AQUA

AQUA 2021

Annual Queenstown Update in Anaesthesia

Programme & Abstracts

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Welcome to Queenstown

Dear AQUA Delegate,

Welcome to Queenstown, and thank you for joining us in what has been another challenging year for organizing conferences. Unfortunately, due to the suspension of the trans-Tasman bubble, we have lost all of our Australian delegates. On the flip side, this has given us space to welcome those Kiwis stuck on the waiting list.

As usual, the scientific programme contains a broad range of clinically-focused updates. In addition, we have a session devoted to aspects of the COVID pandemic. New topics include presentations on Pharmac's plans for equipment purchasing, and details of the End-of-Life Care Act implementation. We hope you enjoy the eclectic mix.

The programme also includes the BATS regional anaesthesia workshop, and two emergency response workshops (Anaphylaxis and ACLS).

This year we have the AQUA BBQ at Coronet Peak on Friday evening, and the AQUA Conference dinner at the Skyline Restaurant on Saturday.

A special thank you to our sponsors for their continued support of AQUA.

We hope you enjoy the conference.

Jee Young Kim
Helen Lindsay
Neil MacLennan
Mark Welch
AQUA Organizing Committee 2021

Faculty

Dr Mataroria Lyndon	Equity Lead at Mahitahi Hauora PHO, Clinical Director at Tend Health, Senior Lecturer at University of Auckland
Dr Conrad Engelbrecht	Specialist Anaesthetist and Pain Specialist, Waikato Hospital
Dr Katia Hayes	Specialist Anaesthetist, Auckland City Hospital
Dr Kate Hudig	Specialist Anaesthetist, Auckland City Hospital
Dr Nola Ng	Specialist Anaesthetist, Auckland City Hospital
Professor Tim Short	Specialist Anaesthetist, Auckland City Hospital
Dr Kirstin Good	Chief Clinical Advisor, Ministry of Health
Rob McHawk	Manager Regulatory Assurance, Ministry of Health
Dr Kerry Benson-Cooper	Intensive Care Medicine Specialist, Auckland City Hospital
Dr Amanda Dalton	Specialist Anaesthetist, Starship Children's Hospital
Prof Rod Jackson	Professor of Epidemiology at University of Auckland, Director of EPIQ
Dr Sally Roberts	Clinical Head of Microbiology, Auckland City Hospital
Professor Steve Munn	Pharmacology & Therapeutics Advisory Committee
Dr Wayne Morriss	President-Elect, World Federation of Societies of Anaesthesiologists
Dr Colin Baird	Specialist Anaesthetist, Women's Health, Auckland City Hospital

Anaphylaxis Workshop -

Dr Karen Pedersen	Specialist Anaesthetist, Auckland City Hospital

ACLS Workshop -

Dr Shelia Hart	Specialist Anaesthetist, CCDHB / President, NZSA

Local Organising Committee -

Dr Neil McLennan	Specialist Anaesthetist, Auckland City Hospital
Dr JeeYoung Kim	Specialist Anaesthetist, Auckland City Hospital
Dr Helen Lindsay	Specialist Anaesthetist, Auckland City Hospital
Dr Mark Welch	Specialist Anaesthetist, Auckland City Hospital

Event Manager -

Joanne Martin	Director, Professional Events Management Ltd

Social Programme

THURSDAY, 19 AUGUST 2021

17:00 – 19:00hrs

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

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

FRIDAY, 20 AUGUST 2021

16:30 – 21:00hrs approx.

AQUA BBQ Function
Coronet Peak Base Building, Queenstown

16:30hrs	Bus to Coronet Peak departs (for non-skiers)	Main Entrance, Heritage
16:30hrs	Function area opens	Coronet Peak Café
18:00hrs	Function commences	Coronet Peak Café
20.30hrs	First bus to Heritage departs	Coronet Peak Car Park
21:10hrs	Bus to the Heritage departs (NB: at the conclusion of night-skiing)	Coronet Peak Car Park

SATURDAY, 21 AUGUST 2021

17:30 – 21:30hrs (you need to be at Skyline Gondola no later than 17:45hrs)

AQUA Conference Dinner (pre-purchase)
Skyline Restaurant – Includes Gondola
Ride and a Glass of Bubbles
Buses from Heritage Hotel to Skyline depart 17:30hrs

16:10hrs	Bus to the Heritage departs (arrives back at the Heritage ~16:55hrs)	Coronet Peak Car Park
17:30hrs	Conference Dinner bus departs from Heritage	Main Entrance, Heritage
18:00hrs	Gondola rides to Skyline restaurant	
18:45hrs	Guests seated	
19:00hrs	Dinner Served	
21:30hrs	Buses depart Skyline restaurant and return to Heritage	

Scientific Programme

Friday, 20th August 2021

0645	Breakfast Buffet	Pounamu Room, Exhibitor Area
Session 1		**Icon Conference Room**
0755 - 0800	Welcome and Introduction	Dr Sheila Hart
0800 - 0830	Advancing Maori health and Equity	Dr Mataroria Lyndon
0830 - 0900	Acute pain update	Dr Conrad Engelbrecht
0900 - 0930	Blood and transfusion medicine update	Dr Katia Hayes
0930 - 1000	Perioperative medicine update	Dr Kate Hudig
1000 - 1030	Morning Break	Pounamu Room, Exhibitor Area
Session 2		**Icon Conference Room**
1030 – 1100	ORL anaesthesia update	Dr Nola Ng
1100 – 1130	Research in anaesthesia update	Professor Tim Short
1130 – 1200	End of Life Care Act: Implementation	Dr Kristin Good & Rob McHawke
1200 – 1230	Close – Lunch packs and fresh fruit available for pick-up	Mackenzies Restaurant
1230	Bus to Coronet Peak departs (skiers)	Main Entrance, Heritage
AQUA Workshops		**Icon Conference Room**
1300 – 1430	Anaphylaxis Workshop [A1] 90 mins	Dr Karen Pedersen
1430 – 1440	Afternoon Break	Icon Foyer
1440 – 1610	Anaphylaxis Workshop [A2] 90 mins	Dr Karen Pedersen

Saturday, 21tst August 2021

0645	Breakfast Buffet	Pounamu Room, Exhibitor Area
Session 1		**Icon Conference Room**
0800 - 0830	ICU update	Dr Kerry Benson-Cooper
0830 - 0900	Paediatric anaesthesia update	Dr Amanda Dalton
0900 - 0930	Pharmac and medical device purchasing	Professor Steve Munn
0930 - 1000	Substance use disorder in anaesthetists: A personal perspective	Dr Colin Baird
1000 - 1030	Morning Break	Pounamu Room, Exhibitor Area
Session 4		**Icon Conference Room**
1030 - 1055	COVID update: ID perspective	Dr Sally Roberts
1055 - 1120	Learning to live with COVID is STILL not a viable option	Professor Rod Jackson
1120 - 1145	Global anaesthesia: Why it matters	Dr Wayne Morriss
1145 - 1200	Panel Q & A	
1200 – 1230	Close – Lunch packs and fresh fruit available for pick-up	Mackenzies Restaurant
1230	Bus to Coronet Peak departs (skiers)	Main Entrance, Heritage
AQUA Workshops		**Pounamu Room, Exhibitor Area**
1300 – 1430	ACLS Workshop [1] 90 mins	Dr Shelia Hart
1430 – 1440	Afternoon Break	Icon Foyer
1440 – 1610	ACLS Workshop [2] 90 mins	Dr Shelia Hart

Advancing Maori Health and Equity

Dr Mataroria Lyndon

Equity Lead at Mahitahi Hauora PHO, Clinical Director at Tend Health,
Senior Lecturer at University of Auckland
(Ngāti Hine, Ngāti Whatua, Waikato)

There are persistent inequities for Māori in healthcare access, healthcare quality, and overall health outcomes compared with other non-Māori New Zealanders. Māori are less likely to access high quality healthcare, suffer a higher prevalence of chronic disease conditions, and recent evidence reports greater risk from COVID-19.

This presentation will outline potential pathways that advance health equity at the individual, whānau, and population level, through equitable health services and systems, and among the health workforce. It will highlight the influence of unconscious bias in clinical decision making, the principles of cultural safety, and the role of the health workforce in reflecting the populations it serves.

Acute Pain Update

Dr Conrad Engelbrecht

Specialist Anaesthetist and Pain Specialist, Waikato Hospital

Prior to Covid-19, the opioid epidemic was arguably one of the greatest modern day health challenges for first-world countries, and in New Zealand we have witnessed a steady increase in opioid prescribing that coincided with a 33% increase in opioid-related deaths.

In Acute Pain Update 2021, we will look at the World Health Organisation's (WHO's) top health priorities and how New Zealand compares to other first world countries in relation to the opioid problem.[1-6]

Opioid free anaesthesia (OFA), in the context of the current opioid epidemic, has been promoted as a strategy that could have a meaningful influence on the problem. However, despite a surge in research on opioid free anaesthesia, it is still not clear if OFA is any better or safer than an opioid permissive balanced anaesthetic. There are many OFA 'recipes' in use and we will look at how it compares to a more 'middle of the road' approach. Studies have suggested that over prescribing of opioids was not only a common problem, but likely a significant contributor to opioid availability in the community. There is also encouraging evidence emerging of effective analgesic modalities that are opioid sparing.[7-14]

In 2015, I presented on Methadone and its perioperative utility. Since that presentation, the landscape for the use of long-acting opioids within the first 24h after surgery has changed, and its use is no longer recommended.[15,16]

A surge in accidental deaths involving Fentanyl caused regulators to restrict the indications for the use of Fentanyl patches, which will likely pave the way for future changes to opioid regulation; including box warnings, smaller pack sizes and changes to the wording in packet inserts of opioids.[17]

We will also turn our attention to non-steroidal anti-inflammatory drugs as part of an opioid minimizing strategy. 2021 has seen the launch of the 5th edition of Acute Pain Management: Scientific Evidence and we will examine some of the new and strengthened learning points that answers a number of questions around their use.[16]

We will also briefly look at interactions between commonly used analgesics and anti-emetics and the implications for clinical practice.[16,18]

There is continued debate on the effect of opioids on cancer and the literature remains conflicting. More recent studies and a meta-analysis has not been able to provide conclusive evidence or recommendations beyond those in existence.[19,20]

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Blood and transfusion medicine update

Dr Katia Hayes

Cardiothoracic Anaesthetist, ADHB, Chair of Transfusion Committee

1. National Massive Transfusion Protocol (MTP) design

A group of blood and transfusion representatives from both regional and tertiary hospitals around NZ have been working on standardizing and improving the national MTP algorithm. The aim of this project is to simplify and standardize all MTPs for all health care workers, regardless of location, and to provide a sensible, nationwide MTP. Ultimately, we want to improve communication between blood banks and clinicians, and reduce wastage of blood products.

A one page MTP (for a tertiary hospital) incorporates a standard MTP, a code crimson/red (trauma) MTP and an obstetric MTP.

The changes within this project include –

1. The introduction of a "Stat Pack". This is an initial 2 RBC (normal MTP) or 2 RBC + 2 FFP (code crimson/red MTP), in order to transfuse the patient and provide an opportunity to reassess the situation.
   This is useful because >40% of MTP activations do not go past box 2, and nearly all of these activations at Auckland City Hospital have not had an initial RBC transfusion with a pause and reassess. These statistics are similar amongst other DHBs, and that is why we have instituted these changes.

2. Following the initial transfuse and reassess stage, you will move onto activating the MTP. This will be simplified to Packs 1/2/3:

   Pack 1 2 RBC, 2 FFP
   Pack 2 4 RBC, 4 FFP, 3 cryoprecipitate
   Pack 3 4 RBC, 4 FFP, 1 platelets

   The Obstetrics MTP will receive 3 cryoprecipitate instead of FFP in Pack 1

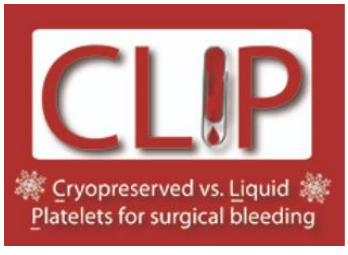
   The code crimson/red MTP will follow the stat pack with alternating Packs 2 and 3 (not Pack 1)

   An example will be included once final professional design is completed

3. There will now be a mandatory "MTP coordinator" when an MTP is activated, who will be a senior clinician, and the point of contact for blood bank. Hospitals will identify this person either by a high visibility vest or a front-of-scrubs sticker (similar to those used in ED during a trauma resuscitation to identify roles).

Successful trauma management is obviously not just about the fine details of blood product ratios and an MTP, but it is rather a coordinated approach to rapid assessment and definitive damage control surgery. While this is occurring, there should be resuscitation with blood products that represent the reconstitution of whole blood with minimal crystalloid administration.

2. Cryopreserved platelets



Platelet transfusion is a life-saving component in the treatment of major bleeding in such scenarios as trauma, major surgery, obstetric emergencies, and acute medical conditions. The main issue with our current formulation of platelets is their short shelf-life of only 7 days. This limits the ability to keep an adequate supply at medium-sized and small hospitals. In addition, almost 30% of platelets

are wasted each year because they expire before administration. This not only results in significant financial loss in excess of $5million/year (each bag costs $900), but it is also a discourtesy to platelet donors.

Unlike red blood cells, platelets cannot be refrigerated as this significantly impairs their function, and room temperature storage (RTS) for >7days is limited by the risk of infection.

Unlike refrigeration, and somewhat surprisingly, cryopreservation of platelets at -80°C increases the shelf life to 2 years. If cryopreserved platelets are as safe and effective as liquid-stored platelets, it would allow smaller hospitals to easily provide platelet transfusions, would reduce platelet wastage, and possibly produce better patient outcomes through more effective haemostasis.

There are two clinical trials which are relevant obligatory steps requiring completion before Cryopreserved platelets will be ready for use in NZ.

CLIP-I (NZ) was a pilot study conducted by Auckland City Hospital Cardiovascular ICU Research and the NZ Blood Service (NZBS). This pilot assessed production and distribution logistics, feasibility and safety aspects of cryopreserved platelets (CPS). In addition, the results of the trial were used by NZBS to support the successful product registration of CPS with MEDSAFE.
Over 12 months, 91 patients were enrolled, with 23 receiving platelets (25% of enrolled patients) and they were randomized to either RTS platelets or CPS. There were no differences in outcomes between the groups. CLIP-1 NZ also demonstrated that NZBS was able to manufacture and distribute CPS, and that these platelets were safe for patients. We have submitted CLIP-I (NZ) for publication.

CLIP-II (NZ) will be a multi-centre, blinded, randomized controlled, non-inferiority trial of CPS vs. conventional RTS platelets for the management of post-operative bleeding in patients undergoing cardiac surgery. CLIP-II will be conducted in all 5 cardiac surgery centres in New Zealand. We will need to recruit ~800-900 patients in order to enroll 230 patients (recruitment rate around 25%) in this study.

If this research demonstrates that CPS are not inferior to traditional platelets for the control of major bleeding occurring during cardiac surgery, then their use will be extended to other situations where urgent platelet transfusion is indicated, and they will be made available in hospitals that do not currently keep them on-site.

The research impact includes -

1. Reduction in inequity - patients presenting to smaller or more remote hospitals will have access to platelets in a more-timely manner, so that the latest MTP advice can be followed. This has been shown to improve outcomes in diverse clinical scenarios including trauma, major surgery and obstetric emergencies
2. Significant cost savings
3. Less wastage of donated platelets

3. 4-Factor prothrombin complex concentrates (PCCs) for New Zealand & Australia, & the use of PCCs in non-warfarin contexts

Australia and New Zealand are the only countries to exclusively have the 3-Factor prothrombin complex concentrate (PCC) *Prothrombinex*. Prothrombinex contains factors II, IX, X, with variable smaller amounts of factor VII, and Heparin 192 iu/vial.

4-Factor PCCs contains factors II, VII, IX, X, and protein S & C. This product will be introduced into NZ towards the end of 2022, replacing our current Prothrombinex.

PCCs are routinely used for reversal of warfarin, however, there is growing evidence for PCCs use in trauma and cardiac surgery.

A recent systematic review of the use of PCCs for the treatment of bleeding in trauma patients, showed that

PCCs could be a beneficial adjunct during an MTP, in addition to FFP. In trauma, PCCs combined with FFP have shown reduced mortality when compared to FFP alone. Use of PCCs also lead to a reduction in RBC transfusions, when compared to transfusions with no PCC use. There was no difference in thromboembolic events between the two groups (van den Brink, 2020).

A Cochrane review will be published this year on PCC use in cardiac surgery. Again, this shows a reduction in amount of RBCs transfused, reduction in the incidence of RBC transfusion, and no increased incidence of thrombotic events. At Auckland City Hospital, we now routinely use PCCs in high risk cardiac surgery patients who cannot tolerate the volume associated with FFP transfusion (Hayes, 2020).

4. Cytosorb – for the emergency removal of Ticagrelor and Rivaroxaban

With no available reversal agent for Ticagrelor or Rivaroxaban, there is a significant challenge treating patients taking these drugs who also have life-threatening bleeding (such as upper GI bleeding, intracranial haemorrhage, ruptured abdominal aortic aneurysm, or those requiring emergency cardiac surgery).

Rivaroxaban is not dialysable as it is highly protein-bound (~95%). It will take 4 half-lives (~28 hours, range: 20-36 hours) for Rivaroxaban effect to have decreased by more than 90%, in patients with normal renal function. Clearly, this is too long to wait in a life-threatening bleeding context.

Andexanet Alpha (available in USA) is a specific reversal agent for Rivaroxaban, but it is not available in Australasia, costs over $60,000 for a bolus and small infusion dose, and there are safety concerns regarding its prothrombotic effect. Prothrombinex will only partially reverse the effects of Rivaroxaban.

Ticagrelor is a reversible inhibitor of ADP on platelets, and has no reversal agent available. If any platelets are transfused to a patient on this drug in a bleeding context, these platelets will in turn become inhibited.
A novel way of removing these drugs is using *Cytosorb*. This 300 ml cartridge is filled with porous polymer beads which absorb drugs with a molecule size <60kD. This technique requires placement of a vascath, a dialysing circuit allowing a blood flow of around 150-250 ml/min, and a pump to re-circulate blood.

So far Cytosorb has been successfully used in cardiac surgery (used while on cardiopulmonary bypass) both in Auckland and Wellington, with approximately 20 patients at each site. This technique provides an option for those extreme cases of life-threatening bleeding caused by these two drugs, where haemorrhage cannot be controlled by other drug, blood, interventional, or surgical means.

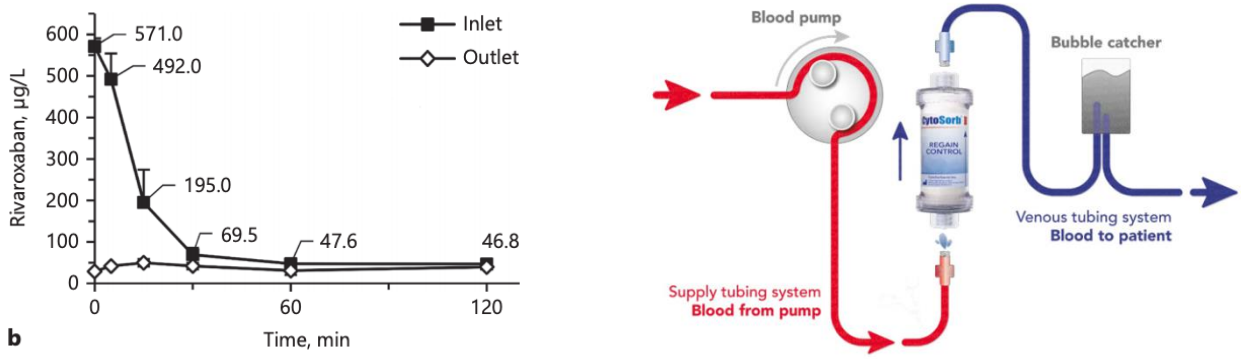


Figure 1 In vitro recirculation model showing inlet/outlet Rivaroxaban plasma concentrations

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Perioperative medicine update

Dr Kate Hudig

Specialist anaesthetist, ADHB

We are all used to asking our patients the age-old question: "Can you walk up 2 flights of stairs without stopping?" as a way of assessing their cardiorespiratory reserve prior to having surgery. Several single centre studies have raised concerns with the validity of this method for assessing functional capacity[3,4]. A recent large multicentre cohort study (the METS study) found that subjective physicians' assessment did not correctly identify those patients who performed poorly on formal pre-operative exercise testing, or those at an elevated risk of post-operative morbidity and mortality[1].

Evaluation of functional capacity is considered one of the corner stones of pre-operative anaesthetic risk assessment, guiding both of decisions on further pre-operative testing, optimization and risk discussion as well as influencing a patient's intraoperative course and post-operative disposition[2]. With a multi-centre study now confirming concerns that subjective assessment is not an accurate way of assessing this, what should we be doing?

The METS study and several of the METS study sub-analyses have helped to answer this question[1,5,6]. These studies have shown us that using the Duke Activity Status Index (DASI) can help predict post-operative morbidity[6], while an elevated pre-operative NT-pro BNP is associated with increased mortality at 1 year[1]. A sub study looking at the 6 minute walk test suggested that using a low cut off 370m helped to predict increased morbidity and mortality at 1 year[6].

The aim of this presentation is to discuss a pragmatic and cost-effective way to assess high-risk patients' functional capacity before surgery based on current evidence. Can we now put subjective physicians' assessment to rest?

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ORL anaesthesia update

Dr Nola Ng

Specialist anaesthetist, ADHB

This session aims to give a brief update on some of the more topical developments in airway management.

PART ONE: Awake Intubation

The Difficult Airway Society (DAS) released a guideline for Awake Tracheal Intubation (ATI) in adults last year[1].

Useful updates from this guideline included:

- Oxygen therapy should always be administered during the procedure, which may not prevent desaturation but will reduce the severity.
    - Use of High Flow Nasal Oxygenation (HFNO) when attempting an oral awake intubation
    - Face tent or Hudson mask cut in half if attempting a nasal intubation
- Ergonomics for ATI, with two examples given; one with the proceduralist at the head of the bed and the other with the proceduralist beside the patient.
    - Essentially the aim is to optimize the position of the patient, proceduralist, assistant and equipment including monitors.
    - Monitors should be in the direct line of sight of the proceduralist
- Topicalization recommendations, with lignocaine maximum dose calculated at 9mg/kg lean body weight. They stress that this is a ceiling dose for lignocaine and not a target.
    - Reminder of lignocaine doses in commonly used preparations for topicalization:
        - Co-phenylcaine spray = lignocaine 5% + Phenylephrine 5mg/ml): 1 spray = 0.1ml=5mg lignocaine
        - Lignocaine 10% (100mg/ml)= 10mg/spray
        - Lignocaine 4% (40mg/ml)
- Recommendation of a two-point check for tracheal tube placement
    - Visualize tracheal lumen in trachea
    - Confirm capnography

We will also address common questions and troubleshooting points regarding ATI:

- Passage of endotracheal tube through the nose
    - Serial nasal dilatation will help with this, and can be done during topicalization of the oropharynx and set up in theatre.
- Difficulty visualizing the glottis
- Get patient to sniff, swallow, vocalize or breathe deeply.
- Hang up at the cords (usually the right arytenoid) - not uncommon as it is a blind procedure!
    - Use a reinforced tube
    - Continuous rotation as advancing
    - Get patient to breathe in
    - Using a videolaryngoscope in combination can help facilitate clearance of the tongue, elevate the epiglottis and advance the ET tube.
- Spray as you go technique
    - Get patient to breathe in as you spray above, at and below cords (by epidural catheter or via working channel).

PART TWO: THRIVE

High flow nasal oxygen (HFNO), which is also known as Trans-nasal Humidified Rapid Insufflation Ventilatory Exchange (THRIVE), is where oxygen that has been warmed to body temperature and 100% humidity is delivered at flows of up to 90 L/minute via nasal cannulae.

This allows for:

- Humidification
- Continuous Positive Airway Pressure (CPAP)
- Apnoeic oxygenation and a variable degree of apnoeic ventilation (some removal of CO_2 from respiratory dead space and replacement of oxygen that has been absorbed, thus assisting in the process of oxygen diffusion)[2]
- Reduction in the work of breathing and airway resistance[3]

In the operating room, THRIVE can be used in airway management in the following ways:

1) Preoxygenation and extension of safe apnoeic time during difficult airway management under anaesthesia
    - 30-40L/min usually well tolerated by the awake patient
    - Especially useful during Rapid Sequence Induction (RSI) and awake intubations as usually mask ventilation is not administered thus allowing for oxygen delivery and some ventilation. HFNO limits the amount of CO2 accumulation, especially in the first 20 minutes[4]
    - Caveats:
        - Airway must be open for THRIVE to work, so steps must be taken to ensure airway patency
        - Awareness is a risk, so intravenous anaesthesia should be used along with bispectral index (BIS) monitoring
        - Mask seal should not be attempted over the THRIVE cannulae (risk of barotrauma or gastric insufflation
            - Note: Fisher and Paykel are currently trialling new nasal cannulae ("Switch" cannulae) that allows for BMV in conjunction with HFNP oxygen delivery
        - High oxygen concentrations increase the risk and intensity of fire, because not only is there increased oxygen concentration, but also increased delivery of oxygen per unit time.
            - HFNP oxygen should be turned off after the airway is secured to avoid high oxygen concentrations around the patient which may pose an increased fire risk
2) Supplementary oxygenation during procedural sedation
    - Advantages: warmed, humidified high flow oxygen delivered.
    - Disadvantages: capnography not possible, and because it may extend the apnoeic period before oxygen desaturation occurs, this may mask patient apnoea and also unrecognised hypercarbia.
3) During elective/acute shared airway surgery using apnoeic gas exchange
    - e.g. during microlaryngeal surgery
    - If the procedure is longer than 20 minutes, then additional methods to ventilate and clear CO_2 are needed[2]
4) Management of an acutely compromised airways
    - e.g. a patient on the ward with an airway emergency
5) After extubation in PACU
    - e.g.in the obese patient who is extubated and breathing but may be a bit drowsy after GA

Contraindications to THRIVE:

ABSOLUTE:

- Use of diathermy within the larynx, pharynx, oral cavity or face
    - NB: Use on the neck for the superficial initial dissection of emergency tracheostomy is the exception
- Use of alcohol based skin prep during the use of HFNO
- Known or suspected base of skull fracture, CSF leak or other communication with the intra-cranial space

- Significant pneumothorax not treated with chest drain, as the CPAP may expand the pneumothorax[5]
- Complete nasal obstruction
- Active epistaxis or recent Functional Endoscopic Sinus Surgery (FESS)

RELATIVE CONTRAINDICATIONS:

- Partial nasal obstruction
- Disrupted airway e.g. laryngeal fracture, mucosal tear or tracheal rupture
- Use of laser or diathermy during the use of HFNO due to fire risk. This becomes an absolute contraindication once Fi02 > 30% required
- Patients with contagious pulmonary infections, especially Tuberculosis
- Patients in whom high concentration oxygen therapy is contraindicated (for example bleomycin chemotherapy)
- Patients unable to tolerate hypercarbia with prolonged apnoea, e.g.
    - Sickle cell anaemia
    - Pulmonary hypertension
    - Intracranial hypertension
    - Congenital heart disease
- Children under the age of 16 years. There have been some case reports of air-leak (e.g. pneumothorax and pneumomediastinum) in children[6]

When using THRIVE it is of utmost importance to remember the very real fire risk that exists. Patient and case selection are essential considerations, and should THRIVE be used in situations where a source of ignition is being used (for example laser or diathermy), an experienced team with knowledge on management of airway fires should be present.

Fire requires fuel, ignition source, and an oxidizer, all of which may be present in surgical cases using high flow nasal oxygenation. There have been several case reports where high flow oxygen channeled under surgical drapes to act as the oxidizer, where tissue or vaporized fat acted as the fuel, and diathermy or laser were the source of ignition to complete the fire triad[7-9]

PART THREE: Ultrasound for the airway

Point of care ultrasound (POCUS) is increasingly being used in airway management. The following are a few examples of how it is being utilised[10]

1) Airway Assessment
    a. Airway size
        i. Measure the subglottic airway diameter; especially important in paediatrics
    b. Prediction of difficult airway
        i. Small studies only at present, four studied methods reported to date:
            - Visualisztion of hyoid bone[11]
                a. Inability to visualize the hyoid bone on US using the sublingual approach predicts difficult intubation
                b. High sensitivity and specificity
            - Hyomental distance ratio[12]
                a. Hyomental distance ratio = the distance between hyoid bone and mandibular mentum in the neutral position to the hyperextended neck position
                b. Shorter hyomental distance ratio of 1-1.05 in morbidly obese patients predicts difficult laryngoscopy with high sensitivity
                c. Patients intubated easily were found to have a hyomental distance ratio ranging 1.12 - 1.16
            - Anterior neck thickness[13-15]

a. Neck thickness at the level of the vocal cords, hyoid bone and thyrohyoid membrane have all been studied.
b. At the level of the vocal cords, mean pre-tracheal tissue exceeding 28 +/- 2.7 mm was found to increase the risk of difficult laryngoscopy[13]. Unfortunately, not reproduced in other populations.
c. However, at the level of the hyoid bone and thyrohyoid membrane, anterior neck thickness above 28mm was found to be a better predictor of difficult laryngoscopy compared to at the level of the vocal cords.

- Tongue thickness and tongue thickness to thyromental distance ratio[16]
  a. Tongue thickness of more than 6.1cm measured using the submental approach may predict difficult tracheal intubation
  b. Higher tongue thickness to thyromental distance ratio of more than 0.87 are capable of predicting difficult tracheal intubation

2) Airway device placement and depth
   a. Endotracheal Tube (ETT) confirmation
      i. Cardiorespiratory arrest, low flow states, bronchoconstriction and technical malfunction may all result in no/poor capnography trace
      ii. Place transducer in a transverse plane, at suprasternal notch; this has been shown to have the best visualization and diagnostic accuracy[17]
      iii. ETT in oesophagus is seen as 'double tract sign' on static imaging[17]
      iv. ETT passing through trachea is seen as flutter of movement, "snowstorm sign" on dynamic imaging[17]
      v. No delay in confirmation using ultrasound, and at the level of the suprasternal notch, oesophageal intubation can be diagnosed with high sensitivity (98.9%) and specificity (94.1%)[18-19]
   b. ETT depth
      i. Clinical assessment by auscultation and observing chest rise and fall may fail to identify up to 55% of endobronchial intubations[20]
      ii. Using a longitudinal view, aim to visualize ETT cuff at the level of the sternal notch, with or without saline[17]
   c. LMA confirmation
      i. In children, ultrasound has been used to detect LMA malrotation with high sensitivity (93%) and specificity (82%) and accuracy of 87%[21]
         - LMA malrotation was recognized and graded based on sonographic arytenoid cartilage elevation in the transverse plane
      ii. LMA cuff can be visualized when inflated with saline and contrast agents
3) Procedures:
   a. Marking cricothyroid membrane
      i. Ultrasound provides accurate landmark identification allowing for improved procedural safety, especially when anatomy is not easily palpated
      ii. Locating the cricothyroid membrane is fast with a short learning curve[22] and real time ultrasound guided bougie assisted cricothyroidotomy has also been shown to have a high success rate in cadavers[23]
      iii. Transverse technique:
         - Place linear probe in midline of neck at level of cricoid cartilage
         - Slowly advance cephalad until thyroid cartilage is seen (hyperechoic, triangular structure)
         - Then move transducer caudally to visualize a hyperechoic white line with reverberation air artefact posteriorly; this is the cricothyroid membrane
         - To confirm, move probe caudally to visualize cricoid cartilage
         - Cricothyroid membrane can be marked in the midline above and below the probe
      iv. Longitudinal technique:
         - Place linear probe in midline of neck at level of cricoid cartilage
         - Rotate probe 90 degrees so that airway is in longitudinal axis

- Tracheal rings will be a series of hypoechoic structures, anterior to a white hyperechoic line ("string of pearls")
- Move transducer cephalad to visualize thyroid cartilage
- Once cricothyroid membrane identified, slide a linear metallic object (e.g. blunt needle) under the probe to create a shadow over the membrane. Remove probe and mark the area

b. Superior laryngeal nerve blocks for awake intubation[24]

4) Pathology:
   a. Epiglottis, e.g. can see thickness
   b. Vocal cord assessment, e.g. can see real time visualization of vocal cord movement for pathology such as a vocal cord palsy or vocal cord cyst
   c. Trachea location and surrounding structures
   d. Laryngeal injury
5) Predicting post-extubation stridor[25]
   a. By measuring the air column width difference at the level of the vocal cords before and after ETT cuff deflation
   b. A smaller difference, means a narrower airway, meaning less air passing through the vocal cords and possible laryngeal oedema

During this session ultrasound images will be shown to demonstrate some of the above as well as key anatomy identifiable when scanning the airway.

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Research in anaesthesia update

Dr Tim Short

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The ANZCA Clinical Trials Network (CTN) has run a busy programme of clinical outcomes research since its inception 12 years ago. Projects have centred around re-evaluating commonly used anaesthetic drugs and procedures where a diversity of strongly held views are expressed, but good quality evidence as to what is best is lacking. I will review some of the programmes of clinical research we have been involved with and where they are heading. There are a number of current major studies that are in their early stages that hospital departments with keen anaesthetists are welcome to join.

ENIGMA 1 & 2 Eliminating nitrous oxide in the gas mixture for anaesthesia. PI Paul Myles, Melbourne.
These studies kicked of the CTN. Nitrous was under attack, but had never undergone a formal safety evaluation, in fact its use pre-dated the existence of both the FDA and Fisherian statistics. The Enigma 1 study of 2050 patients gave a strong hint that the theoretical issue of cardiac toxicity causing MI and death may also be a clinical problem. The 7112 patient Enigma 2 study definitively nailed the answer and found that short term use in our setting did not increase complication rates, and the well-known issue of nausea was transient and easily treated. Long-live nitrous oxide!

Relief Restrictive versus liberal fluid therapy for major abdominal surgery. PI Paul Myles
This ended up being a 2983 patient comparison of 3.7L with 6.1L of IV fluids in the 24 hours in patients having major surgery. There was no difference in the primary outcome of disability free survival at 1 year. However, patients in the restrictive group had a higher incidence of acute kidney injury. The study ended a trend in anaesthetic opinion that was based on good ideas and optimism, but lacked evidence.

Balanced 1 & 2 Anaesthetic depth and complications after major surgery: an international randomized controlled trial. PI Timothy Short, Auckland.
Balanced was a 6644 patient study comparing BIS 35 with BIS 50 anaesthesia in sick elderly patients having major surgery. This was the first large anaesthesia study run out of New Zealand, and we offer a further special thanks to all the anaesthetists from 12 NZ hospitals who helped us recruit 1358 patients into it. We found no difference in 1 year mortality or serious complications. A 600 patient sub-study of delirium however found significantly more delirium in the deep patients and also longer hospital stays and cognitive dysfunction (BJA 2021 in press). The balance is now tilting toward unnecessary depth causing more delirium and possibly worse neurocognitive outcomes. More evidence is needed.
Balanced 2 (PI Carolyn Deng) is now planned and we are in the process of approaching funders. The study will be of 2766 sick elderly patients presenting for major surgery and randomized to deep or light anaesthesia. Both volatile and intravenous anaesthesia will be acceptable and all brands of depth monitor may be used. The primary outcome will be the incidence of post-operative delirium. Secondary outcomes will include neurocognitive function, days alive out of hospital, all-cause mortality and awareness at 90 days.

PADDI Perioperative administration of dexamethasone and infection. PI Tomas Corcoran, Perth.
PADDI was an 8880 patient non-inferiority study of whether dexamethasone increases perioperative surgical-site infection. Patients received 8mg of dexamethasone or placebo and were followed up for 30 days after surgery. The incidence of infection was similar in each group at 8.1% for dexamethasone and 9.1% for placebo (CI95 –2.1 to 0.3). There was also no difference in the incidence of infection in the 1154 diabetic patients in the study, but a 0.4% increase in the incidence of hyperglycaemia in diabetics.

POISE 1,2 & 3 Perioperative ischaemia evaluations. PJ Devereaux, Canada
Poise-1 studied 8351 patients at risk of atherosclerotic disease randomized to metoprolol or placebo. There was a 1.5% absolute reduction in cardiac events, but a 0.8% increase in mortality, mostly due to a doubled incidence of stroke, this has led to a reduction of use of betablockers on the perioperative period.

Poise-2 studied aspirin and clonidine in 10,010 patients at risk of atherosclerotic disease. Clonidine was also found to not decrease the incidence of cardiac events or death. There was a 0.2% increase in the incidence of non-fatal cardiac arrest in the clonidine group. Continuation of aspirin did not decrease myocardial events but led to a 0.8% increase in major bleeding. The conclusion was with-hold aspirin.
Poise-3 was designed firstly to determine if tranexamic acid can reduce the occurrence of life-threatening, major, and critical organ bleeding, and whether it increases major arterial and venous thrombotic events; and secondly to determine the impact of a hypotension-avoidance strategy (stop most antihypertensives, aim MAP>80) versus a hypertension-avoidance strategy (continue all antihypertensives, aim MAP>60) on the risk of vascular death and major vascular events in patients who are followed for 30 days after noncardiac surgery. The target group was patients over 45 undergoing major surgery or with a history of IHD.
The study recently stopped at 9507 patients due to a lack of funds, but an event rate above predicted and that maintains study power. The Cogpoise sub-study of post-operative delirium and cognitive dysfunction recruited 2816 patients and the NT-proBNP sub-study of using BNP as a predictor of badness at 1071 patients. This study should provide important evidence, currently the safety profile of tranexamic acid is largely based on observational data. Blood pressure management is of course endlessly controversial. We hope to have results out early next year.

ROCKET Reduction of chronic post-surgical pain with ketamine. A multicentre double-blind parallel-group placebo controlled, randomized trial of the effect of perioperative ketamine on the risk of development of chronic post-surgical pain. PI Phil Peyton, Melbourne.
This 4884 patient study gained a large NHMRC grant in Australia, where patient recruitment started over 18 months ago. We finally have our approvals in place and the study has commenced in NZ. The target group are patients undergoing surgery with an incision over 8cm long with a post-operative opioid plan for analgesia. The ketamine arm receives an infusion of ketamine from before surgical incision to at least 24h post op. The primary outcome is the incidence of chronic post-surgical pain at 3 months. Other outcomes include 12-month outcome, perioperative pain severity, incidence of delirium, hospital stay etc. We hope this study will answer our questions about the place of ketamine in anaesthetic practice.

VAPOR-C Volatile anaesthesia and perioperative outcomes related to cancer. PI Bernhard Riedel, Melbourne.
This is a 5736 patient international, multicentre, randomised trial of inhalational versus intravenous propofol anaesthesia and also intravenous lignocaine/placebo to improve disease-free survival after cancer surgery that has been funded by NHMRC in Australia with supplementary funding from AMRF in NZ. All cancer surgery done with an intention of cure is included. We hope to start recruitment this year. This study should answer a lot of questions about the relative merits of TIVA versus volatile anaesthesia and also about some of the theoretical advantages of lignocaine in these patients.

LOLIPOP Long-term outcomes after lignocaine infusions for postoperative pain. PI Tomas Corcoran, Perth.
This is a 4400 patient international, multicentre, randomised trial of lignocaine infusion for the reduction of chronic post-surgical pain following operations with a high incidence of this complication. It is funded by NHMRC. This study should provide good quality patient centred outcome data on the effectiveness and safety of lignocaine infusion as a post-operative analgesic. There will also be a pharmacokinetic substudy as the narrow therapeutic index and lack of good PK data in the elderly means varied results from past studies may be a result of inconsistent plasma concentrations. We will be going through the compliance process later this year for NZ.

ATACAS and TRIGS Tranexamic acid to reduce Infection after gastrointestinal surgery. PI Paul Myles, Melbourne.
Atacas was a 4662 patient study of the hazards of using aspirin and tranexamic acid in cardiac surgery. Aspirin neither increased bleeding nor prevented thrombotic events. TxA was associated with a 1.4% lower absolute risk of bleeding without increasing thrombotic complications in this setting, however there was a signal of increased seizures. A substudy of 613 patients found a 5% absolute risk reduction in infection rates.
Trigs is another large, multicentre clinical trial of TxA, funded by NHMRC. The aim is to study 3300 patients and determine whether TxA: reduces surgical site infection and other healthcare-associated infections such as pneumonia and sepsis; reduce red cell transfusion in GI surgery; reduce a composite of any serious postoperative complications, and so increase “days alive and at home up to 30 days after surgery”; and to evaluate the temporal effect of TxA on perioperative immune and inflammatory responses. We are nearly ready to start recruitment in

NZ.

Masterstroke. Management of systolic blood pressure during thrombectomy by endovascular route for acute ischaemic stroke: a randomized clinical trial. PI Doug Campbell, Auckland.
Thrombectomy for ischaemic stroke done within, preferably, 6 hours of onset is associated with a profound reduction in long term disability and is significantly more effective as a treatment than thrombolysis. Surprisingly there is very little guidance on BP management in these patients, or indeed in stroke patients in general. This study compares a target systolic pressure of 140mmHg with 170 mmHg in 550 patients. The primary outcome is modified Rankin score of disability at 90 days and secondary outcomes are functional outcome and days at home in the first 90 days post stroke. The study is a milestone in developing lean outcome studies as all the postoperative data come from service databases. The study is only relevant to the three NZ centres that do clot retrieval, but the result will have much broader applicability.

SNAP Sugammadex or neostigmine and pulmonary complications PI Kate Leslie, Melbourne
Sugammadex is a more effective reversal agent for some muscle relaxants than neostigmine, but expensive. Reliable complete reversal of neuromuscular block may reduce respiratory and other complications of anaesthesia but has not been adequately evaluated and the relative risks of the two agents are unknown. This is a 3500 patient study, we have applied for funding, here's hoping…

FOMO Female or male outcomes in patients participating in large perioperative studies-a post hoc analysis of published research. PI Kate Leslie, Melbourne.
Kate has combined data from 11 large outcome studies that the CTN has been involved with, totalling ~55,000 patients and is investigating whether there are disparities in outcomes between male and female patients that would indicate gender bias in their treatment. Whilst the principal investigator and the two statisticians are female, all of the participating studies were run by aging, middle class white guys. Results are awaited - maybe ANZCA-ASM next year in Perth. We are already well along the path of addressing the gender-bias issue in anaesthesia research, let's hope the outcome in patients is not a surprise!

Future Directions
These big studies are expensive and future funding uncertain. We are looking at simplified randomized study designs, for instance by using the National Minimum Data Set (NMDS), which is Health Department data for all operations in NZ, for the outcome data. This database includes days in hospital, days alive out of hospital and mortality. Doug Campbell's Masterstroke study is our flagship for this approach.
The results have often been controversial, and it is always interesting to hear what anaesthetists make of them, but they form a strong body of evidence from which to tailor our anaesthetics to individual patients. We thank all hospital departments and their research leaders who have been involved in these studies and invite all departments in NZ to get involved in studies that seem relevant to their case mix and interests. The studies are interesting to do, and the outcomes are more relevant to us if we recruit actively into them. Rocket, Vapor-C, Trigs and Lollipop are all open for business.

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End of Life Care Act: Implementation

Dr Kristin Good & Rob McHawk

Chief Clinical Advisor, Ministry of Health & Manager Regulatory Assurance, Ministry of Health

The End of Life Choice Act (The Act) comes into force on 7 November 2021, following the outcome of the referendum at the last election. The Ministry of Health are responsible for the implementation of The Act, and have a work programme dedicated to ensuring a safe and functional assisted dying service available from day one. This presentation will give an outline the legislation, the implementation strategy including the design principles, workstreams, and timelines, and give an overview of the care pathway and the role of health practitioners within it.

ICU Update

Dr Kerry Benson-Cooper
Intensive Care Medicine Specialist, ADHB

I will give an update on research in ICU in 2021. This is focused on renal replacement therapy, temperature management therapy after out of hospital cardiac arrest, some oxygenation updates in critically ill patients, vitamin C in critically ill patients, and a little bit on REMAP-CAP - which will be applied to other viral respiratory infections.

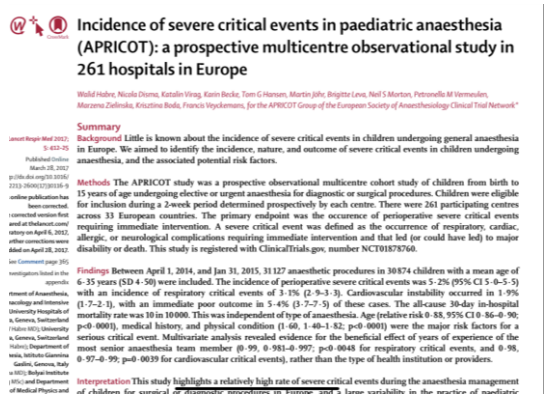
Paediatric anaesthesia update

Dr Amanda Dalton

Specialist anaesthetist, Starship Children's Hospital

There are several insights and publications that have changed the face of paediatric anaesthesia around the world in recent years. In particular, preventing respiratory adverse events and hypoxic episodes remains a primary goal, given their persistent occurrence in day to day practice. Small adaptations to the conduct of anaesthesia will assist with both recognising high risk patients and also preventing adverse events. In addition to this, the nuance of providing safe and high-quality anaesthesia care includes improving how we communicate with children, and a critical look at the choice of induction technique – mask is not always best!

1. APRICOT – Incidence of severe critical events in paediatric anaesthesia: a prospective multicentre observational study in 261 hospitals in Europe



Incidence of severe critical events in paediatric anaesthesia (APRICOT): a prospective multicentre observational study in 261 hospitals in Europe

Summary

Background Little is known about the incidence of severe critical events in children undergoing general anaesthesia in Europe. We aimed to identify the incidence, nature, and outcome of severe critical events in children undergoing anaesthesia, and the associated potential risk factors.

Methods The APRICOT study was a prospective observational multicentre cohort study of children from birth to 15 years of age undergoing elective or urgent anaesthesia for diagnostic or surgical procedures. Children were eligible for inclusion during a 2-week period determined prospectively by each centre. There were 261 participating centres across 33 European countries. The primary endpoint was the occurence of perioperative severe critical events requiring immediate intervention. A severe critical event was defined as the occurrence of respiratory, cardiac, allergic, or neurological complications requiring immediate intervention and that led (or could have led) to major disability or death. This study is registered with ClinicalTrials.gov, number NCT01878760.

Findings Between April 1, 2014, and Jan 31, 2015, 31 127 anaesthetic procedures in 30 874 children with a mean age of 6·35 years (SD 4·50) were included. The incidence of perioperative severe critical events was 5·2% (95% CI 5·0–5·5) with an incidence of respiratory critical events of 3·1% (2·9–3·3). Cardiovascular instability occurred in 1·9% (1·7–2·1), with an immediate poor outcome in 5·4% (3·7–7·5) of these cases. The all-cause 30-day in-hospital mortality rate was 10 in 10 000. This was independent of type of anaesthesia. Age (relative risk 0·88, 95% CI 0·86–0·90; p<0·0001), medical history, and physical condition (1·60, 1·40–1·82; p<0·0001) were the major risk factors for a serious critical event. Multivariate analysis revealed evidence for the beneficial effect of years of experience of the most senior anaesthesia team member (0·99, 0·981–0·997; p=0·0048 for respiratory critical events, and 0·98, 0·97–0·99; p=0·0039 for cardiovascular critical events), rather than the type of health institution or providers.

Interpretation This study highlights a relatively high rate of severe critical events during the anaesthesia management

Despite being four years old, this publication in the Lancet continues to be heavily referenced in any discussion about modern paediatric anaesthesia. Five years ago, an update such as this would almost certainly have included a section on our current understanding of neurotoxicity and its relevance. Our concerns in this regard are now significantly lessened, instead we now know the conduct of our anaesthesia is the most important factor. This study was designed to look at the incidence and nature of severe critical events in children undergoing anaesthesia. Children from birth to 15 years were recruited in 261 European hospitals across 33 countries in Europe. The incidence of severe critical events was 5.2% - a surprisingly high number. Roughly 5% of these had an immediately poor outcome and most were respiratory in nature - we know respiratory adverse events remain more common than we care to believe. Key takeaways from the APRICOT group were that the experience of the anaesthetist had a bearing on the risk of severe critical events, the rate of respiratory and cardiovascular events reduced with anaesthetist experience (1% and 2% reduction respectively for each additional year of experience). Also, respiratory adverse events reduced by 12% with each additional year of age. A history of prematurity roughly doubled the risk. Understanding the causes and risk factors for adverse events becomes important when planning the conduct of anaesthesia.

2. Difficult airway and videolaryngoscopy in children

We are often lead to believe that difficult airways are rare in children. To a certain extent this is true, however difficult airways will be encountered – where are we at in our recommendations on management?

a. Avoid multiple attempts at tracheal intubation

As far back as 2011 NAP4 included 13 paediatric cases, 9 of which were under age 4. Harm was recorded due to repeated intubation attempts. They recommended calling for help early, involving ENT early, and to avoid repeatedly using a technique that has already failed.

Following this the PeDI Registry recorded significant increase in complications where there were >2 intubation attempts (including cardiac arrest and severe airway trauma). Complications went up with each subsequent attempt, with smaller children being at the greatest risk. Again they recommended there should be no more than two attempts at direct laryngoscopy before proceeding to videolaryngoscopy.

Despite these two studies being well known and reported, the Apricot Group also showed that in 38 of the difficult intubations reported, 28 failed to receive an alternative technique, proving that *"old habits die hard"*, and despite the evidence there is still a problem with adhering to guidelines.

Rather than continuing to try what has already failed, change technique.

b. Videolaryngoscopy has become a well-established part of paediatric practice

The PeDI registry demonstrated significantly greater first time and eventual success with videolaryngoscopy (VL) vs direct laryngoscopy (DL), which was logical given the study specifically looked at children with known difficult direct laryngoscopy. The question of which VL to use however remains a difficult one to answer, given the plethora of different devices now available.

Further data from this registry was published in BJA in 2020. Authors postulated that hyperangulated blades would be more successful than standard curvature. In fact, what they found was that in children over 5kg they performed the same, but in smaller infants (<5kg) the hyperangulated blades performed worse. The take-home point, however, is that any videolaryngoscope may work, and do not fret about the right one. Rather, focus on changing your technique when you have failed.

The Lancet also published an RCT in 2020 demonstrating the benefits of videolaryngoscopes in infants, and highlights their benefit for both teaching and routine use.

c. Apnoeic oxygenation is now emphasized for airway management.

Hypoxaemia during intubation is a common occurrence. Nasal cannula oxygenation even at low flows for pre-oxygenation, but also during routine intubation, ensures adequate oxygenation even during prolonged airway manipulation or difficult intubation. At Starship Hospital we are moving towards having nasal cannulae routinely attached to the machines in theatre to encourage and facilitate this practice. High flow oxygen also has a place where the practitioner is familiar with its use.


NEW ZEALAND

RSV virus outbreak: 'Record-breaking' numbers flock to after hours and emergency departments as winter illness takes hold

Breathless babies battling RSV

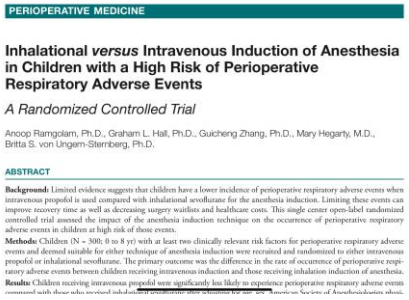
Cases of respiratory syncytial virus (RSV) have exploded across the country, leaving some affected children in intensive care and hospitals forced to expand capacity. Video / NZ Herald

3. Preventing respiratory events in the age of RSV

2021 has seen a huge uptick in the number of RSV infections in our communities. This has translated into a significant burden of inpatient admissions, and also highlights the increased risk of anaesthesia in the child with an URTI or viral infection. Top tips include:

a. Pre-op salbutamol

Salbutamol has long been used pre-emptively prior to surgery in patients deemed at risk of bronchospasm. There has been conflicting evidence as to whether it conveys benefit, however the REACT trial published in JAMA Paediatric in 2019 demonstrated a reduction in respiratory adverse events in children undergoing tonsillectomy who had pre-op salbutamol. This is a clinically significant finding, especially given the volume of tonsillectomies performed, and also the high rate of respiratory adverse events observed during this procedure. Salbutamol should be considered in all these patients, particularly if there is moderate-severe OSA or any other respiratory risk factors.


PERIOPERATIVE MEDICINE

Inhalational *versus* Intravenous Induction of Anesthesia in Children with a High Risk of Perioperative Respiratory Adverse Events

A Randomized Controlled Trial

Anoop Ramgolam, Ph.D., Graham L. Hall, Ph.D., Guicheng Zhang, Ph.D., Mary Hegarty, M.D., Britta S. von Ungern-Sternberg, Ph.D.

ABSTRACT

Background: Limited evidence suggests that children have a lower incidence of perioperative respiratory adverse events when intravenous propofol is used compared with inhalational sevoflurane for the anesthesia induction. Limiting these events can improve recovery time as well as decreasing surgery waitlists and healthcare costs. This single center open-label randomized controlled trial assessed the impact of the anesthesia induction technique on the occurrence of perioperative respiratory adverse events in children at high risk of those events.

Methods: Children (N = 300; 0 to 8 yr) with at least two clinically relevant risk factors for perioperative respiratory adverse events and deemed suitable for either technique of anesthesia induction were recruited and randomized to either intravenous propofol or inhalational sevoflurane. The primary outcome was the difference in the rate of occurrence of perioperative respiratory adverse events between children receiving intravenous induction and those receiving inhalation induction of anesthesia.

Results: Children receiving intravenous propofol were significantly less likely to experience perioperative respiratory adverse events

b. Consider an IV induction

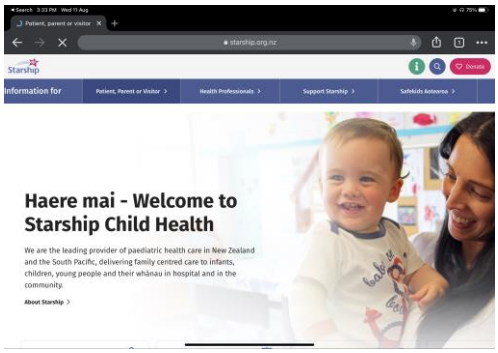
Inhalational induction of anaesthesia has been the predominant mode of induction in children in New Zealand over the last two decades. This is largely historical and institutional. At Starship Hospital we have actively tried to change our culture to support more IV inductions. One major benefit of this is a probable reduced rate of respiratory adverse events

when propofol is used rather than sevoflurane, as well as the inherent safety of having IV access prior to embarking on induction.

4. Talking to patients and whanau about anaesthesia

We are living in an age of anxiety, where anxiety in children is increasingly prevalent, particularly in relation to hospital encounters. Induction of anaesthesia has been found to be a particular source of anxiety, with up to 80% of children experiencing this. Increased anxiety can lead to increased perception of pain, increased analgesia requirement, increased length of stay and prolonged behavioural disturbance post-operatively. The language we use to communicate our plans and our roles have a significant bearing on how a child will experience their trip to theatre.

When talking to children be sure to introduce yourself and build rapport and engage them by talking about their interests. Aim to seed positive suggestions and avoid minimising language ("just a little needle"). Direct conversation to the child and not their parents, and avoid nocebo words (sharp, needle, pinch, sore). Substitute positive or neutral explanations such as "you will have a special straw to give you medicine to help you feel relaxed and sleepy and comfortable". Elicit and reframe concerns e.g. "most children find it was much easier than they thought it would be". When applying a tourniquet do not describe it as a "tight band" instead tell them they may notice their arm feeling heavy and like they can't feel it properly any more. The active imaginations that children have mean the words we use can have a significant bearing on their experience of any given medical intervention.



Please refer to the Starship pre-operative information now publicly available on the Starship website.

5. More on IV inductions

Starship is now trying to change our environment to support more intravenous induction of anaesthesia. Benefits include: possible reduction in respiratory adverse events, inherent safety, likely less post-operative behavioural disturbance, a faster and smoother induction, a reduction in mask phobia and distress associated with being restrained. The short-lived anxiety about IV insertion is considerably less than the prolonged distress that will occur when restraining an older child to facilitate a mask induction. It's also perfect for TIVA! (My preferred anaesthetic in children)

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Pharmac and medical device purchasing

Prof Steve Munn

Pharmacology & Therapeutics Advisory Committee

Medical Devices – The Good, The Bad, and the Ugly

Compared with countries such as Australia, Canada, USA and the UK, New Zealand has an unregulated medical devices market. In addition, unlike pharmaceuticals, which have been carefully appraised by PHARMAC using health technology assessment (HTA) tools, medical devices have not been routinely subjected to HTA prior to funding and procurement decisions.

In the 4 northern DHBs there has been a process for such HTA but it has been on a relatively small scale. The future landscape is changing dramatically with a new regulatory agency coming into being – the Therapeutic Products Authority, HTA about to be done by PHARMAC in a similar fashion to that for drugs, and an approved medical devices list being assembled – with an exceptions process (similar to the Named Patient Pharmaceutical Assessment process).

Anaesthesia and Intensive care facilities use a wide range of medical devices, some of which have been recalled by regulatory agencies and others of which have been associated with lawsuits. In the new environment it will be important to understand the pathways and processes to allow ongoing technological advancement whilst remaining cognizant of fiscal constraints. The future should see a fairer and more consistent approach to medical device evaluation and implementation but there will be added encumbrances.

Substance use disorder in anaesthetists: A personal perspective

Dr Colin Baird

Specialist anaesthesist, Women's Health, ADHB

I began specialist anaesthesia practice in 2012 in Scotland and moved to New Zealand in 2016. I am currently a consultant in Anaesthesia and Pain Medicine at the National Women's, Auckland City Hospital.

I recently published a personal account of my experiences with substance use disorder (SUD) in *Anaesthesia and Intensive Care* where I describe my journey through the intervention process, and eventual phased return to anaesthesia practice. By sharing my experience, I hope to educate our community about the problem of SUD among anaesthetists, and perhaps help those among us who may find themselves in a similar situation to the one I found myself in. I want to emphasize the positive impact of an empathic workplace, the importance of rigorous controls and a robust package of care to protect the patient, the doctor and their colleagues.

COVID update: ID perspective

Dr Sally Roberts

Clinical Head of Microbiology, ADHB

The new coronavirus, SARS-CoV-2, emerged in China in late 2019, and subsequently global spread occurred resulting in WHO declaring a pandemic on 11th March 2020. In mid-July 2021, globally, the incidence of COVID-19 continues to increase, with an average of over 400,000 cases reported each day. The cumulative number of cases reported is now over 186 million and the number of deaths exceeds 4 million. The greatest burden of cases and deaths is in low to middle income countries such as Brazil, India, and Indonesia.

The SARS-CoV-2 virus is an RNA virus and as such, continues to evolve, with emerging variants of concern (VOC) showing different patterns of transmissibility and other phenotypic characteristics. The four VOCs characterized to date (Alpha; Beta; Gamma, Delta) have demonstrated increased transmissibility. The Delta variant has now been detected in at least 111 countries across all six WHO regions in the last two months and has shown higher transmissibility than other VOCs identified to date. It is likely to become the dominant variant globally over the coming months.

There has been considerable debate amongst the aerobiologists, engineers with expertise in fluid dynamics, atmospheric scientists and infection prevention and control experts as to the mode of transmission of the SARS-CoV-2 virus. This has led to a paradigm shift in thinking. The principal way in which people are infected with SARS-CoV-2 is through exposure to respiratory fluids carrying infectious virus. Exposure occurs through inhalation of fine respiratory particles, deposition of respiratory particles on exposed mucous membranes in the mouth, nose or eye by direct splashes or sprays and by touching of mucous membranes by contaminated hands. The currently recommended infection prevention and control measures remain effective for these forms of transmission.

By early July almost a quarter (24.7%) of the world's population has received at least one dose of a COVID-19 vaccine (over three billion doses administered). However, there are vast inequities in vaccine distribution and administration with the majority of vaccines administered in a small number of high and upper-middle-income countries. Vaccination of healthcare workers has been shown to be effective in reducing the risk of COVID-19.

The actions required to prevent infection are not new, and include vaccination, adherence to public health and social measures, hand hygiene and avoiding poorly ventilated indoor environments.

Learning to live with COVID is STILL not a viable option

Prof Rod Jackson

Professor of Epidemiology at University of Auckland, Director of EPIQ

Learning to die from Covid on a road to nowhere

The current spin that 'we need to learn to live with Covid' actually means that we need to learn to die from Covid. The UK Covid death toll of 130,000 would translate to 10,000 deaths in New Zealand. Peru, the worst hit country, has the equivalent of 30,000 New Zealand deaths.

The related spin is that we need a roadmap out of Covid. Unfortunately, there are no safe (i.e. evidence-based) roads out yet, just some dangerous tracks that many politicians worldwide feel pressured to choose from and hope for the best. The Dutch prime minister has just apologized for an error of judgement in relaxing restrictions three weeks ago which has led to 10,000 new daily cases, the highest count since December. The New South Wales Deputy Premier recently acknowledged that the state had lost control of the latest outbreak, admitting that there is no rule book and in retrospect they should have locked down sooner. Boris Johnson plans to open the UK up completely, despite 30,000 new cases per day. It's like building a road to the edge of a wasteland, then providing a roadmap showing that the road continues (and with no speed limit), when it doesn't even exist.

New Zealand remains an outlier because our politicians understand there is no safe road out of Covid yet. We slowed right down where the road ended and are cautiously edging forward, at a pace the majority of us are comfortable with, but a vocal minority are not. We live virtually free of restrictions within our borders and according to most national and international economic authorities (not my area of expertise), our economy is doing as well as or better than most countries but without the deaths, disease and related disruptions. Most reputable economists agree you cannot have a healthy economy without a healthy population.

Yet, if you listen to some commentators, you would think our Covid elimination strategy is an unmitigated disaster. They seem unaware of the devastating effects of driving blindly into the Covid wasteland, with each new Covid variant like a new crevasse suddenly opening up in front of us. A death from Covid-19 is just the tip of an iceberg, or edge of a cliff. There are 5 to 20 hospitalizations for every Covid death and each Covid-related hospital patient requires much more time and resource than other patients. Our hospitals are hardly coping with the current winter influx of respiratory infections; a Covid outbreak would be a complete disaster.

The key blind spot of 'learn to live with Covid' commentators is a failure to understand 'exponential spread.' Without restrictions Covid-19 will spread exponentially. If one person infects two others, the numbers rapidly increase from 1 to 2, to 4, 8, 16, 32, to 64. If one person infects three others (it may be six for the Delta variant), these numbers go from 1 to 3, to 9, 27, 81, 243, to 729 over the same time period an earlier variant took to reach 64. That's why it's not possible to live with a little bit of Covid and why most countries are not coping. Moreover, no country has yet experienced the full impact of exponential spread, because every country has significant restrictions, either imposed by the state or self-imposed by individuals. Most of my UK colleagues have been working from home since March 2020.

We cannot afford to take the risks that some business people are requesting without potentially fatal consequences. While taking risks in business is often necessary, you can recover from bankruptcy but not from death. Our government has been criticized for not taking sufficient advice from business, but given our success to date, perhaps the balance about right and they have taken advice from the right business people. I recently read an article by Rob Fyfe, ex-CEO of Air New Zealand, that I could have written myself, probably because he comes from a business where safety is paramount. He understands that taking risks, and putting profit before people, can cause hundreds of deaths, as happened with the Boeing 737 Max.

A roadmap out of Covid is just not available yet, but the best way to prepare is with a vaccination safety belt. While people are understandably worried about possible vaccine side-effects, experience from a century of vaccinations demonstrates that nearly all important side-effects occur within weeks of vaccination. With over 3 billion Covid-19 vaccine doses given already, we know that significant side-effects are extremely rare. Covid-19 will be around for many years, so until almost every eligible New Zealander is vaccinated, the road ahead will be dangerous and our borders must remain tightly controlled.

Global anaesthesia: Why it matters

Dr Wayne Morriss

President-Elect, World Federation of Societies of Anaesthesiologists

Why should we care about our anaesthetic colleagues in other countries around the world? Why should we care about their patients? Can our vision of equity in New Zealand be translated to the global context?

We will have different answers to these questions but I think that global anaesthesia matters because:

- We have made a global promise to improve healthcare for all;
- We have an ethical responsibility;
- We are all interconnected.

COVID-19 has shown us that we live in an interdependent world where "no-one is safe until everyone is safe". A recent UNICEF statement says: "There is a choice. The world of the next 10 years can be one of greater justice, abundance and dignity. Or it can be one of greater conflict, insecurity and poverty."[1] In my view, these themes can be applied to healthcare in general.

We live in a world where 5 billion out of 7 billion people (over 70% of the population) do not have access to safe, affordable anaesthesia and surgical care when needed.[2] In 2015, the World Health Assembly recognized this crisis and unanimously voted to strengthen anaesthesia and surgical care worldwide. It is important that we hold governments to their promise.

The World Federation of Societies of Anaesthesiologists (WFSA) is a federation of 135 societies representing anaesthesiologists in 150 countries worldwide. Our vision is "universal access to safe anaesthesia" and we work with member societies to improve availability of anaesthesia, improve patient safety, and protect the wellbeing of anaesthesiologists (www.wfsahq.org).

The COVID-19 pandemic has likely increased healthcare disparities in many parts of the world. Anaesthesiologists are playing a vital role in the management of COVID patients and non-COVID patients and the WFSA will continue advocating for improved resourcing for our specialty and our colleagues around the world. We are all in this together.

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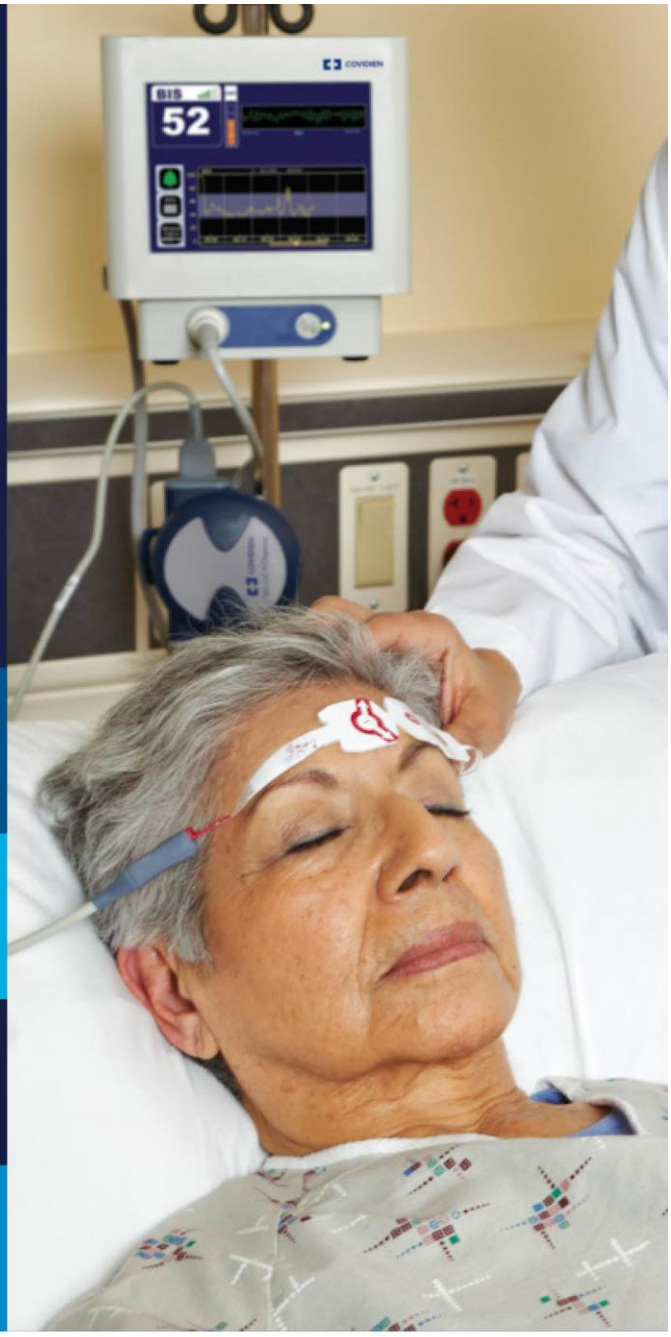

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The above outcomes are based on comparisons against procedures utilising anaesthesia without depth-of-anaesthesia monitoring.

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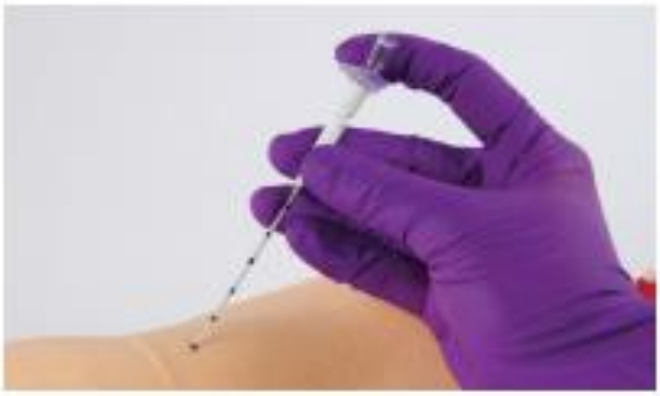

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