SIVA

The Society for Intravenous Anaesthesia

ABSTRACT BOOKLET

28TH & 29TH NOVEMBER 2024

CUTLERS HALL, SHEFFIELD

WELCOME TO THE ABSTRACT BOOKLET FOR THE SIVA 2024 ANNUAL SCIENTIFIC MEETING IN LEEDS AT THE QUEENS HOTEL

NAVIGATION

You can also use 'bookmark' feature to navigate between the contents

SIVA

10 CPD points awarded

PROGRAMME DAY 1

Thursday 28th November 2024
Cutlers Hall, Sheffield

TIME	EVENT	SPEAKERS
09:30-10:30	Registration for Workshops	
10:30-12:30	WORKSHOPS	
	An Introduction to pEEG *Banqueting Suite (First Floor)*	Susan Williams Andrew Ling
	Advanced pEEG *Drawing Room (First Floor)*	Mark Barley Tom Blanks
	Eleveld Model *Eleveld 1: Osborne Room (Second Floor)* *Eleveld 2: Goodwin Room (Second Floor)*	Anthony Absalom Hugo Vereecke Rohit Juneja Myles Dowling
	Paediatric TIVA *Reception Room (First Floor)*	Alistair Baxter Liz Allison Peter Brooks
	TIVA for the FRCA *Muniment Room (Ground Floor)*	Thomas Mount Todd Leckie
12:30-13:25	Lunch, Cont'd Registration for the Main Meeting and Trade	
13:25-13:30	Welcome from President of SIVA	Rohit Juneja
13:30-15:00	SESSION 1: HOW I DO IT?	Chair: Liz Allison
13:30-13:55	Smooth Extubation (ENT/neuro)	Matt Wiles
13:55-14:30	Total Intravenous Anaesthesia in Pre-Hospital Emergency Medicine: Current Strategies, Challenges, and the Future of pEEG	Jake Turner Adam Low
14:30-14:45	Spontaneous Ventilation for Airways/FBs in Children	Sophie Liu
14:45-15:00	Discussion	
15:00-15:45	Refreshments, Posters and Trade Exhibition	
15:45-17:15	SESSION 2: SCIENCE	Chair: John Sear
15:45-16:10	Moving on from MAC	Mark Barley
16:10-16:35	Cardiac Arrest During TIVA Induction: Lessons from NAP7	Jasmeet Soar
16:35-17:00	John Sear Lecture: Female Sex, Propofol Pharmacology, and Awareness	Kate Leslie (Remote)
17:00-17:15	Discussion	
17:15-18:00	AGM of SIVA (SIVA Members Welcome)	
18:00-19:00	President's Drink Reception	
19:30	Reception and Conference Dinner	

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10 CPD points awarded

PROGRAMME DAY 2

Friday 29th November 2024
Cutlers Hall, Sheffield

TIME	EVENT	SPEAKERS
08:30-09:15	Registration, Refreshments and Trade Exhibition	
09:15-10:45	SESSION 3: TIVA IN AUSTERE ENVIRONMENTS	Chair: Susan Williams
09:15-09:40	Anaesthesia in Space	Sindujen Sriharan
09:40-10:05	TIVA in a Hyperbaric Chamber	Craig Holdstock
10:05-10:25	Antarctic TIVA	Katharine Ganly
10:25-10:45	Discussion	
10:45-11:30	Refreshments, Posters and Trade	
11:30-13:00	SESSION 4: INFOGRAPHICS AND WELLBEING?	Chair: PNT Laloe
11:30-11:55	Infographics Competition	Asantha Jayaweera Morgan Back
11:55-12:45	Motivation: "Finding joy in what we do"	Simon Edgar (remote)
12:45-13:00	Discussion	
13:00-14:00	Lunch, Posters and Trade Exhibition	
14:00-15:15	SESSION 5: NEW AND EVOLVING CONCEPTS	Chair: President-elect
14:00-14:20	Sedation for Interhospital Transfer of the Paralysed Patient - Time for TCI?	Nicholas Plummer
14:20-14:40	Remimazolam	Rob Sneyd
14:40-15:00	Rapid, Near Patient Blood Propofol Measurement	Tim Craft Mark O'Connell
15:00-15:15	Discussion	
15:15-15:30	Closing Remarks from President of SIVA	

Dr Matt Wiles, Sheffield Teaching Hospitals NHS Foundation Trust

Smooth tracheal extubation: tips, tricks and trials…
Thursday 28th November 13:30-13:55

Biography

Matt Wiles completed anaesthetic training in Nottingham in conjunction with a research post as a Clinical Lecturer at the University of Nottingham, before taking a consultant post at Sheffield Teaching Hospitals NHS Trust. His clinical commitments primarily involve sessions in neuroanaesthesia (with a particular interest in traumatic brain and spinal cord injury), critical care and major trauma. He is Trust Clinical Lead for the Major Trauma service. He is also the Editor-in-Chief of the journal Anaesthesia (top-rated in the field of anesthesiology) and is an active researcher, regularly publishing in peer-reviewed journals. He has also authored two major anaesthetic textbooks.

Smooth tracheal extubation: tips, tricks and trials…

Dr Matt Wiles
Sheffield Teaching Hospitals NHS Foundation Trust

Summary

- Review why smooth extubation is a requirement in anaesthesia
- Review the published evidence for smooth extubation relating to: remifentanil; lidocaine (including intra-cuff); and dexmedetomidine
- Suggest a practical approach for smooth extubation

Dr Jake Turner, Nottingham University Hospitals NHS Trust

TIVA in PHEM: Current Strategies, Challenges, and the Future of pEEG
Thursday 28th November 13:55-14:30

Biography

Jake is an Anaesthetic, Major Trauma and Pre-Hospital Emergency Medicine (PHEM) Consultant working at Queen's Medical Centre Nottingham, Derbyshire, Leicestershire & Rutland Air Ambulance and West Midlands Ambulance Service MERIT.

Jake has a clinical interest in major trauma resuscitation anaesthesia and pre-hospital critical care.

TIVA in PHEM: Current Strategies, Challenges, and Future of pEEG

Dr Jake Turner
Nottingham University Hospitals NHS Trust

Lecture Summary
For patients with a traumatic brain injury or who have a pre-hospital emergency anaesthetic, pEEG has the potential to improve the quality of clinical care provided. pEEG driven differentiation between focal neurosurgical and global brain injury may facilitate a more streamlined assessment of pathology, timely conveyance to neurosurgical theatres, and delivery of targeted neurocritical care at the point of injury. pEEG monitor integration and calibration will be challenging in the pre-hospital field, with a variety of mechanical and electromagnetic sources of interference. Close collaboration between pEEG manufacturers and pre-hospital specialists in development of this pre-hospital monitor is key.

Dr Adam Low, Queen Elizabeth Hospital Birmingham

TIVA in PHEM: Current Strategies, Challenges, and the Future of pEEG
Thursday 28th November 13:55-14:30

Biography

I am a Consultant Anaesthetist at University Hospitals Birmingham Queen Elizabeth Hospital, sub-specialising in Neuroanaesthesia. I am the CSL for Pre assessment and Perioperative Care. I also enjoy Pre Hospital Emergency Medicine, working for both Midlands Air Ambulance Charity, and West Midlands Ambulance Service MERIT.

TIVA in PHEM: Current Strategies, Challenges, and Future of pEEG

Dr Adam Low
Queen Elizabeth Hospital Birmingham

Lecture Summary
The last decade has seen the evolution of Pre-Hospital Emergency Medicine, underpinned by a national training programme (with GMC sub-specialty accreditation), with Enhanced Care Teams providing critical care interventions from the scene of illness / injury to admission to acute hospital trusts. This lecture explores the development of regional standardised practice surrounding the sentinel intervention or Pre-Hospital Emergency Anaesthesia, and maintenance of adequate sedation / anaesthesia up to hospital admission. This lays the foundation to explore some of the potential research questions that could be posed with regards to pEEG as an additional monitoring modality that may enhance the level and quality of care that is available to critically ill patients from scene to the emergency department and beyond.

Dr Sophie Liu, Sheffield Children's Hospital

Spontaneous Ventilation for Airways/FBs in Children
Thursday 28th November 14:30-14:45

Biography

Dr Sophie Liu is a consultant paediatric anaesthetist at Sheffield Children's Hospital. She completed her anaesthetic training in Manchester and London after graduating from the University of Newcastle upon Tyne. She completed a paediatric anaesthetic fellowship at Queen Mary Hospital, Hong Kong and researched intranasal dexmedetomidine sedation during her time as an assistant professor at Hong Kong University.

Throughout her time as a consultant paediatric anaesthetist at the Royal London Hospital, she primarily utilised TIVA in her practice, particularly in scoliosis and airway surgery. She now works at Sheffield Children's Hospital, which is a paediatric, TIVA focussed department. Sophie also has a keen interest in managing patients with additional needs and burns anaesthesia.

How do I do it? Spontaneous Ventilation for Airways/Foreign Bodies in Children

Dr Sophie Liu
Sheffield Children's Hospital

This lecture explores TIVA techniques for spontaneous ventilation in paediatric patients. The session highlights clinical scenarios where TIVA for spontaneous ventilation is advantageous, outlining both benefits and potential challenges. Discussions will cover optimal drug choices, including pharmacokinetic models specific to paediatrics, with a focus on safe and effective dosing strategies. Practical insights and expert tips will be shared to facilitate smooth implementation and enhance patient outcomes, providing attendees with actionable knowledge to optimise their practice in paediatric anaesthesia.

Dr Mark Barley, Nottingham University Hospitals NHS Trust

Moving on from MAC
Thursday 28th November 15:45-16:10

Biography

Mark is a Consultant Anaesthetist at Nottingham University Hospitals NHS Trust where he is both the equipment and airway leads. His clinical interests are anaesthesia for major head and neck surgery, upper GI and emergency surgery. As the Honorary Secretary of SIVA (the Society For Intravenous Anaesthesia) he is duty bound to be a TIVA DIVA. He's a keen advocate of processed EEG for all patients receiving general anaesthesia and has delivered lectures and workshops regarding pEEG at both national and international conferences. When not lugging multiple pEEG, nociceptive and neuromuscular monitors around Nottinghamshire he's trying to out-run and out-cycle middle age to maintain his brain health.

Moving on from MAC

Dr Mark Barley
Nottingham University Hospital NHS Trust

Despite being a pretty common event movement during anaesthesia causes great excitement to the non-anaesthetists in theatre with cries of "the patient is waking up!". Such events are even more common with anaesthesia maintained by propofol.

But what (if anything) do these movements mean? Do they originate from the brain or body and how can we reassure our theatre colleagues that our patients aren't "waking up" (not that they were ever "asleep").

Taking a meander through the fascinating archives of anaesthetic research this talk will explore the origins and relevance of movements under anaesthesia, consider the relevance of MAC as a measure of anaesthetic potency and look to what's happening in the target organ of anaesthesia.

And if nothing else, you'll never look at a chicken or goat the same way again…

References

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2. Antognini JF, Schwartz K. Exaggerated Anesthetic Requirements in the Preferentially Anesthetized Brain. *Anesthesiology* 1993; **79**: 1244–9.
3. Rampil IJ, Laster MJ. No Correlation between Quantitative Electroencephalographic Measurements and Movement Response to Noxious Stimuli during Isoflurane Anesthesia in Rats. *Anesthesiology* 1992; **77**: 920–5.
4. Rampil IJ, Mason P, Singh H. Anesthetic Potency (MAC) Is Independent of Forebrain Structures in the Rat. *ANESTHESIOLOGY* 1993; **78**: 707–12.

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6. Sanders RD, Gaskell A *et al*. Incidence of Connected Consciousness after Tracheal Intubation. *Anesthesiology* 2017; **126**: 214–22.
7. Connected consciousness after tracheal intubation in young adults: an international multicentre cohort study. Lennertz, R *et al, BJA* 2022
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9. Ching S, Cimenser A, Purdon PL, Brown EN, Kopell NJ. Thalamocortical model for a propofol-induced α-rhythm associated with loss of consciousness. *Proceedings of the National Academy of Sciences* 2010; **107**: 22665–70.
10. Supp GG, Siegel M, Hipp JF, Engel AK. Cortical Hypersynchrony Predicts Breakdown of Sensory Processing during Loss of Consciousness. *Curr Biol* 2011; **21**: 1988–9
11. Lichtner G, Auksztulewicz R, Kirilina E, et al. Effects of propofol anesthesia on the processing of noxious stimuli in the spinal cord and the brain. *NeuroImage* 2018; **172**: 642–53
12. Lichtner G, Auksztulewicz R, Velten H, et al. Nociceptive activation in spinal cord and brain persists during deep general anaesthesia. *BJA* 2018; **121**: 291–302

Dr Jasmeet Soar, Southmead Hospital

Cardiac Arrest During TIVA Induction: Lessons from NAP7
Thursday 28th November 16:10-16:35

Biography

Jasmeet Soar is a consultant in Anaesthetics and Intensive Care Medicine at Southmead Hospital, North Bristol NHS Trust. He is the Royal College of Anaesthetists Clinical Lead for NAP7 which studied peri-operative cardiac arrest.

Cardiac Arrest During TIVA Induction: Lessons from NAP7

Dr Jasmeet Soar,
Southmead Hospital

The Royal College of Anaesthetists NAP7 project studied perioperative cardiac arrest.

There were 881 cardiac arrests reported to the project over a one year period in 2021-2022.

Drug choice, dosing or errors were considered to have been a contributing factor in about a third of these cases.

Specifically, TIVA was considered a factor in 49 (5.6%) of cases.

I will discuss these findings and lessons in more detail in my lecture.

The NAP7 report is available at https://www.rcoa.ac.uk/research/research-projects/national-audit-projects-naps/nap7-report and chapter 26 specifically addresses 'Perioperative cardiac arrest and anaesthetic drug choice and dosing' including TIVA cases.

Professor Kate Leslie, Southmead Hospital

John Sear Lecture: Female Sex, Propofol Pharmacology, and Awareness
Thursday 28th November 16:35-17:00

Biography

Professor Kate Leslie is a specialist anaesthetist and head of research in the Department of Anaesthesia and Pain Management, Royal Melbourne Hospital, and professorial fellow at the University of Melbourne and Monash University in Australia. Prof Leslie's research interests include anaesthetic depth monitoring and awareness, major perioperative outcomes, sex/gender equity and building the next generation of research leaders. She was a leader of the B-Aware, ENIGMA 1-2, POISE 1-3, RELIEF, Balanced and PADDI studies, and is a chief investigator of ROCKet, Chewy, LOLIPOP and SNaPP. Kate has published over 250 papers and nine book chapters and been awarded over $22M in grants. She is a former president of the Australian and New Zealand College of Anaesthetists and the Australian Medical Council. She is one of the six editors of Miller's Anesthesia textbook, one of the twelve editors of the British Journal of Anaesthesia and a member of the Anesthesiology editorial board. Prof Leslie was appointed as an Officer in the Order of Australia in 2016.

John Sear Lecture: Female Sex, Propofol Pharmacology, and Awareness

Professor Kate Leslie
Southmead Hospital

It is a great privilege to give a lecture in honour of Professor John Sear who is a giant in the field of intravenous anaesthesia and a father of the SIVA movement.

Propofol dominates anaesthesia like no other drug in history: used for nearly 100% of intravenous inductions worldwide, its use is growing for maintenance of anaesthesia due to innovative technology and concerns about sustainability. The small differences in pharmacokinetics and dynamics of propofol in males and females are easily accommodated by TCI devices.

Awareness is defined as postoperative recall of intraoperative events, and is best measured with direct questioning. There are no large randomised trials comparing volatile- and propofol-based anaesthesia with respect to awareness. There is no consistent signal from observational studies on this issue. TCI toolkits can help avoid awareness during TCI.

Females recover from anaesthesia more rapidly than males. This may be the reason that studies using a variety of methods suggest that awareness is more common in females. A recent systematic review confirmed these findings.

Dr Sindujen Sriharan, Alfred Hospital Melbourne

Anaesthesia in Space
Friday 29th November 09:15-09:40

Biography

Sindu is an anaesthetics registrar from London, UK with a subspecialty interest in extreme physiology and its clinical applications, specifically in the space environment. Having completed a space medicine workshop at ESA in 2011, his interest in this field continued to develop and he went on to complete his MSc in Space Physiology and Health in 2019 and the ESA Space Physician Training Course in 2022. In particular, his interests lie in the management of emergencies in space having published his research on CPR methods in hypogravity. He has also given international talks on different space medicine topics including: preparation of participants for suborbital spaceflight, aerospace medical transfers and CPR in space.

He is currently working in the opposite extreme as a registrar in Diving & Hyperbaric Medicine at the Alfred Hospital in Melbourne, which treats the highest proportion of critical care patients undergoing hyperbaric oxygen therapy in Australia.

Anaesthesia in Space

Dr Sindujen Sriharan
Alfred Hospital, Melbourne

The space industry has witnessed a remarkable growth over the past decade. From the expansion of the suborbital spaceflight sector, regular missions to low-Earth orbit and the renewed enthusiasm for interplanetary travel, possibilities continue to expand. This has been further enhanced by the growth of private space companies like SpaceX and Virgin Galactic who also plan to regularly send fee-paying lay travellers to space. These individuals, however, may lack the rigorous training and medical vetting that government astronauts undergo.

NASA predicts that on a 900-day mission to Mars with a crew of six, there's likely to be at least one medical emergency. As we set our sights on destinations further from Earth, expeditious medical evacuation back to Earth becomes less feasible. This makes it crucial for space crews to become medically self-sufficient - capable of handling emergencies, including performing anaesthesia.

In this lecture, we will explore the unique challenges that occur when planning for an anaesthetic in the space environment. We will discuss the physiological changes that astronauts experience in microgravity and how these impact anaesthesia planning and delivery – be it a regional or a general anaesthetic.

To date, there has never been an anaesthetic conducted in space. But as we prepare for interplanetary travel, robust protocols and plans are essential for ensuring the safety of these space travellers.

Dr Craig Holdstock, Plymouth Hospitals NHS Trust

TIVA in a Hyperbaric Chamber
Friday 29th November 09:40-10:05

Biography

Craig is a Consultant Cardiothoracic Anaesthetist at University Hospitals Plymouth NHS Trust. This involves adult cardiac and thoracic anaesthesia, and adult cardiac intensive care.

Craig has been one of the on call doctors for DDRC Healthcare since 2013. This role includes national and international hyperbaric advice via the British Hyperbaric Association telephone helpline. It also includes assessment and management of acute hyperbaric emergencies locally at DDRC Healthcare. Craig has been instrumental in developing the service at DDRC Healthcare to allow critically unwell patients to be treated with hyperbaric oxygen. He is the lead anaesthetist for DDRC Healthcare.

In his spare time Craig is a keen scuba diver using both open circuit and closed circuit diving equipment, including the use of trimix to allow technical and deeper diving. Craig is a cave diver exploring caves in the UK and abroad with the Cave Diving Group. He also is an active caver exploring caves in the UK and abroad and particularly enjoys taking photographs. Craig volunteers for Devon Cave Rescue Organisation where he is their medial officer and has been involved in several cave rescues.

Total intravenous anaesthesia in a hyperbaric chamber

CM Holdstock
DDRC Healthcare, Plymouth, UK
University Hospitals Plymouth NHS Trust, Plymouth, UK

Hyperbaric oxygen therapy is commissioned in the NHS for the treatment of decompression illness (DC) and gas embolism (GE).

Decompression Illness
DCI comprises of two different conditions caused by the rapid decompression of the body. The two different mechanisms are:

- Decompression sickness (DCS) occurs from metabolically inert gas dissolved in the body tissues under pressure precipitating out of solution and forming bubbles during decompression.
- Arterial gas embolism (AGE) occurs from perfusion blockage by gas bubbles in the arterial bloodstream.

Gas Embolism
GE is the entrainment of air (or other exogenously delivered gas) from the environment into the arterial or venous circulation. It is an uncommon but potentially life-threatening complication of many procedural interventions.

Severe DCI and GE may require a patient to be anaesthetised for the hyperbaric treatment.

Critical Care in a Hyperbaric Chamber

Patients requiring critical care in a hyperbaric chamber require personnel and equipment that are able to deliver safe anaesthesia / critical care in this unique environment. This environment is at elevated ambient pressure and includes the use of oxygen at high partial pressures. It is very isolated and requires a high degree of self-sufficiency. It involves a large multi-disciplinary approach including hyperbaric physicians, hyperbaric anaesthetist / intensivist, chamber staff and intensive care. When sedation/anaesthesia is required it must be delivered intravenously due to the logistics of the hyperbaric chamber.

Dr Katharine Ganly, Royal Alexandra Hospital

Antarctic TIVA
Friday 29th November 10:05-10:25

Biography

Katharine (Kat) is an Anaesthetics Registrar in the West of Scotland.

Kat spent 2 years working for the British Antarctic Survey as a doctor on one of the remotest UK overwintering stations.

Kat has an MSc in Global & Remote Healthcare, has completed the Fellowship of the Academy of Wilderness Medicine, and is a Fellow of the Royal Geographical Society.

Kat is currently training for a winter crossing into the Arctic Circle by pulling a tyre through the towpaths of Glasgow's canals.

TIVA in the Antarctic

Dr Katharine Ganly
Royal Alexandria Hospital, Paisley

Summary
Antarctica is the coldest, windiest, and driest continent on Earth. Provision of Anaesthesia in the Antarctic is associated with numerous additional risks and difficulties not encountered elsewhere.
Even in 2024, the Antarctic remains a continent that is largely inaccessible for vast portions of the year. Medical care is provided by a small team, and often by a sole physician. There is a narrow set of equipment and pharmaceuticals, with limited telecommunication connections to the outside world.
The focus of this talk is to provide an educational review of the historical milestones in delivering anaesthesia in the Antarctic, to explore present-day challenges and considerations in the provision of safe Antarctic anaesthesia, and to discuss the benefits and limitations of Total Intravenous Anaesthesia (TIVA) on the world's coolest continent.

References
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2. Russel Pardoe. A ruptured Intracranial aneurysm in Antarctica , The medical Journal of Australia. 1965; 344
3. Vladislav Rogozov, Neil Bermel. Auto-appendectomy om the Antarctic: case report. British Medical Journal. 2009;339:b4965
4. Browne E., Peeters F., Priston M., Marquis P.T. Expired Drugs in the Remote Environment. Wilderness & Environmental Medicine. 2019;30(1):28-34

Dr Simon Edgar, NHS Lothian

Motivation: "Finding joy in what we do"
Friday 29th November 11:55-12:45

Biography

Simon Edgar is a consultant anaesthetist living and working in Edinburgh.

As a Director of Medical Education for NHS Lothian, he has a broad ranging input into high quality clinical education and has academic interests in simulation for learning, systems improvement, and development of faculty, alongside a key focus on the well-being of the healthcare workforce.

He believes passionately in the power of relationships; in the development of individuals to maximally achieve; the strength of effective team working and finding joy in our work.

Dr Nicholas Plummer, Nottingham University Hospitals

Sedation for Interhospital Transfer of the Paralysed Patient - Time for TCI?
Friday 29th November at 14:00-14:20

Biography

Nick is a final year anaesthetics and ICM trainee with special interests in transfer medicine, neuro-ICM, and risk prediction modelling.

Sedation for Interhospital Transfer of the Paralysed Patient - Time for TCI?

Dr Nicholas Plummer
Nottingham University Hospitals NHS Trust

This talk will explore the use of TCI systems (and pEEG) during transfer of the critically unwell adult, focusing on potential benefits over traditional intensive care infusions, especially with regards to neurological emergency transfers. We will examine the evidence, or lack thereof, of challenges to TCI adoption in this cohort, and discuss strategies to overcome any barriers to its use.

Professor Rob Sneyd, Plymouth Hospitals NHS Trust

Remimazolam
Friday 29th November at 14:20-14:40

Biography

Qualifications: MD MA MB BChir FRCA SFHEA DL PhD
Professor Sneyd was brought up in Cornwall and one of his first jobs (1975) was as a Nursing Auxiliary in Devonport Hospital, Plymouth - now long since demolished! He graduated from Cambridge University in 1981 and continued his medical training in London. Halfway through he undertook a research degree and then spent a period working full time in the pharmaceutical industry before returning to work in the NHS.

After completing his UK anaesthetic training, he worked at the University of Michigan Medical School at Ann Arbor, USA. In 1993, he returned to the South West as a Consultant Anaesthetist and after a few years moved to the University as Reader in Anaesthesia and then Professor. In 1998 he took over the running of the Plymouth Postgraduate Medical School, first as Acting Dean and then as Dean. He led the Plymouth team in the successful bid for a new Peninsula Medical School and served as Vice-Dean of the Peninsula College of Medicine and Dentistry. The first medical graduates have been working as NHS doctors since 1st August 2007 and the dental graduates have been doing so since 2011. He worked as a Consultant Anaesthetist at Derriford Hospital, mostly in neuro-anaesthesia and is very familiar with the interface between universities and the NHS. Until retiring in late 2018 he served as Executive Dean of the Faculty of Medicine and Dentistry in Plymouth, leading schools of medicine, dentistry and biomedical science.

In anaesthesia he has engaged nationally through the Association of Anaesthetists of Great Britain and Ireland as Council Member and Vice-President (2006-2011), the Royal College of Anaesthetists, UK as Council Member and Vice-President (2008-2018) and internationally with the European Society of Anaesthesiology, ESA as Council member and Director (2006-2012). For the NHS he has served on the Board of University Hospitals Plymouth (2013-2018), Peninsula Dental Social Enterprise (2013-2018) and Cornwall Partnership NHS Foundation Trust (2017-2019). Also Chair of the Intensive Care National Audit and Research Centre (2019-2020). In each case he has tried to represent the interests of patients and clinicians with an emphasis on sound strategy and common sense.

Professor Sneyd's research interests focus on drugs, pharmacology and pharmacokinetics with related projects based on signal processing. Having worked in the pharmaceutical industry he has a special interest in drug development, especially in intravenous anaesthesia. He led the 2013 UK national sedation review for the Academy of Medical Royal Colleges. He is a regular scientific reviewer, mostly for the British Journal of Anaesthesia but also for Anesthesiology, Anaesthesia and Analgesia, the European Journal of Anaesthesiology and various other journals.

As Emeritus Professor he remains research active and works internationally to support the development of new medicines.

Remimazolam

Professor J Robert Sneyd
University of Plymouth

The advantageous pharmacodynamics and pharmacokinetics of remimazolam(1-3) are well characterised in adults and will not be repeated here.

In comparison with propofol, there is relative freedom from pain on injection and modestly improved hemodynamics.

In my presentation I will briefly summarise the above and mainly focus on possible areas for development.

Possible development areas….Induction agent for the USA? Induction agent for Europe? Routine flumazenil reversal after sedation and GA.? ICU sedation? Allergy? Reformulation? Paeds? Neonates? Dilution? Non-anaesthesiologist use for sedation?

Most recent relevant publications (Some very up-to-date references plus one old one)

Editorial. Etomidate and its derivatives: time to say goodbye? J. Robert Sneyd, Beatrijs I. Valk In Press in BJA , Corrected Proof, Available online 31 October 2024

Also (4-6)

1. Sneyd JR, Gambus PL, Rigby-Jones AE. Current status of perioperative hypnotics, role of benzodiazepines, and the case for remimazolam: a narrative review. British Journal of Anaesthesia. 2021;127(1):41-55.
2. Sneyd JR, Rigby-Jones AE. Remimazolam for anaesthesia or sedation. Current Opinion in Anesthesiology. 2020;33(4):506-11.
3. Sneyd JR. Remimazolam: new beginnings or just a me-too? Anesth Analg. 2012;115(2):217-9.
4. Sneyd JR. Why sedative hypnotics often fail in development. Current Opinion in Anesthesiology. 2024;37(4):391-7.
5. El-Boghdadly K, Desai N, Jones JB, Elghazali S, Ahmad I, Sneyd JR. Sedation for awake tracheal intubation: A systematic review and network meta-analysis. Anaesthesia. 2024.
6. Sneyd JR, Anderson BJ. Remimazolam and Ciprofol: More Research Is Needed but Ask the Right Questions and Perhaps Aim Higher. Anesthesiology. 2024;141(6):1034-8.

Professor Tim Craft, Co-Founder and CEO, Somnus Scientific Limited

Rapid, Near Patient Blood Propofol Measurement
Friday 29th November at 14:40-15:00

Biography

Having been a consultant in anaesthesia and intensive care for over 25 years, Tim left clinical practise to co-found Somnus Scientific Limited. Somnus was established specifically to find solutions for the demand for near patient blood propofol monitoring during TIVA and sedation. Somnus has created the world's first antibody to propofol and is now developing an immunoassay-based blood propofol monitor for us at the bedside.

Rapid, near patient blood propofol measurement

Tim M Craft,[1] and Mark T O'Connell[1]
[1]Somnus Scientific Limited, Bath, UK

Propofol is a low molecular phenol that offers little recognition opportunity for clinical sensors [1]. Somnus has spent 5 years in R&D developing novel sensors that work at clinically relevant concentrations. We have created the world's first commercially exploitable antibody to propofol. ProSed® is an immunoassay-based, rapid, near patient blood propofol monitor capable of providing fully quantitative propofol measurements in a matter of minutes.

The initial use for ProSed® will be to optimise sedation in ICU patients. Over 12 million patients a year are admitted to ICU globally and 40% of them require sedation in order to tolerate the treatments. Propofol is the recommended sedative and is used in over 90% of sedated patients in UK ICUs. Currently, propofol dosing is empirical and rarely personalised to individual patients.

Sedation assessment is based on poorly reproducible, subjective scoring systems and daily sedation holds, both of which cannot be applied in some patients. Over sedation is common and results in increased time being spent on a ventilator, more episodes of pneumonia and delirium, and a higher risk of death [2]. Nurses tend to favour deeper sedation than doctors and find managing sedation stressful. They cite it as a contributor to professional burn out [3].

We report progress in the development of a lateral flow device and early results from the testing and validation of propofol measurement in the blood of patients receiving TIVA (recruited following ethics approval in accordance with IRAS 271939).

ProSed® promises personalised sedation administration by maintaining blood propofol concentration within an acknowledged reference range. Optimisation of sedation will improve outcomes. Blood propofol measurement will be used to influence the need for brain imaging or support prognostication in patients failing to regain consciousness as expected. ProSed® will provide essential assurance for clinicians and families prior to undertaking neurological examination in those being considered for palliation or organ donation.

References

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2. Ely EW, Shintani A, Truman B, et al. Delirium as a Predictor of Mortality in Mechanically Ventilated Patients in the Intensive Care Unit. Journal of the American Medical Association 2004;291(14):1753–1762. https://doi::10.1001/jama.291.14.1753
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Dr Mark O'Connell, Somnus Scientific Limited

Rapid, Near Patient Blood Propofol Measurement
Friday 29th November at 14:40-15:00

Biography

More than 35 years' experience in drug monitoring in patients and clinical research.

Pioneered the technique of clinical microdialysis initially at the Institute of Neurology London, where he obtained his PhD, before moving to the University of Cambridge and Addenbrooke's Hospital.

Won the Business Launch Award at the Cambridge Enterprise Conference, 2003, an international speaker, and author of over 50 scientific and medical papers, and many patents.

Rapid, near patient blood propofol measurement

Tim M Craft,[1] and Mark T O'Connell[1]
[1]Somnus Scientific Limited, Bath, UK

Propofol is a low molecular phenol that offers little recognition opportunity for clinical sensors [1]. Somnus has spent 5 years in R&D developing novel sensors that work at clinically relevant concentrations. We have created the world's first commercially exploitable antibody to propofol. ProSed® is an immunoassay-based, rapid, near patient blood propofol monitor capable of providing fully quantitative propofol measurements in a matter of minutes.

The initial use for ProSed® will be to optimise sedation in ICU patients. Over 12 million patients a year are admitted to ICU globally and 40% of them require sedation in order to tolerate the treatments. Propofol is the recommended sedative and is used in over 90% of sedated patients in UK ICUs. Currently, propofol dosing is empirical and rarely personalised to individual patients.

Sedation assessment is based on poorly reproducible, subjective scoring systems and daily sedation holds, both of which cannot be applied in some patients. Over sedation is common and results in increased time being spent on a ventilator, more episodes of pneumonia and delirium, and a higher risk of death [2]. Nurses tend to favour deeper sedation than doctors and find managing sedation stressful. They cite it as a contributor to professional burn out [3].

We report progress in the development of a lateral flow device and early results from the testing and validation of propofol measurement in the blood of patients receiving TIVA (recruited following ethics approval in accordance with IRAS 271939).

ProSed® promises personalised sedation administration by maintaining blood propofol concentration within an acknowledged reference range. Optimisation of sedation will improve outcomes. Blood propofol measurement will be used to influence the need for brain imaging or support prognostication in patients failing to regain consciousness as expected. ProSed® will provide essential assurance for

clinicians and families prior to undertaking neurological examination in those being considered for palliation or organ donation.

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Poster Presentations

QI Project: Fresh Gas Flow value during Total Intra Venous Anaesthesia (TIVA)

click here to view this poster presentation

Cost-benefit analysis between clonidine and dexmedetomidine in nasal surgery: impact on recovery and discharge home

click here to view this poster presentation

Audit on the practice of total intravenous anaesthesia (TIVA)

click here to view this poster presentation

Pilot survey of TIVA use and errors in the North-West deanery

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Refining a Potential Protocol for RN Led Sedation with TCI Remifentanil and Propofol in Endoscopy

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Peripheral venous extravasation injury management in children: a survey of UK anaesthetic practice

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The effect of alfentanil vs remifentanil TCI on post-surgical pain

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Validation of a laboratory based real-time blood propofol monitor using blood samples obtained during TIVA

click here to view this poster presentation

Possible accidental awareness under total intravenous general anaesthesia in a patient with a history of sleep paralysis - A case report

click here to view this poster presentation

Talking TIVA: a checklist to improve adherence to SIVA guidelines

click here to view this poster presentation

Survey of drug mixtures and TCI in paediatric anaesthesia – out of the limelight but not off the scene?

click here to view this poster presentation

QI Project: Fresh Gas Flow value during Total Intra Venous Anaesthesia (TIVA)

Dr. Amit Kurani[1], Dr. Sunil Israni[1]
Anaesthetic Department, West Hertfordshire Teaching Hospitals, UK 1

Globally, healthcare is responsible for 4-5% of total emissions, with a single surgical operation generating 150-170 kg CO2 equivalent [1]. This project profiles local practice, reviews soda lime usage, and evaluates the evidence for high fresh gas flow (FGF) in with total intravenous anaesthesia (TIVA).

Methods
A survey was completed by all anaesthetists to review FGF values used with TIVA. Soda lime usage was averaged over four weeks in April 2023. In September 2023, data was presented at the clinical governance meeting and an intervention using high FGF (6L/minute) with a target FiO2 of 0.30 was recommended with posters placed on TIVA pumps. Soda lime usage was re-evaluated in October 2023. Data for all general anaesthetic (GA) cases in April and October 2023 was analysed, excluding charts with measured end tidal anaesthetic agent and sole regional technique. The duration of anaesthetic was monitored from the start to stop times documented by theatre staff. Ethical approval for this project was waived by the local R&D division.

Results
The pre-intervention survey demonstrated most anaesthetists (n=15) used a low FGF (3L/minute), while a minority (n=10) used 6L/ minute. In April 2023, there were 273 GA cases, increasing to 385 in October 2023. TIVA usage increased from 22% to 35%. The total GA hours increased from 463 hours to 628 hours. Soda lime usage reduced by 3kg per month post intervention. This led to an estimated annual saving of 113kg of soda lime. This reduced the carbon footprint by 82kg CO2 equivalent and a saving of £283.
The cost of increased fresh gas flow following intervention was considered. The amount of oxygen annually consumed was reduced from 27900L to 18600L resulting in a reduction in 33 kgCO2 equivalent.

Discussion
In 2020, the NHS emitted 6.1 metric tonnes CO2 equivalent of greenhouse gases, with anaesthesia contributing 2%. Zhong et al. [2] explored the impacts of increasing FGF to 6L/minute during TIVA to reduce CO2 absorbent consumption in a test lung and in vivo. This approach is supported by the intercollegiate green theatre checklist and validated at Wythenshawe Hospital, Manchester, estimating annual savings of up to £8000. The carbon footprint to produce soda lime is greater than the cost of medical oxygen and air generation, but a FiO2 of 0.30 should be used to give the best savings. Despite the benefits, there is a lack of consensus on the optimal FGF for TIVA indicating a gap between research findings and clinical practice. Our environmental and cost savings are likely to be increased further once our satellite day surgery hub is included in within future studies.

The project had several limitations including the difficulty in adherence to 6L/minute and FiO2 0.30 when using TIVA. There was an inability to separate soda lime usage between TIVA and non-TIVA cases. This shift towards more sustainable practices aligns with our responsibility to prioritise both financial efficiency and environmental stewardship within the NHS.

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Cost-benefit analysis between clonidine and dexmedetomidine in nasal surgery: impact on recovery and discharge home

A. Garcia-Garay Oscar Rafael, B. Reyes-Pesqueira Luis Armando, C. Eulogio-Reyes Karla Denisse
A.B. Anesthesiology, C. Otolaryngology. Otolaryngology and Ambulatory Surgery Clinic, Hermosillo, Mexico

The use of clonidine and dexmedetomidine in perioperative management for nasal surgery has gained attention due to their potential benefits in recovery enhancement. Both agents have been shown to provide hemodynamic stability and analgesia, yet limited studies directly compare their impact on recovery time and cost-effectiveness. Existing data suggest both may be beneficial, but economic considerations and clinical outcomes remain areas where evidence is sparse. This study aims to address these gaps by comparing the cost-benefit profiles of clonidine and dexmedetomidine, with a focus on recovery time, discharge readiness, and associated costs.

Methods
In this randomised controlled trial, 30 patients undergoing elective endoscopic nasal surgery were assigned to receive either clonidine (n=15) or dexmedetomidine (n=15) as part of their anaesthetic regimen. Ethics approval was obtained and written informed consent was provided by all participants. Key outcomes measured were time to fluid intake resumption, discharge home, and MAP at various intervals. Statistical analysis was performed using the Mann-Whitney U test for continuous variables and the chi-squared test for categorical data, with a significance level set at $p<0.05$.

Results
A total of 30 patients were analysed: clonidine group (n=15) and dexmedetomidine group (n=15). Recovery time was similar between the two groups, with median times of 35 (25-45) minutes for clonidine and 36 (25-45) minutes for dexmedetomidine (p=0.436). Time to resume fluid intake was significantly shorter in the clonidine group, with a median of 95 (87-125) minutes versus 122 (45-165) minutes in the dexmedetomidine group (p=0.011). Discharge times were comparable: 150 (120-253) minutes for clonidine and 145 (120-172) minutes for dexmedetomidine (p=0.624). Economic analysis revealed total costs of $111.18 USD for the clonidine group versus $140.10 USD for the dexmedetomidine group (p=0.0001).

Discussion
This study demonstrates that while clonidine and dexmedetomidine offer similar recovery profiles, the cost implications differ significantly, with clonidine proving more cost-effective. Additionally, the shorter time to resume fluid intake with clonidine may contribute to earlier recovery. Further research is warranted to explore the long-term effects of these findings in larger patient populations.

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Audit on the practice of total intravenous anaesthesia (TIVA)

Dr. Salman Chenath[1], Dr. Sadeep Joshi[1], Dr. Boopathy Dhanasekar[1]
[1]Fairfield General Hospital, Bury, Greater Manchester, BL9 7TD United Kingdom

The Royal College of Anaesthetists (RCOA) emphasize the importance of proficiency in delivering TIVA using TCI [1]. The National Audit Project 5 (NAP5) found improper dosing during TIVA to be a major cause of AAGA, underscoring the need for better TIVA training [2]. In this audit, we compared our TIVA practice to the published standards [1]. After the initial audit and implementation of action plan, we re-audited to identify the improvements achieved.

Methods

In February 2024, we conducted a prospective cross-sectional audit in all 8 theatres. Data were collected via a questionnaire survey and direct observations, analysed against published standards, implemented an action plan, including education on TIVA practice, TIVA workshop, two-person check of drugs, displayed aid memoire, and ODP training. Re-audited our work in July and compared it with the initial data and measured the change in compliance.

Results

Table: Comparison of compliance to standards post-action plan implementation.

Std	Standards	Compliance (%)	
		First audit (Feb 24)	Reaudit (Jul 24)
1.	All anaesthetists should be trained in delivering TIVA	52-71	82
2.	TCI (Target Control Infusion) is recommended	100	100
3.	Starting target concentration depending on patient	100	100
4.	Preferable to stock only one conc. of propofol	74-84	100
5.	Dedicated giving sets recommended	80	100
6.	Programming after the syringe placed onto the pump	86	100
7.	IV cannula to be visible from anaesthetist end	16	20
8.	pEEG is recommended whilst using muscle relaxant	100	100
9.	Stacking up of syringes (propofol top & remifentanil bottom)	88	100
10.	Pumps plugged to power socket	72	100

Discussion

Improvement in compliance were noted after dissemination of the standards and action plan. Visibility of IV cannula is challenging due to varied surgical factors. We are looking into options to improve this aspect and improve training/education in TIVA.

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Pilot survey of TIVA use and errors in the North-West deanery

W. Musselbrook, M. Hulgur, S. Ahmed
Royal Albert Edwards Infirmary, Wigan, UK

The joint guideline for safe use of TIVA was published by the AAGBI and SIVA in 2019 [1], highlighting practical methods of ensuring safe delivery of this method of anaesthesia. Previous surveys have been conducted in various regions identifying aspects of TIVA where errors are most commonly occurring [2,3]. We sought to conduct our own pilot survey to gain a glimpse of preference of practice within our own deanery.

Methods

We designed a simple questionnaire on SurveyMonkey, featuring four distinct questions: grade of anaesthetist, preferred method of anaesthesia, observed errors with TIVA use and frequency of their use of a 'modified TIVA RSI'. This survey was distributed via email to trainees within the North-West deanery. The survey link was also distributed to local consultants.

Results

We received a total of 115 respondents to the survey. There was an even spread of grades in our responses, although noticeably we lacked any SAS doctors. A very slight majority voted that TIVA was their preferred method of anaesthesia. The most common errors seen by respondents were failure of IV cannula (48.7%) and pump battery failure (40%). 67% of respondents started they never or rarely used a 'modified TIVA RSI', whilst 26% stated they frequently used it, or that it was their preferred method of RSI.

Discussion

The only notable trend in preference of anaesthetic technique was the low preference of TIVA in the CT1 cohort, potentially identifying an educational gap in familiarity with TIVA. Utilisiation of materials such as PERUSE and the inclusion of pump 'machine checks' as part of pre-list checklists are suggested to address pump failure. Regular inspection of cannulas and confirmed standards of IV line sited could address the most common error seen. As a significant proportion of those surveyed are using a 'modified TIVA RSI', we suggest it would be prudent to formulate a formal guideline for the safest methodology, as a variety of practices have been described.

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Refining a Potential Protocol for RN Led Sedation with TCI Remifentanil and Propofol in Endoscopy

M.Amyotte, B. Walker and K. Anderson
Foothills Medical Centre, Calgary, Alberta, Canada and Cumming School of Medicine, University of Calgary, Alberta, Canada

There is a subset of endoscopy patients that fail routine nurse administered physician led sedation with midazolam and fentanyl in endoscopy1,2. These have traditionally had their procedure scheduled with anaesthetist administered propofol sedation or general anaesthesia. Anesthesia shortages have led us to explore if we can develop a protocol that could be delivered by endoscopy nurses.

Methods
This was an audit of nurse delivered, with direct assistance of a supervising anaesthetist using plasma TCI remifentanil (Minto) and plasma TCI propofol (Marsh) using a proposed protocol in 20 patients over 2 days. Remifentanil was started at 1.0 ng/ml and propofol at 1.5mcg/ml 2min later. Starting propofol and drug titrations were originally allowed every 2 min for Cp and Ce equilibration and limited to 0.2ng/ml and 0.2mg/ml respectively. Times from start of sedation to scope passed, and discharge from recovery were recorded. As were all maximum administered doses and any interventions for apnea, hypoxia, bradycardia and hypotension and excessive sedation (OASS) recorded.

Results
Average time (Range) sedation start-scope in 12(3-23) minutes. Average time from admission to recovery-discharge 39 (31-60) minutes. Average (range) maximum drug dose was Remifentanil 1.4 (1.0-2.0)ng.ml-1 Propofol 2.5 (1.4-3.3) mcg.ml-1. Main adjustments to protocol were:

1. Using Cp/Ce Not Time: Propofol commenced when Ce remi 0.7 rather than time based, and propofol titration allowed when Ce>=1.0 . Titrations remained time based propofol or remifentanil every 2min.
2. Dose Range: Initial Dose Ranges were Ce remifentanil 1.0-2.0 ng/ml and Ce propofol 1.0-3.0 .ml-1 .1 patient (5%) required dose>3.0 .ml-1. Propofol range changed to Ce 1.0-3.5 g.ml-1
3. Propofol Titration Increments: time from start of protocol-scope in was slow (>20min) in 19% patients. So When Cp was 1.5 .ml-1 and Ce 1.0 .ml-1 the endoscopist and seditionist have to agree if the patient is minimally sedated (OASS 5) then they can be deemed “not sensitive” to propofol and larger titration increments of 0.4mcg/ml used. This speeds sedation onset and time to scope in (average 10min).

Discussion
It seems very useful for anaesthetists to supervise non anaesthetists directly while administering TCI propofol-remifentanil by protocol. This allows rapid adjustment to protocol before finalizing and introducing a service and quality assurance audit. It can be done while training.

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Peripheral venous extravasation injury management in children: a survey of UK anaesthetic practice

R. Biggs, L. Bubb, J McArdle and PATRN Committee
University Hospital Southampton, UK, Alder Hey Children's Hospital, Liverpool, UK, and Great North Children's Hospital, Newcastle-upon-Tyne, UK

Extravasation injuries are one of the most common iatrogenic injuries experienced by patients. Young children and babies are at particularly high risk. Up to 11% of children and 70% of neonates who receive intravenous (IV) therapy will sustain an extravasation injury [1]. This is of particular interest in paediatric anaesthetic practice, where TIVA usage has increased in popularity over the past 10 years, and where IV access may be challenging or difficult to access intra-operatively [2]. Although many hospitals have extravasation injury policies and national guidance has recently been published [3], local guidelines may differ, and clinicians may not be aware of recommendations.

Methods
To ascertain the understanding of extravasation injuries amongst anaesthetists with a paediatric interest, we developed an electronic survey that was disseminated amongst the Association of Paediatric Anaesthetists of Great Britain and Ireland (APAGBI) membership. The survey was open for two months and received 277 responses, of whom 89 identified themselves as consultant paediatric anaesthetist and 84 identified as consultant anaesthetists with a mixed caseload of adults and children, with the remainder mostly identifying as anaesthetists in training, fellows or SAS grades.

Results
With respect to immediate management of an extravasation injury from a peripheral intravenous cannula (PIVC) in an anaesthetised child, 131(47%) of respondents reported they would remove the PIVC after attempting to aspirate it, whilst 114 (41%) would remove the PIVC immediately. 173 (62%) of respondents would elevate the affected limb and 121 (43%) would mark or photograph the lesion. Regarding subsequent interventional procedures for an extravasation injury 148 (53%) would not undertake any themselves but would contact the plastic surgery team, 36 (13%) would use a saline irrigation technique washout and 29 (10%) would use a saline with dilute hyaluronidase irrigation technique to washout. Two hundred and three (73%) anaesthetist who completed the survey were not aware of any grading system for extravasation injuries.

Discussion
Whilst recent national guidance advises that a PIVC should be left in situ until attempts to aspirate it have been made [3], a large proportion of our respondents would remove it immediately. The lack of awareness of any grading system for extravasation injuries may pose challenges when communicating the extent of injury to others. Our results show variations in practice, possibly reflecting inconsistencies in local guidance and a lack of knowledge regarding recommended practice for peripheral extravasation injuries, suggesting that more education and improved guideline publicity is required

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The effect of alfentanil vs remifentanil TCI on post-surgical pain

S. Pathak, D.J. Magee, J. Mathiszig-Lee
Royal Marsden Hospital, London, UK

During the COVID-19 pandemic, a shortage of remifentanil [1] resulted in increased reliance on alfentanil to deliver total intravenous anaesthesia (TIVA) at our institution. The pharmacokinetic profile of alfentanil is considerably different [2]. Anecdotal reports from the Royal Marsden Hospital (RMH) suggested that alfentanil may be associated with lower reported post-operative pain. Consequently, this is something we set out to explore.

Methods

Analysis of patients undergoing general anaesthesia with alfentanil or remifentanil from June – September 2022 at RMH was undertaken, with sub-group analysis of breast surgery patients. Exclusion criteria were incomplete details of operation, intraoperative medication or recovery assessments. Pain was evaluated using recovery pain scores and opioid use. Statistical analysis used Fisher's exact and chi-squared tests to assess differences in proportions, and Mann-Whitney U to compare non-parametric data between the two groups. This evaluation received Trust approval (SE1369).

Results

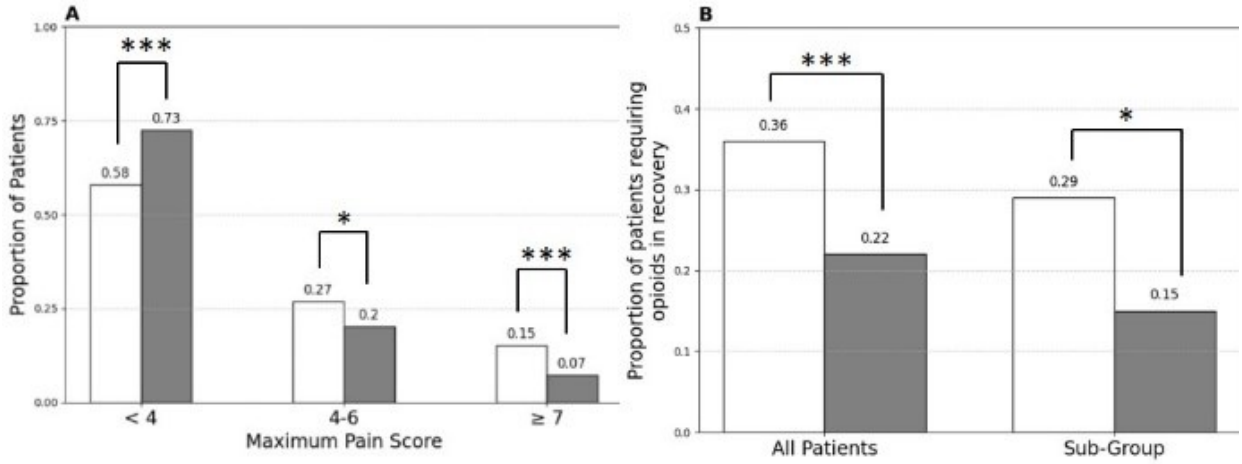

Figure 1: (A) Maximum pain scores on movement in recovery in remifentanil (white) and alfentanil (grey) patients; Fisher's exact. **(B)** Proportion of remifentanil (white) and alfentanil (grey) patients requiring opioids in recovery, amongst all patients and in the sub-group; *Chi-squared. * = P<0.05, ** = P<0.01, *** = P<0.001*

846 adult patients were included, who received either alfentanil (n=606) or remifentanil (n=238) TIVA, with 270 alfentanil and 45 remifentanil patients in the sub-group. Remifentanil patients reported maximum pain scores of moderate - severe intensities more frequently than alfentanil patients (P<0.05) (Fig 1A). A significantly larger proportion of remifentanil patients required opioids in recovery, in both the main group (36.3% vs 22.0%; P<0.001) and sub-group (28.9% vs 15.2%; P=0.041) (Fig 1B). Of those receiving opioids in recovery, the median oral morphine equivalence dose was lower in the alfentanil group but did not reach statistical significance (P=0.057).

Discussion

Alfentanil's longer half-life, potentially extending its analgesic effect into recovery, may account for the improved pain scores and reduced recovery opioid use observed. Limitations of this work include the retrospective nature, lack of propensity-score matching, and small sub-group sample size. Future research could look to undertake a prospective randomised study and potentially use the Quality-of-Recovery-15 Score to assess broader recovery outcomes.

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Validation of a laboratory based real-time blood propofol monitor using blood samples obtained during TIVA

M. Hillier[1], O. Barker[1], J. Condry[1], R. Oram[1], O. Stoten[1], TM. Cook[1], M. OConnell[3] and T. Craft[2]
1 Royal United Hospital, Bath, UK. 2 Somnus Scientific Ltd, Bath, UK

Approximately 24% of UK general anaesthetics are propofol total intravenous anaesthesia (TIVA). Propofol TIVA is usually delivered by target-controlled infusion (TCI), using imprecise pharmacokinetic models [1]. Incidence of Accidental awareness during general anaesthesia (AAGA) during TIVA was twice that of volatile anaesthesia in the 5th National Audit Project [2]. Developing a real-time point-of-care blood propofol monitor would enable monitoring propofol delivery and reduce risk of AAGA. This study assessed the correlation of pharmacokinetic model-derived propofol TCI values to plasma propofol concentrations measured using high performance liquid chromatography (HPLC).

Methods

Blood samples were collected from 10 patients during general anaesthesia with propofol TIVA. Inclusions were ≥18 yrs, anaesthesia >120 mins, not pregnant and able to consent. TCI model and 'effect site' concentrations were recorded, and two samples collected at 0, 30, 90 and 120 minutes of infusion. Samples were transported at <4OC on wet ice, then centrifuged and stored at <-70OC. Serum was defrosted for HPLC analysis [3] and plasma propofol concentrations compared to effect site concentration. Patients were anonymised. Ethical approval was granted before recruitment (IRAS 271939).

Results

Overall, there was a positive bias of 0.6 µg/mL in effect site compared to serum propofol concentration. However, accuracy varied depending on set concentration. Calculated TCI values overestimated serum concentration at low values (□3 µg/mL, bias 0.64; SD 0.52) and underestimated it at high values (>4µg/mL, bias -0.34, SD 1.31). Two patients were outliers, demonstrating even wider deviation.

Discussion

This research supports previous work showing TCI models were accurate within the midrange of typical doses, but increasingly inaccurate at extremes. These data are part of a 30 patient cohort to be used in the development of a point-of-care device to assess plasma propofol concentrations in real-time; which would improve accuracy of propofol delivery, potentially reducing rates of AAGA.

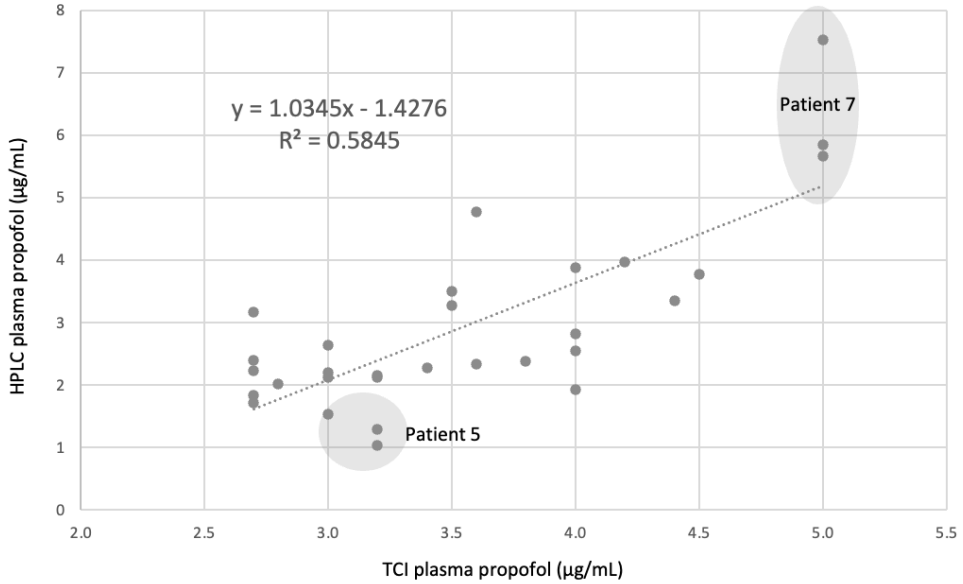

Figure 1: Modelled TCI plasma concentration is underestimated at low values and overestimated at high values when assessed using HPLC.

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Possible accidental awareness under total intravenous general anaesthesia in a patient with a history of sleep paralysis - A case report

H. Ng, N. Cowley
Worcestershire Acute Hospitals NHS Trust

Sleep paralysis is a common phenomenon where individuals are temporarily unable to move or speak while falling asleep or waking up, with studies indicating that 8% to 50% of people experience it at least once in their lifetime. Literature on its nature, pathophysiology, and impact is inconsistent, and it is often associated with narcolepsy. The frequency and severity of episodes can vary greatly; some people experience it infrequently and without significant effects, while others may have more regular occurrences linked to sleep or psychological disorders. There is limited guidance on anaesthetic techniques for managing patients with a history of sleep paralysis. We report a case of possible accidental awareness under total intravenous anaesthesia in a patient with a history of sleep paralysis.

Methods

This case involves a 22 years old female undergoing emergency laparoscopic appendicectomy out of hours. Her background includes anxiety and depression, recently commenced on escitalopram 5mg once daily. She had a history of chronic pain that was managed with regular opioids. Due to poorly controlled knee pain, she also used recreational drugs. Two weeks leading to her operation, she reported using 3.5 grams of cannabis in total. In addition, she smoked occasional tobacco and regular nicotine vape. Over the preceding years, she reported previous heavy usage of ketamine, amphetamine and diazepam, and consumed large amounts of alcohol. Prior to induction, Sedline Masimo processed EEG monitoring was established for depth of anaesthesia monitoring, along with standard non-invasive monitoring. Total intravenous anaesthesia (TIVA) with the Marsh model of propofol target controlled infusion was administered, with morphine and clonidine boluses. She was paralysed with rocuronium and mechanically ventilated during the procedure. Upon emergence, she reported having felt something moving in her abdomen and sensations of being stitched up. She reported trying to move her right hand but unable to, which she associated with her previous experience of sleep paralysis. No physiological changes were noted during surgery with Patient State Index (PSi) consistently under 50 on processed EEG with density spectral array. Postoperatively, she was assessed using the Modified Brice Questionnaire and followed up by consultant anaesthetists the next morning and two weeks later, with no signs of lasting psychological effects. She declined further follow-up.

Discussion

In this case, the anaesthetic team learned about the patient's history of sleep paralysis during the postoperative period. The interaction between sleep paralysis and anaesthetic response remains unclear, which may have complicated perioperative management and increased the risk of AAGA. This case also illustrates the challenges of managing anaesthesia in patients with complex medical, psychological, and substance use histories, particularly in emergency situations. The patient's young age and female gender are noted risk factors for AAGA in the NAP5 report [1]. Although the Marsh model is commonly used for TIVA, it has limitations in patients with altered pharmacokinetics, opioid tolerance, or substance use. The relationship between sleep paralysis and awareness during anaesthesia is an under researched area.

References

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Talking TIVA: a checklist to improve adherence to SIVA guidelines

W. Dace[1] and S. Morgan[1]
1 Royal Glamorgan Hospital, Llantrisant, Wales, UK

The Society for Intravenous Anaesthesia (SIVA) produced a set of recommendations regarding total intravenous anaesthesia (TIVA) practice following the results of the 5th National Audit Project [1]. Following an episode of accidental awareness under general anaesthesia (AAGA) in our department, we designed a quality improvement project to review our adherence with some of the practical recommendations made in these guidelines with the aim of improving departmental TIVA practice and improving patient safety.

Methods
Guided by SIVA quality improvement resources [2], over a two-week period we collected data on the following aspects of cases involving TIVA: pumps being checked and plugged in; documentation of target-controlled infusion (TCI) model used; use of processed EEG (pEEG) at induction; cannula visibility and documentation of regular checks; and fresh gas flows (FGF) used. We presented this data and provided TIVA guideline education at our local audit departmental meeting. The resultant discussion with key stakeholders helped inform our choice of intervention: a TIVA checklist, visible in all anaesthetic rooms and attached to infusion pumps. We disseminated the checklist electronically to all staff before a repeat two-week period of data collection.

Results
Over a two-week period, we identified 20 cases of general anaesthesia using TIVA. Prior to intervention, only 8 (40%) cases performed pump checks prior to commencing induction. 7 (35%) cases documented the TCI model they used. 4 (20%) cases used pEEG from induction. 7 (35%) cases had a visible cannula and 1 (5%) was checked intra-operatively. 12 (60%) cases used a FGF of 4-6L/min. Following departmental education and checklist implementation, 8 (70%) cases completed a pump check prior to induction. 10 (90%) cases documented the TCI model used. 9 (80%) cases used pEEG at induction. 7 (64%) cases had a visible cannula and regularly checked their cannula during the case. All cases used FGF of 4-6L/min.

Discussion
This project demonstrated the variability in compliance with national TIVA guidance in our anaesthetic department. Education on guidelines and introduction of a simple checklist effectively improved adherence to this guidance. Feedback from stakeholders at audit meetings suggested that placing these checklists in the anaesthetic room & on pumps not only served as a visual prompt but also encouraged the wider team, particularly operating department practitioners, to engage in safe TIVA practice. We did not collect data on the incidence of adverse events although there were two case reports of prevention of inadvertent boluses of remifentanil at induction due to two-person checks of the pumps, prompted by the checklist. Through education, data collection and presentation at audit meetings, we normalised discussions about TIVA safety between consultants, trainees and ODPs in our department. “Talking TIVA” and the implementation of our checklist served as a time, resource, and cost-efficient intervention to promote safe & standardised TIVA practice, which may be easily reproduced in other departments.

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Survey of drug mixtures and TCI in paediatric anaesthesia – out of the limelight but not off the scene?

I. Kantsedikas, P. Brooks and L. Allison
Hammersmith Hospital, London, UK, Chelsea and Westminster Hospital, London, UK, and Sheffield Children's Hospital, Sheffield, UK

Using a single target-controlled infusion (TCI) pump for delivery of mixtures of propofol with other drugs in paediatric anaesthesia has been debated recently. Proponents of this technique cite potential to bring the benefits of total intravenous anaesthesia [TIVA] (e.g. reduction in airway reactivity, nausea and vomiting and emergence delirium) to high turnover lists [1]. Opponents point to concerns about titration and safety, referring to evidence from simulation studies [2]. We hypothesised that the practice persists despite these criticisms and sought to explore this to further inform the debate.

Methods
We circulated a 15-question survey hosted on SurveyMonkey (Survey Monkey Inc., San Mateo, CA, USA) to our professional networks. Questions included experience of using mixtures, drugs used, use of TCI with mixtures, self-reported frequency of adverse events when using mixtures, as well as respondents' grade and clinical setting. We did a descriptive analysis of the responses.

Results
We received 210 responses of which 184 (88%) indicated experience of using mixtures. The median experience of using mixtures was 6 years (interquartile range: 3-10 years) with 174 (83%) of respondents using TCI with mixtures. Most (153 [88%]) respondents were consultants (with 112 (64%) specialist paediatric anaesthetists). Remifentanil was most used with TCI mixtures (165/174 (95%) responses) and Paedfusor was the most used pharmacokinetic model (151/171 (88%) responses). Table 1 summarises reports of adverse events from 171 (81%) users of mixtures with TCI technology.

Adverse event type	Self-reported frequency of adverse events				
	Never	Very rarely	Rarely	Occasionally	Often
Airway	81 (50%)	76 (45%)	10 (6%)	4 (2%)	0 (0%)
Respiratory	103 (61%)	50 (29%)	11 (6%)	7 (4%)	1 (0.5%)
Circulation	60 (36%)	80 (47%)	18 (11%)	11 (7%)	0 (0%)

Table 1: self-reported frequency of adverse events when using TCI to deliver drug mixtures, values are numbers of respondents selecting the option and percentage of total responses to this section (n/171).

Discussion
Our survey suggests ongoing use of TCI technology to deliver drug mixtures in paediatric TIVA. We cannot make definitive statements about the safety of this practice due to the limitations in methodology of this survey, however reports of adverse events appear less common than simulation studies might suggest. We therefore propose that with a detailed understanding of paediatric pharmacology and physiology, and appropriate experience in clinical practise, this technique may be used without exposing patients to undue risk.

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