Anaesthesia and Intensive Care

Anaesthesia and Intensive Care
2020, Vol. 48(1S) 1–48

DOI: 10.1177/0310057X20967615
journals.sagepub.com/home/aic
SAGE

Australian Society of Anaesthetists 78th National Scientific Congress, 20–24 September 2019, International Convention Centre, Sydney, Australia

Abstracts are published as supplied excluding those for which necessary ethics approval and/or clinical trial registration information was not provided. Abstracts have not otherwise been subject to editorial review or correction.

2

Post-Operative Pain and Comfort Scores: Do they Correlate?

Michelle Miu[1], Andrew Martin[1] and Allan Cyna[1,2]
[1]Nepean Hospital, Kingswood, Australia
[2]Women's and Children's Hospital Adelaide

Introduction: Pain is defined as 'an unpleasant sensory and emotional experience associated with actual or potential tissue damage'. Research on the nocebo effect suggests that the assessment of 'pain' may negatively influence how sensations are perceived by patients. Associating patients with 'comfort' rather than 'pain' may be a potentially useful approach for assessing pain post-operatively whilst recovery is occurring.

Aims: We aimed to determine how comfort correlates with pain in the same patient post-operatively.

Methods: Patients were questioned post-operatively before routine post-anaesthesia rounds to rate their pain and then comfort levels, or asked the same questions in reverse sequence. Responses about pain and comfort

Table 1 Interview Questions of comfort and pain asked to all participants

Pain questions	Comfort questions
You have had a recent surgery and I am very interested in your pain from the surgical trauma. So, is it OK if I ask you some questions about your pain?	You have had a recent surgery and your wound is healing and you're in the process of recovery. Is it OK if I ask you some questions about your level of comfort?
Do you have any pain?	Are you comfortable?
VNRS for pain where 0=no pain; **10**=worst pain imaginable	VNRS for comfort where 0=no comfort; 10=most comfortable
At rest	At rest
On movement	On movement
VAS for pain where 0=no pain; **10** = worst pain imaginable	VAS for comfort where 0=no comfort; 10= most comfortable
At Rest	At Rest
On movement	On movement
Does the pain bother you?	Does the healing wound bother you?
How much is the healing wound bothering you, where zero is no bother at all and 10 is the most bothersome you can imagine?	How much is the healing wound bothering you, where zero is no bother at all and 10 is the most bothersome you can imagine?
Would you like any additional medication for pain relief?	Would you like any additional medication to get you more comfortable?
Would you say that you are comfortable?	Would you still say that you are in pain?
VNRS for comfort score	VNRS for pain score
VAS for comfort score	VAS for pain score
All Patients were asked;	
Do you think that the sensation that you have had after your operation to be unpleasant or not particularly unpleasant?	

were rated on a 0–10 point verbal numerical rating scale (VNRS) where '0' means no pain/comfort and '10' the worst pain/most comfort imaginable and also rated on a 10cm visual analogue scale (VAS). Patients were asked whether the surgical wound was bothersome, unpleasant and whether additional analgesia was required.

Results: We included 100 patients. A moderate positive correlation of 0.62 was found between pain scores and inverted comfort scores (95% CI 0.47–0.72, $p < 0.0001$). The question sequence did not affect pain or comfort scores. There was a higher proportion of patients with high pain and inverted comfort scores (VRNS 8–10) who requested more analgesia and found the wound bothersome and unpleasant.

Conclusions: There is a moderate positive correlation between pain scores and inverted comfort scores. Therefore comfort scores may be a suitable alternative when assessing post-operative discomfort and analgesia requirements.

Ethics Approval: Ethics approval was obtained from the local Human Research Ethics Committee (HREC) approval (LNR/17/Nepean/153).

3

Impact of critical care Point-of-Care Ultrasound (CC-POCUS) short courses on trainee competence

Arvind Rajamani[1], Michelle Miu[1], Stephen Huang[1], Henry Elbourne-Binns[1], Florian Pracher[2], Sutrisno Gunawan[3], Ramanathan Lakshmana[4], Gordon Flyhn[5], Kandasamy Sasiaran[6], Shyama Subasinghe[7], Jinal Parmar[1] and Trieu Hyunh[8]

[1]Nepean Hospital, Kingswood, Australia
[2]Royal Darwin Hospital, Darwin, Australia
[3]Townsville Hospital, Townsville, Australia
[4]Liverpool Hospital, Liverpool, Australia
[5]Prince of Wales Hospital, Randwick, Australia
[6]Dr Mehta's Hospital, Chennai, India
[7]Sri Jayewardenepura General Hospital, Sri Jayawardenepura Kotte, Sri Lanka
[8]Hospital for Tropical Diseases, Ho Chi Minh City, Vietnam

Introduction: Competence in critical care point of care ultrasound (PoCUS) is recommended/mandated by several critical care specialties. Although doctors commonly attend PoCUS short courses for introductory training, there is little follow-up data on whether they eventually attain PoCUS-competence.

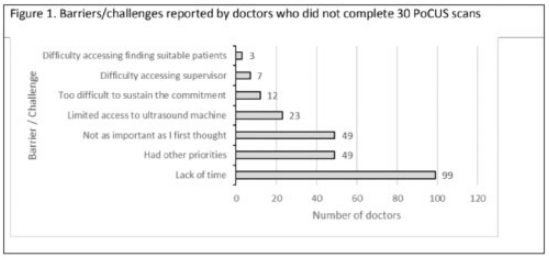
Aims: This study aimed to determine the impact of short-term PoCUS courses on PoCUS competence.

Methods: Doctors from Asia-Pacific countries who attended a PoCUS short-course between December 2015 – February 2018 were invited to complete a survey questionnaire >6 months following the course. They were asked if they had performed >30 structured PoCUS scans and/or reached PoCUS-competence and the reasons/challenges/barriers, and if they used PoCUS as a clinical diagnostic aid. Each email also contained an invitation to join a PoCUS-mentorship program to become competent.

Results: The response rate was 74.9% (182/243). Among the 182 respondents, only 12 (6.6%) had attained competence in their chosen PoCUS modality, attributing their success to self-motivation and time-management. For the remaining doctors who did not attain competence (170/182, 93.4%), the common reasons were lack of time, change of priorities, and less commonly, difficulties in accessing an ultrasound machine/supervisor. Common suggestions to improve short courses included scanning practice on acutely ill ICU patients and prior information on the challenges regarding PoCUS competence. Suggestions to improve competence pathways included regular supervision and protected learning time. All 12 credentialed doctors regularly used PoCUS as a clinical diagnostic aid. Of the 170 non-credentialed doctors, 123 (72.4%) reported performing unsupervised PoCUS for clinical management, either sporadically (42/170, 24.7%) or regularly (81/170, 47.7%).

Conclusions: Very few doctors attending PoCUS short-courses attained competence at 6 months, primarily due to lack of motivation and supervision. Unsupervised PoCUS use by non-competent doctors is common. Further research into effective strategies to improve PoCUS competence is required.

Ethics Approval: Ethics approval was obtained from the local Human Research Ethics Committee (HREC) approval (LNR/14/NEPEAN/36).



4

Effects on postoperative nausea and vomiting of nefopam versus fentanyl following bimaxillary orthognathic surgery: a prospective double-blind randomized controlled trial

Seung-hwa Ryoo[1], Myong-hwan Karm[1], Eunhye Choi[2], Eunsun So[3], Yoon Ji Choi[4], Yul Oh[5], Hye Joo Yun[1], Hyun Jeong Kim[2] and Kwang-Suk Seo[2]

[1]Seoul National University Dental Hospital, South Korea
[2]School of Dentistry, Seoul National University, South Korea
[3]School of Dentistry, Dankook University, Cheonan, South Korea
[4]Korea University Ansan Hospital, Ansan, South Korea
[5]Asan Medical Center, South Korea

Introduction: Postoperative nausea and vomiting (PONV) frequently occurs following bimaxillary orthognathic surgeries. Compared to opioids, Nefopam is associated with lower incidences of PONV, and does not induce gastrointestinal tract injury, coagulopathy, nephrotoxicity, or fracture healing dysfunction, which are common side effects of nonsteroidal anti-inflammatory drugs

Aims: We compared nefopam- and fentanyl-induced incidence of PONV in patients with access to patient-controlled analgesia (PCA) following bimaxillary orthognathic surgeries.

Methods: Patients undergoing bimaxillary orthognathic surgeries were randomly divided into nefopam and fentanyl groups. Nefopam 120 mg or fentanyl 700 μg was mixed with normal saline to a final volume of 120 mL. Patients were given access to nefopam or fentanyl via PCA. Postoperative pain intensity and PONV were measured at 30 minutes and 1 hour after surgery in the recovery room and at 8, 24, 48, and 72 hours after surgery in the ward. Frequency of bolus delivery was compared at each time point.

Results: Eighty-nine patients were enrolled in this study, with 48 in the nefopam (N) group and 41 in the fentanyl (F) group. PONV occurred in 13 patients (27.7%) in the N group and 7 patients (17.1%) in the F group at 8 hours post-surgery ($P = 0.568$), and there were no significant differences between the two groups at any of the time points. VAS scores were 4.4 ± 2.0 and 3.7 ± 1.9 in the N and F groups, respectively, at 8 hours after surgery ($P = 0.122$), and cumulative bolus delivery was 10.7 ± 13.7 and 8.6 ± 8.5, respectively ($P = 0.408$). There were no significant differences in pain or bolus delivery at any of the remaining time points.

Conclusions: Patients who underwent bimaxillary orthognathic surgery and were given nefopam via PCA did not experience a lower rate of PONV compared to those that received fentanyl via PCA. Furthermore, nefopam and fentanyl did not provide significantly different postoperative pain control.

Ethics Approval: Permission to conduct this study was granted by the institutional review board of Seoul National University Dental Hospital (approval number, CME15001). Written informed consent was obtained from all participants. All aspects of participant privacy and confidentiality were preserved. The investigation was registered with the Clinical Research Information Service (https://cris.nih.go.kr/KCT0001592) and performed according to the guidelines for the proper conduct of medical research on human participants.

Table 1 Incidence of postoperative nausea and vomiting at different time.

	Nefopam group (n = 48)	Fentanyl group (n = 41)	P value
0.5 h			0.784
None	40 (83.3)	33 (80.4)	
Nausea	2 (4.1)	4 (9.7)	
Retching	1 (2)	1 (2.4)	
Vomiting	5 (10.4)	3 (7.3)	
1 h			0.725
None	39 (81.2)	36 (90)	
Nausea	5 (10.4)	3 (7.5)	
Retching	2 (4.1)	1 (2.5)	
Vomiting	2 (4.1)	0 (0)	
8 h			0.626
None	34 (72.3)	34 (82.9)	
Nausea	2 (4.2)	0 (0)	
Retching	2 (4.2)	1 (2.4)	
Vomiting	9 (19.1)	6 (14.6)	
24 h			1.000
None	45 (93.8)	38 (92.7)	
Nausea	2 (4.2)	2 (4.9)	
Retching	0 (0)	0 (0)	
Vomiting	1 (2.1)	1 (2.4)	
48 h			0.209
None	48 (100)	39 (95.1)	
Nausea	0 (0)	2 (4.9)	
Retching	0 (0)	0 (0)	
Vomiting	0 (0)	0 (0)	
72 h			1.000
None	38 (95.0)	33 (100)	
Nausea	1 (2.5)	0 (0)	
Retching	0 (0)	0 (0)	
Vomiting	1 (2.5)	0 (0)	

Values are presented as number (%).

7

Evaluating Nociception Indices Analgesia Nociception Index & Surgical Pleth Index in Elective Supratentorial Tumour Excision under General Anaesthesia-A Prospective Single Group Correlational study

Kotipi Rajagopal Madhusudan Reddy[1], Prashanth A Menon[1] and Sudhir Venkat[1]
[1]NIMHANS, Bengaluru, India

Introduction: Analgesia nociception index (ANI) and Surgical plethysmographic index (SPI) have evolved as new surrogates to quantify pain. There are no studies, that explore the association between ANI and SPI in supratentorial tumour surgeries.
Aims: This study aims to assess the association /correlation between SPI and ANI at predefined time points.
Methods: After informed consent and clearance from institutional ethics committee, 55 adult patients of both sex undergoing elective supratentorial tumour surgery under General Anaesthesia were included in the study.
The patient demographics, duration of surgery, blood loss, Visual analogue score (VAS) And ANI after extubation were recorded. ANI, SPI, Mean arterial pressure (MAP) and Heart rate (HR) were recorded pre and post predefined time points i.e. induction, intubation, pin fixation, skin incision, craniotomy, dural opening, tumour resection, dural closure, skin closure and extubation. The difference between Pre time point and post time point values were calculated as (Δ)ANI, (Δ)SPI, (Δ)HR and (Δ)MAP respectively.
Results: The mean age, BMI, duration of surgery, blood loss was 47.7 ± 12.6yrs, 22.8 ± 4.3, 210 ± 55 minutes and 471 ± 125 ml respectively. The study population had 23 females and 32 male patients. ANI and SPI showed a good negative correlation. Mixed effect modelling showed estimates of -0.44, -0.78 and -0.357 for pre-timepoint, post- timepoint and Delta (Δ) values respectively. ANI showed a weaker negative correlation with HR and MAP with estimates of -0.14, -1.35, -0.84 and 0.54 -1.27, -0.60 respectively. ANI at extubation and the VAS showed a negative correlation (rho of 0.76)
Conclusions: ANI and SPI Both reflect the balance of analgesia in supratentorial tumour surgery with a good negative correlation.
Ethics Approval and Clinical Trial Registration: NO. NIMH/DO/Ethics Subcommittee/BS & NS/ 4TH MEETING 2017 -ref letter no: 20/02/2017.
CTRI/2018/02/012170

8

A preliminary assessment of vital-signs-integrated patient-assisted intravenous opioid analgesia for postsurgical pain: a case series

Leong Sng[1], Daryl Jian'an Tan[2], Chin Wen Tan[1], Reena Nianlin Han[1], Rehena Sultana[3] and Alex Tiong Heng Sia[1]
[1]KK Women's and Children's Hospital, Singapore
[2]Ministry of Health Holdings, Singapore
[3]Duke-NUS Medical School, Singapore

Introduction: We developed a Vital-signs-integrated Patient-assisted Intravenous opioid Analgesia (VPIA) delivery system, a closed-loop vital signs monitoring and drug delivery system which embodies in a novel and intelligent algorithm that takes into account patients' vital signs (oxygen saturation, heart rate).
Aims: The system aims to allow responsive titration of personalized pain relief to optimise pain relief and reduce the risk of respiratory depression. Moreover, the system will be important to enable continuous monitoring of patients during delivery of opioid analgesia.
Methods: Nineteen patients who underwent elective gynaecological surgery with postoperative patient controlled analgesia with morphine were recruited. The subjects were followed up from their admission to the recovery room/ ward for up to 24 hours until assessment of patient satisfaction on the VPIA morphine pump.
Results: The primary outcome measure of incidence of oxygen desaturation showed all patients had at least one episode of oxygen desaturation (below 95%) during the study period. Only 6 (31.6%) patients had oxygen desaturation that persisted for more than 5 minutes. The average percentage time during treatment that SpO_2 fell below 95% was 4.6%. Fifteen out of 19 patients (75%) encountered safety pause, due to transient oxygen desaturation or bradypnoea. The patients' median [IQR] pain scores at rest and at movement after post-op 24 hours were 0.0 [2.0] and 4.0 [3.0] respectively. The average morphine consumption in the first 24 hours was 12.5 ± 7.1 mg. Majority of patients were satisfied with their experience with the VPIA morphine pump.
Conclusions: We have demonstrated the potential of VPIA morphine pump to increase the safety and patient satisfaction by incorporating vital signs monitoring to intravenous opioid analgesia.
Ethics Approval: This study was approved by the SingHealth Centralised Institutional Review Board, Singapore (Singhealth CIRB Ref: 2015/3062), and registered on Clinicaltrials.gov (NCT02804022).

14

Reducing Delirium after Hip Fracture Surgery with a Perioperative Multidisciplinary Care Bundle

Alwin Chuan[1,2], Linheng Zhao[2], Nikela Tillekeratne[2], Sally Alani[1], Paul Middleton[1], Ian Harris[1,2], Lynette McEvoy[1] and Danielle Ni Chroinin[1]

[1]Liverpool Hospital, Liverpool, Australia
[2]SWS Clincial School, University of New South Wales, Liverpool, Australia

Introduction: Delirium after hip fracture (HF) surgery is common. While evidence-based recommendations exist, implementation of risk reducing behaviours is often uncoordinated across the main 3 clinical units involved in HF care: Emergency department (ED), Anaesthesia and PACU, and Orthogeriatrics ward. The Anaesthesia Department introduced a perioperative multidisciplinary delirium care bundle, focusing on best practice analgesia and rationalising medications. The bundle care thus included: fascia iliaca blocks performed in ED and repeated preoperatively; emphasis on paracetamol and short acting opioids; avoidance of morphine, tramadol, midazolam, atropine, antihistamines, antipsychotics; weekly newsletters; continuous compliance audit; fortnightly in-service to close the audit loop and delirium education.

Aims: The primary outcome was post-operative Day 3 delirium. Secondary outcomes were Day 30 all cause mortality, composite morbidity, residential location, and walking status.

Methods: Thus before-and-after study was performed from June 2017 to December 2018. Patients $\geq$50 years old admitted for isolated HF surgery were recruited. Functional status, cognitive state, Charlson comorbidity index, APACHE-II score, and biochemistry was **prospectively** collected on admission. Delirium was assessed on admission and on Day 3 post-surgery with the Confusion Assessment Method. On multivariable logistic regression analysis, only the presence of admission delirium, out of all admission and intra-operative covariates, affected outcomes (Bonferroni corrected $p < 0.005$). Therefore the Mantel-Haenszel statistic was used to adjust for Day 3 delirium outcome analysis.

Results: 150 patients were recruited before ("control"), and 150 patients after, introduction of bundle care. There was a 33% delirium reduction in bundle care (33 patients, 22%) versus control (49 patients, 33%), $p = 0.04$. There was a greater 43% reduction in more vulnerable intermediate/high delirium risk patients, bundle care (21 patients, 24%) versus control (39 patients, 42%), $p = 0.01$. A bundle care patient with admission delirium had relative risk of -2.29 (95%CI -2.18 to -2.34), $p < 0.001$, to recover by Day 3 compared to a control patient. All secondary outcomes were not statistically significant (all p values > 0.06). Day 30 mortality was 3–5%, 20% suffered new onset morbidity, 51–63% remained institutionalised, and 3% were able walk without aids.

Conclusions: There was a clinically and statistically significant reduction in post-operative delirium in HF patients treated with bundle care. The reduction is greater in more vulnerable patients. The study did not show improvement in mortality, composite morbidity, **residential** status or walking ability, over historical controls.

	Control	Bundle care	p value
Primary outcome			
Day 3 delirium			
Intermediate/high risk patients	*n = 93* 39 (42)	*n = 87* 21 (24)	0.01
All patients	49 (33)	33 (22)	0.04
Secondary outcomes			
Day 30 endpoints			
Composite morbidity	29 (20)	30 (20)	1.00
Mortality	7 (5)	5 (3)	0.77
Remained institutionalised	76 (51)	94 (63)	0.06
Walks without aids/assistance	3 (3)	4 (3)	1.00

Data expressed as count (%).

Ethics Approval: South Western Sydney Local Health District Human Research Ethics Committee HREC/17/LPOOL/19

Australian and New Zealand Clinical Trials Registry number 12619000296134

18

Observational Analysis of the Departmental Educational and Transfusion Practice Impact of the TEG6s versus Rotem Sigma Viscoelastic Haemostatic Assay pilot study – Princess Alexandra Hospital Brisbane.

Rae Duffy[1], Shaun Roberts[1] and Danielle Volling-Geoghegan[1]

[1]Princess Alexandra Hospital, Brisbane, Queensland

Introduction: Following approvals for a Viscoelastic Haemostatic Assay (VHA) TEG 6s versus Rotem Sigma

study we commenced targeted education and data acquisition.

Aims: To establish a baseline of actual VHA exposure, preference and experience in the Princess Alexandra anaesthetic department.

Upon completion to assess the effectiveness of our educative endeavours and change of transfusion practice.

Method: In April 2018, VHA Rotem/TEG 6s educative measures were pursued in the PA anaesthetic department including departmental morning meetings, registrar teaching and nursing education sessions. Rotem and TEG guided transfusion algorithms and VHA study protocol was emailed to all and a hard copy placed in every theatre and on department notice boards.

An online Entry Survey was then emailed triweekly for 3 weeks to medical staff.

During the VHA study, regular online and hard copy Rotem /TEG teasers in the form of clinical scenarios, traces and questions were circulated and followed up with answers and educative points.

With study completion an EXIT Survey was emailed triweekly for 4 weeks.

Results: The Entry Survey had a 56% response rate and a good coverage from all groups of anaesthetic staff. 59% of respondents were familiar with both VHAs, 78% had acquired their knowledge through the morning meetings and departmental tutorials, 2.5% had never used a TEG 6s and 40% never a Rotem Sigma, 74% of respondents preferred the TEG 6s.

The Exit Survey had a 39% response rate. 60% of respondents accessed educational modules on email, 2.5% on both email and departmental website and 20% viewed the hard copies on notice boards, 17.5% did not access them. 52.5% reviewed and improved their VHA understanding, 40% saved to review at a later date, 2.5% reviewed and did not find informative and 5% did not intend to access this material. The VHA pilot saw a 40% change in transfusion practice. 63% of respondents correctly translated an expected Fibtem result given a CFF of 9mm and 29% were in the next close abnormal range, indicating that 92% of respondents could translate between the 2 VHAs. Only 56% of respondents would have correctly followed the TEG 6s transfusion algorithm for this value of CFF and 31% would have given half of the indicated product.

Conclusions: Online resourcing is only one means of effective dissemination of educative material. The study and the associated education did change transfusion practice at PA, however the disparity between abnormal result and product transfusion needs ongoing redress.

Ethics Approval: HREC/18/QPAH/131 – SSA/18/QPAH/132 Queensland Health Metro South Research Governance.

19

The Contrast of product usage between a fixed and a Viscoelastic Haemostatic Assay guided Massive Transfusion Protocol – Four case reviews with unanticipated massive intra-operative bleeding.

Rae Duffy[1], Shaun Roberts[1] and Danielle Volling-Geoghegan[1]

[1]Princess Alexandra Hospital, Brisbane, Queensland

Introduction: The Princess Alexandra Hospital (PAH) is a 688 bed, major tertiary surgical referral hospital with expertise in trauma, renal and liver transplantation. The PAH has both TEG 6s and Rotem Sigma Viscoelastic Haemostatic Assay (VHA) systems. In April 2018 a revised Massive Transfusion Protocol (MTP) was released with a VHA arm and a fixed product transfusion arm. A subsequent pilot study evaluating the use of the TEG 6s and Rotem Sigma VHA in the management of intra-operative bleeding patients was conducted to evaluate the degree of correlation of results between the two.

Aims: To observe the impact of VHA systems on actual product requirement in intra-operatively bleeding patients resultant from data collection in the TEG 6s Versus Rotem sigma pilot study.

Method: After machine validation, 30 bleeding patients were randomly recruited by anaesthetic staff from May to December 2018. VHA assessments were done to determine intraoperative, product requirement. Citrated viscoelastic haemostatic assays were run on the same citrated blood samples. Data for time to test, time to transfuse, product transfusion, emergency and ICU admission data, anaesthetic management and qualitative anaesthetic feedback on relevance and actual use of VHA was collected.

Results: 4 cases of non-trauma-related intra-operative activation of MTPs are presented to highlight the contrast between fixed MTP product useage and the actual VHA results and real life product transfusions used. In 3 of 4 of these cases there was agreement between the VHA results in both systems and the subsequent product recommendation of the respective VHA algorithms employed at PA. There is a notable difference in the increased quantity of fibrinogen replacement used in the VHA guided MTP contrasted to the fixed transfusion arm.

Conclusions: VHA systems contribute to our intra-operative assessment of bleeding and subsequent product transfusion. The data collected in this pilot study suggests that surgery induced and gastro intestinal bleeding has a different profile to trauma induced coagulopathy and bleeding. Further investigation with a larger, bleeding, patient cohort is recommended to enhance data acquisition and explore VHA transfusion concurrence.

Ethics Approval: HREC/18/QPAH/131 – SSA/18/QPAH/132 Queensland Health Metro South Research Governance

20

TEG 6s Versus Rotem Sigma – A Comparison of Two Viscoelastic Haemostatic Assays in the Management of Major Haemorrhage

Rae Duffy[1], Shaun Roberts[1] and Danielle Volling-Geoghegan[1]
[1]Princess Alexandra Hospital, Brisbane, Queensland

Introduction: Princess Alexandra Hospital is a 688 bed, tertiary adult hospital in Brisbane and leads the state in trauma management, liver and renal transplantation. Since participation in the 2016 Feisty Trial, the emergency department and Intensive Care Unit routinely use Rotem Sigma Viscoelastic Haemostatic Assay (VHA) analysis in assessment of bleeding. The Anaesthetic Department and 26 Theatre Operating Complex have used TEG Technology since 2008 and now specifically the TEG 6s Cartridge system.
Aims: This pilot study investigated similarities and differences in equivalent VHA parameters using TEG 6s and Rotem Sigma in patients with major bleeding undergoing non-cardiac and non-transplant surgery.
Method: As per biostatistical advice VHA device validation was undertaken on 15 patients. 30 bleeding patients were then randomly recruited by anaesthetic staff from May to December 2018. VHA assessments were done to determine further intraoperative, product requirement. Citrated viscoelastic haemostatic assays were run on the same citrated blood sample. Data for time to test, time to transfuse, product transfusion, parameters for equivalent assays ie CFF – Fibtem, CRT – Extem, CK – Intem and qualitative anaesthetic team feedback on relevance and actual use of VHA was collected.
Results: Results showed a strong correlation ie R coefficient >0.9 for CFF and Fibtem A10 all results and CFF and Fibtem A10 with normal values, as well as Maximum Amplitude and Clot Formation Time on both CRT – Extem and CK – Intem. There was a weaker correlation ie $R < 0.6$ between abnormal CFF and Fibtem A 10 results, as well as R time and Clotting Time in both the CRT – Extem and CK – Intem assays across all values. There was a 20 minute VHA sampling time difference and on average a 40 minute delay from VHA result to product commencement in the theatre. TEG 6s was the preferred VHA.
Conclusions: Although the 2 systems showed consistency, in 60% of abnormal CFF – Fibtem A10 assays, the differences in result impacted on fibrinogen dose as per TEG6s algorithm and Rotem algorithm ie the TEG 6s result falling into a dosing category half that recommended by the Rotem result.
Further investigation with a larger, bleeding, patient cohort is recommended to investigate a potential saving of both product usage and cost.
Ethics Approval: HREC/18/QPAH/131 – SSA/18/QPAH/132 Queensland Health Metro South Research Governance

21

Change of Regional Anaesthesia Practice for Total Knee Arthroplasty

Emily Scott[1], Sam Loh[2], Christopher Mitchell[3] and Steven Myles[3]
[1]Joondalup Health Campus, Perth, Australia
[2]Department of Anaesthesiology, Singapore General Hospital
[3]Department of Anaesthesia, Sir Charles Gardiner Hospital, Perth, Australia

Introduction: Total knee arthroplasty (TKA) is well recognised as a painful surgery that requires early postoperative mobilization for successful joint function. Regional anaesthesia offers significant advantages in patients undergoing TKA. Various regional techniques have been used for TKA.
Aims: We aimed to explore the changing trends of regional anaesthesia practice for TKA over the years at our centre.
Methods: We performed a prospective audit and examined patients whose data were collected in the Plexus Audit database between 2005 and March 2017.
Results: In our analysis on total knee arthroplasty, there is a significant change of practice for PNB evolving from combined femoral and sciatic nerve blocks to femoral nerve block to adductor canal block as shown in table 1.

Table 1: PNB for total knee arthroplasty

n (%)	Both femoral and sciatic nerve blocks	Femoral nerve block	Adductor canal block
2005-10	305 (69.0)	137 (31.0)	0 (0.00)
2011-17	785 (46.8)	444 (26.5)	447 (26.7)
$p < 0.001$*			

Conclusions: Our centre has seen a shift in practice of regional techniques for TKA evolving from combined spinal epidural to both femoral and sciatic nerve block to femoral nerve block combined with local infiltration analgesia (LIA). Our current practice is the use of adductor canal block combined with LIA.
Ethics Approval: The audit was approved by the hospital Quality Improvement Committee.

24

Comparison of propofol versus sevoflurane anaesthesia in subarachnoid haemorrhage patients undergoing clipping for aneurysm

Mihir Pandia[1], Subodh Kumar[1], Gyaninder Singh[1] and Ashish Suri[1]
[1]All India Institute of Medical Sciences, New Delhi, India

Introduction: Anaesthetic agents have known effects on the cerebral blood flow (CBF) and cerebral blood volume (CBV) which may affect the intracranial pressure (ICP), intraoperative brain conditions and also the overall neurological outcome of patients. Various studies done in patients undergoing elective craniotomy for supratentorial tumour excision have compared propofol and sevoflurane anaesthesia, and have failed to prove superiority of propofol over sevoflurane. Because of the difference in the cerebral dynamics in subarachnoid haemorrhage (SAH) compared to supratentorial tumours, the results of the studies done in brain tumour patients cannot be extrapolated to SAH patients.
Aims: The aim of our study was to compare the intraoperative effects and postoperative outcomes of inhalational (sevoflurane) versus TIVA (propofol) in SAH patients undergoing aneurysm clipping.
Methods: After ethical clearance and written informed consent 60 SAH patients between 18–65 years posted for clipping of intracranial aneurysm were studied. Thirty patients of each of low grade SAH (Hunt and Hess grade 1 & 2) and high grade SAH (Hunt and Hess grade 3, 4, 5) with ruptured aneurysm were randomised separately into sevoflurane (S) and propofol (P) groups. For maintenance of anaesthesia group S received sevoflurane with minimum alveolar concentration (MAC) between 0.7–1.0 while the group P received propofol infusion at the rate of 6 −10 mg/kg/hr.
Results: One patients of S group was excluded from final analysis as patient developed blood transfusion reaction intraoperatively. The group S and group P were similar in demographic and baseline characteristics. The subdural ICP were comparable between two groups (group S = 10.1 ± 3.0 mmHg, group P = 8.9 ± 1.9 mmHg, P value = 0.109). The dural tension grading and severity of brain bulge were comparable between the two groups. Fifteen patients out of 59 were extubated in the operating room. The emergence, extubation, recovery time in group S(n = 5) and group P (n = 10) were found to be comparable. The postoperative complications including vasospasm, cerebral infarct, tracheostomy, decompressive craniectomy were found to be comparable in between the two groups. Forty-four patients required postoperative ventilation. Median duration of mechanical ventilation, ICU stay, hospital stay were found to be comparable between the two groups. Postoperative outcome assessed using modified Rankin score and Glasgow outcome score were comparable in the two groups.
Conclusions: The intraoperative brain condition, ICP, recovery, postoperative complications, ICU stay, hospital stay were comparable between propofol and sevoflurane in patients of subarachnoid haemorrhage undergoing aneurysm clipping.
Ethics Approval
Human/animal research ethics committee approval number: **IECPG/302/2704.2016, rt-36/29.06.2016.** Clinical Trials Registry Number: **CTRI/2018/04/013082**

25

Atropine Versus Glycopyrrolate in Preventing Spinal Anesthesia Induced Hypotension in Adult Patient Undergoing Lower Limb Orthopedic Surgeries

Sindhu Khatiwada[1] and Raju Thapamagar[1]
[1]BP Koirala Institute of Health Sciences, Dharan, Nepal

Introduction: Hypotension is an inevitable adverse event of spinal anaesthesia. Although the effectiveness of atropine and glycopyrrolate in preventing spinal anaesthesia induced hypotension reported, a comparative study between them is not done.
Aims: To compare the effectiveness of atropine and glycopyrrolate on occurrence of spinal anaesthesia induced hypotension and other adverse events if any.
Methods: After approval from institutional review committee and informed consent, 126 American Society of Anaesthesiologist Physical Status I/II adult patients undergoing lower limb orthopedic surgeries were enrolled. Patients were randomized to receive 2 ml of either 5 mcg/kg atropine (Group A), 2.5 mcg/kg glycopyrrolate (Group G) or Normal saline (Group S) intravenously immediately after spinal anaesthesia. Occurrence of intraoperative hypotension and other adverse events was recorded.

Results: Hypotension occurred in 10(23.8%) patients of group G, 20(47.6%) patients of group A and in 27(64.3%) patient of group S. Number of patient developing hypotention were less in group G compared to group A ($p = 0.02$) and group S ($p = 0.00$), but were similar between group A and group S ($p = 0.12$). Intraoperative tachycardia and nausea/vomiting occurred frequently in patients of group A and group S respectively compared to other groups (Table 1).

Table 1 Intraoperative adverse events

Type	Group A (n = 42)	Group G (n = 42)	Group S (n = 42)	P value
Nausea/vomiting	2 (4.7)	3 (7.1)	8 (19.0)	0.04
Shivering	0	1 (2.3)	1 (2.3)	1.00
Tachycardia	19 (45.2)	6 (14.2)	12 (28.5)	0.01

Values presented as number of patient (%).

Conclusions: Administration of intravenous glycopyrrolate 2.5 mcg/kg, after spinal anaesthesia is associated with less intraoperative hypotension and tachycardia as compared to atropine 5mcg/kg, in patients undergoing lower limb orthopaedic surgeries.
Ethics Approval: Reference number: 149/074/075- IRC, Institutional Review Committee of BPKIHS, Dharan, Nepal.
Clinical Trial Registration: NCT03580889

29

Intrathecal morphine is associated with reduction in postoperative opioid requirements and improvement in postoperative analgesia in patients undergoing open liver resection

Jefferson Tang[1], Leonid Churilov[2], Chong Tan[1], Raymond Hu[1], Brett Pearce[1], Luka Cosic[1], Christopher Christophi[3] and Laurence Weinberg[1]
[1]Austin Health, Heidelberg, Australia
[2]Florey Institute of Neuroscience and Mental Health, Parkville, Australia
[3]Department of Surgery, University of Melbourne, Parkville, Australia

Introduction: The optimal analgesic method for patients undergoing major open hepato-pancreatic-biliary surgery remains controversial. Continuous epidural infusion at the thoracic level remains the standard choice, however concerns have been raised due to associated complications. Single shot intrathecal morphine has emerged as a promising alternative offering similar analgesia with an enhanced safety profile.
Aims: Our study aimed to test the hypothesis that the addition of intrathecal morphine (ITM) results in reduced postoperative opioid use and enhanced postoperative analgesia in patients undergoing open liver resection using a standardised enhanced recovery after surgery (ERAS) protocol with multimodal analgesia.
Methods: A retrospective analysis of 216 adult patients undergoing open liver resection between June 2010 and July 2017 at a university teaching hospital was conducted. The primary outcome was the cumulative oral morphine equivalent daily dose (oMEDD) on post-operative day (POD) 1. Secondary outcomes included postoperative pain scores, opioid related complications, and length of hospital stay. We also performed a cost analysis evaluating the economic benefits of ITM.
Results: 125 patients received ITM (ITM group) and 91 patients received usual care (UC group). Patient characteristics were similar between the groups. The primary outcome – cumulative oMEDD on POD1 – was significantly reduced in the ITM group. Postoperative pain scores up to 24 hours post-surgery were significantly reduced in the ITM group. There was no significant difference in complications or hospital stay between the two study groups. Total hospital costs were significantly higher in the ITM group.
Conclusions: In patients undergoing open liver resection, ITM in addition to conventional multimodal analgesic strategies reduced postoperative opioid requirements and improved analgesia for 24 hours after surgery, without any significant differences in opioid-related complications, and length of hospital stay. Hospital costs were significantly higher in patients receiving ITM, reflective of a longer mandatory stay in intensive care.
Ethics Approval: LNR/18/Austin/79, Austin Health Human Research Ethics Committee

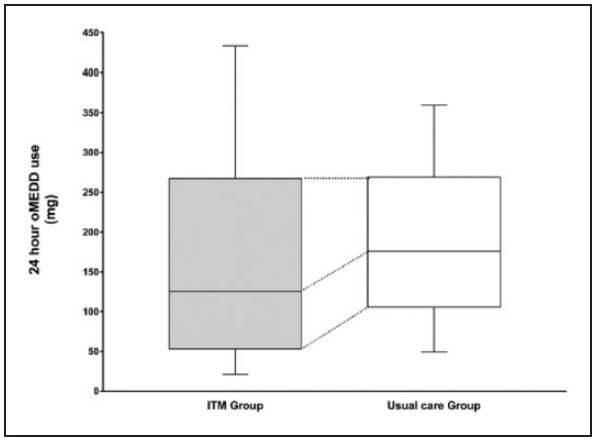


Figure 1 Boxplots of oral morphine equivalent daily dose (oMEDD) use at 24-hours post-surgery in the intrathecal morphine (ITM) group or Usual care group.

31

An Anaesthetic Return To Work Pilot Programme

Jan Davies[1], Judy Marois[1] and Sandy Shysh[2]
[1]Cumming School of Medicine, University of Calgary, Calgary, Canada
[2]Peter Lougheed Medical Centre, University of Calgary, Calgary, Canada

Introduction: During anaesthetists' careers, wanted but not required (non-remedial) leaves of absence (LOA) are common. After prolonged leaves, updating may reduce practitioners' anxiety and stress about concerns of decreased knowledge/skills. In Australia and the UK,[1,2] formal programmes and courses for use before and after LOAs help anaesthetists prepare for return to work (RTW). In contrast, there are no Canadian RTW programmes or supports. Having ended an LOA, regardless the reason or duration, practitioners most often simply return to work, with no orientation before providing anaesthetic care, potentially in new Operating Theatres, using new equipment and undertaking new services. Thus, we report our initial design of a Canadian RTW Programme.

Aims: The goals of the RTW programme are to update anaesthetists' knowledge/skills, increasing confidence and decreasing anxiety/stress upon RTW, with an overall goal of providing safer patient care. Through pilot testing, we aimed to evaluate this Programme's effectiveness and adequacy as a useful and desired RTW support for anaesthetists returning from non-remedial LOAs.

Methods: After prospectively obtaining approved ethics clearance, we emailed Canadian specialist anaesthetists who had indicated in a Needs Analysis survey their interest in participating in a one-day Pilot. This user-centered designed Pilot consisted of workshops and simulations, and group discussions evaluating the day's format and content (Table). Participants provided verbal and written feedback on the Programme's relevance and usefulness as an RTW support.

Results: Faculty and participants all had previous experience with a post-LOA RTW. Input was sought from both groups (n = 9 clinicians) to increase results' representativeness, with overall positive results. Respondents agreed/strongly agreed the Programme was a good use of time, informative and relevant. The simulation experience helped achieve RTW goals. The Programme assisted with building confidence for an RTW. Participants favoured the collegial, sharing environment and group discussions. Suggested changes included individualization for certain RTW needs (i.e., parental leave), online modules, and equipment refreshers specific to each participant's workplace. Opinions about an LOA's duration, for which the Programme would be useful, varied from 3–12 months. Additional comments provided suggestions of clinical scenarios and situations for future Programmes.

Conclusions: LOAs are common among practicing anaesthetists but currently there are no formal Canadian RTW programmes. This Pilot Programme's results will assist in improving provision of relevant, user-centred supports to meet Canadian practitioners' needs after temporary, non-remedial LOAs. This type of Programme may contribute to safer patient care

Table. Canadian Return To Work Programme Schedule (single-day, pilot)

Session (duration)	Type	Focus/Topic Reviewed
1 (30 minutes)	Group Discussion	Considerations when planning an anesthetic
2 (45 minutes)	Group Discussion, Workshop	Non-clinical details for RTW (hospital/Operating Theatre tour, computer systems, software logins/passwords, department protocols, etc.) Equipment (anesthetic machines, emergency, airway, supplies, etc.)
(15 minutes)	Coffee break	
3 (90 minutes)	Simulation	2 Simulations, each with a minor single event Crisis Resource Management
4 (45 minutes)	Workshop	Updated guidelines (CAS, ASRA, etc.) Preoperative assessments/discussion of clinical scenarios (OSA, NOAC, DM, CAD, etc.)
(45 minutes)	Lunch	
5 (45 minutes)	Workshop	Hands-on practice (difficult airway kit, cricothyrotomy, fiberoptic intubation, etc.)
6 (90 minutes)	Simulation	1 Simulation with a major critical event Crisis Resource Management
(15 minutes)	Coffee break	
7 (30 minutes)	Group Discussion	Peer support, mentorship, coping mechanisms, etc.
8 (30 minutes)	Group Discussion	Regulatory standards

CAS = Canadian Anesthesiologists' Society, ASRA = American Society of Regional Anesthesia, OSA = Obstructive Sleep Apnea, NOAC = Novel Oral Anticoagulant, DM = Diabetes Mellitus, CAD = Coronary Artery Disease.

through improving practitioners' knowledge, skills and confidence.

Ethics Approval: "Consistent with the standards set out in the TriCouncil Policy Statement 2014 (Chapter 2, Article 2.5), this project, which seeks to develop a return to work program for Canadian anesthesiologists, is exempt from the research ethics review requirement as it is a quality assurance/program evaluation activity." Dr. Stacey Page, Conjoint Health Research Ethics Board, University of Calgary. 26 March 2019.

References

1. RCoA. Giving Anaesthesia Safely Again (GASagain). https://www.rcoa.ac.uk/GASAgain. Accessed May 23, 2019.
2. The Royal Melbourne Hospital. CRASH course – Critical care, Resuscitation and Airway Skills in High Fidelity Simulation. https://www.thermh.org.au/health-professionals/continuing-education/anaesthesia-and-pain-management-courses/crash-course. Accessed May 23, 2019.

34

Risk Factors Associated With Development Of Acute Postsurgical Pain After Caesarean Delivery: A Prospective Cohort Study

Cheng Teng Yeam[1], Jason Ju In Chan[2], Ju In Jason Chan[2], Chin Wen Tan[2], Kirthinanda Dinoo[2], Wan Ling Leong[2], Farida Ithnin[2], Rajive Dabas[2], Rehena Sultana[3], Alex Tiong Heng Sia[1,2] and Ban Leong Sng[1,2]

[1]Duke-NUS Medical School, Singapore, Singapore
[2]Department of Women's Anaesthesia, KK Women's and Children's Hospital, Singapore, Singapore
[3]Centre for Quantitative Medicine, Duke-NUS Medical School, Singapore, Singapore

Introduction: Acute postsurgical pain after Caesarean delivery is distressing to the mother, associated with poorer childbirth experience and slower recovery. Predictive factors such as pre-operative pain and anxiety could significantly contribute to post-operative pain in general surgery, however little information is available with regards to Caesarean delivery. Previous studies suggested that pain scores upon local anaesthetic injection is positively correlated to post-Caesarean pain scores.[1] In addition, anxiety, anticipated post-operative pain score and anticipated medication need are also found to be associated with more severe pain after Caesarean delivery.[2–4]

Aims: We investigated the risk factors for post-operative pain after Caesarean delivery, and aimed to investigate the association of pain and psychological vulnerability, pain on local anaesthetic injection, mechanical temporal summation (MTS) with post-Caesarean pain.

Methods: We conducted a prospective cohort study between May 2018 to Apr 2019 at KK Women's and Children's Hospital in women undergoing Caesarean delivery under regional anaesthesia. Pain and anxiety assessments were conducted, MTS assessment and a series of questionnaires. Primary outcome is to investigate the association factors for moderate to severe pain at rest 24 hours after Caesarean delivery (compared to no to mild pain).

Results: There are 216 patients analysed and categorized into two groups: pain scores at rest at 24 hours post-surgery of 0–3 (low pain group) ($n = 168$), or 4–10 (high pain group) ($n = 48$). Low pain group had lower pain scores (24 hours at rest) of 0.0 [2.0] as compared with the high pain group (5.0 [2.0]; $p < 0.0001$). Similarly, the low pain group showed a lower pain score on movement (4.0 [3.0]) as compared with the high pain group (7.0 [2.0]; $p < 0.0001$).

There was a significantly higher pre-operative surgical anxiety level ($p = 0.004$) and anticipated pain score ($p = 0.042$) in high pain group. There was higher pre-operative pain catastrophizing scale ($p = 0.037$). There was no significant difference found for anticipated pain medication needed and on MTS testing. Additionally, the post-op 24 hours pain scores at rest was associated with higher 48-hours acute postsurgical anxiety (HADS; $p < .0001$) and greater pain vulnerability (PCS) on general pain catastrophizing ($p = 0.026$), rumination ($p = 0.032$), magnification ($p = 0.023$) and helplessness ($p = 0.0495$).

Conclusions: Preoperative surgical anxiety, anticipated pain score and pain catastrophizing are associated with higher pain scores after Caesarean delivery and further guide in future studies on potential novel risk stratification in this patient population.

Ethics Approval: This study was approved by the SingHealth Centralized Institutional Review Board, Singapore (SingHealth CIRB Ref: 2017/2381), and registered on Clinicaltrials.gov (NCT03645239).

References

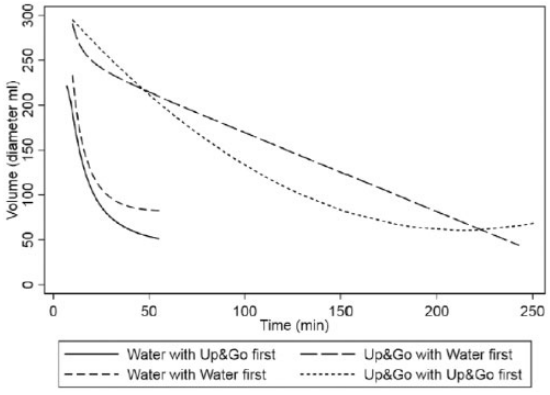
1. Orbach-Zinger, S., et al., Severe pain during local infiltration for spinal anaesthesia predicts post-caesarean pain. *Eur J Pain*, 2015. 19(9): p. 1382–8.
2. Eisenach, J.C., et al., Severity of acute pain after childbirth, but not type of delivery, predicts persistent pain and postpartum depression. *Pain*, 2008. 140(1): p. 87–94.
3. Pan, P.H., et al., Multifactorial preoperative predictors for postcesarean section pain and analgesic requirement. *Anesthesiology*, 2006. 104(3): p. 417–25.
4. Booth, J.L., et al., A Randomized Controlled Trial Comparing Two Multimodal Analgesic Techniques in Patients Predicted to Have Severe Pain After Cesarean Delivery. *Anesth Analg*, 2016. 122(4): p. 1114–9.

38

Gastric emptying time assessed by ultrasound following ingestion of equal amounts of a nutritious fluid drink and water; A prospective, randomised, cross-over volunteer trial.

Yayoi Ohashi[1], James Macko[2], Michael Phillips[3] and Tomás Corcoran[2]
[1]Fiona Stanley Hospital, Murdoch, Australia
[2]Royal Perth Hospital, Perth, Australia
[3]University of Western Australia, Crawley, Australia

Introduction: The aspiration of gastric contents is a rare but potentially catastrophic anaesthetic complication. The presence of gastric contents makes an aspiration event more likely and preoperative fasting is recommended to decrease the volume of gastric contents and reduce this risk. Point-of-care gastric ultrasound (POCGUS) of the gastric antrum can provide accurate information regarding the composition and volume of gastric contents.
Aims: Primary: To compare the rates of emptying of water with a nutritious fluid drink (which is isocaloric to a light meal) from the stomach in healthy volunteers.
Secondary: Does the order of consumption influence gastric emptying rates?
Methods: This prospective, randomised, cross-over study recruited 20 healthy volunteers without known gastric pathology and a BMI < 35. The subjects fasted at least 6 hours for food and 2 hours for clear fluid prior to participation. A baseline gastric volume ultrasound scan was performed by a sonographer and an anaesthetist experienced in gastric ultrasound scanning. Ten of the volunteers (group W) ingested 250 ml of water and underwent gastric scanning until stomach volumes returned to empty (baseline) status. They then ingested 250 ml of the nutritious liquid (UP&GO^{TM}) and underwent gastric scanning until stomach volumes returned to empty status. The second ten volunteers (group N) followed the reverse order of consumption.
Gastric volume values were log-transformed prior to inclusion in a multivariable regression model. Interaction terms were incorporated in the analysis to compare the change in volumes over time for the two fluids and the two groups defined by the order of consumption. The models incorporated sex and BMI category for detection of any effect-modification.
Results: One volunteer could not complete the clear fluid phase due to a mechanical issue at the time of scanning. The range of gastric emptying times for nutritious liquid was 120–260 minutes, and that of water was 20–80 minutes. Gastric emptying time was found to be independent of age, sex, and BMI. However gastric emptying time was influenced by ethnicity, with subjects of Asian ethnicity having significantly longer gastric emptying time ($p = 0.033$). The order of consumption did not influence the rate of emptying.
Conclusions: In the healthy non-obese population, nutritious liquid and water were cleared from the stomach within 260 minutes and 80 minutes, respectively. A larger study is required to determine whether Asian ethnicity is associated with slower emptying times.
Ethics Approval
The Human Research Ethics Committee of Royal Perth Hospital (**REG 13/175**) approved this study. This study was registered to Australia and New Zealand Clinical Trial Registry (ACTRN12614001106628).



39

Non-invasive blood pressure measurement in obese patients – arm dimensions and patient experiences

Peter Ceglowski[2], Katie Lehane[2], Christopher Chow[2], Anita Pelecanos[3], Angela Tognilini[1,2] and Victoria Eley[1,2]
[1]The Royal Brisbane And Women's Hospital, Brisbane, Australia
[2]The University of Queensland, Brisbane, Australia
[3]Queensland Institute of Medical Research Berghofer, Brisbane, Australia

Introduction: Non-invasive blood pressure (NIBP) measurement in obese patients can be difficult or impossible. Arm slant angle has been used to quantify arm conicity and a slant angle $<83^{\circ}$ associated with NIBP measurement error[1] The slant angle decreases as arm conicity increases. The experiences of obese patients regarding NIBP measurement has not previously been evaluated.
Aims: This study aimed to describe arm dimensions in patients presenting to the bariatric surgery clinic. We aimed to determine what proportion had a slant angle

Table 1.

Slant angle according to body mass index (BMI) category, 100 patients with BMI $>$ 30 kg/m^2

BMI Category kg/m^2	Number	Slant Angle (degrees), mean (SD)
30-39	32	84.6 (2.4)
40-49	34	84.3 (3.0)
50-59	23	83.4 (3.1)
$\geq$ 60	11	82.2 (2.5)

Linear regression models describing the relationship between body mass index (BMI), weight and right mid-arm circumference (MAC) with right arm slant angle, n=100.

Explanatory variable	Constant	β (95% CI)	R^2
BMI kg/m^2	87.89	−0.084 (−0.14 – −0.029)	0.08
Weight kg	87.15	−0.024 (−0.042 – −0.0069)	0.07
Right MAC cm	90.03	−0.14 (−0.23 – −0.055)	0.09

$<$83° and which anthropometric measure was the best predictor of arm conicity, defined by the slant angle. We also aimed to describe the experiences of patients presenting to the bariatric surgery clinic, regarding NIBP measurement, using survey questions and free-text responses.

Methods: Eligible participants had a body mass index (BMI) $>$ 30 kg/m^2, age $>$ 18 years and provided consent. Information collected included demographics and co-morbidities. Measurements were taken from both upper limbs applying standard anthropometry procedures[1] Slant angle was calculated: SA = arccosine[(C1-C2)/(2πL)] x (360/2π), where C1, C2 = upper and lower arm circumference, L = arm length[2] Linear regression was used to determine which of BMI, weight and right mid-arm circumference (MAC) best predicted conicity (defined by right arm slant angle). Participants answered questions on pain and tissue damage caused by NIBP measurement. Free text comments were summarised by two researchers independently using conventional content analysis to identify major concepts and themes.

Results: One hundred patients had a mean (SD) age of 48.5 years (12.7), median (IQR) BMI of 44.1 kg/m^2 (39.1–53.1), 75 (75%) were female and 90 (90%) Caucasian. Thirty-two (32 %) had a current diagnosis of hypertension. The mean (SD, range) right MAC was 42.0 cm (6.1, 30.9 – 59.6) and right arm slant angle was 84.0 degrees (2.9, 75.1–95.8). Thirty-three (33%) had a right arm slant angle $<$ 83°. Table 1 shows the mean slant angle according to BMI category and the linear regression results. BMI, weight and right MAC had a low correlation with right arm slant angle (r = −0.29, −0.27, −0.31, p = 0.003, 0.007 and 0.002). Forty-two (42%) agreed or strongly agreed that NIBP measurement caused severe pain and 30 (30%) reported visible skin damage sometimes or always. Major themes identified were "Problems with equipment", "Feelings and experiences" and "Concerns about accuracy".

Conclusions: Based on arm conicity represented by the slant angle, a significant proportion of this cohort may have erroneous NIBP measurements. The lower slant angles were observed in the highest BMI categories. Right mid-arm circumference was identified as the better predictor of right arm conicity, explaining only 9% of the variation observed. NIBP measurement causes pain for people who are obese, who lack confidence in the accuracy of the measurements.

Ethics Approval: This project was approved by the Royal Brisbane and Women's Hospital Human Research Ethics Committee (RBWH HREC, EC00172), approval number HREC/2018/QRBW/46657.

References

1. Centre for Disease Control: National Health and Nutrition Examination Survey: Anthropometry Procedures Manual. US, 2007.
2. Palatini P et al. Rectangular cuffs may overestimate blood pressure in individuals with large conical arms. *J Hypertens* 2012; 30: 530–536.

40

Financial Burden of Postoperative Complications Following Colonic Resection: A Systematic Review

Maleck Louis[1], Samuel Johnston[1], Leonid Churilov[2,3], Ronald Ma[4], Christopher Christophi[5] and Laurence Weinberg[1,5]

[1]Department of Anaesthesia, Austin Health, Heidelberg, Australia
[2]Department of Medicine, Austin Health, Heidelberg, Australia
[3]The Melbourne Brain Centre, Royal Melbourne Hospital, Parkville, Australia
[4]Department of Finance, Austin Health, Heidelberg, Australia
[5]Department of Surgery, University of Melbourne, Austin Health, Heidelberg, Australia

Introduction: Cost-effective health care, particularly in the hospital setting, is crucial for the sustainability of our health care systems. Colonic resection is a common surgical procedure associated with a high rate of postoperative complications. The development of complications is expected to be a major contributor to hospital costs.

Aims: The primary aim of this systematic literature review is to outline the health costs of postoperative complications in adult patients who undergo colon resection surgery. Secondary aims include determining the association between: 1) Complication severity, length of stay, 30-day readmission and mortality, and costs; 2) Surgical technique, surgical urgency and indication, and the development of complications and costs.

Methods: We searched the literature using the MEDLINE, EMBASE, Cochrane and EconLit databases from January 2010 to February 2019 to identify English studies containing an economic evaluation of postoperative complications following colonic resection. Colon resection was defined as complete excision of any part of the large bowel (excluding rectum). All surgical techniques and indications for colon resection were included. Eligible study designs included randomised and non-randomised controlled trials, comparative observational studies and conference abstracts. Risk of bias was assessed using validated assessment tools. Findings are reported as a narrative synthesis.

Results: Thirty-four articles met the eligibility criteria. Our findings demonstrate a vast degree of heterogeneity in study design, methods used to calculate cost and defining and reporting on complications. We found a high overall complication incidence with associated increased costs and resource utilisation following colonic resection surgery. Increasing number and severity of complications was associated with increased costs. Hospital readmissions are highlighted as a significant financial burden and postoperative complications are associated with greater incidence of hospital readmissions. Postoperative complications were found to result in increased hospital length of stay and mortality incidence. Open colonic surgery is associated with increased complications incidence and costlier complications. There was inconclusive evidence to evaluate the financial impact of surgical urgency, indication for surgery and mortality. Limitations include few high-quality costing studies and substantial study heterogeneity preventing quantitative analysis of cost results.

Conclusions: Postoperative complications in colon resection appear to be associated with a significant financial burden. Our review highlights key shortcomings in defining and reporting of hospital resource use and postoperative complications. High quality, consistent prospective economic studies are needed to evaluate the cost of complications arising from colonic resection surgery.

Ethics Approval: Austin Health Human Research Ethics Committee approval number: LNR/18/Austin/350, approved on 28/06/2018. The protocol of this review was retrospectively registered in PROSPERO 2019 CRD42019128618

43

The Impact of Postoperative Complications on Hospital Costs Following Colonic Resection Surgery: A Retrospective Cohort Study

Maleck Louis[1], Samuel Johnston[1], Leonid Churilov[2,3], Ronald Ma[4], Nada Marhoon[5], Adele Burgess[6], Christopher Christophi[6] and Laurence Weinberg[1,6]

[1]Department of Anaesthesia, Austin Health, Heidelberg, Australia
[2]Department of Medicine, Austin Health, Heidelberg, Australia
[3]The Melbourne Brain Centre, Royal Melbourne Hospital, Parkville, Australia
[4]Department of Finance, Austin Health, Heidelberg, Australia
[5]Data Analytics and Research Centre, University of Melbourne, Austin Health, Heidelberg, Australia
[6]Department of Surgery, University of Melbourne, Austin Health, Heidelberg, Australia

Introduction: Hospital expenditure is the largest contributor to health care costs in Australia. The development of postoperative complications is a major

component of hospital costs. Colonic resection, a common surgical procedure, is associated with a high rate of post-operative complications; therefore, it is a key target for cost containment strategies.

Aims: The primary aim is to determine the incidence and in-hospital costs of complications following colon resection surgery. Secondary aims include identifying perioperative variables associated with complication development and assessing the impact of complications on length of stay and 30-day readmissions.

Methods: Postoperative complications were retrospectively recorded for 487 adult patients (>18 years) undergoing colonic resection surgery between January 2013 and June 2018. Colon resection was defined as complete excision of any part of the large bowel excluding the rectum. Postoperative complications were defined as any deviation from the normal postoperative course and complication severity was graded according to the Clavien-Dindo classification system. In-hospital cost of index admission, excluding preoperative costs, was calculated using an activity-based costing methodology and reported in 2019 United States Dollars. Logistic regression was used to investigate the relationship of a priori perioperative variables and patient costs.

Results: The overall complication incidence was 69.6% (339 patients). Complication incidence was significantly associated with increasing Charlson Comorbidity Index (Odds ratio: 1.09; 95%CI: 1.02 to 1.17) and open as compared to laparoscopic resection (Odds ratio: 2.42; 95%CI: 1.32 to 4.42). Conversely, higher preoperative albumin levels appear to be protective (Odds ratio:0.94; 95%CI: 0.91 to 0.98). Median [Inter Quartile Range] cost of patients with postoperative complications was significantly increased as compared to patients without complications ($17, 964 [13, 534:25, 178] vs $12, 579 [10, 196:16, 140]; $p < 0.0001$). Increasing complication number was associated with a significant increase in hospital costs. Costs were significantly increased for all complication severity grades except for grade V complications. Patients with complications had an increased median hospital length of stay (8 [6:13] vs 5 [4:6] days; $p < 0.0001$). There was no significant difference in 30-day readmission rates between complicated (12.7%) and uncomplicated patients (11.5%); $p = 0.77$.

Conclusions: Our study highlights postoperative complications as a key target for cost containment strategies. We demonstrate a high incidence of postoperative complications following colonic resection associated with an increase in hospital costs and hospital length of stay.

Ethics Approval: This study was approved by the Austin Health Human Research Ethics Committee (Approval number: LNR/18/Austin/350) on 28/06/2018 and registered in the Australian New Zealand Clinical Trials Registry (Registration number: ACTRN12619000803190).

45

Audit of preoperative blood tests for elective surgery at a tertiary teaching hospital

Patrick Chee Kong Teo[1], Dinushka Kariyawasam[1] and Daniel Friedgut[1]

[1]Bankstown-Lidcombe Hospital, Bankstown, Australia

Introduction: Preoperative investigations form a part of optimising patient safety for elective surgery. The National Institute for Health and Care Excellence (NICE) in 2016 updated its guideline on routine preoperative tests aimed at preventing unnecessary testing, which adds little clinical benefit with associated financial burden. Additionally, excessive testing has the potential to cause patient discomfort, anxiety and further unnecessary testing due to false positive results. At the study hospital, preoperative tests are ordered by surgical teams or clinical nurses guided by a local protocol which recommends investigations based on the planned surgery. Patients and their test results are then reviewed by an Anaesthetist.

Aims: This audit sought to assess the preadmission clinic's current practice of preoperative blood testing for elective surgical patients against the NICE guideline. In addition, the financial burden of unnecessary testing was examined.

Methods: A prospective observational audit was performed on patients attending the preadmission clinic over 4 weeks in March 2019. Data collected included age, gender, American Society of Anesthesiologists (ASA) grade, surgery type and blood tests performed. Surgery type was further classified into minor, intermediate and major. Indications for full blood count (FBC), electrolytes urea and creatinine (EUC), and coagulation profile were determined based on surgery class and ASA grade according to the NICE recommendations.

Results: A total of 402 patients were included in our audit. Fifteen patients were excluded due to missing data. The median age was 68 years (interquartile range 59–76 years) with slightly more males (52%) than females. The majority of patients, 231 (57.5%), underwent minor surgeries and 90% were of ASA grades 2 and 3. In total, 1, 224 tests were ordered. There were no guideline indications for 236 (65%) of FBCs, 86 (24%) of EUCs, and 27 (44%) of coagulation profiles performed (Table 1). Of these 349 unindicated tests, 83.4% and 16.6% were ordered by Nurses and Surgeons respectively. Only 4 blood tests were omitted. Other investigations included 211 random glucose tests and 28 instances of erythrocyte sedimentation rate and C-reactive protein. Excessive preoperative testing of FBC, EUC and coagulation profiles accounted for $5, 555.46 in laboratory expense and can be extrapolated to $72, 220.98 per annum.

Table 1: Breakdown of indicated (white cells) and unindicated tests (grey cells) according to NICE guidelines.

Surgical class	Minor	Intermediate	Major
Full blood count			
ASA 1	4	3	11
ASA 2	81	34	33
ASA 3 or 4	114	44	39
Electrolytes urea and creatinine			
ASA 1	4	2	11
ASA 2	80	32	33
ASA 3 or 4	114	44	39
Coagulation profile			
ASA 1	0	0	3
ASA 2	1	5	9
ASA 3 or 4	9	6	28

Conclusions: Consistent with published audits, excessive rather than under testing was demonstrated in our hospital. Modification of our local policy towards guideline-recommended testing can be a source of significant financial saving while maintaining patient safety and satisfaction.
Ethics Approval: Ethics approval for this audit (DA19/019) was granted by South Western Sydney Local Health District Research and Ethics Office with no need for formal review.

46

Procedural sedation for upper gastrointestinal endoscopy (UGIE) and colonoscopy in a rural Australian hospital, is it safe?

Nicola Crowley[1], Mei Tan[1], Jessica Howard[1], Elizabeth Alexander[1], Edward James[1] and Gurvinder Kaur[1]
[1]Mount Gambier Districts Health Service, Mount Gambier, Australia

Introduction: UGIE and colonoscopy are low risk procedures that are commonly performed. However, the patients undergoing them are increasingly complex. Our anaesthetic agents provide analgesia and anxiolysis for these procedures and this enables the thorough examination of the gastrointestinal tract but they can also cause multiple side effects. The tracking and reporting outcomes of procedural sedation (TROOPS) document is a standardised, quality improvement tool designed to identify perioperative complications and their severity.
Aims: Primary aim: Identify complications in patients undergoing UGIE and colonoscopy.
Secondary aim: Identify factors contributing to these complications.
Methods: From 4th March to 10th May 2019, 153 consecutive patients undergoing UGIE and colonoscopy were included in our audit. Sedation related complications were recorded by the procedural Anaesthetist and recovery nurses.
Results

Complication	Complication type	Intervention	Risk factor
Airway only	Airway obstruction (4)	Nasopharyngeal airway (3) Laryngeal Mask Airway (LMA) (1)	UGIE Gastro-oesophageal reflux (GORD)
Airway and CVS	Laryngospasm/ airway hyperreactivity and hypotension (2)	Additional anaesthetic agent doses LMA vasoconstrictors	GORD Additional anaesthetic agent doses
CVS only	Hypotension (7)	Vasoconstrictors	Anaemia Underlying CVS disease Additional anaesthetic agent doses Colonoscopy
	Bradycardia (3)	Anticholinergics	

Two of our patients had both airway and cardiovascular complications. One patient developed laryngospasm during an UGIE, the other patient experienced airway hyperreactivity during a colonoscopy. The management of these airway complications included the administration of propofol boluses which caused hypotension.
Patients undergoing a colonoscopy were more likely to develop bradycardia and hypotension. Fasting, bowel preparation, anaemia, the presence of CVS disease and its medical management all contributed to the haemodynamic instability experienced by this patient group.
The TROOPS authors state that interventions requiring an oral airway, including LMA's, are intermediate severity complications and warrant timely reporting with peer scrutiny. We will prospectively include these events in our quality improvement meetings and aim to reduce these complications. The episodes of haemodynamic instability were of minor severity but we will also aim to reduce these adverse effects.
Recommendations:
- Identify and optimise high risk patients preoperatively e.g.
- Local anaesthetic spray to abolish gag reflex.
- Early intravenous fluid hydration prior to colonoscopy.
- Move high risk patients to the morning list.
- Follow up audit in 2 years.

Conclusions: The provision of sedation in our rural setting is safe. Our complications were easily managed but there is room for improvement.

Ethics Approval: This project was evaluated by the Southern Adelaide Clinical Human Research Ethics Committee (SAC HREC) who deemed that ethical approval was not required.

53

Eliminating Slow-Release opioids from post-Caesarean analgesia – a retrospective cohort study

Gregory Evans-McKendry[1], Tuck Ng Seng[1], Annie Williams[1] and Gordon Mar[1,2]
[1]Eastern Health, Box Hill, Australia
[2]Monash University

Introduction: The ANZCA position statement on use of slow-release opioids in acute pain has prompted the adoption of protocol-based analgesia regimen using exclusively immediate-release opioids and non-opioid analgesia for women after elective Caesarean section in a Melbourne Metropolitan Hospital.
Aims: To assess the total opioid utilisation in women who underwent elective Caesarean section (LUSCS) under regional anaesthesia after the implementation of a protocol-based 'immediate-release only' analgesia regimen and compare this to historical prescribing practices.
Methods: Prescribing data was retrospectively collated for two groups of women who had elective LUSCS under regional anaesthesia; 138 women pre- and 162 women post-adoption of an immediate-release-only opioid prescribing protocol. Women who had opioid allergies or non-standard operative courses were excluded. Opioid and non-opioid analgesia use over the first 96 post-operative hours was recorded, with total daily opioid dose converted to its Oral Morphine Equivalent Dose (OMED).
Attempts were made to collate records of adequacy of analgesia (such as Numeral Rating Scale pain scores) however these data were generally poorly recorded so are not reported in this study.
Major outcomes were average daily OMED and Length Of Stay (LOS).
Results: There was no statistically significant difference in average daily OMED in either group (SR+IR group 79mg/day; IR group 84mg/day, $P > 0.05$). Average LOS for the IR group was 16.5hours less than the SR+IR group (IR group 3.16 days; SR+IR group 3.85 days, $P = 0.011$). Similar percentages of patients received 'breakthrough' parenteral opioid doses within the first 24 post-operative hours (12% in IR group, 10.1% in SR+IR group). Immediate release Tramadol utilisation in the IR group was 2.4 times that of the SR+IR group.
Conclusions: The adoption of an analgesia regimen that excluded slow-release opioids has not let to a reduction in average daily OMED but has led to a reduction in length of stay post elective LUSCS. Historical prescribing practices potentially represent a bias against the use of Tramadol as a first line analgesic agent. These findings warrant further research including prospective analysis of patient and clinician satisfaction, and potential use of exclusively immediate-release opioids for other surgical populations post-operatively.
Ethics Approval: This audit is registered with Eastern Health's Office of Research and Ethics; Ref #QA39-2018

55

Algorithms for the unanticipated difficult endotracheal intubation following induction of anaesthesia.

Victoria Sadick[1], Tim Suharto[1], Sivan Wexler[1], Yasmin Endlich[2,3], Michelle Miu[1] and Allan M Cyna[1,4]
[1]Nepean Hospital, Sydney, Australia
[2]Royal Adelaide Hospital, Adelaide, Australia
[3]Women's and Children's Hospital, Adelaide, Australia
[4]University of Adelaide, Adelaide, Australia

Introduction: Several algorithms have detailed steps following an unanticipated failed intubation after induction of anaesthesia. Following the findings of the 4th National audit project of the Royal College of Anaesthetists and difficulty airway society (NAP 4) 2011, a large number of difficult airway algorithms have been advocated internationally. This may lead to confusion and reduced utility if found to be inconsistent with each other.
Aims: We aimed to investigate the commonalities and differences between algorithms in the context of an unanticipated difficult airway following induction of general anaesthesia in the adult population.
Methods: A manual google scholar and Medline search in May 2019 identified algorithms published by National Airway Societies, in the management of unanticipated difficult airways following anaesthesia. We have piloted the difficult airway management guidelines from the United Kingdom, Australia, United States and Canada. The various strategies and steps within the pictorial airway algorithm and accompanying text on unanticipated difficult airway management were compared.
Results: The Difficult Airway Society (DAS-UK) guidelines was the only publication explicit in defining an 'unanticipated difficult intubation'. Three of the four guidelines incorporated airway pre-evaluation whilst the Canadian algorithm did not address airway predictive tests.

The DAS-UK and Australian and New Zealand College of Anaesthetists (ANZCA) algorithm incorporate four steps, whilst the ASA algorithm encompasses five steps. 'Can't intubate, Can't Oxygenate' (CICO) was the final step in all four algorithms. The Canadian algorithm reaches cricothyrotomy in either two or three steps. All four guidelines have directed to 'Call for help' early and advise for bag-mask-ventilation and use of supraglottic devices. The use of external laryngeal manipulation, two-person bag-mask ventilation, videolaryngoscopy and neuromuscular block was suggested by the DAS-UK and ANZCA guidelines. Apnoeic oxygenation was only referenced in the text of the DAS-UK publication. DAS-UK was the only guideline to advocate a particular technique (scalpel technique) for front of neck access. No guideline recommended lateral positioning to improve airway and timing to address progression to another stage of the algorithm.

Conclusions: Each of the various guidelines have commonalities and differences, strengths and limitations. Researching manoeuvres that support the individual differences of current guidelines is required. Commonalities could be used as a basis for the development of a universal algorithm for this context.

Ethics Approval: Not applicable.

57

The Ionised Calcium Levels and Supplementation in Patients Who Underwent Cardiac Surgery and Required Intra-Operative Blood Transfusion.

Aoife Brady[1], Irmina Bukowska[1] and Georgina Flood[1]

[1]Mater Misericordiae University Hospital, Dublin, Ireland, Dublin, Ireland

Introduction: The use of calcium replacement during and following blood transfusion is important to ensure adequate coagulation and to prevent the deleterious cardiovascular effects of hypocalcaemia. The Mater Misericordiae University Hospital (MMUH), Dublin, Ireland, has formed a Major Haemorrhage Protocol which outlines that ionised (i) calcium ($Ca2^+$) levels are to be measured before transfusion and every 30–60 minutes thereafter. It outlines that the aim is to maintain $iCa2^+ > 1$ mmol/L.

Aims: We wanted to explore calcium replacement practice following blood transfusion during cardiac surgery in MMUH.

Methods: Data was collected retrospectively from 9/4/18 to 1/9/18 and prospectively from 1/9/18 to 17/12/18. All patients who underwent cardiac surgery and required blood transfusion in MMUH were included. Data was collected in a secure database. Information gathered included: type of surgery, length of surgery, cardiopulmonary bypass (CBP) time, aortic cross clamp time, haemoglobin at baseline, haemoglobin at the end of surgery, number and type of blood products transfused, estimated blood loss, $Ca2^+$ supplementation, $Ca2^+$level at baseline, during transfusion and at the end of surgery, type and amount of $Ca2^+$replacement administered and whether the patient returned to theatre in the first post-operative 24 hours for re-exploration due to haemorrhage.

Results: Total number of patients audited: 47 Mean blood loss: 1080ml Mean blood products transfused: RCC – 2 units, FFP – 4.6 units, PLT – 1.54 pools, Fibrinogen – 2.13g In total 26 patients received $Ca2^+$ supplementation (55.3%)

In cases where calcium was replaced: Calcium chloride was used in 46% with mean $iCa2^+$ levels of 1.13mmol/L at the end of surgery; Calcium gluconate was used in 54% of cases with mean $iCa2^+$ levels of 1.11 mmol/L at the end of surgery.

During transfusion the $iCa2^+$ levels varied as follows:

Ionised calcium level	Number of patients	% of patients audited	Number of patients who received calcium supplementation	% of patients who received calcium supplementation
1.1-1.28 mmol/L	14	29.7%	2	14.3%
1.0-1.1 mmol/L	15	31.9%	10	66.7%
$<$1.0mmol/L	18	38.4%	14	77.8%

Of the $<$1.0mmol/L group: 4 received no supplementation and a further 4 didn't have their levels adequately restored despite supplementation, 79% of patients had normal $iCa2^+$ levels at the end of surgery (taken as $\geq$1.1mmol/L).

Conclusions: Adequate $Ca2^+$ replacement in patients undergoing cardiac surgery in MMUH who require blood transfusion is often not achieved. Continued education on this topic is needed to emphasise the importance of replacement, checking levels regularly and avoiding falling below the critical level of $<$1.0mmol/L which can have deleterious coagulation and cardiovascular effects. The exact level to target replacement in an actively bleeding patient remains a topic of debate.

Ethics Approval: Approved by local audit ethics committee in the Mater Misericordiae University Hospital, Dublin, Ireland.

59

A Unique Case of Hypoxaemia in a Patient Undergoing Total Knee Replacement

Kyle Dailey[1,3], Ahmad Dawar[1] and Ahmad Dawar[1]
[1]Ipswich Hospital, Ipswich, Australia

Introduction: Platypnoea-Orthodeoxia Syndrome is a condition characterised by marked oxyhaemoglobin desaturation in the upright position, and improvement with recumbency. The rarity of this syndrome along with the associated clinical implications in Anaesthesia and Peri-Operative Medicine render it an important diagnostic consideration.
Case Report: An 83 year-old man originally presented to hospital for an elective total knee replacement with a background history of mild dyspnoea, unprovoked pulmonary embolism nine years prior, cryptogenic transient ischemic attack, compensated congestive cardiac failure, hypertension, Parkinson's Disease and hemochromatosis heterozygosity.
The patient was examined preoperatively in the recumbent position, vital signs as well as cardiorespiratory examination were within normal limits. Specifically, no murmurs could be auscultated at this stage. An anaesthetic plan was devised and patient consented to neuraxial anaesthesia.
Monitoring was attached including ECG, plethysmography and both non-invasive blood pressure monitoring as well as an arterial line. The patient was made to sit up for the administration of spinal anaesthesia, when his SpO2 was noted to be $<$75% on room air with satisfactory plethysmograph trace and minimal response to supplemented Oxygen. Arterial blood gas sample obtained which confirmed PaO2 of 39.6 mmHg. Surgery was promptly abandoned, and the patient was admitted for investigations.
Chest X-ray reflected fine reticular changes at the pulmonary periphery suggesting mild pulmonary fibrosis which was confirmed on CT pulmonary angiography but no evidence of pulmonary embolism. Patient was further investigated with Transthoracic echocardiography including bubble study and agitated saline contrast study which was positive with the patient in the upright position, reflecting a right to left inter-atrial shunt. Other transoesophageal echocardiography findings included a long tunnel patent foramen ovale with aneurismal interatrial septum and small fenestrating atrial septal defects, without evidence of pulmonary hypertension.
The patient was diagnosed with Platypnoea-Orthodeoxia Syndrome and transferred to a tertiary cardiac centre where he underwent coronary angiography with right heart catheterisation and patent foramen ovale closure. Follow-up transthoracic echocardiography identified patent foramen ovale closure device appropriately seated with no residual flow detected. The patient was reviewed in Anaesthetic clinic seven months after this procedure, and describes a dramatic improvement in his dyspnoea. He has since had an uneventful total knee replacement.
Discussion: Platypnoea-Orthodeoxia syndrome is a rare condition with a distinct presentation typically identified in patients more than 50 years of age. It should be considered as a differential diagnosis when investigating hypoxaemia without an obvious cause.
Ethics Approval: This case report was reviewed by the local Chairperson of the Human Research Ethics Committee

60

A process to improve difficult airway communication in Queensland

Elizabeth Mclellan[1] and Jane Elms[2]
[1]Royal Brisbane And Women's Hospital, Brisbane, Australia
[2]The Prince Charles Hospital, Brisbane, Australia

Introduction: Difficult airway (DA) events account for significant morbidity and mortality in anaesthesia care. A documented previous difficult or failed tracheal intubation is a strong predictor of a subsequent difficult tracheal intubation.[1] A DA notification process for airway events is recognised as an important aspect of safe patient care.
Aims: Queensland's Statewide Anaesthesia and Perioperative Care Clinical Network Difficult Airway Alert working group sought to improve DA communication and notification.
Methods: We developed a Difficult Airway Alert (DAA) process using existing electronic platforms within Queensland Health (QH). This process involves documentation of a difficult airway, which generates an electronic alert that is displayed in the electronic medical record, similar to alerts for drug allergies. Through statewide consultation, a standardized DAA Form and a supporting document were developed. The form is utilized both for paper-based documentation, or within the electronic medical record either as a scanned document or an editable PDF. The electronic form permits scope for data collection. The process called for individual site coordinators to oversee its application.
Results: The DAA process was introduced for widespread use in Queensland in October 2018 and uptake has been outstanding. All 46 QH facilities have appointed designated officers, with 141 electronic alerts uploaded to date. A byproduct of the working group's efforts has been advocacy for clinically descriptive and consistent definitions in snomed clinical terminology used throughout electronic medical records.

Conclusions: DA concerns traditionally emphasized difficult intubation, however a DA is any event in which there is a clinically significant threat to oxygenation or ventilation, in any of the key domains of airway management. We have established a clinically useful and robust process for notification of the presence and details of a known DA, thus improving patient safety across all hospital areas where airway management may be encountered. This system also has the potential to provide big data to help fill the holes in research into airway assessment and management. Our continued efforts focus on refining this process and expanding its application to facilities beyond QH, potentially utilizing My Health Record, to allow enhanced patient safety and data collection on a national scale.
Ethics Approval: Ethics approval was not sought for this initiative given the nature of the project.

References

1. Lundstrøm et al. Anaesthesia. 2009;64(10):670–84
2. Baron et al. Anaesthesia. 2003;58(1):73–7

62

Comparison of the analgesic effect of patient-controlled oxycodone and fentanyl in patients undergoing robot gastrectomy

Hee Jung Kong[1], Sang Il Kim[1] and Na Young Kim[1]
[1]Department of Anesthesiology and Pain Medicine, Anesthesia and Pain Research Institute, Yonsei University College of Medicine, 50–1 Yonsei-ro, Seodaemun-gu, Seoul 03722, Republic of Korea

Introduction: Robotic gastrectomy has been performed by minimizing skin incision; however, still the patients undergoing robotic gastrectomy suffer from the postoperative pain, which may be caused by splanchnic pain. Fentanyl is an opioid which have been commonly used for this purpose safely. However, inadequate analgesia and adverse effects have also been reported.
Aims: There is still lack of study which compared oxycodone and fentanyl on its analgesic, adverse effect or patient satisfaction while using them for patient-controlled analgesia. Thus, we compared the effect of oxycodone and fentanyl based intravenous patient-controlled analgesia in patients who underwent robotic gastrectomy.
Methods: A total of 72 consecutive patients undergoing robotic gastrectomy between May and October 2017 were retrospectively reviewed. Patients received oxycodone-based IV-PCA (Group O, n = 35) or fentanyl-based IV-PCA (Group F, n = 33). Four patients were excluded if the IV-PCA was discontinued or if the ASA class was greater than 3. The primary outcomes were to evaluate postoperative analgesic effects. Secondary outcomes were to assess additional rescue analgesics consumption and the number of delivery and attempts of IV-PCA.
Results: Sixty-eight patients were finally completed the study. The postoperative pain intensity in the Group O was significantly lower than those in the Group F at PACU (3.7 ± 1.5 vs 4.6 ± 2.2, $P = 0.041$). And there were no significant differences of pain intensity in other time pints between the two groups. Patients in the Group O needed significantly fewer rescue analgesics at PACU compared to the Group F (5 vs 12, $P = 0.036$), and had a significantly higher ratio of delivery to attempt between 9 and 48 hours after surgery than those of the Group F.
Conclusions: Oxycodone-based IV-PCA significantly improved postoperative analgesia in patients undergoing robotic gastrectomy, Furthermore, this approach could be clinically more meaningful owing to the attenuation of patients` attempt trial.

Table 1 Pain scores and additional analgesic requirements

	Group O (n = 35)	Group F (n = 33)	p-value
Pain score			
In PACU	3.7 ± 1.5	4.6 ± 2.2	0.041*
Post-op 1–6 h	5.3 ± 2.3	4.9 ± 2.3	0.544
Post-op 6–12 h	4.5 ± 2.4	4.2 ± 2.1	0.576
Post-op 12–24 h	3.1 ± 2.0	3.4 ± 1.7	0.586
Post-op 24–48 h	2.2 ± 1.3	2.5 ± 1.8	0.402
Analgesic drugs			
In PACU	5 (14.3%)	12 (36.4%)	0.036†
Post-op 1–6 h	22 (62.9%)	23 (69.7%)	0.551
Post-op 6–12 h	22 (62.9%)	16 (48.5%)	0.233
Post-op 12–24 h	22 (62.9%)	20 (60.6%)	0.849
Post-op 24–48 h	13 (37.1%)	17 (51.5%)	0.233

Values are mean ± standard deviation or numbers
Pain score, a numerical pain intensity scale (0 = no pain, 10 = the worst pain)
PACU post-anesthesia care unit, post-op postoperative
Number of patients requiring analgesic drugs

*†$P < 0.05$.

Ethics Approval: 4-2017-0985

Yonsei University, Severance Hospital, Institutional Review Board

63

Peri-operative Temperature Management: An Audit of Australian and New Zealand Anaesthetic Practice and Outcomes.

Raymond Hu[1], Philip Peyton[1] and Callum Robinson[1]
[1]Austin Health, Melbourne, Australia

Introduction: Peri-operative hypothermia, defined as a temperature of <36OC during the peri-operative journey, is considered a preventable source of morbidity and mortality. Nevertheless, it remains a common issue in Australian anaesthetic practice.

Aims: The primary aim of this audit was to obtain data about peri-operative temperature management and determine compliance with standards derived from the Australian and New Zealand College of Anaesthetists clinical audit guide on normothermia.[1] The secondary aims of this study were to determine the prevalence of hypothermia pre-, intra- and postoperatively; to understand the range of devices used to measure and warm patients.

Methods: This was a prospective audit. After ethical approval, invited and consenting anaesthetists from Australia and New Zealand collected de-identified data regarding the temperature management of their patients from April 2018 to July 2018. Data collected included anaesthesia experience, region of practice, patient demographics, surgical and anaesthetic details, as well as temperature and equipment details within the pre-, intra- and postoperative periods.

Results: 1718 cases were submitted. There was sufficient data for analysis in 1, 552 cases. 1, 144/1, 551 cases were from the private/mixed private and public sector. 1285/1550 cases were from metropolitan regions. 1, 279/1551 cases involved consultant anaesthetists with >10 years' experience. Mean age was 52 years with ASA status of 1–2 (1160/1152). Compared to best practice, areas identified for improvement were:

• Percentage of patients actively pre-warmed if identified to be hypothermic preoperatively: 19%, (95% confidence interval 13–25%, n = 171) vs. target of 100%;

• Percentage of patients who are normothermic post-operatively: 79% (95% confidence interval 77–81%, n = 1511) vs. target of 100;

• Percentage of patients shivering post-operatively: 7% (95% Confidence interval 6–8%, n = 1540) vs. target of 0%.

The prevalence of hypothermia was: 11% pre-operatively (95% confidence interval 10–13%, n = 1498); 48% intra-operatively (95% confidence interval 45–51%, n = 1080) and 21% postoperatively (95% confidence interval 19–23%, n = 1510).

Conclusions: Intra-operative hypothermia remains very prevalent. We have demonstrated key areas for improvement to meet established peri-operative temperature best practice from a binational sample that includes the private sector. These results may be used to guide quality improvement in temperature measurement and management in the peri-operative setting.

Ethics Approval: Ethical Approval to conduct this audit was sought from, and approved by the Austin Health Human Research Ethics Committee. Approval Number: LNR/18/Austin/75 (Approved 1st March, 2018).

Reference

1. ANZCA Clinical Audit Guide, Perioperative normothermia. Last modified August, 2014. http://www.anzca.edu.au/documents/perioperative-normothermia-clinical-audit-guide-v1.pdf

64

Perioperative Temperature Management at the Royal Adelaide Hospital

James Turnbull[1] and Min-Qi Lee[1]
[1]Department of Anaesthesia, Pain & Hyperbaric Medicine, Royal Adelaide Hospital, Adelaide, Australia

Introduction: Hypothermia during the perioperative period has been associated with a number of adverse consequences including; increased rates of myocardial ischemia, coagulopathy, prolonged drug effects and surgical site infections.

There is a growing body of evidence suggesting that switching the mentality from one of a reactive to proactive view towards patients' temperature management in the perioperative period will reduce the adverse outcomes associated with inadvertent perioperative hypothermia.

A small audit of patients at the Royal Adelaide Hospital (RAH) was previously undertaken where it was found that there were a high proportion of patients (18.6%) who arrived in the Post Anaesthetic Recovery Unit (PACU) hypothermic. With less than a third of patients having their temperature monitored intraoperatively[1].

Aims: The aim of this project was to investigate what is the proportion of patients who arrive in the PACU with a temperature less than 36.0°C.

Methods: This audit was a cross-sectional observational study.

An education period to all preoperative, theatre and post-operative recovery nursing staff was undertaken prior to commencing the audit.

Temperatures were recorded using the tympanic membrane method, a temperature probe placed in the oro-pharynx, nasopharynx or intravesically. Data was extracted from an electronic database for 300 patients who had pre and post-operative temperatures recorded.

All patients over the age of 18 who were not discharged to ICU and who underwent general or regional anaesthesia at the RAH were included in the study.
Descriptive statistics for the incidence of perioperative hypothermia and usage of pre-warming will be reported.
Results: 687 patients' data was recorded to obtain 300 patients who had a pre and post-operative temperature recorded.
40 patients arrived to the theatre suite hypothermic. 55 patients arrived in PACU hypothermic. Of these, 4 (7%) were hypothermic prior to the commencement of the operation, 47 (85.5%) had no intraoperative temperature recorded, 21 (38.1%) were warmed in PACU.

Table 1: Peri-operative hypothermia management

	Number of Patients (300)	Percentage
Hypothermic upon arrival to the pre-operative holding bay	18	6%
Hypothermic upon arrival to PACU	55	18.3%
Temperature recorded intraoperatively	66	22%
Warming administered Intraoperatively	68	22.6%
Warming administered in PACU	21	7%

Conclusions: Despite an extensive education campaign to nursing staff, the rate of patients arriving in PACU hypothermic did not change significantly from the previous baseline audit. However, the education was successful in alerting nurses to the importance of warming in PACU as evidenced by the warming of 21 patients.
It is recommended that this audit be repeated after an education and awareness education series is presented to both nurses and other clinicians involved in the patient journey from pre-op to discharge from PACU.
Ethics Approval: Human Research Ethics Committee, Central Adelaide Local Health Network (CALHN)
CALHN Reference Number: R20190215

Reference

1. Madigan, R., *Perioperative Temperature Management Audit*. 2017, Royal Adelaide Hospital.

65

Reflecting on Local Practice: An Audit of Anaesthetic Modality for Ruptured AAAs

Rebecca Caragata
Princess Alexandra Hospital, Brisbane, Australia

Introduction: There is emerging evidence that the use of local anaesthesia (LA) confers a significant survival advantage for patients undergoing endovascular repair (rEVAR) of ruptured abdominal aortic aneurysms (rAAAs). Recent literature has shown as much as a four-fold survival benefit over general anaesthesia (GA). Ultimately, this has culminated in a new recommendation from the European Society for Vascular Surgery (ESVS), endorsing LA as the modality of choice in rEVAR.
Aims
This retrospective audit sought to evaluate clinical practice at the Princess Alexandra Hospital (PAH) with reference to this recommendation. It aimed to quantify the uptake of LA/Sedation for rEVAR and to qualitatively evaluate the factors surrounding the choice of anaesthetic modality as well as the effect of mode of anaesthesia on outcomes.
Methods: The PAH is a tertiary hospital in Brisbane, which serves as a vascular referral centre for a catchment population of more than one million patients. This audit analysed emergency surgical repairs for rAAAs across a two-year period, between April 1st 2017 and March 31st 2019. Patients were excluded if they had undergone an elective, thoracic or non-primary repair. The hospital's electronic records system was utilised to obtain data on patient demographics, physical observations, anaesthetic management, intraoperative events as well as outcome variables (ie. length of ICU/hospital stay and mortality). Statistical analysis was performed using R (version 3.4.0).
Results: Within the two-year period, the PAH performed 22 primary repairs for rupture, with 12 patients undergoing open surgical repair (OSR) and 10 planned for EVAR. Although all of the endovascular cases were initially offered LA/Sedation, there was a significant conversion rate to GA (n = 6 or 60%). Reasons for conversion included: haemodynamic deterioration (n = 3), restlessness (n = 2) and aspiration (n = 1). Conversion occurred at various time-points following surgical start time (range: 5–49 minutes). The study was unable to determine a significant difference in mortality based on anaesthetic modality.
Conclusions: Clinical practice at the PAH reflects the recent ESVS Guidelines, utilising LA/Sedation as a first-line for all rEVAR cases. Although the small size of this audit limits the utility of its outcome analysis, it does provide a unique insight into the provision of LA/Sedation as well as the reasons behind its potential failure. The high conversion rate in this audit re-emphasises the need for

constant preparedness throughout the case. In a pathology with notoriously high mortality stakes, any anaesthetic intervention with the potential to reduce this burden should be thoroughly explored.

Ethical Approval: This audit was determined to be a negligible risk project by the Metro South Health HREC in Brisbane, Australia on April 24th 2019.
HREC Reference Number: LNR/2019/QMS/53141

66

The contribution of an emergency department to the opioid crisis

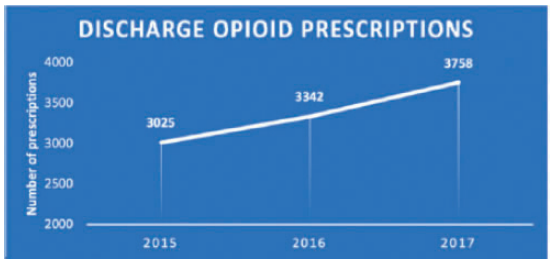
William Birkett[1], Pourya Pouryahya[1,2], Stephen Louey[1], Miriam Belhadfa[2], Sapphire Ferdousi[2], Kimberly Imperial[2], Phi Nguyen[2], Amber Wang[2] and Alastair D McR Meyer[1,2]
[1]Monash Health, Melbourne, Australia
[2]Monash University, Melbourne, Australia

Introduction: Misuse of prescription opioids is a significant public health issue in Australia. There has been a rapid rise in prescription opioid use over the past 20 years, with an associated increase in overdose and death.[1] In the United States (USA), hospital emergency departments (ED) have been recognised as a significant source of opioid prescriptions, often provided for inappropriate indications on discharge from hospital.[2] There is anecdotal concern that a similar prescribing practice may exist in Australian EDs, which could be contributing to a growing national opioid crisis. There is however limited Australian literature studying opioid prescribing in local EDs.

Aims: Our study primarily aimed to quantify the volume of opioids prescribed on discharge from an Australian ED. As a secondary outcome, we aimed to identify any trends in prescribing behaviour.

Methods: We performed an observational, retrospective data analysis of all oral schedule 8 opioid prescriptions provided on discharge from a single-centre metropolitan ED. Data was collected for a three-year period from MerlinMap® electronic prescribing software.

Results: During the 2017 calendar year, 5.6% of patients presenting to the ED were discharged back into the community with a prescription for an opioid. Oxycodone immediate-release (IR) 5mg was the most frequently ordered, however there were also 303 prescriptions (8.1%) for slow-release (SR) opioids. 77.7% of opioid prescriptions allowed for a maximum quantity of tablets. The annual volume of discharge opioid prescriptions has increased over a three-year period, reaching 3, 758 prescriptions in 2017 (figure 1).



Conclusions: A concerningly large number of opioids were prescribed on discharge from the ED. Oxycodone has an important role in the management of severe acute pain, however this high prevalence suggests an inappropriate overuse of this medication, especially in SR formulation. The high quantities of tablets provided per prescription may also put patients at risk of harm through the development of long-term opioid dependence.
Alarmingly, the increasing trend of opioid supply into the community is suggestive of a growing problem. Hospitals should consider steps to reduce the volume of prescribed opioids into the community, such as introducing education or prescribing guidelines for junior medical staff. This may avoid contributing to a potential iatrogenic 'opioid epidemic', as experienced overseas.[2]

Reference List

1. Australian Institute of Health and Welfare. Opioid harm in Australia. Canberra, 2018.
2. del Portal DA, Healy ME, Satz WA. Impact of an Opioid Prescribing Guideline in the Acute Care Setting. *J Emerg Med* 2016; 50(1): 21–7.

67

Relative survival in adults with new delirium, cerebrovascular events or both after cardiac surgery

Anna Lee[1], Derek Yau[1], Floria Ng[1], Malcolm Underwood[1] and Gavin Joynt[1]
[1]The Chinese University of Hong Kong, Shatin, Hong Kong

Introduction: New postoperative delirium and cerebrovascular events after cardiac surgery are independently associated with higher healthcare costs, poorer quality of life and mortality. However, the inter-relationship between delirium and cerebrovascular events, and long-term mortality after cardiac surgery has not been well established.

Aims: To determine the long-term survival of adults with delirium in the intensive care unit (ICU), cerebrovascular events, or both after cardiac surgery, compared with the Hong Kong general population

Methods: Prospective cohort study of 600 consecutive adults undergoing cardiac surgery at the Prince of Wales Hospital, Hong Kong, between July 2013 to July 2015, and followed up until 31st December 2018. Bedside ICU nurses performed delirium assessment using the Confusion Assessment Method-ICU tool 3 times/day. New postoperative cerebrovascular events were identified from the Cardiothoracic Surgery database, an identical dataset to the Society for Cardiothoracic Surgery in Great Britain and Ireland. Observed mortality was compared to expected mortality in the general population, matched for gender and age, obtained from appropriate calendar-year life tables. The standardized mortality rate (SMR) and relative excess risk of death using a Poisson regression were estimated.

Results: The mean (SD) age was 60.2 (10.6) years and 187 (31.2%) were female. 506 (84.3%) patients had no new postoperative ICU delirium or cerebrovascular events (reference group), 72 (12%) had ICU delirium alone (Group 1), 11 (1.8%) had cerebrovascular events alone (Group 2) and 11 (1.8%) had both ICU delirium and cerebrovascular events (Group 3). At the end of follow-up (median 4.4 years), there were 69 (11.5%) deaths. Standardised to the general population, cardiac surgical patients had an excess mortality rate of 17.5/1000 patient-years; the highest SMR was found in Group 3 patients (Table 1). The 4-year cumulative relative survival (95% CI) in the reference group was 94.0% (90.9%-96.3%). In Groups 1 to 3, the corresponding 4-year cumulative relative survival was 90.7% (79.6%-97.4%), 78.5% (40.0%-97.4%) and 66.6% (31.1%-88.5%). Compared to the reference group, the relative excess risk of death (95% CI) in Groups 1 to 3 were 1.47 (0.53–4.10), 4.04 (1.37–11.95) and 8.38 (3.51–19.99) respectively.

Conclusions: Compared to the general population, postoperative cardiac patients have an increased risk of death that progressively increases in patients who have delirium, cerebrovascular events, and both delirium and cerebrovascular events. Management strategies should address the diagnosis, prevention and treatment of new ICU delirium and cerebrovascular events after cardiac surgery to improve long-term survival.

Ethics Approval: The study was approved by the Joint The Chinese University of Hong Kong-New Territories East Cluster Clinical Research Ethics Committee (CREC Ref. No: 2017.688).

Table 1 Long-term mortality compared with mortality of the general population

Group (N)	Person-years at risk	Observed deaths	Expected deaths	Excess rate/1000 person-years	SMR (95% CI)
No events (506)	2131	51	20.2	14.4	2.5 (1.9-3.3)
Delirium only (72)	291	10	4.0	20.6	2.5 (1.2-4.6)
Stroke only (11)	40	3	0.8	55.4	4.0 (0.8-11.6)
Delirium & stroke (11)	32	5	0.4	142.5	13.3 (4.3-31.1)
Full sample (600)	2493	69	25.4	17.5	2.7 (2.1-3.4)

68

Cardiac Surgery Patient Audit

Xiao Liang[1] and Ann Ngui[1]
[1]Fiona Stanley Hospital, Perth, Australia

Introduction: Cardiac surgery is the most expensive surgery in Australia, yet complications occur in over one third of patients, increasing costs further. Little is known about factors potentially modifiable byanaesthetic practice. Four of these factors are examined in this audit.

Aims: The aims of this audit were to collect local data on variables that are potentially modifiable by cardiac anaesthetic practice, to compare this local data against national/international standards, and to use this data for a future project that could change anaesthetic practice and improve patient outcomes.

Methods: This retrospective audit was conducted at Fiona Stanley Hospital. Electronic record review was performed on all patients undergoing non-emergency cardiac surgery during the period of January to December of 2017.

Results: A total of 512 patients (533 surgical cases) were included in the analysis. 378 were male (73.8%) and 134 were female (26.2%), with an age range of 17–85 years old. Of the 465 cases with PONV data, 19.6% were associated with PONV.

99.8% of patients were adequately fasted from solids and 88.5% were adequately fasted from clear fluid as per ANZCA guidelines. However, patients were found to have fasted for excessive durations – on average, 7.7 hours and 5.2 hours in excess for solid and fluid, respectively. 71.9% of cases were fasted from solid for at least twice the minimum recommended duration (similar figures for fluids, at 67%).

The average duration of mechanical ventilation was 16 hours, with 176 cases (33.1%) extubated within 6 hours, 146 cases (27.5%) extubated after 12 hours, and 64 cases (12%) extubated after 24 hours.

Out of the 532 cases analysed, 298 (56%) had a core temperature of $<$36C on arrival to the ICU (or PACU).

Conclusions: The present study has yielded a number of significant findings. Firstly, it confirms that cardiac surgery patients are at high risk of PONV. However, the incidence in our population is lower than in previous studies, and further studies to identify factors contributing to this lower incidence may be helpful. Secondly, patients are commonly fasted for excessive durations, which may be detrimental to recovery and outcomes. Thirdly, a significant proportion of patients are mechanically ventilated for a prolonged period of time, which may be associated with significant complications. Finally, a large proportion of patients are hypothermic postoperatively. Further studies in these areas may help to improve patient outcomes in cardiac surgery.
Ethics Approval: GEKO Quailty Activity 28184

69

Advanced haemodynamic monitoring in the prehospital setting

Cor Slagt[1,2], Rein Ketelaars[1,2], Marijn Tacken[1,2], Geert Jan van Geffen[1,2], Corien Verrips[2], Lonneke Baggen[1], Gert Jan Scheffer[1,2] and Lucas van Eijk[1]
[1]Radboud University Medical Center, Nijmegen, The Netherlands
[2]Helicopter Emergency Medical Service, Lifeliner 3, Nijmegen, The Netherlands

Introduction: Traditionally, critically ill patients in the prehospital setting are monitored using only ECG, peripheral oxygen saturation and non-invasive blood pressure. Invasive hemodynamic monitoring theoretically could help to guide treatment and improve outcome, as it does in high risk surgery patients, including trauma patients. However, invasive techniques are not practicable in acute prehospital care.
Electrical cardiometry (EC) is a non-invasive method to measure cardiac output by the detection of alterations in thoracic impedance, using four skin electrodes. EC is able to detect changes in impedance created by the circulation, partly caused by the change in orientation of the erythrocytes during the cardiac cycle. It has shown a good correlation with invasive cardiac output measurements in elective surgery patients, provided that the internal control indicator Sequencial Quality Index (SQI) is $\geq$70. Due to its compact design and non-invasive character, EC could be an excellent tool to aid in clinical decision making in the prehospital care provided by the Helicopter Emergency Medical Service (HEMS).
Aim: To investigate the feasibility of performing non-invasive hemodynamic measurements by electrical cardiometry during pre-hospital care provided by the HEMS.
Methods: An explorative feasibility study was performed in 50 non-selected critically ill patients in which acute assistance of the HEMS was required. EC measurements were performed using an ICON® device (Osypka Medical GmbH, Germany). Data were sampled over 1 minute intervals. The primary end point was the proportion of measurements with an SQI$\geq$70. Secondary endpoints were the number of patients in which at least 1 measurement with an SQI$\geq$70 could be measured, and the mean proportion of measurements with an SQI$\geq$70 per patient.
Results: Of the included 50 patients, 16(32%) were medical emergencies (intoxication n = 6, neurological n = 4, sepsis n = 4, drowning n = 1, and burns n = 1) and 34 (68%) were trauma patients. Thirty-seven (74%) were intubated and ventilated.
In 50 patients a total of 684 advanced cardiac output measurements were recorded during 896 minutes of registration. Of all performed measurements 524(77%) had a SQI$\geq$70. In 47(94%) patients at least 1 measurement with an SQI$\geq$70 could be measured. The mean proportion of measurements with an SQI$\geq$70 per patient $\pm$ SD was 69 $\pm$ 28%. Means $\pm$ SD of advanced hemodynamic data were: cardiac output 9.9 $\pm$ 4.1L/min; cardiac index 4.8 $\pm$ 1.8 L/min/m^2.
Conclusions: The use of advanced hemodynamic monitoring by electrical cardiometry is feasible during acute patient care provided by the HEMS in the preclinical setting.
Ethics Approval: Approved by CMO Arnhem-Nijmegen, the Netherlands, file 2017–3203.
Registered at www.trialregister.nl, NTR5249-NL7250.

70

Prediction of difficult laryngoscopy in acromegaly patients by ultrasonographic assessment of airway

Nidhi Panda[1], K Manikiran[1], Komal Gandhi[1] and Sivashanmugam Dhandapani[1]
[1]Post graduate Institute of Medical Education and Research Chandigarh, Chandigarh, India

Introduction: The incidence of difficult airway is higher (13–30%) in acromegaly cases. Credibility of routine parameters of airway assessment is found to be less in acromegaly patients. Hence, in addition to these conventional parameters, more reliable method of airway assessment is required. Use of airway ultrasonography (USG) to predict difficult airway have been proven. Hence, a study was planned to compare ultrasonographic upper airway assessment in acromegaly patients.

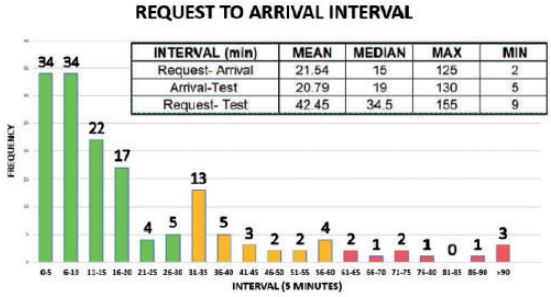
Aims: To compare ultrasonographic measurements of upper airway in acromegaly and non-acromegaly patients undergoing transsphenoidal surgery (TSS). Primary objective is to compare ultrasonographic measurements of tongue thickness at submandibular level. Secondary objectives include ultrasonographic measurements of anterior soft tissue at hyoid, pretracheal and vocal cord.
Methods: In this prospective, observational study, consenting acromegaly patients and subsequent non-acromegaly patients (controls) undergoing TSS over one year period were enrolled. Relevant history, airway assessment using conventional parameters and upper airway USG were collected preoperatively in all patients. Ultrasonographic measurements of tongue thickness at SM level, anterior soft tissue neck (ASTN) thickness at hyoid, pretracheal and vocal cords level, and clinical parameters of airway examination were recorded. Under anaesthesia, laryngoscopic views were assessed using Cormack-Lehane (CL) grading.
Results: Twenty six acromegaly patients and 25 non-acromegaly (non-functioning pituitary tumour) patients were enrolled during study period. Ultrasonographic measured tongue thickness at SM level was significantly higher in acromegaly patients than controls (4.4 ± 0.82cm Vs 3.80 ± 0.74cm, $p = 0.017$). Tongue width (5.6 ± 0.79cm Vs 5.1 ± 0.86cm, $p = 0.027$) and oral cavity height (5.5 ± 0.94cm Vs 4.7 ± 0.86cm, $p = 0.007$) were also significantly higher in acromegaly patients than controls. In acromegaly group, majority of patients had higher grades in upper lip bite test (grades I/ II/ III-5/ 9/ 12 Vs 22/ 2/ 1, $p < 0.001$) and modified Mallampati grades (grades I/ II/ III/ IV- 4/ 5/ 7/ 10 Vs 8/ 12/ 4/ 1, $p = 0.006$) as compared to controls. In our study cohort, we found difficult laryngoscopy in 19% (5/26 patients) of acromegaly patients compared to 8% (2/25 patients) in controls.
Conclusions: Coherence is noted between clinical parameters of airway examination and airway USG measured parameters in the cohort of acromegaly patients. Tongue thickness measured using USG at submandibular level was more in acromegaly patients which is one of the predictor of difficult laryngoscopy.
Ethics Approval:
NK/3871/MD/239 from Post-Graduate Institute of Medical Education and Research, Chandigarh, India. Clinical Trials Registry India registration number: CTRI/2018/02/011749

71

An Audit of Labour Epidural Response Times at a Tertiary Maternity Hospital

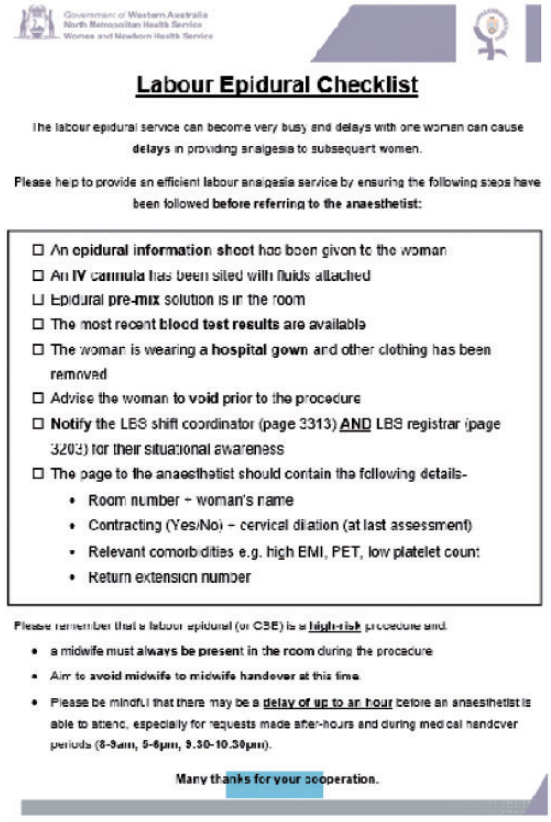
Sneha Neppalli[1]
[1]King Edward Memorial Hospital (Women and Newborn Health Service), Perth, Australia

Introduction: The timely provision of labour epidural analgesia is an important part of the service offered by anaesthetists. Delays can often result in significant distress to the labouring woman.
The Association of Anaesthetists of Great Britain and Ireland (AAGBI) Guidelines for Obstetric Anaesthesia Services recommends that in hospitals where a 24-hour labour regional analgesia service is offered, the time from the anaesthetist being informed about an epidural until being able to attend to the mother should not normally exceed 30 minutes, and must be within 1 hour except in exceptional circumstances.
Aims: An audit was undertaken to ascertain whether standards for best practice, as recommended by the Royal College of Anaesthetists (RCOA), were being met at our institution and to identify reasons for delays.
RCOA Audit Standard 1
$\geq$**80**% of women are **attended** to by an anaesthetist within **30 minutes** of requesting labour regional analgesia
RCOA Audit Standard 2
$\geq$**90**% of women are **attended** to by an anaesthetist within **60 minutes** of requesting labour regional analgesia
Methods: The audit was conducted at King Edward Memorial Hospital (KEMH), a maternity hospital located in Perth that serves as a tertiary referral centre for high-risk pregnancies. It provides a 24-hour dedicated on-site anaesthesia service for more than 5500 deliveries per annum.
A prospective audit was carried out over a 4- week period where anaesthetists (in conjunction with the midwife) completed a data collection form every time a labour epidural was sited. Data fields recorded included: Date, Shift, Grade of anaesthetist, Time anaesthetist first informed of epidural request, Time of arrival of anaesthetist, Time of epidural test dose, Reason/s for delays (if $>$ 30 minutes from time of first notification to time of arrival)
Results: 155 labour epidurals were audited over this time period.
75% of labour epidurals were attended to by an anaesthetist within 30 minutes of first request and 94% were attended to within 60 minutes of first request. The median time to arrival was 15 minutes and mean time to arrival 22 minutes (Figure 1). 79% of delays occurred out-of-hours. 22% of delayed epidurals were for women not yet experiencing labour pain (e.g. pre-induction epidurals).



The anaesthetist being busy in theatre or attending to another epidural accounted for over 50% of the delays in arrival. Other frequently cited reasons included the second (on-call) anaesthetist travelling from home (16%) and delays due to medical handover meetings (7%).

Conclusions: The results show that the RCOA benchmarks were only partially being met at KEMH. It was recommended that the on-site anaesthetist contact the on-call anaesthetist as early as possible if a 30 minute delay in attending to an epidural is anticipated e.g. occupied in theatre or multiple epidural requests. The implementation of a labour epidural checklist to guide midwives was also placed in every delivery room to help improve the efficiency of the labour epidural service (Figure 2).



Government of Western Australia
North Metropolitan Health Service
Women and Newborn Health Service

Labour Epidural Checklist

The labour epidural service can become very busy and delays with one woman can cause delays in providing analgesia to subsequent women.

Please help to provide an efficient labour analgesia service by ensuring the following steps have been followed **before referring to the anaesthetist:**

- ☐ An **epidural information sheet** has been given to the woman
- ☐ An **IV cannula** has been sited with fluids attached
- ☐ Epidural **pre-mix** solution is in the room
- ☐ The most recent **blood test results** are available
- ☐ The woman is wearing a **hospital gown** and other clothing has been removed
- ☐ Advise the woman **to void prior to the procedure**
- ☐ **Notify** the LBS shift coordinator (page 3313) **AND** LBS registrar (page 3203) for their situational awareness
- ☐ The page to the anaesthetist should contain the following details-
  - Room number + woman's name
  - Contracting (Yes/No) + cervical dilation (at last assessment)
  - Relevant comorbidities e.g. high BMI, PET, low platelet count
  - Return extension number

Please remember that a labour epidural (or CSE) is a **high-risk** procedure and:

- a midwife must **always be present** in the room during the procedure
- Aim to **avoid midwife to midwife handover** at this time.
- Please be mindful that there may be a **delay of up to an hour** before an anaesthetist is able to attend, especially for requests made after-hours and during medical handover periods (8-9am, 5-6pm, 9.30-10.30pm).

Many thanks for your cooperation.

Ethics Approval: This audit was registered with the local quality improvement committee (GEKO Quality Activity # 28764).

74

Arm size and shape in obese pregnant women – recommended cuff size and mode of delivery.

Matthew Bright[1] and Victoria Eley[1,2]
[1]The Royal Brisbane And Women's Hospital, Brisbane, Australia
[2]The University of Queensland, Brisbane, Australia

Introduction: Accurate non-invasive blood pressure (NIBP) measurement is essential during pregnancy. Measurement may be difficult in obese pregnant women due to the size and shape of their arms.

Aims: To determine the mid-arm circumference (MAC), arm Conicity Index (CI)[1] and recommended cuff sizes[2] of obese women in the third trimester. We prospectively recorded the mode of delivery, development of pre-eclampsia and use of invasive arterial lines in women with body mass index (BMI) >35 kg/m^2.

Methods: The initial pilot study recruited 450 pregnant women of any BMI and of >32 weeks gestation from the antenatal clinic of a tertiary hospital. Participant consent was obtained, along with demographic and pregnancy information. Measurements were taken from both upper limbs by trained investigators, applying standard anthropometry procedures. CI was calculated: (D1-D2/L) X 100 ((D1, D2 = upper and lower arm diameter, L = arm length).[1] MAC measurements were compared with recommended arm cuff sizes.[1] Women with BMI >35 kg/m^2 were selected from the original 450 and the mode of delivery, use of invasive arterial monitoring and development of pre-eclampsia documented. The CI of those with BMI >35 kg/m^2 was compared with those with BMI ≤ 35 kg/m^2 using independent sample t-tests; statistical significance was set at $\alpha<0.05$.

Results: Eighty-one women had a BMI >35 kg/m^2. They had a mean (SD) age of 30.7 years (5.1), median (IQR, range) BMI of 38.2 kg/m^2 (36.6 – 42.2, 35.1 – 62.2) and 27 (33.3%) were nulliparous. Nine women (11.1%) had gestational hypertension or chronic hypertension. Recruitment occurred at a mean (SD) gestation of 35.5 weeks (1.9). Right arm measurements and recommended cuff sizes are reported in Table 1. Forty-four women (54.3%) delivered by caesarean section (CS). The 44 women who delivered by CS had a median BMI (IQR, range) of 38.2 kg/m^2 (36.5–42.9, 35.2–61.1). None had invasive arterial monitoring. Five women (6.2%) developed

peripartum pre-eclampsia. The mean (SD) right CI of the 368 women with BMI $\leq$35 kg/m^2 was 6.2 (1.7), significantly lower than those with BMI $>$ 35 kg/m^2, $p < 0.00001$.

Conclusions: In this selected population, based on right MAC, women with BMI $>$35 kg/m^2 were more likely to require a NIBP cuff larger than the standard adult size. Only one woman was outside the recommended cuff range. Women with BMI $>$35 kg/m^2 had arms that were more cone-shaped, according to the CI.

Ethics Approval: This project was approved by the Royal Brisbane and Women's Hospital Human Research Ethics Committee (RBWH HREC, EC00172), approval number HREC/17/QRBW/108.

Table 1 Arm measurements and recommended non-invasive blood pressure cuff sizes according to American Heart Association,[2] based on right mid-arm circumference (MAC), 81 pregnant women with BMI $>$35 kg/m^2.

Measurement	Mean (SD)	Range
Right MAC, cm	37.6 (5.0)	30.5 – 53.2
Right arm conicity index	8.0 (3.0)	-0.1 – 17.4
Right MAC cm	Recommended cuff size	Number (%)
27–34.9	Adult	29 (35.8)
35–44.9	Large adult	45 (55.6)
45–51.9	Thigh	6 (7.4)
$\geq$52	No recommendation	1 (1.2)

References

1. Palatini P et al. Rectangular cuffs may overestimate blood pressure in individuals with large conical arms. *J Hypertens* 2012; 30: 530–536.
2. Pickering TG et al. Recommendations for blood pressure measurement in humans and experimental animals part 1. *Hypertension* 2005; 45: 142–61.

77

Names and Roles on Theatre Caps to Improve Identification and Communication in Theatres – Perceptions and Challenges

Marie Nemani[3], Boris Waldman[1,2], Alexandra Trollope[3] and Robert Hackett[2]
[1]Sydney Medical School, Faculty of Medicine and Health, University of Sydney, Camperdown, Australia
[2]Royal Prince Alfred Hospital, Camperdown, Australia
[3]James Cook University College of Medicine and Dentistry, Douglas, Australia

Introduction: WHO safe surgery guidelines have encouraged operating theatre staff to clearly identify themselves by name and role since 2009. Displaying names and roles on theatre caps, may facilitate introductions and encourage communication in operating theatres.

Aims: We hoped to determine current practices in operating theatres and potential barriers to uptake of named theatre caps, depending on the professional group and seniority.

Methods: We conducted a practical survey disseminated via social media and email in April and May 2018, using multiple choice and free text responses.

Results: Health care staff who worked in operating theatres overwhelmingly believed that staff should display their name and role at all times (513/594, 87%), however support for this concept was lower amongst surgeons (77%, $p < 0.05$ two-sided t-test). Support was lowest among surgeons having worked 20 years or more (64%), compared to those having worked 10 or fewer years (92%). Most respondents believed that named theatre caps were a good idea (443/552, 80%) (Figure 1). This response aligned with their views on the importance of identification in theatre (χ^2, $p < 0.001$). Medical and nursing students strongly supported both the importance of introductions in general (96%) and named theatre caps as a solution (100%).

Respondents, who did not support the idea of named theatre caps, cited concerns regarding infection control (9%), personal safety (12%), lack evidence for this approach (11%) or looking unprofessional (33%).

Overall, 49% felt that staff in theatres did not clearly identify their name and role. These respondents were more likely to support the use of names on theatre caps (88% v 72%, $p < 0.0001$).

Conclusions: Our findings highlight the ongoing issue of staff not knowing the name and role of other team members in the operating room. This persists despite the

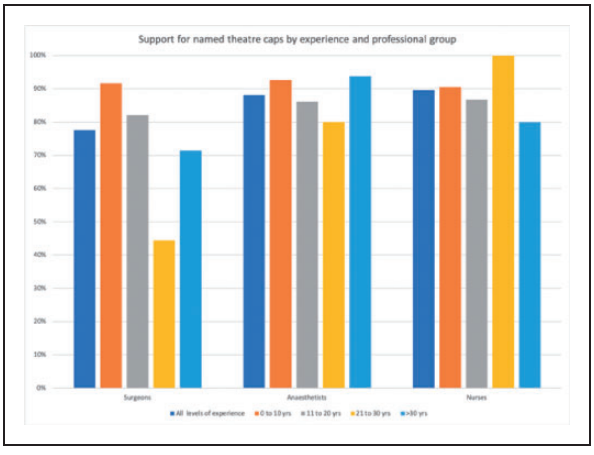


Figure 1: Support for (A) clear identification of name and role in theatres and specialty by professional group and seniority

World Health Organisation Surgical Safety Checklist and other initiatives. One practical aid – displaying names and roles on theatre caps appears well supported particularly amongst junior staff, nurses and anaesthetists. Engaging the support from senior staff members, particularly surgeons, is likely to be key to the success of this simple intervention.

Ethics Approval: Ethics Approval Number H7318, HREC James Cook University, Townsville.

78

Resuscitation in Haemorrhagic Shock Through Unrecognised Inadvertent Brachial Artery Cannulation. A Case Report.

Ahmad Dawar[1] and Timothy Gilmour[1]
[1]Ipswich Hospital, Ipswich, Australia

Introduction: Placenta accreta spectrum (PAS) is associated with significant maternal morbidity. Up to 95% of patients require blood transfusion as a result of peripartum haemorrhage and aggressive resuscitation is often required. Large bore intravenous (IV) cannulation is essential to providing resuscitation and ultrasound guidance (USG) is often used when difficulty is suspected. The commonly used method to identify a vein under USG is a collapsible lumen with direct pressure and visual appreciation of non-pulsatile vessel.

Case Presentation: We present a case of haemorrhagic shock in which an unrecognised inadvertent brachial artery cannulation was utilized to resuscitate patient. A 28-year-old Female (G2P1) with a known grade 4 placenta praevia presented to our hospital for an elective repeat caesarean section at 38 + 2 weeks gestation. 2 Large bore cannulae in the right upper limb and cell saver for the operation was part of preparation. After delivery she was found to have an undiagnosed placenta accreta, resulting in severe post-partum haemorrhage. A massive transfusion protocol was activated and while awaiting blood products, patient was resuscitated with colloids and high dose vasopressor infusion to support perfusion of vital organs. Need for more IV access was realised due to inadequate resuscitation with available IV accesses and a 14-gauge cannula was inserted into the left cubital fossa under ultrasound guidance. At the time of cannula insertion patient's both arms had mottled appearance, radial pulsation was not palpable and arterial trace was very damped. The cannula was inserted in the vein which was thought to be the median cubital vein due to its anatomical location and the vessel was collapsible and non-pulsatile with gentle ultrasound probe pressure. The cannula was connected to transfusion pump set. Crystalloid and blood products were administered under pressure through this line. After successful resuscitation it was realized that cannula is in brachial artery and was promptly removed. During patient stay in intensive care unit for next 24 hrs vascularity of the patient's limb was closely monitored with plethysmograph, doppler and manual palpation of radial pulse. The patient did not sustain any complications as a result of arterial cannulation.

Conclusions: This case demonstrates that demonstration of collapsibility and non-pulsatile vessel with the use of ultrasound is not enough to exclude arterial cannulation in a shocked patient. Furthermore, we conclude that although resuscitation through an arterial cannula possesses considerable risk, it may be utilised for a short period in the setting of severe shock and where no other IV access is available.

Ethics Approval: Ethics exemption granted by West Morten Health Human Research Ethics Committee EC00184 (31st May 2019)

80

Survey on Preoperative Fasting: Patient Experience and Understanding (Sugar Study – II)

Philip Chan[1] and Aihua Wu[1,2]
[1]Eastern Health, Ringwood East, Australia
[2]Monash University, Clayton, Australia

Introduction: The effects of preoperative fasting on patient wellbeing and postoperative recovery has been extensively studied. This is reflected in the current guideline recommendations that patients should consume a carbohydrate drink up until 2hrs prior to anaesthesia. However, our previous study has shown that adherence to the guidelines is poor with too many fasting for too long[1].

Aims: To improve the guidelines' adherence, we designed this survey to examine the reasons behind the prolonged fasting and its impact on patient experience.

Methods: Following institutional ethics approval, we included all patients undergoing elective surgery at our hospital, between 26/11/2018 and 21/12/2018. We followed up these patients soon after their discharge from recovery room and, when sufficiently alert, we sought their consent to complete an anonymous questionnaire survey.

Results: There were 283 eligible patients, excluding 80 patients (loss of follow-up, incomplete information, patient refusal or incompetence), data from the remaining 203 was examined.

The results saw an improvement in preoperative fasting periods from the previous study[1], particularly clear fluids (Table 1). However, the incidence of prolonged fasting persisted high (40∼60%).

Further questioning revealed that prolonged fasting was likely attributable to the following misconceptions:

First, confusion about the recommended fasting periods (Figure 1). When asked how long is the recommended fasting periods for clear fluids and solid food, only 22.2∼23.2% of patients had selected the correct answer. Of concern, many patients (36.5%∼62.6%) believed that 8-hour fasting was the standard for both clear fluids and solid food, which is presumably related to the dogma of "nil by mouth from midnight".

Second, misperception of clear fluids. Unfortunately, clear sugary beverages were only recognized by 2∼15% of patients, while a clinically significant proportion of patients (1.5%) thought milky drinks were clear fluids.

When asked why they did not drink until 2hrs prior, most patients said "I was told not to by staff" followed by "Didn't know when my operation would be". Despite that, the majority of patients (85%) were satisfactory with their preoperative fasting instructions provided.

Conclusions: Since the initial study 4 years ago[1], there has been an improvement in preoperative fasting periods, however, adherence to current guidelines is still far from ideal. The reasons were complex and multifactorial, but may be related to: confusion about the recommended fasting times, lack of understanding of "clear fluids" and uncertainty of surgical scheduling. Despite these, most patients were satisfied with preoperative fasting instructions provided.

Approvals: **Eastern** Health Research Ethics Committee: approval obtained (LR74-2018)

Table 1 Percentage of patients in each fasting category* for clear fluids and solid foods[1] (*Clear fluids: <2hrs 'non-fasting', 2∼3.99hrs 'good practice', 4∼5.99hrs 'acceptable', 6∼9.99hrs 'prolonged' and ≥10hrs 'excessive'. Solid fooods: <6hrs 'non-fasting', 6∼7.99hrs 'good practice', 8∼11.99hrs 'acceptable', 12∼15.99hrs 'prolonged' and ≥16hrs 'excessive').

		Clear Fluids		Solid Foods	
Non-fasting (%)		0.5		0.0	
Good Practice (%)	Acceptable	20.4	58.8	25.1	39.4
Acceptable (%)	Practice (%)	38.4		14.3	
Prolonged (%)	Unacceptable	33.2	40.8	33.0	60.6
Excessive (%)	Practice (%)	7.6		27.6	

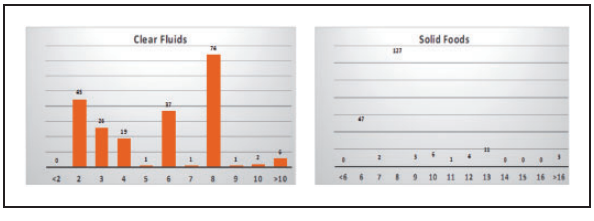


Figure 1 Patient response to "how long is the recommended fasting period before an operation?"

Reference

1. Thomson A, Wu A. Surgical Metabolic Prehabilitation: a Current Concept of Preoperative Fasting (Sugar Study I). *Anaesth Intensive Care* 2017, 45 (1): 117–118.

81

Cancellations of The Scheduled Surgery: An Analytic Study

Rudi Falovic[1] and Aihua Wu[1,2]
[1]Eastern Health, Ringwood East, Australia
[2]Monash University, Clayton, Australia

Introduction: Cancellation on the day of surgery (DOS) is well studied, however, literature is limited about advanced cancellations of scheduled surgery. While DOS cancellation is undesirable in terms of patient experience and health care cost, prior cancellations are similarly undesirable. Cancellations, especially with short notice, can introduce extra workload to booking staff and may create an inaccurate surgical scheduling, which in turn will lead to inefficient use of operating theatre (OT) time and result in cancellations on DOS[1].

Here, a "cancellation" is defined as: any operations booked for OT but subsequently didn't occur as scheduled, *i.e.,* date and type of surgery[2].

Aims: In order to improve OT efficiency, we designed this quality assurance project to examine the reasons for the cancellations of scheduled surgery and the percentage thereof.

Methods: This is a retrospective audit for all cancelled OT bookings at a public general hospital from 1/4/2012 to 31/3/ 2013. This hospital has 228 beds and 4 theatres for general, orthopaedics, plastics and urology operations. After institutional ethics approval, cancellations during the study period (from 38 surgeons) were retrieved from the hospital database. From this dataset, three surgeons were randomly selected, under whom, a total of 90 cancellations occurred. Of this, the following data were extracted from electronic patient records: when the cancellation occurred, who cancelled and why.

Results: During the study year, there were 4262 operations performed and 1721 cancellations occurred, representing a cancellation rate of 40%.

On further examination, the 90 cancellations involved 77 patients, of whom, 11 cancelled twice and one three times (the reasons are detailed in Table-1). The results showed over a third of the cancellations occurred on DOS (Chart-

Table 1 Why patients were cancelled for more than once.

	1st Cancellation	2nd Cancellation	3rd Cancellation
Pt 1	Lack of OT Time	Change of Surgery Type	
Pt 2	Surgeon Unavailable	Anaesthetist Unavailable	
Pt 3	Prior Cancellation with Unclear Reasons	Lack of OT Time	
Pt 4	Prior Cancellation with Unclear Reasons	Change of Surgery Type	
Pt 5	Prior Cancellation with Unclear Reasons	Anaesthetist Unavailable	
Pt 6	Lack of OT Time	Lack of OT Time	
Pt 7	Prior Cancellation with Unclear Reasons	Anaesthetist Unavailable	
Pt 8	Patient Personal Reasons	Surgical Condition Change	
Pt 9	Patient Personal Reasons	Patient Personal Reasons	
Pt 10	Patient Personal Reasons	Surgical Condition Change	
Pt 11	Patient Personal Reasons	Patient Personal Reasons	
Pt 12	Medical Unfitness	Medical Unfitness	Medical Unfitness
NB:	Prior Cancellation with Unclear Reasons	Prior Cancellation by Patient	Cancellation on DOS

1A), which were mainly due to non-availability of OT time (58%) or staff (18%) (Chart-1B).

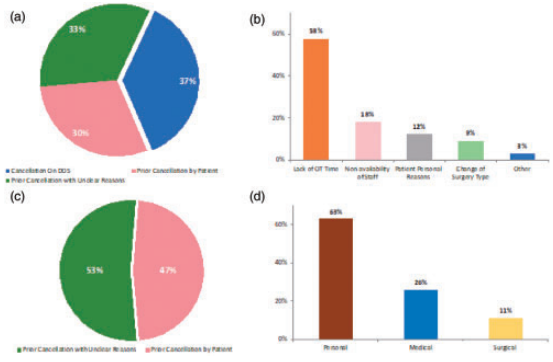
Of interest, cancellations on DOS by patients were rare and only accounted for 12%, the reasons for which included: failure to attend, unwillingness to wait or refusal to accept the associated risks.

Unfortunately, about half of the 'prior' cancellations had no clear reasons recorded (Chart-1C). For the other half (47%), the following reasons were identified (Chart-1D): patient personal issues (63%), e.g., insufficient social support, travelling; medical unfitness (26%); and lastly, change in surgical conditions (11%).

Conclusions: In conclusion, cancellations on DOS were principally due to non-availability of OT time or staff. However, prior cancellations were mainly due to patient personal issues, the impact of such cancellations on the OT efficiency is yet to be determined.

Approvals: Eastern Health Research Ethics Committee: approval obtained (QA58-2018)

Chart 1. The rates and reasons for cancellations of scheduled surgery.



Acknowledgements

We thank Mr Jarred Kimberley and Mr Peter Long for assistance with data extraction from the hospital database.

References

1. Talati S, et al. Analysis of time utilization and cancellations of scheduled cases in the main operation theater complex of a tertiary care teaching Institute of North India. *J Postgrad Med.* 2014;61:3–8.
2. González-Arévalo A, et al. Causes for cancellation of elective surgical procedures in a Spanish general hospital. *Anaesthesia.* 2009;64(5):487–493.

82

Clinical Outcomes in Elderly Patients with a Hip Fracture (CHIEF Sub-Study)

Basel El-behesy[1], Michael Fahey[5], Afnan Khaleque[1], Aihua Wu[2,3] and David Story[4]
[1]Monash Medical Centre, Clayton, Australia
[2]Eastern Health, Ringwood East, Australia
[3]Monash University, Clayton, Australia
[4]Centre for Integrated Critical Care, The University of Melbourne and Melbourne Academic Centre for Health, Melbourne, Australia
[5]Department of Statistics, Data Science and Epidemiology, Swinburne University of Technology, Australia

Introduction: Hip fractures (HF) in the elderly are a leading cause of morbidity and mortality in orthopaedic surgery and impose heavy medico-economic burden on the health system.

A recent editorial[1] has called for large observational studies in various countries so that comparative effectiveness research is possible for this population. In Australia, there are only a few small studies reporting on mortality rates

with minimal exploration into other outcome measures and therefore a research gap on local data is present.

Aims: This study aims to estimate the mortality rates in the elderly patients presenting with HF, the survival days until study cut-off date and days alive out of hospital at 90 days (DAOH-90d) after hospital admission (non-operative group) or surgical repair (operative group).

Methods: A historical cohort study was performed on patients aged 70 years or older, who were admitted to a Victorian metropolitan hospital during the period July-2011 to July-2015 due to HF.

After institutional ethics approval, the hospital's diagnostic-related-group database identified 1048 eligible patients. Of this, 105 patients were excluded from this study due to incomplete data, predominately because of hospital transfers.

Based on the mortality data, retrieved from Victorian Registry of Births, Death and Marriages, the survival days up to the study cut-off date (1st August 2016, *i.e.*, one year after the last patient's operation) and DAOH-90d were calculated.

Unpaired *t* test and descriptive statistics were used.

Results: Demographics data was extracted from electronic patient records (Table 1).

The mortality rates for non-operative patients were 26% at 30 days, 31% at 90 days and 45% at one year; for operative patients, 10%, 17% and 28% respectively.

When comparing between non-operative and operative groups (Figure 1), there was a significant difference in survival days ($p = 0.019$) with the average of 595 (95% confidence interval (CI) 490 to 701) *versus* 720 days (95% CI 684 to 757); however, the mean DAOH-90d was 49 (95% CI 43 to 56) and 51 days (95% CI 49 to 53) with no statistical difference between the groups ($p = 0.62$).

Conclusions: This study confirms persistently high mortality in HF patients regardless of surgical or conservative management. Notably, their 30-day postoperative mortality doubled that of the general surgical population[2].

While the results may suggest surgical repair prolongs survival days, the proportion of non-operative patients who lived quite a while is also noticeable, although the quality of life may differ between the groups.

Approvals: Eastern Health Research Ethics Committee: approval obtained (LR86/2015);

Table 1 Demographics for patients presenting with a hip fracture for medical or surgical treatment.

	Non-Operative (n = 118)	Operative (n = 825)
Age (mean ± SD)	86 ± 7	85 ± 7
Gender		
Female (%)	77 (65%)	602 (73%)
Male (%)	41 (35%)	223 (27%)

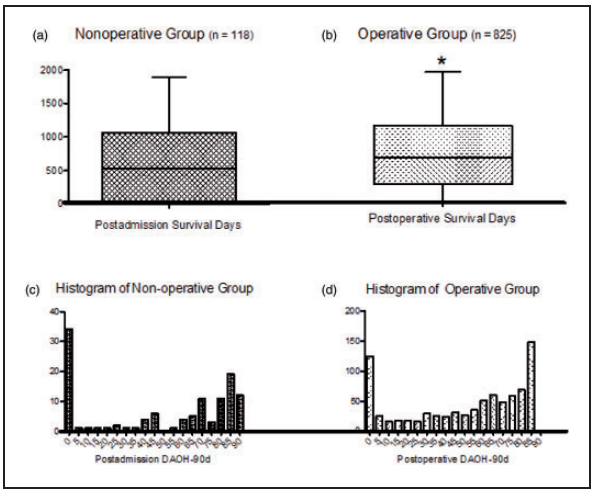


Figure 1 Survival days (A & B) and DAOH at 90 days (C & D) in patients with an operative or non-operative hip fracture.

This research is registered with ANZCTR (ACTRN12617000367347).

Acknowledgements

This research was supported by a grant from the ANZCA Research Foundation (N18/003);

We thank Dr Philip Chan, Dr Tim Lee and Ms Amy Skiller for assistance with data entry.

References

1. Coburn M, et al. We may have improved but we must get better still: The never-ending story of the elderly with fractured neck of femur. *Eur J Anaesthesio* 2017; 34: 115–117.
2. Story DA, et al. Complications and mortality in older surgical patients in Australia and New Zealand (the REASON study). *Anaesthesia* 2010; 65(10):1022–1030.

83

Establishing and Maintaining "Stop Before You Block" – A continuing quality improvement campaign

Oscar Wen[1], Mark Azer[1] and Laurence Boss[1]

[1]The St George Hospital, Kogarah, Australia

Introduction: Placenta accreta spectrum (PAS) is associated with significant maternal morbidity. Up to 95% of patients require blood transfusion as a result of peripartum haemorrhage and aggressive resuscitation is often required. Large bore intravenous (IV) cannulation is essential to providing resuscitation and ultrasound guidance (USG) is often used when difficulty is suspected. The commonly used method to identify a vein under USG is a

collapsible lumen with direct pressure and visual appreciation of non-pulsatile vessel.

Case Presentation: We present a case of haemorrhagic shock in which an unrecognised inadvertent brachial artery cannulation was utilized to resuscitate patient. A 28-year-old Female (G2P1) with a known grade 4 placenta praevia presented to our hospital for an elective repeat caesarean section at 38 + 2 weeks gestation. 2 Large bore cannulae in the right upper limb and cell saver for the operation was part of preparation. After delivery she was found to have an undiagnosed placenta accreta, resulting in severe post-partum haemorrhage. A massive transfusion protocol was activated and while awaiting blood products, patient was resuscitated with colloids and high dose vasopressor infusion to support perfusion of vital organs. Need for more IV access was realised due to inadequate resuscitation with available IV accesses and a 14-gauge cannula was inserted into the left cubital fossa under ultrasound guidance. At the time of cannula insertion patient's both arms had mottled appearance, radial pulsation was not palpable and arterial trace was very damped. The cannula was inserted in the vein which was thought to be the median cubital vein due to its anatomical location and the vessel was collapsible and non-pulsatile with gentle ultrasound probe pressure. The cannula was connected to transfusion pump set. Crystalloid and blood products were administered under pressure through this line. After successful resuscitation it was realized that cannula is in brachial artery and was promptly removed. During patient stay in intensive care unit for next 24 hrs vascularity of the patient's limb was closely monitored with plethysmograph, doppler and manual palpation of radial pulse. The patient did not sustain any complications as a result of arterial cannulation.

Conclusions: This case demonstrates that demonstration of collapsibility and non-pulsatile vessel with the use of ultrasound is not enough to exclude arterial cannulation in a shocked patient. Furthermore, we conclude that although resuscitation through an arterial cannula possesses considerable risk, it may be utilised for a short period in the setting of severe shock and where no other IV access is available.

Ethics Approval: Ethics exemption granted by West Morten Health Human Research Ethics Committee EC00184 (31st May 2019).

84

Arm size and conicity in adults presenting for elective surgery – implications for blood pressure measurement.

Christopher Chow[2], Katie Lehane[2], Peter Ceglowski[2], Anita Pelecanos[3], Kellie Wren[1,2] and Victoria Eley[1,2]

[1]The Royal Brisbane And Women's Hospital, Brisbane, Australia

[2]The University of Queensland, Brisbane, Australia

[3]Queensland Institute of Medical Research Berghofer, Brisbane, Australia

Introduction: Accurate perioperative non-invasive blood pressure (NIBP) measurement is essential but standard NIBP cuffs fit obese patients poorly. Arm conicity (identified by the arm slant angle) has been associated with NIBP measurement error. Predicting arm conicity may help decisions regarding blood pressure measurement techniques.

Aims: We aimed to obtain arm measurements of adults presenting to a tertiary hospital preadmission clinic to determine: the requirement for different cuff sizes; the best predictor of arm conicity based on the right slant angle; the incidence of a right arm slant angle $< 83^{\circ}$.

Methods: Eligible participants were presenting for a procedure, age > 18 years and provided consent. Demographics and co-morbidities were recorded. Standard measurements were taken from both upper limbs.[1] Slant angle was calculated: SA = arccosine[(C1-C2)/(2πL)] x (360/2π) (C1, C2 = upper and lower circumference, L = arm length).[2] Right mid-arm circumference (MAC) was compared to recommended cuff sizes. Independent t-tests were used to compare measurements from males and females. Linear regression was used to determine the best predictor of right slant angle. Correlation coefficients were calculated and R^2 values compared. Statistical significance was set at $\alpha < 0.05$.

Results: 454 patients were recruited between December 2018 and March 2019. Mean (SD) age was 59.9 (16.6) years, 247 (54.4%) were female and 409 (92.1%) were Caucasian. The median (IQR, range) BMI was 28.1 kg/m^2 (24.2 – 33.4, 16.1 – 60.9). The most common surgical specialties were plastic 130 (28.6%) and general surgery 71 (15.6%). Diagnosed hypertension was present in 197 (43.4%) with 78 (48.1%) taking two or more antihypertensive medications. The mean (SD, range) right MAC was 31.0 cm (5.0, 20.8 – 52.5) and slant angle was 86.9 degrees (1.3, 80.3 – 90.5). There was no statistically significant difference between right MAC and right slant angle between males and females. Table 1 shows the

Table 1

Recommended non-invasive blood pressure cuff sizes based on right mid-arm circumference: 454 patients presenting for elective surgery at a tertiary hospital.

Right mid-arm circumference (cm)	Cuff size[3]	Number (%)
<22	No adult cuff suitable	3 (0.7)
22-26.9	Adult small	87 (19.2)
27-34.9	Adult	284 (62.6)
35-44.9	Large Adult	73 (16.1)
45-51.9	Adult Thigh	6 (1.3)
>52	No adult cuff suitable	1 (0.2)

Linear regression models describing the relationship between body mass index (BMI), weight and right mid-arm circumference (MAC) with right arm slant angle, n=454.

Explanatory variable	Constant	β (95% CI)	R^2
BMI kg/m^2	89.49	−0.086 (−0.10 – −0.072)	0.24
Weight kg	88.80	−0.022 (−0.027 – −0.017)	0.15
Right MAC cm	90.81	−0.13 (−0.15 – −0.10)	0.23

recommended cuff sizes based on right MAC and the linear regression results. BMI, weight and right MAC all had low to moderate correlation with right arm slant angle ($r = 0.49, 0.39, 0.38$, $p < 0.001$ for each). Six (1.3%) had a slant angle $< 83°$.

Conclusions: In pre-operative patients, BMI or right MAC could be used to help predict right arm conicity, each explaining 24 and 23% of the variation in slant angle observed. In only one participant was the mid-arm circumference outside the recommended cuff size range. However based on arm conicity, 6 may be expected to have erroneous NIBP measurements.

Ethics Approval: This project was approved by the Royal Brisbane and Women's Hospital Human Research Ethics Committee (RBWH HREC, EC00172), approval number HREC/18/QRBW/335.

References

1. Centre for Disease Control: National Health and Nutrition Examination Survey: Anthropometry Procedures Manual. US, 2007.
2. Palatini P et al. Rectangular cuffs may overestimate blood pressure in individuals with large conical arms. *J Hypertens* 2012; 30: 530–536.
3. Pickering TG et al. Recommendations for blood pressure measurement in humans and experimental animals part 1. *Hypertension* 2005; 45: 142–161.

85

Anaesthesia workforce and service profile in Timor Leste.

Amir Babu Shrestha[1]
[1]Hospital Nacional Guido Valadares, Dili, East Timor

Introduction: East Timor was a colonized by Portugal for nearly 400 years and then merely after 2 weeks occupied by Indonesia in 1975 which withdrawn in 1999 leaving the health system purely paralyzed and there were only 20 Timorese-based medical doctors and no specialists. The small pacific country with population of 1.35 million at present had fluctuations of specialist health care deliveries in terms of services, trainings, medical education since independence.

Aims

A narrative of development of anaesthesia workforce including initial basic nurse Anaesthetist (non-physician anaesthesia provider) training and current post graduate diploma in anaesthesia course (physician anaesthesia provider).

Methods: Retrospective review of the impact of the nurse Anaesthetist training and postgraduate diploma in anaesthesia course in the mainstream of anaesthesia service delivery in the East Timor. This reviews the 3 cohorts of Basic Nurse Anaesthesia training of 12 months each commenced in June 2004 and ended in 2008 and specialist training of 18-month postgraduate diploma in anaesthesia course in Dili from year 2012. Also reviews the anaesthetic volume in the country in 2018 in the national hospital in Dili. This presentation also compares with the Lancet recommendation of minimum four Specialist Anaesthetists requirement per 100, 000 population to meet the surgical needs of a country.

Results: Country with a handful of doctors without a single specialist from the time of withdrawal of Indonesian military in 1999 to date 14 national specialists (MMed) in various disciplines including three in anesthesia not counting 10 doctors have completed and one currently enrolled in a Postgraduate Diploma in Anaesthesia at HNGV under UNTL. Four of the Diploma graduates progressed to Masters training at Fiji, two of whom

completed the MMed in 2018 and all of whom are working in country. One diploma graduate will soon complete the MMed from Indonesia. Besides that 21 nurse anaesthetists have been trained during the period of 2004 – 2008 and 18 among whom are still in anaesthesia service. Currently through the bilateral negotiations between governments of Cuba and China, many specialists in various disciplines are working for capacity building and healthcare delivery in the country.

Conclusions: East Timor has progressed qualitatively and quantitatively in the sector of anaesthetic workforce development with the introduction and implementation of the nurse anaesthetist training program and the post-graduate diploma in anaesthesia course further to abroad training.

86

When do we switch it on? – an audit of factors influencing Massive Transfusion Protocol activation

Jason Oh[1] and John Boss[2]
[1]St George & Sutherland Clinical School, University of New South Wales, Kogarah, Australia
[2]Department of Anaesthesia, St George Hospital, Kogarah, Australia

Introduction: The Massive Transfusion Protocol (MTP) is a key component of the resuscitation of patients with critical haemorrhage. Timely activation of the MTP reduces time to haemostasis and reduce mortality,[1] but massive transfusion is associated with complications such as electrolyte imbalances, acidosis, fluid overload, and multiorgan failure[2]. Judicious activation is thus essential. Validated tools are available for trauma,[3,4] but the literature is sparse for non-traumatic haemorrhage despite these contributing over 80% of massive transfusion cases.[5] In the absence of evidence-based tools clinicians rely on gestalt, which has low sensitivity and specificity.[6]

Aims: The authors aimed to identify factors considered when activating the MTP, relate these to local MTP activation criteria, and to suggest strategies to improve clinician decision-making.

Methods: A survey of three clinical vignettes was distributed to staff in anaesthetics, emergency, and intensive care. As each vignette progressed, clinicians justified their decisions to activate or withhold the MTP. Responders were tested on their knowledge of the local MTP activation criteria. Post-survey thoughts on MTP activation and quality improvement were collected.

Results: 43 clinicians completed the survey – 16 intensive care, 16 anaesthetics, 11 emergency. There were 16 consultants/fellows, 22 registrars, and five residents, with a median of eight years' experience and one MTP activation per year. Half had accessed the local MTP document, and only six (14%) correctly identified the activation criteria.

Clinicians noted a variety of factors they considered when activating the MTP:

Clinical factors
- Haemodynamics
- Evidence of end-organ dysfunction
- Mechanism of injury

Biochemical factors
- Haemoglobin
- Coagulation studies
- Acid-base balance

Patient-based factors
- Estimated physiological reserve

Systemic factors
- Anticipated delay until definitive management
- Anticipated delay until arrival of blood products

MTP activation within the vignettes was compared between specialties and between experience level. In each vignette, consultants and anaesthetists consistently activated the MTP later than their comparative cohorts. The trauma vignette revealed similar activation patterns across every cohort, excepting the residents. No clear trends or consensuses were observed in the two non-trauma vignettes, with contradictory decisions and justifications made by the surveyed clinicians.

Clinicians identified the subjectivity of the activation criteria as a limitation. They noted that 'likelihood of losing an entire blood volume within 24 hours' was vague and difficult to apply.

Conclusions: The decision to activate the MTP is difficult – subjectivity of the activation criteria drive clinicians to rely on a multitude of factors. Unfortunately, both the literature and this audit have shown clinical gestalt to be inconsistent. The uniformity of MTP activation in the trauma vignette may reflect widespread familiarity with evidence-based prediction tools, and we suggest similar tools for non-traumatic haemorrhage may improve clinical decision-making.

Ethics Approval: Ethics approval was not sought as the project was a quality improvement project.

References

1. Meyer DE, Vincent LE, Fox EE, O'Keeffe T, Inaba K, Bulger E, et al. Every minute counts: Time to delivery of initial massive transfusion cooler and its impact on mortality. *J Trauma Acute Care Surg*. 2017;83(1):19–24.

2. Flint AWJ, McQuilten ZK, Wood EM. Massive transfusions for critical bleeding: is everything old new again? *Transfus Med*. 2018;28(2):140–9.
3. Nunez TC, Voskresensky IV, Dossett LA, Shinall R, Dutton WD, Cotton BA. Early prediction of massive transfusion in trauma: simple as ABC (assessment of blood consumption)? *J Trauma*. 2009;66(2):346–52.
4. Yucel N, Lefering R, Maegele M, Vorweg M, Tjardes T, Ruchholtz S, et al. Trauma Associated Severe Hemorrhage (TASH)-Score: probability of mass transfusion as surrogate for life threatening hemorrhage after multiple trauma. *J Trauma*. 2006;60(6):1228–36; discussion 36–7.
5. Ruseckaite R, McQuilten ZK, Oldroyd JC, Richter TH, Cameron PA, Isbister JP, et al. Descriptive characteristics and in-hospital mortality of critically bleeding patients requiring massive transfusion: results from the Australian and New Zealand Massive Transfusion Registry. *Vox Sang*. 2017;112(3):240–8.
6. Pommerening MJ, Goodman MD, Holcomb JB, Wade CE, Fox EE, Del Junco DJ, et al. Clinical gestalt and the prediction of massive transfusion after trauma. *Injury*. 2015;46(5):807–13.

88

Rotational Thromboelastometry (ROTEM®) Assessment of the Combined Effect of Term Pregnancy and Obesity on Coagulation in Healthy Women with Uncomplicated Pregnancies in Australia: A Prospective Observational Study.

Julie Lee[1,2], Victoria Eley[1,2], Kerstin Wyssusek[1,2], Rebecca Kimble[1,2], Mandy Way[3], Jeremy Cohen[1,2] and Andre van Zundert[1,2]

[1]The Royal Brisbane And Women's Hospital, Brisbane, Australia

[2]The University of Queensland, Brisbane, Australia

[3]QIMR Berghofer Medical Research Institute, Brisbane, Australia

Introduction: Rotational thromboelastometry (ROTEM®) is a point-of-care coagulation test which has been used to demonstrate hypercoagulability in pregnant and obese populations separately. The combined effect of both pregnancy and obesity has been analysed in two previous studies using thromboelastography (TEG®), an alternative viscoelastic test, but not ROTEM®.

Hypercoagulability has been demonstrated to increase with increasing body mass index (BMI) and increasing gestation in pregnancy in the form of a decreased clotting time and increased clot firmness in the ROTEM® assay. When using ROTEM®-directed resuscitation, effective management may be hindered if there is uncertainty surrounding the baseline parameters for the specific population of pregnant women who are obese, particularly as obesity is a risk factor for postpartum haemorrhage. In addition, the risk of venous thromboembolism is increased by a factor of four to six times in pregnancy, and obesity itself is a moderate risk factor.

Aims: The aim of this study was to assess the combined effect of pregnancy and obesity on coagulation using ROTEM® in healthy pregnant women of varying BMIs presenting for elective Caesarean delivery.

Methods: Ethics approval was granted for recruitment of elective Caesarean delivery patients for this prospective observational study. Women with any condition affecting coagulation were excluded. The ROTEM® parameters of EXTEM/FIBTEM amplitude at 5 minutes (A5), coagulation time (CT), maximum clot firmness (MCF) and clot formation time (CFT) were compared between three different patient groups: normal, overweight and obese patients.

Results: One hundred and eighty-five women met inclusion criteria and were divided into three groups; normal (BMI$<$25kg.m^{-2}, n = 86), overweight (BMI 25–29.9 kg.m^{-2}, n = 54) and obese (BMI $\geq$30 kg.m^{-2}, n = 45), with a mean (SD) age of 32.7 $\pm$ 5.0 years and median

Table: Associations of ROTEM® parameters with BMI for elective Caesarean delivery patients

ROTEM® Parameter	BMI$<$25 kg.m^{-2} N = 86	BMI $\geq$ 25 & $\leq$30 kg.m^{-2} N = 54	BMI$>$30 kg.m^{-2} N = 45	p-value
FIBTEM				
CT (s)	52.0 [48.0–57.0]	54.0 [51.0–59.0]	52.0 [48.0–58.0]	0.16
CFT (s)	294.9 [207.0–634.0]	234.0 [126.0–363.0]	186.0 [119.0–284.0]	0.047
MCF (mm)	24.0 [20.0–26.0]	25.0 [23.0–28.0]	26.0 [21.0–28.0]	0.032
A5 (mm)	20.0 [17.0–21.0]	21.0 [19.0–23.0]	21.0 [18.0–23.0]	0.018
EXTEM				
CT (s)	54.0 [48.0–56.0]	54.6 [50.0–59.0]	54.0 [50.0–59.0]	0.28
CFT (s)	65.0 [59.0–75.0]	62.0 [56.0–67.0]	62.9 [55.0–70.0]	0.094
MCF (mm)	70.0 [68.0–72.0]	71.0 [69.0–74.0]	71.0 [68.0–73.0]	0.015
A5 (mm)	52.0 [50.0–56.0]	54.0 [51.0–57.0]	54.0 [51.0–57.0]	0.092

Data are median [IQR]; abbreviations: CT (clotting time); CFT (clot formation time); MCF (maximum clot firmness); A5 (amplitude at 5 minutes).

(interquartile range) body mass index of 25.6 $kg.m^{-2}$ (22.0–29.6). Forty-one (22.2%) women were nulliparous. There was a significant difference across the three groups for FIBTEM A5 ($p = 0.018$), FIBTEM MCF ($p = 0.032$), FIBTEM CFT ($p = 0.047$) and EXTEM MCF ($p = 0.015$). However, following Bonferroni correction, this was no longer significant.

Conclusions: There is no association between BMI and ROTEM® parameters in pregnant women presenting for elective Caesarean delivery at term. This suggests that the hypercoagulability of term pregnancy is likely greater in magnitude than the hypercoagulability seen with increasing BMI alone.

Ethics Approval: HREC/14/QRBW/497, The Royal Brisbane and Women's Hospital Human Research Ethics Committee.

89

The efficacy of chlorhexidine antisepsis on peripheral intravenous needleless connectors in reducing bacterial infection: a systematic review

Nathan Harvey[1] and Matthew Doane[2]
[1]Blacktown and Mount Druitt Hospitals Department of Anaesthesia, Blacktown, Australia
[2]Royal North Shore Hospital Department of Anaesthesia and Pain Management, St Leonards, Australia

Introduction: The use of chlorhexidine as an antiseptic agent in the hospital setting has progressively become more ubiquitous. Concomitantly, there has been an increase in clinical practice guidelines that preference chlorhexidine-containing solutions for antiseptic maintenance of peripheral intravenous needleless connectors. Conversely, there is a growing body of literature regarding chlorhexidine's potential as an allergenic agent. While the degree to which peripheral venous cannulas contribute to blood stream infections should not be underappreciated, interventions to address this issue must also be weighed against their risks. In light of an increasing recognition of Chlorhexidine's allergenic potential, an assessment is warranted to determine whether the benefit of chlorhexidine outweighs the increased exposure and potential allergy to the agent.

Aims: The objective of this review is to assess the current literature for evidence regarding the efficacy of chlorhexidine cleansing of needleless connectors to reduce peripheral intravenous access related blood stream infections.

Methods: Medline, CINAHL, Pre-Medline, Cochrane Library, Nursing in Ovid and EMBASE were searched to identify original research in peer reviewed journals which investigated the choice of antiseptic agent of peripheral intravenous needleless connectors in hospitalised patients and its effect on the incidence of blood stream infections.

Results: The search strategy yielded a total of 2429 results from six databases. After manual review of the primary and secondary literature, there were no studies which met criteria for evidence addressing the antiseptic benefit of chlorhexidine in PIVC maintenance. While the role of peripheral cannulae in the incidence of blood stream infections is well established, there was a paucity of studies directly evaluating the comparative efficacy of antiseptic solutions applied to needless connectors.

Conclusions: Beyond expert consensus, there is no definitive evidence to support a reduction in PIVC-BSIs from preferential use of a particular antiseptic solution in decontamination of PIVC needleless connectors. Conversely, a growing body of literature is highlighting the allergenic potential of chlorhexidine. The increasing publication of Chlorhexidine-associated allergic reactions should prompt a greater scrutiny of chlorhexidine's risk: benefit profile for an application as prevalent as PIVC maintenance antisepsis.

Ethics Approval: PROSPERO database (CRD42017056810).

90

Are patient-information leaflets harming patients?

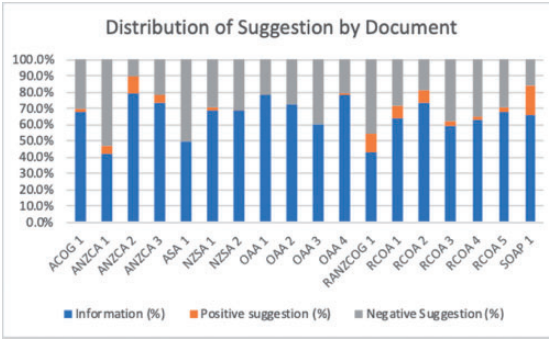
Owen Jones[1], Michael Dunne[1] and Allan Cyna[2,3]
[1]Flinders University, Bedford Park, Australia
[2]Womens and Children Hospital, Adelaide, Australia
[3]University of Adelaide, Adelaide, Australia

Introduction: Patient-clinician interactions may have placebo and nocebo effects. Discussion of side effects and complications of a procedure or medication may influence patient expectations and have nocebo effects. For example, the word 'pain' is defined as an unpleasant subjective experience associated with actual or perceived tissue damage and may therefore function as a nocebo unless the patient has mentioned it first. Patient-information leaflets (PILs) are used in patient education. However, the inadvertent use of negative suggestion (nocebo language) may adversely affect patient experiences.

Aims: To analyse labour epidural / spinal anaesthesia PILs for suitability of risk information and to identify the incidence and nature of negative suggestions presented.

Methods: Websites from international obstetric anaesthetic bodies were searched between August 2017 and May 2018. PILs were downloaded and analysed using NVivo 12 software. Coding covered all text within the document. Analysis was conducted for information

themes, language that could function as a suggestion and word frequencies. Language was classified depending on the motivation or attitude it created in the patient. Negative suggestion was defined as language potentially leading to non-volitional negative perceptual or behavioural experiences (nocebo) whilst a positive suggestion may have a therapeutic (placebo) effect. Neutral language added factual information without potential placebo or nocebo effects. The distribution of suggestion, neutral information statements and negatively associated words were identified. Statistical analysis was conducted using descriptive statistics and Pearson's chi square test for homogeneity. Readability of documents was assessed using the Simple Measure of Gobbledygook (SMOG) tool.
Results: Eighteen documents were analysed from nine organisations. Document types included mixed anaesthetic option PILs (9), specific spinal and epidural PILs (6), and side effect specific PILs (3). Sixteen documents discuss relative risk, fifteen as a numerical value and five in a pictorial format. Neutral statements made up 65.3%, positive statements 4.3% and negative statements 30.4%. The distribution of statements was not homogeneous between documents ($p < 10^{-6}$). Negative statements were most common in general information sections with pain being the most commonly used negative reference. The average SMOG was grade 12.95.



Conclusions: PILs focus heavily on side effect and risk discussion rather than benefits of the procedure. Almost a third of statements contained a negative suggestion and information presented was at a comprehension level beyond most patients' expected understanding. Our findings suggest a poor understanding of potential placebo/nocebo effects of information provided. Further research to assess the impact of these findings clinically is indicated.
Ethics Approval: Not required.

91

Effect of preoperative anxiety on patients' selecting choice of anesthesia in patients scheduled for regional anesthesia

Dr Jenjira Suwanvithi[1] and Sirikarn Siripruekpong[1]
[1]Department of Anesthesia, Prince of Songkla University, Hatyai, Thailand

Introduction: Preoperative anxiety is the most common problem in patients scheduled for surgery and also triggers the perioperative stressful event both physiological and emotional responses. It can produce aggressive responses in hemodynamic, thus causing more difficult postoperative pain management, low level of satisfaction and increasing postoperative anxiety. Many patients deny an operation under regional anesthesia (RA) without any medical contraindication. There is not adequate and timely information to the relationship between level of preoperative anxiety and patients' selecting choice of anesthesia in RA.
Aims: To evaluate level of preoperative anxiety and effect of preoperative anxiety on patients' selecting choice of anesthesia in RA. Otherwise, to assess the patients' fears and their perception about RA.
Methods: The study is a prospective observational study of 200 adult patients scheduled for elective procedures under RA in Songklanagarind hospital, Thailand from January to March 2019. The patients were interviewed verbally with the standard questionnaires by an anesthesiologist on the previous day of surgery. The patients were assessed the level of preoperative anxiety using The Amsterdam Preoperative Anxiety and Information Scale (APAIS) Thai version and the patients' fears and their perception about RA using modified Alberta survey questionnaire.
Results: Fifty-six percent of patients provided the high level of preoperative anxiety which was statistically significant in younger age, married status ($P<0.05$). Contrary to an advice from anesthetists and previous patients' experience of anesthesia were associated with the low level of preoperative anxiety ($P<0.01$). The result showed a strong association between the high level of preoperative anxiety and patients' selecting choice of anesthesia, in additional, patients with the high level of preoperative anxiety selected general anesthesia (GA) greater than RA (58% vs 23%; $P<0.01$) but more than half of patients with the low level of preoperative anxiety favored RA and volunteered for choice of anesthesia, 44% and 23% in respective ($P<0.01$). Patients with the high level of preoperative anxiety rated fears and perception about RA were strongly significant in feeling pain during surgery, seeing the surgery, a headache and the needle in your back ($P<0.01$).
Conclusions: Patients with the high level of preoperative anxiety preferred GA rather than RA. The fears and

perception about RA were potentially in feeling pain during surgery, seeing the surgery, a headache and the needle in your back. The risk factors and perception of patients varied according to personality and culture. Some modifiable factors could be modified by anesthesia education and anesthesia advice.

Ethics Approval: The trial was approved by Human Research Ethic Committee at Prince of Songkla University (REC.61-363-8-1) and Clinical Trials Registry Number is TCTR20190106002.

	High n (%)	Low n (%)	P value
Total	113	87	
Age [median(IQR)]	53 (34,65)	60 (38,71.5)	0.016
Gender			0.734
Male	65 (57.5)	53 (60.9)	
Female	48 (42.5)	34 (39.1)	
Education			0.743
Preelementary school	1 (0.9)	2 (2.3)	
Elementary school	33 (29.2)	29 (33.3)	
High school	36 (31.9)	24 (27.6)	
B.A.	43 (38.1)	32 (36.8)	
Occupation	54 (47.8)	40 (46)	0.911
Marital status			0.022
Single	29 (25.7)	9 (10.3)	
Married	72 (63.7)	65 (74.7)	
Widow	12 (10.6)	13 (14.9)	
Smoking	34 (30.1)	19 (21.8)	0.251
Experience	66 (58.4)	66 (75.9)	0.015
General anesthesia	51 (45.1)	46 (52.9)	0.346
Reginal anesthesia	39 (34.5)	38 (43.7)	0.24
ASA classification			0.394
I	17 (15)	8 (9.2)	
II	77 (68.1)	66 (75.9)	
III	19 (16.8)	13 (14.9)	
Type of surgery			0.746
General surgery	12 (10.6)	13 (14.9)	
Urology surgery	25 (22.1)	20 (23)	
Plastic surgery	1 (0.9)	2 (2.3)	
Traumatic surgery	10 (8.8)	4 (4.6)	
Orthopedic surgery	62 (54.9)	46 (52.9)	
Gynecology surgery	3 (2.7)	2 (2.3)	
Advice from anesthesiologist	44 (38.9)	53 (60.9)	0.003
Selecting choice			
General anesthesia	58 (51.8)	23 (26.1)	<0.001
Regional anesthesia	46 (41.1)	44 (50)	
Do not know (Volunteered)	7 (6.2)	21 (23.9)	
No response	1 (0.9)	0 (0)	

92

Comparison of kinemyography with electromyography for monitoring neuromuscular blockade in obese patients

Kimi Tanaka[1], John Paydar[1], Dukyeon Kim[2], Sophie Liang[3], Paul Stewart[1,4] and Stephanie Phillips[1,4]
[1]University Of Sydney
[2]Blacktown and Mount Druitt Hospital
[3]Westmead Hospital
[4]Sydney Adventist Hospital

Introduction: Residual neuromuscular blockade is common and associated with significant complications, including airway obstruction and aspiration. Fade following train-of-four (TOF) stimulation cannot be detected by subjective (qualitative) monitoring at TOF ratios as low as 0.4. Kinemyography (KMG) and electromyography (EMG) are quantitative neuromuscular function monitoring techniques used to examine onset, depth and recovery from neuromuscular blockade. The importance of quantitative neuromuscular monitoring in optimising the safety of general anaesthesia is recognised by Professional Standard 18 of the Australian and New Zealand College of Anaesthetists, which states "Neuromuscular function monitoring, preferably quantitative, must be available for every patient in whom neuromuscular blockade has been induced and should be used whenever the anaesthetist is considering extubation following the use of non-depolarising neuromuscular blockade". Recent data suggests that increasing body mass index (BMI) may affect precision of these monitors. Obese patients are at higher risk of airway and other complications, regardless of the use of neuromuscular block.

Aims: We compared the precision and agreement of KMG with EMG during recovery from non-depolarising neuromuscular blockade in obese patients.

Methods: TOF ratios obtained by KMG were compared with EMG measured at the abductor digiti minimi (ADM) muscle in obese patients (BMI$\geq$30). Demographic data, wrist circumference, subcutaneous tissue depth and supramaximal stimulus for each monitor were recorded. TOF recordings were taken in a pre-determined order during recovery from non-depolarising neuromuscular block.

KMG readings were compared to EMG readings from the ipsilateral hand of the same patient, using Bland-Altman analysis. The repeatability coefficient of each monitor was used to compare precision, with a smaller repeatability coefficient denoting higher precision. Bland-Altman analysis was used to assess bias and limits of agreement. Clinically acceptable agreement was defined *a priori* as $<$0.025 with limits of agreement $\pm$ 0.05.

Table 1 Bias and limits of agreement between kinemyography (KMG) and electromyography (EMG) measured at abductor digiti minimi (ADM).

	KMG-EMG(ADM)		
Train-of-four range#	n	Bias (95% confidence interval)	Limits of agreement
0.8 to 0.9	9	−0.012 (−0.067 to 0.043)	−0.155 to 0.130
0.9 to 1.0	7	−0.017 (−0.053 to 0.019)	−0.094 to 0.060
Overall	121	0.001 (−0.020 to 0.022)	−0.232 to 0.234

Results: We recorded data from 22 patients. There was no relationship between supramaximal stimulus and subcutaneous tissue depth or wrist circumference.
The precision of KMG (repeatability coefficient 0.032) was not significantly different to that of EMG at ADM (repeatability coefficient 0.023) in the TOF range 0.9–1.0.
There was no bias between KMG and EMG at ADM in the 0.9–1.0 TOF range (table 1).

Conclusions: The equivalent precision, minimal bias and narrow limits of agreement in the clinically relevant TOF range of 0.9 to 1.0 suggests that KMG and EMG at ADM may be used interchangeably in monitoring neuromuscular function in obese patients receiving non-depolarising neuromuscular blockade.
Ethics Approval: This study was approved by the Human Research and Ethics Committee of Sydney Adventist Hospital (EC00141:2017-028).

93

Comparison of electromyography in three hand muscles for monitoring recovery from neuromuscular blockade in the obese

John Paydar[1], Kimi Tanaka[1], Dukyeon Kim[2], Sophie Liang[3], Paul Stewart[1,4] and Stephanie Phillips[1,4]
[1]University Of Sydney, Sydney, Australia
[2]Blacktown and Mount Druitt Hospital, Sydney, Australia
[3]Westmead Hospital, Sydney, Australia
[4]Sydney Adventist Hospital, Sydney, Australia

Introduction: Residual effects of neuromuscular blocking agents can persist into the postoperative period resulting in serious complications such as aspiration and airway obstruction. Mortality and morbidity associated with residual neuromuscular blockade can be reduced with quantitative intraoperative neuromuscular transmission monitoring and should be available to all patients receiving neuromuscular blockade as recommended by the Australian and New Zealand College of Anaesthetists. Electromyography (EMG) is a quantitative neuromuscular function monitor which measures onset, depth, and recovery of neuromuscular blockade. Recent data suggests that the precision and/or agreement of EMG monitoring may be impaired by an increasing body mass index (BMI).

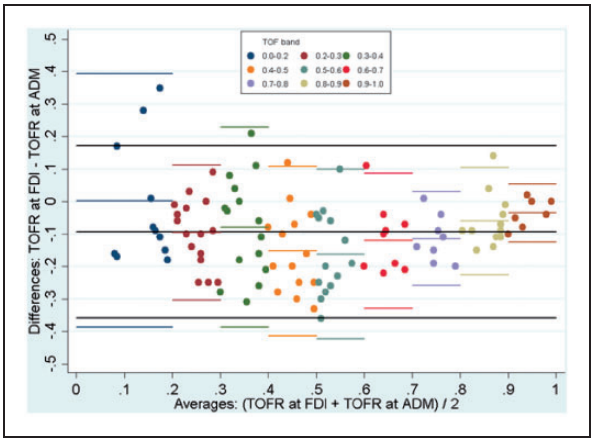


Figure 1 Bland-Altman Plot showing bias and limits of agreement between First Dorsal Interosseous (FDI) and Adductor Digiti Minimi (ADM) muscles during train of four (TOF) monitoring (%).

Table 1 Repeatability Coefficients (RC) & 95% Confidence Interval (95% CI) for Electromyography at Adductor Digiti Minimi (ADM), Adductor Pollicis (AP), and First Dorsal Interosseous muscles (FDI).

	EMG(ADM)		EMG(AP)		EMG(FDI)	
TOF range	n	RC (95% CI)	n	RC (95% CI)	n	RC (95% CI)
0.8-0.9	10	0.052 (0.029 to 0.075)	6	0.053 (0.023 to 0.082)	10	0.095 (0.054 to 0.137)
0.9-1.0	10	0.023 (0.013 to 0.034)	6	0.049 (0.021 to 0.077)	6	0.011 (0.005 to 0.017)
Overall	130	0.103 (0.090 to 0.116)	109	0.197 (0.171 to 0.223)	102	0.077 (0.066 to 0.088)

Obesity is a risk factor for airway and other operative complications irrespective of neuromuscular blockade use.
Aims: To compare the precision and agreement of EMG in the Abductor Digiti Minimi (ADM), Adductor Pollicis (AP) and First Dorsal Interosseous (FDI) muscles in obese subjects during recovery from neuromuscular blockade.
Methods: Patients between the ages of 18 and 90, with a BMI $\geq$30, undergoing surgery requiring neuromuscular blockade were invited to participate in this study. Train of four (TOF) ratios were recorded every 20 seconds using EMG at the ADM, AP, and the FDI of the same hand during recovery from neuromuscular blockade. The Bland-Altman technique was used to compare TOF ratios. Precision was compared by calculating the repeatability coefficient (RC). A lower RC value denotes higher precision. Agreement between the muscles were compared using the bias and limits of agreement. Clinically acceptable agreement was defined *a priori* as a bias of $<$0.025 and limits of agreement within $\pm$ 0.05.
Results: Data from 22 patients were recorded. FDI was the most precise (Table1). Over all TOF ranges, the bias of EMG at AP (-0.084) and FDI (-0.093) underestimate ADM with unacceptably wide limits of agreement (Figure 1).

Conclusions: FDI was the most precise. The wide bias and limits of agreement suggest that these muscles cannot be used interchangeably in the obese. Further investigation in this high risk group is warranted.
Ethics Approval: Ethical approval was obtained from the Adventist Healthcare Limited Human Research and Ethics Committee (HREC 2017–028).

94

A systematic review of the safety of sustained release opioids in acute pain

Josh Lun[1] and Jennifer Reilly[2]
[1]Royal Womens Hospital, Melbourne, Australia
[2]The Alfred Hospital, Melbourne, Australia

Introduction: Health professionals are in part culpable for the current opioid pandemic[1]. In the setting of this, there has been much discussion regarding how the battle might be won. ANZCA recently released a statement suggesting that this might be achieved by moving away from the use of sustained release (SR) opioids in acute pain. This has produced much disagreement[2].
Aims: We have 1) appraised the literature used by ANZCA in their statement and 2) conducted a systematic review in order to find primary data to support or refute this suggestion.
Method: 1. Appraisal of ANZCA statement: Citations used were appraised. A narrative review was then conducted to consider the strengths and limitations of the arguments put forward.
2. Systematic review of safety of SR opioids in acute pain: In accordance with PRISMA guidelines[3], a search was conducted on MEDLINE and EMBASE for prospective studies comparing SR and immediate release (IR) opioids in an acute pain setting whilst measuring adverse events. Non-English studies more than 20 years old, with sample sizes under 100 were excluded. Subsequent studies were assessed for bias, and incidence of adverse events and volume of opioid used between groups were collated.
Results: 1. Appraisal of ANZCA statement: The majority of the arguments are limited to rationale justified by clinical experience and or expert opinion[4–9]. The association between SR opioids and chronic use is concerning[10], but is complicated by multiple confounders.
2. Systematic review of safety of SR opioids in acute pain: 819 studies were screened and 5 studies were included in the full review.[11–15] There was a higher incidence of both sedation in the SR opioid group (average of 4% versus 0.9%) and higher overall opioid consumption (3 of the 5 studies)[12,13,15]. These findings are limited; the majority of studies were of poor quality, and all were underpowered, and not designed to detect a difference in adverse effects between groups.
Conclusions: The trend of increased adverse effects with SR opioids is hypothesis generating. The increased dose associated with SR opioid regimes either represent a confounder or may provide a mechanism for increased risk. As such, we believe they still have a place in patients with severe and constant pain where careful monitoring is possible. But caution must be taken, especially when SR opioids allow the clinician to give a dose of opioid that they might not prescribe if only IR opioids were available.
Ethics: Not required.

References

1. Dhalla, I.A., N. Persaud, and D.N. Juurlink, *Facing up to the prescription opioid crisis*. *BMJ*, 2011. 343.
2. Baird, C. and D. Wood, *Letters to the editor*. ANZCA Bulletin, 2008. **September**: p. 6–7.
3. Liberati, A., et al., *The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration*. *PLoS medicine*, 2009. 6(7): p. e1000100.
4. Webster, B.S., S.K. Verma, and R.J. Gatchel, *Relationship between early opioid prescribing for acute occupational low back pain and disability duration, medical costs, subsequent surgery and late opioid use*. *Spine*, 2007. 32(19): p. 2127–2132.
5. Schug, S.A, et al., *Acute Pain Management: Scientific Evidence*. 4th ed. 2015: Australian and New Zealand College of Anaesthetists.

6. Macintyre, P., J. Loadsman, and D. Scott, *Opioids, ventilation and acute pain management*. *Anaesthesia and intensive care*, 2011. 39(4): p. 545–558.
7. Dowell, D., T.M. Haegerich, and R. Chou, *CDC guideline for prescribing opioids for chronic pain—United States, 2016*. *JAMA*, 2016. 315(15): p. 1624–1645.
8. Chou, R., et al., *Management of Postoperative Pain: a clinical practice guideline from the American pain society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' committee on regional anesthesia, executive committee, and administrative council*. *The Journal of Pain*, 2016. 17(2): p. 131–157.
9. ANZCA. *Position statement on the use of slow-release opioid preparations in the treatment of acute pain*. 2018 26/02/2019]; Available from: http://www.anzca.edu.au/resources/endorsed-guidelines/position-statement-on-the-use-of-slow-release-opio.
10. Shah, A., C.J. Hayes, and B.C. Martin, *Characteristics of initial prescription episodes and likelihood of long-term opioid use – United States (2006–2015)*. *Morbidity and mortality weekly report*, 2017. 66(10): p. 265–269.
11. Rajpal, S., et al., *Comparison of perioperative oral multimodal analgesia versus IV PCA for spine surgery*. *Clinical Spine Surgery*, 2010. 23(2): p. 139–145.
12. Musclow, S.L., et al., *Long-acting morphine following hip or knee replacement: a randomized, double-blind, placebo-controlled trial*. *Pain Research and Management*, 2012. 17(2): p. 83–88.
13. Kogan, A., et al., *Early oral analgesia after fast-track cardiac anesthesia*. *Canadian Journal of Anesthesia*, 2007. 54(4): p. 254–261.
14. de Beer, J.d.V., et al., *Efficacy and safety of controlled-release oxycodone and standard therapies for postoperative pain after knee or hip replacement*. *Canadian Journal of Surgery*, 2005. 48(4): p. 277.
15. Ahdieh, H., et al., *Efficacy of oxymorphone extended release in postsurgical pain: a randomized clinical trial in knee arthroplasty*. *The Journal of Clinical Pharmacology*, 2004. 44(7): p. 767–776.

95

Enhanced Recovery After Elective Weight Loss Surgery: a Multi-Disciplinary Approach to Halving Length of Stay

Lan-Hoa Le[1] and Hock Cheah[1]
[1]Gosford Private Hospital, North Gosford, Australia

Introduction: Laparoscopic sleeve gastrectomy (LSG) is currently the most commonly performed bariatric procedure in the world. The length of stay (LOS) for LSG is reported in the literature to be an average 2.8 days. Enhanced Recovery After Surgery (ERAS) protocols are evidence-based methods employed to reduce LOS, decrease surgical complications and readmissions of patients undergoing surgery. A multi-disciplinary approach with input from surgeons, anaesthetists, nurses and dietitians has halved the LOS for patients undergoing LSG in our unit. Our LOS and readmission rates compare favourably with ERAS focused bariatric centers.
Aims: To analyse the LOS and readmission outcomes of our high volume bariatric center without ERAS protocols against published results for ERAS focused bariatric centers.
Methods: Data was prospectively collected for all patients undergoing LSG in our bariatric unit under a single surgeon and one hospital from January 2013 to December 2018. Patient demographics, types of operation, duration of operation, length of stay and post-operative complications were further analysed.
Results: A total of 1100 patients who underwent LSG over the six year period analysed. Of the 1100, X were male and Y were female. The average LOS was 1.72 days. Over this period, incremental multidisciplinary measures were instituted with regards to peri-operative management of LSG patients. There was a significant downward trend of the LOS over the six year period (2.45 days in 2013, 2.19 days in 2014, 2.04 days in 2015, 1.99 days in 2016, 1. 68 days in 2017 and 1.26 days in 2018). The total readmissions in the first seven days of discharge is 14. No mortality was recorded in the cohort of 1100 patients.
Conclusions: A multi-disciplinary approach with input from surgeons, anaesthetists, nurses and dietitians has halved the LOS for patients undergoing LSG in our unit. Our LOS and readmission rates compare favourably with ERAS focused bariatric centers.
Ethics Approval: N/A

96

A longitudinal, qualitative evaluation of the 'Intern Boot Camp' simulation course

Hannah Watson[1], Sian Myers[1] and Cate McIntosh[1]
[1]Hunter New England Simulation Centre, New Lambton, Australia

Introduction: The 'Intern Boot Camp' is a simulation-based course that aims to prepare interns for clinical situations they may encounter after hours or on rural rotations on commencement of internship. The interactive course focuses on the assessment and management of the deteriorating patient, and the communication and teamwork skills needed to be effective in these clinical situations. The course is designed for junior medical officers commencing internship within the Hunter New England network, having previously been conducted within orientation week, however has recently been trialled in final year medical students.

Aims

To evaluate the effectiveness of the 'Intern Boot Camp' simulation course in preparing junior doctors for commencing internship.

Methods: A longitudinal, prospective evaluation was conducted utilising brief, in-person and phone interviews focussing on four main feedback domains: content, relevance, structure and timing. A total of five 'Intern Boot Camp' courses were trialled in final year medical students between the months of August and October 2018. Two cohorts of participants were interviewed following completion of the course: current junior doctors having completed the course during internship orientation in 2018, and medical students due to commence internship in 2019. Longitudinal follow-up interviews of the medical students were conducted 3 months following their internship commencement.

Results: A total of 13 junior doctors and 13 medical students completed the interview, with 11 of the 13 medical students completing the follow-up interview. Course content and applicability was generally well received by both cohorts. Suggestions for improving content relevance included both practical and organisational skills. One suggestion warranting further exploration was for the inclusion of a demonstrative simulation by skilled clinicians, and the opportunity to discuss situations with current junior doctors. With regards to timing, 12 (92%) of junior doctors favoured undertaking the course at commencement of internship. Interestingly, initially 8 (62%) of medical students elected for the course to be held in the final year of medical school, with 5 (38%) undecided. However, on follow-up, 8 (73%) of the 11 junior doctors reinterviewed preferred at commencement of internship.

Conclusions: The evaluation findings suggest the course content was well delivered and applicable to commencing work as a junior doctor. Results suggest that scheduling of the course should remain at the commencement of internship to maintain relevancy. Suggestions for improvement with regards to content, duration and structure are worth further consideration in course development, and if implemented, will need to be re-evaluated in future.

Ethics Approval: Not applicable – this was an internally conducted quality improvement project involving the voluntary participation of junior doctors and medical students only. All responses were de-identified. No patients were involved in this study.

97

Ketamine Only Patient Controlled Analgesia – Audit of outcomes in complex acute pain setting

Simon Minns[1], Jaffar Hosain[1], Emily Edmonds[1] and Alan Bullingham[1]

[1]Department of Anaesthetics, Western Sydney Local Health District, Blacktown and Mount Druitt, Australia

Introduction: Ketamine is an NMDA receptor antagonist with properties that make it useful in patients with complex pain. There is evidence that it reduces hyperalgesia, prevents opioid tolerance and lowers opioid consumption in post-operative patients[1]. Ketamine is considered a safe drug and is used as a sole agent in emergency and trauma medicine due to its ability to provide analgesia without respiratory or cardiovascular depression[2]. Ketamine has been added to opioid patient-controlled analgesia (PCA) solutions to improve analgesia outcomes but there are very few studies where ketamine has been used as the sole agent. At our institution we have used ketamine only PCA (KOPCA) as an alternative method of analgesia in complex acute pain patients with poor pain control, tolerance or opioid induced hyperalgesia.

Aims

To assess the outcomes of KOPCA on analgesic efficacy, opioid use, and complications.

Methods: We conducted a retrospective audit involving all patients who received KOPCA between 2016 and 2018. KOPCA, bolus dose 3–5mg, lockout 15–20 minutes, was commenced in patients with inadequate pain control despite conventional multi-modal analgesia as assessed by the Acute Pain Service (APS). Data was obtained from the APS electronic database. Pain scores as verbal response scale, daily ketamine, opioid requirements and occurrence of complications, were recorded as part of routine daily assessments. Variables were compared in each patient before, during and after KOPCA administration. The data was analysed by the Wilcoxon signed-rank test.

Results: 19 patients were included in the study. Median opioid consumption was significantly lower (90mg vs 320mg, $P<0.01$) whilst patients were on KOPCA versus prior to starting KOPCA. Opioid requirements were also reduced following discontinuation of KOPCA (98mg vs 320mg, $P<0.05$) versus prior to starting KOPCA. Median pain scores at rest were 2 points lower whilst on KOPCA compared to prior starting KOPCA (6 vs 8, $P=0.07$) although not significantly. There was a 2.25-point reduction (5.75 vs 8, $P<0.05$) in median pain scores at rest for patients after KOPCA was ceased versus prior to starting KOPCA. Hallucinations occurred in 3 patients

(16%) whilst nausea and vomiting occurred in 2 (11%) patients.

Conclusions: KOPCA administration resulted in a decrease in pain perception as well as a reduction in opioid requirements for patients with inadequate pain control from conventional analgesics. There were no severe adverse events however hallucinations limited use of the technique in 3 patients. Larger studies are required to investigate further.

Ethics Approval: Approval by WSLHD Human Research Ethics Committee for a Quality Assurance Project. Number 1809–03-QA

References

1. Vadivelu N et. al. Role of ketamine for analgesia in adults and children. *J Anaesthesiol Clin Pharmacol*. 2016 Jul-Sep; 32(3): 298–306.
2. Vardy JM et. al. Audit of the safety and effectiveness of ketamine for procedural sedation in the emergency department. *Emerg Med J*. 2008 Sep;25(9):579–82. doi: 10.1136/emj.2007.056200.

98

Post-operative outcomes among patients undergoing elective arthroplasty – the impact of pre-operative iron deficiency

Jaffar Hosain[1], Julia Lee[1], Simon Minns[1] and Julian Marshall[1]
[1]Anaesthetics Department, Blacktown and Mount Druitt Hospital, Sydney, Australia

Introduction: One third of surgical patients are anaemic and it is associated with poorer outcomes. Iron deficiency is the most common cause of anaemia. Patient Blood Management ("PBM")1 involves screening patients undergoing major surgery for anaemia and iron deficiency ("low FE"). Parenteral iron supplementation ("IV Iron") has been shown to benefit patients with iron deficiency anaemia. An initial audit cycle demonstrated worse outcomes for patients with anaemia undergoing arthroplasty. Compliance with PBM was inadequate. Iron Studies were not routine.

Aims: To perform a closed loop audit of the prevalence of anaemia and iron deficiency and its associated outcomes and adherence to PBM guidelines.

Methods: Retrospective data was collected from the electronic records of 658 patients undergoing elective arthroplasty during July 2016–June 2018 at BMDHs. Pre-operative anaemia was defined as a Haemoglobin ("Hb") less than 130 g/L and iron deficiency as a serum Ferritin ("FE") less than 100ng/ml. Patients were screened prior to surgery and managed as per the Australian PBM Guidelines. The outcomes were adherence to guidelines, transfusion rate, total length of stay ("LOS") including rehabilitation, and complications. Between group differences were tested with Mann-Whitney and Kruskal-Wallis tests. Significance of complications was tested with Chi-squared or Fisher's Exact tests.

Results: The mean (SD) Hb was 134g/L (15.9) and the prevalence of anaemia was 37.7%. The mean decline in Hb was 27.4g/L (13.9). In the initial 414 patients, FE was measured in 14% of patients and IV Iron was not routine. In the next 244 patients FE was measured in 77% of patients. The mean FE was 129.9ng/ml (143.2) and there was low FE in 57% of patients when measured. After improvements in screening for low FE the rate of IV Iron in patients with low FE was 67%.

was a statistically significant difference in mean LOS (SD) in the anaemic group, 10.19 days (10.7) vs 7.6 days (5.9). Differences in LOS in the low vs normal FE groups did not reach statistical significance. The anaemic group had significantly increased odds ("OR") of transfusion (OR 7.5), infections (1.74), AKI (1.99), and admission for rehabilitation (2.22). The low FE group had significantly increased odds of infection (3.08). Other outcomes (UTIs, ICU Admission, and 30-Day readmission) were measured but differences were not significant.

Conclusions: Anaemia continues to be common in elective surgical patients and is associated with poorer outcomes. Although compliance with PBM guidelines have improved, there is room for improvement.

Ethics Approval: Approval by WSLHD Human Research Ethics Committee for a Quality Assurance Project. Number 5644-QA

Reference

1. National Blood Authority and National Health and Medical Research Council (Australia) (2012) Patient blood management guidelines: module 2 – perioperative., National Blood Authority.

99

The Emergency Laparotomy: A St Vincent's Hospital perspective

Kathleen Fixter[1] and Erez Ben-Menachem[1]
[1]Department of Anaesthesia, St. Vincent's Hospital, Darlinghurst, Sydney, Australia

Introduction: Emergency Laparotomy (EL) is a common surgical procedure, often performed on elderly,
complex or unwell patients. The UK National Emergency Laparotomy Audit (NELA) has
demonstrated the efficacy of repeated audit cycles, risk scores and care bundles in improving patient outcomes.

Australian data is lacking regarding the morbidity and mortality of this surgical subset.
Aims: St Vincent's Hospital participated in the Australian and New Zealand Laparotomy Audit
(ANZELA) pilot study across a nine-month period in 2018/2019. The intention was to identify
case acuity, preoperative and perioperative care, and consequent outcomes of EL cases.
Key performance indicators inspired by the UK NELA audit were used to benchmark
performance.
Methods: An acute abdomen with suspected gastrointestinal pathology requiring surgical intervention
within 24 hours was included. Preoperative, perioperative and postoperative data points were
collected. The NELA risk calculator was used to generate a 30-day mortality estimate.
Results: Eighty-three cases met inclusion criteria (42 male, 41 female). The mean age was 59 and
44% of patients were over the age of 65. The most common pathology requiring EL was
small bowel obstruction. The mean NELA score was 9.23% (mean 13.2% for those aged
>65). 92% of patients had a CT scan preoperatively and 91% of these were reported
preoperatively (61% were by a consultant). 74% of patients arrived in theatre in the booked
urgency timeframe. 42% of patients had a NELA >5%, however only 77% of these had either
a consultant anaesthetist or consultant surgeon present. 42% of all patients were admitted to
ICU postoperatively. More than half (56%) of patients in the >65 group were admitted directly
to ICU. However, 26% of patients deemed high risk (NELA >10%) were admitted directly to
the ward. 31% of elderly patients were reviewed by the geriatric team postoperatively. The
average length of stay was 18.4 days. 7 patients died. The mortality rate was 14.2% in the
>65 group. 50% of patients in the elderly group were not discharged directly home (75% of
patients <65 were).
Conclusions: International studies have shown that mortality and morbidity within this patient group may be
modifiable. Locally our data is on par with the most recent NELA report. Risk scoring may
help guide appropriate resource delegation (ICU admission and consultancy presence). Our
data suggests morbidity and mortality is high amongst older patients. Geriatric input in
patients >65 should become an integral part of perioperative care.
Ethics Approval: HREC: RGS0000000848, South Metropolitan Health Service Human Research Ethics Committee. SSA File Number: 18/157, St Vincent's Hospital Research Office.

101

Anatomical variations of internal jugular vein in relation to carotid artery and its implication on ultrasound guided cannulation: an observational study

Niraj Kumar[1], Gyaninder Pal Singh[1], Keshav Goyal[1], Navdeep Sokhal[1] and Ashish Bindra[1]
[1]All India Institute Of Medical Sciences (AIIMS), New Delhi, India

Introduction:
Central venous cannulation is a common procedure and has become an integral part of management of critically ill patients. Although it is very safe but associated with some potential complications. Anatomical variations and overlapping of the internal jugular vein (IJV) and the carotid artery (CA) predisposes a patient to an increased risk of carotid artery injury. The purpose of this study will be to determine the anatomical variations of internal jugular veins in relation to carotid artery and risk of carotid artery puncture.
Aims: To evaluate anatomical variations of right internal jugular veins (IJV) in relation to carotid artery (CA). Two compared the anterolateral and anterior position with respect to first attempt cannulation success, Number of attempts, Time-to-cannulation, Carotid artery (CA) puncture.
Methods: Following approval of Institute Ethics Committee, 100 patients in between the age group of 18–60 years, admitted for elective surgery was enrolled for this prospective observational study. After anesthetizing the patients a portable ultrasound system with a linear probe of 13–6MHz was used for all examinations. Exact location of IJV will be identified in relation to CA on USG and was recorded as lateral, anterolateral, anterior, anteromedial and medial. After that, ultrasound guided IJV cannulation was done and observed for any complication like carotid artery puncture.
Results: Anterolateral (71%) was the commonest position of IJV in relation to CA followed by lateral (21%) and anterior position (8%). Incidence of carotid artery puncture was 50% (4 out of 8 subjects) in the anterior position group whereas it was 4.23% (3 out of 71 subjects) in the anterolateral group of patients ($p < 0.001$).
Conclusions: Anterolateral is the commonest position of the IJV in relation to the CA. Anterior position poses a

significant risk of CA puncture during Central venous cannulation.

Ethics Approval: IEC/NP-05/2014

102

Comparison of two muscles using a novel electromyographic device to assess recovery from muscle relaxants in patients undergoing general anaesthesia.

Ashley Creighton[1], Stephanie Phillips[2,4], Danny Kim[3], Sophie Liang[1] and Paul Anthony Stewart[2,4]

[1]Westmead Hospital, Australia

[2]Department of Anaesthesia, Sydney Adventist Hospital, Wahroonga, Australia

[3]Blacktown & Mount Druitt Hospital, Australia

[4]Sydney Medical School, Faculty of Medicine and Health, University of Sydney, Camperdown, Australia

Introduction: To ensure adequate reversal of neuromuscular blockade, the Australian and New Zealand College of Anaesthetist's recommends quantitative neuromuscular transmission (NMT) monitoring. Residual neuromuscular blockade (RNMB) is the presence of muscular weakness post extubation, with recovery defined as train-of-four ratios (TOFr) >0.9. The TetraGraph™ is a novel electromyographic NMT monitor. TetraGraph™ application to different muscles may affect the precision for monitoring neuromuscular blockade recovery.

Aims: This study compared the precision, bias and limits of agreement of the TetraGraph™ at the abductor digiti minimi (ADM), and first dorsal interosseous (FDI) muscles, using train-of-four stimulation of the ulnar nerve. We hypothesised that the TetraGraph™ would have higher precision at the FDI compared to the ADM due to the greater amplitude of the muscle action potential at FDI.

Methods: TetraSens™ electrodes were applied to the ADM and FDI on contralateral hands. Calibration of both TetraGraphs™ was performed concurrently prior to administration of neuromuscular blockade. Simultaneous measurements of TOFr at the muscles were repeated every 20 seconds until full spontaneous recovery or reversal agent administration. Data was analysed from TOFr 0.2–1.0. Precision, bias and limits of agreement of the Tetragraph™ at the muscles were compared using Bland-Altman analysis. A smaller repeatability coefficient suggests higher precision. A smaller bias with narrower limits of agreement indicates a stronger agreement, and thus interchangeability between the muscles for TetraGraph™ monitoring.

Table 1: Precision (repeatability coefficient) of train-of-four ratios (TOFr) measured by Tetragraph™ at the abductor digiti minimi (ADM) and first dorsal interosseous (FDI) muscles of the hand, ordered TOFr range and overall.

TOFr range	n	ADM Repeatability coefficient (95% CI)	n	FDI Repeatability coefficient (95% CI)
0.2-0.3	21	0.038 (0.027 to 0.050)	18	0.022 (0.015 to 0.029)
0.3-0.4	18	0.043 (0.029 to 0.057)	15	0.034 (0.022 to 0.046)
0.4-0.5	17	0.030 (0.020 to 0.040)	14	0.023 (0.014 to 0.031)
0.5-0.6	17	0.032 (0.021 to 0.042)	17	0.030 (0.020 to 0.040)
0.6-0.7	18	0.068 (0.046 to 0.090)	17	0.050 (0.033 to 0.067)
0.7-0.8	15	0.029 (0.019 to 0.039)	14	0.039 (0.025 to 0.054)
0.8-0.9	14	0.045 (0.028 to 0.062)	14	0.034 (0.022 to 0.047)
0.9-1.0	13	0.060 (0.037 to 0.082)	10	0.032 (0.018 to 0.046)
All	133	0.046 (0.040 to 0.051)	119	0.034 (0.030 to 0.039)

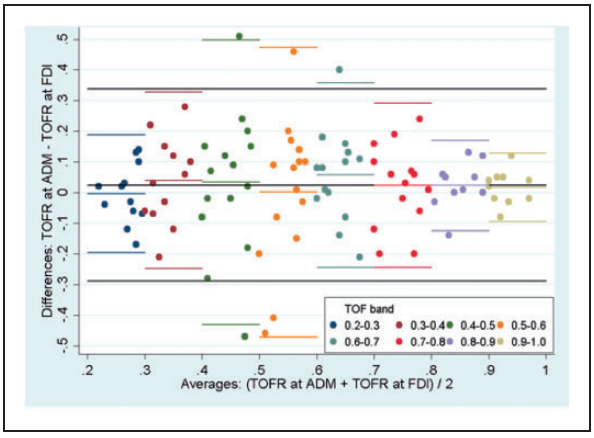


Figure 1: Bland-Altman plot for percentage train-of-four ratios (TOFr) measured by TetraGraph™ demonstrating bias and limits of agreement between measurements at the abductor digiti minimi (ADM) and first dorsal interosseous (FDI) muscles of the hand.

Results: We collected a total of 119 sets of repeated comparisons from 27 participants. TOFr were more precisely measured by the TetraGraph™ at the FDI (repeatability coefficient 0.034 (95% confidence intervals (CI) 0.030 to 0.039) than ADM (repeatability coefficient 0.045, 95% CI 0.040 to 0.051) (Table 1). Within the range of TOFr values of clinical interest for excluding RNMB (TOFr >0.9), the TOFr measured by the TetraGraph™ demonstrated a bias of +0.017 (95% CI 0.023 to 0.057) at the ADM compared to the FDI, with limits of agreement of −0.095 to 0.129 (Figure 1).

Conclusions: The TetraGraph™ was more precise when measuring TOFr at the FDI compared to the ADM, with 95% of consecutive measurements differing by 0.034. For TOFr >0.9, the ADM demonstrated a small positive bias (0.017) with wide limits of agreement (-0.095 to 0.129)

compared to the FDI. Despite a small bias, TOFr measured by the TetaGraph™ at the muscles are not interchangeable due to the wide limits of agreement. When using the TetraGraph™ monitoring at the FDI is suggested in preference to the ADM.

Ethics Approval: This study was approved by Human Research and Ethics Committee of The Sydney Adventist Hospital (HREC2018-40) and registered with the Australian New Zealand Clinical Trials Registry (376414).

104

Potentially Lethal Airway Obstruction from Dislodged NasoPore Dressings

Thomas Callaghan[1], Vaishali Londhe[1], Justin O'Brien[1] and Zoe Keon-Cohen[1]
[1]The Royal Victorian Eye and Ear Hospital, Melbourne, Australia

Introduction: We report a case of acute airway obstruction caused by the dislodgement of NasoPore dressings into the oropharynx following elective sinus surgery.

Description

A healthy 63-year-old man presented for elective endoscopic sinus surgery for sinonasal polyposis. Anaesthesia was induced and maintained using propofol and remifentanil with a single dose of atracurium for endotracheal intubation. Surgery proceeded uneventfully and the nasal cavity was packed with NasoPore prior to wakening. Laryngeal mask exchange was performed after removal of the throat pack and direct visualisation of the oropharynx. Coughing and breath holding accompanied by desaturation on emergence from anaesthesia was assumed to be laryngospasm and managed with continuous positive airway pressure (CPAP). Persistent inadequate ventilation and poor oxygenation prompted repeat laryngoscopy to exclude foreign body obstruction or haemorrhage but neither was obvious. Nebulised salbutamol was administered to ameliorate potential bronchospasm with negligible benefit but after further emergence from anaesthesia two large pieces of blood soaked NasoPore were expectorated with immediate improvement in ventilation. A postoperative chest x-ray in recovery was unremarkable and the patient was discharged the following day with no adverse sequelae.

Discussion: NasoPore is a bioresorbable polyurethane foam dressing used following nasal and sinus surgery to aid haemostasis and prevent adhesions. The foam fragments over 7–10 days and does not usually require removal, giving it a favourable profile for postoperative comfort and bleeding upon removal, when compared to non-absorbable Merocel.[1] However, its softer texture lends itself to be more easily dislodged through the nasal airway, where smaller pieces may occlude or traverse the laryngeal inlet causing potentially catastrophic airway obstruction. NasoPore aspiration has previously been reported in an 11-year-old child, which required retrieval using a rigid bronchoscope.[2] Both of these cases highlight the potential for any intranasal dressings to obstruct the airway especially after the application of CPAP. Increased vigilance is required when using NasoPore with early anticipation of foreign body aspiration if there are any concerns regarding airway obstruction post-operatively. Prompt assessment with early intervention is essential and a rigid bronchoscope should be readily available to remove any obstructing material. Surgeons should be aware that cutting NasoPore dressings into smaller pieces could increase the chance of dislodgement. Consideration should be given to suturing in any nasal spacers where the risk of aspiration is significant.[3]

Published with kind permission of the patient.

References

1. Wang J, Cai C, Wang S. Merocel versus Nasopore for nasal packing: a meta-analysis of randomized controlled trials. *PLoS One*. 2014 Apr 7; 9(4): e93959.
2. Smith J, Reddy E. Aspiration of Nasopore nasal packing. *BMJ Case Rep*. 2017 Oct 4; 2017. pii: bcr-2017-221969.
3. Hockstein NG, Bales CB, Palmer JN. Transseptal suture to secure middle meatal spacers. *Ear Nose Throat J*. 2006 Jan; 85(1): 47–8.

105

A single-centre examination of opioid usage habits for birthing patients

Dennis Nguyen[1] and Kym Osborn[1]
[1]Lyell McEwin Hospital, Elizabeth Vale, Australia

Introduction: Worldwide usage of prescription opioid analgesia has at least doubled since 2001, predisposing to potentially inappropriate opioid prescribing habits, such as excessive dosing and prolonged courses. The resulting licit and illicit use of these prescriptions has been linked to an increased prevalence of adverse drug reactions (ADRs) – the so-called "opioid epidemic"[1]. These ADRs are particularly problematic in obstetrics, with additional considerations such as sedation impairing the mother's ability to care for her newborn child, and breastmilk contamination.

Aims: We therefore conducted a pilot study retrospectively auditing opioid usage for birthing patients at our institution, to identify practices amenable to future quality improvement initiatives.

Methods: Following approval from the local ethics committee, a cohort of 50 Caesarean section (C-section) and 60 vaginal delivery patients was selected by Excel randomisation of all birthing patients at our institution from October to December 2017. After excluding non-opioid naive patients and those for whom casenotes were unavailable, 44 C-section and 48 vaginal delivery patients remained. Data collected from casenote review included demographics, times of delivery and hospital discharge, analgesic and anaesthetic techniques used during delivery, estimated blood loss, postpartum inpatient analgesia prescriptions and actual doses consumed by patients, and discharge prescriptions. This data was then analysed, particularly focussing on opioid prescriptions and consumption, and opioid-sparing strategies.

Results: Notably in the C-section arm, 21/44 (48%) patients were discharged with a script providing an opioid supply exceeding 3 times their opioid consumption in the 24 hours preceding discharge. 8/44 (18%) patients were provided an opioid script less than 3 times worth, 4/44 (9%) were not provided an opioid script and 9/44 (20%) were unknown.

Also, 8/44 (18%), 15/44 (34%) and 15/44 (34%) patients were prescribed oxycodone 5–20mg, 5–15mg and 5–10mg 2-hourly PRN respectively. We compare these results against the experience of Duke et al[2], who demonstrated that a prescription as low as 2.5–5mg may provide adequate analgesia while minimising opioid consumption.

In the vaginal delivery arm, 17/48 (35%) patients required inpatient opioids. Of these patients, half were given opioids, despite not having clinically indicated simple analgesics (paracetamol and non-steroidal anti-inflammatories) optimised first.

Conclusions: Our pilot study demonstrates a potential mismatch between discharge opioid prescriptions and patients' actual inpatient requirements, as well as inpatient opioid dosing potentially exceeding requirements for adequate analgesia. Quality improvement projects are therefore indicated, focussed on educating clinical staff to better balance the goals of judicious opioid usage and adequate analgesia.

References

1. Neuman MD, Bateman BT, Wunsch H. Inappropriate opioid prescription after surgery. *The Lancet*. 2019 Apr 13; 393: 1547–57.
2. Duke JL, Raju A, Tan EKS, Sok R. Lower Oxycodone Prescription Post Caesarean Section is Associated with Decreased Inpatient Opioid Consumption. *International Journal of Obstetric Anesthesia*. 2019. doi: https://doi.org/10.1016/j.ijoa.2019.04.005