25). In addition, dexmedetomidine may be a useful rescue drug for treating agitation due to delirium in non-intubated patients in whom haloperidol has failed, and it seems to have a better effectiveness, safety, and cost-benefit profile than does haloperidol (26).

In conclusion, delirium in critically ill patients is a frequent and significant problem, which requires a multipronged approach with careful attention to prediction, early recognition, prevention and treatment to improve short and long-term patient-centred outcomes.

Resources

1. Ouimet S, Kavanagh BP, Gottfried SB, Skrobik Y. Incidence, risk factors and consequences of ICU delirium. *Intensive Care Med* 2007; 33: 66-73.
2. Mehta S, Cook D, Devlin JW, Skrobik Y, Meade M, Fergusson D, Herridge M, Steinberg M, Granton J, Ferguson N, Tanios M, Dodek P, Fowler R, Burns K, Jacka M, Olafson K, Mallick R, Reynolds S, Keenan S, Burry L, Investigators S, Canadian Critical Care Trials G. Prevalence, risk factors, and outcomes of delirium in mechanically ventilated adults. *Crit Care Med* 2015; 43: 557-566.
3. Bulic D, Bennett M, Rodgers H, Nourse M, Rubie P, Looi JC, Van Haren F. Delirium After Mechanical Ventilation in Intensive Care Units: The Cognitive and Psychosocial Assessment (CAPA) Study Protocol. *JMIR Res Protoc* 2017; 6: e31.
4. Zaal IJ, Devlin JW, Peelen LM, Slooter AJ. A systematic review of risk factors for delirium in the ICU. *Crit Care Med* 2015; 43: 40-47.
5. Siddiqi N, Harrison JK, Clegg A, Teale EA, Young J, Taylor J, Simpkins SA. Interventions for preventing delirium in hospitalised non-ICU patients. *Cochrane Database Syst Rev* 2016; 3: CD005563.
6. Ely EW, Inouye SK, Bernard GR, Gordon S, Francis J, May L, Truman B, Speroff T, Gautam S, Margolin R, Hart RP, Dittus R. Delirium in mechanically ventilated patients: validity and reliability of the confusion assessment method for the intensive care unit (CAM-ICU). *JAMA* 2001; 286: 2703-2710.
7. Luetz A, Weiss B, Boettcher S, Burmeister J, Wernecke KD, Spies C. Routine delirium monitoring is independently associated with a reduction of hospital mortality in critically ill surgical patients: A prospective, observational cohort study. *J Crit Care* 2016; 35: 168-173.
8. Barr J, Fraser GL, Puntillo K, Ely EW, Gelinas C, Dasta JF, Davidson JE, Devlin JW, Kress JP, Joffe AM, Coursin DB, Herr DL, Tung A, Robinson BR, Fontaine DK, Ramsay MA, Riker RR, Sessler CN, Pun B, Skrobik Y, Jaeschke R, American College of Critical Care M. Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. *Crit Care Med* 2013; 41: 263-306.
9. Wassenaar A, van den Boogaard M, van Achterberg T, Slooter AJ, Kuiper MA, Hoogendoorn ME, Simons KS, Maseda E, Pinto N, Jones C, Luetz A, Schandl A, Verbrugghe W, Aitken LM, van Haren FM, Donders AR, Schoonhoven L, Pickkers P. Multinational development and validation of an early prediction model for delirium in ICU patients. *Intensive Care Med* 2015; 41: 1048-1056.
10. Litton E, Carnegie V, Elliott R, Webb SA. The Efficacy of Earplugs as a Sleep Hygiene Strategy for Reducing Delirium in the ICU: A Systematic Review and Meta-Analysis. *Crit Care Med* 2016; 44: 992-999.
11. Martinez FE, Anstey M, Ford A, Roberts B, Hardie M, Palmer R, Choo L, Hillman D, Hensley M, Kelty E, Murray K, Singh B, Wibrow B. Prophylactic Melatonin for Delirium in Intensive Care (Pro-MEDIC): study protocol for a randomised controlled trial. *Trials* 2017; 18: 4.
12. Smith CD, Grami P. Feasibility and Effectiveness of a Delirium Prevention Bundle in Critically Ill Patients. *Am J Crit Care* 2016; 26: 19-27.
13. Patel J, Baldwin J, Bunting P, Laha S. The effect of a multicomponent multidisciplinary bundle of interventions on sleep and delirium in medical and surgical intensive care patients. *Anaesthesia* 2014; 69: 540-549.
14. Tonna JE, Dalton A, Presson AP, Zhang C, Colantuoni E, Lander K, Howard S, Beynon J, Kamdar BB. The Effect of a Quality Improvement Intervention on Sleep and Delirium in Critically Ill Patients in a Surgical ICU. *Chest* 2021; 160: 899-908.
15. Delaney LJ, Litton E, Van Haren F. The Nexus Between Sleep Disturbance and Delirium Among Intensive Care Patients. *Crit Care Nurs Clin North Am* 2021; 33: 155-171.
16. Wibrow B, Martinez FE, Myers E, Chapman A, Litton E, Ho KM, Regli A, Hawkins D, Ford A, van Haren FMP, Wyer S, McCaffrey J, Rashid A, Kelty E, Murray K, Anstey M. Prophylactic melatonin for delirium in intensive care (Pro-MEDIC): a randomized controlled trial. *Intensive Care Med* 2022; 48: 414-425.
17. Smith HAB, Gangopadhyay M, Goben CM, Jacobowski NL, Chestnut MH, Thompson JL, Chandrasekhar R, Williams SR, Griffith K, Ely EW, Fuchs DC, Pandharipande PP. Delirium and Benzodiazepines Associated With Prolonged ICU Stay in Critically Ill Infants and Young Children. *Crit Care Med* 2017; 45: 1427-1435.
18. Kerr A, McVey JT, Wood AM, Van Haren F. Safety of nicotine replacement therapy in critically ill smokers: a retrospective cohort study. *Anaesth Intensive Care* 2016; 44: 758-761.
19. Wilby KJ, Harder CK. Nicotine replacement therapy in the intensive care unit: a systematic review. *J Intensive Care Med* 2014; 29: 22-30.
20. Kowalski M, Udy AA, McRobbie HJ, Dooley MJ. Nicotine replacement therapy for agitation and delirium management in the intensive care unit: a systematic review of the literature. *J Intensive Care* 2016; 4: 69.
21. Santos E, Cardoso D, Neves H, Cunha M, Rodrigues M, Apostolo J. Effectiveness of haloperidol prophylaxis in critically ill patients with a high risk of delirium: a systematic review. *JBI Database System Rev Implement Rep* 2017; 15: 1440-1472.

22. Rood PJT, Zegers M, Slooter AJC, Beishuizen A, Simons KS, van der Voort PHJ, van der Woude MCE, Spronk PE, van der Hoeven JG, Pickkers P, van den Boogaard M. Prophylactic Haloperidol Effects on Long-term Quality of Life in Critically Ill Patients at High Risk for Delirium: Results of the REDUCE Study. *Anesthesiology* 2019; 131: 328-335.
23. van den Boogaard M, Slooter AJC, Bruggemann RJM, Schoonhoven L, Beishuizen A, Vermeijden JW, Pretorius D, de Koning J, Simons KS, Dennesen PJW, Van der Voort PHJ, Houterman S, van der Hoeven JG, Pickkers P, Investigators RS, van der Woude MCE, Besselink A, Hofstra LS, Spronk PE, van den Bergh W, Donker DW, Fuchs M, Karakus A, Koeman M, van Duijnhoven M, Hannink G. Effect of Haloperidol on Survival Among Critically Ill Adults With a High Risk of Delirium: The REDUCE Randomized Clinical Trial. *JAMA* 2018; 319: 680-690.
24. Mo Y, Yam FK. Rational Use of Second-Generation Antipsychotics for the Treatment of ICU Delirium. *J Pharm Pract* 2017; 30: 121-129.
25. Reade MC, Eastwood GM, Bellomo R, Bailey M, Bersten A, Cheung B, Davies A, Delaney A, Ghosh A, van Haren F, Harley N, Knight D, McGuiness S, Mulder J, O'Donoghue S, Simpson N, Young P, Dah LIAI, Australian, New Zealand Intensive Care Society Clinical Trials G. Effect of Dexmedetomidine Added to Standard Care on Ventilator-Free Time in Patients With Agitated Delirium: A Randomized Clinical Trial. *JAMA* 2016; 315: 1460-1468.
26. Carrasco G, Baeza N, Cabre L, Portillo E, Gimeno G, Manzanedo D, Calizaya M. Dexmedetomidine for the Treatment of Hyperactive Delirium Refractory to Haloperidol in Nonintubated ICU Patients: A Nonrandomized Controlled Trial. *Crit Care Med* 2016; 44: 1295-1306.

Māori experience of anaesthesia in the perioperative setting

Dr Courtney Thomas
Specialist Anaesthetist, Waitaha Canterbury

Purpose
Māori experience disparities in access to care, inequity in health outcomes and barriers to culturally safe care in Aotearoa, New Zealand. Little is known about Māori experiences of anaesthesia and factors promoting or impeding interactions between Māori patients and Anaesthetists in the perioperative setting. Giving focus to Indigenous health and Indigenous health outcomes is an emerging area of research and priority in anaesthesia and the perioperative environment.

Methodology
This research is underpinned by Kaupapa Māori (Māori centred) research methodology and aims to undertake an in-depth exploration of Māori patients' experiences of Anaesthesia to identify factors promoting and impeding interaction with Māori patients in the perioperative setting, and to synthesise this information into recommendations for improving future practice.

Key projects designed to meet these aims include a qualitative systematic review of Māori experiences of hospital care and conducting patient surveys and interviews.

Results
The systematic review was published in *Alternative* in 2022.
135 patient surveys and fifteen interviews completed. These projects required development of culturally appropriate assessment tools.
The qualitative analysis of the interviews is in progress. Two of the themes identified are presented for discussion; *Confrontation with the system* and *Positionality*.

Conclusion
Multilevel interventions are needed to address the inequitable care and disparate outcomes afforded to Māori in NZ. Qualitative research allows us to consider how to translate these findings into the subspecialty care setting ie. anaesthesia and the wider perioperative environment where our practice might be adjusted to facilitate cultural safety and contribute towards equitable health outcomes for Māori patients.

Resources
Thomas, C., Weller, J., Rahiri, J.-L., Harwood, M., & Pitama, S. (2022). Māori experiences of acute hospital care. AlterNative, 18(3), 327-334. https://doi.org/10.1177/11771801221114385

Obstetric anaesthesia update

Dr Lauren Kelly
Specialist Anaesthetist Te Whatu Ora Capital, Coast and Hutt Valley
lauren.kelly@ccdhb.org.nz

Much like in many other areas of anaesthesia, whilst there may not have been any seismic shifts in obstetric anaesthesia, small incremental improvements have continued. This update will cover recent publications whose results can be incorporated into everyday practice, some unintended consequences of treatments as well as issues and challenges to be faced in the future.

Use of tranexamic acid (TXA) in obstetrics - use and unintended consequences

The use of TXA on obstetrics has markedly increased in recent years, and is recommended by the WHO for the treatment of postpartum haemorrhage (PPH). The WOMAN study of 2017[1] was the largest RCT to study the use of TXA in PPH and whilst the authors concluded that TXA is beneficial in reducing the risk of death due to PPH, the study had several limitations and may be of only modest benefit in well resourced settings.

The findings from the TRAAP[2] and TRAAP 2[3] trials do not support the prophylactic use of TXA in the prevention of PPH for vaginal and caesarean deliveries respectively. Despite unconvincing evidence, on the basis of it being cheap with a good safety profile, advice remains to consider giving tranexamic early in post-partum haemorrhage. Early resuscitation, management of coagulopathy and surgical assistance with source control, remain the most important interventions.

One of the unintended consequences of having TXA more readily available in our environment is its potential for drug error. TXA is a potent neurotoxin, antagonising GABA and glycine receptors, leading to profound sympathetic stimulation. Intrathecal administration presents as a failed spinal, rapidly progressing pain and myoclonus starting in the buttocks and legs, followed by sympathetic hyperstimulation, cardiac arrhythmias and seizures. Treatment is supportive, whilst CSF lavage has been used with some effect. The reported fatality rate sits at 50-80% and was recently brought to our attention after case reports were published in South Africa following a cluster of such events[4]. The report incorporated recommendations to reduce the risk of further incidents including:

Education and awareness of all staff in areas where TXA is used
Physical separation of TXA from any dedication spinal/ regional anaesthesia trolleys
Adherence with drug checking procedures
Reporting and reviewing adverse drug events

Neuraxial anaesthesia in parturients with thrombocytopenia

The Society for Obstetric Anaesthesia and Perinatology (SOAP) have published a consensus statement to provide expert guidance on what to do in the case of low platelets in pregnancy[5]. The systematic review distilled the best available evidence and expert opinion to recommend that the risk of spinal epidural haematoma was very low in parturients with a platelet count of >70x 10^9/L when associated with conditions such as gestational thrombocytopenia, ITP and hypertensive disorders of pregnancy. The guidelines do discuss considerations such as aetiology and stability of platelet counts, as well as factors including patient comorbidities, obstetric risk factors, airway examination, risk of general anaesthesia and patient preferences.

Enhanced recovery after caesarean delivery

Many units around the country have adopted ERAS protocols or are in the process of doing so and SOAP have a comprehensive document available that provides evidence-based guidance on various aspects of care[6]. For anaesthetists, most of the recommendations mentioned are probably already being done, such as antacid and antibiotic prophylaxis, regional anaesthesia and multimodal regular post-operative analgesia. Areas that may require review include:

Pre-operative fasting times and carbohydrate loading
Education in the antenatal period, especially with regard to the likely post-op course, analgesia and mobilisation.
Indwelling catheter management

Post operative pain management practicalities
Staffing resources

Epidurals Part 1 - effect on neonatal outcomes
Despite some controversial studies of dubious quality, several studies including that by Kearns[7] has shown that the use of epidural analgesia in labour was not associated with adverse neonatal outcomes.

Epidurals Part 2 - effect on maternal outcomes
A recent study of over 500,000 parturients in New York undergoing their first vaginal delivery and showed that having neuraxial analgesia in labour led to a 14% reduction in severe maternal morbidity, mainly through its reduction in the rate of PPH[8]. Whilst the study was not designed to look at the reasons behind these findings, if we consider the package of care that surrounds epidural analgesia such as IV access and maintenance fluids, regular observations as mandated by protocols and use of IDCs, these are likely to play some role in the findings.

The authors also noted a difference in epidural rates amongst various ethnicities, with people identifying as hispanic, black, asian and other ethnic minorities less likely to receive neuraxial analgesia. In the US, there are marked racial disparities in maternal and perinatal outcomes, with the risk of virtually any poor outcome being 3-5x higher in black populations compared to white populations. Currently huge resources are starting to be poured into task forces at state and federal levels to start addressing these issues.

Perinatal and maternal mortality review committee report findings
The PMMRC recently released its 15th annual report which makes for sobering reading[9]. Whilst in 2020 there were no statistically significant differences detected in perinatal and maternal mortality in the context of the COVID-19 pandemic, there's not much else to celebrate in the findings. Perinatal and maternal morbidity and mortality rates have not changed significantly since the PMMRC began collating data in 2007. Ethnic, deprivation and age inequities persist in all findings, with the burden of poor outcomes falling on Māori, Pacific peoples, Indian populations, those aged under 20 years and those living in areas of high deprivation, all of whom experience worse perinatal outcomes than those of New Zealand European ethnicity.
Wāhine Māori were 2.91 times more likely to die by suicide as a direct result of maternal mortality than women of NZ European ethnicity in the 2006-2020 period.

Epidurals Part 3 - doses, regimes, effect on labour
There's been somewhat of an evolution in the way we use epidurals for labour analgesia, from continuous infusions, manual top-ups through to PCEAs and now PIEBs. There's also been a slow decrease in the concentration of local anaesthesia preparations, all with the goal of providing the best analgesic effect, without causing motor block and impacting on prolonged second stage and risk of instrumental delivery that has long been associated with epidurals.

PIEB with PCEA is superior to straight PCEA with providing good analgesia with less self-administered boluses and lower overall doses required, and less motor block[10].

There's a trend to move away from the conventionally low dose epidural of 0.125% bupivacaine to ultra-low concentrations of less than 0.08% bupivacaine. Many units around the country are changing to 0.0625% bupivacaine or 0.1% ropivacaine for maintenance of epidural analgesia. In a meta-analysis comparing >0.1% bupivacaine to low (0.08-0.1%) and ultra-low (<0.08%) concentrations, ultra-low dose preparations show an increased chance of spontaneous vaginal delivery OR 1.46 (1.18-1.86), reduced motor block OR0.32 (0.18-0.54) and reduced length of second stage -13.2min (-21.54- -4.77) compared to high dose without impact on pain scores[11].

In considering whether epidural analgesia still carries an increased risk of instrumental delivery if ultra-low concentrations are used, the evidence is not yet clear. One recent meta-analysis of 10 studies[12] concluded that when comparing ultra-low dose epidurals to non-epidural analgesia that there was no significant difference in the duration of the second stage of labor (mean difference = 5.71 minutes, 95% confidence interval [CI], −6.14 to 17.83; P = .36) or the instrumental birth rate (risk ratio [RR] = 1.52, 95% CI, 0.97–2.4; P = .07)[12].

Nitrous oxide and its environmental impact

Nitrous oxide is a potent greenhouse gas that absorbs infrared radiation, trapping heat and contributing to climate change. The carbon emissions associated with the use of nitrous oxide are so much worse than other forms of labour analgesia that it's difficult to chart it on the same graph, with 4 hours of nitrous oxide use equating to 245kg CO2e compared to all others being around 1 kg CO2e[13]. There are also significant concerns regarding occupational exposure to high ambient levels of nitrous oxide which has led to several units in the UK ceasing its use.

Nitrous oxide, in its 50:50 O2:N2O mixture of Entonox is used in about 50-60% of labours, with similar rates in Australia and the UK. Entonox use is uncommon in the US, with use in the realm of approximately 5% of all births, whereas the rates of epidural use in the US sit at around 73-80% of all labours. Numerous studies have shown that entonox is more effective for analgesia than intramuscular opioids, about the same as TENS, and less effective than both Remifentanil PCA and Epidural. Despite this, Entonox has only slightly lower overall satisfaction rates than epidurals. When seen from the parturient's perspective, entonox does hold appeal. The time from request to use is usually just a few minutes, it can take the edge off contractions and mobility can be maintained. Additionally, it generally doesn't require any assessment or sign off by a doctor before they can access it, doesn't require iv access, iv fluids, CTG and blood pressure monitoring, nor insertion of an IDC - all things that can change the dynamics of the labour.

Options to address the problem include central and mobile destruction units that can break down nitrous oxide to nitrogen and oxygen. A recently published quality improvement study in Manchester looked at ambient nitrous oxide levels during the last 30 minutes of labour without any scavenging, with scavenging via a mouthpiece and then via a facemask[14]. Their study showed that emissions could be decreased by 71% with the use of the mouthpiece and 81% with the use of a low profile facemask. Whilst these units could be a way forward, they are very expensive and may present a cost barrier to widespread implementation.

Alternatively, if the use of entonox is to be discouraged or stopped, what options are available to fill the void? As seen in countries such as the US where entonox is uncommon in labour, we may need to plan for a significant increase in labour epidural use which would involve a significant upscaling in human resources to meet the number of requests as well as achieve analgesia in a timely manner. The solution to the conundrum of entonox is far from clear and this will be a topic of great debate and study for the near future.

Resources

1. WOMAN Trial Collaborators: Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international, randomised, double-blind, placebo-controlled trial. Lancet 2017; 389(10084):2105–2116.
2. Sentilhes L, Winer N, Azria E et al: Tranexamic acid for the prevention of blood loss after vaginal delivery. N Engl J Med 2018; 379:731-742
3. Sentilhes L: TRAAP2: Tranexamic acid for the prevention of blood loss after caesarean delivery. N Engl J Med 2021; 384:1623-1634.
4. Bishop D, Lundgren A, Moran N, Popov I, Moodly J: Intrathecal tranexamic acid during spinal anaesthesia for caesarean delivery: A lethal drug error. SAMJ Nov 2019: 109:(11) 841-844.
5. Bauer M, Arendt K et al: The Society for Obstetric Anesthesia and Perinatology Interdisciplinary Consensus Statement on Neuraxial Procedures in Obstetric Patients with Thrombocytopenia. Anaesthesia Analgesia June 2021 132 (6) 1531-1544
6. Bollag L, Lim G et al: Society for Obstetric Anesthesia and Perinatology: Consensus Statement and Recommendations for Enhanced Recovery After Cesarean. Anaesthesia Analgesia 2021 May 1;132(5):1362-1377.
7. Kearns R, Shaw, M, Gromski S, Lawlor D, Nelson S: Association of Epidural Analgesia in Women in Labor with Neonatal and Childhood outcomes in a Population Cohort. JAMA 2021; 4(10)
8. Guglielminotti J, Landau R, Daw J, Friedman A, Chihuri S, Li G: Use of Labor neuraxial analgesia for vaginal delivery and severe maternal morbidity. JAMA 2022;5(2)
9. Fifteenth annual report of the perinatal and maternal mortality review committee: Reporting Mortality and Morbidity 2020.https://www.hqsc.govt.nz/assets/Our-work/Mortality-review-committee/PMMRC/Publications-resources/15thPMMRC-report-final.pdf
10. Roofthooft B, Schildermans J, Cromheecke S, Devroe S, Nieuws S, Rex S, Wong C, Van de Velde M: Programmed intermittent epidural bolus vs Patient-controlled epidural analgesia for maintenance of labour analgesia: A 2-center, double-blind, Randomized study. Obstetric Anaesthesia Digest Dec 2021 41 (4) 199-203.

11. Halliday L, Kinsella M, Shaw M, Cheyne J, Nelson S, Kearns R: Comparison of ultra-low, low and high concentration local anaesthesia for labour epidural analgesia: a systematic review and network meta-analysis. Anaesthesia 2022, 77, 910-918.
12. Wang, T, Sun S, Huang S: Effects of epidural labour analgesia with low concentration local anaesthetics on obstetric outcomes: A systematic review and meta-analysis of randomised controlled trials. Anaesthesia and Analgesia 2017 124 (5) 1571-1580.
13. Gynther A, Pearson F, McGain F: Nitrous oxide use on the labour ward: Efficacy and environmental impact. Australasian Anaesthesia 2021 183-192.
14. Pinder A , Fang L, Fieldhouse A, Goddard A, Lovett R, Khan-Perez J, Maclennan K, Mason E, MacCarrick T, Shelton C. Implementing nitrous oxide cracking technology in the labour ward to reduce occupational exposure and environmental emissions: a quality improvement study. Anaesthesia 2022, 77, 1228-1236.

Trauma

Dr Richard Stephenson

Specialist Emergency Physician & Clinical Director, Dunedin Hospital

Efficient and effective teamwork between clinicians is vital in providing the best care possible in the crucial first minutes after a severely injured patient arrives in hospital. Modern trauma care is a multidisciplinary affair and trauma teams receiving injured patients in the ED often consist of multiple clinical staff from a range of specialties.

Bringing diverse skillsets and specialist knowledge to the resuscitation room has huge advantages in optimising patient care but brings with it a unique set of challenges. Managing a large group of clinicians in a high-pressure environment, many of whom may be unfamiliar with their physical surroundings and the colleagues whose company they are thrust into can be challenging.

Having robust systems, structure and training can undoubtably smooth the way to a high functioning trauma team but on the day a lot will still depend on the trauma team leader's ability to bring team members together and meld their individual skills and perspectives into a coherent whole.

Being a trauma team leader isn't necessarily about having the most expert medical knowledge in the room. Communication and interpersonal skills are at least as important if a collection of individuals is going to be brought together effectively.

Decisions need to be made quickly but it wont surprise anyone to learn clinicians don't always agree on the best course of action and sometimes there is even the odd large ego to be managed! The potential for chaos is never far away and I will try and share some insights and perspectives into how to herd the cats in the right direction when the pressure is on.

CVL complications

Dr Cathy Caldwell & Dr Jeremy Cooper
Specialist Anaesthetist, Private Practice Wellington
Specialist Cardiothoracic Anaesthetist, Te Toka Tumai Auckland

There are only a few events in anaesthesia practice where anaesthetists can cause severe harm, and even mortality, within minutes. They include failure to manage a difficult airway, malignant hyperthermia, severe anaphylaxis, and various sequelae due to placement of neuraxial local anaesthetic agents in the wrong place. There has been a great deal of welcome effort involved in teaching about and research into how we can manage these situations better in the future.

Another procedure we often do, namely CVL placement, also has the potential to cause severe complications, including death. It is the authors' view that it's time to evaluate what we can do better with this procedure. This presentation will mainly concentrate on insertion of a CVL into the internal jugular vein.

Initially we will present clinical cases, so today this is a closed meeting with a requirement of complete confidentiality, as you would have for any morbidity review.

Then we will review the evidence, including a particular publication that allows us to calculate a rough estimate of how many serious CVL insertion complications might be happening annually in NZ.

Following this there will be an outline of the recommended safety improvements that should be used to insert CVLs without causing complications. This outline is based to a large extent on the ASA(USA) most recent published guidelines and where relevant, other literature will be presented. In particular, the absolute need to use real time ultrasound during the procedure and the requirement to make sure the Seldinger wire is in the central vein before vessel dilation will be reinforced. Those of you who currently do not insert and then transduce a cannula which has been hopefully inserted into the jugular vein should at least start to learn how to do this, whether for every case (perfect) or when teaching junior staff what to do, or whenever there is any question of where the wire has gone.

The next item we will outline (beyond what the ASA recommends) is a suitable literature package which all SMOs and RMOs should read to be up to date on this topic. This arguably should be part of any improvement process which covers CVL insertion. Additionally, we will list several contexts where SMO staff should be actively involved in the insertion of a CVL. The days of handing off any predicted difficult CVL insertion to an RMO working on their own should be gone.

At the end of the presentation, you should be aware of the current state of CVL complications in NZ, a plan for how to improve your CVL insertion technique if you think you need to, a literature base for you and trainees to use and some idea of cases which need obligatory SMO active involvement. Then it's over to you.

Take Home Points:
#1. From combining UK data about the frequency of CVL insertion along with a recent Swedish study (the biggest study so far) which documents the serious complication rate, we can say that NZ might be having as many as 74 serious complications per year from CVL insertion.

#2. The data are clear that using real time US is a major help in reducing these complications, but that US use alone *does not eliminate* serious complications.

#3. Relying on the absence of pulsatility and/or red colour to determine unintentional arterial needle placement is falsely reassuring, as 20% of the time you will miss that the needle is accidentally in an artery.

#4. In more than 10,000 cases reported using pressure transduction to confirm whether or not the cannula or needle was in an artery, no arteries were accidentally dilated.

#5. Using US to confirm correct wire placement before dilation has been found to be helpful but we have documented cases where this has been falsely reassuring and arterial dilatation has occurred despite believing the wire was in a vein.

Bottom line…. Current practice in NZ is still causing CVL insertion complications and the literature suggest that much of this harm is preventable.

Resources

1. Practice Guidelines for central Venous Access 2020. Anesthesiology Jan 2020;132:8-43. Tung et al
2. Mechanical complications after central venous catheterisation in the ultrasound-guided era: a prospective multicentre cohort study. BJA 129(6)843-850(2022). Adrian et al
3. Eliminating Arterial Injury During Central Venous Catheterization Using Manometry Anesth Analg 2009;109:130-4. Ezaru et al
4. Vascular complications of central venous catheter placement: evidence-based methods for prevention and treatment. J Cardioth Vasc Anesth 2014, April (2)358-68. Bowdle
5. Preventing vascular damage during central venous catheter insertion via the internal jugular vein. Australasian Anaesthesia 2019 .p 75-88. Bath
6. Arterial trauma during central venous catheter insertion:Case series,review and proposed algorithm. J Vasc Surg 2008;48:918-25. Guilbert et al.

Unsupported South Pole Ski Expedition

Dr Gareth Andrews & Dr Richard Stephenson
Specialist Anaesthetist, St Vincent's Hospital, Sydney
Specialist Emergency Physician & Clinical Director, Dunedin Hospital

In November 2022 Dr Gareth Andrews and Dr Richard Stephenson embarked on a 2000km record-breaking attempt to cross the Antarctic continent on foot, with no outside support or assistance, a feat never before accomplished.

Over their 66 day journey they endured the harshest conditions on earth - extreme cold, polar storms and hurricane force winds - while pushing themselves to the edge of mental and physical exhaustion in a quest to collect critical climate data for the Australian Antarctic Division and unique physiology data to advance our knowledge of the impact of extreme endurance on the human body.

Gold Sponsor

GOLD

Michael Bell PGDip HSc (Advanced Nursing)
Territory Manager | Patient Monitoring & Respiratory Interventions

Medtronic
Level 3, Building 5, Central Park Corporate Centre, 666 Great South Road,
Penrose, Auckland | New Zealand
Customer Service 0800 377 807 | Mobile +64 21 222 6025
michael.r.bell@medtronic.com

Bold thinking. Bolder actions. **We are Medtronic.**
We lead global healthcare technology and boldly attack the most challenging health problems facing humanity by searching out and finding solutions. Our Mission — to alleviate pain, restore
health, and extend life — unites a global team of 95,000+ passionate
people. Powered by our diverse knowledge, insatiable curiosity, and desire to help all those who need it, we deliver innovative technologies that transform the lives of two people every second,
every hour, every day. Expect more from us as we empower insight-driven care, experiences that put people first, and better outcomes for our world.
In everything we do, we are **engineering the extraordinary.**

Silver Sponsors

SILVER

Tracey Matthews & Terry Sullivan

B. Braun New Zealand
tracey.matthews@bbraun.com
terry.sullivan@bbraun.com
www.bbraun.co.nz
0800 227 286
PO Box 37353, Parnell, Auckland

B. Braun is one of the world's leading providers and manufacturers of healthcare solutions today. Every service that B. Braun provides incorporates the entirety of our knowledge and skills, the company's deep understanding of users' needs, and extensive expertise since 1839. With its constantly growing portfolio of effective medical care solutions, B. Braun makes a substantial contribution towards protecting and improving people's health. In total, the B. Braun product range comprises 5,000 different products, 95 percent of which are manufactured by the company. By offering supplementary services and consulting, B. Braun is a system supplier that develops the best solution for patients in close partnership with our customers, making a significant contribution to medical advancements.

SILVER

FUJIFILM
SONOSITE

FUJIFILM Sonosite, Inc., the world leader in bedside and point-of-care ultrasound (POCUS), delivers solutions that meet the imaging needs of the medical community. Headquartered near Seattle, the company is represented by a global distribution network in over 100 countries. As a recognized market leader, Sonosite continues to earn worldwide recognition for its innovative product line, educational programs, and advocacy for a broader understanding of ultrasound's many benefits.

Please visit: www.sonosite.com.au

Deborah Stanley
Clinical Sales Specialist

FUJIFILM SonoSite

M +64 021 664 985
E deborah.stanley@fujifilm.com
W www.sonosite.com/au
T 0800 888 204
F +61 2 9939 1831

Jennifer Spencer
Product Specialist

Device Technologies
Ltd47 Arrenway Drive
Albany
Auckland 0632

M +64 021 589 884
E jspencer@device.co.nz
W www.device.co.nz
DD +64 9 215 0988
T 0508 332 423
E sales@device.co.nz

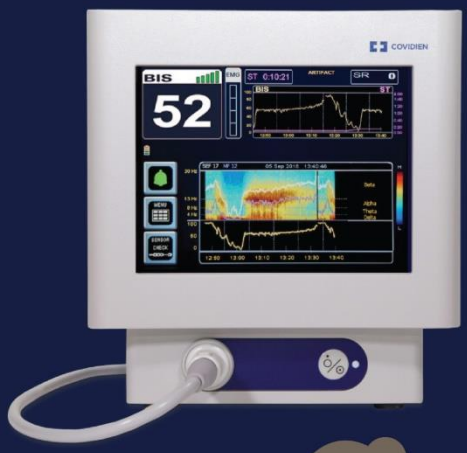
The Device Technologies Critical Care portfolio represents some of the most innovative products in their field. We choose to partner with manufacturers from around the world who are known for their commitment to client care from pre-hospital; Ambulance and Aeromedical to hospital; Emergency Departments, Intensive Care and High Dependency Units, Operating Theatres, Neonatal Intensive Care Units and Special Care Nurseries.

We represent over 20 trusted brands who align with our core values, these include Vygon, Eitan Medical, Sedana Medical, International Biomedical and Reactive Robotics, to name only a few.

With over 2,500 products available, we service customers across New Zealand and Australia, and from the Antarctic to the remote island nations of the Pacific Ocean.

YOUR EXPERTISE. OUR TECHNOLOGY.

The BIS™ brain monitoring system helps to enhance the delivery of anaesthesia. And with BIS™ index value-guided TIVA it enables:



- Less incidence of postoperative delirium in elderly patients[1]
- Reduction in the amount of propofol used[2,3]
- Reduction in the length of stay[2]
- Up to a 78% reduction in the incidence of awareness[4]
- Cost savings[3]
- Improved patient satisfaction[5]

PLAY THE TIVA CHALLENGE VIDEO GAME

Created by Level Ex to demonstrate patients' depth of anaesthesia — and learn more about BIS™ technology.

Scan the QR code to download the app.

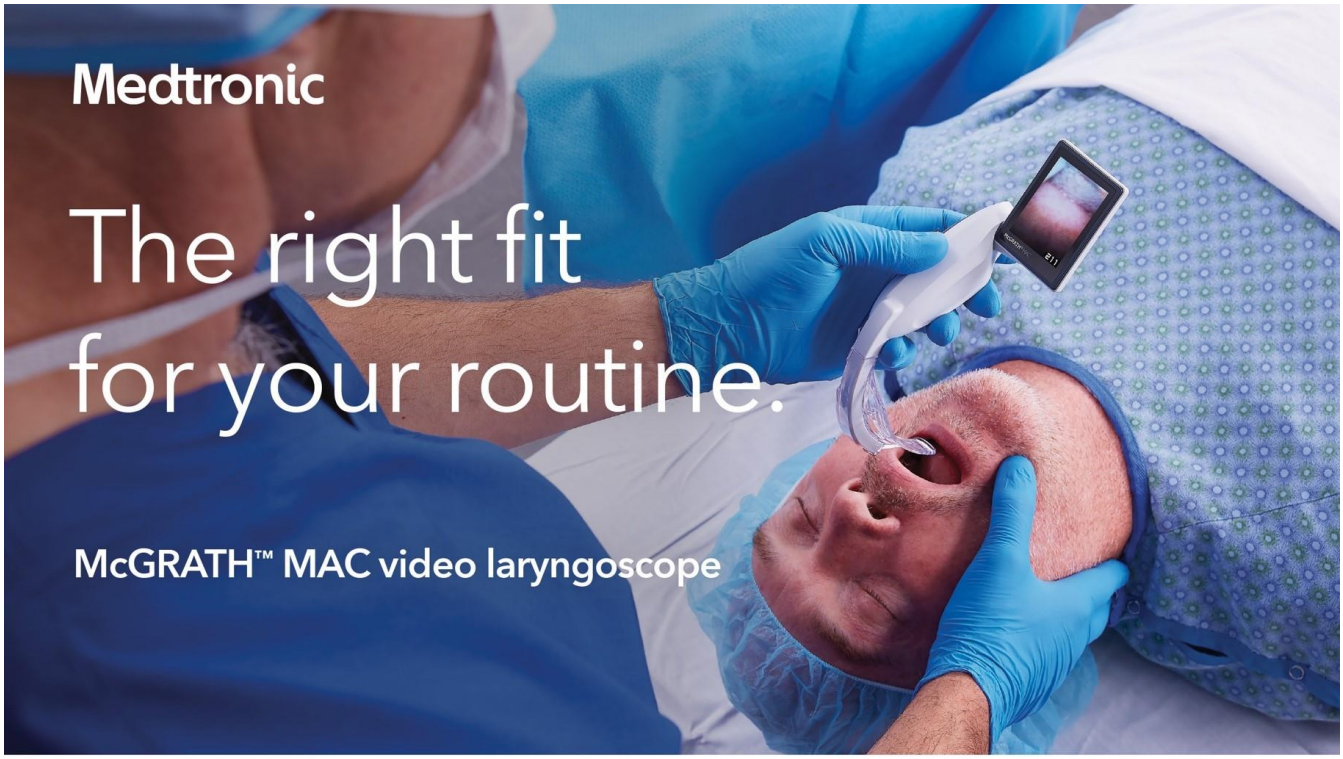
The above outcomes are based on comparisons against procedures utilising anaesthesia without depth-of-anaesthesia monitoring.

The BIS™ monitoring system should not be used as the sole basis for diagnosis or therapy and is intended only as an adjunct in patient assessment. Reliance on the BIS™ system alone for anaesthetic management is not recommended.

1. Zhou Y, Li Y, Wang K. Bispectral index monitoring during anesthesia promotes early postoperative recovery of cognitive function and reduces acute delirium in elderly patients with colon carcinoma: A prospective controlled study using the attention network test. *Med Sci Monit.* 2018;24:7785–7793.
2. Gan TJ, Glass PS, Windsor A, et al. Bispectral index monitoring allows faster emergence and improved recovery from propofol, alfentanil, and nitrous oxide anesthesia. BIS™ Utility Study Group. *Anesthesiology.* 1997;87(4):808–815.
3. Bocskai T, Loibl C, Vamos Z, et al. Cost-effectiveness of anesthesia maintained with sevoflurane or propofol with and without additional monitoring: a prospective, randomized controlled trial. *BMC Anesthesiol.* 2018;18(1):100.
4. Zhang C, Xu L, Ma Y, et al. Bispectral index monitoring prevents awareness during total intravenous anesthesia: a prospective, randomized, double-blinded, multi-center controlled trial. *Chin Med J.* 2011;124(22):3664–3669
5. Luginbuhl M, Wuthrich S, Petersen-Felix S, Zbinden AM, Schnider TW. Different benefit of Bispectral (BIS™) in desflurane and propofol anesthesia. *Acta Anaesthesiol Scand.* 2003;47(2):165–73.

Medtronic Australasia Pty Ltd
2 Alma Road, Macquarie Park NSW 2113 Australia Tel: +61 2 9857 9000 Fax: +61 2 9889 5167 Toll Free: 1800 668 670
Medtronic New Zealand Ltd
Level 3 - Building 5, 666 Great South Road, Penrose, Auckland 1051 New Zealand Fax: +64 9 918 3742 Toll Free: 0800 377 807

Medtronic



Better airway visibility drives better first-pass intubation success.[1] The McGRATH™ MAC video laryngoscope combines your core laryngoscopy skills with our evolved technology.

4X More pixels
than the previous generation device, providing a crisp image with higher resolution enabling more detail to be captured on the screen*.

3X Brighter LED
than the previous generation device, providing more uniform illumination and the a warmer tone which provides more natural colouration*.

2X Light spread
than the previous generation device, expanding the field of view so you to see more with the same size screen*.

1 Choice for routine intubation
The new normal for intubation – engineered for everyday use.

Understand the benefits of the McGRATH™ MAC video laryngoscope.

Scan the QR code to sign up for a free trial.

[1]Kriege et al. Evaluation of the McGRATH™ MAC and Macintosh laryngoscope for tracheal intubation. Br J Anaesth. 2020; 125(1): e209aryngoscope

*As compared to the previous version of the McGRATH™ MAC video laryngoscope

PIRAMAL SEVOFLURANE™

(Sevoflurane 100% v/v, Liquid for inhalation)
Prescription only medicine

Piramal Critical Care

INDICATIONS FOR USE
Piramal Sevoflurane may be used for induction and maintenance of general anaesthesia in adult and paediatric patients undergoing surgery.

MANUFACTURED IN USA

Representative labelling only

88 COUNTRIES[2]
Use Piramal Sevoflurane™

18 MILLION[1]
Procedures per year are conducted across the world using Piramal Sevoflurane™

1 in 4[3]
Sevoflurane bottles used in the USA are manufactured by Piramal

Piramal Critical Care, Inc.
3950 Schelden Circle
Bethlehem, PA 18017, USA
Toll Free No.: +1-800-414-1901
www.piramalcriticalcare.com

AUSTRALIA
✆ 1300 DEVICE (338 423)
customers@device.com.au
www.device.com.au

NEW ZEALAND
✆ 0508 DEVICE (338 423)
sales@device.co.nz
www.device.co.nz

Marketed and Distributed by
DEVICE TECHNOLOGIES
For further information contact
1 300 DEVICE (338 423) | Customers@device.com.au |
www.device.com.au

JAFA
Joint Anaesthesia Faculty auckland

THE UNIVERSITY OF AUCKLAND
FACULTY OF MEDICAL AND HEALTH SCIENCES

AUCKLAND CITY SYMPOSIUM

At the heart of the matter

Cardiac assessment for non-cardiac surgery

23rd March 2024

With international speakers Prof Christian Mueller & Dr SuYin MacDonell

School of Medicine, The University of Auckland

AQUA

ANNUAL QUEENSTOWN
UPDATE IN ANAESTHESIA

www.aqua.ac.nz