



**SOUTH AFRICAN SOCIETY
OF ANAESTHESIOLOGISTS (SASA)**

SASA Congress Abstracts 2018

Contents:

• Congress Abstracts	S1
• Refresher Text	S10
• Nurse Talk	S27

SASA Congress 2018 - ABSTRACTS

Context sensitive management of obstetric spinal hypotension

David G. Bishop

Obstetric spinal hypotension remains a common and clinically important issue. Local and international research generated from resource-rich environments has led to significant advances in the clinical management of area in the last decade. Mechanistic work and an improved understanding of haemodynamic changes have informed changing vasopressor usage: phenylephrine is now considered the first line agent for obstetric spinal hypotension. A recent international consensus statement in *Anaesthesia* confirms increasing agreement on many of the management strategies previously being debated.

However, despite these developments, many strategies for the management of obstetric spinal hypotension have not been adopted in resource-constrained environments. In South Africa, research from resource-rich environments has contributed significantly to these recent guidelines. Yet in the resource-

constrained areas of the country, the findings are cannot be safely implemented and have yet to result in a change in national guidelines. This may be due to concerns in generalisability to a vastly different clinical context: where equipment, staff and patients are not comparable to those found in the context of the research environment.

This talk will address several areas: Firstly, it will briefly summarise existing evidence for the management of obstetric spinal hypotension in resource-rich environments. Secondly, it will highlight strategies developed in our context that translate these guidelines into practical, pragmatic recipes that may be adopted in tertiary, regional and district settings within South Africa. It will draw on recent studies from South Africa that examine this issue and give practical options for managing hypotension in different settings. Finally, it will use the pathway followed in researching this area of obstetric anaesthesia to propose a collaborative model for studying other areas of obstetric anaesthesia that need to be contextualised.

Can the use of anaesthetist performed preoperative focused cardiac ultrasound improve patient postoperative outcome?

David Canty

Over the last decade, there has been a rapid uptake in the clinical use of abbreviated or focused transthoracic echocardiography (also referred to as focused cardiac ultrasound) by emergency and critical care physicians and anaesthetists in order to guide decision-making in real time, or at the 'point-of-care'.¹ This enables the physician to confidently diagnose the likely cause of haemodynamic instability, such as hypovolaemia, left or right heart failure, vasodilatation, pericardial effusion and significant valve disease, and usually only takes a few minutes to perform

at the bedside, or even during a cardiac arrest. The diagnostic information aids the treating physician to make better-informed decisions. The time taken to perform focused cardiac ultrasound is generally less than for alternative diagnostic modalities such as transesophageal echocardiography, X-ray, CT scanning or ultrasound examinations in a cardiology or radiology setting, and does not require transporting the patient or exposing them to harmful radiation or oesophageal trauma.

A recent systematic review² identified 13 reports supportive of point of care focused cardiac ultrasound in perioperative management for non-cardiac surgery. It found that clinically

important cardiac pathology was missed by clinical evaluation in 17 to 78% of cases, leading to important management change in 12 to 82%, unsurprisingly with the biggest changes being in higher-risk populations. Changes in planned treatments included fluid therapy, vasoactive drugs, type of anaesthesia, surgical management, and postoperative admission to critical care. Focused cardiac ultrasound has been included into training curricula in critical care, emergency medicine and medical school and the next will be anaesthesia.

Despite the enthusiasm, learning focused cardiac ultrasound is not easy and requires considerable effort and time. Although it

is logical that improved diagnosis leads to better management decisions, which in turn may affect outcome, the evidence for this sequence is weak until recently. Several recent trials demonstrate that patient outcome may be improved. If this is the case then the meteoric rise of point of care echocardiography is set to explode!

References:

1. Moore CL, Copel JA. Point-of-care ultrasonography. *N Engl J Med* 2011; 364: 749-57.
2. Heiberg J, El-Ansary D, Canty DJ, Roysse AG, Roysse CF. Focused echocardiography: a systematic review of diagnostic and clinical decision-making in anaesthesia and critical care. *Anaesthesia* 2016; **71**: 1091-100.

What has TRICS III taught us?

C. David Mazer

TRICS III (Transfusion Requirements in Cardiac Surgery) was a pragmatic global multicenter randomized controlled non-inferiority trial of 2 different transfusion strategies in patients undergoing moderate to high risk cardiac surgery with cardiopulmonary bypass. Over 5200 patients were randomized to either a Restrictive Strategy in which transfusion was given if the haemoglobin concentration fell below 75g/L in the operating theatre, Intensive Care Unit (ICU) or postoperative ward; or a Liberal Strategy in which the transfusion triggers were 95 g/L in the operating theatre or ICU, and 85 g/L on the ward. The trial was conducted in 74 sites in 19 countries, including South Africa. The primary outcome (a composite of death, myocardial infarction, stroke or new renal failure with dialysis) occurred in 11.4% of the Restrictive group and 12.5% of the Liberal group. Similarly

there were no significant or clinically important differences in the secondary outcomes which included the incidence of each individual component of the primary outcome, in-hospital clinical outcomes and lengths of stay. As expected, Restrictive patients received significantly less red blood cell transfusion and significantly fewer of them were transfused. The results were very consistent among all subgroup and sensitivity analyses, and demonstrate that a restrictive transfusion strategy appears to be safe even in elderly patients. Thus, in considering the risks of exposure to anaemia and allogeneic transfusion, TRICS III confirms the safety of restrictive transfusion in moderate to high risk cardiac surgery, with reduced red blood cell transfusion and associated costs. These findings are likely applicable to patients with cardiovascular disease in other surgical settings. TRICS III also demonstrates the ability of the global anaesthesia community to answer important clinical questions by collaborating on large pragmatic multicenter trials.

How general anaesthetics work, for the clinical anaesthetist, by a clinical anaesthetist

Donal Buggy

General anaesthetics are challenging to understand from a pharmacology viewpoint, because they produce similar effects (unconsciousness, amnesia, analgesia and inhibited motor responses), despite the fact that they are chemically diverse molecules (inhalation anaesthetics are hydrocarbons, propofol is a phenol, thiopentone is a barbiturate, etc.), which act at different anatomical and molecular sites in the CNS.

While initially it was thought that general anaesthetics worked in proportion to their solubility in the lipid bilayer of the cell wall (Mayer-Overton theory), demonstration that general anaesthetics inhibited the firefly protein enzyme, *luciferase*, transformed the search for targets of anaesthetic action towards cell surface receptors and ion channels.

All IV general anaesthetics (except ketamine and α -2 agonists) have now been shown to effect synaptic transmission at the $GABA_A$ post synaptic receptor. Gamma-amino butyric acid (GABA) is an inhibitory neurotransmitter in the CNS, i.e. when it acts as an agonist at its $GABA_A$ receptor, it causes an inhibitory post-synaptic potential, by increasing Cl^- ion conductance. This prevents action potentials from being generated in the post-synaptic axon and hence prevents impulse transmission. Therefore many IV anaesthetics work by "switching on inhibition".

IV GA agents also work at *extra-synaptic* $GABA_A$ receptors, which are important in giving a "tonic inhibition", i.e. a longer-lasting effect.

While inhalation agents also act at the $GABA_A$ receptor, they are pharmacologically promiscuous, acting at multiple different

receptor types. Among these, inhalation agents act at *Tandem-Pore K⁺ Channels*, which are a family of 15 trans-membrane proteins, which form two K⁺ ion channels side-by-side. When stimulated, K⁺ conductance out of the post-synaptic receptor increases, causing hyperpolarisation by a contrasting mechanism to the GABA_A receptor.

A further concept in how GA works is that of *Integrated Neural Networks*. GA agents act on the receptors and ion channels described above to create inhibitory activity in connected networks of neurons, which deliver clinical anaesthetic effects. Examples include the Thalamico-Cortical Neural Network and

the Fronto-Parietal Neural Network, which are demonstrably inhibited by GA action on functional MRI scans.

In summary, there is no single, unitary theory on how general anaesthetics work. They effect multiple molecular targets and different agents have different mechanisms of action to produce similar anaesthetic effects. They interact with receptors and ion channels to inhibit post-synaptic neurotransmission.

References:

1. Khan K, Hayes I and Buggy DJ. Pharmacology of anaesthetic agents I: IV agents. *BJA Education* 2014;14:100-105.
2. Khan K, Hayes I and Buggy DJ. Pharmacology of anaesthetic agents II: inhalation agents. *BJA Education* 2014;14:106-111.

Academic transformation in South Africa

Elelwani Ramugondo

The term 'transformation' gained traction in South Africa during the transition period following the first democratic elections in 1994. It is a word that carried significant hope, although there was and still is disagreement about what it means. Within university discourse and practice, it is a term that was allowed to have dual meaning. To claim that the university exists primarily to advance meaningful interpretation is to make interlocutors of all academics, and students as well. This interlocutory work must start with what it means to transform the academy. But what is this space in-between from whence the interlocutor speaks, between who and what, to whom and what do they speak, and with what consequences? This paper will draw from lessons learnt during the 2015/2016 student protests that were witnessed across South African universities, as well as reflections on the work of the Curriculum Change Working Group at the University of Cape

Town (UCT) during 2016/2017. A key lesson to be shared pertains to the opportunity offered by the decolonization/decoloniality discourse that emerged during the #RhodesMustFall moment, deepening our conversations towards meaningful academic transformation. These conversations troubled the idea of 'the discipline', and exposed some of the unintentional and often limiting conceptions of 'the student'. In order to concretize this key lesson, an example from a curriculum change workshop, conceptualized by Dr Kasturi Behari-Leak and delivered to two groups of students and staff at UCT, will be shared. There can be no escape from the interlocutory work of the academy, with all its problematics that have us even before we start to speak within disciplines, and continue to haunt us even as we pretend not to speak. Whatever interlocutory work is advanced within the academy and at whichever moment, it will have consequences. It is for this reason that the questions about who speaks in the academy, and on whose behalf, must always be asked.

Management of peripheral nerve injury: What to do?

Francois W. Retief

Nerve injury after regional anaesthesia and surgery may have devastating consequences for both patient and healthcare professionals. Traditional management protocols prescribed supportive care and a "wait and see" approach of repeated evaluations to look for spontaneous re-innervation, before surgical management is offered as a last resort. This is because it is difficult to predict whether spontaneous recovery will take place, but if it does the outcome is generally much better than that of surgical repair.

Unfortunately, the chance of successful surgical repair decreases over time since the ability of axons to regenerate and the condition of the tissue that needs to be re-innervated deteriorates. Ongoing causative pathology like nerve compression, ischemia

or infection and conditions like hyperglycaemia or coagulation abnormalities may also cause further harm if not treated.

Early diagnosis of reversible pathology or of the need for surgical repair is currently feasible using a sound clinical approach and modern technology including ultrasound, nerve conduction studies and advanced magnetic resonance imaging. Therefore, detailed clinical evaluation and special investigations as indicated should take place as early as possible, with the aim of optimising conditions for recovery and of early diagnosis of the need for surgical intervention.

The lecture will describe the pathophysiology of nerve injury and recovery, discuss priorities in initial evaluation, especially signs of ongoing pathology and indications for early referral, and present a general approach to the management of nerve injury for the anaesthetist.

The 23 Hour Admission: Do's and Dont's

Lance Thompson

Globally, an ever increasing number of surgical procedures are being performed on a day case basis, both in the adult and paediatric population. Advances in minimally invasive surgery and shorter acting anaesthetic agents contribute to this increase. Furthermore, targets are being set to increase the proportion of patients undergoing day case procedures. Day case surgery encompasses elective, semi-elective and urgent cases.

Benefits for paediatric day surgery include cost effectiveness, less disruption to family life, potential improved patient and parental experience and a decrease in nosocomial infection risk. The aim should be for a service where there are low post-operative morbidity and in-patient admission rates, and high patient and parental satisfaction.

A successful paediatric day case service requires good organisation, with purpose built paediatric facilities. The service should be run by senior staff to operate efficiently.

Appropriate pre-operative screening is important. The selection criteria for suitability of patients for day case procedures relate to age and health status, surgical and anaesthetic considerations

and social factors (including access to transport, social support and distance from the unit).

The provision of anaesthetic care should be tailored to avoid or minimise a delay in discharge. Various scoring systems or scales may be used as protocols or guidelines to manage patients. Factors that may result in in-patient admission, such as severe pain or vomiting, need to be targeted.

Certain criteria need to be met before patients can be safely discharged. The routine use of discharge scoring systems may make this process more efficient. Both written and verbal instructions need to be given to the parents and patients. Post-operative follow up is important.

Analysis of complaints and litigation claims are useful to address areas of risk or for improvement. In the paediatric day case population, this may include OSA, tonsillectomy, opioid prescribing and issues relating to discharge.

Audits are a useful means of assessing the quality of care of a day case system. Analysis of unplanned admissions is particularly important, especially when considering patient selection and case mix.

To block or not to block? Regional anesthesia in patients at risk of acute compartment syndrome

Marcin B. Nejtardt

Failure to timeously react to the presence of an acute compartment syndrome (ACS) may have grave repercussion for patients and healthcare providers. The suggested hypothesis that regional anaesthesia may delay presentation of ACS by masking symptoms has at best been limited to heterogeneous case reports. Review of current literature together with a recent Joint Committee Practice Advisory by The European Society of Regional Anaesthesia and Pain Therapy and the American Society of Regional Anesthesia and Pain Medicine suggests there is no current evidence linking the development or delayed diagnosis of ACS with peripheral regional anaesthesia.¹⁻⁴ Lack of evidence does not however exclude causality. A prudent approach is to actively identify the individuals at risk. Men, under thirty-five years of age with diaphyseal tibial fractures are particularly high risk.⁵⁻⁹ Proximal radius fractures in children also pose a significant risk. Comminuted fractures, long surgical procedures and associated vascular injury should be flagged as elevated risk. This active identification is key, as the most usual cause of a delayed diagnosis is failure to identify patients at risk and not offer them sufficient postoperative monitoring. Surgeon and patient engagement is crucial as both are actively

involved in monitoring and care. Established Acute Pain Services are well placed to follow up and timeously identify symptoms associated with ACS. Consider alternative multi-modal analgesic strategies in patients at very high risk of ACS where postoperative monitoring may be suboptimal. However, intravenous opioids themselves may mask the symptoms of ACS, thus a blanket ban on regional anaesthesia in high-risk individuals may not be in the best interest of the patient. When a decision to block is made, consider the following to facilitate early detection: i) single shot as opposed to an infusion, ii) avoid exceeding 0.25% of either bupivacaine or ropivacaine to establish the block, iii) avoid adjuncts iv) if an infusion is indicated then limit the concentration to 0.1% of bupivacaine or ropivacaine as well as the volume in catheters. Objective, serial compartment pressures may be considered when the clinical exam is equivocal or assessment is unreliable such as in ventilated, critically ill and patients with impaired level of consciousness. Compartment pressure monitoring however has significant limitations with no consensus guidelines available.

Conclusion: If regional anaesthesia is indicated then the risk of compartment syndrome is not a contraindication. With active monitoring and minor technique adjustments regional anaesthesia can offer appropriate pain relief with acceptable risk.

References:

1. Ivani, G., et al. (2015). "The European Society of Regional Anaesthesia and Pain Therapy and the American Society of Regional Anesthesia and Pain Medicine Joint Committee Practice Advisory on Controversial Topics in Pediatric Regional Anesthesia." *Reg Anesth Pain Med* 40(5): 526-532.
2. Lonnqvist, P. A., et al. (2017). "The European society of regional anesthesia and pain therapy and the American society of regional anesthesia and pain medicine joint committee practice advisory on controversial topics in pediatric regional anesthesia I and II: what do they tell us?" *Curr Opin Anaesthesiol* 30(5): 613-620.
3. Driscoll, E. B., et al. (2016). "Regional anesthesia or patient-controlled analgesia and compartment syndrome in orthopedic surgical procedures: a systematic review." *Local Reg Anesth* 9: 65-81.
4. Mar, G. J., et al. (2009). "Acute compartment syndrome of the lower limb and the effect of postoperative analgesia on diagnosis." *Br J Anaesth* 102(1): 3-11.
5. Park, S., et al. (2009). "Compartment syndrome in tibial fractures." *J Orthop Trauma* 23(7): 514-518.
6. Shadgan, B., et al. (2015). "Risk factors for acute compartment syndrome of the leg associated with tibial diaphyseal fractures in adults." *J Orthop Traumatol* 16(3): 185-192.
7. McQueen, M. M., et al. (2000). "Acute compartment syndrome. Who is at risk?" *J Bone Joint Surg Br* 82(2): 200-203.
8. McQueen, M. M., et al. (2015). "Predictors of Compartment Syndrome After Tibial Fracture." *J Orthop Trauma* 29(10): 451-455.
9. Shore, B. J., et al. (2013). "Acute compartment syndrome in children and teenagers with tibial shaft fractures: incidence and multivariable risk factors." *J Orthop Trauma* 27(11): 616-621.

Analgesics for theatre and at home

Michelle Casey

With the ever-increasing number of paediatric day case surgical procedures being performed, it has become imperative that children's pain be managed effectively, starting in theatre and extending to the home environment. Numerous studies have demonstrated inadequate treatment of pain postoperatively with more than 30% of children being noted to experience moderate to severe levels of pain for up to seven days after being discharged home. Uncontrolled pain can result in significant morbidity including sleep and behavioural disturbances, delayed recovery and readmission to hospital.

Multiple factors should be considered when deciding on an optimal analgesic regime, including the nature of the procedure

performed, the need for an 'around the clock' versus an 'as required' dosage schedule, the patient's comorbidities and possible side effects related to the drug. Barriers to effective pain management should also be kept in mind, including child, parental, medication and system related factors. Recent recommendations by global regulatory authorities advising against the use of codeine and tramadol in children younger than 12 years, have left us with few alternative options to manage moderate to severe breakthrough pain, as there is limited data regarding the efficacy and safety of the use of alternative potent analgesics in children. This has prompted us to explore the use of new drugs (eg. tapentadol), regional techniques and adjuvant drugs including alpha 2 agonists, ketamine, corticosteroids and gabapentin.

Why postoperative ICU care makes a difference?

Nadiya Ahmed

A 2009 audit of critical care beds reveals a total number of critical care beds for South Africa being 4719. Seventy-five percent of these beds service the private sector. Ideally, as intensivists, surgeons, anaesthetists and physicians, would like to utilise this limited resource for the patient that would most benefit. In turn, it would result in a higher turnover of that bed, so to benefit as many patients as possible. The unstable or organ at risk emergency patient is usually the easy one to decide if they should be admitted according to a critical care unit protocol. It is in the elective group of surgical patients where the conundrum lies. Are the risk factors pre-operatively enough or are we unnecessarily utilising these precious critical care beds.

The role of type and risk of surgery as well as intra-operative evaluations may also be useful in making this difficult choice. Additionally we have to ask, are there any interventions that may be instituted to eliminate the need for ICU admission either a patient intervention, or hospital intervention. Ultimately there are scoring systems and scoring tools along with patient and surgical risk factors, that need to be accounted for, in making the decision of admit to ICU or not? The long term goal of better post-operative care is returning the patient to previous baseline function as soon as possible with the least morbidity as possible. From hospital perspective, the onus is also to decrease the burden of prolonged length of hospital stay as well as costs associated with complications.

Perioperative Haemoglobin: How low is Safe?

Rob Wise

Peri-operative transfusion medicine is a critical, yet sometimes controversial subject. Blood products are both scarce and expensive in low-middle income countries. We face a rapidly growing population and dwindling blood donor numbers in South Africa. Added to these pressures is the high demand from several patient populations, including obstetrics, trauma, and surgery. Many parts of South Africa still do not have ready access to blood products, resulting in morbidity and mortality. Consequently, correct decision-making is important to ensure appropriate use when these life-saving products are available, avoiding unnecessary use that may expose patients to risk, and not wasting products that should be kept for others.

Recent scientific evidence has enabled better guidance regarding appropriate use of red cell concentrate peri-operatively. Haemoglobin triggers and targets have been extensively researched in many different patient populations, with substantial evidence supporting restrictive transfusion strategies in the majority of cases. Sadly, there appears to be a significant gap between published research and clinical practice.

The majority of studies in this field were performed in developed countries. This presentation will examine the evidence for peri-operative haemoglobin triggers and targets. Specifically, other important logistic factors that may influence transfusion related decision-making in South Africa will be addressed. There remains an essential need for South African peri-operative physicians to develop applicable and responsible peri-operative transfusion guidelines.

Sensible perioperative haemodynamic management

Rupert Pearse

Complications following major surgery are a leading cause of morbidity and mortality. It is now well established that derangements in cardiac output and related variables are strongly associated with post-operative complications and death. Such observations led to the use of these variables as treatment end-points within algorithms to determine the doses of intravenous fluid and inotropic therapy during the peri-operative period. This treatment approach has been termed 'perioperative optimisation'. This approach may correct abnormalities of microvascular flow which occur early after major surgery and in turn improve tissue oxygenation. However

The use of cardiac output monitoring to guide fluid therapy, also known as 'optimisation', 'goal directed therapy' and 'flow directed therapy' has been evaluated in many small clinical trials the findings of which have proved inconsistent, largely because of important methodological variations including differences in patient group, timing and duration of interventions, treatment end-points, therapies used to achieve end-points and choice of monitoring technology. Until recently, we have had no data from large clinical effectiveness trials of peri-operative optimisation. The OPTIMISE trial findings raise important questions for all those who prescribe perioperative fluid therapy.

Black box thinking to improve patient safety

Tessa Oelofse

"On the 29th March 2005 at 7.15, Martin and Elaine Bromiley, married for fifteen years, left home. Elaine – a 37-year-old mother of two young children – had been suffering with sinus problems for two years had been advised that it would be sensible to have a minor operation to deal with the problem once and for all. The risks are tiny, the doctor advised her. Elaine had a standard anaesthetic, however two minutes after induction her oxygen saturation had fallen to 75%. On April 11, Elaine died from a hypoxic brain injury after being on ITU for 13 days, following a routine, minor operation."

Elaine's husband, Martin, is an airline pilot and following the death of his wife had to fight to get an independent investigation to aid the understanding of what happened.

Following the report he could not understand how human factors that is a routine priority for every flight, could be so grossly overlooked in health care.

Comparisons between safety in Aviation and Health Care are not a new concept, but why is it that in Health Care don't learn from errors? Do we apply tools used by other high risk industries, like aviation? How can we do better?

Governance and Risk Management is an essential part of providing high quality, safe, patient-centred care. In practice, what does this mean for clinicians at the forefront of patient care? How can we interpret and learn from risk management and governance to ensure patient safety and quality of care? In 1912, 57% of US airline pilots died in crashes, and in 2013 there were 36.4 million commercial flights, carrying 3 billion passengers,

with 210 fatalities. Yet preventable medical errors are the third leading cause of death worldwide, behind cancer and heart disease. Preventable harm is estimated to affect 400,000 patients per annum. The difference between health care and aviation lies in our approach to management of failure. The challenge is changing mindsets and it involves a whole new way of thinking

and a change in our culture. "The definition of insanity is to do the same thing over and over again, but expecting different results". Albert Einstein

References:

1. Black Box Thinking. Marginal Gains and the Secrets of High Performance. Matthew Syed

Innovative training of the clinical scientist

Thomas E. Cox

It is important for academic anesthesiology departments to promote the careers of trainees who have interest and talent in the realm of basic, clinical, or translational research. There are many challenges for young physicians to overcome in order to successfully launch a career as a clinician scientist, including the duration of training, financial sacrifice, as well as developing a focus for their research. The Department of Anesthesiology at Washington University in St. Louis, Missouri (USA) has created two novel programs for training future clinician scientists in anesthesiology in order to address these challenges.

The most important initial deliberation for Departments exploring the establishment of a clinician scientist training program is to examine their own strengths and weaknesses with regards to research infrastructure as well as their financial strength. Departments wishing to sustain research training programs most often must commit to internally funding the program in the beginning until extra-mural funding can be obtained. In many instances, some evidence of success must be demonstrated in order to competitively apply for and receive extra-mural grant support, including institutional and public training grants. In the USA, the National Institutes for Health

(NIH) provide institutions and departments with grants such as a T-32 training grant or a KO8 career development grant, which can pay for the research portion of training.

Departments must also decide how to optimize the structure of the program to accomplish the goals of training a highly competent clinician as well as a research scientist. Department and program leadership must often work closely with the various regulatory agencies that provide oversight of training programs e.g. Accreditation Council for Graduate Medical Education (USA) and credentialing of physicians e.g. American Board of Anesthesiology (USA). For departments in good standing, regulatory agencies may provide programs latitude to propose novel training continuums. However, most accreditation and credentialing bodies will require minimum standards such as the performance of a certain number of cases and/or procedures for the clinical and professional components of the training.

The design and implementation of novel training programs for clinician scientists may provide opportunities for departments to enhance their curriculums and develop "best practices" for the teaching and assessment of physicians-in-training. There may also be future opportunities for the development of collaborations with like-minded academic research departments in this realm of postgraduate medical education.

The epidural is dead: Gold standard no longer

Celeste Quan

The epidural remains the gold standard for labour analgesia, as there are currently no other good alternatives. However, the same cannot be said for the use of epidural for post-operative analgesia. The reasons are multifactorial:

1. Little evidence of a decrease in postoperative mortality with the use of epidural analgesia
2. Little evidence of decrease morbidity in the low-to medium-risk surgical population
3. Epidurals are invasive
4. Epidurals are costly and labour-intensive and not suited to practice in a country with limited high care facilities and staff
5. Advances in surgical techniques
6. The wide-spread use of anticoagulant regimen
7. The advent of alternative techniques for post-operative analgesia
 - a. Paravertebral block
 - b. Serratus plane block
 - c. Erector spinae plane (ESP) block
 - d. Quadratus lumborum block
 - e. Transverse abdominus plane (TAP) block
 - f. Subcostal TAP block
 - g. Rectus sheath blocks

CPR in obstetrics

Ada Ezihe-Ejiofor

Cardiac arrest in obstetrics can occur during pregnancy, delivery or post-partum. It is a rare event with an incidence of 1:30,000 pregnancies [1]. The resuscitation response must occur in a timely and coordinated fashion to improve the chances of survival for mother and baby. The anatomical and physiological changes of pregnancy necessitate pregnancy specific interventions during resuscitation. Peri-mortem caesarean delivery is now a recommended part of the maternal resuscitation drill. However, this poses its own knowledge and confidence challenges. With

the increasing complexity of the obstetric population we are more likely to care for parturients who become seriously ill and may deteriorate to a cardiac arrest. Regular multidisciplinary training which includes maternal cardiac arrest drills is vital to responding appropriately in the event of a maternal cardiac arrest. Regions and institutions need to find training models that suit their peculiar requirements.

References:

1. Morris S, Stacey M. Resuscitation in pregnancy. *Br Med J* 2003; 327: 1277-9
2. McDonnell NJ. Cardiopulmonary arrest in pregnancy: two case reports of successful outcomes in association with perimortem Caesarean delivery. *Br J Anaesth* 2009; 103(3): 406-9

Preeclampsia in 2018

RA Dyer

In many centres, Anaesthesia now incorporates Perioperative Medicine. This is particularly true in the management of preeclampsia, where anesthesiologists, work as part of a multidisciplinary team that includes obstetricians, cardiologists, neonatologists, midwives and critical care specialists. They are well positioned to understand the pathophysiology and assessment of the severity of preeclampsia and how this should impact on the administration of anesthesia, cardiovascular monitoring, and critical care. New definitions stress the rapid progression of the disease and highlight the importance of early detection. Anaesthesiologists should develop the ultrasound skills required to assist in the assessment of disease severity. Regional anaesthesia remains central, but there are important developments in the practice of general anaesthesia, if indicated. Anaesthesiologists should also lead the resuscitation team in the management of cardio-respiratory failure and coagulopathy.¹

The American College of Obstetricians and Gynaecologists' (ACOG) Executive Summary in 2013 introduced changes in the definition. The old criteria for severe disease, namely hypertension and proteinuria, were expanded to include new onset hypertension and the presence of "severe features", namely thrombocytopenia, impaired liver function, pulmonary oedema or impaired liver function.^{2,3}

In low resource settings, access to obstetric care for critically ill women with preeclampsia is the main barrier to reduction in morbidity and mortality. Key issues in management remain adequate resources for the management of early onset disease, and active management of blood pressure. Postpartum blood pressure monitoring should not be neglected.

Animal studies suggest that abnormalities of the normal adaptive cardiac angiogenesis in pregnancy may contribute to the development of peripartum cardiomyopathy. There is

still controversy as to whether there is some overlap between the pathophysiological pathways leading to preeclampsia and peripartum cardiomyopathy.

Many authors subscribe strongly to the theory of abnormal placentation as the precipitating pathophysiological mechanism for preeclampsia⁴; however a recent editorial questions the existence of a unified hypothesis, and analyses potential pre-placental, placental and post-placental influences.⁵

Current practice is to use noninvasive blood pressure monitoring in uncomplicated cases with severe features. There should be a low threshold for the placement of an arterial line in complicated cases, and point of care transthoracic echocardiography (TTE) is useful to assess ventricular function and volume status. Biomarkers such as BNP may also have a role in predicting cardiac outcome in the future. A recent TTE study confirms that increased inotropy and diastolic dysfunction are the hallmarks of cardiac dysfunction in preeclampsia, although systolic failure may occur.⁶ Early and late onset disease may represent two different maternal haemodynamic states. An excellent recent review discusses cardiovascular implications in preeclampsia.⁷ Lung ultrasound is of benefit in identifying pulmonary interstitial oedema, which may precede alveolar oedema.⁸

A further review has given good insight into the safety of spinal anaesthesia for caesarean section.⁹ A recent randomised trial showed that neonatal acid base status is independent of the vasopressor used during spinal anaesthesia for caesarean section in preeclampsia with fetal compromise.¹⁰ A further trial showed that phenylephrine is more effective than ephedrine in restoring systemic vascular resistance during spinal anaesthesia. Phenylephrine is therefore recommended for the management of spinal hypotension.¹¹ A further narrative review has addressed the issue of the prevention of peri-induction hypertension during general anaesthesia for caesarean section in preeclampsia.¹² It is now well established that there is a very significant future cardiovascular risk after preeclampsia.¹³

References

- Hofmeyr R, Matjila M, Dyer RA. Preeclampsia in 2017: obstetric and anaesthesia management. *Best Practice and Research Clinical Anaesthesiology* 2017; 31: 125-138.
- Leffert LR. What's new in obstetric anesthesia? Focus on preeclampsia. *Int J Obstet Anesth* 2015; 24: 264-271.
- Leffert LR. What's New in Obstetric Anesthesia: The 2014 Gerard W. Ostheimer Lecture. *Anesth Analg* 2015; 120: 1065-1073.
- Powe CE, Levine RJ, Karumanchi SA. Preeclampsia, a disease of the maternal endothelium: the role of antiangiogenic factors and implications for later cardiovascular disease. *Circulation* 2011; 123: 2856-2869.
- Dennis AT. Hypertension and haemodynamics in pregnancy - is a unified hypothesis for preeclampsia possible? *Anaesthesia* 2014; 69: 1183-1196.
- Dennis AT, Dyer RA, Gibb M, Nel L, Castro JM, Swanevelder JL. Transthoracic echocardiographic assessment of haemodynamics in severe pre-eclampsia and HIV in South Africa. *Anaesthesia* 2015; 70: 1828-1838.
- Melchiorre K, Sharma R, Thilaganthan B. Cardiovascular Implications in Preeclampsia: an Overview. *Circulation* 2014; 130: 703-714.
- Zielekiewicz L, Contargyris C, Brun et al. Lung ultrasound predicts interstitial syndrome and hemodynamic profile in parturients with severe preeclampsia. *Anesthesiology* 2014; 120: 906-914.
- Henke VG, Bateman BT, Leffert LR. Spinal anesthesia in severe preeclampsia. *Anesth Analg* 2013; 117: 686-693.
- Dyer RA, Emmanuel A, Adams SC. A randomised comparison of bolus phenylephrine and ephedrine for the management of spinal hypotension during spinal anaesthesia for severe preeclampsia with fetal compromise. *Int J Obstet Anesth* 2018; 33: 23-31.
- Dyer RA, Daniels A, Vorster A, et al. Maternal cardiac output response to colloid preload and vasopressor therapy during spinal anaesthesia for severe preeclampsia: a randomised controlled trial. *Anaesthesia* 2018; 73: 23-31.
- Prevention of perinduction hypertension in preeclamptic patients: a focused review. Pant M, Fong R, Scavone B. *Anesth Analg* 2014; 119: 1350-1356
- Ahmed R, Dunford J, Mehran R, Robson S, Kunadian V. Preeclampsia and future cardiovascular risk among women. *J Am Coll Cardiol* 2014; 63: 1815-1822.

Revisiting informed consent in anaesthesiology: Disclosure - what should I tell my patients?

Malcolm De Roubaix

Legal, regulatory & moral imperatives

- Legal definition of consent; informed consent
- Documented v. oral
- Implicit v. explicit
- Nemesis provision of information
- Discuss:
 - *Contextualise*
 - *Invasive procedures, expected*
 - *All common and serious complications, particularly realistically to be expected*
 - *Options & alternatives*
 - *An uninformed patient cannot provide legally valid & rational IC*

- Waiver of right to be informed
- Sincere attempt, given local context
- Opportunity for questions/discussion; listen
- Science of information (verb)
- 'Contract' does not negate virtues, responsibility, beneficence, non-maleficence, trust
- Therapeutic value of information
- Research opportunities

Reference article:

De Roubaix Malcolm (2018). What should I tell my patient? Disclosure in anaesthesiology: difficulties, requirements, guidelines and suggestions. *SAJAA*, 24(1), 1-8. <https://doi.org/10.1080/22201181.2018.1432252>

Abstract

Christina Lundgren

Research on human subjects in South Africa is guided by the Research Ethics Guidelines produced by the National Department of Health, as well as many other documents such as the Bill of Rights, the National Health Act and ethical guidelines published by the Health Professions Council of South Africa.

The fundamental issue when considering the ethics of human research is to ensure that vulnerable people are protected from exploitation. The ethics of research is based on principle-based ethics, which is made up of the principles of autonomy, beneficence, non-maleficence and justice. Supporting principles

include respect for autonomy and the issue of informed consent, scientific integrity, privacy and confidentiality.

Many clinical trials initiated by researchers and/or pharmaceutical companies include a genetic component in addition to the main clinical study. The genetic component entails the taking and storing of patients' blood or other tissues for up to twenty years, often in a foreign country in a biobank or similar repository. Acquiring informed consent for this genetic component of these studies is often problematic, in that the exact nature of the research is not always known at the time that the samples are taken. In addition the patient may not understand the consequences of giving up these samples to various organisations for future experimentation and international data exchange and sharing.

SASA Congress 2018 - REFRESHER TEXT

Anaesthesia for liver resection

Anthony Beeton

- Liver resection represents a heterogenous group of surgical procedures for a variety of indications. In general, surgery for hepatic metastases is done against the background of normal underlying architecture and hepatocyte function, whereas primary tumours generally occur on a background of cirrhosis
- The key elements of anaesthesia for liver resection are limitation of blood loss and transfusion; and preservation of function in the residual liver
- Surgical bleeding in hepatectomy is largely dependent on hepatic venous pressure (CVP). With evolution of surgical and anaesthetic techniques, bleeding is becoming less significant
- Anaesthesia for liver resection without blood flow control or with only inflow control generally requires a low CVP technique with preservation of cardiac output and perfusion pressure
- Surgery involving complete in and outflow interruption demands euvolaemia and inotropic support. Where outflow control is selective, the haemodynamic insult is less profound than with complete hepatic vascular exclusion (CHVE)
- Surgery for previously irresectable lesions – in terms of position and size may include *ex vivo* resection and two stage surgery with liver partitioning and portal vein ligation to the affected lobe, followed by formal resection (ALPPS procedure). Haemodynamic management similar to CHVE or liver transplantation
- Preservation of residual liver function
 - Largely dependent on the extent of liver resection, limitation of ischaemia and reperfusion injury and underlying liver function. Tolerated resection ranges from 0 – 75% depending on risk factors
 - Large resections (and techniques to protect liver function) least effective in the elderly; those with steatosis and cirrhosis and with prolonged liver ischaemia
 - Ischaemic preconditioning / intermittent clamping and drug (sevoflurane) preconditioning all more effective in low risk patients for lesser degrees of resection
- Thoracic epidural analgesia remains a valuable, if controversial, element
- New developments in liver resection
 - Novel surgical procedures
 - Fast track / ERAS principles in liver resections
 - High dose steroids with induction (methylprednisolone 1 – 2 mg/kg)
 - Paracetamol as an hepatotoxin

Reference:

Tympa A et al. Review Article: Anaesthetic Considerations in Hepatectomies under Hepatic Vascular Control. HPB Surgery 2012; Article ID 720754

Understanding coagulation (haemostasis)

Anthony Beeton

- Haemostasis is the process whereby appropriate clot formation and lysis is linked to tissue remodeling and the local inflammatory process
- Previously considered a plasma protein cascade, it is now known to be a process allowing rapid fabrication of plasma plasma protein complexes on the factory floor of the activated platelet phospholipid surface – anchored to other platelets, the vascular endothelium and the glycocalyx

- It is a sequential process, with each phase having promoting and limiting / terminating factors
 - Platelet activation at the site of vascular endothelial injury producing a loose platelet plug
 - Exposure of platelet membrane phospholipids allowing assembly of tenase and prothrombinase complexes on the platelet surface – the factories for amplification of activation of the serine protease clotting factors
 - Simultaneous exposure and / or generation of tissue factor (TF) at the site of injury producing initiation of the coagulation cascade and generation of a small amount of thrombin (extrinsic pathway)
 - Thrombin-induced amplification and propagation of the clot (similar to intrinsic system) to form a stable clot with multiple fibrin – platelet bonds
- Termination phase initiated by thrombin – thrombomodulin interaction and involving anti-thrombin (AT), tissue factor pathway inhibitor (TFPI), and protein C – limiting the extent of clot formation
- Restoration of vessel patency (fibrinolysis) via the fibrin-tPA (tissue plasminogen activator) – plasminogen system. This system is, in turn via the tissue-activated fibrinolysis inhibitor (TAFI) system to prevent unregulated fibrinolysis
- There is cross talk with the inflammatory system via, inter alia, the XIIa – kallikrein – bradykinin system

Reference:

Leung LLK. Overview of haemostasis. Up to Date. December 2017

A neurocritical care update

Busisiwe Mrara

This brief update covers neurocritical care for patients with common neurological and neurosurgical pathology. Updates from the last three years in neuroprotection, traumatic brain injury and stroke management are given, which would be of interest to Anaesthesiologists whose role as perioperative physicians may extend to critical care.

1. General neurocritical care

- The Neurocritical care subspecialty is a relatively new fast growing discipline that is increasingly being recognised as essential in the management of critical neurological and neurosurgical pathology and managing the simultaneously affected organ systems in these complex patients.
- Literature from the USA, where neurocritical care is board certified reports positive outcomes from neurointensivist-led units particularly in subarachnoid haemorrhage (SAH). In the South African context, developing specific certification in neurocritical care is worth exploring as we have a high burden of traumatic brain injury that is a leading cause of disability.
- There is evidence to support a move to focus on palliative care consultations in neuro-ICUs where discussions on prognosis and functional outcomes are emphasised early in the ICU stay. By exploring personal, family and religious values and attitudes to life and disability, this may reduce the burden of devastating disability.
- Neurological assessment and prognostication in neurointensive care is often challenging, thus impacting rationing of ICU beds. The commonly used Glasgow Coma Scale has been widely criticised for poor interobserver reliability and lack of validity. The full outline of unresponsiveness (FOUR) score which includes brainstem reflexes, visual tracking, breathing patterns and respiratory drive is gaining recognition as a prognostic tool. In post

cardiac arrest patients, it has been shown to perform well as an early predictor of outcome when used with serial organ function scores. It has also been tested in SAH and found to predict mortality, functional outcomes and vasospasm.

2. Targeted temperature management for neuroprotection

- In comatose post cardiac arrest patient management, for shockable and unshockable rhythms, the American Heart Association recommendation is currently targeted temperature management (TTM), as opposed to induced therapeutic hypothermia (TH), 32-34 °C. TTM encompasses therapeutic hypothermia (32-36 °C) and fever control/normothermia (36°C). The change is a result of research by Nielsen and colleagues who reported no difference in survival and neurological outcome between target temperatures of 33°C and 36°C. This was a well conducted trial on 939 unconscious out-of-hospital resuscitated cardiac arrest patients, although its methodology was criticised for early neurological evaluations which skewed the results. It is hypothesised that the neuroprotective effects of TTM depend more on preventing shivering and pyrexia than the temperature level.
- It should be noted that despite a lack of evidence, experts in the field suggest the use of TH targeting 33°C for 24 hours in patients with features of extensive cerebral injury post cardiac arrest as evidenced by deep coma, convulsive EEG patterns and cerebral oedema.
- Application of this neuroprotective strategy in traumatic brain injury (TBI) remains unsupported by evidence, however there is post hoc evidence from the major trials on the subject, which suggest the intervention could benefit patients <50 years, with surgically treated haematomas, where hypothermia 35 °C is induced before or immediately after craniotomy and maintained for 48 hours.
- Favourable results in the use of noble gases, Xenon and Argon for this indication have come to light. Xenon has been

shown in human studies to improve neurological outcomes in patients post cardiac arrest and in neonatal hypoxic ischaemic encephalopathy, when used in conjunction with TH.

- Argon is also emerging as a cheaper alternative to Xenon with less sedative side effects.

3. Management of Cerebrovascular Accidents

- In patients with acute ischaemic stroke, thrombolysis with intravenous recombinant tissue plasminogen activator is considered first line therapy with benefits on neurological outcomes, if given within 4.5 hours of stroke onset. More recently, intra-arterial mechanical thrombectomy has been found to be superior to thrombolysis alone in patients with large artery occlusions in the proximal anterior circulation of the brain, when performed within 6 hours of stroke onset. Five large well conducted multicenter trials support this intervention: MR CLEAN, ESCAPE, SWIFT PRIME, EXTEND-1A, REVASCAT. This treatment is however limited by availability only in specialized centers.
- For this procedure, the choice of anaesthetic between general anaesthesia and conscious sedation is under debate. Evidence to date has shown equivalent neurological outcomes in these two options.

4. Traumatic Brain Injury Management

- The role of decompressive craniotomy in the management of severe traumatic brain injury is still under debate. The DECRA trial that showed poor outcomes with decompression was criticised for non-uniform TBI severity between the treatment groups. More recently the RESCUEicp trial results support this intervention, though there are concerns of increased neurovegetative complications.
- Further research is needed to investigate the reasons for the negative/neutral impact of lowering ICP with decompression, on neurological outcome.
- Some authors postulate that lowering ICP does not immediately improve brain tissue oxygenation and autoregulation as shown in a recent research report.

5. Conclusion

This narrative provides a snapshot of recent notable developments in neurocritical care, although not limited to those listed here. Readers are invited to access the references for further information.

References:

1. Kuroda Y; Neurocritical Care Update, Review, Journal of Intensive Care (2016) 4:36
2. Tran LN, Back AL, Creutzfeldt CJ; Palliative Care Consultations in the Neuro-ICU- A Qualitative Study, Research, Neurocritical Care 2016 October; 25 (2); 266-272
3. Pasternak J, Lanier WL; Neuroanaesthesiology Update, J Neurosurg Anaesthesiol 2017 April, 29(2) 97-131

What's New in Obstetric Anaesthesia?

David Bishop

1. Obstetric Spinal Hypotension: A recent international consensus statement in *Anaesthesia* brings agreement to many of the issues surrounding obstetric spinal hypotension.¹ It also addresses areas such as definitions and context-sensitive management strategies. Studies in South Africa relating to prediction and pragmatic management of hypotension have proved fixed-rate, low-dose infusions are a viable option in our setting. Administration of phenylephrine with the co-load as an infusion in resource-poor settings has been recommended, and while showing promise, has yet to be formally studied. Recent studies looking at noradrenaline as an alternative to phenylephrine are not yet advised even in settings where the drug is available.

2. Obstetric Haemorrhage: Recent advances in the haemostatic management of obstetric haemorrhage are discussed, with particular attention to the role of fibrinogen and point of care testing. The early administration of fibrinogen seems advantageous, at lower thresholds than previously advised. The use of tranexamic acid, as used in the WOMAN trial, and critical responses to this trial are discussed briefly. While there has been criticism of the methodology and results of the WOMAN trial, the use of tranexamic acid still has a sound theoretical base and should probably be used early in the context of PPH. Carbetocin,

a longer acting oxytocin analogue, continues to show promise and has multiple theoretical benefits, although most of the research at this point is in the elective caesarean delivery.

3. Obstetric Airway Management: The Difficult Airway Society (DAS) guidelines released in 2015 are briefly covered given the resistance to some of the suggested practises. These include the use of 'gentilation' in selected patients and the earlier use of supraglottic airway devices. The role of rocuronium vs suxamethonium is also briefly covered.

4. South African Research: There continues to be a significant contribution to the international literature from the South African Obstetric Anaesthesia community. Highlights of published international work will be covered, including literature pertaining to thermoregulatory changes under spinal anaesthesia, reviews and new work in the area of pre-eclampsia and the influence of body mass index on spinal height. South Africa contains both resource rich and resource poor environments: this, coupled to the rich contribution it makes towards global obstetric anaesthesia research, makes it ideally placed to advance translational research through collaboration in the future.

Reference:

- Kinsella SM, Carvalho B, Dyer RA, et al. International consensus statement on the management of hypotension with vasopressors during caesarean section under spinal anaesthesia. *Anaesthesia* 2018; 73, 71-92.

Human factors in anaesthesia

David Bogod

- Patient harm is more likely to occur from human than technical factors.
- The 'Swiss cheese' model describes those unfortunately incomplete shields that exist to prevent an error or a risk from causing patient harm.
- One of the most important shields is ensuring a process for supervision of trainee staff, especially when working out-of-hours or in isolated areas.
- However egregious an individual error appears to be, it is nearly always related to a deep background of organisational, environmental and occasionally technical factors.
- Close team-work and good communication are the most important immediate factors which protect patients from harm when errors occur.
- Individuals should be on their guard against loss of situational awareness and silo working.
- A 'fresh pair of eyes' is one of many reasons to call for help in a crisis.
- Legal processes often unfortunately focus on the individual rather than the system.

Medicolegal aspects of obstetric anaesthesia

David Bogod

- At the intersection of two high-risk specialties, obstetric anaesthesia is uniquely prone to claims relating to clinical negligence.
- Failings relating to communication, record-keeping and consent feature prominently in such claims.
- In the UK, pain felt during Caesarean section under regional anaesthesia is probably the commonest successful claim against all anaesthetists.
- Pain during section accounts for 21% of all claims in a large medicolegal database, but for 40% of successful claims.
- Perhaps surprisingly, regional techniques are more likely to lead to litigation than general anaesthetic techniques, albeit usually for lower levels of patient harm.
- Maternal deaths in the database are largely due to haemorrhage or airway complications.
- Anaesthetists are increasingly included in claims relating to neonatal hypoxic-ischaemic damage arising from delay in delivery.
- Accurate record-keeping and – most importantly – a centralised clock system are essential in defending such claims.

Reference:

McCombe K, Bogod D. Lessons from the law: A review of 21 years of litigation for pain during Caesarean section. *Anaesthesia* 2018; 73: 223-30

Neurological complications after regional anaesthesia

David Bogod

- Direct damage to a nerve root may arise from momentary contact, but is more likely to suggest persistence in the face of paraesthesia or pain.
- Direct damage to the spinal cord itself, whether from a spinal or epidural technique, is very likely to indicate poor practice on the part of the anaesthetist.
- Anaesthetists regularly misjudge the lumbar level at which they are inserting their needles, almost always thinking they are lower than they actually are.
- Severe neurological consequences are rare in the obstetric arena, but this does not translate to elderly patients receiving postoperative epidural pain relief, who have a much higher incidence of haematoma and abscess.
- A number of very severe cases of paraplegia/quadruplegia, often accompanied by obstructive hydrocephalus, have arisen in recent years.
- Current thinking ascribes this to ingress of chlorhexidine into the CSF, although firm evidence is lacking.
- Guidance now exists for the safe use of antiseptics around the neuraxis.
- Communication problems between anaesthetist and patient may increase the chance of complaints.

Reference:

National audit of major complications of central neuraxial block in the United Kingdom – NAP3. Royal College of Anaesthetists 2009. www.rcoa.ac.uk/nap3

Legal and ethical aspects of consent in the labouring woman

David Bogod

- Consent, whether written or verbal, is only valid when the patient has received sufficient information to make an informed decision.
- The legal test in the UK for what information should be provided has shifted over the years from “What would a responsible body of medical opinion tell the patient” (the prudent doctor) to “What information would this patient regard as important when making a decision” (the prudent patient).
- Recent case law in the UK has caused concern to many clinicians, but has really only brought the law into line with professional standards.
- Problems can arise when patients are unable to provide consent due to incapacity, whether temporary, permanent or fluctuating, age, or coercion.

- Good management dictates that information should be provided in a comprehensible form at a time when a patient’s ability to weigh it in the balance is not compromised by pain, anxiety, drugs or time constraints.
- In the UK, the fact that a fetus might be at risk from a mother’s decision should not be taken into account when deciding how to proceed in the face of maternal refusal of treatment.
- Following a number of ‘forced Caesarean section cases’, firm guidance now exists for clinicians faced with patients who refuse surgical delivery.

References:

- Consent for Anaesthesia. Association of Anaesthetists of Great Britain and Ireland 2017. www.aagbi.org/sites/default/files/AAGBI_Consent_for_anaesthesia_2017_0.pdf
- McCombe K, Bogod D. Paternalism and consent: Has the law finally caught up with the profession? *Anaesthesia* 2015; 70: 1013-1019

Peri-arrest bed-side focused ultrasound

David Canty

- There has been a rapid uptake in the clinical use of an abbreviated or focused form of transthoracic echocardiography (also referred to as focused cardiac ultrasound) in management of the critically ill by anaesthetists and intensive care physicians.
- Focused cardiac ultrasound improve speed and accuracy of diagnosis of patients with haemodynamic instability.
- It is used to diagnose presence or absence of acute cardiac pathology, such as ventricular, valve and pericardial fluid, and abnormal haemodynamic states, such as hypovolaemia and vasodilation.
- The indications for focused cardiac ultrasound have been extended recently to cardiac arrest, where societal guidelines recommend its routine use, and it has been incorporated into an advanced cardiac life support algorithm.¹
- In cardiac arrest, ultrasound can also be used to improve the diagnosis of cardiac rhythm - even though the initial rhythm check may show asystole (non-shockable rhythm), ultrasound may demonstrate myocardial movement of fine ventricular fibrillation (a shockable rhythm).

- Ultrasound may also reveal pulseless electrical activity and its cause, which could prompt specific life-saving therapies, such as drainage of pneumothorax, pleural or pericardial effusion, or emergency management of pulmonary embolus or acute myocardial infarction.
- There have been a number of ultrasound protocols designed for rapid assessment of peri-arrest or cardiac arrest, extending from detection of significant intra-peritoneal bleeding (Focused Abdominal Sonography in Trauma) to detection of other causes of shock including blood in the pleura, pericardium and more recently in rapid identification of common acute respiratory, cardiac and vascular conditions.
- The use of ultrasound in peri-arrest is consistent with the evolution of the concept of discrete organ-based ultrasound examinations, such as transthoracic echocardiography, to whole body ultrasound ‘ultrasound assisted examination’, and ‘ultrasound guided procedures’, and is represents a valuable skill for the perioperative physician.

Reference:

- Breitkreutz R, Walcher F, Seeger FH. Focused echocardiographic evaluation in resuscitation management: Concept of an advanced life support-conformed algorithm. *Critical Care Medicine* 2007; 35(5) S150-S161.

Perioperative management of new anticoagulants and antiplatelet agents

C. David Mazer

- New oral anticoagulant drugs (NOACs) are direct acting drugs which inhibit Factor Xa (rivaroxaban, apixaban, edoxaban) or Thrombin (dabigatran). They are potent agents which have a short onset (peak effect ~2-4 hours) and half-life of about 7-14 hours, although the effects may be very prolonged in the setting of renal failure.
- NOACs are increasingly being used to prevent or treat deep venous thrombosis or in the setting of non-valvular atrial fibrillation because they are at least as effective as warfarin in preventing thrombotic outcomes with the advantages of less intra-cranial bleeding and limited drug or food interactions, thus obviating the need for routine monitoring of levels
- NOACs should be discontinued 1-5 days prior to elective surgery (depending on specific drug and renal function) to decrease the risk of bleeding complications,
- Routine laboratory tests such as a PTT and INR may detect the presence of a NOAC, but normal results do not reliably exclude a residual anticoagulant effect
- Emergency management of patients taking NOACs can include activated charcoal (if recent ingestion), antifibrinolytics, prothrombin complex concentrates and other haemostatic therapies
- A specific reversal agent (idarucizumab) is available for dabigatran; other reversal agents are being developed for Factor Xa inhibitors
- New Antiplatelet agents include ticagrelor and prasugrel which are more potent, more rapid acting and more effective than clopidogrel, and are usually combined with aspirin (DAPT)
- Current guidelines recommend that the minimum time for discontinuation of these agents electively preoperatively is 3 days for ticagrelor, five days for clopidogrel and seven days for prasugrel
- In the setting of recent PCI for acute coronary syndrome, DAPT should be continued at least 1-3 months prior to elective non-cardiac surgery
- Resumption of antithrombotic therapy should be considered 1-3 days postoperatively

Extracorporeal life support

David Thomson

- Extracorporeal membrane oxygenator (ECMO) systems are a supportive therapy and not a disease modifying treatment in themselves.
- The evidence base is not robust - the best evidence in adults comes from a single randomized control trial which showed that patients with refractory respiratory failure allocated to an ECMO centre did better than those who weren't.
- Patient selection and timing of initiation is key to ensuring only patients who can potentially benefit are offered extracorporeal life support (ECLS) support and that outcomes are beneficial.
- Various configurations are possible:
 - Venous-arterial (VA): Blood is drained from the IVC and returned to the arterial system either centrally or peripherally. This is used for cardiopulmonary support.
 - Venous-venous (VV): Blood is drained from the IVC and returned to the right heart. This is used for isolated respiratory failure.
 - Pumpless extracorporeal lung assist: The patient's heart pumps the blood through the oxygenator from the femoral artery and returns it to the femoral vein. This is used primarily for CO₂ removal and not oxygenation due to the low blood flow rate.
- The amount of blood flow through the oxygenator is the primary determinant of the oxygenation
- The amount of gas flow through the oxygenator is the primary determinant of carbon dioxide removal
- Anticoagulation is required and although most circuits are heparin bonded and can be run for limited periods without systemic heparinization this runs the risk of clotting the oxygenator.
- Complications such as bleeding are common and it is essential ECLS therapies are offered in centres with adequate experience and training.
- eCPR is when ECLS therapy is instituted post cardiac arrest in patients without return of spontaneous circulation.
- Outcomes are better in younger patients.
- Outcomes are better for VV ECMO vs VA ECMO vs eCPR.
- ECLS therapy is expensive and given its potential to prolong the dying process with no reasonable chance of recovery good governance and ethical practices are essential.

Reference:

Makdisi, G., & Wang, I. (2015). Extra Corporeal Membrane Oxygenation (ECMO) review of a lifesaving technology. *Journal of Thoracic Disease*, 7(7), E166–E176. <http://doi.org/10.3978/j.issn.2072-1439.2015.07.17>

Task shifting and sharing: the only possible answer?

David J Wilkinson

- In a world population of over 7 billion people, 5 billion do not have access to basic surgery and anaesthesia care
- There is a vast shortage of doctors, nurses, drugs, equipment and facilities
- In countries in which there is the most need there is often the most corruption

- The World Bank has shown the cost-effective nature of investing in this type of surgical and anaesthesia care
- To ensure that effective care is provided quickly it seems rational to develop task shifting and sharing to maximise care to patients
- Such task sharing and shifting should not stop the usual methods of development for all healthcare professionals

Reference:

World Federation of Societies of Anaesthesiologists website: www.wfsahq.org

Looking back to go forward; the history and future of our speciality

David J. Wilkinson

- In April of 1847 a dentist, Mr Alfred Raymond, gave an ether anaesthetic for the removal of some teeth in Cape Town
- Anaesthetic practice slowly developed in the subsequent years as the area became embroiled in a series of conflicts
- Boer settlements were involved in intermittent struggles with both Pedi, Basotho and Zulus from the 1860s onwards
- The Anglo-Zulu War of 1878 provided a major challenge to all medical services including anaesthesia
- The two Anglo-Boer Wars in the following two decades created challenges to army doctors who had either practiced in the

Crimean conflict under very different terrains and climates or were completely new to the problems of large numbers of severe casualties and limited resources

- In large parts of Africa today there are numerous patients who require care for which there are insufficient trained staff, resources or facilities
- Medical and nursing staff in South Africa have an opportunity to help make significant changes to this state of affairs

Reference:

World Federation of Societies of Anaesthesiologists website: www.wfsahq.org

Handover of patients in the intensive care unit

Dean Gopalan

Patients subjected to surgery during an admission to hospital require multiple transitions during their care. Such transitions, or handovers, are defined as the transfer of information, professional responsibility, and accountability between individuals and teams.¹ If inappropriately and incompletely performed, handovers place patients at increased risk of negative outcomes by making medical errors and communication breakdowns more likely.² Despite this, many ICU handover situations are still sub-optimally performed by incomplete teams providing incomplete patient-specific, surgery-specific and anaesthetic-specific information.^{2,3}

Patients may be particularly susceptible during the risky postoperative ICU handover as a result of the numerous distractions that lead to an ineffective transition of care and an incomplete transfer of information. The mere transfer of information does not necessarily translate into effective communication, wherein the understanding and appreciation of that transferred information is crucial.

A systematic review by Segall examined postoperative ICU handovers.² Incomplete transfer of information was common with a higher rate of adverse events with poor handovers. Four key recommendations arose from the reviewed studies:

- i. the implementation of postoperative handover protocols that standardize the process
- ii. the completion of urgent clinical tasks before information transfer
- iii. allowing only patient-specific discussions during verbal handover
- iv. the presence of all relevant team members during the handover process.

Appropriate planning by both delivery and receiving teams involved in the handover is mandatory. Such preparation should include all the appropriate resources for the transfer itself, as well as those necessary for the receipt of the patient, so ensuring that the transition is smooth and appropriate.

Burgeoning electronic records with multiple bits of information make information overload likely. Selecting appropriate, relevant

information to share during patient transitions may become challenging. A structured postoperative handover process improves information transfer and reduces medical error without increasing the duration of handover.^{4,5} Other investigators have extrapolated from other domains such as aviation and formula 1 motor racing, where precision and process are paramount.⁶

Breuer and colleagues achieved a sustained improvement in communication, the number of reporting inaccuracies (errors and omissions) and patient outcomes by using a strict protocol for their PICU handovers.⁵ Their protocol included *inter alia* scripted bedside templates and an opportunity for questions and clarifications at the end of the handover. Bonifacio and colleagues suggest that patient, anaesthesia and surgical information should be followed by information about the patient's current status and details of the care plan.⁷

To minimize errors and omissions, effective handovers should be a priority in patient care. All institutions should develop a structured, detailed, postoperative handover process in ICU, with each health care practitioner clearly understanding their roles in effecting the smooth transition of critically ill patients from the operating room to the ICU.

References

1. Jeffcott SA, Evans SM, Cameron PA, et al. Improving measurement in clinical handover. *Qual Saf Health Care*. 2009;18:272–276.
2. Segall N, Bonifacio AS, Schroeder RA, et al; Can we make postoperative patient handovers safer? A systematic review of the literature. *Anesth Analg* 2012; 115:102–115.
3. Nagpal K, Vats A, Ahmed K, et al: An evaluation of information transfer through the continuum of surgical care: A feasibility study. *Ann Surg* 2010; 252:402–407.
4. Gardiner TM, Marshall AP, Gillespie BM: Clinical handover of the critically ill postoperative patient: An integrative review. *Aust Crit Care* 2015 Mar 18. [Epub ahead of print]
5. Breuer RK, Taicher B, Turner DA, et al: Standardizing Postoperative PICU Handovers Improves Handover Metrics and Patient Outcomes. *Pediatr Crit Care Med* 2015; 16:256–263.
6. Catchpole KR, De Laval MR, McEwan A, et al. Patient handover from surgery to intensive care: using Formula 1 pit-stop and aviation models to improve safety and quality. *Pediatric Anesthesia* 2007; 17: 470–478
7. Bonifacio AS, Segall N, Barbeito A, Schroeder RA, et al. Handovers From the OR to the ICU. *Int Anesthesiology Clinics* 2013; 51, 43-61.

Table 3: Postoperative Information Transfer Recommendations Consistently Identified in the Literature

Patient Information

- Name
- Age
- Weight
- Allergies
- Diagnosis
- Procedure performed
- Condition
- Medial history

Anaesthesia information

- Type of anaesthesia and anaesthetic course
- Anaesthesia complications
- Intraoperative medications, including dose and time
- IV fluids administered
- Blood products (type and amount)
- Estimated blood loss
- Transesophageal echocardiography/echocardiogram report

Surgical information

- Surgical course
- Surgical site information, including dressing, tubes, drains, and packing
- Surgical complications and interventions
- Cardiopulmonary bypass (CPB)/circulatory arrest/cross-clamp/ other procedure duration
- Problem weaning from CPB

Current status

- Assessment of hemodynamic stability

Care plan

- Anticipated recovery and problems
- Clear postoperative management plan
- Postoperative orders and investigations
- Monitoring plan and range for physiological variables
- Analgesia plan
- Plan for IV fluids, antibiotics, medications, deep venous thrombosis prophylaxis
- Plan for nasogastric tube and feeding

Can anaesthetic or analgesic technique during cancer surgery influence recurrence or metastasis?

Donal Buggy

- In 2006, this research question was posed following retrospective clinical studies which indicated an association between regional anaesthesia during cancer surgery and improved oncological outcomes;
- However, since then, an approximately equal number of other retrospective studies have not shown any such association;
- There is laboratory and some clinical evidence that tumour excision surgery, some general anaesthetics, acute postoperative pain and opioid analgesia inadvertently increase the risk that minimal residual cancer (micrometastasis) may subsequently develop into clinical recurrence;

- Recent laboratory studies have shown that amide local anaesthetics have multiple anti-metastatic effects on different cancer cells;
- Laboratory models also suggest that propofol may also have beneficial cancer cell inhibitory effects;
- These promising effects of lidocaine and propofol in vitro studies are supported by recent in vivo (live animal model) studies.
- There is insufficient evidence at present to justify a change of practice to one anaesthetic technique over another in cancer patients;
- It is necessary to conduct a large, prospective, randomised controlled trial to answer this compelling clinical research question.

References:

- Royds J, Khan AH, Buggy DJ. [An Update on Existing Ongoing Prospective Trials Evaluating the Effect of Anesthetic and Analgesic Techniques During Primary Cancer Surgery on Cancer Recurrence or Metastasis.](#) *Int Anesthesiol Clin.* 2016 Fall;54(4):e76-83. doi: 10.1097/AIA.
- Buggy DJ, Borgeat A, Cata J, Doherty DG, Doornebal CW, Forget P, Gottumukkala V, Gottschalk A, Gupta A, Gupta K, Hales TG, Hemmings HC, Hollmann MW, Kurz A, Ma D, Parat MO, Sessler DI, Shorten G, Singleton P. [Consensus statement from the BJA Workshop on Cancer and Anaesthesia.](#) *Br J Anaesth.* 2015 Jan;114(1):2-3. doi: 10.1093/bja/aeu262
- Mark Z. Johnson, Peter Crowley, Andrew Foley, Chou Xue, Cara Connolly Helen Gallagher, [Donal J. Buggy.](#) Effect of perioperative IV lidocaine on metastasis after sevoflurane or ketamine-xylazine anaesthesia for breast tumour resection in the 4T1 murine model. *Br J Anaesth* 2018 [in press]

Pharmacodynamics

Ernest Welch

- Pharmacodynamics details how and what effects drugs have on the body.
- This is usually mediated through drug-receptor interaction on the cell membrane or in intracellular fluid.
- The resulting effect and response is dependent on the drug concentration and its ability to stimulate a response. (Agonist response).
- This response is measured using a dose-response curve which tracks the dose (concentration) against the effect. (Correctly termed "agonist concentration effect curves").
- Alterations in the shape and size of this curve occur due to:
 - ° Patient age, state of health and concomitant disease.
 - ° Antagonists – agents that compete for binding with the receptor changing the agonist effect (Usually making the agonist less effective).
 - ° Efficacy – the magnitude of the response a drug is able to produce through binding a receptor.
 - ° Potency – the amount of drug needed to produce an effect.
- Desensitisation – a reduced response due to long term exposure of the receptor to the drug.
- Receptor binding occurs through a variety of mechanisms determined by their specificity (only bind specific ligands), affinity (amount of agent bound) and intrinsic activity (ability to produce a response)
- Once bound signals are transduced and magnified through further receptors, and intracellular first and second messengers.
- Clinically pharmacodynamics are used to determine an agent's effective dose, therapeutic dose, lethal dose and the therapeutic ratio.
- Pharmacodynamic models are being produced to measure depth of anaesthesia assessment, neurotoxicity models and when combined with pharmacokinetic models, systems for anaesthesia delivery utilising a closed-loop feedback.

References:

- Gambús PL, Trocóniz IF. Pharmacokinetic-pharmacodynamic modelling in anaesthesia. *Br J Clin Pharmacol.* 2015 Jan;79(1):72-84
- Applied Pharmacology for Anaesthesiology and Critical Care.* Edited by Analee Milner and Ernest Welch. Published by Medpharm publishers in 2012. www.milnerandwelch.co

Anaesthesia for the head injured child

Estie Cloete

- Critical management goals in children with traumatic brain injury (TBI) is to guarantee adequate cerebral perfusion, to meet metabolic demands and limit secondary brain injury.
- Primary injury impairs cerebral autoregulation - cerebral perfusion may become directly dependent on the mean arterial pressure
- Secondary injury, inflammatory and neurotoxic responses triggered by the primary injury induce oedema, hypoperfusion, hypoxia and ischaemia which lead to raised intracranial pressure, temperature dysregulation, loss of autoregulation and seizures
- There is no one-size-fit-all solution for the management of TBI in children- individualize.
- The **ADAPT trial** is an observational study currently ongoing that will address first-line intracranial hypertension management as well as strategies to mitigate iatrogenic ischemia and hypoxia and the provision of metabolic support.
- The total time that ICP(Intracranial pressure) is elevated to greater than 20 mmHg correlates strongly with outcome
- With glucose as the primary source of energy in the brain, hypoglycaemia may be more injurious to neurons than hyperglycaemia.
- Hypertonic saline as treatment for raised ICP can also act as a volume expander, enhance cardiac output, improve cerebral blood flow (CBF) and inhibit inflammation.
- Lactate : pyruvate ratio (LPR) is a measure of the balance of aerobic and anaerobic metabolism; Sustained elevations in LPR has been associated with poor outcome.

References:

- Figaji AA, Fieggen G, Mankahla N, Enslin N, Rohlwink N. Targeted treatment in severe traumatic brain injury in the age of precision medicine. *Childs Nerv Syst* (2017) 33:1651–1661
- Adapt trial (Approaches and decisions in Pediatric Acute TBI Trial) <http://www.adapttrial.org/about/>
- Agrawal S, Branco RG. Neuroprotective measures in children with traumatic brain injury. *World J Crit Care Med* 2016 February 4; 5(1): 36-46
- Carney N, Totten AM, O'Reilly C, Ullman JS, Hawryluk GW, Bell MJ et al. (2017) Guidelines for the management of severe traumatic brain injury, fourth edition. *Neurosurgery*;1(80 (1));6–15

Update on paediatric resuscitation

Heidi Meyer

- Overall survival in children with an in-hospital cardiac arrest has increased nearly three-fold during the past decade.
- The variability of survival rates among different locations given the same rhythm and same setting suggests that resuscitation performance may be a contributing factor.
- In the NRCPR database of paediatric in-hospital cardiac arrests, 27% had ventricular tachycardia or fibrillation at some point during the resuscitation, 10% as an initial rhythm.
- Risk factors for perioperative cardiac arrest include; age < 1yr, ASA III or more, emergency surgery and congenital heart disease.
- Children with pre-existing cardiomyopathy, aortic stenosis and pre-glen single ventricle pathology are all at increased risk of mortality post perioperative cardiac arrest.
- Cardiac arrest can be divided into 4 phases; 1) Prearrest phase, 2) The no-flow phase, 3) The low-flow phase, and 4) The post resuscitation phase.

- Fibrillation can actually be broken down into three distinct, time-dependent “phases.” Phase 1: The Electrical Phase – 0 to 4 minutes, Phase 2: The Circulatory Phase – 4 to 10 minutes, and Phase 3: The Metabolic Phase – 10+ minutes.
- High quality chest compressions with minimal interruptions and prompt defibrillation may be the most important actions during cardiac arrest with a shockable rhythm that will translate into a survival benefit.
- Among children with in-hospital cardiac arrest with an initial non shockable rhythm who received epinephrine, delay in administration of epinephrine was associated with decreased chance of survival to hospital discharge, ROSC, 24-hour survival, and survival to hospital discharge with a favourable neurological outcome.

Reference:

<https://www.resus.org.uk>

Cardiopulmonary dysfunction secondary to chronic liver disease

Howard Radford

1. Patients with chronic liver disease are at risk of extra-hepatic complications. Certain select liver diseases may affect the lungs and heart.
2. These complications may compromise quality-of-life, while also increasing morbidity and mortality in pre- and post-liver transplantation and hepatic resection.
3. Pulmonary manifestations:
 - a. Hepatopulmonary Syndrome [HPS] is characterized by intrapulmonary vascular dilatations leading to altered gas exchange and right-to-left shunting of blood within the pulmonary vasculature. HPS occurs more commonly in patients with cirrhosis and portal hypertension. It may occur in any patient with any degree of hepatic dysfunction. True HPS is estimated to occur in at least 10% of all patients with cirrhosis and portal hypertension; the disease is more prevalent in those with more advanced liver disease. Transplantation is the only modality to improve outcome.
 - b. Portopulmonary Hypertension is the presence of pulmonary hypertension in the presence of portal hypertension (almost always in the setting of cirrhosis). All other aetiologies of portal hypertension should be excluded. The estimated 1-year survival without treatment is 60%. Medical treatment includes endothelin receptor antagonists, phosphodiesterase 5 inhibitors, and prostacyclin analogues. Transplantation may be an option.

c. Alpha-1-antitrypsin deficiency involving the liver can manifest as abnormal liver enzymes, and in a subset of patients, advanced fibrosis and cirrhosis, while in others it can lead to features of chronic obstructive pulmonary disease.

4. Cardiac manifestations:

- a. Systolic dysfunction. Portal hypertension leads to a state of marked peripheral arterial vasodilation due to the release of vasodilatory mediators such as nitric oxide, carbon monoxide and prostacyclin. The peripheral arterial vasodilation leads to a lowering of the systemic vascular resistance, activation of the renin-angiotensin-aldosterone system, and consequently sodium retention and volume overload. The cardiac output is increased giving rise to a hyperdynamic circulation. In a subset of patients, systolic function decreases in the setting of decreased renal perfusion, impaired renal function, and ultimately the hepatorenal syndrome.
- b. Diastolic dysfunction occurs in 50% of patients. The exact mechanism is unknown.
- c. QT Prolongation is prevalent in many cases of cirrhosis. It may be due to autonomic dysfunction.
- d. Cardiac manifestations may occur secondary to Haemochromatosis, Non-alcoholic steatohepatitis and Non-alcoholic fatty liver disease and Hepatitis C.

Reference:

Goldberg D Lung and Heart Disease Secondary to Liver Disease Clin Gastroenterol Hepatol. 2015 November; 13(12): 2118–2127

Local anaesthetic systemic toxicity – an update

Jody G. Davids

Local anaesthetic systemic toxicity (LAST) is a serious complication affecting primarily the cardiovascular and central nervous systems. It is relevant to a multitude of specialities and should be considered whenever a local anaesthetic (LA) is used. Points worth emphasizing:

- All LAs pose a risk for causing LAST
- The clinical presentation may be highly variable, and cardiovascular effects may be the presenting problem in up to 14% of patients
- Risk factors for developing LAST can be sub-divided into those that increase free plasma drug concentration, those that increase sensitivity to LAs, and the nature of the block itself

- The prevention of LAST centres on good preparation and monitoring of the patient, as well as utilising techniques to mitigate the risk: dose adjustment, safe injection practices and the use of ultrasound guidance
- The successful management of LAST rests on early recognition, stopping the administration of LA, maintenance of oxygenation and ventilation, seizure suppression, cardiovascular support and the use of intravenous lipid therapy

References:

1. El-Boghdadly K, Chin KJ. Local anesthetic systemic toxicity: Continuing Professional Development. *Can J Anaesth* 2016; 63:330
2. Vasques F, Behr AU, Weinberg G, et al. A Review of Local Anesthetic Systemic Toxicity Cases Since Publication of the American Society of Regional Anesthesia Recommendations: To Whom It May Concern. *Reg Anesth Pain Med* 2015; 40:698

Major complications in thoracic anaesthesia

Johan Bence

What are they?

- Airway Bleeding
- Airway Injury
- Massive Intrathoracic Bleed

How to deal with them

- Be prepared – Anticipate
- Be aware – Follow and know the surgery and risk factors
- Early recognition = Good outcomes
- Communicate
- Work as a team
- Stay Calm
- Delegate
- Keep it Simple - **ABCDE**

A - Airway – secure, maintain and protect

B - Breathing – ventilate, support, oxygenate

C - Circulation – Aggressive Resuscitation, Control Blood loss, venous access.

D - Drugs – Control pressures, coagulation, anaesthesia.

E - Environment - Positioning, Temperature - All the help you can get

References:

1. Major intraoperative complications during video-assisted thoracoscopic anatomical lung resections: an intention-to-treat analysis. Herbert Decaluwe, René Horsleben Petersen, Henrik Hansen, Cezary Piwkowski, Florian Augustin, Alessandro Brunelli, Thomas Schmid, Kostas Papagiannopoulos, Johnny Moons and Dominique Gossot, on behalf of the ESTS Minimally Invasive Thoracic Surgery Interest Group (MITIG). *European Journal of Cardio-Thoracic Surgery* 48 (2015) 588–599 doi: 10.1093/ejcts/ezv287
2. Oxford Textbook of Cardiothoracic Anaesthesia. Edited by R Peter Alston, Paul S. Myles, and Marco Ranucci
3. Management of Intra-operative Crises, An Issue of Thoracic Surgery Clinics, By Shanda H. Blackmon. ISSN 1547-4127 Volume 25. Number 3. August 2015

Is anaesthesia the same as sleep?

Johan Diedericks

Anaesthesia and non-REM sleep have similar behavior characteristics eg both cause hypnosis, amnesia and immobility and reduce sleep debt. As anaesthesia share many behavior and EEG changes with coma, it is also seen as a reversible drug induced coma.

EEG similarities include δ -wave domination. With anaesthesia there are also an increase α - and θ wave activity and at deepest levels there are burst suppression and flat lining. However, during anaesthesia there is also prominent faster β -wave activity.

Sleep and wake activity resides in certain nuclei in the thalamus and cortex and anaesthesia act on the same areas. However under anaesthesia the activity is more spatially blurred without grouped spindle activity. Like sleep this activity is directional. With anaesthesia the frontoparietal communication is reduced compared to the wakeful state, while parietal to frontal activity remains the same. In the thalamo-cortico-thalamic loop during sleep thalamic deactivation precedes cortical deactivation. However during anaesthesia loss of consciousness leads to profound EEG changes at cortical level with little change at subcortical level. In contrast subthalamic effects of anaesthesia

are responsible for immobility. There is evidence that anaesthetics create stereotypical metastable brain states which may change with depth of anaesthesia. This implies degeneracy between brain state and effect site concentration. Oscillations disrupt communications between different regions of the brain.

On cellular level ligands may pass through chreodes created by hydrophobic states of surface amino acid chains under the influence of hydrophobic effects of nearby water. It is proposed that with sleep N may lead to these changes and during anaesthesia anaesthetic agent molecules. Different effects and different modes of action is present with some anaesthetics. Recent work suggests that propofol restricts syntaxin1A presynaptic mobility leading to inhibition of presynaptic release of neurotransmitters

References:

1. Brown EM, Ralph Lydic R, Schiff ND. General Anesthesia, Sleep, and Coma. *N Engl J Med* 2010;363:2638-50.
2. Velly LJ, Rey MF, Bruder NJ, Gouvisos FA, Witjas T, Regis JM, Peragut JC, Gouin FM. Differential dynamic of action on cortical and subcortical structures of anesthetic agents during induction of anesthesia. *Anesthesiology* 2007;107:202-212.
3. Lee U, Kim S, Noh GJ, Choi B-M, Hwang E, Mashour GA. The directionality and functional organization of frontoparietal connectivity during consciousness and anesthesia in humans. *Conscious Cogn* 2009;18:1069-1078.
4. Murphy M, Bruno MA, Riedner BA, Brady A, Riedner BS, Boveroux P, Noirhomme Q Jr, Brichant J-F, Phillips C Jr, Massimini M, Laureys S, Boly M. Propofol anesthesia and sleep: a high-density EEG study. *Sleep* 2011;34:283-291A.
5. Mashour GA, Orser BA, Avidan MS. Intraoperative awareness: From neurobiology to clinical practice. *Anesthesiology* 2011;114:1218-1233.
6. Magnin M, Rey M, Bastuji H, Guillemant P, Mauguière F, Garcia-Larrea L. Thalamic deactivation at sleep onset precedes that of the cerebral cortex in humans. *Proc Natl Acad Sci U S A* 2010;107:3829-3833.
7. Kier LB, Cheng C-K, Testa B. A Cellular Automata Model of Ligand Passage Over a Protein Hydrodynamic Landscape. *J Theor. Biol.* (2002) 215, 415–426
8. Bademosi et al., Trapping of Syntaxin1a in Presynaptic Nanoclusters by a Clinically Relevant General Anesthetic 2018, *Cell Reports* 22, 427–440
9. Hudson AE. Metastability of Neuronal Dynamics during General Anesthesia: Time for a Change in Our Assumptions? *Frontiers in Neural Circuits*. 2017 doi: 10.3389/fncir.2017.00058

ESMOE anaesthesia training methods

Jonathan Burke

- Anaesthesia related maternal mortality unchanged over triennia despite ESMOE anaesthesia training.
- Majority of deaths at level one and two hospitals.
- Spinal hypotension (80%) and GA airway complications (20%) the cause.
- 90% of deaths assessed to be avoidable.
- Basic obstetric anaesthesia skills lacking: assessment, problem recognition, monitoring, and management.
- Obstetric anaesthetic service providers are CSMO, MOs and foreign trained graduates.

- ESMOE anaesthesia module to be updated to millennial learning standards.
- NDOH to prioritize, fund and drive obstetric anaesthesia training and ESMOE. HPCSA to sign off interns for ESMOE.
- Ensure all junior doctors have access to training, especially in rural areas.
- Call to SASA and all anaesthesiologists across SA to get involved.

Reference:

Theron A, Rout C. *South Afr J Anaesth Analg* 2013;14

Polypharmacy in the elderly

Kathleen Ross

Polypharmacy

- is present if a patient uses 5 or more concurrent drugs (including OTC, prescription, supplements etc). Excessive polypharmacy is more than 10 drugs
- increases the occurrence of adverse drug events. These are any injuries caused by the drug when used at normal doses.
- results in increased adverse patient outcomes like nursing home placement, falls, hospitalization and death
- risks are much more prevalent in the elderly due to age-related decline in physiological reserves and frailty. Heterogenous ageing results in variability in pharmacokinetics and dynamics that is unpredictable usually requiring smaller doses for clinical effect and resulting in a prolonged duration of action

of the drug. The anaesthetist should be aware of this and adjust doses and drug selection accordingly.

- and the use of psychotropic medications (benzodiazepines, anticholinergics, antihistamines, antipsychotics) increases the risk of postoperative delirium and thus patient outcomes
- The Beers Criteria for Potentially Inappropriate Medication (PIM) use in the elderly 2015 is a list highlighting drugs to be avoided or doses to be reduced based on kidney function and selected drug-drug interactions.
- PIMs are associated with poor health outcomes in the elderly

References:

http://www.sigot.org/allegato_docs/1057_Beers-Criteria.pdf
<https://www.priorityhealth.com/provider/clinical-resources/medication-resources/~media/documents/pharmacy/cms-high-risk-medications.pdf>

Paediatric patient with cardiac failure for non-cardiac surgery

Kotie Bester

- The etiology of cardiac failure in children differs from that in adults: idiopathic dilated cardiomyopathy is more common than ischaemic cardiomyopathy, and congenital heart disease is a common cause of cardiac dysfunction.
- Many underlying conditions have potential to cause cardiac failure and should prompt further interrogation or investigation. These include obstructive sleep apnoea, a history of cancer treatment, muscular disorders, mitochondrial disorders, endocrine conditions e.g. pheochromocytoma and thyroid disease, liver and renal failure, glycogen storage diseases and metabolic disorders.
- The pathophysiology of failure involves myocyte injury, catecholamine secretion and activation of the rennin-angiotensin-aldosterone system, chamber enlargement and valvular regurgitation, and inflammatory reactions.
- Consequences of failure include beta-receptor desensitisation, anaemia, cardiorenal syndrome and liver dysfunction.
- Catecholamine inotropic agents have several limitations – they cause apoptosis and myocyte injury, receptor desensitisation decrease their potency, they increase myocardial oxygen consumption, and cause tachycardia and arrhythmias.
- Calcium sensitisers preserve lusitropy and do not increase oxygen demand.

- Although milrinone is used commonly, little published data is available for use in children outside the setting of cardiac surgery.
- Positive pressure ventilation has many beneficial effects in cardiac failure, but it should be used with caution in patients with right ventricular diastolic dysfunction.
- Anaesthesia should be provided by personnel with appropriate experience; attention should be paid to intravascular status, acidosis, electrolyte disturbance and temperature control, while due vigilance will allow for prompt treatment of deteriorating haemodynamics.
- Afterload reduction should be balanced against the risk of subendocardial ischaemia, heart rate usually needs to be maintained to maintain adequate cardiac output, and patience is demanded to accommodate for slow circulation times of medication.

References:

1. Rosenthal DN, Hammer GB. Cardiomyopathy and heart failure in children: Anesthetic implications. *Paediatr Anaesth.* 2011;21(5):577–84.
2. Costello JM, Mazwi ML, McBride ME, Gambetta KE, Eltayeb O, Epting CL. Critical care for paediatric patients with heart failure. *Cardiol Young.* 2015;25(S2):74–86.
3. Hoffman TM. Chronic Heart Failure. *Pediatr Crit Care Med.* 2016 Aug;17(8 Suppl 1):S119-23.
4. Jefferies JL, Hoffman TM, Nelson DP. Heart Failure Treatment in the Intensive Care Unit in Children. *Heart Fail Clin.* 2010 Oct;6(4):531-58.

Preventative, effective, multimodal analgesia

Latifa Firfiray

- Despite advancements in the understanding of pain pathophysiology, pharmacology and neuroscience, acute postoperative pain remains poorly treated in about 80% of patients in the United States of America.
- Poorly treated pain has negative biopsychosocial consequences, influencing the individual patients, their caregivers and society at large.
- The goals of acute pain management should be to alleviate patients' symptoms and suffering, and to prevent the development of persistent postoperative pain by reducing or eliminating peripheral and central sensitization.

- A holistic, multidisciplinary, perioperative pain management plan should be formulated, together with the patient, which incorporates multimodal pharmacological and non-pharmacological analgesic techniques.
- Pain management plans should be individualised according to patient and surgical risk factors.
- Procedure specific pain regimens have been described in the literature, and should be consulted when formulating an analgesic plan.
- Frequent reassessment of patients is crucial, with dose adjustments and modification of analgesic techniques if needed.

Physiology and pathophysiology of the critically ill obese patient

Malcolm Miller

The obesity epidemic is also reaching lower and middle-income countries. South Africa has a growing epidemic of obesity especially amongst our black female population. The growing

epidemic worldwide results in about 25% of patients admitted to ICU are obese.

Body Mass Index(BMI) is still the metric used internationally to define obesity. The worldwide epidemic has led to numerous studies that examined the impact of obesity upon clinical outcomes during critical illness. Although the data are conflicting,

the prevailing theme is that increased morbidity is associated with an increasing BMI above normal but a u-shaped curve may be present when relating BMI to survival. Malnourished patients with low BMI (<18.5KG/M²) and those with severe class III obesity (BMI >40kg/m²) would thus be expected to have the worst outcomes and improved ICU survival for those with class I and class II obesity (BMI = 30-39.9KG/M²).

The above is incongruent or opposite of what would be expected. The term obesity paradox has therefore been used to describe the observed phenomenon of improved survival for critically ill patients with obesity when compared the non-obese counterparts.

Aetiologies for the presumed paradox are not clear. Emerging research indicates that adipose cells may mediate a range of short-term beneficial functions in response to sepsis or stress despite the chronic inflammatory and detrimental health effects from obesity. Adipose tissue is a functional organ capable of altering metabolism and secreting immune-modulating chemokines, and not just a depot for excess energy as assumed in the past. Leptin, secreted from adipose tissue, augmented the immune response and improved bacterial clearance in

animal studies. Critically ill septic patients who survived sepsis had threefold higher plasma concentrations of leptin compared with those who died. Lipoproteins, apoproteins, and eicosanoid-derived resolvins and protectins have been shown to neutralize lipopolysaccharide, to stimulate clearance of inflammatory debris, and to exert direct anti-inflammatory actions.

In ARDS, recent evidence suggests the existence of a protective response called the pre-conditioning cloud where obesity induces low-grade inflammation, generating a process that subsequently protects the lung against further insults. In addition, during critical illness adipose tissue macrophages shift from pro-inflammatory M1 to alternative or anti-inflammatory M2 phenotypes. Finally, the metabolically healthy obese (MHO) patient has been recently proposed, referring to obese individuals without associated metabolic co-morbidities. These individuals may prove to have greater reserve to survive critical illness.

Obesity remains a challenge to manage in ICU but outcomes suggest that these patients deserve our full attention.

References available on request.

Awake craniotomy: a practical approach

Marli Smit

The following are important considerations:

1. Appropriate patient selection. A motivated, cooperative patient without procedure-specific contra-indications. (Rath, Mahajan and Bithal, 2014)
2. Excellent communication and teamwork between all parties involved.
3. Meticulous theatre preparation. This includes planning for the sedating and/or anesthetizing of the patient, patient positioning, intra-operative monitoring and a stress-free theatre environment for the patient. (Türe *et al.*, 2014)
4. Back-up plan for airway management during elective as well as potential emergency intra-operative situations.
5. A sound knowledge of the anatomy of the nerves innervating the scalp, an understanding of the local anesthetic dosage limitations in this patient group, as well as the establishment of dense scalp blocks are of the utmost importance. (Cormack and Costello, 2005)
6. Thorough emotional pre-operative patient preparation as well as the establishment of a good rapport.
7. Patient comfort intra-operative. Give adequate consideration to local anesthetic infiltration for all intra-venous sites, Remicaine jelly before catheter and nasopharyngeal airway placement, comfortable ambient temperature and positioning.

8. Knowledge and understanding of the different anesthetic techniques (sedation, asleep-awake-asleep and asleep-awake technique) as well as the ability to (flexibly) apply it. (Stevanovic *et al.*, 2016) evidence for optimal anaesthesia management remains limited. We aimed to summarise the latest clinical evidence of AC anaesthesia management and explore the relationship of AC failures on the used anaesthesia techniques. Methods: Two authors performed independently a systematic search of English articles in PubMed and EMBASE database 1/2007-12/2015. Search included randomised controlled trials (RCTs)
9. Make use of easily *titratable* drugs and use vital signs, depth of anesthesia monitoring and communication with the patient to guide drug titration.

References:

- Cormack, J. and Costello, T. (2005) 'Awake craniotomy: anaesthetic guidelines and recent advances', *Australasian Anaesthesia*, pp. 77–83.
- Rath, G., Mahajan, C. and Bithal, P. (2014) 'Anaesthesia for awake craniotomy', *Journal of Neuroanaesthesiology and Critical Care*. Medknow Publications, 1(3), p. 173.
- Stevanovic, A. *et al.* (2016) 'Anaesthesia management for awake craniotomy: Systematic review and meta-analysis', *PLoS ONE*. Edited by M. Gemma. Public Library of Science, 11(5), p. e0156448.
- Türe, H. *et al.* (2014) 'ANESTHETIC MANAGEMENT OF AWAKE CRANIOTOMY : OUR STANDARDISED PROTOCOL AND REVIEW OF THE LITERATURE UYANIK KRANIYOTOMİ DE ANESTEZİ YÖNETİMİ: STANDART PROTOLÜMÜZ VE LİTERATÜRÜN GÖZDEN GEÇİRİLMESİ', *Yeditepe Medical Journal*, 8, pp. 31–32. (Accessed: 27 January 2018).

The role of resuscitation fluids in renal injury

Michael FM James

- Fluid therapy is context sensitive. Fluids are drugs and the risk/benefit ratio depends on the appropriate use of fluids in the correct context. Clinical trials of fluid therapy that lack a sound conceptual basis will produce flawed results. This principle is critical in any interpretation of the available scientific evidence of renal injury related to fluid therapy.
- The contribution of resuscitation fluids to renal injury is multifactorial and includes inadequate fluid administration, fluid overload and the specific properties of the various fluids.
- Volume status is a critical determinant in the evolution of renal injury. Whilst it is widely recognised that hypovolaemia is a critical factor in renal injury associated with resuscitation, recent evidence is that generous fluid administration does not protect the kidney and may be a trigger for renal injury through increased venous back pressure, abdominal compartment syndrome and intrarenal oedema.
- The “Third Space” concept is erroneous and the large fluid administration protocols that resulted were harmful. Specifically, these strategies, while initially maintaining renal output, almost certainly contributed to renal injury through development of abdominal compartment syndromes. This is particularly true in burns resuscitation where current recommendations are returning to the early use of colloids (especially albumin) to minimise this risk.
- The role of 0.9% saline in the evolution of renal injury is the subject of considerable debate. Hyperchloraemia is associated with a decrease in renal plasma flow and GFR. Several retrospective studies suggest that chloride-restrictive strategies are associated with a reduction in renal injury, but two recent (underpowered) studies could not demonstrate a difference between saline-based fluids and balanced crystalloids.
- The role of colloids in the genesis of renal injury is highly contentious and is totally dependent on the context in which the fluids are used. The data must be considered with this in mind.
- The use of colloid solutions as maintenance fluids, particularly in ICU is irrational and probably harmful. This was the basis of the “pragmatic” ICU trials including SAFE, VISEP, CHEST and 6S. All administered colloids (albumin in SAFE, HES in the other three). The incidence of renal replacement therapy in SAFE (saline v albumin) was 6.8% v 7.2%, and in CHEST (saline v HES) was 5.8% v 7.0%. There is no evidence that HES is more of a risk than albumin in this context.
- These three studies have come under widespread criticism relating to methodology and data handling and should not be regarded as evidence of colloid-associated renal risk when colloids are used for volume replacement in genuinely hypovolaemic patients. The CHEST trial failed to identify these specific conditions for which HES may be useful because the trial lacked a coherent paradigm for fluid administration.
- Recent data regarding the use of colloids in the context of fluid resuscitation do not support the argument that colloids (in particular HES) pose a risk of renal injury. The only two randomised, controlled trial of colloids v crystalloid (FIRST and CRYSTAL) both suggested that better volume resuscitation with colloids may provide some degree of renal protection.
- A large number of recent studies comparing the renal risk of HES to that of albumin have shown no evidence of renal injury from either colloid. The most recent study indicates that albumin 5% and balanced hydroxyethyl starch 6% have comparable safety profiles in patients undergoing major surgery and do not pose a renal risk.¹

References:

1. Kammerer T, Brettner F, Hilferink S, et al. No Differences in Renal Function between Balanced 6% Hydroxyethyl Starch (130/0.4) and 5% Albumin for Volume Replacement Therapy in Patients Undergoing Cystectomy: A Randomized Controlled Trial. *Anesthesiology* 2018; **128**: 67-78

Alternatives to epidural analgesia in labour

Neil Muchatuta

Key learning points:

- Without any interventions, labour can be one of life's most painful experiences for women
- The experience of labour pain is multi-factorial
- Several pharmacological and non-pharmacological methods have been shown to be beneficial
- Epidural analgesia still provides the best reduction in pain scores
- However maternal satisfaction with labour analgesia depends on more than just analgesic efficacy
- Remifentanyl PCA provides high maternal satisfaction and has an excellent fetal safety profile, but risks maternal apnoea
- Organisational factors and patient expectations are key to providing safe and effective labour analgesia
- Pharmacogenetics may have a future role for individualising women's pain relief

Morphine-free anaesthesia for the obese patient ^{1,2}

AA Murray (Riaan)

- Opiates provide substantial pain relieve, but caution is needed, as the side effects may do more harm.
- The main side effects are respiratory depression, airway obstruction, somnolence, dizziness, post-operative nausea and vomiting (PONV), delayed feeding and gastric emptying, constipation, urinary retention, delayed mobilization, physical dependence, tolerance, hyperalgesia, immunological dysfunction and muscle rigidity.
- Obese patients are particularly prone to these effects, as a significant overlap exists between opiate and obesity related perioperative complications, especially sedatory, respiratory, gastrointestinal and musculoskeletal side effects.
- With a multimodal approach, using foundational and adjuvant analgesic and careful utilization of local anesthesia, opiates can be omitted completely.
- Paracetamol is essential in the absence of hepatic steatosis. NSAIDS has the lowest number needed to treat, but could lead

to increase bleeding and anastomotic leak in non-elective colorectal surgery.

- Ketamine, dexmedetomidine, pregabalin and gabapentin is opiate sparing and produce lower pain scores and PONV, but may increased sedation.
- Magnesium, as a NMDA antagonist, decreases pain scores in orthopedic surgery.
- Dexamethasone has analgesic, antihyperalgesic and antiemetic effects.
- Neuraxial or regional nerve blocks should be used where appropriate. Alternatively a lignocaine infusion is proved to be effective in laparoscopic surgery.
- Bariatric Roux and Y gastric bypass surgery can now be done using no opiates other than a single short acting dose for intubation.

References:

1. De Baerdemaeker L, Margaron M. Best anaesthetic drug strategy for morbidly obese patients. *Curr Opin Anaesthesiol.* 2016;29(1):119-128.
2. Budiansky AS, Margaron MP, Eipe N. Acute pain management in morbid obesity – an evidence based clinical update. *Surg Obes Relat Dis.* 2017;13(3):523-532.

Chronic Pain

H.A. van Zyl (Riaan)

- A multi-disciplinary approach is needed. There are so many facets to the management of a patient with chronic pain that it is not possible for a single healthcare worker to address them all effectively.
- It is important to address the patient's biomedical issues together with the psychological and social issues that are often present. A one-stop point of care ensures continuity in treatment within a pain clinic with different treatment platforms.
- The cornerstone of the successful management of a patient with chronic pain is the establishment of a firm fiduciary doctor-patient relationship.
- A realistic goal of treatment is the improvement of the patient's current quality of life.

- An individualized, stepwise management programme should be formulated for each patient with chronic pain.
- Chronic pain is pain that persists beyond the usual course of an acute disease or after a reasonable time for healing to occur. This usually varies between one and six months.
- One needs to have a clear picture in mind of the type of chronic pain one is treating, whether neuropathic or nociceptive pain, or a combination of the two, because this will determine the appropriate combination of drugs.
- Early psychological assessment forms part of the initial assessment of the patient with chronic pain.
- A specialized pain intervention may be another treatment modality. This modality may include nerve blocks or nerve ablations, steroid injections, radiofrequency treatment, sympathetic blocks or ablation and neuro-modulation.
- Physiotherapists play a vital role in restoring mobility and functionality especially in patients with chronic low back pain.

Pain neuroscience - advancing knowledge for clinical practice

Romy Parker

- Chronic pain poses a particular challenge to clinicians with the pathology being present in the nervous system itself
- Changes have been recorded in both the peripheral and central nervous systems of people with chronic pain.

- Central Pain Modulation has been shown to be dysfunctional in people with chronic pain with descending inhibitory control reduced.
- While many interventions exist to target mechanisms contributing to chronic pain in the periphery and at a spinal cord level, what methods do we have to access the brain to restore Central Pain Modulation?

- Pain Neuroscience Education (PNE) has Level 1A evidence that it reduces pain and facilitates an increase in function in patients.
- PNE has been demonstrated to restore Central Pain Modulation – perhaps through a reduction of threat
- A summary of the evidence to support the use of PNE will be presented
- Guidelines on how to implement PNE in practice will be provided

Reference:

LOUW, A., ZIMNEY, K., PUENTEDURA, E. J. & DIENER, I. 2016. The efficacy of pain neuroscience education on musculoskeletal pain: A systematic review of the literature. *Physiother Theory Pract*, 32, 332-55.

Understanding pain physiology – so much more than a gate theory

Ruben Naidoo

- Pain is a complex personal experience associated with many dimensions of brain function, including sensory discrimination, affective motivation and cognitive evaluation. (1)
- The 'specificity theory' considered nociception as a neural process involving the transduction and transmission of a noxious stimulus from specific receptors to the brain via specific pain pathways.(2)
- The 'intensity theory' of pain suggested that two stimuli were needed to produce pain, one involving a strong intense activation of nerves while there was a weak stimulus which produced non-painful sensation. (1)
- The 'pattern theory', in contrast to the 'specificity theory', maintains that the nerve impulse pattern for pain is produced by intense stimulation of non-specific receptors. (3)
- The 'gate control theory' highlighted the role of the spinal cord and brain mechanisms in both acute and chronic pain. (4) It suggested that there is a "gating" at the first synaptic junction between primary afferent pain signaling neurons

(transmission (T) cells) in the substantia gelatinosa of the spinal dorsal horn. (2)

- The 'neuromatrix theory' considers pain as a multidimensional experience produced by an activation of a characteristic nerve impulse called the "neurosignature", which is genetically predetermined and influenced by many factors, including sensory, affective, evaluative, and postural inputs.
- The neuromatrix can cast its specific signature onto any input received by it. It is triggered by the input though this trigger does not produce the neurosignature itself. (4) This culminates in the ability for this neuromatrix to produce awareness and action. (4)

References:

1. Chen J. History of pain theories. 2011;27(5):343-50.
2. Steeds CE. The anatomy and physiology of pain. *Surg (United Kingdom)* [Internet]. 2016;34(2):55-9. Available from: <http://dx.doi.org/10.1016/j.mpsur.2015.11.005>
3. Melzack R, Wall P. Pain Mechanisms: A New Theory. *Science* (80-). 150(3699):971-9.
4. Melzack R. Evolution of the neuromatrix theory of pain. The Prithvi Raj Lecture: Presented at the Third World Congress of World Institute of Pain, Barcelona 2004. *Pain Pract*. 2005;5(2):85-94.

Frailty scoring and implications of frailty

Simon Howell

- Frailty can affect all of the systems of the body and is a reduced ability to recover after a stressor event.
- Frailty is widely considered to be an independent risk factor for peri-operative complications.
- Frailty is predominantly, although not exclusively, a condition of the elderly. As the population ages it is becoming an increasingly important public health challenge. It is estimated that there will be two billion people aged over 65 years in the world by 2050.
- There is no one universally agreed definition of frailty. There are two main of models for frailty the cumulative deficit model and the phenotype model.
- Frail patients may be identified as the frail using scoring systems such as the Clinical Frail Scale or the Edmonton Frail Scale or tests such as timed get up and go.
- Sarcopenia quantified by abdominal muscle area on CT scanning is often used as an objective measure of frailty.
- There is now a significant body of literature supporting an association between various measures of frailty and adverse perioperative outcome. However, to the value of frailty as a predictor of post-operative complications is less clear.
- A current challenge in the application of frailty assessments to surgical patients include the tendency of scoring systems developed in the community to diagnose a high proportion of surgical patients as pre-frail leading to a low specificity for the identification of higher risk patients.
- One approach to address this problem may be the development of bespoke scoring systems for frailty in surgical patients.

Reference:

Griffiths R, Metha M. Continuing Education in Anaesthesia, Critical Care and Pain (now BJA Education) 2014; 14: 273-7. <https://doi.org/10.1093/bjaceaccp/mkt069>.

SASA Congress 2018 - NURSE TALK

Stress Management Burnout Coping Mechanism

Desiree Matika

Burnout Coping Mechanism

- Evaluate your priorities.
- Simplify your life.
- Don't take own things that you can't control.
- Say no to new commitments.
- Take a daily break from technology.
- Reaching out.
- Support your health with exercise and nutrition.
- Delegate responsibilities.

- Seek support.
- Clarify your job description.

References:

1. Tim Parsons www.timparsons.me. 10 ways to avoid burnout in 2018
2. HELPGuide.org. Trusted guide to mental and emotional health.
3. Stress and Burnout in ministry. Authors: Melinda Segal, Jeanne Segal, PhD Lawrence Robinson and Robert Segal. Last updated: Oct 2017
4. Awake (Published by Jehovah's Witnesses) September 2014. How to deal with burnout. (page 5)
5. Bandura A (1997) Self-efficacy. New York. W.H Freeman and company.
6. www.pauladavislaack.com
7. clevelandclinic.org
8. www.burnoutfunnyquotes.co.za

Dealing with death on the table

Gareth Davies

- The response to a death on the table relates to the cause of death and whether the death was expected or not.
- Current training programs do not equip medical staff to deal with the full impact of a death on the table.
- Events can affect the participant in 3 broad categories: the impact on the participant's professional role, relationships with friends and family and personal impact.
- Short term effects include: feelings of shame / guilt, a loss of confidence and vulnerability to error.

- Longer term sequelae include: depression, anxiety, substance abuse / addiction and prolonged sick leave.
- With time, desensitization may occur, which can represent a healthy coping mechanism or a maladaptive response, precipitating burn-out, cynicism and disengagement.
- Workplace interventions should focus on operating room debriefings, mandatory debriefing sessions, peer review of the intra-operative event (M&M meetings) and counseling.
- Operating room "drills" and mentorship programs may offer other avenues of support to both new and experienced operating room personnel.

Recovery room nurses' knowledge of post-operative airway emergencies

Juan Scribante

- The level of knowledge of post-operative airway emergencies of recovery room nurses attending two anaesthetic nurses' symposia in Cape Town and Johannesburg was low.
- The overall mean score obtained was 40% (SD 18) with a range of 0–88%, this was 30% below the predetermined competency score of 70% and only 24 (8%) OT nurses achieving a score \geq 70%.

- There is a desperate need for an accredited anaesthetic and recovery room nursing course, with a focus on adult learning.
- For nurses to become competent in the management of airway emergencies is a complex challenge that requires more than an educational intervention. It will also require behavioural change at various levels such as the behaviour of nurses, anaesthetists and intuitions.

The role of the theatre technician in perioperative nursing

Lorraine Schutte

- In response to the shortage of operating room (OR) nurses, the United Kingdom employs registered operating department practitioners. While in South Africa, OR theatre technicians are employed, they are not registered as health professionals, nor are they regulated by legislation.
- Workforce planning in South Africa is already challenged by a wide spectrum of disease and high injury burden. Simultaneously, the numbers of specialist nurses notably decreased. The employment of mid-level healthcare workers to perform tasks previously only undertaken by professional healthcare practitioners are increasingly used to supplement the shortage of healthcare staff.
- Theatre technicians, professional nurses and medical practitioners in this study presented diverse views on the training and competence of theatre technicians. This notably relate to the lack of planning and integration of mid-level healthcare workers between the healthcare and higher education sector.
- While mid-level health care workers, such as theatre technicians may provide valuable support in the light of staff shortages, inadequately trained or poorly supervised mid-level healthcare workers may have a negative effect on both quality of care and staff retention.
- The OR budget may account for 40% of a particular hospital, compelling maximum utilisation and minimum operating costs. Thus, managers may be pressurised into increasing staff workload, or opt to use less qualified staff.
- In this study, overlapping roles with consequent vague role boundaries, left the impression that the role of theatre technicians were exclusively determined by managers. It was evident that participants were unaware of legislative,

operational or educational requirements regarding the composition of the surgical team: "We are used to having a PN in each theatre, but nowhere on paper...there are no standard rules or guidelines that say how it (team composition) should be" (Participant 9).

- The findings of this study suggest that task division and supervision regarding the role of theatre technicians are vague: "I don't think there is a scope of practice for us...I don't think at the moment there is anything, black on white, that says, this is what a tech can do... this is what you don't do" (Participant 12).
- Participants in this study experienced that the training of theatre technicians' left them ill-equipped to link existing patient conditions to intra-operative risk management, although theatre technicians reported doing so: "You (theatre technician) must also admit the patient...you ask the patient a whole lot of questions...you explain the procedure...you tell the patient sign here, sign there...then the patient says the doctor did not explain the procedure...then you explain to the patient...you give a fair amount of health education... but I also bring bed pans sometimes, so there is also nursing involved" (Participant 13).
- Role boundaries and role content through the development of standardised training and expected competencies should be established. Role ambiguity may lead to human errors, especially in the high-risk peri-operative environment.

Reference:

Viszolai, L. (2016). Experiences of operating room staff about the role of theatre technicians in peri-operative nursing. Masters' thesis. Stellenbosch University. [Online]. Available: https://www.google.com/linkurl?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0ahUKewis_LPhmo7ZAhUFSBQKHxq2ApsQFggvMAE&url=http%3A%2F%2Fscholar.sun.ac.za%2Fbitstream%2Fhandle%2F10019.1%2F98815%2Fviszolai_experiences_2016.pdf%3Fsequence%3D2&usq=AOvVaw0SJVirOw_6tUa7bjQuY1v [2018, February 5]

Nurse development induction programme – where are we?

Natalie Zimmelman

This presentation will speak to the progress SASA and interested nurse stakeholders are making towards the recognition, development, progression and retention of skilled nursing staff. Specifically, the presentation will cover:

- The core Objectives and intent behind the various initiatives
- The key stakeholders currently participating
- The efforts and progress with regards pre-qualification content, designations and training
- The way forward in this regard
- The efforts and progress with regards post-qualification development
- The way forward in this regard
- A summary of the strategic plans with regards nurse development
- An invitation for involvement in SASA generally, the nurse sub-committee and the abovementioned initiatives
- Details on the next meetings

ECG interpretation

Ntombiyethu Biyase

- House keeping: make sure that the date and patient details are correct. The ECG must be standardised in order for it to be interpreted correctly
- Always have a systematic approach to help you organise your thoughts and not miss any pathologies that might be overlapping i.e. lead, rate, rhythm and axis
- Greatest chances of survival from ventricular fibrillation result when the interval between the start of VF and the delivery of defibrillation is as brief as possible. Therefore it is of outmost importance to be able to identify these life threatening shockable rhythms on the rhythm strip
- Patients that develop AF acutely in hospital must be flagged and actively investigated and treat the cause where possible. Restoration of sinus rhythm with regular rhythm improves haemodynamics and exercise tolerance
- 12 lead ECG should be done routinely as part of preoperative workup for patients ASA 3 and more coming for intermediate and major surgery in the adult population (NICE2015) and it is valid for up to six months unless the patient's condition changes (SASA Guidelines 2013)
- There is no evidence that support the use of magnesium routinely during cardiac arrest unless it is a torsades de pointes or polymorphic VT associated with long QT
- Always correlate the ECG findings with the clinical presentation of the patient before any intervention

Safe recovery room practice

Philip Anderson

- Cases can range from uncomplicated to life threatening
- Some post operative deaths are preventable
- Recovery rooms have been part of core standards of anaesthesia since 1949
- Recovery room nurses have particular skills and are involved in a demanding role
- Standards exist regarding the setup and running of a recovery room, these should be adhered to in South Africa
- Comprehensive handover should occur between anaesthetic staff and nursing staff to ensure safe continuation of care
- Patients should not be discharged from the recovery room until they are awake and oriented, cardiovascularly stable and have an acceptable level of analgesia and anti-emesis

References:

UK National Core Competencies for Post-anaesthesia Care 2013 (AAGBI publications)
<https://www.aagbi.org/sites/default/files/Immediate%20Post-anaesthesia%20recovery%202013%20supplement.pdf>

Improving nurse leadership in theatre

Raymond Visagie

Ensuring and improving on the following attributes will enable improvement of leadership in theatre (Operating Room):

- Modelling
- Mentoring
- Teaching

- Initiative and Decision Making
 - Maintaining Routines
 - Providing Supervision
 - Character
 - Integrity
 - Vision
 - Being the Example
 - Inspiring Trust
- (Cogn Tech Work (2015)
17:451-460 / Springer)
- (Quotes as per the Video)

Conflict management in theatre

Ruben Naidoo

- In many instances, the most challenging part of our job is not the work, but rather interacting and dealing with the very many personalities and emotions encountered in a day. (1)
- Within the operating theatre, incorrect, inadequate or poorly communicated information is often the source of conflict. Poor communication can compromise patient safety. (2)
- Personality traits commonly found among highly educated and skilled professionals such as surgeons, anesthesiologists, and nurses make it more difficult for theatre staff to acknowledge others' expertise and to share control. (2)
- Conflicts of interest are a special category in which research, financial, or other incentives compete with the primary obligation for patient care. (2)
- Effective and timeous conflict management can prevent decay in professional relationships, and enhance teamwork towards good patient outcomes. (2)
- Five activities are commonly employed in conflict resolution: avoidance (or inaction), yielding (or accommodation), collaboration (or integration), compromise, and competition (or contention). (2)
- Institutional policy and strategy endorsement is pivotal in ensuring successful conflict resolution. (2)

- Individual commitment to understand and resolve conflict, while considering factual, emotional and personal aspects can ensure successful outcomes. (2)
- Approach the situation directly, avoiding a public display, before one considers escalating to superiors. This is possible by choosing words carefully and trying to use a common goal to negotiate. Maintain mutual respect. Allow time to self reflect and seek feedback and advise. (1)

References:

1. Mallidi J. How to Handle Conflict With Poise? A Fellow's Perspective. J Am Coll Cardiol [Internet]. 2015;65(1):98-100. Available from: <http://dx.doi.org/10.1016/j.jacc.2014.11.012>
2. Katz JD. Conflict and its resolution in the operating room. J Clin Anesth. 2007;19(2):152-8.

Journal of Clinical Anesthesia (2007) 19, 152–158



Special article

Conflict and its resolution in the operating room

Jonathan D. Katz MD (Clinical Professor)*

Department of Anesthesiology, Yale University School of Medicine, New Haven, CT 06511, USA

Received 7 December 2005; revised 12 July 2006; accepted 25 July 2006

Journal of
Clinical
Anesthesia

WHO Surgical Safety Checklist

Sudha Bechan

1. The WHO Safe Surgery Saves Lives initiative was established to address the *important safety issues*, including inadequate **anaesthetic safety** practices, avoidable **surgical infection** and **poor communication** among team members to reduce the number of surgical deaths across the world.
2. The aim of WHO Surgical Safety Checklist is to reinforce accepted safety practices and foster better communication and teamwork between clinical disciplines.

3. The WHO Surgical Safety Checklist is intended as a tool for use by clinicians interested in improving the safety of their operations and reducing unnecessary surgical deaths and complications
4. The Checklist is divided into three phases:
 - before anaesthesia (SIGN IN)
 - before skin incision (TIME OUT)
 - after wound closure (SIGN OUT)
5. The checklist maybe conducted by any member of the surgical team ie nurse, surgeon or anaesthetist; practically the

circulating nurse maybe in the best position to co-ordinate this.

6 A designated checklist co-ordinator confirms the following:

7. In the first phase: the period before anaesthesia.

- Patient's identity, the type of procedure planned and if consent have been taken/signed.
- Site has been marked
- Pulse oximeter is on patient and functioning
- Does patient have any known allergy?
- Is there a risk of difficult airway/aspiration?
- Is there a risk of > 500ml of blood loss?

8. In the second phase - the period after anaesthesia and before skin incision

- All team members introduce themselves by name and role.
- Surgeon, anaesthetist and nurse verbally confirms patient, site on operation, and procedure.

- Anticipated critical events are reviewed by
 - Surgeon: critical and/or unexpected steps, operative duration, anticipated blood loss
 - Anaesthetist: Patient specific concerns
 - Nurse: Sterility, equipment issues.
- Has antibiotic prophylaxis been given within the last 60 minutes?
- Is essential imaging displayed, if applicable?

9. In the third phase - occurs during or immediately after wound closure, the nurse verbally confirms with the team

- The procedure that was done on the patient.
- The needles, instrument and swab count is correct.
- If there was a specimen, is it labeled correctly.
- Whether there were any equipment issues.

10. Modifications may be made to the WHO Surgical Safety Checklist to suit the specifics of a theatre environment and make it applicable to the needs of a particular situation.

A survey of the knowledge of basic life support, and attitude towards, and the perceptions of, cardiopulmonary resuscitation among theatre nursing personnel at the Tygerberg Academic Hospital

Thoriso Mashego, Latifa Firfiray and Simone Piovesan

Background: Comprehensive knowledge of basic life support (BLS) is an essential skill set that all healthcare providers must have to save lives.¹ The American Heart Association (AHA) recommends the recertification of BLS every two years to prevent the degradation of skills and improve patient outcome.¹ Nurses make up a significant proportion of the resuscitation team in theatre and their contribution to the resuscitation team is significant.²

Objective: The purpose of this study was to assess the knowledge of BLS, and the attitude and perceptions of cardiopulmonary resuscitation (CPR) among theatre nursing personnel at the Tygerberg Academic Hospital.

Methods: A descriptive study using a survey for data collection utilising an anonymous 21-question questionnaire was distributed amongst theatre nursing personnel at Tygerberg Academic Hospital, from 30 January 2017 to 01 February 2017, to sample their theoretical knowledge of BLS, and their attitude towards, and the perceptions of CPR.

Results: There were 98 respondents out of 164 theatre nurses (60% of theatre nursing population). The mean average scores

of the basic life support mark achieved was 4 out of 8, which is less than the 80% pass mark required by the AHA to grant BLS certification for the written examination portion. The average mark was 56.12%

Conclusion: The study demonstrates that nurses are deficient in BLS knowledge and have a poor perception towards BLS and CPR. The study shows the need for BLS training and CPR refresher courses. Nurses can be trained to perform the duties of first responders and can be expected to operate an AED. The perceptions demonstrated in the survey are not in keeping with the international standards and should be addressed to increase the confidence of nursing personnel with regard to resuscitation practices.

References:

1. Field J, Hazinski M, Sayre M, Chameides L, Schexnayder S, Hemphill R, et al. Part 1: Executive summary: 2010 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. *Circ J Am Hear Assoc* [Internet]. 2010 Nov 2 [cited 2014 Oct 20];122(3):S640-S656. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/20956217>
2. Marsch SCU, Müller C, Marquardt K, Conrad G, Tschan F, Hunziker PR. Human factors affect the quality of cardiopulmonary resuscitation in simulated cardiac arrests. *Resuscitation* [Internet]. 2004 Jan [cited 2015 Jan 1];60(1):51-6. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/14987784>

