Can J Anesth/J Can Anesth (2017) 64:S1–S266
https://doi.org/DOI 10.1007/s12630-017-1003-0

260987 - INTERSCALENE BLOCK ANALGESIA AFTER AMBULATORY SHOULDER SURGERY: A FACTORIAL RCT OF DEXAMETHASONE DOSE AND ROUTE

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Introduction:
Dexamethasone consistently prolongs the duration of single injection interscalene block (ISB) when given by either the intravenous or perineural route[1]. Previous comparisons of different dexamethasone doses and routes have been insufficiently powered to precisely estimate differences in analgesic duration[1,2,3]. This study aimed to definitively determine the effect of dose and route on the analgesic duration of ISB after ambulatory arthroscopic shoulder surgery (AASS).

Methods:
This factorial, randomized superiority trial was conducted with appropriate ethics approvals, including that required for off-label dexamethasone use. Consenting adult patients undergoing AASS were randomized in a 1:1:1:1 ratio. They received preoperative ultrasound-guided ISB with 30mL 0.5% bupivacaine and 4mg or 8mg of dexamethasone, by either the perineural or intravenous route. Patients with diabetes mellitus, chronic opioid use or contraindications to ISB or dexamethasone were excluded. Patients, caregivers, recruiters and outcome assessors were blind to the allocation sequence and group assignments. The primary outcome, block duration measured as time of first surgical site pain, and secondary outcomes, including adverse effects and postoperative neurologic symptoms (PONS), were assessed by telephone follow-up or chart review. Power calculations based on a two-tailed alpha error of 0.05, a standard deviation of 5.0 hours (h) and 5% attrition showed that 280 patients would provide ≥90% power to detect a a difference of 3.0h in block duration for the main effects of dose and route, and a synergistic interaction of 4.0h between them.

Results:
Between June 2015 and July 2016, 280 of 522 eligible patients were studied without losses to follow-up or exclusions from analysis. The perineural route significantly prolonged block duration by 2.0h, 95% confidence interval (CI) 0.4 – 3.5h, p = 0.01. However, 8mg of dexamethasone did not significantly prolong block duration compared to 4mg (1.3h, 95%CI -0.3 – 2.9h, p = 0.10), there was no significant statistical interaction (p = 0.51), and no remarkable differences in secondary outcomes between groups (Table). Like previous work[4], PONS at fourteen days were common but reliably resolved by 6 months in all but 5 patients. With diagnoses of shoulder numbness, median nerve injury between shoulder and elbow, multiple sclerosis, cubital and carpal tunnel syndrome, respectively, their relationship to ISB is uncertain. Higher fourteen day PONS rates with 8mg dexamethasone and the perineural route did not reach statistical significance.

Discussion:
ISB analgesic duration was prolonged by the perineural route, but not by a higher dexamethasone dose. The perineural route's analgesic benefit is of marginal clinical significance at these doses, and should be weighed against potential risks. The significance of PONS after ISB and AASS remains unclear.

References:
1. Anaesthesia 2015 70: 71-83
2. Anaesthesia 2015 70:1180-5

3. Eur J Anaesthesiol 2015 32:650-5
4. Anesth Analg 2009 109:265-71

Table. Primary and Secondary Outcomes. Values are expressed as mean (standard deviation), number (percent) or median [range]

	Intravenous		Perineural		
	4mg	8mg	4mg	8mg	*P***
Analgesia					
Block duration (hours)	24.0 (4.6)	24.8 (6.4)	25.4 (6.6)	27.2 (8.5)	0.01, 0.10
Failed blocks	1	0	2	1	0.90
Block duration excluding failed blocks (hours)	23.8 (4.5)	24.8 (6.4)	25.5 (6.7)	27.3 (8.5)	0.008, 0.08
First shoulder pain score at end of block duration	3 [0-10]	3 [0-10]	3 [0-10]	3 [1-10]	0.65; 0.90
Postoperative opioid use*	49 (77)	53 (85)	59 (88)	50 (81)	0.32
Morphine equivalents (mg/h)*	0.7 [0-7.3]	0.7 [0-3.5]	0.5 [0-6.1]	0.9 [0-6.3]	0.90; 0.39
Acetaminophen use*	43 (67)	43 (69)	54 (81)	44 (71)	0.33
Acetaminophen (mg/h)*	33 [0-259]	31 [0-254]	28 [0-200]	31 [0-181]	0.16; 0.53
Intraoperative medications					
Ephedrine or phenylephrine	3 (4)	4 (6)	4 (6)	4 (6)	1.00
Antihypertensives	5 (7)	7 (10)	2 (3)	4 (6)	0.40
Antimuscarinics	4 (6)	0 (0)	1 (1)	2 (3)	0.22
Recovery room					
Length of stay (hours)	1.6 [0.9-3.3]	1.4 [1.0-2.9]	1.6 [0.4-3.0]	1.6 [1.0-3.1]	0.16; 0.003
Opioids administered	4 (6)	1 (1)	4 (6)	5 (7)	0.45
Antiemetics administered	10 (14)	4 (6)	12 (17)	9 (13)	0.21; 0.11
Postoperative day 1 assessments***					
Sleep quality	4 [0-10]	5 [0-10]	5 [0-10]	5 [0-10]	0.26
Nausea and vomiting	0 [0-10]	0 [0-9]	0 [0-8]	0 [0-5]	0.54
Shortness of breath	0 [0-8]	0 [0-8]	0 [0-10]	0 [0-7]	0.008
Anxiousness or restlessness	0 [0-9]	0 [0-10]	0 [0-10]	0 [0-9]	0.58
Distress from sensory block	1 [0-10]	3 [0-10]	2 [0-10]	1.5 [0-10]	0.16
Distress from motor block	1 [0-10]	2 [0-10]	2 [0-10]	0.5 [0-10]	0.07
Likelihood of choosing same technique again	10 [0-10]	10 [0-10]	10 [0-10]	10 [0-10]	0.71
Postoperative day 14 assessments					
Hoarse voice	2 (3)	1 (1)	3 (4)	2 (3)	0.96
Dyspnea	0 (0)	3 (4)	3 (4)	2 (3)	0.39
Numbness	3 (4)	6 (9)	8 (11)	11 (16)	0.05; 0.23
Paresthesia	6 (9)	8 (11)	9 (13)	11 (16)	0.27; 0.46
Surgical arm weakness	3 (4)	7 (10)	3 (4)	6 (9)	0.47
Any of the above	10 (14)	15 (21)	15 (21)	21 (30)	0.11; 0.11

*Measured from recovery room discharge until end of block duration. Data was missing for 25 patients
**p values expressed as overall 4-way comparison or as route; dose ***Higher 11 point numerical response scores indicate more severe adverse effects, except for sleep quality and likelihood of choosing same technique again

262866 - OPTIMAL TRAINING FREQUENCY FOR ATTAINMENT AND MAINTENANCE OF HIGH-QUALITY CPR ON A HIGH-FIDELITY MANIKIN

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Introduction:
Performance of high-quality cardiopulmonary resuscitation (CPR) improves clinical outcomes after cardiac arrest (1). Without intermittent training, the ability to perform high-quality CPR degrades with time (2-5). Frequent training and assessment of CPR skills using interactive devices has been suggested to improve performance (2-5), but the optimal training frequency has yet to be determined. We aimed to identify the least frequent training interval associated with continued performance of high-quality CPR.

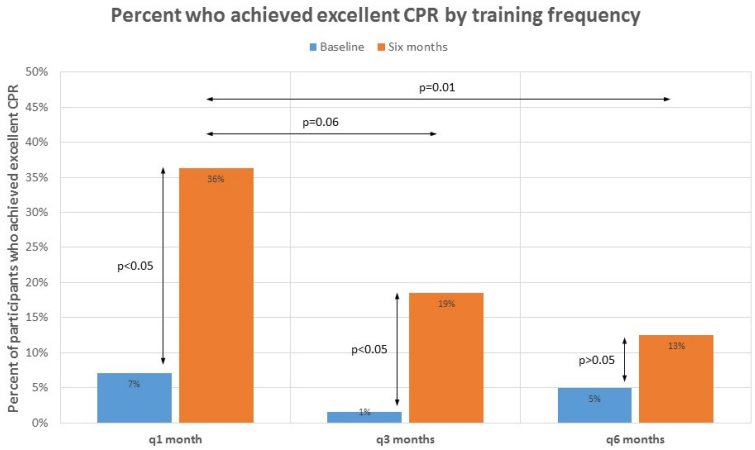
Methods:
Local ethics committee approval was obtained prior to recruitment, and informed consent was obtained from all participants at the time of study enrollment. Nurses from a variety of clinical units at our hospital were recruited and randomized to one-month, three-month, six-month, and twelve-month CPR training intervals over the course of a twelve-month study period. Each session included an assessment, where two minutes of CPR was performed on a high-fidelity manikin without performance feedback. This was followed by a training component, where the assessment session was reviewed, and up to three two-minute, coached CPR sessions with verbal and real-time visual feedback were performed until either "excellent CPR" was achieved (≥90% of compressions with depth of 50-60 mm, ≥90% of compressions with rate of 100-120 /min, and ≥90% of compressions with complete chest recoil), or the maximum number of attempts was reached. Final CPR performance was assessed after twelve months. The primary outcome was the proportion of nurses able to perform "excellent CPR" in each group. Individual performance metrics, including compression depth, rate, and recoil were also compared.

Results:
We recruited 244 nurses to participate in the study, of which 183 were enrolled in the one, three, and six-month groups. This analysis reports the study's results at six months, at which time 74% of these nurses (n=135/183) were still enrolled in the study. At baseline, 7% (4/56), 1% (1/67), and 5% (3/60) in the one-month, three-month, and six-month groups, respectively, performed excellent CPR (χ^2=2.41, p=0.29). Statistically significant improvements in achievement of excellent CPR were observed in the one-month (12/33=36% vs. 4/56=7%, Fisher's exact = 0.01, p2=6.44, p=0.01), but not between the one- and three-month groups (12/33=36% vs. 10/54=19%, χ^2=3.45, p=0.06).

Discussion:
Front line health care providers certified in basic resuscitation do not perform excellent CPR without additional training. Frequent, short-duration bedside training that occurs every month or every three months is effective in improving performance. At six months, there is non-statistically significant trend toward better performance when training on a monthly basis.

References:
1. Emerg Med Clin North Am 2012; 30: 105-122.
2. Resuscitation 2011; 82: 447-453.
3. Resuscitation 2013; 84: 1267-1273.
4. Resuscitation 2014; 85: 1282-1286.
5. Resuscitation 2015; 15: 212-217.

Figure 1



Proportion of participants who performed "excellent CPR" at baseline and at six months, organized by training frequency. Statistically significant improvements in achievement of excellent CPR were observed in the one-month and three-month groups. At the six-month time point, a significant difference in rates of excellent CPR was observed between the one-month and six-month groups, but not between the one-month and three-month groups.

277156 - INTRAVENOUS DEXMEDETOMIDINE FOR THE TREATMENT OF SHIVERING DURING CESAREAN DELIVERY UNDER NEURAXIAL ANESTHESIA

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Introduction: Neuraxial anesthesia is the preferred technique for cesarean delivery. In about 55% of these patients, spinal or epidural anesthesia may be associated with shivering which may be very distressing[1] and interfere with the monitoring of vital signs. Recent studies have shown that dexmedetomidine, an alpha 2-adrenergic agonist, could help to alleviate shivering associated with neuraxial anesthesia[2]. The objective of this study was to test whether dexmedetomidine reduces the duration of shivering episodes associated with neuraxial anesthesia during cesarean delivery.

Methods: Local Ethics Committee approval and consent for study participation were obtained. Eighty healthy parturients, 18 years of age or more, undergoing cesarean delivery under neuraxial anesthesia were enlisted in this prospective, randomized, double-blind trial. After childbirth, when significant shivering occured (Crowley and Mahajan scale[1]), the intervention group (n = 40) received a single intravenous bolus of dexmedetomidine (30 mcg) while the control group (n = 40) received normal saline. Randomization and allocation were based on a computer generated list. The primary outcome measure was the time lapse for an observable decrease in shivering after the intervention.

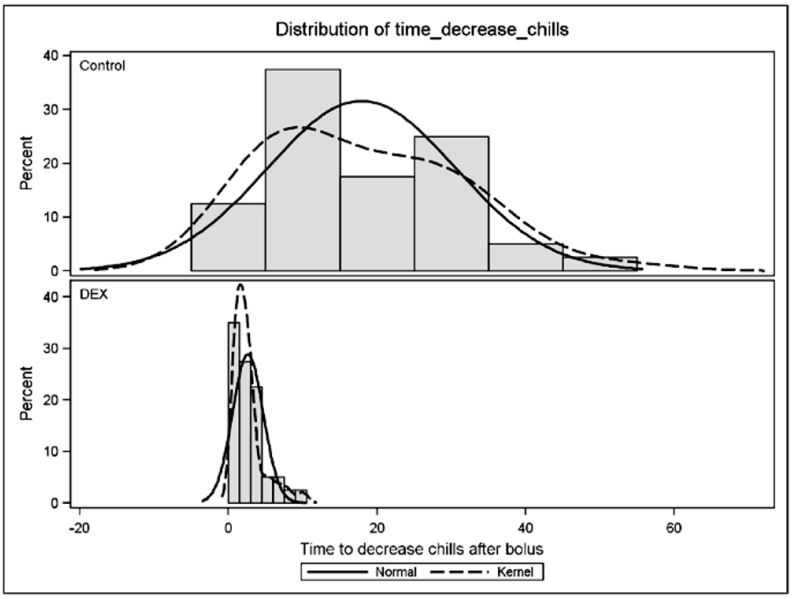
Results: 155 patients undergoing a cesarean section under neuraxial anesthesia met the inclusion criteria and were recruited, of whom 80 presented significant shivering and were randomized. Our study showed that dexmedetomidine reduces the duration of shivering: mean time to decrease chills after the bolus of 2.6 minutes (CI 95% 1.94-3.26) with dexmedetomidine, and 17 minutes (CI 95% 13.9-21.9 min) with normal saline ($p < 0.0001$). The effet persisted at 15 minutes, where chills had completely stopped in 90% of the patients in the intervention group versus 23% in the control group. No adverse effects, including bradycardia (HR < 50 bpm), hypotension (> 30% of baseline MAP) and sedation (Filos et al scale), have been observed.

Discussion: This study demonstrates that an intravenous bolus of dexmedetomidine is an effective treatment to decrease the duration of shivering during cesarean delivery under neuraxial anesthesia.

References:

1. Crowley, L. J., & Buggy, D. J. (2008). Shivering and neuraxial anesthesia. Regional Anesthesia and Pain Medicine, 33(3), 241–252.
2. Mittal, G., Gupta, K., Katyal, S., & Kaushal, S. (2014). Randomised double-blind comparative study of dexmedetomidine and tramadol for post-spinal anaesthesia shivering. Indian Journal of Anaesthesia, 58(3), 257–262.

Time to decrease chills after bolus


Distribution of time_decrease_chills
Control
DEX
Percent
Percent
0
10
20
30
40
-20
0
20
40
60
Time to decrease chills after bolus
Normal
Kernel

278480 - ELEVATED RED CELL DISTRIBUTION WIDTH IS AN ADVERSE PROGNOSTIC INDICATOR IN ELECTIVE NONCARDIAC SURGERY

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Introduction: Red cell distribution width (RDW) is routinely reported with the complete blood count and measures the variability of red cell size. In patients with coronary artery disease and heart failure, elevated RDW is strongly associated with mortality.[1-3] Limited prior data suggest a similar association in surgical patients.[4,5] We examined the adjusted association between elevated RDW and 30-day hospital mortality in a cohort of elective noncardiac surgical patients.

Methods: Following research ethics board approval, we used a large institutional database to conduct a retrospective cohort study of adults (≥18 y) who underwent inpatient noncardiac surgical procedures at a multisite tertiary-care hospital network from 2008 to 2015. The exposure of interest was the most recent RDW within 60 days before the index surgery. The primary outcome was 30-day in-hospital mortality. Secondary outcomes included postoperative cardiac events (troponin elevation, myocardial infarction, or cardiac arrest) and acute kidney injury (doubling of creatinine within postoperative days 1-4). We used separate multivariable logistic regression models to examine the adjusted association of RDW (categorized into quartiles) with these outcomes while adjusting for age, sex, BMI, comorbidities, surgical procedure, and preoperative hemoglobin. Interaction between anemia and RDW on the outcome of mortality was examined.

Results: The primary analysis included 23,337 patients. There were 399 (1.7%) in-hospital 30-day deaths, 808 (3.5%) cardiac events, and 2087 (8.9%) episodes of acute kidney injury in the cohort. After risk adjustment, the highest quartile of RDW (>13.0) was associated with an important increased odds of death [adjusted odds ratio (aOR) 2.36 (1.63-3.43), $p < 0.001$]. When compared with the lowest RDW quartile (≤11.6), all higher quartiles had increased risk for cardiac events. The highest quartile of RDW (>13.0) had an increased odds for cardiac events [aOR 1.39 (1.08-1.78), p=0.01]. There was no significant association between RDW quartile with acute kidney injury. The model predicting death had good discrimination (c-statistic 0.81; bootstrap 95% CI 0.80-0.81), as did the model predicting cardiac events (c-statistic 0.79; bootstrap 95% CI 0.786-0.791). While preoperative anemia was also associated with adverse outcomes, there was no statistically significant interaction between RDW and anemia in the logistic regression models.

Discussion: Elevated RDW is associated with clinically important increases in perioperative mortality and cardiac events. Further research is needed to validate these findings, and determine how best to incorporate RDW into assessing

perioperative risk and targeting patients for risk reduction interventions.

References:

1. Am J Cardiol. 2010 105:312-317.
2. Int Heart J. 2014 55:58-64.
3. Resuscitation. 2012 83: 1248-1252.
4. Eur J Cardiothrac Surg. 2013 43: 1165-9.
5. Int J Cardiol. 2013 165:369-71.

Table 1. Adjusted odds ratios shown for outcomes by RDW Quartile.

30 Day In-Hospital Mortality				
RDW Quartile	*aOR*	*95% CI*	*P-Value*	*Type 3 Analysis of Effects*
1 (≤11.6%)	Reference			
2 (11.7-12.1%)	1.24	0.82-1.88	0.32	<0.0001
3 (12.2-12.9%)	1.55	1.06-2.29	0.03	
4 (≥13.0%)	2.36	1.63-3.43	<0.0001	
Cardiac Events				
RDW Quartile	*aOR*	*95% CI*	*P-Value*	*Type 3 Analysis of Effects*
1 (≤11.6%)	Reference			
2 (11.7-12.1%)	1.38	1.06-1.79	0.02	0.06
3 (12.2-12.9%)	1.34	1.04-1.72	0.02	
4 (≥13.0%)	1.39	1.08-1.78	0.01	
Acute Kidney Injury				
RDW Quartile	*aOR*	*95% CI*	*P-Value*	*Type 3 Analysis of Effects*
1 (≤11.6%)	Reference			
2 (11.7-12.1%)	0.88	0.78-1.01	0.06	0.25
3 (12.2-12.9%)	0.98	0.86-1.12	0.79	
4 (≥13.0%)	0.93	0.81-1.08	0.35	

Models were adjusted for age, sex, BMI, preoperative hemoglobin, procedure category, and comorbidities (ischemic heart disease, heart failure, cerebrovascular disease, chronic obstructive pulmonary disease, chronic kidney disease, smoking status, diabetes).

284789 - PERIOPERATIVE GOAL-DIRECTED THERAPY: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

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Introduction: Goal-directed hemodynamic and fluid therapy (GDT) during major surgery remains controversial.[1] Although recommended by national guidelines, randomized controlled trials (RCTs) and older meta-analyses have demonstrated conflicting results and inconsistent benefit.[1,2] Given the clinical importance, conflicting evidence base, and recently published RCTs of GDT, we performed an updated systematic review and meta-analysis (SRMA) to address whether clinical outcomes differ among different surgical strata, industry-sponsored trials, and the means of measuring and achieving the GDT.

Methods: Comprehensive searches of Medline, Embase, and the Cochrane Library were performed without language restriction up to 31-Dec-2016 to identify RCTs of adult patients undergoing major surgery that received GDT versus standard care. Trauma patients and parturients were excluded. GDT was defined as fluid and/or vasopressor therapy titrated to hemodynamic goals (e.g. cardiac output) or validated measures of volume responsiveness (e.g. stroke volume variation). The primary outcome was in-study mortality. Secondary outcomes included organ-specific morbidity and hospital and ICU length of stay (LOS). Two researchers independently extracted study demographics, outcomes, and assessed study quality via the Cochrane Risk of Bias Tool. Random effects meta-analysis was performed to derive odds ratios (OR) and weighted mean differences (WMD), including 95% confidence intervals (95%CI) and I^2 statistic for heterogeneity. *A priori* subgroup analyses included type of surgery, industry sponsorship of the study, and method of GDT.

Results: The search retrieved 1,945 citations and 95 RCTs (11,599 patients) met the inclusion criteria. Outcomes are summarized in Table 1. GDT reduced in-study mortality compared to standard care (OR 0.80; 95%CI 0.68-0.95; p=0.009; Number needed to treat for benefit [NNTB]=65; I^2=0.0%). Organ-specific morbidity was also reduced for patients receiving GDT with lower rates of pneumonia (OR 0.77; 95%CI 0.63-0.96; NNTB=56; I^2=0.0%), acute kidney injury or renal dysfunction (OR 0.72; 95%CI 0.59-0.88; NNTB=33; I^2=5.8%), and wound infection (OR 0.59; 95%CI 0.48-0.72; NNTB=27; I^2=0.0%). Rates of myocardial infarction (OR 0.97; 95%CI 0.72-1.32), congestive heart failure (OR 0.99; 95%CI 0.79-1.25), and exposure to allogenic blood transfusion (OR 1.08; 95%CI 0.81-1.45) were similar between groups. Additionally, hospital LOS (0.79 days; 95%CI 0.43-1.15; I^2=81.8%) and ICU LOS (0.58 days; 95%CI 0.30-0.86; I^2=86.3%) were decreased with GDT. Sensitivity analysis by industry sponsorship showed larger magnitudes of effect within industry-sponsored trials for some—but not all—outcomes (Table 1). Given the challenge of blinding during GDT, only 4 of 96 RCTs were at low risk of bias.

Discussion: This SRMA is the most comprehensive critical appraisal of the literature to date. The available evidence suggests that perioperative GDT reduces mortality, morbidity, and LOS. Given the high risk of bias of included RCTs, the findings should be interpreted with caution. Nonetheless, the benefit for renal outcomes and wound infection was quite robust, particularly in sensitivity analysis.

References:

[1]JAMA(2014);311(21):2181-2190.
[2]Anesth&Analg(2012);114:640-51.

Table 1

Outcome	Subgroup		OR (95% CI)	p-value	NNTB
Mortality, In-study	Overall pooled (I^2=0.0%)		0.80 (0.68-0.95)	0.009	65
	PAC usage	Yes PAC	0.53 (0.30-0.92)	0.02	18
		No PAC	0.66 (0.50-0.87)	0.004	59
	Industry sponsorship	Sponsored	0.74 (0.51-1.07)	n.s.	-
		Unsponsored	0.82 (0.68-0.99)	0.03	60
	Surgery type	Cardiac	0.67 (0.42-1.08)	n.s.	-
		Non-cardiac	0.82 (0.69-0.98)	0.03	69
Myocardial Infarction	Overall pooled (I^2=0.0%)		0.97 (0.72-1.32)	n.s.	-
CHF	Overall pooled (I^2=0.0%)		0.99 (0.79-1.25)	n.s.	-
Arrhythmia	Overall pooled (I^2=0.0%)		0.80 (0.66-0.96)	0.02	55
	PAC usage	Yes PAC	0.94 (0.71-1.24)	n.s.	-
		No PAC	0.70 (0.55-0.91)	0.006	34
	Industry sponsorship	Sponsored	0.70 (0.53-0.92)	0.01	27
		Unsponsored	0.90 (0.69-1.16)	n.s.	-
	Surgery type	Cardiac	0.57 (0.36-0.91)	0.02	15
		Non-cardiac	0.85 (0.69-1.05)	n.s.	-
Pneumonia	Overall pooled (I^2=0.0%)		0.77 (0.63-0.96)	0.02	56
	PAC usage	Yes PAC	0.88 (0.65-1.21)	n.s.	-
		No PAC	0.69 (0.52-0.92)	0.01	38
	Industry sponsorship	Sponsored	0.70 (0.51-0.98)	0.04	34
		Unsponsored	0.83 (0.63-1.10)	n.s.	-
	Surgery type	Cardiac	0.38 (0.09-1.67)	n.s.	-
		Non-cardiac	0.79 (0.63-0.97)	0.03	58
Acute Kidney Injury or Renal Dysfunction	Overall pooled (I^2=5.8%; p=0.36)		0.72 (0.59-0.88)	0.001	33
	PAC usage	Yes PAC	0.65 (0.36-1.15)	n.s.	-
		No PAC	0.73 (0.58-0.92)	0.007	29
	Industry sponsorship	Sponsored	0.68 (0.50-0.92)	0.01	33
		Unsponsored	0.73 (0.54-0.99)	0.04	31
	Surgery type	Cardiac	0.84 (0.49-1.45)	0.53	-
		Non-cardiac	0.70 (0.57-0.86)	0.001	33
Wound Infection	Overall pooled (I^2=0.0%)		0.59 (0.48-0.72)	<0.001	27
	PAC usage	Yes PAC	0.80 (0.58-1.10)	n.s.	-
		No PAC	0.48 (0.37-0.63)	<0.001	19
	Industry sponsorship	Sponsored	0.50 (0.37-0.69)	<0.001	19
		Unsponsored	0.66 (0.51-0.86)	0.002	37
	Surgery type	Cardiac	0.31 (0.12-0.84)	0.02	8
		Non-cardiac	0.61 (0.49-0.75)	<0.001	29
Stroke	Overall pooled (I^2=0.0%)		0.68 (0.33-1.37)	n.s.	-
Allogenic Blood Transfusion Exposure	Overall pooled (I^2=38.0%; p=0.02)		1.08 (0.81-1.45)	n.s.	-

Table 1: Summary of Clinical Outcomes. Odds ratio values below 1 favour the goal-directed therapy group compared to control and vice versa. Abbreviations: OR=odds ratio; 95% CI = 95% confidence interval; NNTB=number needed to treat for benefit; CHF=congestive heart failure; I2=heterogeneity statistic. 'n.s.'=not significant. PAC=pulmonary artery catheter.

285277 - CAN PEDIATRIC GASTRIC SONOGRAPHY BE USED AS A CLINICAL TOOL TO ESTABLISH EMPTY ANTRAL CROSS-SECTIONAL AREAS?

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Introduction: Gastric antral sonography is emerging as a point of care tool for the assessment of aspiration risk. There are few studies in pediatric patients[1-3] and none have focused on describing the sonoanatomy of the empty antrum or determining an upper cross-sectional area (CSA) limit of the empty antrum. The objectives of this study were (1) to describe the sonographic appearance of the empty antrum, (2) to determine if an upper CSA limit of the empty antrum could be incorporated into a pediatric clinical algorithm and (3) establish the sensitivity and specificity to determine the validity of antral sonography in the diagnosis of an empty antrum.

Methods: This prospective observational cohort study received REB approval. Consent was obtained. Antral sonography was performed in 99 fasted elective patients, 1 to 17 years of age, in the supine and right lateral decubitus (RLD) positions that were scheduled for elective upper gastrointestinal (GI) endoscopy under general anesthesia. Antral CSA values measured prior to and after endoscopic suction were compared across assigned qualitative grading groups using a Kruskal-Wallis H test. Receiver operator characteristic (ROC) curves were plotted to estimate the discriminating power of antral sonography position in the diagnosis of an empty antrum. Cut-off values were chosen using the Youden index, maximizing the sum of sensitivity and specificity. Positive (PPV) and negative predictive values (NPV) are presented for each sonographic position.

Results: The empty antrum sonographic appearance is ovoid-shaped. Significant differences in pre- and post-suctioned RLD measured CSAs were found between classified grade 1 ($p < 0.001$), grade 2 ($p = 0.017$) and all subjects ($p < 0.001$). Correlations between suctioned volume and CSA difference were $\rho = 0.22$ and $\rho = 0.58$ in supine and RLD positions, respectively for any suctioned volume. The discriminatory power of ultrasound view in diagnosing an empty antrum is presented by ROC curves where the area under the supine and RLD curves were 0.54 (95% CI 0.45-0.62, $p = 0.4$) and 0.73 (95% CI 0.66-0.8, $p < 0.001$), respectively (Figure 1). The cut-off value of the empty antrum in supine position is 2.20 cm^2 with a sensitivity of 76%, specificity of 35%, PPV of 53% and NPV of 58%. The cut-off value of the empty antrum in RLD is 3.07 cm^2 with a sensitivity of 76%, specificity of 68%, PPV of 70% and NPV of 74%.

Discussion: Antral sonography is becoming an established tool to assess gastric content and volume in pediatric patients. The RLD position is both sensitive and specific to qualitatively assess the gastric antrum grade and to quantitatively measure antral CSA. An antral CSA of ≤ 3.07cm^2 in the RLD position confirms that the antrum is empty in patients 1 to 17 years of age.

References:

[1]Pediatr Anesth 2012 22: 144-149.
[2]Pediatr Anesth 2015 25: 301-308.
[3]Br J Anaesth 2016 116: 649-654.

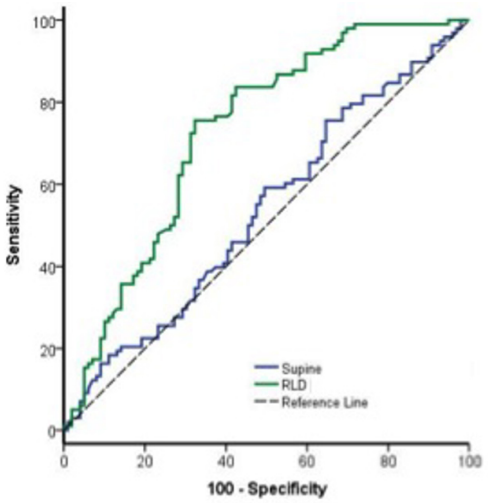

Figure 1: Receiver operator characteristic (ROC) curves represent the discriminatory power of the gastric ultrasound view in diagnosing an empty antrum in the supine (blue) and right lateral decubitus (RLD, green) positions.

280324 - MODERATE ANEMIA IS ASSOCIATED WITH RENAL TISSUE HYPOXIA AND INCREASED CEREBROVASCULAR REACTIVITY IN MICE

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Introduction: Moderate anemia, with hemoglobin concentrations (Hb) between 80-100g/L, has been associated with increased risk of organ injury (brain, kidney) and mortality by undefined mechanisms (1,2). We hypothesize that anemia–induced tissue hypoxia is a unifying mechanism for these outcomes. We measured the partial pressure of oxygen in tissues (P_tO_2), expression of hypoxia signaling molecule hypoxia inducible factor-1α (HIF-1α), and changes in cerebrovascular reactivity (CVR) to evaluate the mechanisms associated with tissue hypoxia during moderate anemia. In addition to standard measures of tissue hypoxia, we assessed CVR because clinical and experimental studies have associated reduced CVR with brain hypoxia and stroke (3-5).

Methods: With institutional animal care committee approval, a transgenic HIF-ODD Luciferase mouse model, ubiquitously expressing a HIF-1α-luciferase fusion protein, was assessed. Moderate anemia was induced with a red blood cell (RBC)-specific antibody (TER119). This antibody binds to the glycophoryn-A complex, removing red blood cells via intravascular hemolysis and splenic sequestration. Under isoflurane anesthesia (2% isoflurane, 21% O_2), Hb (Co-oximetry); peripheral arterial oxygen saturation (S_pO_2; pulse-oximetry); P_tO_2 (G4 Oxyphor phosphorescence quenching); blood flow (high-frequency ultrasound); CVR to a 5% CO_2 challenge (high-frequency ultrasound); and real-time HIF-luciferase radiance (IVIS luciferometer) were measured.

Results: RBC-specific antibody reduced Hb concentrations from baseline (143±7g/L) to a nadir of 94±11g/L at day 4 ($n=22$, $p < 0.001$). Anemia-induced cardiovascular adaptations included: 1) increased S_pO_2 ($p=0.018$); 2) increased cardiac output (26%, $p=0.011$); and 3) increased internal carotid blood flow (80%, $p < 0.001$). Brain P_tO_2 did not decrease in anemic mice (22.7±5.2 vs. 23.4±9.8 mmHg, $p=0.935$). By contrast, CVR increased during anemia relative to non-anemic controls ($p < 0.001$). During anemia, renal blood flow did not increase ($p=0.239$); and this was associated with a reduction in kidney P_tO_2 (13.1±4.3 vs. 20.8±3.7 mmHg, $p< 0.001$). HIF-1α expression increased in the renal (30%, $p=0.006$) and gut region (72%, $p=0.017$).

Discussion: Antibody-induced anemia was associated with adaptive cardiovascular responses to improve tissue oxygen delivery. These adaptations resulted in preferential cerebral perfusion and maintained brain P_tO_2. Under these conditions, we observed the novel finding of increased CVR. This increase in CVR may contribute to improve cerebral perfusion and oxygen delivery during anemia. By contrast, kidney blood flow did not increase during anemia, resulting in renal tissue hypoxia and increased expression of HIF-1α. The physiological significance of these responses remains yet to be elucidated. Further study is required to determine if anemia-induced renal tissue hypoxia contributes to acute kidney injury in surgical patients with moderate perioperative anemia.

References:

1)Lancet 2011;378(9800):1396-407
2)JAMA 2007;297(22):2481-88
3)J Cereb Blood Flow Metab. 2016;Epub ahead of print
4)Neurology 2014;83(16):1424-31
5)AJNR Am J Neuroadiol 2016;37(2):228-35

284809 - EFFICACY AND SAFETY OF ERYTHROPOIETIN AND INTRAVENOUS IRON TO REDUCE RED BLOOD CELL TRANSFUSION IN SURGICAL PATIENTS

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Introduction: Pre-operative anemia, including iron restricted anemia, affects up to 50% of surgical patients and increases the risk of red blood cell (RBC) transfusion. Both pre-operative anemia and perioperative RBC transfusion are associated with increased risk of adverse outcomes following surgery (1-4). Pre-operative treatment of anemia includes oral and intravenous (i.v.) iron and erythroid stimulating agents (ESA) such as erythropoietin (EPO); however, the optimal treatment strategy for pre-operative anemia remains to be established. Our objectives were to evaluate the efficacy and safety of ESA and iron therapy based on their effects on the prevalence of RBC transfusions and adverse thrombotic events. We hypothesized that ESA therapy would be more effective than iron therapy at reducing RBC transfusions.

Methods: We searched the Cochrane Central Register of Controlled Trials, MEDLINE and EMBASE from inception to July 2016; reference lists of published guidelines, reviews and associated papers, as well as conference proceedings. No language restrictions were applied.We included randomized controlled trials in which adult patients undergoing surgery received either an ESA and/or i.v iron before surgery, versus iron or no intervention. Two authors independently reviewed the studies and extracted data from included trials. Risk of bias was assessed for all included studies. Where applicable, we pooled risk ratios of dichotomous outcomes and mean differences of continuous outcomes across trials using random-effects models.Our primary outcome was the number of patients transfused with red blood cells. Secondary outcomes included risk of mortality and other thrombovascular events (stroke, myocardial infarction, deep vein thrombosis, and pulmonary embolism).

Results: A total of 79 randomized controlled trials (8,181 participants) were included. Patients that received ESAs in addition to oral or i.v. iron had a reduction in their risk for transfusion (risk ratio [RR], 0.50; 95% CI, 0.46-0.53), relative to those that only received oral or i.v. iron or no intervention. Treatment with i.v iron alone, relative to oral iron or no treatment, also reduced the risk of RBC transfusion (RR, 0.80 [95% CI, 0.63-1.01]. No clear increased risk of adverse events was observed with EPO use: mortality (RR, 1.03 [95% CI, 0.68-1.57]), myocardial infarction (RR, 1.14 [95% CI, 0.60-2.14]), deep vein thrombosis (RR, 1.43 [95% CI, 0.92-2.21]), stroke (RR, 1.49 [95% CI, 0.62-3.59]) or pulmonary embolism (RR, 0.50 [95% CI, 0.12-2.06]).

Discussion: Amongst patients undergoing surgery, the administration of an ESA in addition to oral or i.v. iron was associated with a reduction in patients requiring RBC transfusion. Intravenous iron was less effective at reducing RBC transfusion. Neither treatment was associated with any clear increase in risk of adverse thrombotic events. Additional large prospective randomized controlled trials are required to determine the optimal management strategy for patients undergoing surgery with iron restricted anemia.

References:

1. Circulation 2008; 117: 478-84
2. Anesthesiology 2009; 110: 574-81
3. Lancet 2011; 378: 1396-407
4. Br J Anaesth 2011; 107 Suppl 1: i41-59

284874 - MEDICATIONS FOR PROPHYLAXIS OF PRURITUS AFTER CESAREAN DELIVERY : A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: Intrathecal morphine provides excellent analgesia after cesarean delivery (CD), but can be associated with troublesome pruritus in 60-100% of patients.[1] A variety of medications have been used for prophylaxis against pruritus with varying success. We performed this meta-analysis to evaluate the efficacy of these medications in preventing intrathecal morphine-induced pruritus in women having CD.

Methods: This review complies with the PRISMA guidelines. A literature search of multiple electronic databases was conducted. We included randomized controlled trials (RCTs) that compared drugs used for prophylaxis of pruritus with a control group in women undergoing CD under spinal anesthesia with intrathecal morphine. The search was carried out using key words “prevention”, “treatment”, “pruritus”,“itching”, “intrathecal”, “spinal”, “morphine”, “obstetric patients”, “parturients”, “caesarian section”, “cesarean delivery.” All RCTs in the English language that reported at least one event in prophylaxis and control group were included. Quality of the studies was assessed using modified oxford scoring system. Dichotomous data were extracted and summarized using relative risks (RR) with 95% confidence intervals (CIs). Statistical analysis was conducted using Cochrane Review Manager 5.3 and forest plots were constructed for graphical representation.

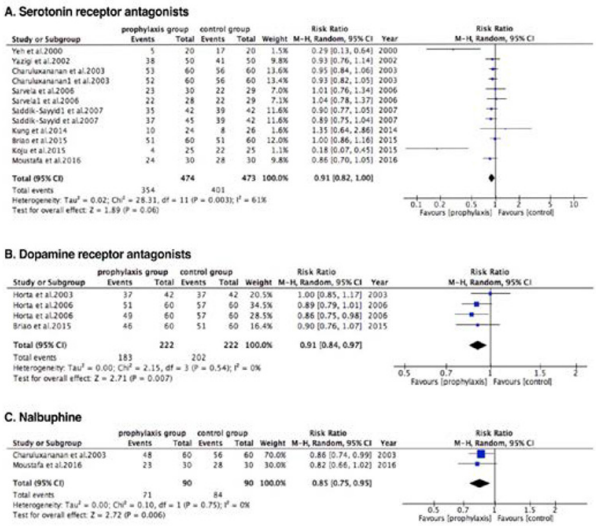
Results: Nineteen RCTs with 2435 patients (prophylaxis vs. control: 1219 vs. 1216) were included. Quality scores ranged from 6 to 7 indicating a low risk of bias. 474 patients received serotonin receptor antagonists (ondansetron^{7studies}, granisetron^{1study}, tropisetron^{1study}); 222 patients received dopamine receptor antagonists (alizapride^{2studies}, droperidol^{2studies}); 179 patients received opioid receptor agonist-antagonists (nalbuphine^{2studies}, butorphanol^{2studies}); 145 patients received opioid antagonists (naltrexone^{4studies}, nalmefene^{1study}, naloxone^{1study}); 80 patients received histamine receptor antagonists (diphenhydramine^{1study}, promethazine^{1study}); 89 patients received propofol^{1study} and 30 patients received celecoxib^{1study}.
The incidence of pruritus was not reduced with serotonin receptor antagonist prophylaxis compared with control group (RR: 0.91; 95%CI: 0.82-1.0; p=0.06). However, their use significantly reduced the incidence of severe pruritus and need for treatment of pruritus. There was a significant reduction in the incidence (RR: 0.91; 95% CI: 0.84-0.97; p=0.008) and severity of pruritus (RR: 0.39; 95% CI: 0.17-0.91; p=0.03) with dopamine receptor antagonist prophylaxis compared with control group. Nalbuphine decreased the incidence (RR: 0.85; 95% CI: 0.75-0.95; p=0.006), severity and need for treatment of pruritus (RR: 0.37; 95% CI: 0.26-0.52; p=0.00001) compared with placebo (Figure 1). There was no difference in the incidence, severity and need for treatment of pruritus with histamine receptor antagonists, propofol and celecoxib groups when compared with placebo.

Conclusion:
This systematic review comprehensively evaluates all the medications used in the English language literature for the prevention of pruritus from intrathecal morphine in women having CD. Prophylaxis with serotonin receptor antagonists reduced the severity and need for treatment, while the dopamine receptor antagonists and nalbuphine significantly reduced the overall incidence of intrathecal morphine-induced pruritus in women having CD.

References:
J Clin Anesth 2003;15:234–9.

CAS abstract 2017

Figure 1: Incidence of pruritus in prophylaxis vs. control group



285572 - A PREOPERATIVE SMOKING CESSATION INTERVENTION UTILIZING PATIENT E-LEARNING - AN OBSERVATIONAL STUDY

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Background

Interventions for preoperative smoking cessation can reduce perioperative complications and increase abstinence. It is not routinely provided due to various barriers such as a lack of time or training.[1, 2] In the general population, computer-based smoking cessation interventions have been utilized, but in the surgical population, evidence is limited on the use of patient e-learning programs.[3] The objective of this study was to develop and implement a patient e-learning program as part of a preoperative smoking cessation program in the surgical population.

Methods

REB approval and informed consent was obtained from all participants. In a prospective multicenter observational study, 459 adult patients undergoing elective, non-cardiac surgery were recruited in the preadmission clinic. The preoperative smoking cessation program consisted of a patient e-learning module, brief advice from a research assistant, referral to a tobacco quit-line, pamphlet, and/or pharmacotherapy. The patient e-learning program explained the importance of smoking cessation before surgery, benefits of quitting smoking, how to quit smoking and how to cope with quitting. Smoking status was assessed on the day of surgery, 1 month, 3 months and 6 months post-surgery. Self-reported abstinence was biochemically confirmed with urinary cotinine. The primary outcome was the 7-day point prevalence abstinence rate 6 months after surgery. Secondary outcomes included the 7-day point prevalence abstinence on the day of surgery, 1 month and 3 months after surgery. Multivariable logistic regression was used to identify independent variables related to abstinence.

Results

The 7-day point prevalence abstinence at 6 months was 22%. On the day of surgery, 1 and 3 months post-surgery, the 7-day point prevalence abstinence was 28%, 25% and 22% respectively. The variables predicting abstinence at 6 months were body mass index (OR 0.98; 95% CI: 0.93-0.99; P = 0.034), average amount of money spent on cigarettes (OR 0.69; 95% CI: 0.58-0.82; P < 0.0001), presence of other smokers in the household (OR 0.46; 95% CI: 0.25-0.84; P < 0.012), use of pharmacotherapy (OR 6.8; 95% CI: 3.5-13.2; P = 0.0001) and contact with Smokers' Helpline (OR 4.03; 95% CI: 2.3-7.0; P < 0.0001).

Conclusion

Intervention for preoperative smoking cessation utilizing a patient e-learning program led to a high rate of abstinence 1, 3, and 6 months after elective surgery. In overburdened preadmission clinics during routine clinical practice, the patient e-learning program may be valuable in overcoming barriers that hinder the provision of smoking cessation interventions.

References:

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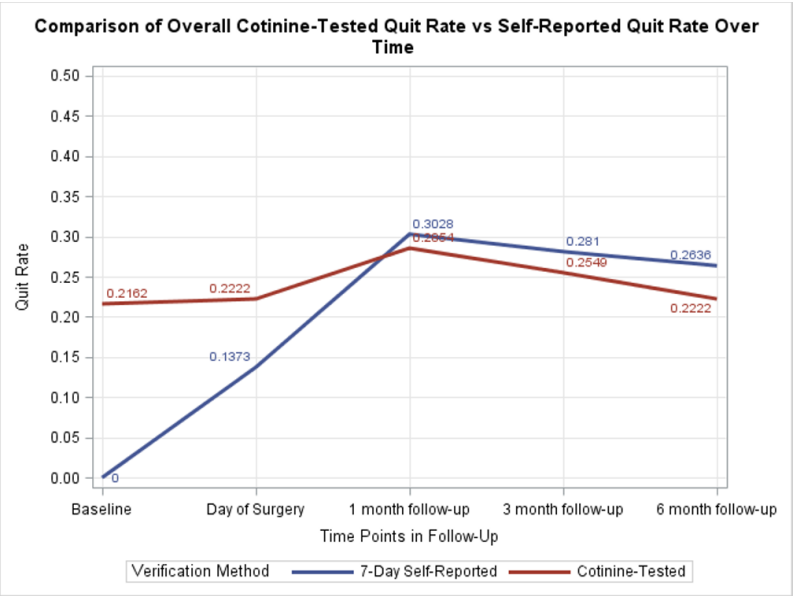
2. Wong J, et al. Can J Anaesth 2012; 9(3):268-79.
3. Wolfenden L. Anaesthesia. 2005 Feb;60(2):172-9.

Overall Quit Rate – Self-Reported vs. Cotinine Tested


Comparison of Overall Cotinine-Tested Quit Rate vs Self-Reported Quit Rate Over Time
Quit Rate
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.3028
0.2854
0.281
0.2636
0.2549
0.2222
0.2162
0.2222
0.1373
0
Baseline
Day of Surgery
1 month follow-up
3 month follow-up
6 month follow-up
Time Points in Follow-Up
Verification Method
7-Day Self-Reported
Cotinine-Tested

285764 - SIDESTREAM DARK FIELD IMAGING OF SUBLINGUAL MICROCIRCULATION TO ASSESS PREECLAMPSIA MICROVASCULAR DYSFUNCTION

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Background

Preeclampsia is a multi-system hypertensive disorder of pregnancy and a significant cause of maternal mortality worldwide. Efforts to develop models for prediction of preeclampsia only yielded modest results.[1] Anti-angiogenic signalling and vascular abnormalities manifest prior to the development of clinical signs, even as early as mid-gestation.[2,3] It was hypothesized that impaired indices of microcirculatory function could be detected using sidestream dark field (SDF) imaging. The objective of this study was to examine microvascular function in women at high risk for preeclampsia at mid-gestation using SDF imaging.

Methods

With REB approval, women presenting for a prenatal clinic visit between 16 and 22 weeks gestation of pregnancy were screened for eligibility. Patients at high risk for preeclampsia were recruited if they met at least one of the following criteria: previous preeclampsia, pre-existing renal disease or diabetes mellitus, antiphospholipid syndrome, BMI ≥ 35, pre-existing hypertension, or both age > 40 years and family history of preeclampsia in a first degree relative. Participants were excluded if they were smokers, consumed caffeine within 6 hours of imaging or were non-English speaking. Investigators performed analytical non-invasive SDF imaging of the 5 different visual fields of the sublingual microcirculation. Video images were analyzed blindly following randomization to determine the microcirculatory parameters (microvascular flow index (MFI), perfused vessel density (PVD), total vessel density (TVD), and proportion of perfused vessels (PPV)). After delivery, charts were reviewed to determine if they developed gestational hypertension, preeclampsia or severe preeclampsia. The primary outcome was the difference in MFI between the normal participants and participants with preeclampsia.

Results

Data from sixty-six patients were included in the final analysis. Twelve of the participants (18.2%) developed preeclampsia or severe preeclampsia during the course of their pregnancy. Obesity was a common risk factor for inclusion across all groups, representing over 50% of participants with no preeclampsia. MFI was not significantly different between participants with normal pregnancies and participants with preeclampsia or severe preeclampsia (2.75 ± 0.38 vs. 2.80 ± 0.34, respectively; $p = 0.459$). Similarly, there were no significant differences in TVD, PVD and PPV between the two groups.

Discussion

We did not detect a functional difference in microcirculation between women who did develop preeclampsia and those who did not. SDF imaging of the sublingual microcirculation may remain an appropriate tool to identify women at risk for the disease, albeit later in pregnancy.

References:

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2. N Engl J Med (2006) **355***(10)* 992-1005
3. Circulation (2010) **122***(5)* 478-87

287466 - DOCUMENTATION OF FRAILTY, CAPACITY AND CONSENT FOR ELDERLY PATIENTS HAVING ELECTIVE INPATIENT NON-CARDIAC SURGERY

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Introduction: Older people are increasingly prevalent in the perioperative setting, and advanced age is an independent risk factor for adverse postoperative outcomes.[1] Given the increasing number of older patients in the perioperative setting, and their unique risk profile, guidelines for the optimal preoperative care of geriatric surgical patients have been published.[2] Guidelines recommend that geriatric-specific risk quantification, in the form of frailty assessment, be performed. Furthermore, the guidelines recommend that decision-making capacity (DMC) assessment and the consent process be documented in a manner that reflects geriatric syndromes such as frailty and cognitive dysfunction. The objectives of this study were to (1) measure the proportion of elderly patients where frailty assessment, capacity assessment, and consent processes were documented; and (2) to evaluate whether the presence of frailty influenced documentation of DMC assessment and proper consent processes.

Methods: Ethics approval was obtained for this historical cohort study. A random sample of 240 patients, aged 65 or older, having elective inpatient surgery at a tertiary care center was identified. Preoperative surgical consultations were reviewed to identify frailty assessment and risk quantification, as well as criteria for DMC based on the American College of Surgeons/American Geriatrics Society guidelines. Legal elements required for consent, per provincial legislation, were also identified. Supporting quotes were recorded. Data extraction forms were piloted in duplicate to ensure consistency. All data was reviewed by two extractors and the senior author; disagreements were resolved by consensus. Descriptive analyses of findings were performed; risk-adjusted analyses are ongoing. Qualitative analysis of quotes will be performed.

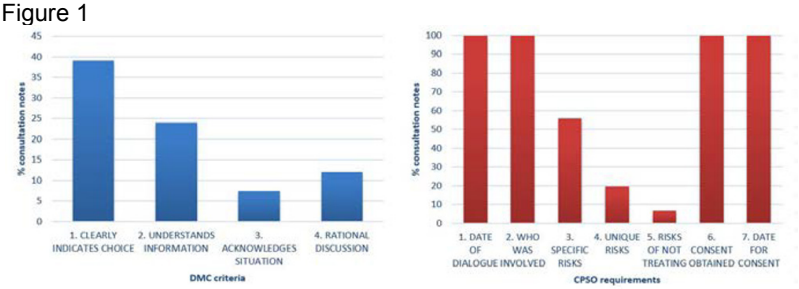
Results: Consultation notes were available for 233/240 patients. Frailty was mentioned in 1% of the charts reviewed (2/233); no formal frailty assessments were documented. Risk quantification was documented in 15% of the preoperative notes (34/233). The four legally relevant criteria for assessment of DMC were documented in 3% of the notes (7/233). All notes documented at least four of the seven elements required for informed consent; all elements were present in 1% (3/233) of the notes. Specific risks of the procedure were documented in 56%, unique risks in 20%, and the risks of not treating the diagnosed condition were documented in 6% of surgical notes. Figure 1 reports the proportion of DMC and consent elements documented.

Conclusion: Despite guidelines for optimal preoperative assessment of the geriatric patient, recommended practices such as frailty and DMC assessment are rarely documented. Furthermore, legally required elements of informed consent are regularly missing from the preoperative surgical notes. Although we cannot differentiate between elements that were discussed vs. documented, the low proportion of recommended and required elements present in the medical record highlights a key gap in the preoperative care and assessment of our growing population of older surgical patients.

References:

1. Am Surg 2003 69(11): 961–5
2. J Am Coll Surg 2012 215(4): 453–66

Figure 1



Proportion of DMC and consent elements documented in the preoperative surgical notes

271314 - FUNCTIONAL CASE CONTROL STUDY EVALUATING THE EFFECTIVENESS OF CRICOID PRESSURE IN PATIENTS WITH GERD

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Introduction: Since Sellick's original study in 1961 (4), cricoid pressure (CP) has become the standard of care to reduce the risk of aspiration during induction of anesthesia in patients considered to be at high risk for gastric regurgitation. Recent evidence, however, calls into question the efficacy and safety of the maneuver (1, 2, 5). Data to support CP comes mainly from cadaveric studies (4), descriptive anatomic series using MRI (3), and videolaryngoscopic observational studies evaluating esophageal patency during CP (6). To date, no real-time functional studies in live patients have been performed to evaluate the true effectiveness of CP. Therefore, the objective of this prospective observational case control study was to examine whether CP, applied after ingestion of barium contrast by patients with radiologically confirmed gastroesophageal (GE) reflux, effectively prevented regurgitation of contrast into the pharynx during an Upper GI study.

Methods: With REB approval obtained, patients with a documented history of GERD who were scheduled for an Upper GI study were recruited and consented for the research study. Only those patients that demonstrated significant GE reflux of barium had a repeat administration of barium to encourage reflux but with the additional application of CP. This was to determine whether or not contrast refluxed beyond the level at which CP was applied. Fluoroscopic images were analyzed by a radiologist for esophageal location, degree of GE reflux, site of CP application and proximal level of contrast column during CP application. The anatomic effect of CP on esophageal occlusion was described.

Results: Of the patients that were consented, only five demonstrated significant GE reflux of barium during the initial Upper GI study and were subsequently recruited for the CP study. With the application of CP, three of the five patients demonstrated prominent GE reflux with the contrast column abruptly ending at the applied compression site. The esophagus was midline in two of these patients, and was right paramedian in the third; CP was applied midline at the C7 level in one patient, and at the T1-T2 level in the other two patients. While the remaining two patients demonstrated moderate GE reflux, the contrast column did not reach the level of applied CP. **Discussion:** Application of CP in awake volunteers appears to have resulted in the complete prevention of contrast regurgitation into the pharynx with CP being applied at the C7 to T1-T2 levels and despite instances where the esophagus was not midline. Anatomically, CP may be occluding the digestive conduit by applying pressure against the vertebral body as well as the longus colli muscle when there is lateral displacement of the esophagus. This study therefore adds new functional data in support of the efficacy of CP in the prevention of gastric regurgitation.

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4. Lancet 1961;2:404-6
5. Anesthesiology 2003;99:60-64
6. Anesth Analg 2014;118:580-6

282937 - A COMPARISON OF THREE TECHNIQUES FOR CRICOTHYROTOMY ON A MANIKIN

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Background
Cricothyrotomy can either be performed by an “open” cricothyrotomy technique, or by a needle (Seldinger) technique. Clinical equipoise exists regarding which technique is more effective. We compared three different techniques for cricothyrotomy, performed by anesthesiologists on a manikin.

Methods
The techniques studied include an open surgical technique, the Melker Cricothyrotomy kit (Cook©), and the Portex® Cricothyroidotomy Kit (Smiths Medical). Participants were randomized to the order they performed each technique. Each procedure was videotaped and the time to first ventilation recorded.

Results
Mean time to ventilation was significantly faster with the surgical cricothyrotomy technique, when compared to both the Portex and Melker techniques. (Portex – Surgical = 18 sec; $p = 0.044$, and Melker – Surgical = 42 sec; $p < 0.001$). The Portex technique was significantly faster than the Melker technique (Melker – Portex = 24 sec; $p < 0.001$). Six of the 11 (55%) participants preferred the Melker procedure, 4 (36%) prefered the surgical procedure, and only one anesthesiologist (9%) preferred the Portex procedure.

Discussion The surgical technique was faster than the Portex, and Melker techniques. The surgical technique was also more successful than the Melker technique. The preferred technique among the participants was the Melker technique, despite being slowest, least successful, and rated most difficult by participants and observers. This suggests that while the surgical technique may not be preferred by many anesthesia practitioners, it has been shown to be the most likely technique to achieve the primary goal of the procedure: establishing oxygenation, and preventing death.

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Table 1

Table 1. Means, standard deviations, and pairwise comparisons

Outcome	Means (Std. Deviations)			Pairwise Comparisons[a]		
	Portex (n = 11)	Melker (n = 11)	Surgical (n = 11)	Portex vs. Melker	Melker vs. Surgical	Portex vs. Surgical
Time to ventilation	62.71 (29.77)	86.49 (24.09)	44.22 (11.25)	$p < .001$*	$p < .001$*	$p = .044$*
Participant-rated difficulty	3.73 (2.45)	4.00 (2.45)	1.82 (0.87)	$p = .783$	$p = .005$*	$p = .020$*
Observer-rated difficulty	1.82 (1.60)	2.09 (1.51)	1.09 (0.30)	$p = .618$	$p = .029$*	$p = .264$

Table 2. Overall tests of model effects when controlling for order effects

Outcome	Means (Std. Deviations)		
	Main Effect for Type	Main Effect for Order	Type*Order Interaction
Time to ventilation	$\chi^2(2) = 305.64$, $p < .001$	$\chi^2(2) = 3.51$, $p = .17$	$\chi^2(4) = 9.46$, $p = .051$
Participant-rated difficulty	$\chi^2(2) = 27.40$, $p < .001$	$\chi^2(2) = 5.46$, $p = .07$	$\chi^2(4) = 0.42$, $p = .98$
Observer-rated difficulty	$\chi^2(2) = 13.18$ $p = .001$	$\chi^2(2) = 2.01$, $p = .37$	$\chi^2(4) = 6.36$, $p = .17$

Means, standard deviations, and pairwise comparisons

283847 - RELATIONSHIP BETWEEN ANESTHESIOLOGISTS' EXPERIENCE LEVEL AND CUFF PRESSURE OF THE ENDOTRACHEAL TUBE

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Introduction: While insufficient cuff pressure (CP) of the endotracheal tube may lead to aspiration, excessive CP may damage the tracheal epithelium. It is unclear whether anesthesiology fellows can adjust the CP more appropriately than non-fellows. We investigated the relationship between anesthesiologists' level of experience and the CP of endotracheal tubes.

Methods: This study was performed with the approval of the Ethics Review Board and involved patients who were scheduled for general anesthesia with insertion of single lumen endotracheal tubes at a single center between Sep 2016 and Oct 2016. The participating anesthesiologists were divided into group A (fellow group) and group B (non-fellow group). The number of group A and B anesthesiologists were 18 and 12, respectively. CPs after tube insertion were measured using the AG Cuffill device (Covidien Japan Co., Tokyo). Results were compared by the t-test using JMP®12.0.1 software; P values < 0.05 indicated statistical significance.

Results: The study included 221 patients. The number of intubations performed by group A and B anesthesiologists were 159 and 62, respectively. CPs (mean±SD) with group A and B intubations were 22.6 ± 13.6 cm H_2O and 26.6 ± 14 cm H_2O, respectively. The 95% confidence intervals in the two groups were 20.4 to 24.7 and 23.0 to 30.1, respectively. The value of P was 0.028 for CP.

Dicusssion: It is recommended to maintain CP between 20-30 mm H_2O. The CP in both groups were almost within the appropriate range. However, CPs in group A were lower than in group B, indicating that anesthesiology fellows tend to limit cuff inflation to prevent excessive CP. This study confirmed the relationship between anesthesiologists' level of experience and endotracheal tube CP. The CP of endotracheal tubes inflated by anesthesiology fellows was lower than that in the non-fellow group.

References:

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Am J Respir Crit Care Med 2005;171(4):388-416

284659 - ULTRASOUND - A RELIABLE AND FASTER TOOL FOR CONFIRMATION OF ENDOTRACHEAL INTUBATION BY NOVICE ANAESTHESIA RESIDENTS

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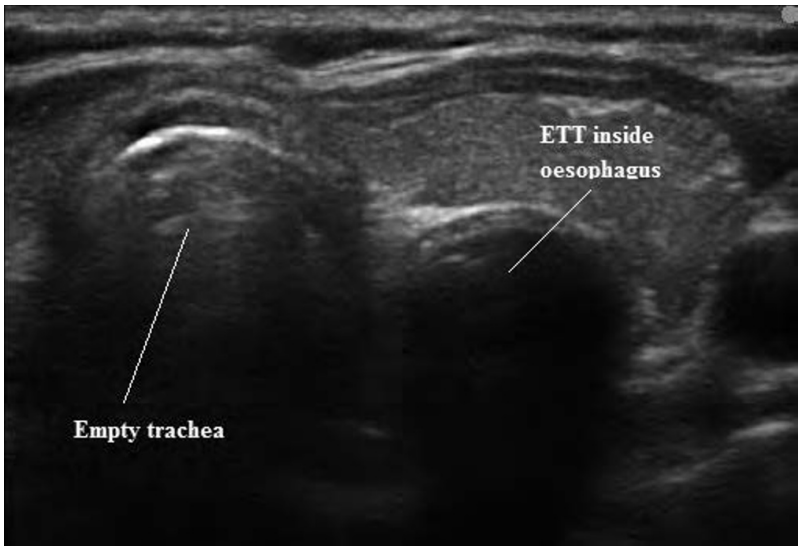
Introduction:
Teaching endotracheal intubation to a novice anaesthesia resident is a challenging task because of longer time taken, inadvertent oesophageal intubation and the need to confirm correct intubation by chest auscultation, capnography and/or repeat laryngoscopy by an experienced anesthesiologist. This can cause morbidity including desaturation in the patient.
Ultrasound has recently been used as a reliable tool for confirmation of endotracheal intubation in emergency setting and has the added advantage of being independent of physiological factors like ventilation and pulmonary perfusion[1].
The primary objective of this prospective observational study was to determine if real time ultrasonography during endotracheal intubation by a novice anaesthetist is a reliable tool for confirmation of correct placement of endotracheal tube (ETT). The secondary objective was to ascertain if ultrasound was faster than chest auscultation and capnography in confirming ETT placement.

Methods:
After obtaining institutional ethics committee approval, 120 patients posted for elective surgery requiring general anaesthesia with endotracheal intubation were enrolled in the study. Following induction, the intubation was performed by novice anaesthesia resident in the first year of training period. One observer performed trans-cricoid ultrasonography to visualize the passage of the ETT into the trachea , second confirmed the placement by bilateral chest auscultation and the third observer noted the appearance of a continuous capnography waveform. Time taken to confirm via all three methods were noted.

Results:
Ultrasound was found to be in good agreement with both chest auscultation and capnography as a method of confirmation of correct ETT placement. Ultrasound was also found to be the fastest method (mean time = 36.50 ± 15.14 seconds) as compared to chest auscultation (50.29 - 51.90 seconds) and capnography (53.57- 61.67 seconds) which was statistically significant.
In five patients, ultrasound detected passage of ETT into the oesophagus with appearance of double trachea sign, which was promptly reported to the novice anaesthetist, and ETT was repositioned. In one patient during endotracheal intubation, the flutter of the ETT passing into the trachea was not detected on the ultrasound. However, absence of a double trachea sign reliably confirmed the correct placement of ETT inside the trachea.
Ultrasound did not interfere with performing of laryngoscopy and there were no complications.

Discussion:
Teaching intubation to novice anaesthesia residents using conventional direct laryngoscopy, ultrasonography is a reliable and faster method compared to capnography and chest auscultation in confirming the correct placement of ETT. Ultrasonography promptly detects oesophageal intubation by the appearance of double trachea sign[2] and the resident can be guided to redirect the ETT towards the trachea.

References:
1. J Emerg Med 2007 32: 409–14
2. Eur J Ultrasound 2014 35: 451–8
Double trachea sign



Ultrasound image showing endotracheal tube (ETT) placed inside the oesophagus

285221 - CERVICAL SPINE MOTION DURING INTUBATION: COMPARING LEVITAN FIBREOPTIC STYLET (FPS)® WITH MACINTOSH LARYNGOSCOPE.

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Introduction: The definitive technique for intubation of patients with cervical spine instability remains debatable. Securing the airway can be achieved using direct laryngoscopy coupled with cervical spine stabilization [1,2]. This technique is generally useful in urgent or emergency situations. Awake fibreoptic intubation is another excellent choice but relatively limited for elective situations. Alternatively, various new approaches for indirect laryngoscopy and optical stylets have been introduced to bridge the gap between both modalities[3]. With the evolution of optical stylets; the Levitan Fibreoptic stylet (FPS) ® has been introduced with high success rates[4]. This study compared intubation in cervical spine patients using Levitan FPS versus using Macintosh Laryngoscopy. The use of fluoroscopic video guided the assessment of cervical spine motion during intubation using both techniques.

Methods: After approval of Local Medical Ethics Committee and obtaining informed written consent, a total of126 patients (ASA I –III), aged 18-70 years, requiring cervical spine immobilization during intubation and scheduled for elective cervical spine surgery were enrolled in this prospective, single-blinded study. Patients were randomly assigned to one of two groups according to the method of intubation; group L using the Levitan FPS (n=63) and group M: using the Macintosh Laryngoscope (n=63). All patients received the same anesthetic induction regimen and neck collar was applied prior to airway manipulation. Cervical spine motion was the primary outcome, assessed at three levels; the occiput- C1 junction, C2-C5 junction and C5-T1 area. Intubation time along with hemodynamic responses to intubation and airway related complications were also recorded as secondary outcomes.

Results: The degree ofcervical spine motion was 47% less (P< 0.001) at the three segments assessed comparing the Levitan FPS with Macintosh laryngoscopy. The intubation time was significantly less with Macintosh laryngoscopy (21.32 sec ± 3.97) compared with the Levitan FPS (26.72 sec ± 5.21) P < 0.001. There was significant increase in mean arterial blood pressure (MBP) (92.1 mmHg ± 6.9) and Heart rate (HR) (92.3 beat/min ± 4.3) in group M, two minutes after intubation, compared with the Levitan group where the MABP was (79.0 mmHg ± 6.5) and HR was (83.9 beat/min± 6.7), P

Discussion: To limit cervical spine motion during intubation, the Levitan FPS can be used as an alternative to Macintosh laryngoscopy successfully for airway management and decreasing the hemodynamic response to intubation. However, the Levitan FPS increases the time required for intubation significantly.

References:

1 - J Emerg Med. 2013 Apr; 44(4): 750-6.
2- Anesthesiol Clin. 2015 Jun; 33(2): 315-27.
3- Anaesthesia. 2011 Jul; 66(7): 579-81.

4- Can J Anaesth. 2007 Jun; 54(6): 441-7.
4-

286053 - COMPARISON OF OROPHARYNGEAL LEAK PRESSURE BETWEEN THE AMBU AURAGAIN AND THE LMA SUPREME - A RCT

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Introduction:
Oropharyngeal leak pressure **(OLP)** is the airway pressure at which gas leaks back around the supraglottic airway (SGA) cuff. In a randomized controlled trial, we compared the OLP between two SGAs, the LMA Supreme™ (Supreme) and the recently introduced Ambu AuraGain™ (Ambu), in patients undergoing general anesthesia.

Methods:
REB approval and patient consent were obtained. Adult patients >18 years presenting for ambulatory surgery (arthroscopies, strabismus, bladder surgery) requiring SGA were enrolled. Patients with recent sore throat or BMI>40 were excluded. Patients were randomized to either the Ambu or Supreme group. Size of SGA (3/4/5) was selected according to manufacturer's recommendations. Anesthesia was induced with lidocaine (1mg/kg), fentanyl 1-2 ug/kg), propofol (2-3 mg/kg). The SGA was inserted using standard technique and the cuff was inflated to 60 cmH_2O. Correct placement was confirmed by capnography and auscultation. A maximum of 3 insertion attempts were allowed. OLP, the primary outcome, was measured by a research assistant, using a stethoscope over neck with APL valve at 70 cmH2O and fresh gas flow at 3 l/min. Airway pressure at which a leak was first auscultated was deemed the OLP.
Continuous data was analyzed using unpaired t-tests and categorical data, Chi square analyses.

Results:
105 (Ambu-51, Supreme-54) patients were studied. Demographics were similar between the groups. OLP was significantly higher in the Ambu than the Supreme group (25.6 ± 2.8 vs 21.1 ± 3.7, $p < 0.001$). Insertion time was longer in Ambu than Supreme group (13.5 ± 3.3 vs 11.4 ± 2.9 secs).

Discussion:
In patients undergoing ambulatory anesthesia using a SGA, the OLP is higher in the Ambu AuraGain than the LMA Supreme. The insertion time is longer with Ambu AuraGain than the LMA Supreme. SGAs with a higher OLP may be utilized in a wider range of patients and surgeries and may enhance patient safety.

References:
Zhang L et al, *Oropharyngeal Leak Pressure with the Laryngeal Mask Airway Supreme™ at Different Intracuff Pressures: a Randomized Controlled Trial*, Can J Anaesth 2011; 58(7):624-9

Table. Demographics and outcomes of study patients

	Ambu Group (Ambu AurgGain™)	Supreme Group (LMA Supreme™)	P value
Number of Subjects	51	54	
Age (yrs)	50.6 ± 15	50.6 ± 12	NS
Gender (M/F)	29/22	34/20	NS
BMI (kg/m^2)	27.6 ± 5.1	29.0 ± 4.9	NS
Insertion time (s)	13.5 ± 3.3	11.4 ± 2.9	< .001
Orophar Leak pressure (cmH_2O)	25.6 ± 2.8	21.1 ± 3.7	< .001

286328 - VENTILATION QUALITY DURING NASAL OR FACE MASK VENTILATION AFTER INDUCTION OF GENERAL ANESTHESIA IN OBESE PATIENTS

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Introduction: Face mask ventilation has a distinct place in anesthesiology. One of the difficulties with a mask, is laryngeal airway obstruction caused by the backward displacement of the tongue and soft tissue which is further exacerbated by obesity (body mass index over 25). Considering the fact that ventilation using a nasal mask appears to be more effective than conventional face mask (1,2) , we decided to compare the quality of ventilation after the induction of general anesthesia using ventilation through an anatomical face mask or nasal mask in patients with body mass index (BMI) over than 25.

Methods: In a clinical trial study, after approval of Research and Ethical Committee of the Anesthesiology Department and Faculty of Medicine and obtaining written informed consent, 70 patients between the ages of 18 and 70 years, with a BMI over 25, who were candidates for elective general and orthopedic surgeries under general anesthesia were selected. Before induction of general anesthesia and for pre oxygenation, patients were administered 100% oxygen using a face mask held at proximity to the face for 3 minutes. After induction of anesthesia, the patients were randomly divided into 2 groups .In the first group, ventilation was undertaken using the standard mask ventilation with 100 % oxygen for 3 minutes. In the second group, ventilation was performed through an anatomical nasal mask. The mean expiratory volume, mean SpO2, mean end tidal Co2 (Et CO2) and mean airway pressure were measured and compared in both groups at the 2^{nd} minute after mask ventilation and also five minutes after tracheal intubation.

Results: Demographic and basic variables were similar in both groups. Maximum airway pressure during the 2^{nd} minute after initiation of mask ventilation was significantly higher in the face mask group compared to the nasal mask group (14.6 ± 1.6 Vs. 12.5 ± 1.7 Cm H2O respectively, $p< 0.001$).The SpO2 at this time was higher in the nasal mask group compared to the face mask group (97.6 ± 1.7 Vs. 95.3 ± 3 percent respectively, $p< 0.001$). Other ventilation parameters were not significantly different between the two groups.

Discussion: According to the findings in this study, ventilation with a nasal mask may be more efficient than a face mask in patients with a BMI of more than 25 and is recommended during induction of general anesthesia and mask ventilation in these patients.

References:

1: Kapoor MC, Rana S, Singh AK, Vishal V, Sikdar I. Nasal mask ventilation is better than face mask ventilation in edentulous patients. J Anaesthesiol Clin Pharmacol. 2016 Jul-Sep;32(3):314-8.
2: Liang Y, Kimball WR, Kacmarek RM, Zapol WM, Jiang Y. Nasal ventilation is more effective than combined oral-nasal ventilation during induction of general anesthesia in adult subjects. Anesthesiology. 2008 Jun;108(6):998-1003.

Comparison of ventilation quality parameters in face mask and nasal mask groups.

Variable	Face mask	Nasal mask	P value
Set tidal volume (mL)	731.4 ± 96.3	708.6 ± 87.1	0.279
Expiratory tidal volume in 2nd minute after initiation of mask ventilation (mL)	547.2 ± 72.9	530.8 ± 56.1	0.29
Expiratory tidal volume in 5th minute after endotracheal intubation (mL)	639.9 ± 85.7	619.7 ± 67.1	0.27
Maximum airway pressure at 2nd minute after mask ventilation (Cm H2O)	14.6 ± 1.6	12.5 ± 1.7	0.001
Maximaum airway pressure at 5th minute after intubation (Cm H2O)	15.4 ± 1.4	15.1 ± 1.7	0.39
EtCo2 at 2nd minute after initiating of mask ventilation (mmHg)	24.2 ± 2.3	25.1 ± 2.6	0.12
EtCo2 at 5th minute after intubation (mmHg)	37.9 ± 6.6	37.7 ± 5.4	0.75
Baseline Spo2 (%)	93.2 ± 1.1	93.4 ± 1.1	0.46
Spo2 in 2nd minute after initiating mask ventilation (%)	95 ± 3	97.6 ± 1.7	0.001
Spo2 in 5th minute after intubation (%)	97.3 ± 1.4	97.6 ± 0.9	0.37

Numbers are reported as mean ± standard deviation.

286518 - AIRWAY MANGEMENT IN ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY : GASTROLARYNGEAL TUBE VS. ENDOTRACHEAL TUBE

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Introduction:
Ideal anesthetic management for Endoscopic Retrograde Cholangiopancreatography (ERCP) remains a debate among anesthesiologists. With complex painful ERCP procedures, anesthesia with endotracheal tube (ETT) is usually favoured [(1).] Despite airway protection conferred by ETT, it bears various risks and adds to overall ERCP procedure time and cost [(2)]. Various supraglottic airway (SGA) devices have been described for airway management in ERCP [(3,4)]. The Gastro-Laryngeal Tube (GLT) is a modified Laryngeal Tube that offers dedicated port for insertion of the endoscope while serving as a SGA device for ventilation [(4)].
This study compared the use of GLT or ETT during ERCP regarding: hemodynamic responses, airway complications, extubation time and endoscopist satisfaction.

Methods:
After Local REB approval, 114 consenting patients, ASA I to III, scheduled for ERCP under general anesthesia were enrolled in this prospective single-blinded study. Patients were randomly assigned to either group G (GLT, n= 57) or group E (ETT, n=57)
Hemodynamic variables; heart rate (HR) and mean arterial blood pressure (MAP) were recorded prior to induction and then immediately, 2, 5 and 10 minutes after airway device insertion. Time required for airway device insertion, procedure time and extubation time were recorded. Success rates and attempts for device insertion and airway intervention requirements were also recorded. Respiratory and airway related complications were also noted. A questionnaire-based survey was used to assess endoscopist satisfaction.

Results:
The endoscope was successfully passed in all 114 patients and their data were included in analysis. HR was significantly lower in G group immediately and two minutes after intubation compared to group E ($P < 0.05$). Moreover, MAP 5 minutes after intubation was significantly higher in E group (89.4±5.4 mmHg) compared to group G (78.4 ± 4.2 mmHg) ($p < 0.05$). Procedure and airway device insertion time were not significantly different between groups; however, extubation time was significantly shorter for the GLT (3.4 vs. 6min.; $p < 0.001$). Satisfactory airway was not achieved by GLT in 2 patients requiring rescue ETT. 4 cases required a second attempt for GLT insertion while only 2 cases required second attempt for ETT insertion. There was a significantly greater incidence of coughing at extubation in the ETT group than in the laryngeal mask group (59.6% vs. 10.5%; $p < 0.001$). Endoscopist satisfaction scores for insertion and manipulation of the endoscope were significantly higher in the G group (89% vs. 80%; $p < 0.001$).

Discussion:
In conclusion, GLT is a safe effective alternative to ETT for airway management during ERCP. GLT is associated with less hemodynamic stress response, shorter extubation time with less incidence of cough and higher endoscopist satisfaction scores compared to ETT.

References:
1- Endoscopy 2002; 34(9);721-726
2- Dig Dis Scin 2014; 59:513-519
3- Gastrointest Endosc 2002; 56:122-128
4 - Anaesthesia 2010; 65:1114-1118

AMBULATORY AND NEUROANESTHESIA
Saturday, June 24
10:30 - 12:15

Track: Ambulatory Anesthesia

284841 - DEATH OR NEAR-DEATH IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA: A COMPENDIUM OF CASE REPORTS

Presenting Author: Yamini Subramani, Department of Anesthesia and Perioperative Medicine, London Health Sciences Centre, Schulich School of Medicine and Dentistry, Western University, London, Ontario, Canada., London, Ontario

Co-Author(s): MAHESH NAGAPPA, FRANCES CHUNG

286294 - EXPLORING THE TEACHABLE MOMENT: FACILITATORS AND BARRIERS TO PERIOPERATIVE SMOKING CESSATION, A QUALITATIVE STUDY

Presenting Author: Susan M. Lee, Royal Columbian Hospital / Eagle Ridge Hospital, New Westminster, British Columbia

Co-Author(s): Rachel Tenney, Arthur Wallace, Mehrdad Arjomandi

286422 - THE END PERIOPERATIVE SMOKING PILOT STUDY: A RANDOMIZED TRIAL COMPARING E-CIGARETTES VERSUS NICOTINE PATCH

Presenting Author: Susan M. Lee, Royal Columbian Hospital / Eagle Ridge Hospital, New Westminster, British Columbia

Co-Author(s): Rachel Tenney, Arthur Wallace, Mehrdad Arjojmandi

Track: Neuroanesthesia

281164 - DOES THE PRESENCE OF ANAESTHESIOLOGISTS IMPROVE OUTCOMES AFTER ENDOVASCULAR TREATMENT FOR ACUTE ISCHEMIC STROKE?

Presenting Author: Gabriela Alcaraz García-Tejedor, Toronto Western Hospital - University Health Network - University of Toronto, Toronto, Ontario

Co-Author(s): Jason Chui, Pirjo Manninen, Andreu Porta-Sánchez, Pereira Vitor, Lashmi Venkatraghavan

283263 - A CO2-MRI BRAIN STRESS TEST FOR ASSESSMENT OF HEMODYNAMIC STROKE

Presenting Author: Lakshmikumar Venkat Raghavan, Toronto Western Hospital, University of Toronto, Toronto, Ontario

Co-Author(s): David Mikulis, Joseph FIsher, Olivia Sobczyk, James Duffin, Adrian Crawley, Julien Poublanc, Daniel Mandell, Casey Rosen, Kevin Sam

283758 - CEREBROVASCULAR REACTIVITY MAPS VARY WITH THE MAGNITUDE AND DIRECTION OF A CARBON DIOXIDE STIMULUS

Presenting Author: Elyana Wohl, Toronto Western Hospital, University of Toronto, Toronto, Ontario

Co-Author(s): Lashmi Venkatraghavan, David Mikulis, Joseph Fisher, Olivia Sobczyk, James Duffin, Casey Rosen

284705 - ASSESSMENT OF DEXMEDETOMIDINE AND SCALP BLOCK TO FACILITATE INTRAOPERATIVE BRAIN MAPPING FOR AWAKE CRANIOTOMY.

Presenting Author: Niamh A. McAuliffe, St Michael's Hospital, Toronto, Ontario

Co-Author(s): Stuart Nicholson, Marco Garavaglia, Iryna Pshonyak, Greg Hare, Andrea Rigamonti, Sunit Das

285273 - CARDIOVASCULAR PERTURBATIONS DURING NUCLEI STIMULATION IN PATIENTS UNDERGOING DEEP BRAIN STIMULATION SURGERY

Presenting Author: Tumul Chowdhury, University of Manitoba, Winnipeg, Manitoba

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281164 - DOES THE PRESENCE OF ANAESTHESIOLOGISTS IMPROVE OUTCOMES AFTER ENDOVASCULAR TREATMENT FOR ACUTE ISCHEMIC STROKE?

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Background: Recently, there has been a growing interest on the impact of the type of anesthesia[1,2] and the blood pressure control[3,4] during endovascular treatment for acute ischemic stroke (AIS). In many centers, anaesthesiologists might not routinely get involved except for patients who are unstable or require general anaesthesia (GA)[3,5]. The aim of our study was to determine if the presence of an anaesthesiologist improves the outcomes of patients undergoing endovascular treatment of AIS.

Materials and Methods: After Institutional ERB approval, we conducted a retrospective cohort study on patients undergoing endovascular treatment for AIS of the anterior circulation between 2012 and 2016. Clinical and procedural variables during the intervention were collected. Multivariate analysis was performed to identify the predictors of hemodynamic intervention, failed hemodynamic control (systolic blood pressure, SBP, < 140 and/or >180 mmHg), in-hospital death and favourable neurological outcomes (Modified Rankin Scale ≤ 2) at discharge.

Results: A total of 143 patients were analyzed, 43% male and 57% female. Median age was 74 years (Interquartile Range, IQR, 63-83). The majority of cases had a thrombotic origin (98%), and intravenous thrombolysis prior to endovascular treatment was performed 69.3% cases. The location of the occlusion was: Middle Cerebral Artery (79.3%), Internal Carotid Artery (6.9%), Tandem (6.9%) and multiple (6.9%). The mean (±SD) NIHSS and ASPECTS scores were 17.26 (± 6.84) and 8.21 (± 1.6) respectively. Anesthesiologists were present in 98.6% of the procedures. The majority of patients received monitored anesthesia care (MAC), with or without sedation (88.1%). Nine patients received GA and 8 had intraoperative conversion to GA. Hemodynamic intervention was needed in 46.9% of the patients; 23% required intervention for hypotension and 23.8% for hypertension. The need for hemodynamic intervention was significantly associated with GA (OR 5.88; p=0.01) and SBP at hospital admission (OR 1.02; p=0.019). Hemodynamic control failed in 47 patients, and the main predictor for hypotension (OR 0.92, p=0.001) and hypertension (OR 1.08, p=0.001) were baseline SBP. Successful revascularization and favourable neurological status were achieved in 68.5% and 27.9% of patients respectively. In-hospital mortality was 16.3%. This was significantly higher among patients converted to GA (50%) compared to elective GA (25%), sedation (12.7%) and MAC (20%), p 0.019.

Conclusion**:** This cohort represented one of the highest involvement rates of anaesthesiologists during the endovascular therapy of AIS**.** In our study, the involvement of anaesthesiologists resulted in a low rate of GA, a tighter hemodynamic control and better outcomes. The presence of an anaesthesiologist during endovascular treatment should be routine practice to provide appropriate anaesthetic care and better hemodynamic control.

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283263 - A CO2-MRI BRAIN STRESS TEST FOR ASSESSMENT OF HEMODYNAMIC STROKE

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Background: Hemodynamic stroke is a type of ischemic stroke caused by hypoperfusion rather than thromboembolism. Diagnostic imaging tests currently used in the risk assessment of these patients are mainly static imaging techniques; doesn't provide any information on the functional status. Cerebrovascular reactivity (CVR) is the change in cerebral blood flow in response to a vasodilatory stimulus, a marker of vascular reserve capacity. We have developed a non-invasive method of mapping CVR using a precise targeting of CO2 and Blood oxygen level dependent (BOLD) MRI. Aim of our study was to investigate the feasibility of this technique to identify patients at risk for hemodynamic stroke and to monitor the effect of treatments.

Methods: After IRB approval, 100 patients who are at risk for hemodynamic stroke were recruited for this prospective observational study. BOLD-MR imaging was performed in 3.0 Tesla magnet while CO_2 was controlled using a custom made sequential breathing circuit and a computer controlled gas blender. Two different $P_{ET}Co2$ targets (baseline and baseline +10mmHg) were achieved. The acquired MRI and CO_2 data were analyzed using standard software and the positive and negative correlations between CO2 and BOLD signal were color coded to generate CVR maps. Areas of normal reactivity are color coded as red and paradoxical vasodilatory responses (intracerebral steal) are color coded as blue indicating poor vascular reserve. After surgical intervention, the extent and magnitude of improvement in clinical symptoms and its correlation with CVR changes were assessed at 3 months and 1 year.

Results: 98 patients completed the study (mean age of 56 years, M: F 32:68). The presenting pathologies include carotid stenosis (17), intracranial stenosis with Moyamoya disease (71), cerebral vasculitis (8) and others (4). 26 patients showed normal cerebrovascular reserve capacity and 74 patients had impaired CVR with IC steal indicating poor cerebrovascular reserve (Figure 1A). Sixty-two (62/74) patients had a surgical revascularization and following surgery, 87% (54/62) of patients showed a significant improvement in the post surgery CVRs **(Figure 1B)** which correlated with the improvement of the clinical symptoms. Among the patients with impaired CVR who were not a candidate for surgery (12/74), 2 patients had a stroke and 6 patients had worsening of cognitive function at 1 year.

Conclusions: Our study showed that the precise targeting of CO2 in combination with BOLD-MRI, provide a feasible, non-invasive and reproducible measure of CVR. This combined technique may be complementary in identifying patients with poor cerebrovascular reserve at risk for stroke and thus constitute a " Brain Stress test ". This technique can now be used for routine clinical test in the diagnosis, treatment and prognosis of patients who are at risk of hemodynamic stroke and others suspected cerebral blood flow abnormalities.

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Figure 1A,1B

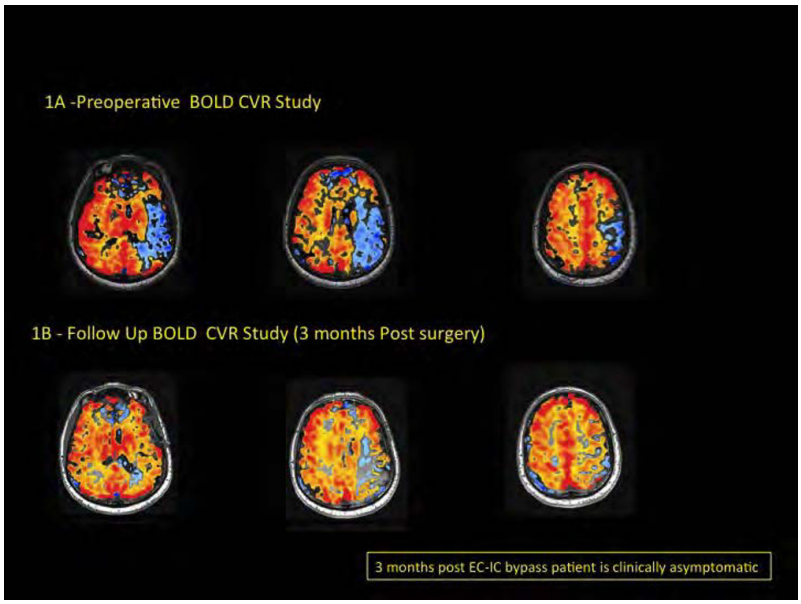

Figure below shows impaired CVR (Blue Brain) in a 57-year-old patient presented with recurrent transient ischemic attacks (TIA's) secondary to intracranial stenosis of middle cerebral artery (1A). Patient underwent surgical revascularization and 3-month post surgery CVR map shows marked improvement in CVR (1B) which correlated with the improvement in clinical symptoms.

283758 - CEREBROVASCULAR REACTIVITY MAPS VARY WITH THE MAGNITUDE AND DIRECTION OF A CARBON DIOXIDE STIMULUS

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Introduction: PCO_2 control is an important consideration not only in patients with elevated ICP, but also in patients with intracranial steno-occlusive disease. Carbon dioxide (CO_2) is a potent cerebral vasoactive stimulus, and increased or decreased CO_2 causes corresponding changes in cerebral blood flow (CBF). Hypercapnia-induced increase in CBF is not uniform. Consequently, in some areas of brain, there can be a paradoxical decrease in CBF with hypercapnia, especially in patients with intracranial steno-occlusive disease. This phenomenon is known as “intra-cerebral steal”, and is associated with an enhanced risk of stroke. However, we do not know how this steal phenomenon varies with the direction and magnitude of change in PCO_2.

Methods: Local Ethics Committee approval was obtained. We studied 18 patients with intracranial steno-occlusive disease. We monitored brain blood-oxygen-level dependent (BOLD) signal at 3T MRI while applying a continuous ramping change in $PetCO_2$ between 30 and 55 mmHg, rising over 4 min, using a computer controlled gas blender and sequential breathing circuit. BOLD MRI signal was used as a surrogate for CBF. We then calculated cerebrovascular reactivity (CVR, the change in BOLD signal relative to the change in PCO_2) maps at various stimulus ranges ($PetCO_2$ 40-30, 30-40, 40-45, 45-50 and 50-40), as well as with 2 mmHg changes in both hypocapnic and hypercapnic ranges. To obtain the maps, the BOLD responses were registered into MNI space, and CVR was calculated, scored according to color code, and mapped onto the corresponding voxel of the anatomical scans.

Results: 10 female and 8 male patients were studied. Mean age was 45 +/- 17 years. Our study showed that each stimulus range resulted in a different CVR map. The changes in $PetCO_2$, as little as 2 mmHg, affected steal phenomenon. Magnitude of change in CVR was different in hypocapnic and hypercapnic ranges. The appearance of cerebrovascular steal, reverse steal, and their extent, depended on the range of the $PetCO_2$ change.In the hypercapnic range, the more subtle the dysfunction, the higher the $PetCO_2$ required to induce steal.

Conclusion: These findings demonstrate that CVR data differed at all $PetCO_2$ ranges and direction of change. Hence, tight control of PCO_2 is important in patients with cerebrovascular disease, as reductions in CVR have been shown to indicate enhanced risk of stroke and reduced cognitive ability.

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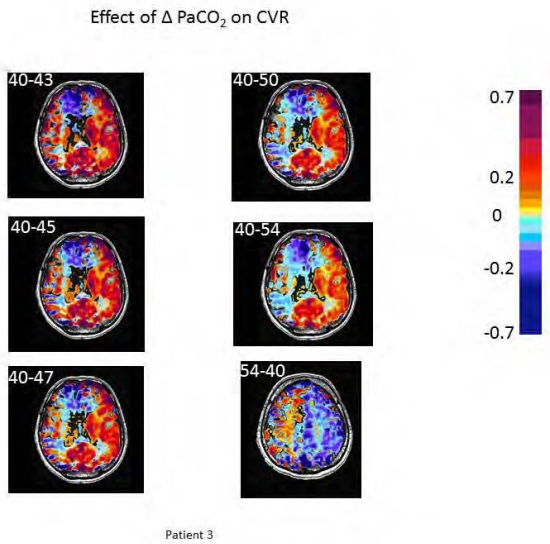
Effect of changing PCO2 on CVR



Representative BOLD MRI signal of PETCO2 stimulus ranges, induced sequentially in a single patient. With increasing PETCO2, zones of progressively decreasing cerebrovascular reactivity can be seen (blue territory), marking increased regional ischemia as blood is shunted to healthy vasculature (red territory), creating a “steal” phenomenon. With hypercapnia (PETCO2 54-40 mmHg), a “reverse steal” phenomenon can be appreciated. Vasoconstriction of healthy vessels (blue territory representing decreased reactivity) results in blood shunting back to the stenotic region (red territory showing increased reactivity).

284705 - ASSESSMENT OF DEXMEDETOMIDINE AND SCALP BLOCK TO FACILITATE INTRAOPERATIVE BRAIN MAPPING FOR AWAKE CRANIOTOMY.

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Introduction:
Important anesthetic goals for awake craniotomy are to ensure: airway patency, stable hemodynamics, patient comfort, and optimal conditions for real-time brain mapping. In 2012, we instituted a standardized anesthetic technique using dexmedetomidine and scalp blocks in patients selected for awake craniotomy due to the anatomic characteristics of brain tumour pathology. [1,2] We hypothesized that dexmedetomidine in conjunction with scalp blocks is a safe and effective anesthetic in patients undergoing awake craniotomy for brain tumour resection.

Methods:
With Research Ethics Board approval, we conducted a retrospective cohort study describing perioperative outcomes for all patients who underwent awake craniotomy from 2012 to 2016. We assessed the incidence of critical perioperative airway outcomes, perioperative complications, and successful intraoperative mapping for all patients. The primary anesthesia outcome was the incidence of perioperative airway complications. Secondary outcomes were duration of surgery and the incidence of perioperative complications (significant hemodynamic instability, nausea and vomiting, new onset neurological deficits or seizure activity, and protocol failure requiring conversion to general anesthesia). A primary surgical outcome was the correlation between functional MRI analysis and intraoperative brain mapping, as well as the incidence of altered surgical management due to information acquired at the time of real-time brain mapping.[3]

Results:

We identified 39 eligible patients who completed the awake craniotomy protocol and successful tumour resection. The median length of an awake craniotomy procedure was 200 min (IQR±50 min). Characteristics and intraoperative data for all patients are summarized in the Table. There were no critical events that involved rescue of an obstructed airway and no patients required airway instrumentation or conversion to a full general anesthetic. No significant hemodynamic instability was observed. Conditions for intraoperative mapping were deemed excellent in all cases and allowed for multimodal motor, sensory and language assessment. In most cases, intraoperative mapping provided additional functional and anatomical information that was not provided by preoperative fMRI. In many cases, information provided by intraoperative mapping influenced surgical decisions regarding the degree of tumour resection, enhancing the ability to preserve eloquent brain function or safely increase the degree of tumour resection. Individual cases will be explained in full text/during presentation.

Discussion:
Safe and effective anesthesia for awake craniotomy was provided using dexmedetomidine with scalp blocks. The lack of airway manipulation, and titratable levels of sedation, provided excellent conditions for intraoperative mapping and patient cooperation. Consequently, surgical conditions were ideal, which minimized the risk of neurological deficit and increased the ability to provide maximal surgical resection. Ongoing assessment of such an approach could include the development of a formalized prospective trial to assess important clinical outcomes, including duration of disease-free survival, time to tumour recurrence, and the overall quality of patient experience.

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Patient characteristics and intraoperative data. (n=39)

Table 1. Patient's characteristics and intraoperative data. (n = 39)

Characteristic, mean ± standard deviation unless specified	**N = 39**
Age in years	47 ± 17
BMI (Kg/m^2)	26 ± 6.4
ASA classification, *n (%)*	
III	19 (49)
IV	20 (51)
Dexmedetomidine dose (mcg/Kg/hr)	
Maximum	0.89 ± 0.35
Minimum	0.52 ± 0.20
Systolic Blood Pressure (mmHg)	
Maximum	142 ± 19
Minimum	109 ± 5
Heart Rate (bpm)	
Maximum	74 ± 11
Minimum	54 ± 8
Duration (minutes), *Median(IQR)*	200 (185 to 235)
Intraoperative seizures , n (%)	6 (15)

BMI, body mass index; ASA, American Society of Anesthesiologists; IQR, interquartile range

284841 - DEATH OR NEAR-DEATH IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA: A COMPENDIUM OF CASE REPORTS

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Background: Obstructive sleep apnea (OSA) is highly prevalent in the surgical population, with an increased risk of perioperative complications. The care of surgical patients with OSA is often fraught with safety and liability concerns. The effects of anesthetics, sedatives and narcotics on ventilatory responsiveness, arousal mechanisms and the upper airway muscle tone may potentially aggravate OSA in the postoperative period leading to life threatening hypoxia and hypercapnia. Recent closed malpractice claims of 12 surgical patients with OSA found dead in bed were reported.[1] Identifying risk factors for death or near-death in OSA patients constitutes a significant step in advancing perioperative patient safety. The objective of this report is to identify the perioperative pattern of death and near-death in OSA patients by reviewing the medical literature of the case reports, case series and medico-legal reports.

Methods: Case reports, case series and medico-legal reports from 1946 to June 2016 were screened to identify reports of life threatening complications and deaths in OSA patients in the perioperative period. Cases were categorized by outcomes: death, anoxic brain injury, critical respiratory events and other life threatening complications attributable to OSA. All the critical perioperative outcomes associated with OSA in terms of timing and location of events, opioid/sedative administration, OSA severity and treatment were summarized using either frequency or percentage statistics.

Results: The literature search yielded 935 case reports/case series reports and 73 medico-legal reports. After screening, only reports of death and near-death associated with OSA patients undergoing surgery were included. In total, 12 case reports and 2 medico-legal reports were included in our analysis. A total of 60 OSA patients suffered death or near death. Overall, there were 26 deaths, 17 anoxic brain damage, 12 critical respiratory events and 5 other life threatening complications including 2 resuscitated cardiac arrests and 3 heart blocks. Seventeen percent of OSA patients were undiagnosed before surgery. Details of CPAP therapy was available for twenty-nine patients and 34% were on preoperative CPAP. Only 30% of patients on preoperative CPAP utilized their CPAP postoperatively. Morbid obesity was associated with 8 deaths, 5 anoxic brain damage and 4 life threatening critical respiratory events. Seventy-five percent of the OSA patients with severe life threatening complications received opioids. Importantly, eighty-one percent received relatively small doses of opioids. Death or near-death occurred regardless of the route of administration. Eighty percent occurred in the first 24h and 67% in the general hospital floor (Table 1).

Conclusion: Surgical patients with OSA are at a high risk of death and near-death, especially in first 24h. Preoperative and postoperative usage of CPAP is suboptimal. This upholds the need to educate health care professionals and patients on the benefits of CPAP therapy. The majority of death or near-death occurred in the surgical floor, emphasizing the need for continuous monitoring to avoid failure to rescue.

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CAS abstract 2017

Table 1. Summary of characteristics of OSA patients with death or near-death

Age, sex, body habitus Mean ± SD	60 patients [62% males (49 ± 9 y), 38% females (46 ± 8 y)]; overall BMI: 42 ± 13 kg/m^2
Outcomes reported (n=60)	26 deaths, 17 anoxic brain injury, 12 CRE, 5 other serious complications (2 cardiac arrest: resuscitated, 3 heart block)
AHI data (events/h) (n=4)	Mean preoperative AHI 30 : 2 CRE, 1 death Postoperative AHI 81 : 1 CRE
CPAP use (n=50)	OSA diagnosed preoperatively: 50 CPAP treatment: 10 Did not receive CPAP/treatment or information NA: 40
Timing of deaths, near deaths and CRE	92% (45/49) - 1st 72h, 80% (39/49) - 1st 24h, 12% (6/49) - 24-72 h, 8% (4/49) - >72h, Timing of Cx: NA (n=11)
Location of deaths, near deaths and CRE (n=60)	OR: 13% (8/60) PACU: 18% (11/60) Floor: 67% (40/60)
Opioid use: Opioids given: 45 Opioids not given: 15	75%(n=45) OSA patients with death or near-death received opioids, 81%(n=13) received relatively small doses of opioids
Route of opioid administration	IV opioids: 17 IV PCA opioids: 8 Epidural opioids: 4 IM opioids: 3 No opioid: 15 Route of administration NA: 10

BMI – Body mass index; Cx.- Complications; NA – Not available; OSA – Obstructive sleep apnea; CRE – Critical respiratory events; AHI – Apnea hypopnea index; CPAP – Continuous positive airway pressure; D – Death; PACU –Post anesthesia care unit; y- years

285273 - CARDIOVASCULAR PERTURBATIONS DURING NUCLEI STIMULATION IN PATIENTS UNDERGOING DEEP BRAIN STIMULATION SURGERY

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Introduction

Deep brain stimulation (DBS) has become an established surgical therapy for the patients with Parkinsonism disease (PD) and also being used for other chronic neurological conditions [1, 2]. The effects of stimulation of different thalamic and subthalamic nuclei (STN) on cardiovascular changes are still a matter of investigation [3, 4, 5]. These changes may produce dreaded complications including hypertension, stroke, intracranial bleed and myocardial infarction [1-4]. Therefore, this study attempts to determine the incidence of hemodynamic perturbances and related risk factors during the nuclei stimulation in patients undergoing deep brain stimulation surgery.

Methods

After taking ethics approval, the retrospective chart review [2000-2012] was performed. Demographic characteristics including age, sex, disease, number of medications, duration of symptoms, comorbidities and types of nuclei were noted.To match the accuracy of data, neurophysiologist was asked to provide the time at which he started to stimulate the electrode (nuclei) and hemodynamic events [predefined BP and HR] during 20 minutes from the start of simulation time (given by neurophysiologist) was taken as for the calculation purpose. All procedures were divided into two groups (with or without the cardiovascular changes) and we noted the effects of various variables on these changes by the regression model analysis.

Results

Data from 79 procedures were included in the final analysis. The stimulation of various nuclei showed 16 percent incidence of cardiovascular changes. Out of the various nuclei, the STN nuclei showed 58 percent of all the hemodynamic perturbations. Out of the four neurological diseases, PD showed maximum (61 percent) of hemodynamic events during nuclei stimulation. However, regression analysis between the two groups did not reveal any statistically significant variables/risk factors.

Discussion-

In a small case series, the precise stimulation of periaqueductal grey matter incited cardiovascular changes including BP and HR changes [6]. Similarly, the STN stimulation may also cause hemodynamic perturbations that include a rise in HR and BP [7,8]. Our study also shows that the STN nuclei stimulation causes more than half of the all cardiovascular changes; however, a larger prospective study would determine the actual incidence of cardiovascular changes of the various nuclei stimulation.

In conclusion, an anesthesiologist can anticipate a maximum number of cardiovascular changes during PD as well as STN nuclei stimulation. This knowledge would impart better patient safety and management in such surgery.

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Figure 1 and 2

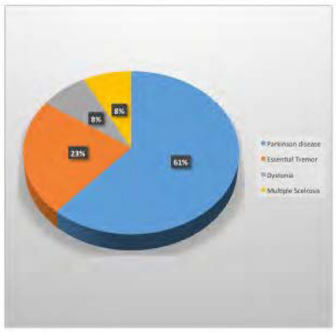

Figure 1- Distribution of hemodynamic events in various diseases

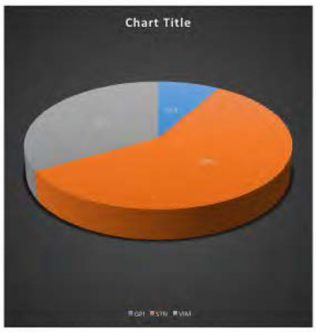

Figure 2- Distribution of hemodynamic events in various nuclei stimulation

Distribution of hemodynamic perturbations

286294 - EXPLORING THE TEACHABLE MOMENT: FACILITATORS AND BARRIERS TO PERIOPERATIVE SMOKING CESSATION, A QUALITATIVE STUDY

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Introduction: Cigarette smoking is known to increase postoperative complications, particularly respiratory and wound complications[1,2]. Therefore, it is preferable that smokers stop smoking prior to surgery. The perioperative period has been described as a 'teachable moment' where patients are more motivated to quit smoking than usual, sometimes permanently[3,4]. However, the facilitators and barriers to smoking cessation for surgical patients have not been examined in detail. The purpose of this study was to better understand patients' attitudes, beliefs, cognitions, and emotions surrounding smoking cessation in the perioperative period.

Methods: Approval by the institutional REB was obtained and each participant gave both written and verbal informed consent. A qualitative approach was used which incorporated face-to-face 45-minute semi-structured interviews with 29 patients postoperatively at a veterans hospital. Interviews were recorded and transcribed verbatim. Data were analyzed using thematic analysis[5]. Two investigators generated codes, which were discussed and applied to the data, then collated into themes and a thematic map was developed. This qualitative study was embedded in a pilot randomized trial (NCT02482233), whereby patients were assigned either e-cigarettes or nicotine replacement therapy as well as brief counselling, a brochure, and a referral to a telephone quitline prior to surgery.

Results: Themes that emerged indicated that internal beliefs and attitudes as well external factors influenced patients' motivations and abilities to quit smoking. Internal factors that facilitated smoking cessation were desire for good health and fear of illness, identifying the negative health effects of smoking in the context of having surgery and having a willingness to quit without fearing failure. Internal barriers included identifying smoking as a powerful addiction, acceptance of the negative health effects of smoking, and fear of failing to quit (being willing to quit only if it's easy). External factors that formed both barriers and facilitators of smoking cessation included effectiveness of smoking cessation products, degree of health care professional support in cessation, and the social milieu.

Discussion: Having an improved understanding of internal facilitators and barriers to smoking cessation allows the healthcare provider to better motivate the smoker presenting for surgery. Furthermore, external factors can be improved by the health system to help support smokers in smoking cessation, including the provision of pharmacologic and counselling support.

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Thematic map of internal and external barriers and facilitators in smoking cessation with representative quotes.

	Facilitators	Barriers
Internal Factors		
Beliefs about smoking, self, and health	*Negative health effects of smoking and surgery* "You know, a lot of pain and frustration and hurt and damage done to my body. And it's like, whoa, what's it all from? What am I doing to myself, and so... When they came up to me and asked me about it, I said, to hell with it. What do I got to lose? I'm either going to die under the table, under the knife right now, by the cigarette down the road, or I'm going to die by, you know, natural causes of a long life. And so, I'm shooting for the third one." (PID 15)	*Acceptance of negative health effects of smoking* "... maybe you get older, you don't have as much willpower as you did when you were younger, I dunno. Not as much conviction or maybe I feel like, I know I felt like that the VA wasn't doing anything for me, I'm going to die anyway, might as well smoke and enjoy it while I can, you know? Which is a hell of a way to think about things, but I think that's the way I was thinking towards not that long ago, so..." (PID 20)
Drive to quit	*Willingness to quit* "Cuz, overall, you know, my maidses was that surgery and then she came about and asked me about that. Oh, but of course I will. Anything that will help me. You know, cuz we don't know when we gunna leave here. So anything I can help to make my life more enriched, so be it." (PID 06)	*Willingness to quit, but only if it's easy* "I am, but you know, like everybody else, I'm looking for the quick fix, the instant miracle, and me, I'm lazy, so I mean I do want to quit, but I want it easier, I'm going to tell the truth. 'A magic wand – ohh – you quit'" (PID 01)
External Factors		
	Facilitators	**Barriers**
Smoking cessation products	*Products were helpful* "Smoking patches seemed to be effective for me, just because mentally I understand that I can't smoke when I have those on. So, even though I want to, I keep those on, and then a few days pass and then a few more days pass and then before you know it I haven't really noticed...or I've forgotten about the smoking because I know this thing's on my arm and I can't so it's like, it's just something that I can trick myself by using." (PID 31)	*Ineffective products* "You know, all these different apparatuses, you know, they're crutches in a sense, in my mind. Even though I'm on a crutch right now, you know. But I can see it. A lot of people don't see it, you know and you know I see more younger people, you know, messin' with the e-cigarettes, you know, they shouldn't be messing with any type of smoke or vapor, but you know again its being promoted by society. It's the tobacco game all over again." (PID 04)
Medical practices	*Medical professional support* "Well, cuz if surgery was coming up, I did want to actually stop. I mean, it's been on my mind. I want to stop smoking. I've been wanting to stop smoking. So, it was just an opportune time when the lady says, 'Well, if you want to stop smoking the lady outside the curtain is doing a study, are you interested?' And I said yes." (PID 21)	*Failure of medical professional support* "But um, advice-wise, though, that's always been mainly 'Ever thought about quitting?' Well, I'm tryin'. And then that'd be it, you know, they wouldn't recommend stuff like with what you guys did when you came in there. Would you like to try this? You know what, yes. I've been waiting for something like that, actually. So yeah..." (PID 15)
Social milieu	*Social support* "Do you feel like you're setting an example in some ways for your kids? P: Well, I hope so. Cuz, my grandkids buy the hell out of me. Every time they see me. Especially with a cigarette." (PID 14)	*Military and smoking* "That's what everyone was doing, smoking cigarettes. That's all we had time to do, was smoke cigarettes. We was always waiting and stuff, so... On guard duty, we'd smoke cigarettes. You know, everything? So, that's where it was. But ummm..." (PID 27)

PID = Participant Identification Number

286422 - THE END PERIOPERATIVE SMOKING PILOT STUDY: A RANDOMIZED TRIAL COMPARING E-CIGARETTES VERSUS NICOTINE PATCH

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Background: Cigarette smoking by surgical patients is associated with increased complications and mortality[1,2]. E-cigarettes or electronic nicotine delivery devices have recently emerged as a potential tool for smoking cessation, although none are currently approved for such use[3]. Despite their appeal to smokers[4], the use of e-cigarettes for smoking cessation remains controversial[5]. In this pilot study, we sought to determine the feasibility and acceptability of e-cigarettes, compared to nicotine patch, for perioperative smoking cessation in veterans.

Methods: Approval by the institutional REB was obtained and each participant gave both written and verbal informed consent. This pilot randomized controlled trial was conducted at a veterans hospital and registered on clinicaltrials.gov prior to enrollment (NCT02482233). Patients seen in the anesthesia preoperative clinic at least 3 days preoperatively were randomized to either the nicotine patch group (NRT-10 patients) or the e-cigarette group (END-20 patients). Both the NRT and END groups were given a free respective 6-week supply in a tapering dose. All patients also received brief counselling, a brochure, and a referral to a telephone quitline. The primary outcome was the rate of smoking cessation on the day of surgery as confirmed by exhaled carbon monoxide breath test. Secondary outcomes included smoking habits and pulmonary function on the day of surgery and at 8weeks. Smoking status was assessed by phone at 6-months.

Results: Between August 2015 and March 2016, 30 patients were recruited. Biochemically verified smoking cessation on the day of surgery was similar in both groups and occurred in 2 patients (20%) in the NRT group and 3 patients (15%) in the END group (p=0.73). At both 8-week and 6-month follow-up, smoking cessation was reported in 1 patient (10%) in the NRT group and 5 patients (25%) in the END group (p=0.63). At 8-weeks, improvements in spirometry were noted in the END group: change in FEV1 was 592ml greater in the END group (95% CI 1531031ml, p=0.01) and change in FEV1/FVC ratio was 40.1% greater in the END group (95% CI 18.2%78.4%, p=0.04).

Discussion: E-cigarettes are a feasible tool for perioperative smoking cessation with quit rates comparable to nicotine replacement patch. Spirometry appears to be improved 8-weeks after initiating e-cigarettes compared to nicotine patch. A large adequately powered study is recommended to determine if the results from this pilot study can be duplicated.

References:

1. *JAMA Surg.* 2013;148(8):755-762.
2. *Chest.* 2005;127(6):1977-1983.
3. *Circulation.* 2014;129(19):1972-1986.
4. *Addict Sci Clin Pract.* 2013;8(1):5-5.
5. *Tob Control.* 2011;20(3):243-248.

Table 1. Smoking cessation and laboratory outcomes from the END Perioperative Smoking Pilot Study

Smoking cessation outcomes				
Outcome	NRT Group (n=10)	END Group (n=20)	Relative Risk (95% CI)	p
Day of surgery				
Smoking cessation (verified*)	2 (20%)	3 (15%)	0.75 (0.15-3.79)	1.0
Smoking cessation (self-report)	3 (30%)	4 (20%)	0.67 (0.18-2.42)	0.66
Smoking reduction†	7 (70%)	13 (65%)	0.93 (0.55-1.56)	1.0
30-days postoperatively				
Smoking cessation (self-report)	3 (30%)	5 (25%)	0.83 (0.25-2.80)	1.0
Smoking reduction†	5 (50%)	9 (45%)	0.90 (0.41-1.98)	1.0
8-weeks after randomization				
Smoking cessation (verified*)	0 (0%)	3 (15%)	RR=undefined‡	0.53
Smoking cessation (self-report)	1 (10%)	5 (25%)	2.5 (0.34-18.6)	0.63
Smoking reduction†	4 (40%)	14 (70%)	1.75 (0.78-3.94)	0.14
6-month follow-up				
Smoking cessation (self-report)	1 (10%)	5 (25%)	2.5 (0.34-18.6)	0.63
Smoking reduction†	5 (50%)	6 (30%)	0.62 (0.31-1.24)	0.43
Laboratory outcomes				
Outcome	NRT Group	END Group	Difference (95% CI of difference)	p
Day of surgery	(n=10)	(n=18)		
FEV1 (ml) change	-236 (585)	-163 (549)	73 (-383 to +528)	0.75
FEV1/FVC ratio (%) change	-32.2% (74%)	-1.6% (8.2%)	+30.6% (-5.3% to +66.5%)	0.09
Cotinine (ng/ml) change	+106 (137)	+19 (119)	-87 (-189 to +14)	0.09
Exhaled CO (ppm) change	+1.9 (7.2)	-1.7 (10.7)	-3.6 (-11.4 to +4.2)	0.35
8-weeks after randomization	(n=8)	(n=18)		
FEV1 (ml) change	-300 (497)	+292 (503)	+592 (+153 to +1032)	0.01
FEV1/FVC ratio (%) change	-38.1% (79.2%)	+2.0% (10.5%)	+40.1% (+1.8% to +78.4%)	0.04
Cotinine (ng/ml) change	+34 (89)	-48 (103)	-82 (-169 to +5)	0.06
Exhaled CO (ppm) change	+7.1 (11.0)	-2.1 (12.2)	-9.2 (-19.6 to +1.2)	0.08

Smoking cessation outcomes are n (percentage) and p-values from Fisher's exact test. Laboratory values are mean (standard deviation) and p-values from two-sided t-tests. Relative risks were END versus NRT. Cessation on the day of surgery was determined based on 48-hour point prevalence abstinence. Cessation at all other time points was determined by 7-day point-prevalence abstinence. Smoking reduction includes those that quit. NRT = nicotine replacement therapy; END = electronic nicotine delivery (e-cigarette); CO = carbon monoxide; FEV1 = forced expiratory volume in first second; FVC = forced vital capacity; *Smoking cessation verified by exhaled carbon monoxide 10ppm or less. †Smoking reduction defined by reduction of 50% or more cigarettes per day compared to baseline. Analysis by intention-to-treat – those lost to follow-up were assumed to have continued smoking. ‡Relative risk undefined due to no quitters in the NRT group, risk difference = 15% (95% CI -6.5% to +30.6%)

CARDIOVASCULAR AND THORACIC
Saturday, June 24
13:15 - 15:00

Track: Cardiovascular & Thoracic: Basic Science & Clinical

272918 - BODY MASS INDEX AND INSULIN SENSITIVITY DURING CARDIAC SURGERY

Presenting Author: Yosuke Nakadate, Department of Anesthesiology, McGill University Health Centre Glen Site, Royal Victoria Hospital., Westmount, Quebec

Co-Author(s): Hiroaki Sato, Tamaki Sato, Takumi Codere-Maruyama, Takashi Matsukawa, Thomas Schricker

274810 - EFFECT OF INTRANASAL INSULIN ADMINISTRATION ON GLYCEMIA DURING CARDIAC SURGERY

Presenting Author: Yosuke Nakadate, Department of Anesthesiology, McGill University Health Centre Glen Site, Royal Victoria Hospital., Westmount, Quebec

Co-Author(s): Hiroaki Sato, Tamaki Sato, Patricia Roque, Linda Wykes, Thomas Schriker

282700 - PULSATILE PORTAL FLOW AND ACUTE KIDNEY INJURY AFTER CARDIAC SURGERY.

Presenting Author: William Beaubien-Souligny, Montreal Heart Institute, Montréal, Quebec

Co-Author(s): Roberto Eljaiek, Yiorgos Alexandros Cavayas, Élise Rodrigue, Josée Bouchard, André Denault

283977 - PHYSIOLOGY OF LUNG COLLAPSE DURING ONE-LUNG VENTILATION: UNDERLYING MECHANISMS

Presenting Author: Olivier Moreault, Department of Anesthesiology and Critical Care, Laval University, Québec, Quebec

Co-Author(s): Steeve Provencher, Jean Bussières

284037 - NUTRITIONAL ADEQUACY AND OUTCOMES IN CRITICALLY ILL CARDIAC SURGCIAL PATIENTS

Presenting Author: Etienne Archambault, University of Ottawa, Ottawa, Ontario

Co-Author(s): Joanne MacNeill, Diem Tran, Bernard McDonald

284883 - IMPACT OF CEREBRAL OXYGEN SATURATION MONITORING ON PERIOPERATIVE OUTCOMES: A SYSTEMATIC REVIEW AND META-ANALYSIS.

Presenting Author: Vandana Vaishnav, St Catherines General Hospital, Oakville, Ontario

Co-Author(s): Divya Sharma, Reem Mustafa

286026 - ELEVATED RED CELL DISTRIBUTION WIDTH AS A PREDICTOR OF POSTOPERATIVE EVENTS: A SYSTEMATIC REVIEW & META-ANALYSIS

Presenting Author: Justyna Bartoszko, Department of Anesthesia, University of Toronto,, Toronto, Ontario

Co-Author(s): Alexandra Shingina, Stephanie Ladowski, Marina Englesakis, Duminda Wijeysundera

286279 - PULMONARY ARTERY PULSATILITY INDEX PREDICTS NEED FOR INOTROPIC SUPPORT POST CARDIAC SURGERY

Presenting Author: Asadollah Mir ghassemi, University of Ottawa, Anesthesia department, Ottawa, Ontario

Co-Author(s): Marc Ruel, Amy Chung, Michael Bourke, Robert Chen, Louise Sun

272918 - BODY MASS INDEX AND INSULIN SENSITIVITY DURING CARDIAC SURGERY

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Takashi Matsukawa - University of Yamanashi
Thomas Schricker - McGill University Health Centre Glen Site, Royal Victoria Hospital.

Introduction

While some studies reported better outcomes in overweight and obese patients than normal weight patients known as the "obesity paradox"[1], it remains unclear whether obesity is associated with morbidity and mortality after major surgery. Based on the previous observation that the degree of intraoperative insulin resistance is a predictor of adverse events[2] we investigated the relationship between body mass index (BMI) and insulin sensitivity during open heart surgery.

Methods

With the approval of the institution's REB we studied patients scheduled for elective coronary artery bypass grafting, valve procedure, or a combination of both between May 2008 and June 2015 at our hospital. Patients undergoing off pump CABG or procedures with anticipated dteep hypothermic circulatory arrest were excluded. Consenting subjects were divided into patients without and patients with diagnosed type 2 diabetes mellitus and then, based on their BMI, categorized into five groups.
Group 1: underweight, BMI BMI < 18.5 kg/m^2
Group 2: normal weight, BMI 18.5-25 kg/m^2
Group 3: overweight, BMI 25-30 kg/m^2
Group 4: obese, BMI 30-35 kg/m^2
Group 5: morbidly obese, BMI>35 kg/m^2
Patients received standardized iv anesthesia using sufentanil and midazolam supplemented with inhaled sevoflurane. Insulin sensitivity was assessed by the hyperinsulinemic-normoglycemic clamp technique during cardiac surgery. The dextrose infusion rate during steady-state conditions before cardiopulmonary bypass, was used as an indicator of insulin sensitivity. We assumed steady-state conditions if the coefficient of variation of five subsequent dextrose infusion rates was less than 5%.

Results

Four hundred and one patients completed the study, 134 of which were diabetic. There was a negative correlation with BMI and intraoperative insulin sensitivity independent of the presence of diabetes mellitus.(Figure. 1)
The insulin sensitivity in non-diabetic underweight and normal weight patients was higher than in overweight, obese and morbidly obese subjects. Diabetic patients in the underweight, normal weight and overweight group had a greater insulin sensitivity than obese and morbid obese diabetics. On average diabetic patients were less insulin sensitive than non-diabetics in all weight groups

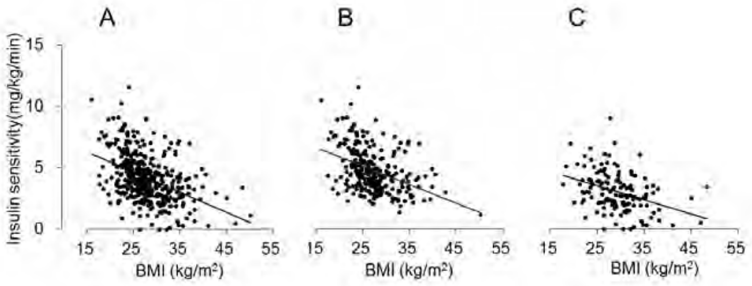
Conclusions

We report a linear negative relationship between BMI and insulin sensitivity during open heart surgery, independent of the patients' diabetic state. Altered insulin sensitivity unlikely accounts for the previously reported "obesity paradox".

References:

1.Diabetes care. 2013;36:S276-281
2.The Journal of clinical endocrinology and metabolism. 2010;95:4338-4344
Relationship between BMI and insulin sensitivity

Fig. 1



Relationship between BMI (kg/m2) and insulin sensitivity (dextrose infusion mg/kg/min) in all (A: insulin sensitivity=0.1633 · [BMI] + 8.784; r=-0.435; P<0.001), non-diabetic (B: insulin sensitivity=-0.151 · [BMI] + 8.921; r=-0.414; P<0.001) and diabetic patients (C: insulin sensitivity=-0.114 · [BMI] + 6.394; r=-0.373; P<0.001).

274810 - EFFECT OF INTRANASAL INSULIN ADMINISTRATION ON GLYCEMIA DURING CARDIAC SURGERY

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Patricia Roque - McGill University
Linda Wykes - McGill University
Thomas Schriker - McGill University Health Centre Glen Site, Royal Victoria Hospital.

Introduction
The intranasal administration of insulin has been shown to improve both memory performance and metabolic integrity of the brain in patients suffering from Alzheimer's disease or cognitive impairment[1]. Postoperative cognitive dysfunction is an increasing health problem as more elderly patients undergo major surgical procedures[2]. We have previously demonstrated that the intravenous administration of insulin preserves both short and long-term memory function after open heart surgery[3]. Insulin applied *via* nasal spray bypasses the blood-brain-barrier and causes a sustained elevation of insulin concentrations in the cerebrospinal fluid[4]. While intranasal insulin has been shown not to alter peripheral insulin levels in non-surgical subjects[4], the influence of intranasal insulin administration on glycemia during major surgery is unknown.

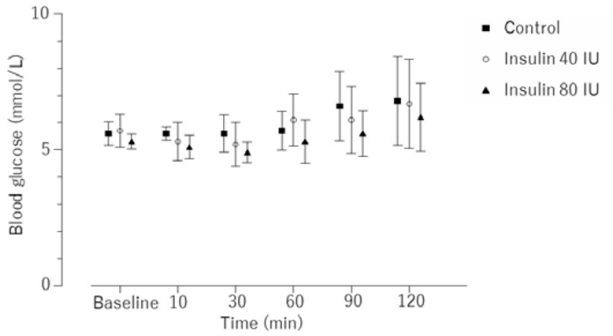
Methods
With the approval from the local research ethics board, we approached non-diabetic patients scheduled for elective cardiac surgery requiring cardiopulmonary bypass. Patients scheduled for procedures with anticipated deep hypothermic circulatory arrest were excluded.
Using a computer-generated randomization schedule consenting patients were allocated to three groups (Group 1: placebo, Group 2: 40IU intranasal insulin, Group 3: 80IU intranasal insulin). Participating researchers, anesthesiologists and surgeons were blinded to the group assignment. Insulin was applied using a sterile metered nasal dispenser after the induction of general anesthesia and endotracheal intubation. Arterial blood samples were collected over two hours, every 10 minutes before CPB and every 30 minutes during CPB.
Hypoglycemia was defined as a blood glucose level < 3.5 mmol/L.
A total of 45 patients is required to detect a significant difference in glycemia between the three groups.

Results
We present present data from an interim analysis performed after 20 patients (Group 1 n=8, Group 2 n=6, Group 3 n=6). Patient demographics, surgical and anesthetic data are comparable between groups. After 10 to 30 minutes of insulin administration there is a trend towards lower blood glucose levels in patients receiving insulin compared to baseline and patients in the placebo group (Figure). No episode of hypoglycemia was observed at any point in time.

Conclusion
Preliminary data suggest that the intranasal administration of 40IU or 80IU of insulin does not cause hypoglycemia during cardiac surgery. Whether there is a significant dose dependent effect on glycemia remains to be seen.

References:
1. CNS drugs. 2013;27:505-514.
2. British journal of anaesthesia. 2015;114:194-203.
3. PLoS ONE. 2014;9:e99661
4. Nature neuroscience. 2002;5:514-516.
Blood glucose after intranasal insulin during cardiac surgery

Figure.1



After 10 to 30 minutes of insulin administration there is a trend towards lower blood glucose levels in patients receiving insulin compared to baseline and patients in the placebo group.

282700 - PULSATILE PORTAL FLOW AND ACUTE KIDNEY INJURY AFTER CARDIAC SURGERY.

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Élise Rodrigue - Montreal Heart Institute
Josée Bouchard - Hôpital Sacré-Coeur
André Denault - Montreal Heart Institute

Introduction: Venous congestion resulting from right heart failure and fluid overload could be an important mechanism leading to acute kidney injury (AKI) following cardiac surgery. Portal vein flow pulsatility is a known echographic sign of right heart failure and could be a marker of significant organ congestion. (1,2) We aim to assess whether the presence of portal flow pulsatility is independently associated with AKI after cardiac surgery.

Methods: We performed a retrospective cohort study and a prospective validation cohort study. In both cohorts, the association between portal flow pulsatility defined as a pulsatility fraction ≥ 50% and the risk of AKI was assessed using logistic regression analysis. Factors associated with the presence of portal flow pulsatility were also explored. We retrospectively reviewed 102 patients who had at least one Doppler assessment of portal flow during the week following cardiac surgery. In the prospective cohort study, portal flow was systematically assessed before, immediately after and during post-operative day 1 after cardiac surgery by bedside transthoracic echography. Both the retrospective and the prospective studies have been approved by the local ethics comittee. Written consent was obtained for the prospective study.

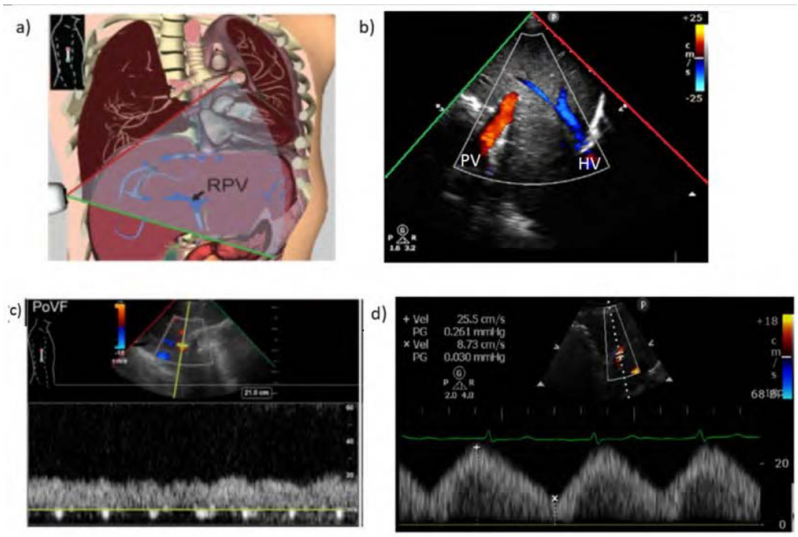
Results: In the retrospective cohort (n=102), the detection of portal flow pulsatility was associated with an increased risk for subsequent development of overall (OR: 4.34 (95%CI: 1.56 – 12.1)) and AKI (OR: 4.38 (95%CI: 1.17 – 16.32)). The risk of overall acute kidney injury remained significant after adjustment for the mean cardiovascular SOFA score during post-operative days 0 and 1 (OR: 4.62 (95%CI: 1.58-13.49)). In the prospective cohort (n=115), portal flow pulsatility detected on post-operative day 1 was associated with an increased risk of subsequent severe AKI (OR: 7.75 (95%CI: 2.00 - 30.02)) and dialysis requirement (OR: 8.00 (95%CI: 1.45-44.19)) but not with overall AKI (OR: 1.40 (95%CI: 0.47-4.19)). Portal flow pulsatility during or immediately after surgery was not associated with AKI. In both cohorts, a higher cumulative fluid balance was associated with the presence of portal flow pulsatility.

Discussion: In these observational studies, the presence of portal flow pulsatility is associated with an increased risk of subsequent AKI after cardiac surgery. Assessment of portal flow using Doppler ultrasound at the bedside might be a promising tool to detect patients with AKI due to cardiogenic venous congestion.

References:

1. Styczynski G, Milewska A, Marczewska M, et al. Echocardiographic Correlates of Abnormal Liver Tests in Patients with Exacerbation of Chronic Heart Failure. J Am Soc Echocardiogr. 2016;29:132-139.
2. Tang WH, Kitai T. Intrarenal Venous Flow: A Window Into the Congestive Kidney Failure Phenotype of Heart Failure? JACC Heart Fail. 2016;4:683-686.

Figure 1: a) Right portal vein (RPV) position obtained from a posterior axillary view using the Vimedix simulator (CAE Healthcare) (b) corresponding 2D transthoracic ultrasound with color Doppler showing the relative position the portal vein (PV) and hepatic vein (HV) c) Pulse-wave Doppler waveform of a normal portal flow showing minimal variation during the cardiac cycle and d) of a pulsatile portal flow



Pulsatility fraction: 66%) (RPV: right portal vein, PoVF: portal vein flow.

283977 - PHYSIOLOGY OF LUNG COLLAPSE DURING ONE-LUNG VENTILATION: UNDERLYING MECHANISMS

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Jean Bussières - Institus Universitaire de Cardiologie et de Pneumologie de Québec

Introduction: Lung isolation and one-lung ventilation are the mainstays of thoracic anesthesia. Both double lumen endotracheal tube (DLT) and bronchial blocker (BB) are frequently used in video-assisted thoracic surgery. Until recently, studies were inconclusive weather DLT or BB offered the best lung collapse[1]. However, in 2016, a research group observed a faster lung collapse with BB compared with DLT while the internal channel of the BB was occluded and using a second period of apnea at the opening of the pleura[2]. The physiologic mechanisms behind this faster collapse remained unknown.

Objectives: The objective of this study was to assess the physiologic mechanisms behind lung isolation with DLT and BB. We aimed to compare pulmonary pressure measurements (P_{Pulm}) and gaseous movement (V_{Resorb}) from ambient air to the non-ventilated lung during one-lung ventilation using DLT and BB.

Methods: After approval of the local REB and obtention of written informed consent, 40 patients requiring one-lung ventilation for video-assisted thoracic surgery were recruited to P_{Pulm} or V_{Resorb} with either a left-sided DLT or BB (4 groups; 10 patients per group). For P_{Pulm}, a differential pressure transducer was used to measure the intra-bronchial pressure associated with the occlusion of the lumen of the DLT of the non-ventilated lung or the occlusion of the internal channel of the BB. The pressures were averaged every thirty seconds before and after pleural opening. For V_{Resorb}, the lumen of the DLT of the non-ventilated lung or the internal channel of the BB were connected to a respiratory bag filled with a precise volume of air (FiO2 0.21). The V_{Resorb} was calculated from the residual volume in the bag at the end of the observation period.

Results: One patient with BB was excluded because of unreliable pressure analysis. Subjects were comparable in age, sex, BMI, FEV_1 and side of surgery (all $p>0.1$). P_{Pulm} became progressively negative until the opening of the pleura in both groups ($p < 0.0001$) (Figure 1). There was no significant difference in P_{Pulm} at pleural opening between the DLT and the BB groups (-20 ± 18 versus -31 ± 28 cmH_20, $p=0.12$). Similarly, V_{Resorb} was comparable in the DLT and BB groups (504 ± 268 versus 630 ± 272 mL, $p=0.31$).

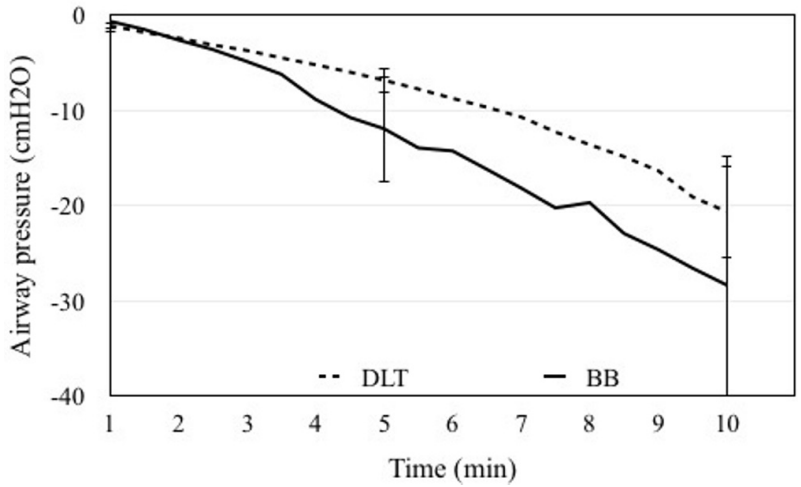
Conclusion: Lung isolation with closed chest caused the development of a significant negative P_{Pulm} with both DLT and BB when the lumen or internal channel was occluded. When opened to ambient air, lung isolation with closed chest resulted in a significant aspiration of air through the lumen or internal channel of the DLT/BB, likely slowing the resorption atelectasis by diluting intra-alveolar O_2 with ambient air. These results explain the faster complete lung collapse previously observed when occluding the internal channel of the BB compared to the traditional DLT with opened lumen.

References:

1. J Cardiothorac Vasc Anesth 2015 29: 955-66
2. Can J Anesth 2016 63: 818-827

Figure 1 : Results

Figure 1 : Airway pressure - Closed chest
Double-lumen Tube vs Bronchial Blocker



Data are expressed as mean airway pressure averaged every 30 seconds from 1 to 10 min after beginning of one-lung ventilation, Error bars are standard error of the mean. DLT, Double-Lumen Tube, BB, Bronchial Blocker

284037 - NUTRITIONAL ADEQUACY AND OUTCOMES IN CRITICALLY ILL CARDIAC SURGCIAL PATIENTS

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Diem Tran - University of Ottawa Heart Institute
Bernard McDonald - University of Ottawa Heart Institute

Introduction: Optimal calorie and protein intake in critical illness and effect on outcome remains controversial[1]. Beyond recent observations indicating that cardiac surgical patients are especially at risk for iatrogenic malnutrition[2], little is known regarding nutritional adequacy in critically ill cardiac surgical patients. The objective of this study was to examine the relationship between calorie and protein intake on in-hospital outcomes in critically ill cardiac surgery patients.

Methods: Following local REB approval, a retrospective chart review was undertaken. All consecutive adult patients who underwent major cardiac surgical procedures at a single centre between July 1, 2012 and December 31 2015 and who remained alive in the ICU and had not progressed to oral diet by POD 10 were included in the study. We calculated energy delivery over the first 10 ICU days as total delivered from enteral and/or parenteral feeds and from non-nutritional sources and lipids delivered with sedatives. We calculated energy target, for patients with BMI < 30 kg/m^2 as 25 kcal/kg/d. For obese patients with a BMI >30 kg/m^2, the calculated energy target was 23.5 kcal/kg of ideal body weight. Similarly, the protein targets were calculated as follows: BMI < 30 kg/m^2 = 1.35 g/kg, BMI 30-40 kg/m^2 = 2 g/kg ideal body weight, BMI > 40 kg/m^2 = 2.5 g/kg ideal body weight. Logistic regression analyses were then performed to assess the association of 10 day cumulative caloric or protein deficit on in-hospital mortality, our primary outcome. Regression modeling included baseline demographic and surgical predictors as well as physiologic severity of illness score on ICU admission.

Results: Over the study period there were 5054 cardiac surgical cases and 206 patients met our inclusion criteria. 201 patients received enteral nutrition and/or 24 patients received parenteral nutrition (Table). Over the first 10 postoperative days, the mean daily energy intake was 1181 +/- 387 Kcal and average of % caloric goal achieved was 65% +/- 20%. The mean daily protein intake was 55.6 +/- 20.2 g and average of % protein goal achieved over first 10 days was 22% +/- 21%. In hospital mortality was 18%, however neither cumulative 10 day caloric or protein deficit was an independent factor for mortality.

Discussion: Post-operative cardiac surgery patients requiring nutritional support are severely ill yet at high risk for inadequate nutritional therapy. Nutritional inadequacy was worse for protein vs. caloric intake and is a good target for practice improvement. However, nutritional inadequacy was not associated with hospital mortality. Further work needs to be done to identify cardiac surgery patients most likely to benefit from nutritional intervention.

References:

1. Crit Care Med. 2015 43:1569-79
2. J Parenter Enteral Nutr. 2010 34:644-52

Table. Nutritional Therapies and Outcomes

Patients receiving EN n (%)	201 (98)
Patients receiving PN n(%)	24 (11.7)
Mean Daily Energy Intake kcal	1181+/- 387
Cumulative10 day Calorie deficit kcal	6533 +/- 4032
Avg % 10 day Calorie goal achieved	65 +/- 20
Mean Daily Protein Intake g	55.6 +/- 20.2
Cumulative 10 day Protein deficit g	842 +/- 675
Avg % 10 day Protein goal achieved	22 +/- 21
In Hospital Mortality n (%)	37 (18)
Length of ventilation hours [IQR]	280.7 [187.9, 559.3]
Length of ICU stay median [IQR]	20 [14,34]
Hospital length of stay median [IQR]	40 [24,63]
Renal Replacement Therapy n (%)	116 (56.6%)
Reintubation n (%)	87 (48.2%)
Tracheostomy n (%)	61 (29.8)

284883 - IMPACT OF CEREBRAL OXYGEN SATURATION MONITORING ON PERIOPERATIVE OUTCOMES: A SYSTEMATIC REVIEW AND META-ANALYSIS.

Author(s)
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Presenting Author

Co-Authors(s)
Divya Sharma - M.S.University Baroda
Reem Mustafa - University of Missouri-Kansas City

Introduction: Intraoperative cerebral hypoxia or desaturations has been linked to adverse clinical outcomes like postoperative cognitive deficit (POCD), neurologic events and prolonged hospital stay. Several observational studies have claimed usefulness of non-invasive monitoring of regional cerebral oxygen saturation (rSO2) by near-infrared spectroscopy (NIRS) for patients undergoing high risk procedures like cardiac surgery. Small scale randomized controlled trials (RCT) have highlighted the role of early identification and reversal of intra-operative cerebral desaturation events (CDE) on major organ morbidity and mortality[1-5]. However these studies are underpowered and lack methodological quality. This systematic review aims to synthesize evidence for clinical utility of rSO2 monitoring on perioperative outcomes.

Methods: We conducted search on Ovid Medline, EMBASE, CENTRAL, DARE and grey literature like clinicaltrials.gov to identify RCTs conducted on adult patients undergoing surgery where NIRS monitoring was compared to blinded NIRS or no NIRS monitoring. Each eligible study was assessed for risk of bias, conflicts of interest and publication bias. Forest plots on RevMan software were created using outcome data for POCD, intra-operative CDEs, post-operative stroke, postoperative ICU stay, acute renal failure requiring dialysis and 30 day mortality. A GRADE profile summary [6] was created for each outcome. We did sensitivity analysis and sub-group analysis which were specified a priori. We explored for heterogeneity in studies and created funnel plots.

Results: We identified 20 eligible studies from our literature search and finally considered 6 RCTs for review and meta-analysis. There is a large effect estimate for outcome like POCD (OR: 0.61, 95% CI: 0.43-0.86; p=0.004) and cerebral desaturation events (OR: 0.66, 95% CI: 0.47- 0.93; p=0.02) in favour of rSO2 monitoring. The GRADE evidence for both outcomes is of moderate quality. The subgroup analysis indicated significant utility of rSO2 monitoring for cardiac surgery patients as compared to major abdominal surgery patients for POCD (OR: 0.61, 95% CI: 0.43-0.86, p = 0.004). The overall confidence in estimates for reduction in length of ICU stay with use of NIRS is low. For other outcomes like neurologic events, acute renal failure and 30 day mortality, the evidence is very low and recommendation is weak. Heterogeneity among studies was not significant with p-value >0.05.

Discussion: rSO2 is a useful physiologic parameter to identify CDEs and reduce incidence of POCD in cardiac surgery patients. Large RCTs are required to upgrade the quality of evidence and generate evidence for other outcomes where it wasn't true absence of effect. The cost-effectiveness would influence policy makers and clinicians to recommend a 'goal directed rSO2 maintenance' to modify perioperative clinical outcomes for a safer patient care. Improved quality of life reduces health care burden for patients & system.

References:

1. Anesth Analg 2007; 104:51-8.
2. Ann Thorac Surg 2009; 87:36-45.
3. Journal of Cardiothoracic and Vascular Anesthesia 2013; 27: 1260-1266.
4. European Journal of Cardio-Thoracic Surgery 2015; 47: 447-454.
5. Anesthesiology 2016; 124:826-36.
6. J. Clin Epidemiol 2013; 66:173-183.

GRADEpro Summary of Findings Table

Author(s): Vandana Vaishnav, Divye Sharma
Date:
Question: NIRS Monitoring compared to Blinded NIRS Monitoring for cerebral desaturation events
Setting: Operating room
Bibliography: ReMan

№ of studies	Study design	Quality assessment						№ of patients		Effect		Quality	Importance
		Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		NIRS Monitoring	Blinded NIRS Monitoring	Relative (95% CI)	Absolute (95% CI)		
Cerebral desaturation events													
5	randomised trials	very serious [e]	not serious	not serious	not serious	strong association		93/406 (22.9%)	120/405 (29.6%)	OR 0.66 (0.47 to 0.93)	79 fewer per 1,000 (from 15 fewer to 131 fewer)	⨁⨁⨁◯ MODERATE	CRITICAL
Postoperative Cognitive Deficit													
3	randomised trials	serious [a]	serious [b]	not serious	not serious	strong association		118/275 (42.9%)	150/277 (54.2%)	OR 0.61 (0.43 to 0.86)	123 fewer per 1,000 (from 38 fewer to 255 fewer)	⨁⨁⨁◯ MODERATE	CRITICAL
Neurologic events (TIA, Stroke, Coma)													
4	randomised trials	very serious [a]	not serious	not serious	serious [c]	none		6/358 (1.7%)	11/365 (3.0%)	OR 0.58 (0.22 to 1.54)	12 fewer per 1,000 (from 16 more to 23 fewer)	⨁◯◯◯ VERY LOW	CRITICAL
30 Days Mortality													
2	randomised trials	very serious [a]	not serious	not serious	very serious [c]	none		4/202 (2.0%)	7/199 (3.5%)	OR 0.57 (0.17 to 1.89)	15 fewer per 1,000 (from 29 fewer to 29 more)	⨁◯◯◯ VERY LOW	CRITICAL
Acute Renal Failure Requiring Dialysis													
3	randomised trials	very serious [a]	not serious	not serious	very serious [c]	none		5/302 (1.7%)	7/299 (2.3%)	OR 0.70 (0.23 to 2.17)	7 fewer per 1,000 (from 18 fewer to 29 more)	⨁◯◯◯ VERY LOW	IMPORTANT
ICU Stay													
4	randomised trials	very serious [a]	serious [d]	not serious	not serious [e]	strong association				not estimable		⨁⨁◯◯ LOW	IMPORTANT

CI: Confidence interval; OR: Odds ratio a. Blinding of care taker not possible and blinding of assessor not mentioned b. significant heterogeneity c. Confidence interval wide d. heterogeneity indicated e. No explanation was provided

286026 - ELEVATED RED CELL DISTRIBUTION WIDTH AS A PREDICTOR OF POSTOPERATIVE EVENTS: A SYSTEMATIC REVIEW & META-ANALYSIS

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Introduction: Red cell distribution width (RDW) is routinely reported with the complete blood count and measures the variability of red cell size. In patients with coronary artery disease and heart failure, elevated RDW is strongly associated with mortality.[1,2] Limited prior data suggest a similar association in surgical patients.[3,4] We therefore conducted a systematic review to better examine the association of elevated RDW with postoperative morbidity and mortality.

Methods: The authors searched MEDLINE, EMBASE, CENTRAL, and Pubmed-NOT-Medline up to April 25, 2016 to identify observational studies that assessed the association between RDW and outcomes in surgical patients. Data were extracted independently by two reviewers. Where appropriate, random effects meta-analysis was used to calculate the pooled adjusted odds ratios (derived from multivariable logistic regression models) describing the associations of elevated RDW with 30-day (or in-hospital) mortality and postoperative morbidity. We also conducted hierarchical summary receiver operating characteristic curve (hsROC) analyses to evaluated the pooled unadjusted association of elevated RDW with mortality and morbidity.

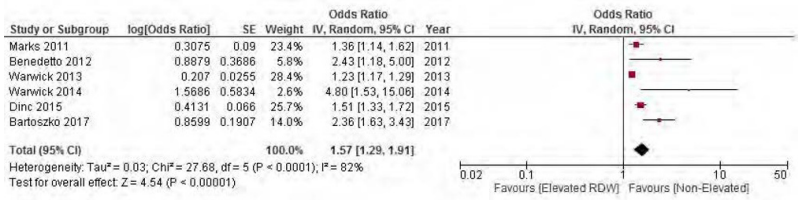
Results: Of 1,493 potentially relevant records that were identified, 15 relevant studies were included in the review, of which 11 were used in quantitative synthesis. In patients undergoing a diverse array of surgical procedures, elevated RDW was associated with an increased odds of 30-day or in-hospital mortality (OR, 1.57; 95% CI, 1.29-1.91, $p < 0.0001$) compared to normal RDW, albeit with considerable heterogeneity (I^2 statistic 82%). When postoperative cardiac morbidity (arrhythmia, myocardial injury, myocardial infarction, or cardiac arrest) was examined, the association with elevated RDW remained (OR, 1.48; 95% CI 1.24-1.75, $p < 0.0001$). For predicting mortality, hsROC analysis demonstrated that the pooled sensitivity was 0.60 (0.47-0.71), specificity 0.70 (0.60-0.79), positive likelihood ratio 2.0 (1.7-2.4), negative likelihood ratio 0.57 (0.45-0.72), and area under the hsROC curve 0.70 (0.66-0.74). For predicting cardiac events, the pooled sensitivity was 0.60 (0.45-0.74), specificity 0.65 (0.55-0.74), positive likelihood ratio 1.73 (1.26-32.39), negative likelihood ratio 0.61 (0.42-0.88), and area under the hsROC curve 0.67 (0.63-0.71).

Discussion: Based on its relatively weak prediction of mortality and cardiac events in hsROC analyses, RDW does not appear to be a promising single univariate marker for differentiating between surgical patients with varying perioperative risk. Within the context of multivariable regression models, RDW may be a useful covariate for inclusion when predicting postoperative mortality and perhaps morbidity. Due to the broad nature of perioperative morbidity reported in the included studies and inconsistent morbidity definitions, it is unclear what postoperative complications RDW may be most useful for predicting.

References:

1. Am J Cardiol. 2010 105:312-317.
2. Int Heart J. 2014 55:58-64.
3. Eur J Cardiothorac Surg. 2013 43:1165-9.
4. Int J Cardiol. 2013 165:369-71.

Figure 1. Forest Plot - Postoperative Mortality



Association of Elevated RDW vs. Non-Elevated RDW With Respect to Postoperative Mortality

286279 - PULMONARY ARTERY PULSATILITY INDEX PREDICTS NEED FOR INOTROPIC SUPPORT POST CARDIAC SURGERY

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Introduction: The pulmonary artery pulsatility index (PAPI), defined as (pulmonary artery systolic pressure – pulmonary artery diastolic pressure)/central venous pressure,[1] is an emerging hemodynamic predictor of right ventricular failure and requirement for inotropic support following left ventricular assist device placement.[1-3] To date, the utility of this simple hemodynamic tool has not been explored in the general cardiac surgical population. The purpose of this study was to determine whether PAPI predicts inotropic medication use following cardiopulmonary bypass.

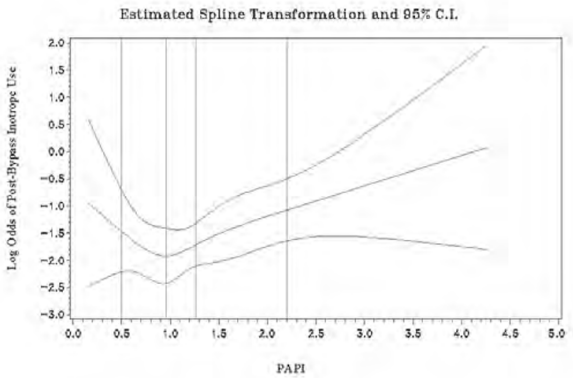
Methods: Institutional ethics board approval was obtained for this retrospective cohort study of 287 patients undergoing major cardiac surgery requiring cardiopulmonary between January and August 2014 who were monitored intraoperatively with a pulmonary artery catheter (PAC). Excluded were off pump procedures, heart transplants, left ventricular assist device implants, pulmonary thromboembolectomies and lack of intraoperative PAC monitoring. Primary outcome was intraoperative use of one or more inotropic agents post-bypass (i.e., dobutamine, milrinone, epinephrine). Primary predictor was PAPI, calculated as described using the first available pulmonary artery pressure and central venous pressure following induction of anesthesia. Baseline patient characteristics and intraoperative variables were extracted from institutional Perioperative Databases. Hemodynamic variables, and details of number of type of intraoperative inotropes used, were obtained from electronic anesthesia records (CompuRecord, Netherlands).Chi-squared and Wilcoxon rank-sum tests were used where appropriate. We evaluated the unadjusted association between PAPI and log odds of post-bypass inotrope use using restricted cubic splines. This association was further modeled using multivariable logistic regression with adjustment for *a priori* selected risk factors. Measure of association was odds ratio (95% confidence interval). Analyses were performed using SAS 9.4, with statistical significance defined as a two-tailed $P < 0.05$.

Results: *The relationship between PAPI and post-bypass inotrope use followed a "U-shaped" distribution (Figure). We therefore categorized PAPI as < 0.5, 0.5-1.39 (reference category), and ≥1.4. Overall, 48 (16.7%) of 287 patients required inotropic support post-bypass. Independent predictors of post-bypass inotropic support were PAPI ≥1.4 (OR 2.53, 95% CI 1.11-5.76), combined valve(s) and bypass grafting (OR 8.55, 95% CI 2.99-24.41), thoracic aortic surgery (OR 7.66, 95% CI 1.71-34.33) and preoperative left ventricular ejection fraction < 35% (OR 27.25, 95% CI 8.09-91.82).*

Discussion: PAPI ≥1.4 is a predictor of need for inotropic support following cardiopulmonary bypass. Given the high frequency of PAC use in cardiac surgical patients, this simple hemodynamic marker is an easy and promising tool for identifying those who are more likely to benefit from use of inotropic agents in the perioperative setting.

References:

1. *J Heart Lung Transplant*. 2014;33:S86.
2. J *Card Fail*. 2013;19:S17.
3. *Circulation*. 2014;130:A19195.


Estimated Spline Transformation and 95% C.I.
Log Odds of Post-Bypass Inotrope Use
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
PAPI

CRITICAL CARE MEDICINE AND TRAUMA; HEALTH MANAGEMENT
Sunday, June 25
10:45 - 12:30

Track: Critical Care Medicine and Trauma

283131 - TRENDS AND OUTCOMES OF SEVERE SEPSIS IN WOMEN OF CHILDBEARING AGE ACCORDING TO PREGNANCY STATUS IN THE U.S 1998-2013

Presenting Author: Kristen M. Kidson, University of British Columbia, Vancouver, British Columbia

Co-Author(s): Jennifer Hutcheon, William Henderson

285850 - POTENTIAL FOR TISSUE DONATION AFTER A SUDDEN CARDIAC ARREST: A SINGLE CENTRE STUDY.

Primary & Presenting Author: Vincent Lafleur, CIUSSS de l'Estrie CHUS, Sherbrooke, Quebec

Co-Author(s): Olivier Lachance, Marie-Hélène Masse, Frédérick D'Aragon

Track: Health Management

281477 - POSTOP HOME MONITORING (POHM) AFTER KNEE & HIP REPLACEMENTS

Presenting Author: Homer Yang, Univeristy of Ottawa, Ottawa, Ontario

Co-Author(s): Geoff Dervin, Susan Madden, Beaule Paul, Sylvain Gagne, Ashraf Fayad, Kathryn Wheeler, Melody Afagh, Mary Lou Crossan, Monica Taljaard

281666 - THE IMPACT OF PREOPERATIVE GERIATRIC ASSESSMENT ON OUTCOMES AFTER ELECTIVE SURGERY: A POPULATION-BASED STUDY

Presenting Author: Daniel I. McIsaac, University of Ottawa, Ottawa, Ontario

Co-Author(s): Allen Huang, Coralie Wong, Gregory Bryson, Carl van Walraven

282657 - A SYSTEMATIC REVIEW OF PERIOPERATIVE INTERVENTIONS TO IMPROVE OUTCOMES IN FRAIL ELDERLY PATIENTS HAVING SURGERY.

Primary & Presenting Author: Abhilasha Patel, University of Ottawa, Brampton, Ontario

Co-Author(s): Nikhile Mookerji, Tim Jen, Manoj Lalu, Daniel McIsaac

284220 - COMPARING TWO FRAILTY TOOLS TO PREDICT DISABILITY AFTER ELECTIVE NONCARDIAC SURGERY: A MULTICENTRE COHORT STUDY

Presenting Author: Daniel I. McIsaac, University of Ottawa, Ottawa, Ontario

Co-Author(s): Gavin Hamilton, Emily Hladkowicz, Gregory Bryson

285153 - ABILITY OF INFLAMMATORY BIOMARKERS TO PREDICT COMPLICATIONS IN HIGH-RISK PATIENTS UNDERGOING NON-CARDIAC SURGERY

Presenting Author: Raegan Cleven, University of Manitoba, Winnipeg, Manitoba

Co-Author(s): Duane Funk, Kent HayGlass

286216 - INCIDENCE RATES AND DEMOGRAPHIC DISPARITIES OF DELIRIUM AFTER SURGERY WITH GENERAL ANAESTHESIA

Presenting Author: Eric Jacobsohn, University of Manitoba, Winnipeg, Manitoba

Co-Author(s): Vincent Wourms, Chris Christodoulou, Tumul Chowdhury, Linda Girling, Eric Jacobsohn

281477 - POSTOP HOME MONITORING (POHM) AFTER KNEE & HIP REPLACEMENTS

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Introduction In 2013, CIHI "…data suggests that demand is rising at a rate that is outpacing the ability of health systems to keep up."[(1)] The median length of stay (LOS) for hip or knee arthroplasty (HA or KA) was 4 days each.[(2)] To increase throughput, hospitals have instituted early discharge (EDc). In one study, the 30-day readmission rate after 4288 KA was 5.6%.[(3)] In another, the 30-day complication rate after 10,244 KA or HA was 2.2%.[(4)] Although ≥ 95% of HA or KA have no post-surgical "returns" (complications or readmissions) and safe for EDc, some do return. The challenge is to repatriate expeditiously those who need to return after EDc but safely manage the lesser complications at home. We hypothesize that wireless home monitoring after EDc is one such solution.

Method **Part 1** was an observational trial of elective primary HA or KA with expected LOS (length of stay) ≤ 1 day; age between 18 and 80 years; Revised Cardiac Risk Index (RCRI) ≤ Class 2; and a care-taker to assist at home. Exclusion criteria included ASA IV; COPD with FEV1 ≤ 1; OSA; patient or family reluctance to participate in early discharge; prior enrollment in POHM; and disease process that is unstable or undiagnosed. Primary Outcome was ≥ 90% successful transmission of BP; HR; SpO2; and pain assessment 4 times a day through postop day (POD) 4 from home. Hardware with cellular connectivity to patient's home; alerts to research team's mobile device; and data behind the hospital firewall was set up.
Part 2 was a Case–Control chart audit of matching cases from the observational trial to controls by age (decades), ASA, & procedure, 2 controls per case, to compare rates of 30-day readmission and emergency department (ED) visit; and total costs.

Results After REB approval, 54 patients completed the study in Part 1: 21 males, 33 females; 9 total hips; 4 unipolar hips; 26 total knees; 15 hemi-knees; 50 under spinal anesthesia and 4 GA. The overall median transmission rate was 97.9%, 3540/3672 [IQR 97.8-98.8%]. The median response to "I would recommend the Remote Monitoring System program to future patients" was 4.5 [IQR 4-5], 5 being "strongly agree". At 30-days, there was no mortality; no re-admissions; and 2 ED visits for pain but > 7 days after POHM. The Table shows results from Part 2. Average costs were $5826.32±$1418.89 for cases and $9198.58±$1513.59 for controls. **Discussion** The Canadian overall post-surgical 30-day ED visit rate was 18.7%; and readmission rate 6.5% with 9-59% cited as preventable[(5)]. POHM is feasible, but also offers an alternative in safe EDc and a tool in perioperative medicine to manage surgical "returns".

References:

References
1. Wait Times for Priority Procedures in Canada, 2013. Canadian Institute of Health Information 2013. accessed: [2017-01-02]. Available from: https://secure.cihi.ca/free_products/wait_times_2013_en.pdf.

2. Hip and Knee Replacements in Canada: Canadian Joint Replacement Registry 2014 Annual Report. Canadian Institute of Health Information; 2014.
3. Vorhies JS, Wang Y, Herndon JH, Maloney WJ, Huddleston JI. Decreased length of stay after TKA is not associated with increased readmission rates in a national Medicare sample. Clin Orthop Relat Res. 2012;470(1):166-71.
4. Mantilla CB, Horlocker TT, Schroeder DR, Berry DJ, Brown DL. Frequency of myocardial infarction, pulmonary embolism, deep venous thrombosis, and death following primary hip or knee arthroplasty. Anesthesiology. 2002;96(5):1140-6.

5. All-Cause Readmission to Acute Care and Return to the Emergency Department. Ottawa, ON. Canadian Institute for Health Information. 2012 ISBN: 978-1-77109-040-7. accessed: [2016-10-08]. Available from: https://secure.cihi.ca/free_products/Readmission_to_acutecare_en.pdf.

Results of Case Control Chart Audit

Variable	Cases (n = 54)	Controls (n = 107) [one case resulted in only one matched control]	*p* value
Age - Mean (SD)	61.43 (8.25)	61.85 (8.54)	$p = 0.45$
Acute LOS – Mean (SD)	0 (0)	3.17 (1.07)	
LOS (Short Term Rehab) - Mean (SD) based on 15 control patients	0	10.67 (3.31)	
BMI - Mean (SD)	27.51 (4.0)	30.68 (6.22)	$p = 0.0003$
HBP	15 (27.8%)	38 (35.5%)	$p = 0.32$
Type II DM	3 (5.6%)	12 (11.2%)	$p = 0.26$
Hypercholesterolemia	14 (25.9%)	28 (26.2%)	$p = 0.98$
Pain > 3 months preop requiring treatment	54 (100%)	96 (89.7%)	
Current Smoker	3 (5.8%)	10 (9.4%)	$p = 0.41$
Anesthesia Type Spinal GA	50 (92.6%) 4 (7.4%)	91 (85.0%) 16 (15.0%)	$p = 0.18$
30-day ED Visit	2 (3.7%)	8 (7.5%)	$p = 0.36$
30-day Readmissions	0	2 (1.9%)	
30-day mortality	0	0	

281666 - THE IMPACT OF PREOPERATIVE GERIATRIC ASSESSMENT ON OUTCOMES AFTER ELECTIVE SURGERY: A POPULATION-BASED STUDY

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Background
By 2050, over 60% of Canadians will be ≥ 60 years old.[1] This demographic shift is reflected in the perioperative setting where people ≥ 65 years have surgery at a higher rate than any other age group.[2] Advanced age also independently predicts a 2- to 4-fold increase in rates of postoperative advere events.[3] Therefore, strategies are needed to support improved outcomes in the growing population of geriatric surgical patients. A systematic review of geriatric assessment before surgery suggests that this intervention may decrease complications and length of stay, however, methodological limitations and small sample sizes limit the validity of these findings.[4] Our objective was to describe utilization of preoperative geriatric evaluation, and estimate the independent association between geriatric evaluation and outcomes after elective noncardiac surgery.

Methods
Ethics approval for this historical cohort study was obtained; the protocol was registered (NCT02975375). Using linked, population-based health administrative date we identified all patients ≥65 years on the day of their first elective noncardiac surgery between 2002-2014. Geriatric consultations and comprehensive assessments were identified using physician billing codes that are known to be accurate;[5] outcomes were ascertained using validated methods. Multi-level multivariable adjusted regression analyses were performed to estimate the association of geriatric evaluation with 90-day mortality (primary outcome), complications, length of stay, and discharge independence. Rates of guideline-recommended screening for colon and breast cancer were identified to investigate a healthy user bias.

Results
Geriatric evaluations were performed in 7 352 (2.8%) of the 266 499 patients identified. Death within 90 days of surgery occurred in 14 per 1000 who were evaluated by a geriatrician, compared to 24 per 1000 who were not. Following adjustment, preoperative geriatric evaluation was significantly associated with improved survival (HR=0.81, 95%CI0.68-0.95). Rates of complications did not differ between groups; costs, length of stay, and supported discharges were higher in the geriatric consultation group. Similar rates of cancer screening were found between groups, which did not support a healthy user bias.

Discussion
Despite existing evidence supporting the role of geriatric evaluation in improving postoperative outcomes in older patients, contemporary perioperative practice rarely includes preoperative geriatric care. Patients evaluated by geriatricians experience an independent and statistically significant improvement in postoperative survival that does not appear to be due to a healthy user bias, however, resource use was higher. Causal mechanisms underlying these findings require further study. Future efforts are required to appropriately increase the role of geriatricians in perioperative care and to identify specific older patients who would be most likely to benefit from preoperative geriatric care.

References:

1. Statistics Canada 2011
2. Annals of Surgery 2003 238:170
3. J Am Ger Soc 2005 53:424
4. Anaesthesia 2014 69:8
5. Med Care 2009 47: 1258

Adjusted study outcomes

Table - Adjusted study outcomes

Outcome	Geriatric evaluation	No Geriatric evaluation	Adjusted association 95% CI	P-value
90-day mortality (n (%))	103 (1.4)	6,172 (2.4)	0.81 0.68-0.95	0.001
Length of stay* (mean (SD))	6.0 (7.3)	7.1 (10.3)	1.03 0.89-1.19	0.7
Complication (n (%))	1,129 (15.4)	50,256 (19.4)	0.99 0.92-1.08	0.9
Non-independent discharge (n (%))	5,264 (71.6)	145,822 (56.3)	1.32 1.23-1.41	<0.0001
90-day total healthcare costs (mean (SD))	22,570.57 (14,642.87)	22,333.46 (19,613.96)	1.03 1.01-1.05	0.002

$: 2014 Canadian dollars; CI: confidence interval; SD: standard deviation
Mortality reported and LOS as hazard ratios (*note, HR>1 signifies shorter length of stay); Complications and Institutional discharge as odds ratios; Costs and length of stay as incidence rate ratios

282657 - A SYSTEMATIC REVIEW OF PERIOPERATIVE INTERVENTIONS TO IMPROVE OUTCOMES IN FRAIL ELDERLY PATIENTS HAVING SURGERY.

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Introduction: Older patients undergo surgery at a high rate, and experience an increased rate of adverse outcomes (1, 2). A growing literature identifies frailty, an aggregate expression of vulnerability to adverse outcomes due to age- and disease- related deficits, as a key predictor of morbidity and mortality in older surgical patients (3-5). Importantly, frailty may be a modifiable risk factor. However, there are no syntheses of interventions to improve post-operative outcomes in frail surgical patients. We conducted a systematic review of studies testing interventions in frail surgical patients in order to improve outcomes, as outlined by the Institute for Healthcare Improvement's Triple Aim framework (health, cost, and experience).

Methods: The need for ethical approval was waived. A protocol was registered *a priori* (2016:CRD42016039909). We searched the Cochrane, Medline, PubMed, CINAHL, and EMBASE databases using a search strategy. The grey literature was also evaluated. Studies testing interventions specifically in frail surgical patients, or studies in which frailty-specific subgroup analysis was possible, were included. Studies that defined the frailty criteria were included, but studies were not limited to specific frailty definitions. Study screenings, full text reviews, data extraction and risk of bias assessments were done in duplicate using piloted forms in DistillerSR. Qualitative synthesis was performed, per our protocol.

Results: Our initial screening identified 2593 titles and abstracts for review, of which 11 were included for final analysis (6 RCTs, 5 non-RCTs). Surgery populations included general surgery, cardiac, orthopedic and mixed. Interventions were applied during the perioperative (1), preoperative (3) and postoperative (7) periods, and included exercise, multicomponent geriatric-specific interventions, and blood transfusion triggers. Exercise therapy was consistently associated with improved outcomes (Figure 1). Geriatric-specific protocols suffered from difficulties in implementation and poor adherence. Liberal blood transfusion triggers had no impact on mortality or other outcomes (Figure 1). Substantial heterogeneity was noted across studies in terms of frailty instruments used and the types of outcomes reported. Risk of bias was moderate to high in all studies.

Discussion: Despite the clear emergence of frailty as an important perioperative risk factor, few studies evaluating interventions specific to frail surgical patients were identified. Development and evaluation of frailty-specific interventions in low risk of bias trials is urgently needed. Such trials should consider perioperative exercise therapy interventions, and should follow best practice guidelines for the development and evaluation of complex interventions.

References:

1. Ann Surg 2003 238: 170-177
2. J Am Coll Surg 2006 203: 865-877
3. Can J Anesth 2014 62: 143-157
4. J Am Coll Surg 2010 210: 901-908
5. Bone Jt J 2016 98: 799-805

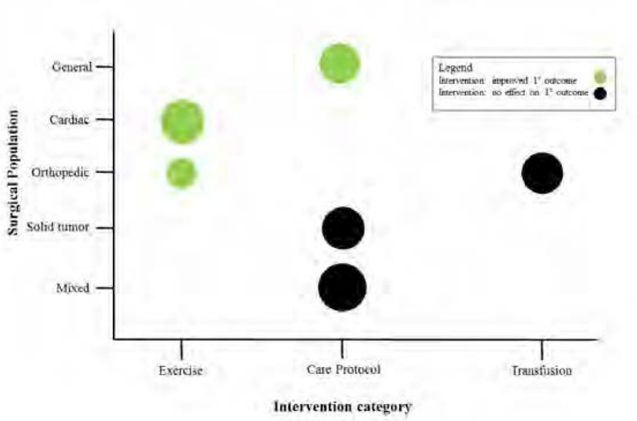

Figure 1: Summary of outcomes by intervention type and surgical population. The size of each circle is proportional to the number of participants per group.

283131 - TRENDS AND OUTCOMES OF SEVERE SEPSIS IN WOMEN OF CHILDBEARING AGE ACCORDING TO PREGNANCY STATUS IN THE U.S 1998-2013

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Introduction

Sepsis is a leading cause of maternal death worldwide[1]. Although the incidence of pregnancy associated severe sepsis (PASS) is rising, case fatality appears reduced compared to their non-pregnant counterparts[2,3,4]. It is hypothesized that this difference is due to pregnant patients being younger and healthier[5]. There exists a paucity of data comparing case fatality and other serious complications of PASS to non-pregnant severe sepsis (NPSS). The only study to date did not adjust for age and excluded patients with comorbidities, limiting the ability to determine the effect of age or chronic illness on outcome[6]. Furthermore, while case fatality of the general population with severe sepsis is decreasing, the trend remains unknown in PASS. Our study aimed to directly compare case fatality, trends in case fatality and risks of adverse outcomes of PASS with NPSS using similar inclusion criteria, controlling for age and chronic comorbidities.

Methods:

This study was exempt from review by the Hospital Research Ethic Board as it utilized de-identified, publically available data. We conducted a retrospective cohort study of all severe sepsis related hospitalizations during 2008-2013 for females of childbearing age (15-44 years old) in the National Inpatient Sample, a 20% sample of inpatient admissions in the United States. Severe sepsis, pregnancy and chronic comorbidities were identified using International Classification of Diseases, Ninth Revision, Clinical Modification codes. Pregnancy associated hospitalizations included antepartum and delivery admissions. Outcomes included case fatality, length of stay (LOS) until death, hospital LOS and number of organ failures. Multivariable Poisson regression was used to estimate rate ratios (RR) for adverse outcomes in PASS compared with NPSS, both crude and sequentially adjusted for socio-economic status (SES), race, age, and comorbidities.

Results:

We identified 6285 PASS and 96,196 NPSS hospitalizations during the study period. The incidence of PASS and NPSS increased over time while there was reduction in case fatality. Case fatality of PASS (9.3%) was lower than NPSS (16%). The RR for case fatality adjusted for SES and race was 0.58 [95% CI, 0.53-0.63], while sequential adjustments for age and chronic comorbidities attenuated, but did not eliminate the association (RR 0.64 [95% CI, 0.59-0.70] and 0.69 [95% CI, 0.63-0.75], respectively). After adjusting for SES, age and comorbidities, PASS had a non-significant but shorter hospital LOS (-0.22 days; 95% CI, -0.64-0.24 days) a longer LOS until death (3 days; 95% CI, 1.72-4.32 days) with fewer organ failures (RR 0.95; CI 95%, 0.93-0.97).

Conclusion:

Age and chronic comorbidities alone do not account for lower case fatality seen in PASS compared with NPSS. The trend of increasing incidence of severe sepsis and decreasing case fatality over time was similar in PASS and NPSS. A less severe presentation of sepsis or protective effect of pregnancy may account for the difference observed in PASS with fewer organ failures, shorter hospital LOS, and longer LOS until death.

References:

1. BJOG 2011 118:1-203
2. Anesth Analg 2013 117: 944-950
3. PLoS One 2013 8: 1-8
4. Crit Care Med 2012 40: 754-761
5. Obstet Gynecol 2012 120: 689-706
6. Med Sci Monit 2016 22: 1976-1986

Table 1. Outcomes of severe sepsis according to pregnancy status in hospitalizations to women aged 15-45 with severe sepsis and septic shock in the Nationwide Inpatient Sample, 1998-2013.

Adverse Outcome	Pregnancy status		Estimated rate ratio [95% CI][a]			
	Non-pregnant (n=96,098) n (%) or median [IQR]	Pregnant (n=6,282) n (%) or median [IQR]	Crude	Adjusted for SES[b] and race	Adjusted for SES, race, and age	Adjusted for SES, race, age, and chronic comorbidities
Death	15,369 (15.99)	587 (9.34)	0.58 [0.54, 0.63]	0.58 [0.53, 0.63]	0.64 [0.59, 0.70]	0.69 [0.63, 0.75]
Length of stay prior to death (days)	8 [2, 19]	11 [4, 24]	3 [1.91, 4.09]	3 [1.63, 4.37]	2.69 [1.34, 4.03]	3.02 [1.72, 4.32]
Hospital length of stay (days)[c]	11 [5, 31]	10 [5, 22]	-1 [-1.60, -0.40]	-1 [-1.38, -0.62]	-0.54 [-0.98,-0.09]	-0.22 [-0.68, 0.24]
Number of organ failures	1 [1,2]	1 [1,2]	0.93 [0.92, 0.95]	0.94 [0.92, 0.95]	0.95 [0.94, 0.97]	0.95 [0.93, 0.97]
Mechanical ventilation >96 hours	18,932 (19.68)	1,213 (19.30)	0.98 [0.93, 1.04]	0.99 [0.93, 1.05]	1.02 [0.96, 1.08]	0.99 [0.93, 1.05]
Hemodialysis	19,332 (20.10)	47 (13.48)	0.67 [0.63, 0.72]	0.64 [0.60, 0.69]	0.68 [0.63, 0.72]	0.87 [0.81, 0.94]

SES= socioeconomic status,
[a]Median difference in days [95% CI] for length of stay prior to death and length of stay
[b]SES denotes primary payer and zipcode income quintile
[c]LOS of deaths replaced with maximum length of stay observed

284220 - COMPARING TWO FRAILTY TOOLS TO PREDICT DISABILITY AFTER ELECTIVE NONCARDIAC SURGERY: A MULTICENTRE COHORT STUDY

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Background
Frailty, an aggregate expression of susceptibility to adverse health outcomes due to age-, and disease-related deficits,[1] has emerged as a key risk factor in older surgery patents. In people ≥65 years old, 25-40% of adverse events after surgery are attributable to frailty.[2] Guidelines recommend that patients ≥65 be evaluated for frailty before surgery; however, no studies have compared different clinical frailty tools in the preoperative setting. Furthermore, studies evaluating the impact of frailty on patient-reported outcomes are lacking. We performed a multicenter cohort study to compare the predictive accuracy of two leading frailty tools in identifying older patients who have self-reported disability after elective surgery.

Methods
Ethical approval was obtained for this prospective observational study; a protocol was published. People 65+ years having elective inpatient noncardiac surgery were recruited. Frailty status was measured before surgery using the Clinical Frailty Scale (CFS)[3] and the Modified Fried Index (mFI).[1] The primary outcome was new disability at 90 days after surgery using the validated WHODAS 2.0 tool.[4] Our primary analysis compared the relative true positive rate (rTPR) and relative false positive rate (rTPR)[5] between frailty tools (CFS≥4/9, mFI ≥3/5). We also measured the association between frailty and disability using logistic regression.

Results
509 of 680 participants have been recruited. 90-day outcomes are complete for 95% of participants. New disabilities were present in 11.2 % of participants. Preliminary findings demonstrate that the CFS was 77% sensitive and 54% specific for new disability; the mFI 13% and 84% respectively. The rTPR and rFPR (CFS vs. mFI) were 5.92 and 2.9. When tested as linear terms, each unit increase on the CFS was associated with a 1.71 times increase in the odds of new disability (95%CI 1.26-2.32); each increase in the mFI increased the odds 1.64-fold (95%CI 1.18-2.29). The area under the receiver-operator curve was 0.70 for the CFS and 0.69 for the mFI.

Conclusion
Preliminary results suggest that the CFS was more sensitive at identifying patients who experience a new disability after surgery, while the mFI was more specific. The incremental risk associated with increasing frailty on each scale was similar, as was the discriminatory performance of both scales. Based on these results, we recommend that choice of a frailty instrument be guided by the purpose for screening. Where a sensitive approach is needed, the CFS appears to be superior. When specificity is required, the mFI appears to be superior. Efforts to assess the feasibility and acceptability of each instrument are needed, as are evaluation of optimal cut-points in the perioperative setting.

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285153 - ABILITY OF INFLAMMATORY BIOMARKERS TO PREDICT COMPLICATIONS IN HIGH-RISK PATIENTS UNDERGOING NON-CARDIAC SURGERY

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Introduction

Patients with co-morbidities undergoing high-risk non-cardiac surgery are known to be at increased risk of postoperative complications[1]. Ideally, if we could better identify those patients who are at highest risk, we could potentially intervene in the early postoperative period to prevent or mitigate damage from these complications. Despite a large body of literature looking at inflammatory biomarkers and outcomes in specific cardiac surgery populations[2], there is a distinct lack of data on their utility in the high-risk, non-cardiac surgical population. The objective of this study was to determine if inflammatory biomarkers have the ability to predict postoperative complications in high-risk patients undergoing high-risk non-cardiac surgery.

Methods

This prospective observational study obtained local ethics approval. One-hundred fifty-three patients were enrolled. High-risk patients were defined as age >60 with at least one medical comorbidity. High-risk non-cardiac surgery included abdominal aortic aneurysm repair, major hepatic resection, colonic resection, pancreatoduodenectomy, nephrectomy, pulmonary resection and esophagectomy. Blood samples were drawn preoperatively and 24 hours postoperatively to be analyzed for inflammatory cytokine levels. Cytokines measured included the acute-phase proteins CRP, ST2, and pentraxin-3 (PTX-3), the pro-inflammatory biomarkers macrophage chemotactic protein-1 (MCP-1), tumor necrosis factor alpha (TNF-alpha), interleukin 6 (IL-6), and interleukin 8 (IL-8), and the anti-inflammatory biomarkers interleukin 10 (IL-10), interleukin 1Ra (IL-1Ra), and tumor necrosis receptor type-II (sTNF-RII), Chart review was performed at 30 days postoperatively to assess for a composite outcome of arrhythmia, myocardial injury/infarction, congestive heart failure, sepsis or septic shock, acute kidney injury, pneumonia, respiratory failure requiring mechanical ventilation, stroke/TIA, and death. Receiver operating characteristic curves were constructed to determine which biomarker had the best predictive ability of the composite outcome.

Results

One hundred thirty-one patients completed the study. Post-operative levels of all biomarkers except TNF-α and TNF-RII were significantly higher than their pre-operative levels. The post-operative rise in ST2 and IL-8 was statistically significantly higher in patients who suffered complications than those who did not. There was no significant increase in any of the anti-inflammatory biomarkers in patients who suffered complications. The area under the receiver operating characteristic curve for ST-2 and IL-8 was 0.67 (95% CI 0.57-0.77, $p < 0.01$) and 0.65 (95% CI 0.53-0.77, $p=0.02$), respectively.

Discussion

Our study has shown that the biomarkers measured, except TNF-alpha and TNF-RII, play a useful role in that they produce a robust response to surgery. The novel findings of our study are that postoperative levels of ST2 and IL-8 have moderate discriminatory ability to predict complications in high-risk patients undergoing high-risk surgery. A more robust and concomitant protective anti-inflammatory response does not occur in those who develop complications and suggests dysregulated immune response to surgery.

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285850 - POTENTIAL FOR TISSUE DONATION AFTER A SUDDEN CARDIAC ARREST: A SINGLE CENTRE STUDY.

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Background: The demand of tissue for transplantation requires continuous efforts in detecting potential deceased donors. Cardiovascular disease is the leading cause of death in Canadaand may therefore constitute a population of interest for tissue donation.

Objective. We aimed to assess the capacity to optimize tissue donation rate in a population of patients who died of a sudden cardiac arrest.

Method: After ethics comity approval, files of deceased patient in the CIUSSS de l'Estrie-CHUS in 2015 were reviewed. Patient over 36 weeks and who died from an unexpected sustained a cardiac arrest without return to sponteanous circulation were illegible. Exclusion criteria were i) age above 85, ii) unwitnessed arrest and iii) perioperative arrest. Data were collected from the medical file and the prehospital report. For each selected patient, demographics, past medical history, presence of contraindication to tissue donation. These data were compile by 4 evaluators in a table validated by an expert. The first ten charts were collected in parallel to assess the interrater reliability. The primary outcome was to determine the number of tissue donor. The primary outcome is descriptive. Accordingly, we reported continuous data with means (standard deviation) or medians (interquartile) and dichotomic data with proportions.

Results: Of 139 patients, 16 (11,5%) successfully donated their tissues. The mean age was 67,9 (± 15,4) years old, 88 were men (63,3%), 63 (45,3%) died in the emergency department and 43 (30,9%) had at least one of Transplant Québec's exclusion criteria for human tissue donation. Of the 96 patients without exclusion criteria, 69 (71,9%) families were approached to discuss tissue donation and 36 (52,2%) refused. This means that 71,9% of eligible patient have been approached. 58% of the approached family were in the emergency which resulted in 11 of the 16 (68,8%) donations.

Conclusion: Patient who had a sudden cardiocirculatory death is an underutilized population for tissue donation. In our center most donations occurred in the emergency department. A pro active detection system and education initiative on tissue donation in critical care area is needed.

References:
N/A

286216 - INCIDENCE RATES AND DEMOGRAPHIC DISPARITIES OF DELIRIUM AFTER SURGERY WITH GENERAL ANAESTHESIA

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Introduction: Reported incident rates of post-operative delirium (POD) have varied depending on the surgical procedure evaluated and inclusion and exclusion criteria used. Few Canadian studies have estimated incidence rates in a mixed elective surgery group. Extant research, primarily from the United States, suggests that approximately 25% of older adults experience POD following a surgical procedure with general anesthesia (1, 2). We aimed to examine the incidence rates of POD in two large tertiary care hospitals in a major Canadian centre and explore whether demographic disparities exist in those with POD compared to those without POD.

Methods: This pragmatic trial received local research ethics board approval. We enrolled 154 patients at two tertiary hospitals. Patients were ≥60 years, having major elective surgery under general anesthesia, and an anticipated minimum 2-day hospital stay. Exclusion were: neurosurgical procedures, pre-operative delirium, a history of intraoperative awareness, and those undergoing a 2nd surgery within 5 days. Demographic data were collected at the Pre-Anesthesia Clinic in the 1-2 weeks prior to surgery. POD was assessed by trained research personnel on post-operative days 0 through 5, using the Confusion Assessment Method-Severity scale (CAM-S) and/or the CAM-ICU as per chart review. POD was defined as the presence of either acute onset of change or symptom fluctuation in mental status, inattention, and either disorganized thinking or altered level of consciousness using CAM-S. If POD assessment was missed, chart review identified those indicated as CAM positive.

Results: A total of 16 patients were excluded due to cancelled surgeries or if the patient withdrew from the study. Sixty patients (39%) were from hospital 1 and 94 (61%) were from hospital 2. The total incidence rate of POD was 11.6%. Of those with POD, 8.8% were male and 19.4% were female; 9.5% were married/common law compared to 18.2% who were divorced, widowed or single; and 14.1% had less than high school or a high school education compared to 8.8% who had college or higher. Although findings were non-significant, differences trended towards significance. With respect to age, there was no significant difference between those with POD (mean age = 71.6, standard deviation (SD) = 9.1) compared to those without POD (mean age = 69.0, SD = 6.0).

Discussion: Estimated incidence rates of POD are lower than what would be anticipated based on existing literature. Being female, not married or common law, and less education may be risk factors for POD. Results are discussed with respect to the cognitive reserve hypothesis (3), and cross-border differences (4), which may contribute to discrepancies in incidence rates.

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EDUCATION AND SIMULATION
Sunday, June 25
08:30 - 10:15

Track: Education

257450 - COMPETENCY IN ANESTHESIA: A MULTIDIMENSIONAL CONCEPT
Presenting Author: Natalie Lidster
Co-Author(s): Natalie Lidster, Saroo Sharda (nee Sharma)

275287 - AN ANALYSIS OF NEEDLE NAVIGATION UNDER REAL-TIME ULTRASOUND GUIDANCE FOR CENTRAL LINE INSERTION: A PHANTOM STUDY
Presenting Author: Golafsoun Ameri, Robarts Research Institute, Western University, London, Ontario
Co-Author(s): Daniel Bainbridge, Terry Peters, Elvis Chen

277667 - UPDATES IN ANESTHETIC MANAGEMENT FOR HIPEC PROCEDURES
Presenting Author: Hossam WISSA NAKHLA. Beshara, TAWAM (JOHN'S HOPKINS) HOSPITAL, AL AIN, UAE, Al Ain, Abu Dhabi, United Arab Emirates

280128 - DESIGNING A POINT OF CARE ULTRASOUND (POCUS) CURRICULUM FOR COMPETENCY BY DESIGN ANESTHESIOLOGY RESIDENCY PROGRAMS
Presenting Author: T Jared. McCormick, University of Ottawa, Ottawa, Ontario
Co-Author(s): Asad Mir Ghassemi, Ashraf Fayad, Hasham Talab, Robert Chen, Meghan McConnell, Daniel Dubois

285433 - RESEARCH PRODUCTIVITY AND RANKINGS OF ANESTHESIOLOGY DEPARTMENTS IN CANADA AND THE US
Presenting Author: Benjamin Walker, Ottawa Hospital Research Institute, Ottawa, Ontario
Co-Author(s): Alexandra Bunting, Sepand Alavifard, Donald Miller, Tim Ramsay, Sylvain Boet

286071 - EXPLORING ANESTHESIOLOGISTS' UNDERSTANDING OF SITUATIONAL AWARENESS
Presenting Author: Julia Haber, Foothills Medical Centre, Calgary, Alberta, Calgary, Alberta
Co-Author(s): Rachel Ellaway, Rosaleen Chun, Jocelyn Lockyer

286507 - BARRIERS TO AND OPPORTUNITIES FOR RECYCLING, REDUCING AND REUSING IN CANADIAN ACADEMIC ANESTHESIA DEPARTMENTS
Presenting Author: Maria-Alexandra Petre, University of Toronto, Hamilton, Ontario
Co-Author(s): Adriaan van Rensburg, Lisa Bahrey, Mark Crawford, Mark Levine, Clyde Matava

286534 - VIRTUAL REALITY FOR TEACHING COGNITIVE MASTERY IN AIRWAY TRAUMA MANAGEMENT - WORK IN PROGRESS
Presenting Author: Fahad Alam, Sunnybrook Health Sciences Centre, York, Ontario
Co-Author(s): Clyde Matava

257450 - COMPETENCY IN ANESTHESIA: A MULTIDIMENSIONAL CONCEPT

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Introduction: As anesthesia residency programs in Canada move towards a competency by design (CBD) framework, it is important that competence be defined in a meaningful way. To our knowledge, no studies have explored an interprofessional perspective of what it means to be a competent anesthesiologist, nor have studies described patient views on competency in anesthesia. Without this more holistic concept of competence, it is challenging to assess residents' progression to competent anesthesiologist. Interprofessional perspectives are particularly pertinent as previous research has shown that interprofessional perceptions of the anesthesiologist's role can differ from anesthesiologists' own perceptions.[1]
The objectives of this study are:
1. To determine the perspective of anesthesiologists, surgeons, patients, operating room, PACU and obstetric nurses on what determines competency in anesthesia.
2. To move towards a more cohesive, well-rounded concept of competency in anesthesia.
3. To describe how this concept may be able to be applied to design of CBD curricula in anesthesia.

Methods: Local Ethics Committee approval and participants' informed consent were obtained. A purposeful sample of 30 clinicians was recruited to ensure adequate representation from all professions. A convenience sample of 10 patients from the outpatient preoperative clinic was obtained. Data were collected via one-on-one, semi-structured interviews with anesthesiologists, surgeons, nurses and patients, and analyzed via inductive thematic analysis. Respondent validation and researcher triangulation were employed to enhance rigour.

Results: Analysis is currently ongoing. Interim analysis reveals a number of key themes:
A *lack of role understanding*, specifically the complexity of the anesthesia process and the perception by non-anesthesiologists of anesthesia as a 'technical' activity. This is in keeping with previous research.[1]

A belief that *overall competence is comprised of individual parts*; some are more easily taught than others but all residents should be considered competent in all facets by the end of training

The expression of competence as a *threshold to be surpassed* and that actual practice expectations exceed a minimal level of competence

An *expectation of strong interpersonal skills and clear communication* for competent anesthesiologists.

A *large variation in the definition of competence* as it relates to anesthesia among health care professionals and patients.

Discussion: While there are similarities in interprofessional perceptions of what makes a competent anesthesiologist, our study highlights that there are also important differences. Current competency based curricula may not be taking into account views from non-anesthesia professionals and patients, possibly overlooking a number of important facets. It is our belief that a cohesive, synthesized and nuanced definition of anesthetic competence, which considers the perceptions of all important stakeholders is required. The results of this study are important in informing such a definition and ultimately the design of effective and meaningful competency-based curricula.

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275287 - AN ANALYSIS OF NEEDLE NAVIGATION UNDER REAL-TIME ULTRASOUND GUIDANCE FOR CENTRAL LINE INSERTION: A PHANTOM STUDY

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BACKGROUND: Despite the improved procedure outcomes with ultrasound (US) guidance for needle placement in the internal jugular vein (IJV), mechanical complications, such as carotid artery (CA) puncture, still occur [1,2]. One of the main contributing factors associated with adverse events is the uncertainties surrounding the exact location of the needle tip with respect to the image plane [3]. However, due to the lack of a quantitative measure, the extent to which needle tip localization error occurs is unknown. The objective of this study was to quantify the distance between the needle tip and US image in a phantom study to better understand how effectively US-guidance is employed. This was achieved by integrating magnetic tracking technology into the US-guidance system.

METHODS: Twenty four experienced physicians placed a needle in a phantom IJV under US-guidance. Magnetic tracking was employed to localize the needle tip and US image plane during the experiment. The recorded information was used to calculate the procedure time, distance between the needle tip and US image, and needle path length. Using the tracking information each procedure was replayed in a virtual environment, from which the success of the procedure was determined an independent observer. Local Ethics Committee approval was obtained for this study.

RESULTS: We observed large operator variability in the use of US-guidance. While most participants preferred the short-axis approach, 21% employed the long-axis technique using the transverse or longitudinal view. The phantom CA was punctured in eight procedures and the needle was not placed inside the phantom IJV in five procedures, three in conjunction with CA puncture. The results strongly suggest that in the unsuccessful procedures, compared to successful cases, the procedure time was longer (p = 0.05) and needle path length was greater (p = 0.07). The average distance between the needle tip and image in the successful and unsuccessful procedures was 14.5 mm and 16.1 mm (p = 0.79), respectively.

DISCUSSION: The relatively large needle-tip to image plane distance indicated that US-guidance was not effectively used, even in the hands of experienced operators. Simply performing a large number of procedures does not help develop the cognitive and associated skills that lead to superior performance. Additionally, due to the lack of standardized training, it was not clear whether all participants had acquired adequate training for needle navigation in US. Employing qualitative skill assessment techniques, such as the one proposed here, may help better identify skills requiring improvement, facilitate establishing standardized US-guidance training programs, and promote best clinical practice.

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277667 - UPDATES IN ANESTHETIC MANAGEMENT FOR HIPEC PROCEDURES

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This study was a retrospective analysis of data to compare two groups of patients who undergone HIPEC procedures.
The aim was to show whether our current implemented anaesthesia protocol is linked to a better patients' outcome in terms of ICU length of stay or not.

After getting an approval from the ethical committee at the research centre in our institute, we started the process of data collection from our hospital intranet database.
Conventional monitoring techniques using central venous pressure, arterial blood pressure ,oesophageal and rectal temperature probes, 5 leads ECG, pulse oximetry ,BIS monitoring and neuromuscular monitoring were used in all cases.

First group (50 patients where the procedure was performed between years 2011-2012).
These patients were managed at a standard anaesthesia protocol with liberal fluid management technique, normal guidelines for transfusion and standard pain management in the form of thoracic epidural analgesia plus multimodal pain medications.
compared to the current practice group (50 patients) treated with Goal-directed therapy in terms of fluid management using stroke volume variation response protocol (besides the conventional monitors, trans pulmonary thermo dilution monitor was used routinely in all current cases), targeted systolic blood pressure not less than 20% of the preoperative values and targeted Haemoglobin not less than 10G/dL.
64% of patients have been extubated on table after the procedure (with extravascular lung water index less than 10 ml/Kg).
We used pre-emptive fresh frozen plasma transfusion (4 units in average) before bleeding commencement and once the decision to proceed for HIPEC gets confirmed by the surgeon to decrease the coagulopathy risk.

Results:

Length of stay was markedly reduced from 5.1 days in the first group to 1.7 days in the second.

Discussion:

The findings showed that goal-directed anaesthetic management for HIPEC surgeries could be superior in reducing length of ICU stay and hence speed up recovery of this group of patients.

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280128 - DESIGNING A POINT OF CARE ULTRASOUND (POCUS) CURRICULUM FOR COMPETENCY BY DESIGN ANESTHESIOLOGY RESIDENCY PROGRAMS

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Background/Purpose:
With the accepted use of ultrasound in anesthesia and the shift in Canadian residency training programs towards a Competence by Design (CBD) there is a need to develop a syllabus for anesthesia residents(1). The Royal College Sub-specialty committee for Anesthesiology has proposed a new entrustable professional activity (EPA) for "Using ultrasound to assist in diagnosis and management of hemodynamically unstable or critically ill patients". Currently, there is no national curriculum or standard objectives that identify the knowledge/skills required for an anesthesiology trainee to demonstrate competence in point of care ultrasound (POCUS). We have attempted to address this need by designing a POCUS curriculum to be available for Anesthesiology CBD training programs.

Methods:
A literature review was undertaken to review what other POCUS curriculums were currently available for anesthesiology postgraduate trainees. Data was obtained from publicly accessible documents and therefore exempt from REB approval under TCPS2 Article 2.2. We used existing curriculums, studies and tools to construct a framework and then drafted our milestones to demonstrate competencies required to achieve the POCUS EPA. These milestones were reviewed and refined by a core group of expert faculty in cardiac ultrasound, medical education and curriculum design. A peer review process was used to ensure the learning activities, exposure, milestones, and assessments were feasible and reliable. Through eight iterations, a consensus was reached regarding a curriculum blueprint for a longitudinal curriculum(2) in POCUS that covers both the foundations and core stage of training. (Table 1)

Results:
The foundational stage of training includes a Foundations of Ultrasound course, which introduces the fundamentals of ultrasound physics, machine/probe orientation, anatomy and introduces basic views. This course is composed of 4 modules which include independent reading, online modules(3) , MCQ quizzes(4), and hands on training(5) in a simulation centre using various US machines and simulators(6). The Core stage of POCUS training has been interwoven into selected high risk rotations (ie Vascular, Cardiac Anesthesia, ICU), whereby residents have the opportunity to work with trained experts and use different POCUS modalities to manage hemodynamically unstable patients. Direct observation by trained assessors using a standardized evaluation and feedback form will be utilized to guide proficiency. All recorded scans and assessments will be maintained in a logbook portfolio curated by the resident.

Conclusion: While the shift in residency training to a CBD paradigm presents certain challenges, we see this as an opportunity to incorporate a novel POCUS curriculum into anesthesiology postgraduate medical training. To our knowledge this is the first CBD POCUS curriculum of its' kind and will best prepare future anesthesiologists to use the latest technologies to manage increasingly complex patients inside and outside of the operating room.

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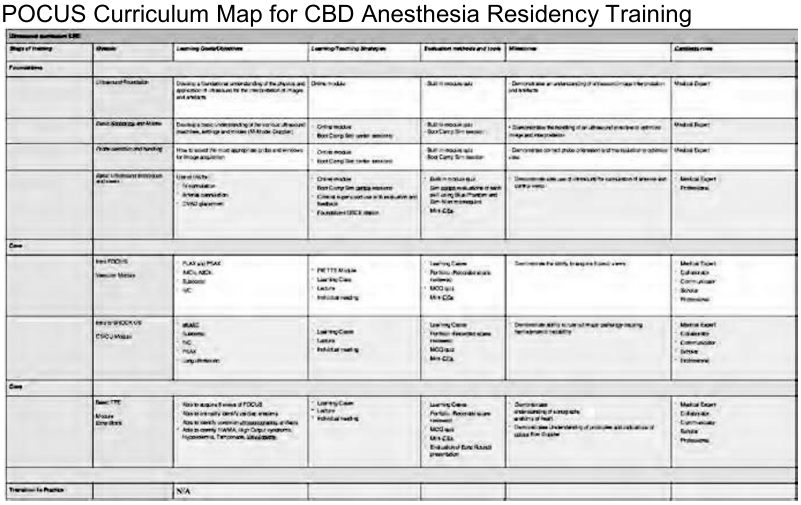
POCUS Curriculum Map for CBD Anesthesia Residency Training



Stage of training	Module	Learning Goals/Objectives	Learning/Teaching Strategies	Evaluation methods and tools	Milestone	Competencies
Foundations						
	Ultrasound Foundation	Develop a foundational understanding of the physics and application of ultrasound for the interpretation of images and artefacts	Online module	Built in module quiz	Demonstrate an understanding of ultrasound image interpretation and artefacts	Medical Expert
	Basic Scanning and Modes	Develop a basic understanding of the various ultrasound machines, settings and modes (M-Mode Doppler)	Online module Boot Camp Skill (under assessing)	Built in module quiz Boot Camp Skill session	Demonstrates the handling of an ultrasound machine to optimize image and interpretation	Medical Expert
	Probe selection and handling	How to select the most appropriate probe and windows for image acquisition	Online module Boot Camp Skill (under assessing)	Built in module quiz Boot Camp Skill session	Demonstrates correct probe orientation and manipulation to optimize view	Medical Expert
	Basic Ultrasound Interpretation and Artefacts	Local Skills: - Visualization - Arterial cannulation - CVAD placement	Online module Boot Camp Skill (simple sessions) Clinical supervised use in ICU (evaluation and feedback) Foundation OSCE station	Built in module quiz Skill (simple) evaluation of each skill using Skill Checklist and Skill Work Assessment Mini CEx	Demonstrate safe use of ultrasound for completion of arterial and CVP lines	Medical Expert Professional
Core						
	Intro POCUS Vascular Module	FUSI and PSAX MDL/MDA Subcostal IVC	PIETTE Module Learning Cases Lecture Individual reading	Learning Cases Portfolio (Recorded scans reviewed) MCQ quiz Mini CEx	Demonstrates the ability to acquire 5 basic views	Medical Expert Collaborator Communicator Scholar Professional
	Intro to POCUS VS CSCI Module	eFAST Lateral IVC PSAX Lung (if relevant)	Learning Cases Lecture Individual reading	Learning Cases Portfolio (Recorded scans reviewed) MCQ quiz Mini CEx	Demonstrate ability to use of music pathology requiring hemodynamic instability	Medical Expert Collaborator Communicator Scholar Professional
Core						
	Basic TTE Module (One Block)	How to acquire 5 views of FOCUS How to visually identify cardiac anatomy How to identify common ultrasonographic artifacts Able to identify RWMA, High Output syndrome, Hypovolemia, Tamponade, Ultrasonography	Learning Cases Lecture Individual reading	Learning Cases Portfolio (Recorded scans reviewed) MCQ quiz Mini CEx Evaluation of Echo Based presentation	Demonstrates understanding of sonographic anatomy of heart Demonstrates Understanding of procedure and indications of using Echo Doppler	Medical Expert Collaborator Communicator Scholar Professional
Transition to Practice		N/A				

285433 - RESEARCH PRODUCTIVITY AND RANKINGS OF ANESTHESIOLOGY DEPARTMENTS IN CANADA AND THE US

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Introduction: Our objective was to evaluate the relative research productivity and ranking of anesthesiology departments in Canada and the United States, using the Hirsch index (h-index) and four other previously validated metrics.

Methods: Information from the Royal College of Physicians and Surgeons of Canada (RCPSC) and the Accreditation Council for Graduate Medical Education (ACGME) was used to identify all anesthesiology departments in Canada and the United States with an accredited residency program. Publications for each of the 150 departments were identified using Thomson's ISI Web of Science®, and the citation report for each department was exported. The bibliometric data was used to calculate publication metrics for three time periods: cumulative (1945-2014), ten year (2005-2014), and five year (2010-2014). The following descriptive group metrics: h-index, m-index, total number of publications, sum of citations, and average number of citations per paper - were then used to determine the publication impact and relative ranking of all 150 departments. Metric values and their dispersions were calculated for all 150 departments, as well as their rank based on each metric and for the three time frames (5 year, 10 year, cumulative). Ranking for each metric were also stratified by departmental size by using the number of residency spots as a proxy for size, and classifying each as small, medium or large. Most common journals in which US and Canadian anesthesiology departments publish their work were identified.

Results: The majority (23 of the top 25) of top ranking anesthesiology departments are in the US, and two of the top 25 departments (University of Toronto; McGill University) are in Canada. There was a strong positive relationship between each of h-index, total number of publications, and the sum of citations (0.91 to 0.97 $p < 0.0001$). Departmental size seems to influence academic productivity on most metrics. The most frequent journals in which US and Canadian anesthesiology departments publish are Anesthesiology, Anesthesia and Analgesia, and the *Canadian Journal of Anesthesia.*

Discussion: Our study ranked the Canadian and US anesthesiology departmental research productivity using the h-index, total number of publications, total number of citations and average number of citations. Although these metrics lead individually to similar rankings among departments, assessing several metrics may be more informative than a single metric alone. In particular, rankings based on average number of citations had the lowest correlation to other metrics.

References:

N/A

Table 2: The three h-indices with respective ranking for the top 25 departments as determined by h(c)

Table 2: The three h-indices with respective ranking for the top 25 departments as determined by h(c)

Program	City	h(c)	Rank h(c)	h(10)	Rank h(10)	h(5)	Rank h(5)
Massachusetts General Hospital Program	Boston	148	1	76	2	32	5
University of California (San Francisco) Program	San Francisco	148	1	70	4	41	2
Brigham and Women's Hospital Program	Boston	143	3	95	1	49	1
University of Washington Program	Seattle	126	4	67	5	26	14
Johns Hopkins University Program	Baltimore	125	5	75	3	38	3
University of Alabama Medical Center Program	Birmingham	123	6	40	26	18	34
Washington University/B-JH/SLCH Consortium Program	St Louis	118	7	56	7	33	4
Duke University Hospital Program	Durham	117	8	55	8	27	11
University of Toronto	Toronto	114	9	66	6	32	5
UPMC Medical Education Program	Pittsburgh	112	10	47	13	27	11
Stanford University Program	Stanford	111	11	47	13	27	11
Mayo Clinic College of Medicine (Rochester) Program	Rochester	110	12	53	9	28	8
University of California (San Diego) Program	San Diego	108	13	47	13	26	14
UCLA Medical Center Program	Los Angeles	105	14	46	17	21	27
Yale-New Haven Medical Center Program	New Haven	92	15	36	33	20	30
University of Iowa Hospitals and Clinics Program	Iowa City	85	16	35	34	17	36
University of Pennsylvania Program	Philadelphia	84	17	48	12	28	8
University of Chicago Program	Chicago	83	18	44	19	23	21
University of Texas Medical Branch Hospitals Program	Galveston	82	19	42	22	20	30
University of Virginia Program	Charlottesville	82	19	41	23	21	27
Medical College of Wisconsin Affiliated Hospitals Program	Milwaukee	80	21	41	23	21	27
McGaw Medical Center of Northwestern University Program	Chicago	80	21	40	26	24	20
McGill University	Montreal	77	23	41	23	23	21
Vanderbilt University Program	Nashville	76	24	47	13	26	14
Wake Forest University School of Medicine Program	Winston-Salem	74	25	33	37	14	43
University of Texas Southwestern Medical School Program	Dallas	74	25	29	41	9	72

286071 - EXPLORING ANESTHESIOLOGISTS' UNDERSTANDING OF SITUATIONAL AWARENESS

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Introduction: Situational awareness (SA), or "knowing what is going on around you," is an important skill and crisis resource management principle in both aviation and medicine.[1-3] However, little is known about how clinical anesthesiologists practically conceptualize SA.[4] This study was undertaken to explore how anesthesiologists understand SA, and how they think it is learned, taught, and assessed.

Methods: This study received approval from the local REB. This was a qualitative study, using grounded theory methods and a focus on participant perceptions, using semi-structured interviews with anesthesiologists. Anonymized interview data were analyzed using thematic analysis, with line by line coding, memo-ing and constant comparison techniques. Regular group meetings were held to develop and review themes emerging from the data.

Results: Respondents displayed an understanding of SA both in a clinical context and based on their prior life experiences. Despite the agreed-upon importance of SA, formal definitions of SA were not often used, and the topic was not commonly explicitly discussed in the clinical setting or while teaching residents. SA was thought to be learned through increasing independence in the clinical context, reflection on errors, role-modeling, and simulation. Respondents taught SA through modeling and discussion of scanning behaviours, checklists, verbalization of the thought processes, and debriefing of events. Simulation may be useful to teach SA although the inauthenticity of the simulated environment presents a disadvantage. Respondents assessed residents' SA mostly summatively, and made decisions about granting them independence based on these assessments. However, respondents struggled with giving feedback on SA skills.

Conclusion: The lack of a common operational definition can hinder teaching and assessment of SA. Respondents may be reluctant to provide trainees with feedback on SA despite its acknowledged importance. Since the concept of SA is considered critical to the practice of anesthesiology, further faculty development and continuing education is required to formalize the tacit knowledge around SA.

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286507 - BARRIERS TO AND OPPORTUNITIES FOR RECYCLING, REDUCING AND REUSING IN CANADIAN ACADEMIC ANESTHESIA DEPARTMENTS

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Introduction: Anesthesia related waste represents 25% of all operating room waste and is a known major contributor to environmental waste and global warming. The aim of this study is to ascertain 1) the current practice and existence of educational programs, and 2) perceived barriers to recycling of operating room waste and environmental sustainability efforts among Canadian anesthesia residency programs and departmental chiefs.

Methods: With REB approval, all 17 Canadian anesthesiology residency program directors were invited to complete a 12-item online survey to delineate current educational programs for residents on environmental sustainability and identify gaps, barriers and interest in developing a Canada-wide curriculum. Similarly, 113 ACUDA-affiliated anesthesiology site chiefs were invited to complete a 13-item online survey to ascertain current efforts in environmentally sustainable anesthesia practice and to determine the departmental resources available and barriers to expanding efforts in this field.

Results: The response rates for the program directors' and chiefs' surveys were 41% (7/17) and 24% (27/113), respectively. Many site chiefs indicated that their departments participate in sustainability efforts such as donating unused medical equipment to medical missions (65%), appropriate waste stream segregation (62%), recycling (58%), using reusable alternatives for commonly-used anesthesia equipment (58%) and choosing anesthetic gases based on their environmental footprints (58%). Furthermore, many chiefs indicated their departments had plans to introduce or expand efforts in environmental sustainability, particularly in recycling (82%). However, respondents identified inadequate funding (72%), lack of a mandate from hospital leadership (64%) and inadequate knowledge on sustainability topics (60%) as barriers to the implementation of environmentally sustainable practices. The survey of the residency program directors indicated that few Canadian anesthesiology programs include environmental sustainability in their formal curriculum (29%). Most respondents indicated they believed residents would benefit from more teaching on the topic (86%) but identified a lack of faculty expertise (100%), time within the structured curriculum (71%), and institutional support (56%) as major barriers to the implementation of such a curriculum. A majority (71%) also indicated an interest in developing and implementing a cross-Canada collaborative residency curriculum on the topic.

Discussion: Our results demonstrate the current attitudes, gaps and barriers to environmentally sustainable anesthesiology practice. Furthermore, this study identifies potential opportunities to develop educational programs and may inform the development of a cross-Canada collaborative residency curriculum in this field.

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286534 - VIRTUAL REALITY FOR TEACHING COGNITIVE MASTERY IN AIRWAY TRAUMA MANAGEMENT - WORK IN PROGRESS

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Background: Immersive virtual reality(VR) has been defined as a computer-generated world that involves immersion and sensory feedback to user input and interaction. Unlike mannequin based simulations virtual environments can be accessible from anywhere at anytime, require fewer resources and have assessment metrics integrated. Furthermore, aspects of gamification can be incorporated into the design allowing for metrics and feedback loops. These technological advancements have led researchers to consider extending and broadening use of the VR into clinically relevant educational contexts. The potential to immerse learners in contexts with patients, equipment and healthcare professionals that function, behave and communicate like real people in the real world provides limitless opportunity to develop and assess learners efficiently and potentially more effectively than what exists today. However, as an educational modality (unlike gaming or simply experiencing an event for example) many of the learning mechanisms and boundaries for learning and/or assessment require further research. The objective of this study is to assess whether 1) immersive virtual reality crisis scenarios can enhance performance and acquisition of competencies; 2) virtual reality is non-inferior to traditional full size body mannequin for assessment of technical and non-technical competencies.

Methods: Utilizing a rapid prototyping approach, we have designed a novel interactive and immersive full size trauma bay with an adult patient and healthcare professionals that is interactive and immersive. In it, learners have to undertake the cognitive decision making steps in managing a patient with an airway injury and then technically proceed with an awake fibre optic intubation. There is also a feedback and evaluation algorithm incorporated. We have designed virtual anesthesia tools for use with the HTC Vive controls. In this study, after obtaining local ethics approval, approximately 50 anesthesia residents will be recruited to participate and will initially receive a didactic training session on airway trauma. Each participant will then manage two scenarios one in immersive virtual reality and one in traditional full body mannequin simulation; with sequence being randomized. Performance will then be assessed using in-situ airway trauma simulation scenarios 4-6 weeks later using the Ottawa Global Rating Scale for non-technical skills and official validated checklists for anaphylaxis and Acute Trauma Life Support (specifically airway injury) as our outcome measures. Data will be analyzed for between group and modality differences.

Discussion: VR technology is increasing in popularity with a great increase in the level of customizability and immersion being achievable. By demonstrating its effectiveness as an educational strategy and through creation of a platform of immersive VR scenarios, we will set the foundation for creating custom curriculums and assessment frameworks that are cost effective, reproducible and accessible. Results will be presented at the conference.

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OBSTETRIC ANESTHESIA
Sunday, June 25
13:30 - 15:15

Track: Obstetric Anesthesia

276642 - EVALUATING EARLY AMBULATION AFTER CESAREAN DELIVERY: A QUALITY IMPROVEMENT AUDIT USING ACTIVITY TRACKERS

Presenting Author: David B. MacLean, University of Toronto, Toronto, Ontario

Co-Author(s): Julia Ma, Michael Gofeld, Michael Geary, John Laffey, Faraj Abdallah

276843 - A COMPARISON OF THREE REAGENTS IN QUANTIFYING THE EFFECTS OF DALTEPARIN ON THROMBOELASTOMETRY (ROTEM) IN PREGNANCY.

Presenting Author: Lorraine Chow, University of Calgary, Calgary, Alberta

Co-Author(s): Lindsay MacKenzie, Walker Andrew, Carr Adrienne, Adrienne Lee

283232 - RANDOMISED CONTROLLED TRIAL OF UTERINE EXTERIORISATION VERSUS IN SITU REPAIR FOR ELECTIVE CESAREAN DELIVERY

Primary & Presenting Author: Danny Mireault, Université de Montréal - Maisonneuve-Rosemont Hospital, Montreal, Quebec

Co-Author(s): Valerie Zaphiratos, Christian Loubert, Drolet Pierre, Richebé Philippe, Laurent Tordjman

284880 - TREATMENT OF PRURITUS IN PARTURIENTS HAVING CESAREAN DELIVERY WITH INTRATHECAL MORPHINE: A SYSTEMATIC REVIEW

Presenting Author: Yamini Subramani, Department of Anesthesia and Perioperative Medicine, London Health Sciences Centre, Schulich School of Medicine and Dentistry, Western University, London, Ontario, Canada., London, Ontario

Co-Author(s): Mahesh Nagappa, Kamal Kumar, S Indu Singh

285062 - ASSESSMENT OF INTERVENTIONS TO DECREASE SHIVERING IN PATIENTS HAVING ELECTIVE CESAREAN DELIVERY: A QI PROJECT

Presenting Author: Aya Alaaeldin. Elsaharty, London Health Science Centre- University of Western Ontario, London, Ontario

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285266 - THERMOGRAPHIC ASSESSMENT AS AN INDICATOR OF UNILATERAL BLOCK IN PATIENTS WITH LABOUR EPIDURALS: A PILOT STUDY

Presenting Author: Inna Oyberman, Postgraduate Medical Education, Department of Anesthesia, University of Toronto, Toronto, Ontario

Co-Author(s): Aaron Hong, Rachel Martin

285892 - LABOUR EPIDURALS: A MIXED METHOD ANALYSIS OF COMMUNICATION AND THEMES ON #SOCIALMEDIA

Primary & Presenting Author: Patricia A. Doyle, Dalhousie University, Halifax, Nova Scotia

Co-Author(s): Ronald George

287455 - PATTERN OF UTEROTONIC USAGE IN CANADA: A NATIONAL SURVEY OF ACADEMIC OBSTETRIC HOSPITALS

Presenting Author: Barry Thorneloe, Royal Columbian Hospital, University of British Columbia, Port Moody, British Columbia

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276642 - EVALUATING EARLY AMBULATION AFTER CESAREAN DELIVERY: A QUALITY IMPROVEMENT AUDIT USING ACTIVITY TRACKERS

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Introduction: Early ambulation is a modifiable factor associated with improving perioperative outcomes including enhancing pain relief, prevention of deep vein thrombosis, reducing hospital stay, and expediting recovery and return to normal activity.[1] Additional benefits specific to the cesarean delivery (Cx) population include facilitating breastfeeding and newborn care.[2]
An early ambulation post-Cx policy has recently been introduced at our institution. The policy calls for removing the Foley catheter 6-8 hours post-Cx and encouraging patients to ambulate as early as possible. To evaluate implementation, we conducted an audit to assess ambulation during the first 24 hours post-Cx in comparison to patients having spontaneous vaginal delivery (SVD). We hypothesized that the new policy should eliminate ambulation differences between SVD and Cx patients during the first 24 hours post-partum if pain control is adequate.

Methods: Institutional research ethics board approval was sought and obtained. All patients provided written, informed consent prior to enrolment. Mothers having their first or second delivery by either elective Cx under spinal anesthesia or SVD under epidural analgesia were compared. All patients received standard multimodal analgesia. Patients having any significant comorbidities, post-partum complications, or ASA class III or greater were excluded. Activity trackers (Jawbone®, San Francisco, California) with demonstrated validity and reproducibility[3] were fitted around patients' wrists immediately postpartum and were collected 24 hours later to quantify ambulation. A patient-diary captured dynamic pain scores at 2, 6, 12, 18, and 24 hours, cumulative 24-hour analgesic consumption, and quality of recovery (QoR) scores at 12 and 24 hours.

Results: Apart from older age in the Cx group (35.0 *vs.* 30.0 years; $p < 0.01$), characteristics of the sixty patients (n=30 per group) enrolled in this audit were similar. SVD patients walked an average of 442 steps more (56%; $p < 0.01$) than Cx patients during the first 24 hours post-partum. Two-thirds of this difference (299 steps) was attributed to the 12-to-24 hours period. There were no differences between groups in pain scores at any time or in 24-hour cumulative analgesic consumption. The SVD group had superior QoR scores with statistically significant and clinically important differences at 12 and 24 hours (Table).

Discussion: This audit demonstrates the feasibility of using patient-worn activity trackers in the post-partum population. Despite the new policy, and though both groups had similar pain relief, Cx was associated with reduced ambulation compared to SVD. Incomplete adherence to the ambulation policy is the immediate conclusion. However, QoR should correlate closely with pain control;[4] thus QoR differences observed may underscore shortcomings of using pain scores and opioid consumption as the definitive analgesic measures in this population. Analgesic-avoidance and under-reporting post-partum pain[5] may call into question the accuracy of conventional analgesic measures, and suggest the need for a broader look at post-partum care outcomes.

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Table of Results

	Cesarean Delivery (*n*=30)	Spontaneous Vaginal Delivery (*n*=30)	*p*-value
Number of Steps			
0–6 hours	27.1 +/- 41.8	170.0 +/- 192.2	<0.01
6–12 hours	192.8 +/- 178.4	320.0 +/- 262.0	0.04
12–18 hours	250.2 +/- 210.8	261.0 +/- 226.0	*NS*
18–24 hours	275.0 +/- 168.5	436.1 +/- 296.5	0.02
Cumulative, 0–24 hours	745 +/- 326	1187 +/- 396	<0.01
Dynamic Pain Scores (VAS)			
2 hours	0.9 +/- 1.0	1.8 +/- 2.1	0.05
6 hours	3.3 +/- 2.3	3.3 +/- 2.0	*NS*
12 hours	4.9 +/- 2.8	5.3 +/- 2.2	*NS*
18 hours	4.4 +/- 2.8	5.5 +/- 1.9	*NS*
24 hours	3.8 +/- 1.7	4.8 +/- 2.3	*NS*
Cumulative 24-Hour Opioid Consumption (Oral Morphine Equivalent, mg)	2.3 +/- 1.6	1.8 +/- 1.4	*NS*
Quality of Recovery (QoR-15) Score			
12 hours	97 +/- 18	108 +/- 20	0.04
24 hours	110 +/- 14	118 +/- 14	0.04

NS=not significant; VAS=visual analog scale.

276843 - A COMPARISON OF THREE REAGENTS IN QUANTIFYING THE EFFECTS OF DALTEPARIN ON THROMBOELASTOMETRY (ROTEM) IN PREGNANCY.

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Introduction: Pregnancy is associated with a state of hypercoagulability that is protective against peri-partum hemorrhage, but can increase thromboembolic complications. Dalteparin is often used for either treatment or prophylaxis against venous thromboembolism. Monitoring of dalteparin by anti-Xa levels is not routinely performed and has not been shown to correlate with risk of bleeding complications[1]. Thromboelastography (TEG) has been shown to detect increasing concentrations of dalteparin in maternal whole blood, but is not sensitive or specific enough to delineate between low concentrations of dalteparin[2]. This study sought to determine which of three activating reagents used in conjunction with thromboelastometry (ROTEM) technology is most sensitive and specific at detecting the presence of dalteparin in maternal whole blood between 0 and 1.0 U/ml anti-Xa activity.

Methods: Local ethics approval was obtained prior to study. Adult ASA I or II singleton term gestation parturients presenting for elective Cesarean section were recruited. Blood samples were collected prior to delivery and divided into five samples of 2.25 ml. 250 µl of saline (control) or dalteparin were added to each sample to yield a final factor Xa activity of 0, 0.125, 0.25, 0.5 and 1.0 U/ml. Samples were selected at random for central laboratory anti-Xa testing to verify dalteparin concentrations. ROTEM was performed separately for each sample using A) standard INTEM reagent, B) INTEM reagent diluted at 1:300 and C) INTEM-HS (high sensitivity) reagent provided by manufacturer. Primary outcomes were CT, CFT, alpha angle, A10, A20 and MCF.

Results: Interim analysis was performed after 10 patients. Dalteparin concentration was confirmed with central lab anti-Xa testing. Clotting time (CT) was the best parameter for detecting anticoagulation by dalteparin in maternal whole blood. INTEM-HS and INTEM 1:300 were superior to INTEM (standard reagent) at detecting the changes in dalteparin concentration. Both reagents showed statistically significant differences in median CT between control and dalteparin concentrations ≥ 0.125 U/ml ($P < 0.05$). The ROTEM CT ROC curves (Fig) for INTEM, INTEM-HS, and INTEM 1:300 yielded an AUC of 0.86, 0.95 and 0.97 respectively.

Discussion: The initial results showed that ROTEM detected increasing concentrations of dalteparin in maternal whole blood between 0 and 1.0 U/ml anti-Xa activity. CT was the most sensitive and specific parameter for detection of dalteparin. From the ROC curves, INTEM-HS and INTEM 1:300 were both superior to standard reagent in the ability to differentiate between control (0 U/ml) and anti-coagulated samples (≥ 0.125 U/ml). This technology can potentially be utilized as a point-of-care test to determine real-time anti-coagulation status of parturients on low molecular weight heparin.

References:

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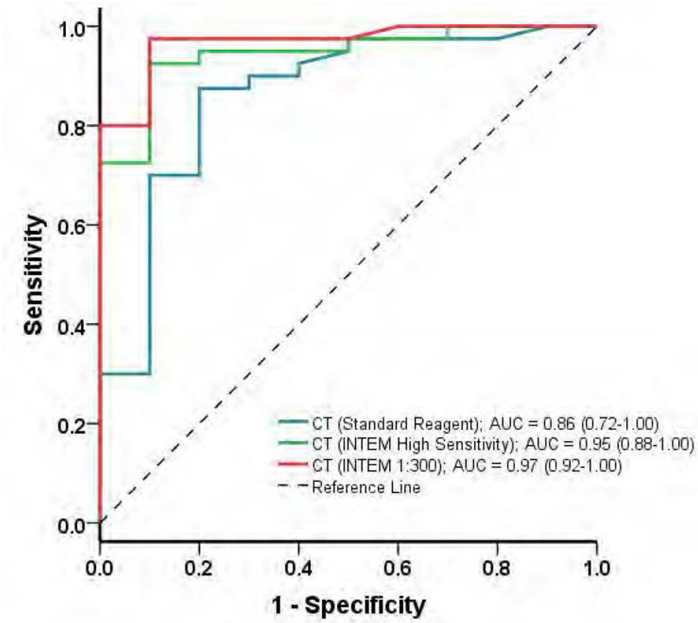
ROTEM Clotting Time (CT) of 3 reagents



A comparison of three reagents of ROTEM clotting time (CT) using INTEM protocol.

283232 - RANDOMISED CONTROLLED TRIAL OF UTERINE EXTERIORISATION VERSUS IN SITU REPAIR FOR ELECTIVE CESAREAN DELIVERY

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Introduction:
During ceserean delivery, the uterus can either be repaired in situ within the peritoneal cavity, or exteriorised from the abdomen. These two approaches have been studied with multiple RCTs and meta-analyses, but neither has been deemed clearly superior. Exteriorisation has been reported as a risk factor for intraoperative nausea and vomiting (IONV). Only one RCT evaluated IONV as a primary outcome with a standardised anesthetic technique. Knowing that IONV is amongst the main concerns of women scheduled for an elective cesarean delivery, this study aims to evaluate the method of uterine repair on maternal morbidity using a standardized anesthetic. We hypothesize that in situ repair causes less maternal discomfort.

Methods:
With IREB approval and written informed consent, 180 healthy, term parturients undergoing elective cesarean delivery will be recruited for this randomized controlled double-blind trial. This is an interim analysis after recruitment of 60 patients. Spinal anesthesia consisted of 10.5 mg hyperbaric bupivacaine, 15 mcg fentanyl, 150 mcg morphine. After the spinal injection, patients were immediately placed in the supine position with left uterine displacement and a phenylephrine infusion at 0.5 mcg/kg/min of lean body weight (LBW). A predetermined algorithm was used to treat hypotension defined as a decrease in mean arterial pressure (MAP) greater than 20% of the baseline value. Subjects were randomly assigned into one of two groups: exteriorized or in situ repair. Nausea was assessed on a 4-point scale (0 none, 1 light, 2 severe, and 3 vomiting), at 5 time points during the procedure, while keeping the data collector and patient blinded: incision, hysterotomy, placental delivery, beginning of uterine repair, beginning of fascia repair. The primary outcome was the incidence of IONV during the last 2 time points comprising potential uterine exteriorisation and reinsertion.

Results:
A total of 54 patients were analysed, 6 were excluded (Table). There was no significant difference in IONV incidence, blood loss, or surgical time. Despite a trend toward less phenylephrine boluses and less severe IONV in the in situ group (5 participants vomiting in the exteriorisation group vs. 0 with in situ repair), this did not reach statistical significance.

Discussion:
This is the first double-blind randomized controlled trial studying the effect of the type of uterine repair on IONV using a phenylephrine infusion. The incidence of IONV was similar in both groups, although there is a trend toward less vomiting and less hypotensive episodes in the in situ group. It might be possible to achieve a more definite conclusion following the inclusion of the remaining 120 participants.

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Table

Measure	Group		p-value
	Exteriorization (n = 27)	In situ (n = 27)	
Age (years)	32.2 ± 3.7	34.3 ± 4.8	0.08
BMI (kg/m²)	30 ± 3.7	29.7 ± 2.9	0.75
Gestational age (weeks)	39 (39-39)	39 (39-40)	0.17
Phenylephrine bolus (#)	4 (1-6)	2 (0-3)	0.06
Phenylephrine total (mcg)*	1447 ± 373.2	1290 ± 455.5	0.18
Crystalloid (mL)	1198 (1175-1300)	1200 (1167-1238)	0.49
Estimated blood loss (mL)	700 (600-800)	800 (500-800)	0.77
Postoperative hemoglobin (g/L)	102.3 ± 15.2	102.6 ± 11.9	0.96
Surgical time (min)	29 (25-36)	29 (26-32)	0.81
IONV n(%)			
IONV total	9 (33.3%)	8 (29,6%)	1.00
IONV 0/3	18 (66.7%)	19 (70.4%)	0.053
IONV 1/3	3 (11.1%)	3 (11.1%)	
IONV 2/3	1 (3.7%)	5 (18.5%)	
IONV 3/3	5 (18.5%)	0 (0%)	

Continuous data normally distributed are presented as mean ± SD and were analyzed with the Student's t test. Ordinal and continuous data non-normally distributed are shown as median (interquartile range) and were compared with the Mann-Whitney U test. The Fisher's exact test was used to compare the groups with regard to the presence of IONV while the Chi-square test was used to analyze the distribution of the IONV scores. *n = 26 for in situ group for this measure

284880 - TREATMENT OF PRURITUS IN PARTURIENTS HAVING CESAREAN DELIVERY WITH INTRATHECAL MORPHINE: A SYSTEMATIC REVIEW

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Background:

Pruritus after intrathecal morphine has a high incidence of 60-100% in patients undergoing cesarean delivery (CD) and commonly leads to maternal dissatisfaction as it can be severe.[1] It is often refractory to conventional antipruritic treatment due to its multifactorial etiology. A variety of drugs have been used to treat pruritus, with varying success rates.[2,3] We therefore performed this systematic review to evaluate the efficacy of drugs used for the treatment of intrathecal morphine-induced pruritus in women undergoing CD.

Methods:
This systematic review was planned in accordance with the PRISMA guidelines. The protocol was defined a priori. An expert literature search of multiple electronic databases-Pubmed, Medline, Medline In-process, Embase, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, Web of Science and Scopus from 1946 up to September 2016 was conducted. Search was carried out using key words like “prevention”, “treatment”, “pruritus”,“itching”, “intrathecal”, “spinal”, “morphine”, “obstetric patients”, “parturients”, “caesarian section”, “cesarean delivery” for randomized controlled trials (RCT) in English language. We included RCTs that compared drugs used for treatment of pruritus in women undergoing cesarean delivery under spinal anesthesia with intrathecal morphine. Relevant trials had to report on the treatment success for all the drugs. Quality of the studies was assessed using modified oxford scoring system. Percentage statistics was used to calculate the success rate of the drugs used for the treatment of pruritus.

Results:
Seven studies (727 parturients) met inclusion criteria.(Table 1). Methodological validity scores determined by modified oxford score ranged from 4 to 7 indicating a lowrisk of bias. Four studies assessed ondansetron for the treatment of pruritus with a success rate of 76.49%. There was a recurrence of pruritus within 12 hours after successful treatment in 20.54%. Pentazocine was evaluated in one study, with a success rate of 96.15%. Nalbuphine was evaluated in 3 studies, with an overall success rate of 89.75%. Two studies examined IV diphenhydramine with a success rate of 68.83%. Propofol was successful in treating pruritus in only 53.27% of patients.

Conclusion:
This systematic review comprehensively reports all the drugs used in the literature for the treatment of pruritus. Pentazocine and nalbuphine have a high overall success rate. Our findings are limited by the small number of studies., further studies are needed to evaluate the most effective drug for the treatment of intrathecal morphine induced pruritus without recurrences.

References:
1. J Clin Anesth 2003;15:234–9.
2. Anesth Analg 2009;109:1606–11.
3. Acta Anaesthesiol Scand 2010;54:764–9.

Table 1: Treatment of intrathecal morphine induced pruritus in patients undergoing cesarean section:

Study ID	Groups Drug (route of Administration)	Results
Albrahemi et al.	(I) Nalbuphine (IV) (T) Diphenhydramine (IV)	**Group N (40) vs. Group D (40)** Incidence(n): 24 vs. 21 Success rate: VAS Score 0: 83% vs. 43% (P<0.01) 24h: VAS score: 4±2 vs. 2±1 (P=0.003) Treatment Failure: 4% vs. 23% (P<0.04)
Bellin et al.	(T) Propofol (IV) (T) Control (IV)	**Group P (17) vs. Control (12)** Success rate: 11.8% vs. 8.3% Treated with Naloxone
Charuluxananan S et al.	(T) Nalbuphine (IV) (T) Nalbuphine (IV) (T) Nalbuphine (IV)	**Group N (30) vs. Group N (30) vs. Group N (30)** Success rate: 86.7 vs. 96.7 vs. 100 [P=0.006] Failure rate: 13.34% vs. 3.34% vs. 0%
Charuluxananan S et al.	(T) Ondansetron (IV) (T) Control (IV)	**Group O (41) vs. Control (39)** Success rate: 80% vs. 36% (P<0.001) Recurrence rate: 12% vs. 70% (P<0.001)
Charuluxananan S et al.	(T) Nalbuphine (IV) (T) Propofol (IV)	**Group N (40) vs. Group D (40)** Success rate: 83% vs. 61% (P<0.001) Recurrence rate: 5% vs. 7% (P=0.76)
Tumbde et al.	(T)Pentazocine (IV) (T) Ondansetron (IV)	**Group P (104) vs. Group O (104)** Severity after treatment • Absent: 84.6% vs. 51.0% • Mild: 11.5% vs. 29.8% • Moderate: 1.9% vs. 6.7% • Severe: 1.9% vs. 12.5% Success rate: 96.1% vs. 80.8% (95% CI Difference: 7% - 28.8%; P=0.001) Recurrence rate: 12% vs. 32.1% (P=0.001)
Sadoik-Sayyid et al.	(T) Ondansetron (IV) (T) Diphenhydramine (IV)	**Group O (57) vs. Group D (56)** Success rate: 70% vs. 70% (P=0.79) Recurrence rate: 28% vs. 35% (P=0.52).

285062 - ASSESSMENT OF INTERVENTIONS TO DECREASE SHIVERING IN PATIENTS HAVING ELECTIVE CESAREAN DELIVERY: A QI PROJECT

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Introduction: Cesarean delivery (CD) is one of the most common operations in North America and the incidence is increasing [(1)]. It is most commonly carried out using spinal anesthesia [(2)]. The rate of CD at our tertiary care academic obstetric center is 22%. This quality improvement (QI) project aimed to assess patient experiences with spinal anesthesia for CD, identify any areas for improvement, develop interventions as per the literature and our resources, and evaluate patient impact using Plan-Do-Study-Act (PDSA) methodology.

Methods: REB approval was obtained. Written informed consent was obtained from all participants in this study. At baseline, 30 healthy, adult, pregnant patients at term gestation with single fetuses who had undergone elective CD with spinal anesthesia were surveyed (by a written questionnaire using a Likert scale (figure 1)) about their experience. The primary outcome measure of interest was the incidence of bothersome events (e.g. breakthrough pain, numbness, itching, nausea, shivering). Based on the results and review of literature, forced air warming was then introduced for PDSA cycle 1 and fluid warming was introduced for PDSA cycle 2. Patient temperatures on arrival in PACU were recorded at baseline and in both cycles. 30 patients were surveyed about their experiences during each PDSA cycle, so that 90 patients in total were surveyed.

Results: All patients completed the surveys. All patients received the intended intervention during the PDSA cycles. At baseline, 40% of patients complained about bothersome shivering and this was the most reported bothersome side effect. The average temperature at baseline in PACU was 36.5. In PDSA cycle 1, this incidence dropped to 32%. The average temperature in PACU was 36.5. In PDSA cycle 2, bothersome shivering was reduced substantially to 13% and the average temperature in PACU was 36.1.

Discussion: This QI project showed that shivering was bothersome among patients having CD under spinal anesthesia. A recent meta-analysis by Sultan et al [(3)] found that active warming during CD reduces the incidence of hypothermia and shivering. Active warming by forced air or warmed fluid was recommended by them for elective CD. We also found that bothersome shivering was reduced by using forced air warming blankets and by fluid warming. Of note, we found fluid warming was more effective in reducing shivering in our patients.

References:

1-Am J Obstet Gynecol 2005; 193:1607-17
2- Anesthesiology 2005; 103:645-53
3- Br J Aneasth 2015; 115 (4): 500–10

Patients' Survey

Patients' receiving spinal anesthesia for Cesarean Delivery Survey

Please Circle the number that represents how you feel about the anesthesia service you have received:

	Question	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1	The information provided to me about the spinal anesthetic was sufficient.	1	2	3	4	5
2	The time provided to me to give consent for the spinal was sufficient.	1	2	3	4	5
3	The teaching and discussion between anesthesia trainee and consultant bothered me	1	2	3	4	5
4	I was comfortable during the placement of the spinal anesthetic.	1	2	3	4	5
5	I felt no pain during my surgery.	1	2	3	4	5
6	.The numbness in my body bothered me	1	2	3	4	5
7	The itching bothered me.	1	2	3	4	5
8	The nausea bothered me.	1	2	3	4	5
9	The shivering bothered me	1	2	3	4	5
10	Overall, my spinal worked well	1	2	3	4	5
11	I would want to receive a spinal again if I had another CS.	1	2	3	4	5
12	If I was asked to add something to improve the service I would suggest.....					

285266 - THERMOGRAPHIC ASSESSMENT AS AN INDICATOR OF UNILATERAL BLOCK IN PATIENTS WITH LABOUR EPIDURALS: A PILOT STUDY

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Introduction:
Adequate labour analgesia is crucial in minimizing patient morbidity associated with experiencing severe pain [(1)]. A recent analysis of nearly 20,000 deliveries revealed that neuroaxial techniques were commonly employed and provided adequate analgesia to over 98% of patients [(2)]. A common cause of inadequate analgesia was unilateral block following epidural catheter placement, with an estimated incidence of 7-18% [(3)]. Tests of adequacy of neuraxial blockade include: assessment of patient symptoms, and sensorimotor testing including sensation to pinprick or temperature, and motor weakness. However the level of blockade observed often differs depending on the method of assessment employed [(4)]; thus these techniques can be invasive and unreliable.
In patients receiving an epidural block, sympathectomy occurs prior to sensory block and causes vasodilation in the lower limbs. An increase in skin temperature in the lower extremities occurs as a consequence of vasodilation [(5,6)]. The primary objective of this study was to demonstrate that in patients experiencing unilateral block after epidural catheter placement, the use of a thermal imaging camera would allow for early detection of asymmetric lower extremity temperature.

Methods:
This is a prospective, observational cohort study. After receiving institutional Research Ethics Board approval, consenting patients requiring epidural top-up due to unilateral blockade were included. Prior to the administration of additional local anesthetic, the skin temperature was assessed over the first webspace of each foot, between the first and second toes on both sides with the FLIR i7 thermal imaging camera (FLIR systems USA). Along with temperature measurements, patient-reported side of worse pain (left versus right) was also recorded.

Results:
Eight patients were included in this study, of which 7 had unilateral blockade (one patient had equal block and was erroneously included). In all patients with unilateral block the side of worse pain had a lower temperature (Table 1). The largest difference in temperature observed was 9.9°C and the smallest difference was 1.1°C. In the patient erroneously included the difference in lower extremity temperature was 0.4°C. **Discussion**:
In this pilot study we were able to demonstrate that the FLIR i7 thermal imaging camera can be used for fast, non-invasive, and objective detection of temperature asymmetry in patients with unilateral epidural blockade. Future studies are needed to validate this technology in a larger cohort, and to examine whether reversibility of temperature asymmetry is associated with rectification of unilateral blockade. We conclude that thermographic imaging may allow for early detection of unilateral epidural blockade before the patient experiences significant pain and morbidity.

References:

1. Dawkins J.L. Epidural analgesia for labor and delivery. NEJM. 2010; 362 (16): 1503 – 1510
2. Pan P.H., Bogard T.D. & Owen M.D. Incidence and characteristics of failures of obstetric neuroaxial anelgesia and anesthesia: a retrospective analysis of 19,259 deliveries. Int J Obstet Anesth. 2004; 13(4): 227-33
3. Withington D.E. & Weeks S.K. Repeat epidural analgesia and unilateral block. Can J Anesth. 1994; 41(7): 568-71
4. Russell I.F. A comparison of cold, pinprick and touch for assessing the level of spinal block at caesarean section. Int J Obstet Anesth. 2004; 13(3):146-52
5. Frank S.M., El-Rahmany H.K., Tran K.M., Vu B. & Raja S.N. Comparison of lower extremity cutaneous temperature changes in patients receiving lumbar sympathetic ganglion blocks versus epidural anesthesia. J Clin Anesth. 2000; 12(7): 525-30
6. Stevens M.F., Werdehausen R., Hermanns H. & Lipfert P. Skin temperature during regional anesthesia of the lower extremity. Anesth Anelg 2006; 102: 1247-51

Table 1: Side of worse pain and lower extremity temperature in women receiving epidural blockade for labour analgesia

Patient #	Side of Worse Pain	Right Temperature	Left Temperature
1	left	33.6	32.5
2	left	36.0	34.6
3	right	28.5	35.5
4	right	34.4	35.9
5	left	34.3	24.4
6	left	37.1	31.5
7	N/A (equal block)	29.3	28.9
8	left	33.2	28.1

285892 - LABOUR EPIDURALS: A MIXED METHOD ANALYSIS OF COMMUNICATION AND THEMES ON #SOCIALMEDIA

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Introduction

Labour epidurals are the gold standard for pain management during labour and delivery. The internet and social media are being increasingly used by the general population, including pregnant women and their families, as a health information resource and a forum to share their opinions and experiences[1]. The objective of our study is to characterize the communication that occurs on social media, specifically within Twitter news and social media platform, on the topic of labour epidurals. This study examines the frequency with which labour epidurals are discussed, which topics and themes dominate the discussion, what type of information is being shared, and what type of users are sharing the information.

Methods

This was a cross-sectional and prospective analysis of publicly available micro-posts or "tweets" from the Twitter social media platform on the topic of labour epidurals. Our mixed-method analysis uses both quantitative and qualitative analysis. "Epidural" in the English language was the search term after preliminary pilot searches, as it allowed for an adequate number of search results specific to the topic. We used the social media analytical software Netlytic© to collect the search result data. This software was programmed to retrieve the last 1000 results, starting on September 1, 2016, and then prospectively collect results every fifteen minutes for the next week. Results were manually screened, only those with specific reference to labour epidurals were further analyzed. Netlytic© analyzed and organized tweets into categories based on the keywords contained within them and to determine which users were the most common posters on the topic . We also determined how many posts contained an enhancement (link to article/website, or multimedia). Lastly, we determined whether the post was being re-shared or a "retweet", i.e. Twitter knowledge dissemination.

Results

We retrieved 2,224 total micro-posts on Twitter. After screening, 1,608 tweets reference labour epidurals. The number of unique users who tweeted on the topic of labour epidurals was 1,375. The dataset included 435 tweets that were disseminated. The most commonly retweeted post was shared 170 times. The dataset contained 338 tweets that contained publicly accessible enhancements. The most commonly used keywords determined through Netlytic© Software were song (n=173), pain (n=147), back (n=143), birth (n=127) and labor (n=117). The most common categories of tweets were tweets describing bad feelings (129 tweets), tweets describing good feelings (95 tweets), and tweets with a reference to time (52 tweets).

Discussion

Social media and Twitter have served as platforms for communication on the topic of labour epidurals and this study has provided insight into the characteristics of this communication. Knowing what communication occurs on social media around the topic will help to tailor our patient education efforts.

References:

1. BMC Pregnancy Childbirth. 2016; 16: 65

287455 - PATTERN OF UTEROTONIC USAGE IN CANADA: A NATIONAL SURVEY OF ACADEMIC OBSTETRIC HOSPITALS

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Introduction

In Canada, the pattern of uterotonic usage for the management of postpartum hemorrhage (PPH) is largely unknown. A recent retrospective study in the United States using so called 'big data' suggests the pattern of secondary uterotonics is highly variable.1 Oxytocin is the primary uterotonic agent used in the prevention of PPH,1,2 however, Canadian uterotonic usage (as compared to the United States) is more varied and complex due to the presence of carbetocin as an alternative to oxytocin. Canada is the only country to recommend carbetocin in PPH management as part of obstetric practice guidelines.2-5 The objective of this study was to determine the pattern of uterotonic usage in obstetric hospitals in Canada.

Methods
Institutional REB approval was obtained for the conduct of this prospective observational study. The study data was collected via an electronic survey. The target group consisted of Chiefsor Directors of Obstetrics and Gynecology, and Obstetric Anesthesia at university-associated obstetric hospitals across Canada. Email addresses were obtained via medical school/university hospital websites. The survey was sent out electronically by the program 'SurveyMonkey' during the period November 2016 to January 2017. Two reminder emails were sent. Data on the size of facility including number of deliveries per year, epidural/cesarean delivery (CD) rate, institutional PPH rate, and usage of utertonic agents were collected. The primary outcome was prophylactic carbetocin versus oxytocin usage after CDs.

Results
The survey was sent to 109 clinicians of which 34 (31.2%) responded. About 50% responders reported a delivery rate of 2500-5000/year and an epidural rate of 51-75% in their institutions. 77% responders reported their institutional CDrate of 21-30%. About 65% responders were unaware of the rate of PPH in their institution. The first line agent for vaginal deliveries was reported as oxytocin by 91% and carbetocin by 9% responders. For women at low risk for PPH undergoing CDs, the first-line uterotonic was reported as oxytocin vs. carbetocin by 66% vs. 34% responders, respectively. For CDs at high-risk for PPH, the first-line agent was reported as oxytocin by 59% and carbetocin by 41% responders. The use of second-line uterotonics was also variable amongst institutions with the use of carboprost, ergometrine and misoprostol reported by 100%, 79% and 79% responders,respectively.

Discussion
Our study reinforces the lack of a unified approach to the use of oxytocin, carbetocin and second-line uterotonics for PPH management. It echoes the findings of Bateman et al in the United States.1 An evidence-based approach to uterotonic usage, as well as consensus of obstetricians and anesthesiologists is warranted in order to improve the management of PPH due to uterine atony.

References:

1. Anesth Analg 2014;119:1344-9.
2. Int J Obstet Anesth;2016:28:61-69.
3. JOGC 2009;235:980-993.
4. Obstet Gynecol 2006;108:1039-47.
5. Green-top guideline 52:RCOG,2009.

PAIN: ACUTE-BASIC AND CLINICAL, PAIN: CHRONIC-BASIC AND CLINICAL
Sunday, June 25
13:30 - 15:15

Track: Pain: Acute - Basic & Clinical

278438 - PERIOPERATIVE SURGICAL HOME FOR TOTAL KNEE AND HIP ARTHROPLASTIES

Presenting Author: Ryan Endersby, University of Calgary, Calgary, Alberta

Co-Author(s): Leyla Baghirzada, Andrew Walker, Kayla Denness, Rosa Reyes, Alicia Ansell

282512 - POST OPERATIVE PAIN MANAGEMENT OF ORTHOTOPIC LIVER TRANSPLANTATION (OLT): RETROSPECTIVE STUDY.

Presenting Author: Hussein Sadkhan, London Health Science Center, London, Ontario

Co-Author(s): Qutaiba Tawfic, Achal Dhir, Karim Qumosani, Stephen Morrison, Kamal Kumar, Kevin Armstrong

282556 - EVALUATION OF THREE CONCENTRATIONS OF EPIDURAL BUPIVACAINE FOR POST OPERATIVE PAIN RELIEF

Presenting Author: Anil Agarwal, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

Co-Author(s): Mohammad Hashim, Sujeet Gautam

284995 - REGIONAL ANAESTHESIA FOR LAPAROSCOPIC CHOLECYSTECTOMY: A PROSPECTIVE OBSERVATIONAL STUDY OF A DIFFERENT APPROACH

Presenting Author: Rashmi Bhatt, All India Institue of Medical Sciences, New Delhi, India, New Delhi, Delhi, India

285340 - POST-OPERATIVE PAIN CONTROL IN A TEACHING HOSPITAL IN A DEVELOPING COUNTRY: AN OBSERVATIONAL STUDY

Presenting Author: Danyela P. Lee, University of Saskatchewan, Saskatoon, Saskatchewan

Co-Author(s): Paulin Banguti, Theo Twagirumugabe, William McKay

285879 - CONTINUOUS TRANSVERSUS ABDOMINIS PLANE BLOCK AFTER OPEN NEPHRECTOMY: A RANDOMIZED CONTROLLED TRIAL

Presenting Author: Derek Dillane, University of Alberta, Edmonton, Alberta

Co-Author(s): Kristen Gadbois, Ronald Moore, Saifee Rashiq

Track: Pain: Chronic - Basic & Clinical

284636 - 10K SPINAL CORD STIMULATION ATTENUATES INCREASES IN SPINAL GLUTAMATE RELEASE AND MEPSC IN NEUROPATHIC RATS

Presenting Author: Chung-Ren Lin, Chang Gung Memorial Hospital-Kaohsiung Medical Center, Chang Gung University, Kaohsiung, Not Applicable, Taiwan (Republic of China)

Co-Author(s): Yu-Chi Chiu, Chia-Kai Liu

286498 - PLASMA LEVEL OF KETAMINE AND NORKETAMINE IN LOW DOSE ORAL KETAMINE IN CHRONIC PAIN PATIENTS

Presenting Author: Qutaiba Tawfic, Department of Anesthesia and Perioperative Medicine, London Health Sience, Western University, London, Ontario

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278438 - PERIOPERATIVE SURGICAL HOME FOR TOTAL KNEE AND HIP ARTHROPLASTIES

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Introduction: A stepwise quality assurance initiative was undertaken leading to the development of a perioperative surgical home focused on total knee (TKA) and total hip (THA) arthroplasties. Implemented over three phases, our final phase (Phase III) incorporated a standardized post-discharge analgesia care plan and ERAS initiatives that complemented a prior introduced standardized post-operative inpatient analgesia pathway (Phase II). We present our Phase III findings with comparisons to previously implemented Phase I (standard of care) and Phase II pathways.

Methods: Categorization of quality assurance provided ethics review exemption. Sixty patients were recruited for each phase. Baseline pain assessments and Quality of Recovery (QoR) scores were acquired preoperatively. American Pain Society patient outcome questionnaires and numerical rating scale (NRS) pain scores were completed and acquired daily during inpatient stay. QoR scores were acquired on postoperative day (POD) 1 and day of discharge. Additional pain assessments were completed on post-discharge days (PDD) 1, 3 and 5 and a final QoR score acquired on PDD 5. Discharged patients were prescribed a standardized analgesia order set incorporating equipotent doses of opioids, NSAIDS and acetaminophen. Statistical analysis was completed using SPSS 19.0 (IBM, Armonk NY, USA).

Results: Thirty-seven TKA and 23 THA patients were recruited in Phase III. Median (interquartile range (IQR)) TKA and THA length of stay (LOS) was 2.26 (0.27) and 2.23 (0.57) days, respectively. This represented significant reductions (corrected $p < 0.017$) compared to Phase I (TKA = 3.21 (1.71), THA = 3.08 (0.22)) and Phase II (TKA = 3.22 (0.95), THA = 3.21 (0.22)). All TKA and THA QoR scores compared favourably or were significantly higher ($p < 0.05$) than previous phases (Table 1). 18.9% and 30.4% of TKA and THA patients presented with high nausea scores (≥ 5 on 0-10 scale) on POD 1 compared to 45.5% and 54.3% in Phase I and 36% and 26.5% in Phase II, respectively. All TKA and THA patients were able to perform post-discharge exercises on PDDs 3 and 5 compared to Phase I where 20% and 30.3% of TKA and THA patients were unable to perform exercises on PDD 3. Satisfaction with discharge medication pain control was 100% for both TKA and THA patients on PDD 5, an increase from 89.4% (TKA) and 95% (THA), in Phase I patients.

Discussion: The development and execution of a perioperative surgical home and incorporation of ERAS initiatives reduced LOS significantly and was shorter than the common care pathway goal of 3 days (72 hours). Additionally, PDD 5 QoR had nearly returned to (TKA) or exceeded (THA) preoperative values. TKA/THA patients expressed high satisfaction in their level of pain control after discharge using a combination of equipotent opioids, celebrex and acetaminophen.

References:

None

Table 1 Median (interquartile range) quality of recovery (QoR) scores.

Quality of Recovery Score	Phase I	Phase II	Phase III
TKA			
Pre-operative	127.0 (21.5)	137.0 (15.0)	133.0 (15.5)
Post-operative Day 1	96.0 (31.0)*^	121.0 (32.0)*#	129.0 (19.5)^#
Discharge Day	129.0 (22.8)	131.0 (19.0)	127.0 (17.3)
Post-discharge Day 5	130.0 (36.8)	129.0 (21.0)	130.0 (21.0)
THA			
Pre-operative	126.5 (21.0)	131.0 (22.0)	130.0 (24.0)
Post-operative Day 1	99.5 (34.8)*^	120.0 (26.0)*	125.0 (31.0)^
Discharge Day	120.0 (30.0)	134.5 (9.5)	131.0 (20.0)
Post-discharge Day 5	125.0 (20.0)*^	135.0 (15.5)*	136.0 (8.0)^

TKA = total knee arthroplasty; THA = total hip arthroplasty *Significant (corrected $p < 0.017$) difference between Phase II and Phase I; ^Significant (corrected $p < 0.017$) difference between Phase III and Phase I; #Significant (corrected $p < 0.017$) difference between Phase III and Phase II

282512 - POST OPERATIVE PAIN MANAGEMENT OF ORTHOTOPIC LIVER TRANSPLANTATION (OLT): RETROSPECTIVE STUDY.

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Introduction:
Orthotopic liver transplantation (OLT) is one of the most extensive of all abdominal surgeries. Due to the lengthy and complicated nature of this surgery, as well as the poor health of most OLT patients, the main focus of perioperative management for these patients is reducing mortality and morbidity. Because of the paucity of data on pain and its management in OLT, we conducted a retrospective, quality improvement study aimed at investigating the pain experience and its management for liver transplant recipients at our centre.

Method:
We conducted a descriptive, retrospective study of OLT recipients at our Centre over a period of 5 years (January 2011-January 2016). The study was approved by our institution's Research Ethics Board. We included adult patients who had no history of chronic pain and were extubated within 48 hours after surgery. Data was obtained from the hospital Electronic Medical Record (EMR) and patients' charts. The collected data included patient's demographic information , duration of intubation, preoperative pain scores and pain medication required, length of hospital stay and pain score after extubation during their admittance to the ICU and Multi Organ Transplant Unit (MOTS). Data regarding pain management modalities , type of opioid analgesics , route of administration and opioid related side effects was collected .

Result: During the study period, 300 patients were identified that received OLT. After excluding those patients that did not meet the study criteria, the data of 200 patients were included in the analysis. The patients were 72% male with a mean age of 53.34 years (±11.72) and mean weight 78.24 kg (±18.12). The mean duration of the surgical procedure was 6.635 hours (±1.65). The mean duration of intubation in the ICU was 9.93 hours (±0.54), while the mean duration of stay in the ICU was 2.32days (± 2.47). The mean visual analogue scores (VAS) were: day 1(3.40 ±1.71), day 2 (4.99 ± 0.11) and day 3 (4.75 ±0.12). During their stay in the ICU; 178 patients received intermittent boluses (89%), 9 patients received a continuous infusion of opioids (4.5%) and 13 patients received PCA (6.5%). Regarding the type of opioids; 130 patients received hydromorphone (65%), 63 received fentanyl (31.5), and 7 received morphine (3.5%). The mean length of hospital stay was 14.86 days (± 8.60). There were no reports of serious side effects such as respiratory depression or severe sedation related to the analgesic medications that were administered.

Discussion: This study reports that OLT patients experience moderate pain during the first 3 days following extubation. The data obtained from this investigation will help us formulate a better understanding of post OLT pain and optimize a pain management protocol that is more efficient and effective.

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2- Moretti EW, Robertson KM, Tuttle-Newhall JE, et al. Orthotopic liver transplant patients require less postoperative morphine than do patients undergoing hepatic resection. J Clin Anesth. 2002 ;14:416-20.

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282556 - EVALUATION OF THREE CONCENTRATIONS OF EPIDURAL BUPIVACAINE FOR POST OPERATIVE PAIN RELIEF

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Introduction: Epidural analgesia is an established method of post-operative analgesia in patients undergoing major abdominal surgery[1]. Post-operative pain management should attempt to relieve both pain at rest and dynamic pain [2]. Dynamic pain relief helps by improving patient's ventilation, coughing, and mobility [3]. The aim of this prospective, observational trial is to evaluate three concentrations of epidural bupivacaine with fentanyl for post-operative pain relief in patients who had undergone major abdominal surgery.

Methods: Following ethical committee approval and informed consent, patients (20-65 yrs) of either sex, ASA physical status I or II, scheduled for major abdominal surgery with planned upper abdominal incision under general anaesthesia and thoracic epidural analgesia, were included in the study. Patients were randomly assigned into three equal groups of 30 each; groups received intra operative and post-operative epidural infusion with a solution containing either 0. 0625%, 0. 1% or 0. 125% bupivacaine with 1 μg ml^{-1}fentanyl at a rate of 0. 1ml/kg/ hr through an 18G thoracic epidural catheter placed at T8-9 or T9-10 intervertebral space and were labelled as Group A, B and C respectively.
Primary outcome measures were postoperative pain during lying supine (rest pain), coughing and rising from supine to sitting position (i.e. dynamic pain); secondary outcome measures were post-operative nausea and vomiting (PONV), sedation and respiratory depression. Assessment of pain was done by a visual analogue scale (VAS); 0= no pain, 10= worst imaginable pain.

Results: Bupivacaine 0.1% and 0.125% provided significantly better pain relief at rest, deep breathing, coughing and sitting than bupivacaine 0.0625%. The incidence of hypotension was significantly higher in the bupivacaine 0.125% group as compared to the other groups; the incidence of other side effects like PONV, motor block and pruritis was found to be highest in the bupivacaine 0.125% group as compared to the other groups, though the difference wasn't significant.

Discussion: Bupivacaine 0.1% and 0.125% provided significantly better pain relief (static and dynamic) than bupivacaine 0.0625%; however bupivacaine 0.125% was associated with significantly higher incidence of side effects. Hence we recommend epidural infusion of bupivacaine 0.1% with 1 μg/ml fentanyl for post-operative pain management in patients undergoing major abdominal surgery.

References:

1. Br J Anaesth 2001 87: 47-61
2. Anaesthesia. 1999 54: 641-646
3. Anesth Analg 1997 85: 124-129

284636 - 10K SPINAL CORD STIMULATION ATTENUATES INCREASES IN SPINAL GLUTAMATE RELEASE AND MEPSC IN NEUROPATHIC RATS

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High frequency spinal cord stimulation treatment attenuates increases in spinal glutamate release and spinal miniature excitatory postsynaptic currents in rats with spared nerve injury-induced neuropathic pain.

Abstract
10K high-frequency spinal cord stimulation (HF-SCS) is a potential paresthesia-free treatment for chronic pain. However, its mechanisms of action remain unknown. The objectives of this study were to assess spinal glutamate release and quantify spinal miniature excitatory postsynaptic currents in spared nerve injury (SNI) rats receiving HFSCS treatment. All experimental protocols were reviewed and approved by the Institutional Animal Care and Use Committee from the hospital. SCS electrodes delivered to the T10/T11 dorsal columns of naïve or SNI rats. The glutamate concentrations in the cerebrospinal fluid were measured by microdialysis at one after SNI. The glutamate transporter activity was measured by sodium-dependent uptake of glutamate in membrane preparations isolated from the ipsilateral dorsal horn of the spinal cord. The miniature excitatory postsynaptic currents (mEPSCs) from neurons in lamina II of the rat dorsal horn were recorded by patch clamp to assess spontaneous synaptic activity after spared nerve injury (SNI).

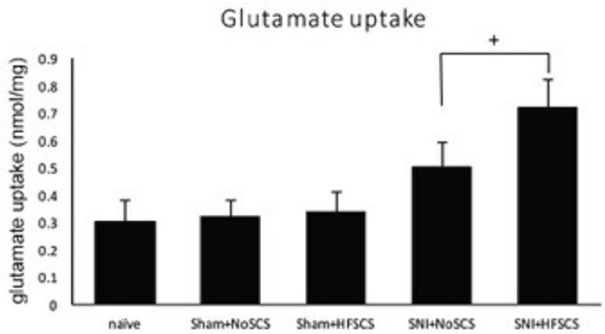
One week after SNI, glutamate concentrations in the cerebrospinal fluid were elevated. Consistent with this finding, the frequency of mEPSCs doubled, indicating heightened glutamate release from primary afferents or spinal interneurons. The levels of glutamate transporters were not significantly increased or even decreased by western blots analysis. The transmitter transporter activity was slightly increased. HFSCS treatment attenuated SNI induced-mechanical alloynia and increased transmitter uptake resulting in lowered extracellular glutamate. Moreover, Treatment with the HFSCS led to a decrease in the frequency of mEPSCs after SNI. Adding the mGluR5 antagonist MPEP to the slices reduced the frequency of mEPSCs further, consistent with the idea that mGluR5 activation after SNI was partially reversed by HFSCS.

We concluded that HFSCS treatment reduces mechanical-allodynia and rebalancing glutamate release and uptake after SNI.

References:

1.Neuromodulation, 2013. **16**(1): 59-65
2.Neuromodulation, 2016. **19**(7): 785-786.

Figure 1



Glutamate transport activity measured in membrane preparations of the ipsilateral dorsal horn of naïve rats and rats 1 week after SNI (N=5). HFSCS treatment increased the transmitter activity. + $p<0.05$, compared to SNI+NoSCS.

284995 - REGIONAL ANAESTHESIA FOR LAPAROSCOPIC CHOLECYSTECTOMY: A PROSPECTIVE OBSERVATIONAL STUDY OF A DIFFERENT APPROACH

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Introduction:
The introduction of laparoscopic cholecystectomy by Phillipe Mouret in Lyon, 1987 has restructured the treatment of gall stone disease, though some prefer to credit the German surgeon Erich Mühe for the same(1). Laparoscopic cholecystectomy has improved surgical outcomes in terms of short operative time, early mobilization and fast recovery, less post operative pain and complications, shorter hospital stay and early return to work as compared to open cholecystectomy(2).
Conventionally, regional techniques, such as low thoracic epidural and lumbar subarachnoid block have been used for laparoscopic surgery primarily in patients with significant comorbidities (3). We aim to establish the feasibility of this approach in more patients along with the use of dexmedetomidine or ketamine as sedative agents to manage shoulder pain.

Methods:
After approval by the research ethics committee, the study was carried out in fifty ASA I and ASA II female patients, aged between 18 and 50 years, posted for elective laparoscopic cholecystectomy, in a randomized controlled manner. Patients in both the groups were administered bupivacaine hydrochloride 17.5 mg (3.5 ml) in 8% dextrose intrathecally with intravenous sedation as per following allocation:
Group A (n=25) received intravenous injection of dexmedetomidine one µg/kg bolus followed by infusion at the rate of one µg/kg/hr
Group B (n=25) received Injection ketamine 0.5mg/kg bolus followed by infusion at the rate of 0.5 mg/kg/hr intravenously.
The patients were assessed for postoperative pain (abdominal as well as shoulder) using the visual analogue scale (VAS), the requirement of first dose of supplemental analgesia, and the total analgesic requirement in the first twenty four hours of postoperative period. Patients were also assessed for any adverse events such as nausea, vomiting, urinary retention etc.

Results:
The requirement of rescue analgesic was higher in group A and the difference was highly significant (p 0.005). The occurrence of intraoperative shoulder pain as well as adverse effects like bradycardia, hypotension, nausea and vomiting and respiratory discomfort was significantly higher in group A, as suggested by p value < 0.05. While comparing abdominal and shoulder pain scores in both the groups, better pain scores were observed in group B (p 0.03 at one hour and p 0.02 at two hours).There was no difference in the mean postoperative analgesic requirement in twenty four hours in both the groups(p 1.00)

Discussion :
No patient required conversion to general anaesthesia for the surgery. The incidence of shoulder pain and other adverse effects was found to be less in the group which received ketamine, hence suggesting that ketamine is a more suitable agent in terms of sedation, analgesia and maintenance of optimal haemodynamics. More research is needed to establish more concrete results and fine tune the sedation protocols.

References:
1. JSLS 1999; 3: 163-7
2. British Journal of Surgery 1991; 78(2):160-2
3. Surg Endosc 2002;16:472-475

285340 - POST-OPERATIVE PAIN CONTROL IN A TEACHING HOSPITAL IN A DEVELOPING COUNTRY: AN OBSERVATIONAL STUDY

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INTRODUCTION

Pain is a global health problem. In 2011, the World Medical Association passed a resolution asserting that people in pain have a right to appropriate pain management and that the denial of pain treatment may be medically unethical (1,2). Despite this, effective post-operative analgesia is lacking in developing countries. We studied: 1) *Practice*: what is the quality of post-operative analgesia for patients in a university teaching hospital in a developing country? 2) *Perceptions:* are patients satisfied with their post-operative analgesia?

METHODS

This observational study was approved by the authors' institutional Research Ethics Boards. Consenting adult patients undergoing major abdominal, thoracic, or orthopedic surgery were recruited. Participants were able to withdraw from the study at any time. On post-operative day 2, participants were administered the International Pain Outcomes (IPO) questionnaire (3), as well as a brief questionnaire developed by Scott *et al.* to assess patient attitudes towards post-operative pain (4).

RESULTS

91 patients were recruited; 83 (91%) completed the questionnaire.
Practice: 45 (54%) patients received pre-emptive analgesia, 8% received no post-operative analgesia. The mean dose of intra-operative narcotics patients received under a general anesthetic was 5.1 (+/- 1.2) mg of intravenous morphine and 102.9 (+/-13.6) mg of intravenous fentanyl. On average, the worst post-operative pain on the numeric rating scale was 6/10 (+/- 2) and the least 3/10 (+/- 1). 44% (+/- 22%) of the time patients were in severe pain, with an interference score of 5/10 (+/- 2) with regards to their ability to do activities in bed, such as turning or sitting.
Perceptions: 54% (+/- 21%) of patients felt they received adequate pain relief, and 71% felt that more pain treatment was not necessary. 57% of patients felt pain should not be taken away completely, and 76% felt that they should put up with some pain rather than complain.

DISCUSSION

With 8% of patients receiving no post-operative analgesia, standards of post-operative analgesia at the univeristy teaching hospital in the developing country in which we conducted our study would not meet generally accepted practice in Canada. That 71% of patients felt that their post-operative analgesia was adequate despite an activity interference score of 5/10 may be due to cultural perceptions that pain is necessary and patients should not complain. These results can be used as a baseline to evaluate future interventions in pain management at this university teaching hospital.

References:

1) Pain Med, 2012, 12:1531-2
2) Anesth Analg, 2007, 105:205-21
3) J Pain, 2014, 14(11):1361-70
4) Anaesthesia, 1997, 52:438-42

285879 - CONTINUOUS TRANSVERSUS ABDOMINIS PLANE BLOCK AFTER OPEN NEPHRECTOMY: A RANDOMIZED CONTROLLED TRIAL

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Introduction: Transversus abdominis plane (TAP) blockade has been utilized to reduce postoperative pain and opioid consumption for a variety of surgical procedures however the optimal approach remains unclear (1-3). This trial examined the effectiveness of continuous TAP blockade via surgically placed catheters at reducing postoperative hydromorphone requirements following open nephrectomy.

Methods: Research Ethics Board Approval was obtained for this study. Forty-eight patients undergoing open nephrectomy were randomized in a double-blinded, placebo-controlled trial to receive 15 ml every 4 hours with 3 ml/h continuous infusion of 0.2% ropivacaine (Group R, n=24) or 0.9% NaCl (Group NS, n=24) via a multi-hole catheter that was surgically placed in the TAP under direct visualization. Catheters were initiated with a bolus of 20ml of 0.25% bupivacaine (Group R) or 20ml of 0.9% NaCl (Group NS). All patients received a standard general anesthetic and multimodal postoperative analgesia consisting of patient controlled analgesia hydromorphone and acetaminophen. The primary outcome, measured in the post-anesthetic care unit, at 6, 12, 24, 36 and 48h, was hydromorphone usage. Secondary outcomes included visual analogue scores at rest and with movement, incidence of postoperative nausea and vomiting, sedation, time to return of bowel function, time to ambulation, and time to discharge.

Results: Patients in Group R used less hydromorphone at all time intervals which reached significance between 12-24 hours (Group R 4.13mg +/- 3.01mg, Group NS 6.08mg +/- 4.30 mg, p= 0.04) (Table 1) . VAS scores did not differ significantly between the study and control groups at any time point (Figure 1). During the 48 hour assessment period, 44% of subjects in Group R and 47% of subjects in Group NS reported nausea or vomiting. No subjects in either group exhibited excessive sedation and the presence of a TAP catheter did not significantly influence the time to discharge, ambulation or to first bowel movement.

Conclusion: Continuous TAP blockade via a surgically placed catheter is effective at sparing opioid and offers an opportunity for improving consistency in postoperative analgesia as part of a multimodal analgesic regimen.

References:

1. *Br J Anaesth* 2009; 102:763-7

2. *Anesth Analg* 2008; 107:2056-60

3. Anaesth Analg, 117(2): 507-513, Aug 2013

Table 1

Table 1: Interval hydromorphone consumption

	Group R (n=24)	Group NS (n=24)	p > |t|
PACU	1.32 ± 1.20	2.14 ± 1.71	0.46
PACU- 6h	2.45 ± 1.41	3.67 ±2.50	0.39
6-12h	1.46 ± 1.75	2.48 ± 1.76	0.41
12-24h	3.70 ± 2.78	6.93 ± 4.07	0.03*
24-36h	3.86 ± 2.49	4.85 ± 2.91	0.86
36-48h	3.31 ± 2.19	5.32 ± 3.46	0.22

Data is presented as mean (standard deviation)

Group R = experimental group, those receiving ropivicaine boluses through TAP catheter

Group NS = placebo group, those receiving normal saline boluses through TAP catheter

* Statistically significant difference at this time point, significance inferred at $p \leq 0.05$

PACU = post anesthetic care unit

Interval hydromorphone consumption. Data is presented as mean (standard deviation). Group R = experimental group, those receiving ropivicaine boluses through TAP catheter Group NS = placebo group, those receiving normal saline boluses through TAP catheter * Statistically significant difference at this time point, significance inferred at $p \leq 0.05$

286498 - PLASMA LEVEL OF KETAMINE AND NORKETAMINE IN LOW DOSE ORAL KETAMINE IN CHRONIC PAIN PATIENTS

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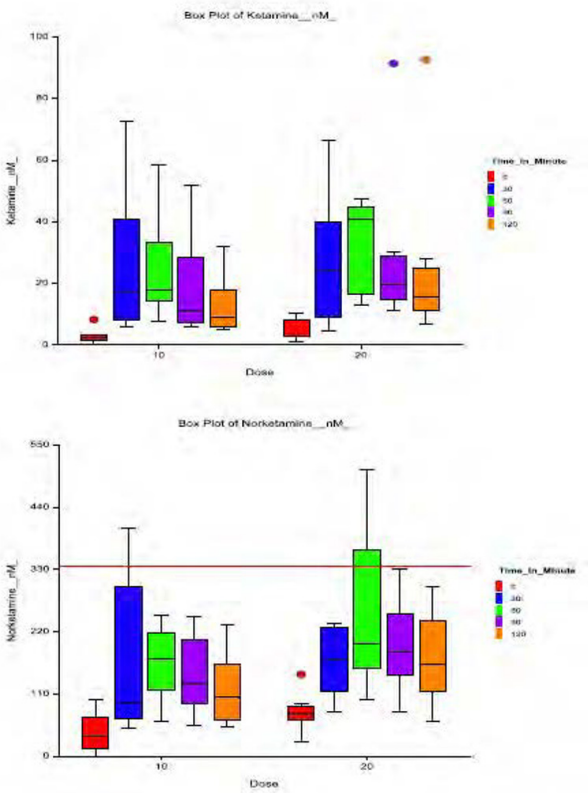
Introduction:
Ketamine, a non-competitive antagonist of the N-methyl-D-aspartate (NMDA) receptor has been shown to have anti-nociceptive effects. It has been used clinically as an opioid-sparing agent, compounded into oral capsules. Ketamine has hallucinogenic properties creating significant safety concerns regarding cognitive impairment and psychomimetic effects. Previous studies showed that IV ketamine starts to impair memory at plasma concentrations of 80 ng/ml (336 nM). This study is designed to measure the plasma concentrations of ketamine and its active metabolite, norketamine, in ambulatory chronic pain patients taking low dose oral ketamine capsules.

Methodology:
The study was approved by our institution's REB. The study population was adults with chronic neuropathic pain. They were already taking oral ketamine for the previous 1-6 months. From Day1 to Day 7, subjects took oral ketamine 10 mg TID. On the morning of Day 7 , 5 mL of blood was collected from an antecubital vein at time Zero (before AM ketamine dose) ,and at 30, 60, 90 and 120 minutes subsequently. On Day 8, the dosage was increased to 20 mg TID ; serum collection was repeated as above on Day 14. Side effects were recorded at each time period. Samples were centrifuged at 120 minutes, and EDTA plasma was stored at -20 ℃ until analysis. The assay was performed by ultra-performance liquid chromatography (UPLC) with a solid phase extraction methodology.

Results:
Eleven patients (9 F, 2 M) were recruited between December, 2013 and December, 2015. Mean age 50.4 years (±2.82), mean weight 90.9 kg (± 4.37) and mean BMI 32.5 (± 1.87). On Day 7, the peak plasma concentration for ketamine occurred at 30 min 25.3 nM (±22.17) and for norketamine 166.1 nM (±131.65). On Day 14, peak plasma concentration for ketamine and nor-ketamine occurred at 60 min 33.2 nM ±(14.07) and 249.02 nM ±(138.79) , respectively. At all points, the plasma concentration of norketamine was around 7.5 times more than that of ketamine. At 20 mg dose, 27% of the participants reported mild dizziness while 18 % reported out-of-body experiences.

Discussion:
This pilot study demonstrated that following ingestion of a standardized oral ketamine dose (either 10 or 20 mg TID), plasma concentrations of both ketamine and norketamine remain below levels previously determined to cause psychomimetic effects. Oral ketamine is rapidly converted to norketamine . Safe concentrations of norketamine have not yet been determined and should be a focus of future studies to confirm the safety of long-term oral ketamine.

References:
1. Anesthesiology. 1998 ;88:82-8.
2-Pain Physician. 2007; 10: 493-500.
3- Anesthesiology. 2012;117:353-64.
4- Paediatr Anaesth. 2007 ;17:831-40.
Plasma level of ketamine and norketamine after 10 and 20 mg of oral ketamine medication


Box Plot of Ketamine__nM_
Ketamine__nM_
Dose
Time_In_Minute
Box Plot of Norketamine__nM_
Norketamine__nM_
Dose
Time_In_Minute

PATIENT SAFETY
Saturday, June 24
10:30 - 12:15

Track: Patient Safety

270648 - UNDER PRESSURE: AIRWAY DEVICE CUFF PRESSURE MONITORING AUDIT AFTER CHANGE TO CAS GUIDELINES

Presenting Author: Isaac Miao, University of Ottawa, Ottawa, Ontario

Co-Author(s): Robert Jee, Chris Pysyk

281401 - COMPARISON OF REGISTERED AND REPORTED OUTCOMES IN RANDOMIZED CLINICAL TRIALS PUBLISHED IN ANESTHESIOLOGY JOURNALS

Presenting Author: Jeffrey T. Chow, The University of Western Ontario, London, Ontario

Co-Author(s): Philip Jones, Miguel Arango, Jason Fridfinnson, Nan Gai, Kevin Lam, Timothy Turkstra

281624 - THE ASSOCIATION OF POLYPHARMACY WITH OUTCOMES AFTER ELECTIVE SURGERY: A POPULATION-BASED COHORT STUDY

Presenting Author: Daniel I. McIsaac, University of Ottawa, Ottawa, Ontario

Co-Author(s): Carl van Walraven

281916 - IMPACT OF PREOPERATIVE HEMOGLOBIN A1C ON POSTOPERATIVE HYPERGLYCEMIA AND MORBIDITY IN DIABETIC PATIENTS

Primary & Presenting Author: Xinyang Huang, University of British Columbia, Delta, British Columbia

Co-Author(s): Tracey Hong, Andrea Bisaillon, Kelly Mayson

282670 - DOES LOW DOSE INTRA-ARTICULAR TXA REDUCE BLOOD LOSS AFTER PRIMARY THA AND TKA? A RANDOMIZED PLACEBO CONTROL TRIAL

Presenting Author: Christina Staniforth, University of Manitoba, Winnipeg, Manitoba

Co-Author(s): Sanjay Aragola

284730 - DECLINES IN PROXY MEASURES OF SURGICAL-SITE INFECTION RATES AFTER CESAREAN SECTIONS IN ONE PROVINCE

Presenting Author: Roanne Preston, University of British Columbia, Vancouver, British Columbia

Co-Author(s): Malcolm Maclure, Anat Fisher, Colin Dormuth, Greg Carney

286509 - THE ASSOCIATION BETWEEN PREOPERATIVE HEART RATE AND POSTOPERATIVE MYOCARDIAL INJURY: A RETROSPECTIVE COHORT STUDY

Presenting Author: Karim Ladha, Department of Anesthesia and Pain Medicine, Toronto General Hospital and University of Toronto, Toronto, Ontario

Co-Author(s): Scott Beattie, Gordon Tait, Duminda Wijeysundera

286523 - CORRELATION BETWEEN POSTOPERATIVE HYPERGLYCEMIA AND MORBIDITY IN NON-DIABETIC PATIENTS

Primary & Presenting Author: Xinyang Huang, University of British Columbia, Delta, British Columbia

Co-Author(s): Tracey Hong, Andrea Bisaillon, Kelly Mayson

270648 - UNDER PRESSURE: AIRWAY DEVICE CUFF PRESSURE MONITORING AUDIT AFTER CHANGE TO CAS GUIDELINES

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INTRODUCTION: The endotracheal tube (ETT) and laryngeal mask airway (LMA) have found widespread use in the operating room (OR) but are also linked to potential complications including trauma to the lips, teeth, tongue, and laryngeal structures [1]. More specifically, high cuff pressures (>30cm H2O for ETT, >60cm H2O for LMA)have been shown to be associated with sore throats, mucosal ulcers, tracheal stenosis, and vocal cord paralysis [2,3]. Studies have shown decreased incidence of these events with use of a cuff manometer [4,5]
The 2015 Canadian Anesthesiologists' Society (CAS) "Guidelines to the Practice of Anesthesia" added a cuff pressure manometer to the list of "immediately available" monitors[6]. As such, our department acquired two cuff manometers in each operating room sterile core. The objective of this quality improvement (QI) study was to measure ETT and LMA cuff pressures and survey resident and staff anesthesiologists about their use of the cuff manometer.

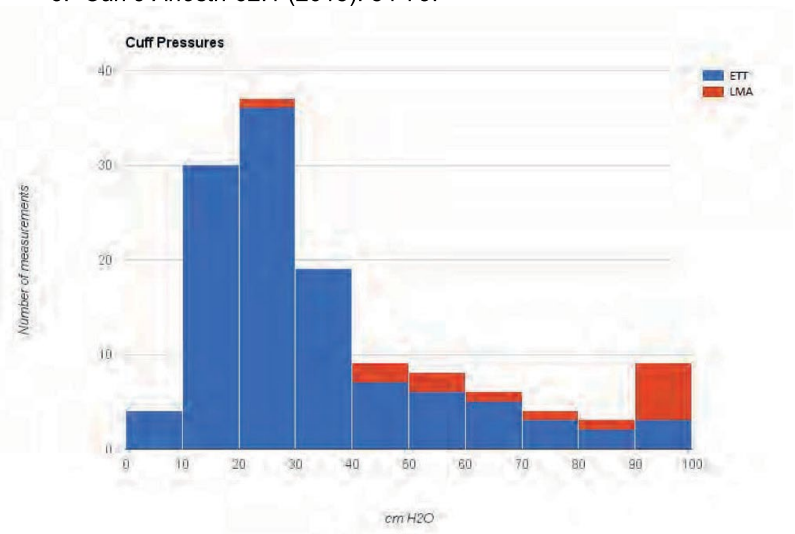
METHODS: Following institutional research ethics opinion that this QI initiative did not constitute human participant research, we performed an observational study at two tertiary health care centres between April and May 2016. All operating rooms were visited once a day. When present, ETT or LMA cuff pressures were measured in adults (>18 years) having elective, non-cardiac surgery. An anonymous survey regarding cuff measurement practices was also completed at the same time. Exclusion criteria included use of nitrous oxide, previous tracheal, laryngeal, or neck surgery.

RESULTS: 129 ETT and LMA cuff measurements revealed 28.7% of ETT and 57% of LMA pressures (Figure 1) were higher than the recommended maximum. 66 individual survey responses were recorded. Palpation was the most popular method to determine appropriate ETT cuff pressure (43.1%) compared to minimum occlusive pressure for LMA (44.3%). Over half (51.5%) of respondents were aware of the presence of cuff manometers; over three-quarters (75.8%) reported using the manometer once a month or less. 87.9% of respondents would use a manometer more often if more readily available.

DISCUSSION: Following the addition of cuff manometer use to CAS Guidelines, over a quarter of ETT and half of LMA cuff pressures were found to be higher than recommended. Most users surveyed reported rarely or never using the cuff manometer. More frequent use of the manometer would occur if it was more accesible. Due to the wide range of potential adverse effects from cuff over-inflation, one could consider a simple system-wide solution of providing cuff manometers in every operating room.

References:

1. *Anesth Analg* 42.6 (1963): 727-32.
2. *Anaesthesia* 69.12 (2014): 1304-308.
3. *Laryngoscope* 95.11 (1985): 1352-59.
4. *Anesth Analg* 111.5 (2010): 1133-137.
5. *Br J Oral Maxillofac Surg* 52.2 (2014): 140-43.
6. *Can J Anesth* 62.1 (2015): 54-79.



Histogram of cuff pressure measurements. Maximum recommended pressure for ETT is 30cm H2O and LMA is 60cm H2O

281401 - COMPARISON OF REGISTERED AND REPORTED OUTCOMES IN RANDOMIZED CLINICAL TRIALS PUBLISHED IN ANESTHESIOLOGY JOURNALS

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Introduction: Randomized clinical trials (RCTs) provide high quality evidence for clinical decision-making. Trial registration is one of the many tools used to improve the reporting of RCTs by reducing publication bias and selective outcome reporting bias. The purpose of our study was to examine whether RCTs published in the top six general anesthesiology journals were adequately registered and whether reported primary and secondary outcomes corresponded to the originally registered outcomes.

Methods: Following a pre-specified protocol, an electronic database was used to systematically screen and extract data from RCTs published in the top six general anesthesiology journals by impact factor (*Anaesthesia*, *Anesthesia & Analgesia*, *Anesthesiology*, *British Journal of Anaesthesia*, *Canadian Journal of Anesthesia*, and *European Journal of Anaesthesiology*) during the years 2007, 2010, 2013, and 2015. A manual search of each journal's Table of Contents was performed (in duplicate) to identify eligible RCTs. An adequately registered trial was defined as being registered in a publicly available trials registry prior to the first patient being enrolled with an unambiguously defined primary outcome in the registry entry. For adequately registered trials, the outcomes registered in the trial registry were compared with the outcomes reported in the manuscript, with outcome discrepancies documented and analyzed by the type of discrepancy.

Results: Over all four years, there were 869 RCTs identified with 102 RCTs determined to be adequately registered (12%). The proportion of adequately registered trials increased over time, with 38% of RCTs being adequately registered in 2015. The most common reason in 2015 for inadequate registration was registering the RCT after the first patient had already been enrolled. Among adequately registered trials, 92% had at least one primary or secondary outcome discrepancy. In 2015, 42% of RCTs had at least one primary outcome discrepancy while 90% of RCTs had at least one secondary outcome discrepancy.

Discussion: Despite trial registration being an accepted best practice, RCTs published in anesthesiology journals have a high rate of inadequate registration. While mandating trial registration has increased the proportion of adequately registered trials over time, there is still an unacceptably high proportion of inadequately registered RCTs. Among adequately registered trials, there are high rates of discrepancies between registered and reported outcomes, suggesting a need to compare a published RCT with its trial registry entry to be able to fully assess the quality of the study. If clinicians base their decisions on evidence distorted by outcome switching, patient care could be negatively affected.

References:

N/A

Table 1 – Abbreviated Description of Adequately Registered Trials and Their Associated Outcome Discrepancies

	All (n=869)	2007 (n=316)	2010 (n=227)	2013 (n=170)	2015 (n=156)
Trials which were adequately registered [a]	102/869 (12%)	2/316 (0.6%)	8/227 (4%)	33/170 (19%)	59/156 (38%)
Registration identified in article	92/102 (90%)	1/2 (50%)	8/8 (100%)	29/33 (88%)	54/59 (92%)
Registration not identified in article	10/102 (10%)	1/2 (50%)	0/8 (0%)	4/33 (12%)	5/59 (8%)
Inadequately registered trials [a]	767/869 (88%)	314/316 (99%)	219/227 (96%)	137/170 (81%)	97/156 (62%)
No trial registration located [b]	562/767 (73%)	285/314 (91%)	173/219 (79%)	73/137 (53%)	31/97 (32%)
Registration occurred after the first participant was enrolled	158/767 (21%)	22/314 (7%)	34/219 (16%)	45/137 (33%)	57/97 (58%)
No (or unclear) primary outcome was specified in registry	17/767 (2%)	0/314 (0%)	1/219 (0.5%)	8/137 (6%)	8/97 (8%)
Registration occurred after the first participant was enrolled and no/unclear primary outcome was specified in the registry	30/767 (4%)	7/314 (2%)	11/219 (5%)	11/137 (8%)	1/97 (1%)
Trials with any primary or secondary outcome discrepancy [A]	94/102 (92%)	2/2 (100%)	8/8 (100%)	30/33 (91%)	54/59 (92%)
Trials with at least one primary outcome discrepancy [B]	46/102 (45%)	1/2 (50%)	6/8 (75%)	14/33 (42%)	25/59 (42%)
Registered primary outcome not reported as primary outcome	25/102 (25%)	1/2 (50%)	3/8 (38%)	7/33 (21%)	14/59 (24%)
Reported primary outcome not registered as primary outcome	29/102 (28%)	1/2 (50%)	4/8 (50%)	7/33 (21%)	17/59 (29%)
Trials with at least one secondary outcome discrepancy [C]	91/102 (89%)	1/2 (50%)	7/8 (88%)	30/33 (91%)	53/59 (90%)
Registered secondary outcome not reported as secondary outcome	28/102 (27%)	0/2 (0%)	2/8 (25%)	9/33 (27%)	17/59 (29%)
Reported secondary outcome not registered as secondary outcome	85/102 (83%)	1/2 (50%)	7/8 (88%)	26/33 (79%)	51/59 (86%)

Data presented are the number of trials / eligible trials (%) unless otherwise stated. Percentages may not sum to 100% due to rounding.

[a] Adequate registration means that the trial was registered before the first participant was enrolled and that a primary outcome was clearly defined in the registry.
[b] No trial registration was located during the systematic search using the full-text article, clinical trial registries, and corresponding author emails as described in the Methods of this manuscript.

All uses of 'registered' pertain to the outcome as registered in the trial registry and all uses of 'reported' pertain to the outcome as reported in the published manuscript. If there are one or more occurrences of the discrepancy in a trial, the trial will be counted as having the described discrepancy. Subcategories are not mutually exclusive so if individual studies have more than one discrepancy, the sum of the subcategories will be larger than the parent category.

[A] Adequately registered trials with at least one discrepancy between the primary or secondary outcomes reported in the published article and those registered in the trial registry.
[B] Adequately registered trials with at least one discrepancy between the primary outcome reported in the published article and that registered in the trial registry.
[C] Adequately registered trials with at least one discrepancy among any of the secondary outcomes reported in the published article and those registered in the trial registry.

281624 - THE ASSOCIATION OF POLYPHARMACY WITH OUTCOMES AFTER ELECTIVE SURGERY: A POPULATION-BASED COHORT STUDY

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The association of polypharmacy with outcomes and resource use after major elective noncardiac surgery: a population based cohort study

Background

Polypharmacy, defined as concurrent use of >5 prescription medications,1 is highly prevalent in older patients, and continues to increase. In non-surgical settings, polypharmacy is associated with complications, disability, falls and decreased survival.2 Older patients are the fastest growing demographic in the surgical setting, however, evidence describing the epidemiology and outcomes associated with polypharmacy in the perioperative period is lacking. Small, single center, studies suggest that polypharmacy is associated with poor in-hospital outcomes;3 population-level studies reporting longitudinal outcomes are not available. Therefore, our objective was to describe the association between polypharmacy and outcomes following major elective noncardiac surgery in a population-level sample of older patients enrolled in a universal pharmacare program. Our secondary objective was to identify relevant effect modifiers to distinguish a higher-risk stratum of patients who might benefit from future intervention.

Methods

Ethics approval for this historical cohort study was obtained. We identified all patients aged >66 years on the day of their first intermediate to high risk elective noncardiac surgery between 2002-2014. Polypharmacy was identified from linked Ontario Drug Benefit records and was defined as receipt of >5 unique prescription medications in the 6 months prior to surgery. Unadjusted and multilevel, multivariable regression analyses, clustered at the hospital-level, which adjusted for sociodemographic factors, baseline risk of mortality, comorbidities, ASA score, historical healthcare resource use patterns, and procedural details were used to estimate the independent association between polypharmacy and 90-day survival (primary outcome), patient safety events, length of stay, discharge disposition, falls and costs of care (secondary outcomes). We also tested a fractional polynomial function to determine the best continuous representation of the number of drugs, and interaction terms between polypharmacy and postulated effect modifiers.

Results

We identified 266 499 patients, of whom 188 996 (70.9%) had polypharmacy. The mean number of prescription drugs per patient was 7.6 (SD 5.0). 5 110 (2.8%) of patients with polypharmacy died within 90 days of surgery; 1 012(1.4%) of non-polypharmacy patients died. Following adjustment for confounders, polypharmacy was independently associated with a decreased survival (HR 1.23, (95%CI 1.14-1.32). A linear function was the best continuous fit; for every additional medication, risk of death increased by 1% ($P < 0.0001$). Frailty and age were significant effect modifiers. Polypharmacy was also significantly associated with all secondary outcomes (Table).

Conclusions

Polypharmacy is present in most older patients having elective surgery. Independent of important confounders, polypharmacy is significantly associated with decreased survival, increased complications, and increased resource use after major elective noncardiac surgery. Patients with polypharmacy who are frail and younger polypharmacy patients are at significantly increased risk. Interventional studies to address polypharmacy before surgery in high risk patients are warranted.

References:

1. Drugs Aging 2010 27:1019
2. J Am Geri Soc 2014 62:2261
3. Br J Clin Pharm 200 49: 353

Study outcomes

Table - Adjusted study outcomes

Outcome	No polypharmacy	Polypharmacy	Adjusted association 95% CI	P-value
90-day mortality (n (%))	1 012 (1.4)	5 110 (2.8)	1.23 1.14-1.32	<0.0001
Length of stay (mean (SD))	6.2 (8.7)	10.8 (11.6)	1.03 1.02-1.04	<0.0001
Complication (n (%))	10 905 (15.2)	38 437 (21.1)	1.07 1.05-1.08	<0.0001
Institutional discharge (n (%))	13 728 (19.5)	45 056 (24.7)	1.10 1.07-1.14	<0.0001
90-day total healthcare costs (mean (SD))	19 531 (15 379)	23 499 (28 811)	1.05 (1.04-1.06)	<0.0001

$: 2014 Canadian dollars; CI: confidence interval; SD: standard deviation
Mortality reported as hazard ratio; Complications and Institutional discharge as odds ratios; Costs and length of stay as incidence rate ratios

281916 - IMPACT OF PREOPERATIVE HEMOGLOBIN A1C ON POSTOPERATIVE HYPERGLYCEMIA AND MORBIDITY IN DIABETIC PATIENTS

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Introduction: Diabetic patients have higher rates of postoperative hyperglycemia and morbidity[1]. There is limited evidence showing the utility of preoperative hemoglobin A1c (HbA1c) in predicting postoperative hyperglycemia and patient outcomes. Our study aimed to determine whether diabetic patients enrolled in an Enhanced Recovery After Surgery (ERAS) program were appropriately optimized prior to their elective surgery via preoperative HbA1c, whether HbA1c correlated with postoperative hyperglycemia, and the association between hyperglycemia and morbidity.

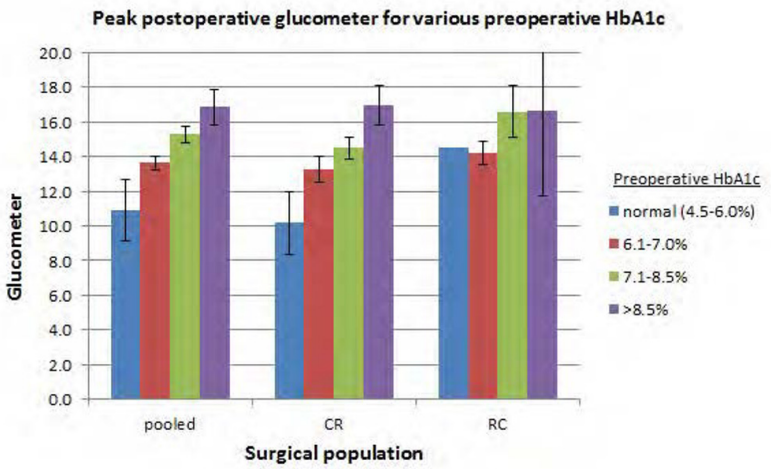
Methods: After obtaining local ethics approval, a retrospective chart review was performed on patients enrolled in our ERAS program for elective colorectal resection (CR) and radical cystectomy (RC) at our tertiary hospital from November 2013 to April 2016 (N=363 for CR, N=122 for RC). American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) defined comorbidity (including diabetic status), 30-day postoperative complications, and length of stay (LOS) were determined, as well as the highest glucometer reading for postoperative day (POD) 0,1,2,3, and the most recent preoperative HbA1c for diabetic patients. We grouped patients based on HbA1c values: 4.5-6.0% (normal), 6.1-7.0%, 7.1-8.5%, >8.5%, and compared the peak postoperative glucometer reading. Severity of hyperglycemia was determined by peak postoperative glucometer (4.4-6.7 mmol/L normal, 6.8-8.9 mild, 9.0-11.1 moderate, >11.1 severe). We compared the rate of postoperative complications and mean LOS between groups with varying severity of hyperglycemia. Comparisons between groups were done using Student's t-test or Fisher's Exact test.

Results: Prevalence of diabetes was 13%, N=64 (N=41 for CR, N=23 for RC). 39% of CR and 41% of RC had a preoperative HbA1c of 7.1-8.5%. 15% of CR and 14% of RC had an HbA1c of >8.5%. 13% of CR and 5% of RC had a normal HbA1c. Preoperative HbA1c positively correlated with peak postoperative glucometer reading and therefore predicted the degree of hyperglycemia (see figure). 81% of CR and 100% of RC diabetic patients had severe postoperative hyperglycemia. In the CR cohort, diabetics with moderate-severe hyperglycemia had a complication rate of 21.1% and mean LOS of 10.2 days, versus 17.1% (p=0.64) and 6.9 days (p=0.04) for non-diabetics with normal-mild hyperglycemia (N=146). In the RC cohort, diabetic patients with moderate-severe hyperglycemia had a complication rate of 47.8% and mean LOS of 10.1 days, versus 14.3% (p=0.01) and 8.8 days (p=0.47) for non-diabetics with normal-mild hyperglycemia (N=35).

Discussion: The majority of diabetic patients had poorly controlled diabetes prior to elective CR or RC surgeries at our hospital, and experienced severe postoperative hyperglycemia. Higher preoperative HbA1c predicted worse postoperative hyperglycemia. Diabetic RC patients all developed severe hyperglycemia and had a high rate of complications. Routine HbA1c testing, improved preoperative optimization, and tighter perioperative glucose control are required for diabetic patients at our center.

References:

1. Diabetes Care 2010 33: 1783-1788



Glucometer on y-axis in mmol/L. Bar graphs represent mean with 95% confidence intervals as error bars. Normal preoperative HbA1c under RC has no error bars due to N=1.

282670 - DOES LOW DOSE INTRA-ARTICULAR TXA REDUCE BLOOD LOSS AFTER PRIMARY THA AND TKA? A RANDOMIZED PLACEBO CONTROL TRIAL

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ABSTRACT

Objective:
Total knee and hip arthroplasty (TKA and THA) are two of the most common orthopedic procedures in North America[1,2]. Both are accompanied by substantial blood loss, often requiring allogenic blood transfusion[3]. It is desirable to reduce the need for blood transfusion as it may be associated with increased morbidity and mortality. Tranexamic Acid (TXA) is an inexpensive antifibrinolytic with a recent increase in perioperative usage [4,5,6]. It has been studied in orthopedic patient populations in multiple randomized clinical trials and systematic reviews which generally show a decrease in intraoperative blood loss and postoperative blood transfusions[4,5]. Although these studies did not detect an increased risk of venous or arterial thromboembolic events, apprehension does remain of this possible risk as a result of systemic administration. These concerns have prevented universal uptake of TXA in primary THA & TKA[3]. It is therefore attractive to investigate alternative administration routes for TXA, at doses less than that used intravenously, which may have the potential to reduce bleeding while minimizing systemic uptake. This study aimed to assess the efficacy of low dose intra-articular TXA for reducing estimated blood loss after primary THA & TKA.

Methods
After ethics approval was obtained, 140 patients were recruited in this study after screening, stratified by gender for THA and TKA (70 each). They were randomized to either receive 0.5 G of TXA in 50 ml NS or 50 ml of NS injected intra-articularly after closure of the joint capsule during surgery. Hemoglobin, D-dimer and troponin levels were checked on postoperative day one and two. Blood loss was estimated based on the drop in Hg compared to preoperative values. Patients were also assessed for any thromboembolic complications, blood transfusions and any other postoperative complications up to 90 days post procedure.

Results
The mean and median calculated blood loss was 1.187L (SD of 0.409L) and 1.245L (range -0.47 to 1.88L) respectively in the control group and 0.893L (SD of 0.234L) and 0.874L (range 0.417-1.457L) respectively in the TXA group in subjects undergoing TKA. The p-value for this result was significant at 0.000016. The difference in hemoglobin concentration also was statistically significant with a p-value of 0.000013. However, the difference in estimated blood loss between the THA study and control groups was not statistically significant. D-dimer values were significantly lower in the TXA group compared to the control group. There was no difference in serum troponin levels, blood transfusion rates and other complication rates between groups.

Discussion and Conclusion
Intra-articular TXA in a low dose (0.5G) is effective in reducing estimated blood loss in patients undergoing TKA. D-dimer values were lower in the TXA group suggesting that it is effective in reducing fibrinolysis at this dose.

References:
1. Clin Orthop Relat Res 2001 388: 58-67
2. J Bone Joint Surg Am. 2007 127: 82-93
3. Jama Surg 2015: 1239. Epublish ahead of print.
4. Health technology Assessment 2013 17: 1366-5278
5. The Cochrane Collaboration 2013 7: 1-73

6. Anesthesia. 2015 70: 50-53
Final Blood Loss Results

Table 1: Final blood loss results

	Mean blood loss	Median blood loss
TKA- Control	1.187 L (SD 0.410 L)	1.245 L (range -0.472-1.878)
TKA- TXA	0.893 L (SD 0.234 L)	0.874 L (range 0.417-1.457)
THA- Control	1.168 L (SD 0.425)	1.151 L (range 0.234- 2.153 L)
THA- TXA	1.031 L (SD 0.371 L)	0.926 L (range 0.577-2.101 L)

284730 - DECLINES IN PROXY MEASURES OF SURGICAL-SITE INFECTION RATES AFTER CESAREAN SECTIONS IN ONE PROVINCE

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Introduction: Cesarean Section (CS) is the most common type of in-hospital surgery not included in the National Surgical Quality Improvement Program (NSQIP). A pilot study at a local hospital suggested about 8% of women had a surgical site infection (SSI) within 30 days after CS, and this was significantly higher than the SSI rate determined from in-hospital data likely due to discharge on day 2/3 post cesarean before SSI appears. Providing healthcare providers with frequent validated outcome measures supports ongoing quality improvement, yet not all hospitals have access to such information.We aimed to develop and assess low-cost hospital-specific 'SQOR sheets' (surgery quality outcomes reports) for proxy measures of SSI rates using central administrative databases.

Methods: Following local Research Ethics Board Approval, and using a central hospital discharge database (DAD) for 2004-2013, we defined a cohort of 102,236 CS and a control group of 230,212 spontaneous vaginal deliveries. This data was then linked using de-identified unique patient numbers with provincial pharmaceutical dispensing data and medical services billing data from the provincial central administration database. We calculated 3 proxy measures related to SSIs in the 30-day window after delivery: the percent of women a) dispensed cephalexin, cloxacillin or clindamycin; b) prescribed any systemic antibiotics and seen by a physician who coded a diagnosis potentially SSI-related within 0-1 days before prescription; and c) had a relevant microbiology assay performed, potentially SSI-related, recorded by laboratories in billing data. Percentages in both groups, CS and control, are each the sum of false positive event rates (not markers of infections) plus true positive infection rates. Assuming false positive rates are similar, the rate difference between the CS cohort and controls estimates the increased risk of proxy events due to CS.

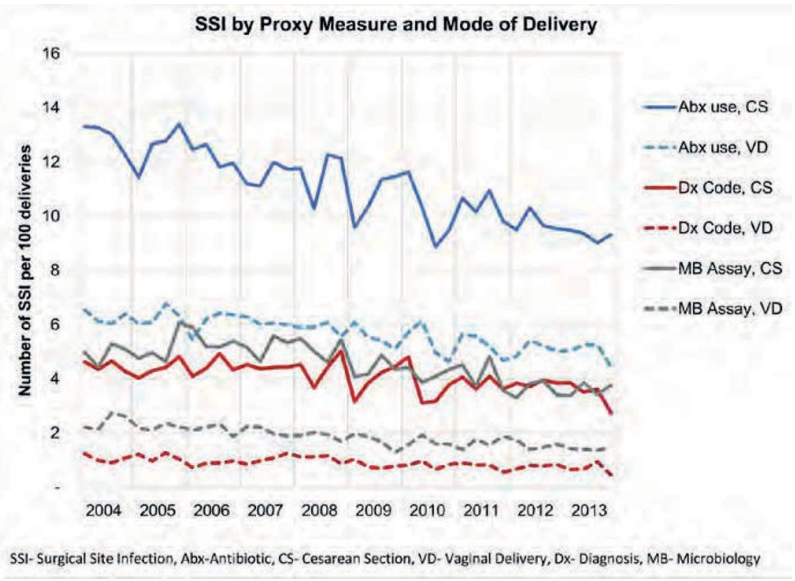
Results: We observed average annual declines of 2.3-2.8% in the 3 metrics in the CS cohort across the province (see Figure). There were different patterns of decline among different hospitals.Rate differences were as follows: Antibiotic use fell from 13.0% (95% confidence interval: 12.3 to 13.7) in 2004, to 9.3% (95% CI: 8.7 to 9.9) in 2013. SSI-related diagnosis, from 4.5% (95% CI: 4.1 to 4.9) to 3.5% (95% CI: 3.2 to 3.9). Microbiology assays potentially related to SSIs, from 4.9% (95% CI: 4.5 to 5.4) to 3.6% (95% CI: 3.2 to 4.0).

Discussion: As the data also contains unique hospital identifiers, each hospital's progress towards fewer SSIs can be inexpensively monitored using administrative data. A record-linkage study comparing NSQIP validated SSIs with proxy measures in administrative data after other types of surgery is planned to assess the accuracy of administrative data proxy measures. Nevertheless, comparisons among hospitals and over time are likely to be valid assuming consistency of the administrative data.

References:

BMJ Qual Saf. 2014 Jul;23(7):589-99.

SSI by Proxy Measure and Mode of Delivery



SSI- Surgical Site Infection, Abx-Antibiotic, CS- Cesarean Section, VD- Vaginal Delivery, Dx- Diagnosis, MB- Microbiology

286509 - THE ASSOCIATION BETWEEN PREOPERATIVE HEART RATE AND POSTOPERATIVE MYOCARDIAL INJURY: A RETROSPECTIVE COHORT STUDY

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Background: Myocardial injury is a frequent complication of non-cardiac surgery that is associated with increased morbidity and mortality.[1] Emerging data suggest a potential association between increasing preoperative heart rates and increased risks of postoperative myocardial infarction.[2] A better understanding of this relationship may help determine appropriate targets for perioperative heart rate reduction with negative chronotropic drugs such as beta-blockers. We therefore conducted a single institution retrospective cohort study to evaluate the adjusted association between preoperative heart rate and myocardial injury in patients undergoing elective non-cardiac surgery.

Methods: Patients undergoing elective non-cardiac surgery at a tertiary care multisite healthcare system from 2008-2014 were included in the study. Following institutional research ethics approval, study data were obtained from linked institutional electronic databases. Myocardial injury was defined as a peak postoperative troponin I ³0.03 ng/ml or an ICD-10 code indicating a postadmission myocardial infarction. Preoperative heart rate data were obtained during the outpatient preoperative clinic visit and categorized as < 60, 60-69, 70-79, 80-89 and ≥90 beats/min. The adjusted association between heart rate and myocardial injury was evaluated using multivariable logistic regression modeling. Covariates in the model included age, sex, ASA-PS class, comorbidities (e.g., coronary artery disease, heart disease, diabetes, anemia, smoking), preoperative medications (e.g., beta-blockers, non-dihydropyridine calcium-channel blockers, aspirin, ace-inhibitors statins) and surgical procedure. To assess the robustness of the results, several sensitivity analyses were performed. These analyses included modeling heart rate using fractional polynomials, excluding patients on negative chronotropic drugs, and accounting for missing heart rate data with inverse probability weighting.

Results: The analysis included 41,138 patients, of which 4,856 patients (11.8%) suffered myocardial injury. There was no clinically significant difference in median heart rates between patients with or without myocardial injury [72 IQR(63-83) vs 73 IQR(65-82), p < 0.001]. Patients with a preoperative heart rates ≥90 beats/min had a significantly higher adjusted odds of myocardial injury compared to patients with heart rates < 60 beats/min (OR 1.21, 95%CI 1.06-1.39, p=0.005). This result was consistent across all sensitivity analyses. Of note, when fractional polynomials were used to evaluate the association between heart rate and myocardial injury, this association appeared to be “J-shaped” (see figure 1).

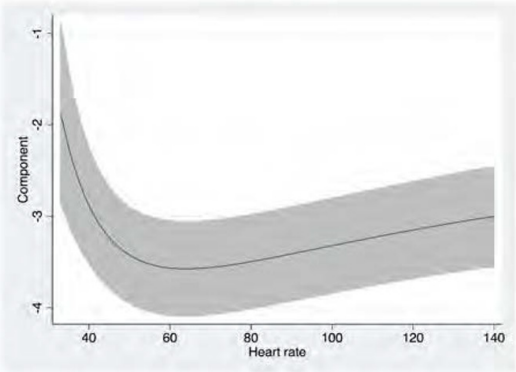
Conclusion: Our analysis confirms the presence of an association between increasing resting preoperative heart rate and postoperative myocardial injury. However, the relationship might not be linear, with some evidence of a “J-shaped” relationship. Further research is needed to confirm these findings, especially with studies that prospectively monitor heart rate for longer periods during the preoperative period.

References:

1. Van Waes JAR, Grobben RB, Nathoe HM, et al (2016) One-Year Mortality, Causes of Death, and Cardiac Interventions in Patients with Postoperative Myocardial Injury. Anesth Analg 123:29–37. doi: 10.1213/ANE.0000000000001313
2. Abbott TEF, Ackland GL, Archbold RA, et al (2016) Preoperative heart rate and myocardial injury after non-cardiac surgery: results of a predefined secondary analysis of the VISION study. British Journal of Anaesthesia 117:172–181. doi: 10.1093/bja/aew182

Figure 1

Figure 1: Relationship between preoperative heart rate and myocardial injury as determined by multivariable regression analysis using fractional polynomials



286523 - CORRELATION BETWEEN POSTOPERATIVE HYPERGLYCEMIA AND MORBIDITY IN NON-DIABETIC PATIENTS

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Co-Authors(s)
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Andrea Bisaillon - Vancouver Coastal Health
Kelly Mayson - Vancouver General and UBC Hospitals

Introduction: Postoperative hyperglycemia is an independent risk factor for morbidity[1]. There is some evidence showing a high incidence of postoperative hyperglycemia in non-diabetic patients[2,3]. Our study aimed to determine the incidence of postoperative hyperglycemia in non-diabetic patients within our Enhanced Recover After Surgery (ERAS) program and the association between hyperglycemia and morbidity.

Methods: After obtaining local ethics approval, a retrospective chart review was performed on all patients enrolled in our ERAS program for elective colorectal resection (CR) and radical cystectomy (RC) at our tertiary hospital from November 2013 to April 2016 (N=363 for CR, N=122 for RC). American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) defined comorbidity (including diabetic status), 30-day complications, and length of stay (LOS) were determined, as well as the highest glucometer reading for postoperative day (POD) 0,1,2,3. Severity of hyperglycemia was determined by peak postoperative glucometer (4.4-6.7 mmol/L normal, 6.8-8.9 mild, 9.0-11.1 moderate, >11.1 severe). We determined the incidence of hyperglycemia in non-diabetic and diabetic patients. We then compared the rate of postoperative complications and mean LOS between groups with varying severity of hyperglycemia, as well as with the diabetic cohort. Comparisons between groups were done using Student's t-test or Fisher's Exact test. Normal and mild hyperglycemia were grouped together due to low number of patients with normoglycemia.

Results: Non-diabetics accounted for 87% of the ERAS patients, N=421 (N=322 for CR, N=99 for RC). 94% of both CR and RC non-diabetics developed some degree of hyperglycemia. 13.5% developed severe hyperglycemia (10.6% CR, 23.2% RC), while 39.4% developed moderate hyperglycemia. Severe hyperglycemia appeared to be associated with an increased incidence of 30-day complications (32.4% vs 17.1%, p=0.06) and LOS (9.6 days vs 6.9, p=0.02) in CR patients, and increased LOS (13.0 vs 8.8, p=0.10) in RC patients (see figure). In patients with severe hyperglycemia, non-diabetics had a higher incidence of complications (32.4% vs 18.2%, p=0.26) than diabetics in the CR cohort, and had a longer LOS (13.0 vs 10.1, p=0.39) than diabetic patients in the RC cohort, but did not reach statistical significance.

Discussion: Most non-diabetic patients developed some degree of hyperglycemia after elective CR or RC surgeries at our hospital. Severe postoperative hyperglycemia was associated with increased morbidity, and 13.5% of our non-diabetic patients experienced severe hyperglycemia. These results highlighted the importance of proactive monitoring and treatment of hyperglycemia for all patients enrolled in an ERAS protocol, and to consider improved screening for diabetes preoperatively. Due to the small sample size of some of the cohorts, further data collection is underway.

References:

1. Diabetes Care 2010 33: 1783-1788
2. Ann Surg 2013 258: 599-605
3. Saudi Med J 2008 29: 1294-1298

	30-day complications	Mean LOS ± 95% confidence interval (days)	Number of patients
CR non-diabetic normal-mild hyperglycemia	17.1%	6.9 ± 0.1	146
CR non-diabetic severe hyperglycemia	32.4%	9.6 ± 0.9	34
CR diabetic severe hyperglycemia	18.2%	9.6 ± 1.9	33
RC non-diabetic normal-mild hyperglycemia	14.3%	8.8 ± 0.6	35
RC non-diabetic severe hyperglycemia	17.4%	13.0 ± 2.3	23
RC diabetic severe hyperglycemia	47.8%	10.1 ± 1.4	23

PEDIATRIC
Saturday, June 24
13:15 - 15:00

Track: Pediatric Anesthesia

276739 - CONTINUOUS CAUDALLY-THREADED EPIDURAL ANALGESIA AFTER PEDIATRIC SURGERY

Primary & Presenting Author: Shih-Chieh Huang, University of British Columbia, Surrey, British Columbia

Co-Author(s): Nicholas West, Gillian Lauder, Carolyne Montgomery

281272 - EVALUATION OF PANDA, A SMARTPHONE APPLICATION DESIGNED TO SUPPORT PEDIATRIC POST-OPERATIVE PAIN MANAGEMENT AT HOME

Presenting Author: Ian Miao

Co-Author(s): Ian Miao, Dustin Dunsmuir, Nicholas West, Matthias Görges, Gregor Devoy, Gillian Lauder, J Mark Ansermino

284514 - ENHANCED PERIOPERATIVE MANAGEMENT OF CHILDREN WITH AUTISM: A PILOT STUDY

Presenting Author: Amanda J. Whippey, McMaster University, Smithville, Ontario

Co-Author(s): Leora Bernstein, Desigen Reddy

284819 - THE USE OF PRE-OPERATIVE ORAL IRON THERAPY TO REDUCE INTRA-OPERATIVE TRANSFUSION DURING PAEDIATRIC CARDIAC SURGERY

Presenting Author: Yvonne Doyle, Sick Kids, Toronto, Ontario

Co-Author(s): Patrick Segun, Nadia Naraine, Kathleen McShane, Wendy Lau, Osami Honjo, Teresa Skelton

285241 - CHILDREN WITH OBSTRUCTIVE SLEEP APNEA UNDERGOING DIAGNOSTIC OR SURGICAL PROCEDURES: TOPICS FOR SYSTEMATIC REVIEW

Presenting Author: Wesley Chen, University of Ottawa Faculty of Health Sciences, Ottawa, Ontario

Co-Author(s): Kimmo Murto, Sherri Katz, Deborah Schwengel, David Gozal

285283 - VR FOR REDUCING ANXIETY IN CHILDREN - PHASE 1: DESIGN, VALIDITY & ACCEPTABILITY BY HEALTHCARE PROFESSIONALS.

Presenting Author: Ben O'Sullivan, The Hospital For Sick Children, Toronto, Ontario

Co-Author(s): Katie Brazel, Monica Caldera, Maria Salman, Fahad Alam, Clyde Matava

285300 - VR FOR EDUCATING & REDUCING ANXIETY IN CHILDREN - PHASE 2: FACE VALIDITY & ACCEPTABILITY BY CHILDREN AND PARENTS

Presenting Author: Ben O'Sullivan, The Hospital For Sick Children, Toronto, Ontario

Co-Author(s): Katie Brazel, Fahad Alam, Clyde Matava

286577 - THE IMPACT OF SOCIAL MEDIA ON PEDIATRIC ANESTHESIA PAPERS AND BIBLIOMETRY

Presenting Author: Maria Salman, Sickkids, Toronto, Ontario

Co-Author(s): Clyde Matava

276739 - CONTINUOUS CAUDALLY-THREADED EPIDURAL ANALGESIA AFTER PEDIATRIC SURGERY

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Co-Authors(s)
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Gillian Lauder - University of British Columbia
Carolyne Montgomery - University of British Columbia

Introduction
Appropriate pain management is a vital part of perioperative pediatric care. However, in infants and neonates, direct lumbar or thoracic placement of epidural catheters is technically challenging(1). To reduce risk of spinal cord puncture, the thoracic or lumbar regions can be accessed via the caudal route(2). Thus, postoperative analgesia in pediatric patients undergoing upper abdominal or thoracic surgeries is often provided through caudally-threaded epidural technique at our institution. The aim of this retrospective, single-centre audit is to examine the practice patterns and complications associated with the insertion and management of these epidurals.

Methods
With local REB approval, a retrospective audit of a 5-year experience (June 2011-June 2016) at our tertiary academic hospital was undertaken. Patients with documented caudally-threaded epidural or those with age and procedure indicating probable use of the technique were identified from the Acute Pain Service records and Operating Room booking system. Definitions of functional success (insertion and use for >24 hrs) and complications were established. Demographic, procedural, pharmacological and complication data were extracted from patient records. Descriptive data analysis was performed in MS-Excel.

Results
Eighty-three subjects with median(range) age 1.7(0.1-30) months, and weight 4.5(1.6-17.3) kg were identified. Of these, 57/83(69%) were cardiac and were managed by 4 cardiac anesthesiologists. The overall success rate of insertion was 98%(81/83), with 2 epidurals abandoned intraoperatively. Routine postoperative xray confirmed catheter tip location in 63/81(78%) of subjects – 5% in cervical, 87% in thoracic, 6% in lumbar and 2% in sacral region. Of the cervical placements, the catheter was repositioned in 2/3 subjects and removed in 1/3. Local anesthetic (LA) was not prescribed in 1 case. Bupivacaine was used in 62/81(77%), ropivacaine in 2/81(3%) and bupivacaine/hydromorphone in 16/81(20%). The median (range) dose of LA prescribed was 0.28(0.15-0.50) mg/kg/hr. Continuous systemic opioid supplementation was used in 34/81(42%) cases. The introducer needle size and type were not documented in 33/83(40%) and 42/83(51%) of cases, respectively, and catheter size was not recorded in 46/83(55%). The number of inserted catheters in use at 24 hrs was 44/81(54%). The reason for epidural removal before 24 hrs was uncertain in 13/37(35%) of cases, and due to incorrect placement of catheter in 10/37(27%). Overall complication rate was 29%(24/83), with soiling of dressing and vascular puncture being more common (Table 1).

Discussion In this series, the functional success of this technique was 53%, suggesting a need to revaluate its usage. More rigorous documentation would better inform future practice. A focused prospective audit guided by information from this series is planned to evaluate more accurately our practice and to determine if risk-benefit trade-offs favour this invasive technique in a vulnerable population.

References:
1. Anesthesiology 2004 100(3): 683-9
2. Can J Anaesth 1990 37(3): 359-62
Incidence of Complications

Table 1. Incidence of Complications

Complication	*n*	Incidence
Vascular puncture	4	4.8%
Abandoned block	2	2.4%
Soiling of dressing	9	10.8%
Catheter leakage	4	4.8%
Hypotension	3	3.6%
Excessive motor block	1	1.2%
Respiratory depression	1	1.2%
Overall	24	28.8%

281272 - EVALUATION OF PANDA, A SMARTPHONE APPLICATION DESIGNED TO SUPPORT PEDIATRIC POST-OPERATIVE PAIN MANAGEMENT AT HOME

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Introduction: The growing trend towards ambulatory surgery has shifted the burden of post-operative pain management from health care providers to families [1]. However, studies suggest that a child's pain is often poorly managed at home [2-4]. Inadequate acute pain control can lead to slower functional recovery, poor oral intake, sleep disturbances and behavioural changes. It can contribute to post-traumatic stress disorder and chronic pain [5-7]. Support for parental decision-making, in the form of an accessible and user-friendly smartphone app, has the potential to reduce unnecessary and severe post-operative pain experienced by children: *Panda* is such an app, designed to aid parents in 1) the assessment of their child's pain, 2) administering pain medications at appropriate times, and 3) tracking pain and medications given. The purpose of this study was to assess the usability of *Panda* with potential users to evaluate its ease of use and display of information.

Methods: With REB approval and informed consent, parents, nurses and adolescents were enrolled into the study. After watching a 2-minute tutorial video on how to use the app, the user was given a simulated scenario of managing a child's post-operative pain. Usability issues were identified from observations while each user performed 4 tasks. Users were encouraged to 'think aloud' [8]. Written feedback and a Computer Systems Usability Questionnaire (CSUQ) [9] were completed. The Usability Problem Taxonomy (UPT) [10] was used to structure and code errors. Severity of each problem was graded on a 1 (low) to 4 (critical) scale

Results: Twelve nurses, 13 parents, and 5 adolescents were recruited for 3 rounds of usability (n=30, 10 per round). The design team modified *Panda,* based on usability data, after each round. A total of 103 problems were identified and organized into 19 discrete usability issues, with a median (range) severity rating of 3 (1-3), or "serious". These problems occurred mostly during the setup of medication alerts (33%), editing a given medication (16%), adding a new medication (13%), and safety checks for medication administration (10%). Most problems were classified as artifact issues (19 total) within the visual (53%), language (16%) and manipulation (16%) categories. Overall, users felt the app was usable, as shown by CSUQ median (range) score of 2 (1-4). Overall 67% (20) of users indicated that they would use *Panda* for management of their child's post-operative pain.

Discussion: Initial usability testing of the *Panda* app yielded usability issues mostly related to medication scheduling, recording and editing. The majority of these usability issues pertain to visual presentation, language within the app, and user manipulation of the interface. A feasibility trial in hospital is currently underway to assess how parents and their child interact with the app in a supervised, but safe, setting, in order to identify further usability issues and barriers that may hinder safe and effective use at home.

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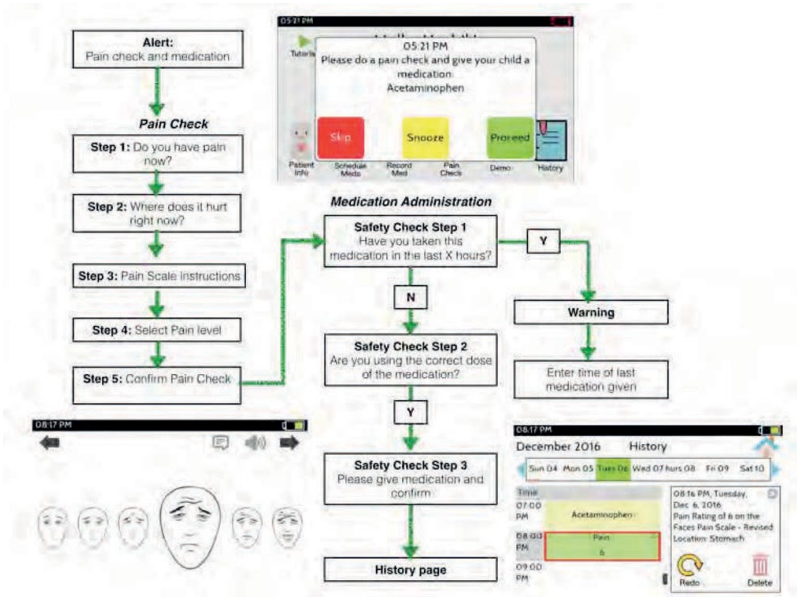
Flowchart of Panda App Pain Assessment and Medication Administration Functions



It illustrates the flow of a user's response to an alert to perform a pain check and give medication through to their completion with a review of the documented values.

284514 - ENHANCED PERIOPERATIVE MANAGEMENT OF CHILDREN WITH AUTISM: A PILOT STUDY

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Introduction: The prevalence of children with autism spectrum disorder (ASD) is increasing. 1 in 68 children is currently diagnosed with ASD[1]. In the hospital setting, difficulties with socialization, communication and behaviour are exacerbated[2,3,4]. Often quantitative measures do not capture the significant difference in perioperative stress experienced by these patients, their families and healthcare providers[5]. The aim of this study was to implement and evaluate a perioperative care pathway for children with autism spectrum disorder (ASD) that would decrease anxiety for patients and families.

Methods: Approval from the local Ethics Committee was obtained. Utilizing parental and healthcare provider feedback, a protocol including environment modification, individualized anxiolysis plans, specialized order sets, and Child Life support was developed over an 18-month period. Autism severity scores (ASS), communication styles, triggers and previous anesthetic experience were used to create an anxiolysis plan. This plan was created by a pediatric anesthesiologist and child life specialist following consultation in a Preoperative Clinic. Child life support was provided on the day of procedure and perioperative processing was altered to minimize transitions, wait times and NPO duration. Preoperative medication was individualized to the patient using midazolam and/or ketamine, administered orally, intravenously, or intramuscularly. Anxiety and sedation scores in same day surgery, at induction and in PACU were recorded. Feedback on the intrusiveness and efficacy of the protocol from nurses and anesthesiologists was obtained. Parental satisfaction and identification of aspects of the protocol that were most helpful were reviewed.

Results: A total of 20 patients were included in this pilot study. 85% (17) of patients were nonverbal and minimally interactive (ASS 1 or 2). The most common sensory dislikes were noise and crowds (75%, 15/20). Anxiety scores were high prior to premedication, however 90% (18/20) of anesthetic inductions were described as very good or excellent (ie. patient calm, accepted IV or mask easily). 60% of patients received midazolam and ketamine presedation. Average recovery time was 60-90 minutes. One episode of emergence delirium was observed in PACU. Parents described the personalized approach, quiet space, parental presence in the operating room, and dedicated child life support worker as advantageous. 50% parents felt no further changes were needed, while others suggested that minimizing people in the area and shorter wait times would be helpful. 100% of nurses, anesthesiologists and parents felt the program should continue.

Discussion: This pilot study demonstrated that a multidisciplinary perioperative care plan that decreases anxiety and agitation in children with severe ASD, was feasible at our institution. Initial feedback from nurses, anesthesiologists and parents has been very encouraging. The individual nature of anxiolysis plans was seen as a strength of the protocol by parents. A larger prospective study will help to identify the best way to support these families.

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284819 - THE USE OF PRE-OPERATIVE ORAL IRON THERAPY TO REDUCE INTRA-OPERATIVE TRANSFUSION DURING PAEDIATRIC CARDIAC SURGERY

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TITLE The use of pre-operative oral iron therapy to decrease intra-operative transfusion in paediatric cardiac surgery patients.

INTRODUCTION: Pre-operative iron has been shown to reduce intra-operative red cell transfusion volumes for a variety of elective major surgical cases. Paediatric patients undergoing surgery for congenital cardiac lesions frequently have significant transfusion requirements, often associated with a variety of risks such as increased lenth of stay, morbidity and mortality. However, it has been proven that lower haematocrit values in infants undergoing congenital cardiac surgery had higher lactate levels and lower cardiac index scores. These children also had worse psychomotor development scores at 1 year of age. While there have been multiple studies suggesting that pre-operative iron reduces transfusion requirements for adult patients undergoing major surgery, there is sparse evidence regarding paediatric patients. Our aim was to examine the impact of the use of pre-operative oral iron therapy on reducing exposure to allogenic blood transfusion in paediatric patients undergoing elective cardiac surgery.

METHODS: We have performed a retrospective analysis of 282 patients weighing greater than 12kg for elective cardiac surgery at our institution from 2011-2014. 141 patients received oral iron therapy pre-operatively, of varying duration, which was prescribed by our blood conservation nurse. 141 patients in the control group did not receive iron therapy. Our primary endpoint was the volume of packed red blood cells (PRBCs)transfused per kg body weight during patients hospital stay. Adjustment was made for cardiopulmonary bypass times for final analysis.

RESULTS: 68.09 % of the patients who received iron were transfused compared to 65.96 % of patients who did not receive iron. The relative risk of transfusion, accounting for all blood products, in patients who received iron was 1.05(0.82, 1.34) with a p value of 0.7 In the unadjusted analysis, the mean volume of PRBCs per kg was 12.17 (9.39, 14.96) in patients on iron therapy versus 16.49 (12.78, 20.2) on those not on iron therapy, with a trend toward significance (p= 0.067) With adjustment for bypass times, we demonstrated that giving iron pre-operatively results in 13.28ml/kg (2.73, 23.83) decrease in PRBCs transfused, with a p-value of 0.047. There was no difference in the average length of stay between the two patient groups.

DISCUSSION: This study has shown that pre-operative oral iron therapy reduces the rates of transfusion of red cells in elective cardiac surgery for children weighing over 12kg, when adjusting for time on cardioplumonary bypass. These results provide a new knowledge as previous studies have only shown a reduction in transfusion in cardiac surgery patients when combining both iron and erythropoiten.

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Summary of Results

Unadjusted association between transfusion outcomes	Mean (SD)	95% Confidence Interval	p-value
Number of Units of Red Blood Cells			0.114
Iron	0.97 (1.41)	0.74, 1.21	
No Iron	1.41 (2.97)	0.92, 1.91	
Number of Units of Frozen Plasma			0.07
Iron	0.26 (0.69)	0.15, 0.39	
No Iron	0.58 (1.96)	0.26, 0.91	
Number of Units of Platelets			0.164
Iron	0.47 (1.00)	0.32, 0.63	
No Iron	0.64 (1.08)	0.46, 0.82	
Number of Units of Cryoprecipitate			0.065
Iron	0.1 (0.36)	0.04, 0.16	
No Iron	0.27 (1.3)	0.1, 0.44	
Vol PRBCs (ml/kg)			
Iron	12.17 (16.7)	9.39, 14.96	0.067
No Iron	16.49 (22.29)	12.78, 20.20	

Results

285241 - CHILDREN WITH OBSTRUCTIVE SLEEP APNEA UNDERGOING DIAGNOSTIC OR SURGICAL PROCEDURES: TOPICS FOR SYSTEMATIC REVIEW

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Introduction: Obstructive sleep apnea (OSA) affects 2-4% of children in North America (NA)[1]. Adenotonsillectomy (AT) is the first-line treatment for OSA and is one of the most common pediatric surgeries in NA[2,3]. OSA increases perioperative risk for respiratory complications in children[4,5]. Unfortunately, less than 12% of children have a definitive OSA diagnosis before surgery[6]. Our goal was to identify the top three controversial topics related to the management of children at risk for OSA undergoing sedation/general anesthesia for a diagnostic/therapeutic procedure.

Methods: This study received research ethics board approval. Two rounds of a Delphi-approach were used to obtain feedback from an interdisciplinary panel of NA pediatric OSA experts. Seventeen committee and resource members within the Society for Anesthesia and Sleep Medicine (SASM) identified 25 colleagues considered experts in the care of children with OSA. Specialty representation included anesthesiology, otolaryngology, pulmonology and sleep medicine. Participants were surveyed using REDCap™ technology. Each participant provided their top three controversial topics of interest in rank order. Topics were collated, presented in descending order of importance and rated by the same clinicians during the second round. Participants rated each of the topics on a Likert scale from 1 (minimal importance) to 5 (greatest importance). Consensus was pre-determined to be 75% of participants selecting a value $\geq$4 (major importance) for a topic.

Results: In the first Delphi round, 24 clinicians (anesthesiologists [n=12], otolaryngologists [n=4], pulmonologists [n=4], and sleep medicine specialists [n=4]) participated. Seven topics were identified. Topics were collated, presented to, and rated by 23 of the same clinicians during the second round (dropout n=1). Two topics met the criteria for consensus (Table 1). The majority (96%) of respondents selected “postoperative disposition” related to postoperative risk assessment for respiratory complications and monitoring. Eighty-three percent selected “preoperative screening” related to identifying an alternative means to polysomnography for OSA diagnosis. Although “pain management” did not achieve consensus (74%), it was considered the third controversial topic due to its rank order (3rd) and lower level of importance (61%) attributed to the 4th ranked topic “sedative use”.

Discussion: A consensus was reached by a panel of pediatric OSA experts on the top three controversial topics related to the perioperative care of children with OSA. In descending order of importance they were: 1) postoperative disposition, 2) preoperative screening, and 3) pain management. These three topics are prime candidates for systematic review and can guide future research endeavors.

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Table 1. Consensus topic results following Delphi round 2

Topic of Interest	Topic Description	Percent Agreement Topic is of "Major-Greatest Importance" (n)
Post-operative disposition	To identify which patients are at risk for postoperative respiratory complications requiring prolonged and/or more intensive monitoring	22/23 = 96%
Pre-operative screening	To identify other preoperative means to diagnose OSA instead of polysomnography	19/23 = 83%
Pain management	What is the appropriate perioperative pain management in children with OSA?	17/23 = 74%
Sedative use	What are appropriate sedative agents for use in children with OSA?	14/23 = 61%
Sleep endoscopy and anesthetic technique	What is the appropriate sedation/anesthetic technique to perform upper airway sleep endoscopy?	8/23 = 35%
Alternative surgical techniques	Excluding AT, what other surgical techniques are appropriate to manage OSA in children?	5/23 = 22%
Sleep endoscopy and OSA diagnosis	What is the role of upper airway sleep endoscopy to diagnose OSA?	5/23 = 22%

OSA=obstructive sleep apnea; AT=adenotonsillectomy

285283 - VR FOR REDUCING ANXIETY IN CHILDREN - PHASE 1: DESIGN, VALIDITY & ACCEPTABILITY BY HEALTHCARE PROFESSIONALS.

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Introduction

Up to 65% of children experience significant pre-operative anxiety when undergoing anaesthesia for operative and diagnostic procedures. Psycho-educational child pre-operative anxiety reduction techniques have been extensively researched and can be conveniently categorised into preoperative preparation, distraction techniques and parental presence. Children above the ages of 6 who have started to develop logical thinking, have a better understanding of the reason for the therapies required and may benefit from tours and preparation programmes.

Virtual Reality offers an immersive experience that may assist with reduction of anxiety in children. However, such technologies need to be assessed for realism and acceptability by healthcare professionals, pediatric patients and their parents.

The aim of our study was to investigate the usability and acceptability of virtual reality for preparation of children for the operating room by healthcare professionals.

Methodology

Following institutional approval, we designed an immersive virtual 1st person perioperative experience. This allows children to prepare for the operating room by enabling them to 'experience' the process of receiving and recovering from an anaesthetic, thereby improving their understanding of upcoming events and hopefully assisting with the reduction of pre-operative anxiety and postoperative behavioural disorders. The concepts in the VR experience were developed in collaboration with our hospital's ChildLife department.

During phase 1, we recruited healthcare workers and asked them to undertake the virtual experience and complete a questionnaire to assess the face and content validity of the VR experience for children. Using an accelerated rapid cycle development framework, we evaluated the level of realism, acceptability, and incidence of side effects.

Results

97 staff (67% female) at our hospital reviewed and completed the Virtual Reality Experience. Staff were from across many professions including physicians – 29%, Nursing 25% and other clinical and non-clinical disciplines 46%.

91% rated the VR experience as realistic, 96% as being beneficial for preparing paediatric surgical patients and 82% believed it would reduce anxiety levels in children and 94% thought that this technology should be used in other areas of the hospital. 99% (96/97) of healthcare workers would recommend the immersive VR experience to their pediatric patients.

The final build had a motion sickness and dizziness incidence of 0% and 7.5% respectively among healthcare workers. These side effects were short lived, resolving with the conclusion of the video with no ongoing negative effects. None of these side effects were significant enough to stop the participant completing the experience.

Conclusions / Discussion

We have demonstrated that healthcare workers believe that our virtual experience is a valid and acceptable form of preparing children for their perioperative experience. The high level of acceptance may indicate a superior efficacy for preparing children and may contribute to reducing anxiety.

Further research is required to ascertain the acceptance, feasibility and benefits of virtual reality by children and their parents and also to ascertain which subsets of children this virtual experience is most appropriate for.

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285300 - VR FOR EDUCATING & REDUCING ANXIETY IN CHILDREN - PHASE 2: FACE VALIDITY & ACCEPTABILITY BY CHILDREN AND PARENTS

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Introduction

Up to 65% of children experience significant preoperative anxiety when undergoing anaesthesia for operative and diagnostic procedures. Psychoeducational child preoperative anxiety reduction techniques have been extensively researched and can be categorized into preoperative preparation, distraction techniques and parental presence. Children above the age of 6 have started to develop logical thinking, have a better understanding for reasons for the therapies required and may benefit from tours and preparation programmes. Virtual Reality offers an immersive experience that may assist with reduction of anxiety in children.

Having previously demonstrated healthcare workers' acceptance of our virtual experience as a valid, acceptable and potentially beneficial form of preparing children for their perioperative journey, phase 2 of our study was to investigate the usability and acceptability by children and parents.

Methodology
Following Institutional Approval and written consent, we recruited children between 6 and 18 to use our novel immersive virtual reality experience prior to anesthesia. This allowed children to prepare for the operating room by enabling them to 'experience' the process of receiving and recovering from an anaesthetic, improving their understanding of upcoming events and assisting with the reduction of pre-operative anxiety and postoperative behavioural disorders. Participants completed questionnaires evaluating the immersive VR experience on ease of use (System Usability Score - SUS), realism, acceptability, impact on their anxiety and preference over the standard PPT method.

Results
We recruited 75 children and parents. 71/75 (95%) of children evaluated the immersive virtual reality as preparing them well for anesthesia and wished to use it in the future. Children with previous anaesthetics rated the experience highly. 1 child declined to participate as they had >8 previous anesthetics and felt they had nothing to gain. 74/75 (98%; 95% CI, 92-100) participants rated the system as easy to use & required no further training. 71/75 (94%; 95%CI, 87-98) of participants chose the immersive virtual reality experience over the PowerPoint slideshow for future anesthesia preparation.

2 (2.67%; 95% CI, 0.7 to 9) children experienced motion sickness / dizziness. 4 (5.33; 95%; 2 to 12) children found the video blurry and in 1 this caused a headache. All symptoms resolved as soon as the headset was removed and did not prevent completion of the experience.

Children & parents reported high SUS scores of 85.45 and 86.4 respectively indicating excellent usability. Comments from children included 'this would help with anxiety' & 'so cool'.

Discussion
We have demonstrated that both children and their parents evaluate our immersive virtual experience as a valid, acceptable and fun form of preparing for the operating room. Children self-reported the benefits of this in reducing their anxiety. The incidence of side effects is low among our participants. We will continue evaluating immersive virtual reality in prospective RCTs.

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[1] M. I. Ahmed, M. A. Farrell, K. Parrish, and A. Karla, "Preoperative anxiety in children risk factors and non-pharmacological management," *Middle East J. Anesthesiol.*, vol. 21, no. 2, pp. 153–170, 2011.

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286577 - THE IMPACT OF SOCIAL MEDIA ON PEDIATRIC ANESTHESIA PAPERS AND BIBLIOMETRY

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Background:
The use of social media has become prevalent in both contemporary and scientific communities. Alternative metrics (altmetrics) allow for the evaluation of the impact generated by academic papers, and can be measured by the aggregate Altmetric Score (ALTScore). Altmetric score is a novel aggregate of various social media mention indices. The purpose of this study was to examine the characteristics of the 100 highest ALTScore papers in pediatric anesthesiology and to evaluate the correlation with citations.

Methods:
This study was exempt from Ethics Approval. A database study was performed in May 2016 utilizing the Altmetric Explorer tool (Altmetric.com) that included articles in anesthesia and pain medicine focusing on pediatric anesthesia. A supplemental search was conducted with other major journals such as The Lancet, and New England Journal of Medicine specifically looking for pediatric anesthesia papers. For the top 100 ALTScore papers, altmetrics and Scopus citation data were collected. Correlation coefficients between variables were determined and statistical significance was calculated. Abstracts were read to identify key themes present.

Results
ALTScores were highly correlated with Twitter mentions (r=0.81) but were not highly correlated with other social media metrics, citations, or access counts. Theme analyses identified original articles and case reports as being highly mentioned. The most popular topics included neurotoxicity, methods of sedation, and chronic pain. There was a strong association between mention on Mendeley with citation (r=0.71; p=0.02). Twitter mentions were not associated with citations.

Conclusion
Our study demonstrates the characteristics of highly mentioned pediatric anesthesia papers. They focus on controversial and challenging topics. Academic based social media such Mendeley appears to influence citation while Twitter does not. Further research on translation of information shared on social media into clinical practice and patient outcomes is needed.

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REGIONAL AND ACUTE PAIN
Sunday, June 25
08:30 - 10:15

Track: Regional Anesthesia

277792 - THORACIC EPIDURAL PLACEMENT IN A PREOPERATIVE BLOCK AREA IMPROVES OR EFFICIENCY AND DECREASES EPIDURAL FAILURE RATE

Presenting Author: Yehoshua Gleicher, Sunnybrook Health Sciences Centre, Toronto, Ontario

Co-Author(s): Oskar Singer, Jamie Belo, Paul McHardy

280260 - USING HOLOLENS AUGMENTED REALITY TO COMBINE REAL-TIME USS IMAGES AND PATIENT MONITOR DATA OVERLAID ON PATIENT

Primary & Presenting Author: Clyde Matava, Hospital for Sick Children, University of Toronto, Toronto, Ontario

Co-Author(s): Fahad Alam, Rami Saab

281186 - COMPARISON OF INFRACLAVICULAR AND SUPRACLAVICULAR BLOCKS FOR ELBOW SURGERY: A RANDOMIZED CONTROLLED STUDY

Presenting Author: Brigid Brown, Western University/Department of Anaesthesiology, St. Joseph's Hospital, London, Ontario

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283054 - ANALGESIC ROLE OF ADDUCTOR CANAL BLOCK IN AMBULATORY ARTHROSCOPIC KNEE SURGERY: SYSTEMATIC REVIEW & META-ANALYSIS.

Presenting Author: Herman Sehmbi, UNIVERSITY HOSPITAL, WESTERN UNIVERSITY, London, Ontario

Co-Author(s): Richard Brull, Ushma Shah, Faraj Abdallah

284738 - A RADIOLOGIC SURVEY OF THE PARAVERTEBRAL SPACE: CONFIRMATION OF LANDMARK TECHNIQUE

Presenting Author: Reva Ramlogan, The Ottawa Hospital, Ottawa, Ontario

Co-Author(s): Jonathan Round, Cheemun Lum, Anne Lui

285026 - EFFECT OF INTRAVENOUS DEXMEDETOMIDINE IN THE DURATION OF INFRACLAVICULAR BLOCK: RANDOMIZED, DOUBLE-BLIND STUDY

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286444 - REGIONAL CHANGES IN BLOOD FLOW AND ENDOTHELIAL FUNCTION FOLLOWING BRACHIAL PLEXUS BLOCK

Presenting Author: Terrence J. Leeper, Western University - Department of Anesthesia, London, Ontario

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286610 - SUBSCAPULARIS PLANE BLOCK - A NOVEL PHRENIC NERVE SPARING SINGLE INJECTION SHOULDER BLOCK - AN ANATOMICAL STUDY

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277792 - THORACIC EPIDURAL PLACEMENT IN A PREOPERATIVE BLOCK AREA IMPROVES OR EFFICIENCY AND DECREASES EPIDURAL FAILURE RATE

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Background

Thoracic epidural analgesia (TEA) offers effective perioperative analgesia, with a low incidence of side effects for major abdominal surgical procedures. Furthermore, they have been shown to reduce perioperative cardiopulmonary complications [1-3] and even mortality [4]. TEA placement takes time and resources. At most centres they are inserted in the operating room prior to anesthetic induction and this consumes valuable operating room time. The pressure for a punctual start may also add to stress burden of the anaesthetist during this busy time. Following the addition of a regional anesthesia block room at our centre, we transitioned to inserting TEA before the patient arrives in the operating room.

Methods

A retrospective quality improvement chart review for all elective major abdominal surgery cases receiving TEA over a 12 month period. The review included 6 months of data prior to implementation of the regional anesthesia block room and 6 months of data following implementation. Collected data included: age, procedure type, time from patient arrival to the operating room to surgical preparation, epidural failure rate (defined as inability to locate the epidural space or lack of any surgical site sensory block following epidural bolus), and number of epidural attempts. Local ethics board approval was not required as per our institution's guidelines for quality improvement studies of this nature.

Results

A total of 245 thoracic epidural cases were reviewed: 107 pre block room TEAs; 134 post-block room implementation TEAs. Insertion of TEAs in the block room reduced patient operating room arrival to surgical preparation time by an average 22.8 minutes per patient (95% CI: 19.3 - 26.38, $P < 0.0001$). TEA failure rates decreased from 16.3%(18/110) to 7.3% (7/134) for an absolute reduction of 9% ($P=0.0054$).

Discussion

Results suggest that insertion of TEA for elective surgeries in a preoperative block room setting can reduce operating room time. This study demonstrates the savings a preoperative block room can have on operating room flow and efficiency.

An unanticipated finding in our study was the reduction of TEA failure rate from 16.3% to 7.3%. Previous published TEA failure rates range from 13% to as high as 32% [5,6]. Potential explanations for this finding include increased time available for patient positioning and anatomical landmark identification, epidural placement by personnel who perform a higher volume of these procedures, and closer supervision for epidurals inserted by trainees.

We plan to further analyze our block room impact on operating room efficiency for similar anesthesia and anesthesia procedures such as spinal anesthesia and peripheral nerve blockade.

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280260 - USING HOLOLENS AUGMENTED REALITY TO COMBINE REAL-TIME USS IMAGES AND PATIENT MONITOR DATA OVERLAID ON PATIENT

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BACKGROUND: Ultrasound machines, difficult airway carts and patient monitors in the operating room are often positioned where it is difficult for the anesthesiologist to see them when performing procedures. The use of augmented reality goggles can help anesthesiologists by superimposing ultrasound images, difficult airway cart images and patient monitor data over the anesthesiologist's field of view and the patient. Our goal was to design a novel system that combined video/ultrasound images, patient monitor data and patient field into one field of view for the operator using augmented reality.

METHODS: We used the Hololens™ connected to an ultrasound machine and a patient monitor. We used an aruduino connected to the ultrasound machine and monitor data to convert data to a streamable form. These were then streamed realtime to a Hololens Device using the Arcuos ™ system. The Hololens interfaced wirelessly with the monitor and displayed waveform and numerical vital signs data as well as real-time US data. Video was recorded during the demo in the lab.

RESULTS: We have successful designed an augmented real-time system that is able to display ultrasound images/difficult airway images alongside patient monitor data in the same field of view of the anesthesia operator. There is minimal lag and latency suggesting our system may be useful during the performance of a real procedure.

CONCLUSIONS: We have developed a novel augmented reality system that demonstrated the feasibility of displaying all important visual while performing anesthesia related procedures. Our system is able to show real-time ultrasound data alongside patient monitor data in one field of view. This is an improvement over old heads up display system that only showed patient monitor data. We will be testing the efficacy of our system in improving ergonomics and safety in series of simulation based randomized trials.

References:

Int J Clin Monit Comput. 1995 Feb;12(1):21-4.Clinical evaluation of the 'head-up' display of anesthesia data. Preliminary communication.

281186 - COMPARISON OF INFRACLAVICULAR AND SUPRACLAVICULAR BLOCKS FOR ELBOW SURGERY: A RANDOMIZED CONTROLLED STUDY

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Background: While supraclavicular and infraclavicular brachial plexus blocks have both been well described regional anesthesia techniques for surgery of the elbow, there is ongoing debate about variation in the speed of onset and the need for block supplementation[1]. A recent meta-analysis evaluating comparisons of supraclavicular and infraclavicular blocks concludes further research is required due to small sample sizes[2]. There is also a paucity of evidence directly comparing supraclavicular and infraclavicular blocks in elbow surgery.

Methods: In this blinded randomized controlled trial, we directly compare supraclavicular and infraclavicular brachial plexus blocks to determine block effectiveness in elbow surgery. After obtaining ethics approval, we prospectively enrolled 150 adult patients scheduled for elective ambulatory elbow surgery. Following recruitment, patients were randomized to receive either a supraclavicular or infraclavicular block following a standardized protocol by a specialist anesthetist or a directly supervised trainee. Procedure time and complications during block insertion were noted. A separate blinded observer recorded onset of sensory and motor block and recorded postoperative pain score

Results:
Block Effectiveness
Conversation to general anesthetic due to block failure was 4% in the infraclavicular group and 5.3% in supraclavicular group, showing no statistically significiant difference. Supplemental blocks were required in 4% (infraclavicular group) and 5.3% (supraclavicular group), again showing no statistical significance.
Block Onset
The total sensory block onset of the supraclavicular group (20.62 minutes) was significantly faster than the infraclavicular group (23.03 minutes), p
The total motor block onset of the supraclavicular group (21.92 minutes) was significantly faster than the infraclavicular group (24.79 minutes), p
However, when axillary nerve block onset was excluded from the data there was no statistically significant difference between the motor or sensory onset of the groups.
Secondary Outcomes
There was no difference between block performance time or postoperative pain scores.

Discussions: We have demonstrated that supraclavicular and infraclavicular brachial plexus blocks are equally effective for use in elbow surgery with similar block onset times and similar failure rates.

References:
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283054 - ANALGESIC ROLE OF ADDUCTOR CANAL BLOCK IN AMBULATORY ARTHROSCOPIC KNEE SURGERY: SYSTEMATIC REVIEW & META-ANALYSIS.

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Background
Adductor canal block (ACB) has emerged as an effective analgesic regional technique for major knee surgeries in the last decade.[1,2] Its motor-sparing properties make it particularly attractive for ambulatory knee surgery[3]; but evidence supporting its use in ambulatory arthroscopic knee surgery is conflicting.[4,5] This systematic review and meta-analysis evaluates the analgesic effects of ACB for ambulatory arthroscopic knee surgeries in the setting of multimodal analgesia.

Methods
We searched electronic databases for randomized controlled trials (RCTs) examining the analgesic effects of ACB compared to control or any other analgesic modality in the setting of multimodal analgesia. Both minor arthroscopic and anterior cruciate ligament reconstruction (ACLR) surgeries were considered. Postoperative rest pain severity (VAS) score at 6 hours after arthroscopic knee surgery was designated as the primary outcome. Secondary outcomes included rest pain scores (at 0h, 8h, 12h, 24h) and dynamic pain scores (at 0h, 6h, 8h, 12h and 24h). Cumulative 24h opioid consumption, postoperative nausea and vomiting (PONV), antiemetic use, postoperative sedation/drowsiness, time to first analgesic request, quadriceps strength and block-related complications were also assessed. Data were pooled using random-effects modeling.
Results
Our search yielded 10 RCTs comparing ACB with placebo or FNB; these were sub-grouped according to the type knee surgery and type of comparator. For minor knee arthroscopic surgery, ACB provided reduced postoperative resting pain scores by a weighted mean difference [95% confidence interval] of -1.46 cm [-2.03, -0.90] ($P < 0.00001$), -0.51 cm [-0.92, -0.10] ($P=0.02$) and -0.48 cm [-0.93, -0.04] ($P=0.03$) at 0, 6 (figure 1) and 8 hours respectively, compared to control. Dynamic pain scored were reduced by a weighted mean difference [95% confidence interval] of -1.50 cm [-2.10, -0.90] ($P < 0.00001$), -0.50 cm [-0.95, -0.04] ($P=0.03$) and -0.59 cm [-1.12, -0.05] ($P=0.03$) at 0, 6 and 8 hours respectively, compared to control. ACB also reduced the cumulative 24-hour oral morphine equivalent consumption by -7.41 mg [-14.75, -0.08] ($P=0.05$), compared to control. For ACLR surgery, ACB did not provide any analgesic benefits and was not different from placebo or FNB.

Conclusion
Following minor ambulatory arthroscopic knee surgery, ACB provides modest analgesic benefits, including improved pain relief and reduced opioid consumption for up to 8h and 24h, respectively. However, the evidence and findings do not support routinely administering ACB as a component of the care standard for ACLR when multimodal analgesia is used. Future studies are needed to determine the role of ACB in the setting of local infiltration and graft donor-site analgesia.

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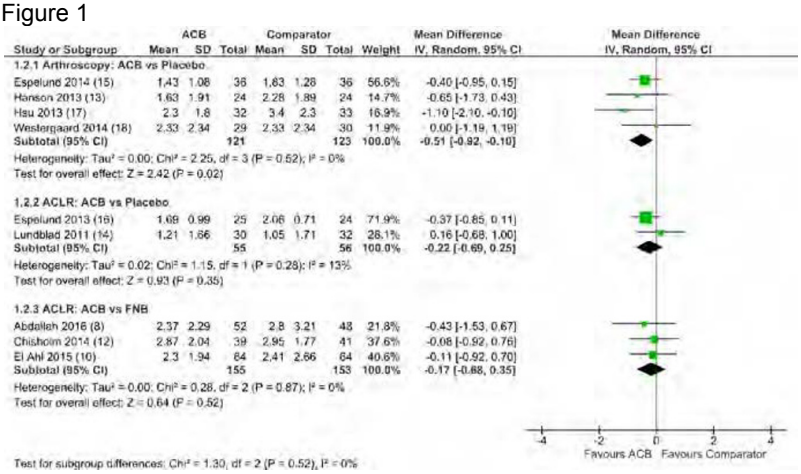
Figure 1



Forest plot depicting resting pain at 6 hours (primary outcome). The pooled estimates of the mean difference are shown. The 95% confidence intervals (CIs) are shown as lines for individual studies and as diamonds for pooled estimates.

284738 - A RADIOLOGIC SURVEY OF THE PARAVERTEBRAL SPACE: CONFIRMATION OF LANDMARK TECHNIQUE

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Introduction

Thoracic paravertebral nerve blocks are commonly used for mastectomy, but have a 0.5% risk of pneumothorax.[1] Ultrasound assistance may reduce the incidence of pneumothorax. However, obtaining the images can be challenging even for experts. Classic landmark technique (LMT) describes measuring 25mm lateral to the spinous process, contacting the transverse process and advancing 10mm to enter the paravertebral space. The aim of this study was to confirm the relevance of landmark technique by examining the dimensions of the paravertebral space, and determining the depth to the pleura, using computed tomography (CT) scans.

Methods

Following institutional ethics approval, thoracic spine CT scans were reviewed with a radiologist. Scans were performed using a 64 or 320-multi-slice CT scanner (GE Healthcare, Milwaukee, WI; Toshiba Medical Systems, Nasu, Japan). Measurements were made with the electronic caliper function of institutional PACS software, at the first (T1) and fourth thoracic (T4) vertebrae. Depth recordings to bony contact, were taken from a distance 25mm lateral to the spinous process (referred to as “TP”). The anterior border of TP was referred to as the “injection point, IP”. Width of the thoracic paravertebral space (TPVS) was determined by subtracting the depth to the pleura from the depth to IP. Statistical analysis was performed using JMP® v*10* (SAS, Cary, NC, 2013). Measurements were compared between thoracic levels and gender, using one-way ANOVA.

Results

53 consecutive CT scans obtained prior to June 2013 were interpreted. Results are presented in Table 1. The average age was 63 (range 23-88). The mean distance from the midline to the lateral border of the transverse process was 6mm (in females) and 10mm (in males) further lateral than TP. The distance from the skin to TP at T1 was 18.85mm (95% CI, 16.93-20.76mm) deeper than the T4 TP, and demonstrated no gender difference. The lung was not encountered at T1 in 47% of the cases (25 of 53 scans) as the needle trajectory was tangential to the vertebral reflection of the pleura. In the remaining 28 cases, the median depth to the lung was 24mm (range 11-38mm) beyond bony contact (TP); compared to 21mm (range 13-51mm) at T4.

Conclusions

The findings of this radiologic survey add to our understanding of the TPVS. As per the LMT, advancing a needle 10mm after touching bone did not translate into contact with lung in these scans. There is an average decrease of 4.5mm in depth of skin to bone contact, per spinous level from T1 to T4. The width of the TPVS decreases and pleura becomes more shallow from T1 to T4. When using ultrasound for landmarking this translates into a more lateral approach than the LMT, and the needle tip will be in closer proximity to the lung.

References:

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Table 1. Computed tomography measurements of the thoracic paravertebral space
Final Table.tif
Legend: (1) Depth to TP = depth from skin to bony contact, 25mm lateral to spinous process; (2) TP thickness = depth to injection point minus depth to TP; (3) TP lateral border = distance from midline to lateral border of the anatomical transverse process; (4) Width of Paravertebral Space determined by subtracting depth to lung from depth to anterior border of TP. (*) a p-value <0.05 was taken as a significant statistical difference.

285026 - EFFECT OF INTRAVENOUS DEXMEDETOMIDINE IN THE DURATION OF INFRACLAVICULAR BLOCK: RANDOMIZED, DOUBLE-BLIND STUDY

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Introduction: Dexmedetomidine, an alfa 2 agonist sedative agent, when is used intravenously, may increases the duration of peripheral nerve blocks. We hypothesized intravenous Dexmedetomidine increases analgesic effect of infraclavicular block for upper limb surgery.

Methods: This study received institutional Ethics board approval (REB).
Inclusion criteria: ASA classes I to III patients, 18 to 80 years old, body mass index (BMI) of 35 kg m-2 or less.
Exclusion criteria: ASA IV, narcotic dependent patients, significant cardiac or respiratory disease, neurological deficits, coexisting hematological disorder or with deranged coagulation, pre-existing major organ dysfunction, psychiatric illness, emergency surgery, lack of informed consent, allergy to any of the drugs used in the study, surgical procedure duration greater than 3 hours. After informed consent obtained, all patients received infraclavicular block with ropivacaine 0.5% 35 to 40 ml. The treated group

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Vital signs and Ramsay sedation score were recorded every 15 minutes along the surgical procedure and the use of any extra sedation (such as midazolam), opioids or vasopressors were recorded as well. At PACU pain scores (Numerical Rating Score) at rest and movement were recorded, also the presence of nausea and vomiting, Ramsay sedation score and level of motor and sensory block. Twenty-four hours after surgery patients were contacted and questioned about the exact time of the day the sensory and motor function on the wrist were recovered (operated side). Pain scores, presence of nausea and vomiting, amount of opioids taken in the first 24 hours, quality of sleep (if the pain woke them up and how many times along the night) and level of satisfaction with the anesthesia technique and pain management were recorded as well.

Results: A total of 98 patients were randomized, all of them (Dex: 49, Prop:49); ten patients converted to general anesthesia during the procedure because the infraclavicular block was partially working or patient was uncomfortable and unable to lay still. A total of 86 patients (Dex: 40, Prop:46) had a complete follow up in the POD1.
No statistical difference was found in the duration of the sensory block: Dex group 13.8h (10.4 to 16.3h) compared with 12h (10.2 to 15.5h) in the Prop group.

There was no significant difference in the motor block duration or 24h equivalent consumption of oral morphine.

Conclusions: In our study intravenous Dexmedetomidine did not significantly increased the duration of sensory block after infraclavicular block for upper limb surgery. However, there was a clinically significant difference of more than 1 hour in the duration of sensory block in the Dexmedetomidine group compared with Propofol group. The election of Dexmedetomidine as a sedative agent is an interest option that is non inferior when is compared to the Propofol sedation and can provide a longer period of analgesia after Infraclavicular nerve block.
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References:
1.Abdulkadir Yektas et al. Dexmedetomidine and propofol infusion on sedation characteristics in patients undergoing sciatic nerve block in combination with femoral nerve block via anterior approach. Rev Bras Anestesiol. 2015;65(5):371-378.
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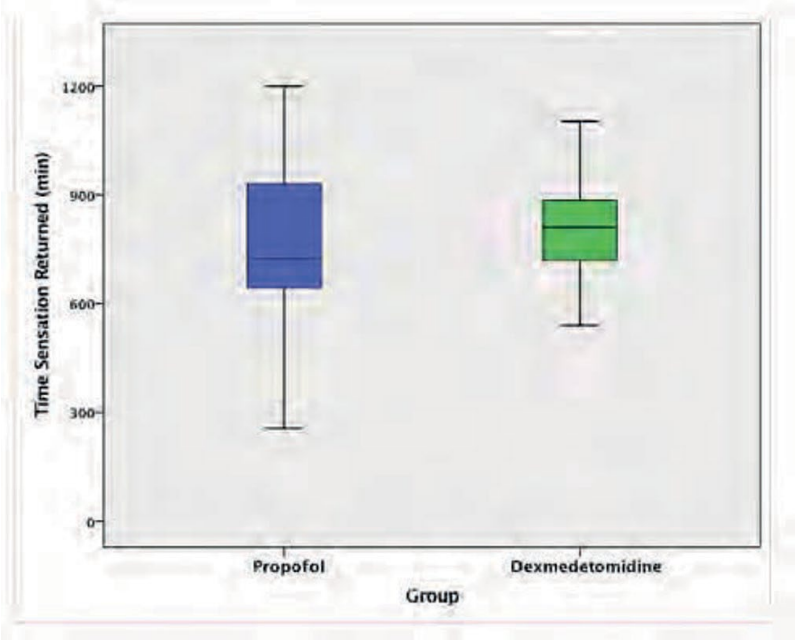
Box plots of duration of sensory block 24 hours after infraclavicular block in the two groups.


Time Sensation Returned (min)
1200
900
600
300
0
Propofol
Dexmedetomidine
Group

286444 - REGIONAL CHANGES IN BLOOD FLOW AND ENDOTHELIAL FUNCTION FOLLOWING BRACHIAL PLEXUS BLOCK

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Kevin Shoemaker - Western University
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Sabrina Wall - Western University
Peter Mack - Western University

Introduction:
The study herein aimed to determine the effects of regional anesthesia on blood flow and diameter in peripheral arteries, as well as the ensuing effects on microvascular endothelial reactivity. Previous studies established peripheral nerve blockade can increase flow through distal arteries without increases in diameter.[1]

Methods:
With the approval of the research ethics board, patients undergoing regional anesthesia for upper extremity surgery underwent assessment of brachial artery diameter and peak velocity using a Duplex ultrasound machine. Under ultrasound guidance, an anesthesia practitioner performed a brachial plexus block on all participants with local anesthetic. Subsequent measurements of brachial artery diameter and peak velocity were again made. Microvascular endothelial function, measured by reactive hyperemia index (RHI)[2] was assessed before and after the administration of a brachial plexus block. All measurements were performed prior to surgery.

Results:
Participants included 12 patients, age 52 ± 15 y of ASA status 1-3. Complete data were obtained on seven patients with partial post-block data on the remaining five. Mean brachial artery intraluminal diameters were acquired longitudinally along the axis of the artery during systole (ECG-gated), and were 0.44 ± 0.08cm pre-block and 0.46 ± 0.05cm (mean±SD) post-block. In pulsed wave Doppler mode, peak values of the mean velocity sampled across the vessel lumen were 5.09 ± 3.19cm/s pre-block, and were elevated to 23.96 ± 10.2 cm/s post-block ($P < 0.05$) after an average of 27 minutes post block administration. Microvascular endothelial function was significantly reduced following the block (figure a) with an average RHI of 2.44 ± 0.33 pre-block and 1.4± 0.44 post-block ($P < 0.05$).

Discussion:
This study set out to determine the effects of brachial plexus block on peripheral arteries and micro vascular endothelial function. We found a significant increase in luminal velocities in peripheral arteries and impaired local microvascular endothelial function post brachial plexus block.

References:
1. Badal JJ, Kiesau A, Boyle P. Effects of median nerve block on radial artery diameter and peak velocity. Local Reg Anesth. 2010;3:5-10.
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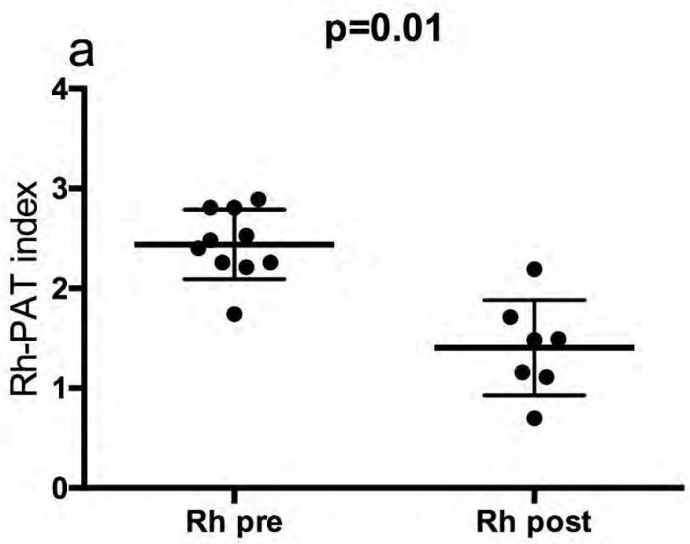
Figure A



Endothelial function measured by reactive hyperemia index pre and post-blockade

286610 - SUBSCAPULARIS PLANE BLOCK - A NOVEL PHRENIC NERVE SPARING SINGLE INJECTION SHOULDER BLOCK - AN ANATOMICAL STUDY

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Co-Authors(s)
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Reese Drake - Western University
Marjorie Johnson - Western University

INTRODUCTION: Interscalene brachial plexus block (ISB) is the gold standard regional anesthesia technique for shoulder surgery, but it invariably causes ipsilateral hemidiaphragmatic paralysis (1). Isolated Suprascapular and Axillary nerve blocks have not found to be superior to ISB (2). We hypothesised that a Subscapularis plane block (SPB) as a phrenic nerve sparing single injection will target the Suprascapular nerve, Axillary nerve and upper Subscapular nerve and may provide an alternative to ISB.

METHODS: Human cadaver studies were exempt from the local ethic board approval. We performed ultrasound guided Subscapularis plane block bilaterally in 5 fresh frozen cadavers and unilateral in 18 embalmed cadavers(1 bilateral) (n=29) with with a linear probe (13-6MHz) using 5% Dextrose with Methylene Blue dye as injectate. With the transducer aligned in the sagittal plane, head of humerus was identified and transducer was moved medially to identify the bicipital grove and then more medially to identify the coracoid process. Just medial to the coracoid process from superior to inferior, skin, subcutaneous tissue, pectoralis major, pectoralis minor, Subscapularis muscle and scapular fossa were identified. An insulated echogenic Tuohy needle (17 gauge x 80 mm) was used to deposit the dye above the fascia of Subscapularis muscle. Fresh frozen cadavers were used to determine the location of injection along with the nerves stained and embalmed cadavers were used to determine the consistency of targetting the subscapularis plane in the above described paracoracoid approach.

RESULTS: 15 out of 29 injections were deemed successful (51%). 4 out of 10 (40%) injections in fresh frozen cadavers were successful in staining the Suprascapular Nerve, posterior cord including Axillary Nerve and Upper Subscapular nerve which provide major innervation to the shoulder. 11/19 (58%) injections in embalmed cadavers were in the subscapularis plane which was our primary goal. The average distance between the phrenic nerve and most proximal border of dye on the suprascapular nerve and posterior cord were found to be 5.34 cm and 5.90 cm respectively, hence phrenic nerve sparing.

CONCLUSIONS: Single injection, phrenic nerve sparing Subscapularis plane block can be a viable alternative to Interscalene brachial plexus block for shoulder surgery. Clinical studies are underway to establish the efficacy.

References:

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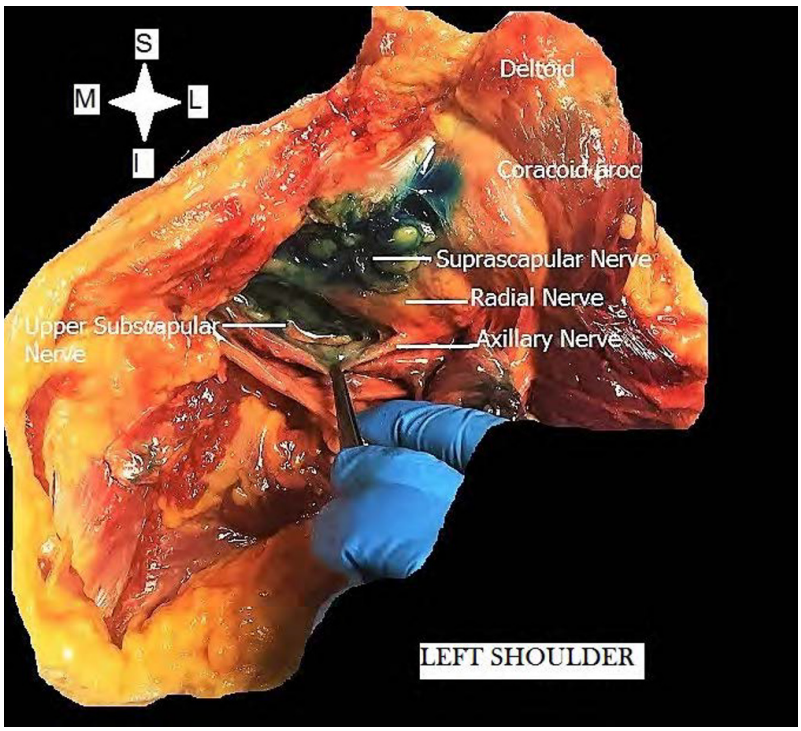
Subscapularis plane block


S
M
L
I
Deltoid
Coracoid proc
Suprascapular Nerve
Radial Nerve
Upper Subscapular Nerve
Axillary Nerve
LEFT SHOULDER

RESIDENTS' COMPETITION
Monday, June 26
08:00 - 09:45

Track: Cardiovascular & Thoracic: Basic Science & Clinical

278480 - ELEVATED RED CELL DISTRIBUTION WIDTH IS AN ADVERSE PROGNOSTIC INDICATOR IN ELECTIVE NONCARDIAC SURGERY

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284789 - PERIOPERATIVE GOAL-DIRECTED THERAPY: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

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Track: Education

262866 - OPTIMAL TRAINING FREQUENCY FOR ATTAINMENT AND MAINTENANCE OF HIGH-QUALITY CPR ON A HIGH-FIDELITY MANIKIN

Presenting Author: Alexandre Sebaldt, Northern Ontario School of Medicine, Sudbury, Ontario

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Track: Obstetric Anesthesia

277156 - INTRAVENOUS DEXMEDETOMIDINE FOR THE TREATMENT OF SHIVERING DURING CESAREAN DELIVERY UNDER NEURAXIAL ANESTHESIA

Primary & Presenting Author: Christina Lamontagne, Université de Montréal, Montreal, Quebec

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Track: Pediatric Anesthesia

285277 - CAN PEDIATRIC GASTRIC SONOGRAPHY BE USED AS A CLINICAL TOOL TO ESTABLISH EMPTY ANTRAL CROSS-SECTIONAL AREAS?

Primary & Presenting Author: Joanna J. Moser, Department of Anesthesiology, Perioperative and Pain Medicine, University of Calgary, Calgary, Alberta

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Track: Regional Anesthesia

260987 - INTERSCALENE BLOCK ANALGESIA AFTER AMBULATORY SHOULDER SURGERY: A FACTORIAL RCT OF DEXAMETHASONE DOSE AND ROUTE

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260987 - INTERSCALENE BLOCK ANALGESIA AFTER AMBULATORY SHOULDER SURGERY: A FACTORIAL RCT OF DEXAMETHASONE DOSE AND ROUTE

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Introduction:
Dexamethasone consistently prolongs the duration of single injection interscalene block (ISB) when given by either the intravenous or perineural route[1]. Previous comparisons of different dexamethasone doses and routes have been insufficiently powered to precisely estimate differences in analgesic duration[1,2,3]. This study aimed to definitively determine the effect of dose and route on the analgesic duration of ISB after ambulatory arthroscopic shoulder surgery (AASS).

Methods:
This factorial, randomized superiority trial was conducted with appropriate ethics approvals, including that required for off-label dexamethasone use. Consenting adult patients undergoing AASS were randomized in a 1:1:1:1 ratio. They received preoperative ultrasound-guided ISB with 30mL 0.5% bupivacaine and 4mg or 8mg of dexamethasone, by either the perineural or intravenous route. Patients with diabetes mellitus, chronic opioid use or contraindications to ISB or dexamethasone were excluded. Patients, caregivers, recruiters and outcome assessors were blind to the allocation sequence and group assignments. The primary outcome, block duration measured as time of first surgical site pain, and secondary outcomes, including adverse effects and postoperative neurologic symptoms (PONS), were assessed by telephone follow-up or chart review. Power calculations based on a two-tailed alpha error of 0.05, a standard deviation of 5.0 hours (h) and 5% attrition showed that 280 patients would provide ≥90% power to detect a a difference of 3.0h in block duration for the main effects of dose and route, and a synergistic interaction of 4.0h between them.

Results:
Between June 2015 and July 2016, 280 of 522 eligible patients were studied without losses to follow-up or exclusions from analysis. The perineural route significantly prolonged block duration by 2.0h, 95% confidence interval (CI) 0.4 – 3.5h, p = 0.01. However, 8mg of dexamethasone did not significantly prolong block duration compared to 4mg (1.3h, 95%CI -0.3 – 2.9h, p = 0.10), there was no significant statistical interaction (p = 0.51), and no remarkable differences in secondary outcomes between groups (Table). Like previous work[4], PONS at fourteen days were common but reliably resolved by 6 months in all but 5 patients. With diagnoses of shoulder numbness, median nerve injury between shoulder and elbow, multiple sclerosis, cubital and carpal tunnel syndrome, respectively, their relationship to ISB is uncertain. Higher fourteen day PONS rates with 8mg dexamethasone and the perineural route did not reach statistical significance.

Discussion:
ISB analgesic duration was prolonged by the perineural route, but not by a higher dexamethasone dose. The perineural route's analgesic benefit is of marginal clinical significance at these doses, and should be weighed against potential risks. The significance of PONS after ISB and AASS remains unclear.

References:
1. Anaesthesia 2015 70: 71-83
2. Anaesthesia 2015 70:1180-5

3. Eur J Anaesthesiol 2015 32:650-5
4. Anesth Analg 2009 109:265-71

Table. Primary and Secondary Outcomes. Values are expressed as mean (standard deviation), number (percent) or median [range]

	Intravenous		Perineural		
	4mg	8mg	4mg	8mg	*P***
Analgesia					
Block duration (hours)	24.0 (4.6)	24.8 (6.4)	25.4 (6.6)	27.2 (8.5)	0.01, 0.10
Failed blocks	1	0	2	1	0.90
Block duration excluding failed blocks (hours)	23.8 (4.5)	24.8 (6.4)	25.5 (6.7)	27.3 (8.5)	0.008, 0.08
First shoulder pain score at end of block duration	3 [0-10]	3 [0-10]	3 [0-10]	3 [1-10]	0.65; 0.90
Postoperative opioid use*	49 (77)	53 (85)	59 (88)	50 (81)	0.32
Morphine equivalents (mg/h)*	0.7 [0-7.3]	0.7 [0-3.5]	0.5 [0-6.1]	0.9 [0-6.3]	0.90; 0.39
Acetaminophen use*	43 (67)	43 (69)	54 (81)	44 (71)	0.33
Acetaminophen (mg/h)*	33 [0-259]	31 [0-254]	28 [0-200]	31 [0-181]	0.16; 0.53
Intraoperative medications					
Ephedrine or phenylephrine	3 (4)	4 (6)	4 (6)	4 (6)	1.00
Antihypertensives	5 (7)	7 (10)	2 (3)	4 (6)	0.40
Antimuscarinics	4 (6)	0 (0)	1 (1)	2 (3)	0.22
Recovery room					
Length of stay (hours)	1.6 [0.9-3.3]	1.4 [1.0-2.9]	1.6 [0.4-3.0]	1.6 [1.0-3.1]	0.16; 0.003
Opioids administered	4 (6)	1 (1)	4 (6)	5 (7)	0.45
Antiemetics administered	10 (14)	4 (6)	12 (17)	9 (13)	0.21; 0.11
Postoperative day 1 assessments***					
Sleep quality	4 [0-10]	5 [0-10]	5 [0-10]	5 [0-10]	0.26
Nausea and vomiting	0 [0-10]	0 [0-9]	0 [0-8]	0 [0-5]	0.54
Shortness of breath	0 [0-8]	0 [0-8]	0 [0-10]	0 [0-7]	0.008
Anxiousness or restlessness	0 [0-9]	0 [0-10]	0 [0-10]	0 [0-9]	0.58
Distress from sensory block	1 [0-10]	3 [0-10]	2 [0-10]	1.5 [0-10]	0.16
Distress from motor block	1 [0-10]	2 [0-10]	2 [0-10]	0.5 [0-10]	0.07
Likelihood of choosing same technique again	10 [0-10]	10 [0-10]	10 [0-10]	10 [0-10]	0.71
Postoperative day 14 assessments					
Hoarse voice	2 (3)	1 (1)	3 (4)	2 (3)	0.96
Dyspnea	0 (0)	3 (4)	3 (4)	2 (3)	0.39
Numbness	3 (4)	6 (9)	8 (11)	11 (16)	0.05; 0.23
Paresthesia	6 (9)	8 (11)	9 (13)	11 (16)	0.27; 0.46
Surgical arm weakness	3 (4)	7 (10)	3 (4)	6 (9)	0.47
Any of the above	10 (14)	15 (21)	15 (21)	21 (30)	0.11; 0.11

*Measured from recovery room discharge until end of block duration. Data was missing for 25 patients
**p values expressed as overall 4-way comparison or as route; dose ***Higher 11 point numerical response scores indicate more severe adverse effects, except for sleep quality and likelihood of choosing same technique again

262866 - OPTIMAL TRAINING FREQUENCY FOR ATTAINMENT AND MAINTENANCE OF HIGH-QUALITY CPR ON A HIGH-FIDELITY MANIKIN

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Introduction:
Performance of high-quality cardiopulmonary resuscitation (CPR) improves clinical outcomes after cardiac arrest (1). Without intermittent training, the ability to perform high-quality CPR degrades with time (2-5). Frequent training and assessment of CPR skills using interactive devices has been suggested to improve performance (2-5), but the optimal training frequency has yet to be determined. We aimed to identify the least frequent training interval associated with continued performance of high-quality CPR.

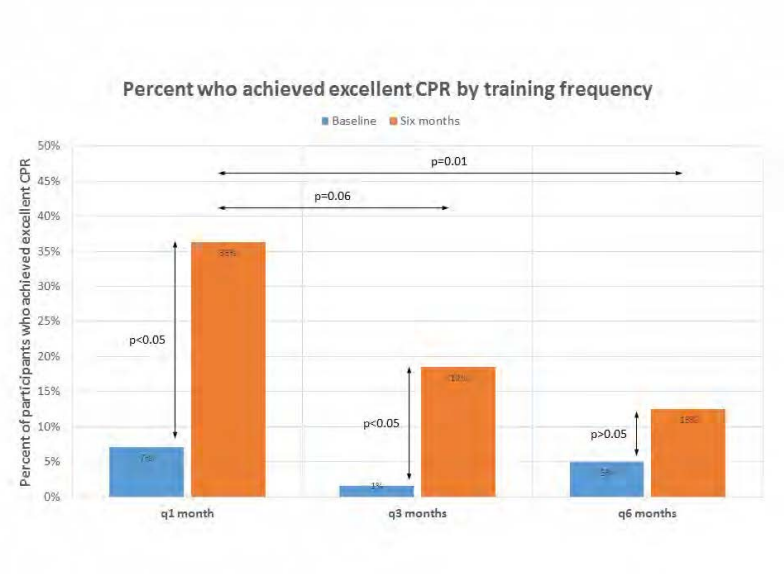
Methods:
Local ethics committee approval was obtained prior to recruitment, and informed consent was obtained from all participants at the time of study enrollment. Nurses from a variety of clinical units at our hospital were recruited and randomized to one-month, three-month, six-month, and twelve-month CPR training intervals over the course of a twelve-month study period. Each session included an assessment, where two minutes of CPR was performed on a high-fidelity manikin without performance feedback. This was followed by a training component, where the assessment session was reviewed, and up to three two-minute, coached CPR sessions with verbal and real-time visual feedback were performed until either "excellent CPR" was achieved (≥90% of compressions with depth of 50-60 mm, ≥90% of compressions with rate of 100-120 /min, and ≥90% of compressions with complete chest recoil), or the maximum number of attempts was reached. Final CPR performance was assessed after twelve months. The primary outcome was the proportion of nurses able to perform "excellent CPR" in each group. Individual performance metrics, including compression depth, rate, and recoil were also compared.

Results:
We recruited 244 nurses to participate in the study, of which 183 were enrolled in the one, three, and six-month groups. This analysis reports the study's results at six months, at which time 74% of these nurses (n=135/183) were still enrolled in the study. At baseline, 7% (4/56), 1% (1/67), and 5% (3/60) in the one-month, three-month, and six-month groups, respectively, performed excellent CPR (χ^2=2.41, p=0.29). Statistically significant improvements in achievement of excellent CPR were observed in the one-month (12/33=36% vs. 4/56=7%, Fisher's exact = 0.01, p2=6.44, p=0.01), but not between the one- and three-month groups (12/33=36% vs. 10/54=19%, χ^2=3.45, p=0.06).

Discussion:
Front line health care providers certified in basic resuscitation do not perform excellent CPR without additional training. Frequent, short-duration bedside training that occurs every month or every three months is effective in improving performance. At six months, there is non-statistically significant trend toward better performance when training on a monthly basis.

References:
1. Emerg Med Clin North Am 2012; 30: 105-122.
2. Resuscitation 2011; 82: 447-453.
3. Resuscitation 2013; 84: 1267-1273.
4. Resuscitation 2014; 85: 1282-1286.
5. Resuscitation 2015; 15: 212-217.

Figure 1



Proportion of participants who performed "excellent CPR" at baseline and at six months, organized by training frequency. Statistically significant improvements in achievement of excellent CPR were observed in the one-month and three-month groups. At the six-month time point, a significant difference in rates of excellent CPR was observed between the one-month and six-month groups, but not between the one-month and three-month groups.

277156 - INTRAVENOUS DEXMEDETOMIDINE FOR THE TREATMENT OF SHIVERING DURING CESAREAN DELIVERY UNDER NEURAXIAL ANESTHESIA

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Introduction: Neuraxial anesthesia is the preferred technique for cesarean delivery. In about 55% of these patients, spinal or epidural anesthesia may be associated with shivering which may be very distressing[1] and interfere with the monitoring of vital signs. Recent studies have shown that dexmedetomidine, an alpha 2-adrenergic agonist, could help to alleviate shivering associated with neuraxial anesthesia[2]. The objective of this study was to test whether dexmedetomidine reduces the duration of shivering episodes associated with neuraxial anesthesia during cesarean delivery.

Methods: Local Ethics Committee approval and consent for study participation were obtained. Eighty healthy parturients, 18 years of age or more, undergoing cesarean delivery under neuraxial anesthesia were enlisted in this prospective, randomized, double-blind trial. After childbirth, when significant shivering occured (Crowley and Mahajan scale[1]), the intervention group (n = 40) received a single intravenous bolus of dexmedetomidine (30 mcg) while the control group (n = 40) received normal saline. Randomization and allocation were based on a computer generated list. The primary outcome measure was the time lapse for an observable decrease in shivering after the intervention.

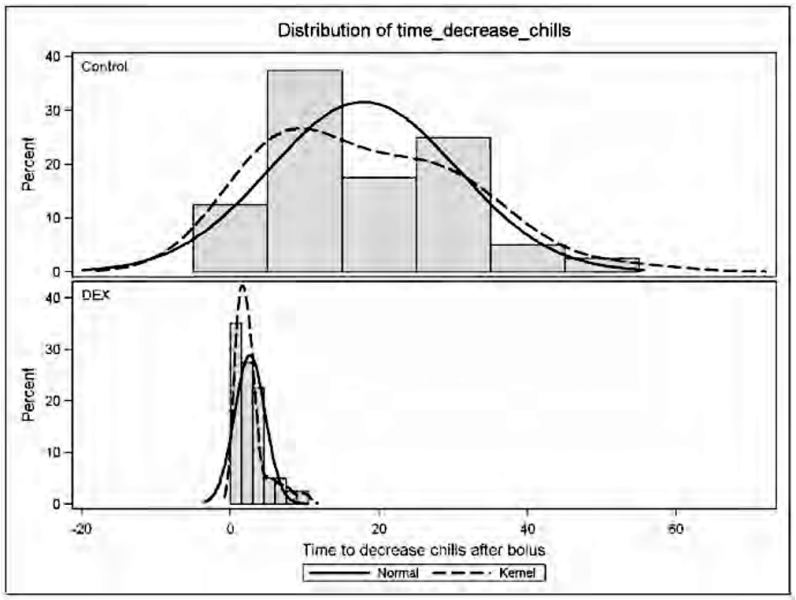
Results: 155 patients undergoing a cesarean section under neuraxial anesthesia met the inclusion criteria and were recruited, of whom 80 presented significant shivering and were randomized. Our study showed that dexmedetomidine reduces the duration of shivering: mean time to decrease chills after the bolus of 2.6 minutes (CI 95% 1.94-3.26) with dexmedetomidine, and 17 minutes (CI 95% 13.9-21.9 min) with normal saline ($p < 0.0001$). The effet persisted at 15 minutes, where chills had completely stopped in 90% of the patients in the intervention group versus 23% in the control group. No adverse effects, including bradycardia (HR < 50 bpm), hypotension (> 30% of baseline MAP) and sedation (Filos et al scale), have been observed.

Discussion: This study demonstrates that an intravenous bolus of dexmedetomidine is an effective treatment to decrease the duration of shivering during cesarean delivery under neuraxial anesthesia.

References:

1. Crowley, L. J., & Buggy, D. J. (2008). Shivering and neuraxial anesthesia. Regional Anesthesia and Pain Medicine, 33(3), 241–252.
2. Mittal, G., Gupta, K., Katyal, S., & Kaushal, S. (2014). Randomised double-blind comparative study of dexmedetomidine and tramadol for post-spinal anaesthesia shivering. Indian Journal of Anaesthesia, 58(3), 257–262.

Time to decrease chills after bolus


Distribution of time_decrease_chills
Control
DEX
Percent
Time to decrease chills after bolus
Normal
Kernel

278480 - ELEVATED RED CELL DISTRIBUTION WIDTH IS AN ADVERSE PROGNOSTIC INDICATOR IN ELECTIVE NONCARDIAC SURGERY

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Introduction: Red cell distribution width (RDW) is routinely reported with the complete blood count and measures the variability of red cell size. In patients with coronary artery disease and heart failure, elevated RDW is strongly associated with mortality.[1-3] Limited prior data suggest a similar association in surgical patients.[4,5] We examined the adjusted association between elevated RDW and 30-day hospital mortality in a cohort of elective noncardiac surgical patients.

Methods: Following research ethics board approval, we used a large institutional database to conduct a retrospective cohort study of adults (≥18 y) who underwent inpatient noncardiac surgical procedures at a multisite tertiary-care hospital network from 2008 to 2015. The exposure of interest was the most recent RDW within 60 days before the index surgery. The primary outcome was 30-day in-hospital mortality. Secondary outcomes included postoperative cardiac events (troponin elevation, myocardial infarction, or cardiac arrest) and acute kidney injury (doubling of creatinine within postoperative days 1-4). We used separate multivariable logistic regression models to examine the adjusted association of RDW (categorized into quartiles) with these outcomes while adjusting for age, sex, BMI, comorbidities, surgical procedure, and preoperative hemoglobin. Interaction between anemia and RDW on the outcome of mortality was examined.

Results: The primary analysis included 23,337 patients. There were 399 (1.7%) in-hospital 30-day deaths, 808 (3.5%) cardiac events, and 2087 (8.9%) episodes of acute kidney injury in the cohort. After risk adjustment, the highest quartile of RDW (>13.0) was associated with an important increased odds of death [adjusted odds ratio (aOR) 2.36 (1.63-3.43), $p < 0.001$]. When compared with the lowest RDW quartile (≤11.6), all higher quartiles had increased risk for cardiac events. The highest quartile of RDW (>13.0) had an increased odds for cardiac events [aOR 1.39 (1.08-1.78), p=0.01]. There was no significant association between RDW quartile with acute kidney injury. The model predicting death had good discrimination (c-statistic 0.81; bootstrap 95% CI 0.80-0.81), as did the model predicting cardiac events (c-statistic 0.79; bootstrap 95% CI 0.786-0.791). While preoperative anemia was also associated with adverse outcomes, there was no statistically significant interaction between RDW and anemia in the logistic regression models.

Discussion: Elevated RDW is associated with clinically important increases in perioperative mortality and cardiac events. Further research is needed to validate these findings, and determine how best to incorporate RDW into assessing perioperative risk and targeting patients for risk reduction interventions.

References:

1. Am J Cardiol. 2010 105:312-317.
2. Int Heart J. 2014 55:58-64.
3. Resuscitation. 2012 83: 1248-1252.
4. Eur J Cardiothrac Surg. 2013 43: 1165-9.
5. Int J Cardiol. 2013 165:369-71.

Table 1. Adjusted odds ratios shown for outcomes by RDW Quartile.

30 Day In-Hospital Mortality				
RDW Quartile	*aOR*	*95% CI*	*P-Value*	*Type 3 Analysis of Effects*
1 (≤11.6%)	Reference			
2 (11.7-12.1%)	1.24	0.82-1.88	0.32	<0.0001
3 (12.2-12.9%)	1.55	1.06-2.29	0.03	
4 (≥13.0%)	2.36	1.63-3.43	<0.0001	
Cardiac Events				
RDW Quartile	*aOR*	*95% CI*	*P-Value*	*Type 3 Analysis of Effects*
1 (≤11.6%)	Reference			
2 (11.7-12.1%)	1.38	1.06-1.79	0.02	0.06
3 (12.2-12.9%)	1.34	1.04-1.72	0.02	
4 (≥13.0%)	1.39	1.08-1.78	0.01	
Acute Kidney Injury				
RDW Quartile	*aOR*	*95% CI*	*P-Value*	*Type 3 Analysis of Effects*
1 (≤11.6%)	Reference			
2 (11.7-12.1%)	0.88	0.78-1.01	0.06	0.25
3 (12.2-12.9%)	0.98	0.86-1.12	0.79	
4 (≥13.0%)	0.93	0.81-1.08	0.35	

Models were adjusted for age, sex, BMI, preoperative hemoglobin, procedure category, and comorbidities (ischemic heart disease, heart failure, cerebrovascular disease, chronic obstructive pulmonary disease, chronic kidney disease, smoking status, diabetes).

284789 - PERIOPERATIVE GOAL-DIRECTED THERAPY: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

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Introduction: Goal-directed hemodynamic and fluid therapy (GDT) during major surgery remains controversial.[1] Although recommended by national guidelines, randomized controlled trials (RCTs) and older meta-analyses have demonstrated conflicting results and inconsistent benefit.[1,2] Given the clinical importance, conflicting evidence base, and recently published RCTs of GDT, we performed an updated systematic review and meta-analysis (SRMA) to address whether clinical outcomes differ among different surgical strata, industry-sponsored trials, and the means of measuring and achieving the GDT.

Methods: Comprehensive searches of Medline, Embase, and the Cochrane Library were performed without language restriction up to 31-Dec-2016 to identify RCTs of adult patients undergoing major surgery that received GDT versus standard care. Trauma patients and parturients were excluded. GDT was defined as fluid and/or vasopressor therapy titrated to hemodynamic goals (e.g. cardiac output) or validated measures of volume responsiveness (e.g. stroke volume variation). The primary outcome was in-study mortality. Secondary outcomes included organ-specific morbidity and hospital and ICU length of stay (LOS). Two researchers independently extracted study demographics, outcomes, and assessed study quality via the Cochrane Risk of Bias Tool. Random effects meta-analysis was performed to derive odds ratios (OR) and weighted mean differences (WMD), including 95% confidence intervals (95%CI) and I^2 statistic for heterogeneity. *A priori* subgroup analyses included type of surgery, industry sponsorship of the study, and method of GDT.

Results: The search retrieved 1,945 citations and 95 RCTs (11,599 patients) met the inclusion criteria. Outcomes are summarized in Table 1. GDT reduced in-study mortality compared to standard care (OR 0.80; 95%CI 0.68-0.95; p=0.009; Number needed to treat for benefit [NNTB]=65; I^2=0.0%). Organ-specific morbidity was also reduced for patients receiving GDT with lower rates of pneumonia (OR 0.77; 95%CI 0.63-0.96; NNTB=56; I^2=0.0%), acute kidney injury or renal dysfunction (OR 0.72; 95%CI 0.59-0.88; NNTB=33; I^2=5.8%), and wound infection (OR 0.59; 95%CI 0.48-0.72; NNTB=27; I^2=0.0%). Rates of myocardial infarction (OR 0.97; 95%CI 0.72-1.32), congestive heart failure (OR 0.99; 95%CI 0.79-1.25), and exposure to allogenic blood transfusion (OR 1.08; 95%CI 0.81-1.45) were similar between groups. Additionally, hospital LOS (0.79 days; 95%CI 0.43-1.15; I^2=81.8%) and ICU LOS (0.58 days; 95%CI 0.30-0.86; I^2=86.3%) were decreased with GDT. Sensitivity analysis by industry sponsorship showed larger magnitudes of effect within industry-sponsored trials for some—but not all—outcomes (Table 1). Given the challenge of blinding during GDT, only 4 of 96 RCTs were at low risk of bias.

Discussion: This SRMA is the most comprehensive critical appraisal of the literature to date. The available evidence suggests that perioperative GDT reduces mortality, morbidity, and LOS. Given the high risk of bias of included RCTs, the findings should be interpreted with caution. Nonetheless, the benefit for renal outcomes and wound infection was quite robust, particularly in sensitivity analysis.

References:

[1]JAMA(2014);311(21):2181-2190.
[2]Anesth&Analg(2012);114:640-51.

Table 1

Outcome	Subgroup		OR (95% CI)	p-value	NNTB
Mortality, In-study	Overall pooled (I^2=0.0%)		0.80 (0.68-0.95)	0.009	65
	PAC usage	Yes PAC	0.53 (0.30-0.92)	0.02	18
		No PAC	0.66 (0.50-0.87)	0.004	59
	Industry sponsorship	Sponsored	0.74 (0.51-1.07)	n.s.	-
		Unsponsored	0.82 (0.68-0.99)	0.03	60
	Surgery type	Cardiac	0.67 (0.42-1.08)	n.s.	-
		Non-cardiac	0.82 (0.69-0.98)	0.03	69
Myocardial Infarction	Overall pooled (I^2=0.0%)		0.97 (0.72-1.32)	n.s.	-
CHF	Overall pooled (I^2=0.0%)		0.99 (0.79-1.25)	n.s.	-
Arrhythmia	Overall pooled (I^2=0.0%)		0.80 (0.66-0.96)	0.02	55
	PAC usage	Yes PAC	0.94 (0.71-1.24)	n.s.	-
		No PAC	0.70 (0.55-0.91)	0.006	34
	Industry sponsorship	Sponsored	0.70 (0.53-0.92)	0.01	27
		Unsponsored	0.90 (0.69-1.16)	n.s.	-
	Surgery type	Cardiac	0.57 (0.36-0.91)	0.02	15
		Non-cardiac	0.85 (0.69-1.05)	n.s.	-
Pneumonia	Overall pooled (I^2=0.0%)		0.77 (0.63-0.96)	0.02	56
	PAC usage	Yes PAC	0.88 (0.65-1.21)	n.s.	-
		No PAC	0.69 (0.52-0.92)	0.01	38
	Industry sponsorship	Sponsored	0.70 (0.51-0.98)	0.04	34
		Unsponsored	0.83 (0.63-1.10)	n.s.	-
	Surgery type	Cardiac	0.38 (0.09-1.67)	n.s.	-
		Non-cardiac	0.79 (0.63-0.97)	0.03	58
Acute Kidney Injury or Renal Dysfunction	Overall pooled (I^2=5.8%; p=0.36)		0.72 (0.59-0.88)	0.001	33
	PAC usage	Yes PAC	0.65 (0.36-1.15)	n.s.	-
		No PAC	0.73 (0.58-0.92)	0.007	29
	Industry sponsorship	Sponsored	0.68 (0.50-0.92)	0.01	33
		Unsponsored	0.73 (0.54-0.99)	0.04	31
	Surgery type	Cardiac	0.84 (0.49-1.45)	0.53	-
		Non-cardiac	0.70 (0.57-0.86)	0.001	33
Wound Infection	Overall pooled (I^2=0.0%)		0.59 (0.48-0.72)	<0.001	27
	PAC usage	Yes PAC	0.80 (0.58-1.10)	n.s.	-
		No PAC	0.48 (0.37-0.63)	<0.001	19
	Industry sponsorship	Sponsored	0.50 (0.37-0.69)	<0.001	19
		Unsponsored	0.66 (0.51-0.86)	0.002	37
	Surgery type	Cardiac	0.31 (0.12-0.84)	0.02	8
		Non-cardiac	0.61 (0.49-0.75)	<0.001	29
Stroke	Overall pooled (I^2=0.0%)		0.68 (0.33-1.37)	n.s.	-
Allogenic Blood Transfusion Exposure	Overall pooled (I^2=38.0%; p=0.02)		1.08 (0.81-1.45)	n.s.	-

Table 1: Summary of Clinical Outcomes. Odds ratio values below 1 favour the goal-directed therapy group compared to control and vice versa. Abbreviations: OR=odds ratio; 95% CI = 95% confidence interval; NNTB=number needed to treat for benefit; CHF=congestive heart failure; I2=heterogeneity statistic. 'n.s.'=not significant. PAC=pulmonary artery catheter.

285277 - CAN PEDIATRIC GASTRIC SONOGRAPHY BE USED AS A CLINICAL TOOL TO ESTABLISH EMPTY ANTRAL CROSS-SECTIONAL AREAS?

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Introduction: Gastric antral sonography is emerging as a point of care tool for the assessment of aspiration risk. There are few studies in pediatric patients[1-3] and none have focused on describing the sonoanatomy of the empty antrum or determining an upper cross-sectional area (CSA) limit of the empty antrum. The objectives of this study were (1) to describe the sonographic appearance of the empty antrum, (2) to determine if an upper CSA limit of the empty antrum could be incorporated into a pediatric clinical algorithm and (3) establish the sensitivity and specificity to determine the validity of antral sonography in the diagnosis of an empty antrum.

Methods: This prospective observational cohort study received REB approval. Consent was obtained. Antral sonography was performed in 99 fasted elective patients, 1 to 17 years of age, in the supine and right lateral decubitus (RLD) positions that were scheduled for elective upper gastrointestinal (GI) endoscopy under general anesthesia. Antral CSA values measured prior to and after endoscopic suction were compared across assigned qualitative grading groups using a Kruskal-Wallis H test. Receiver operator characteristic (ROC) curves were plotted to estimate the discriminating power of antral sonography position in the diagnosis of an empty antrum. Cut-off values were chosen using the Youden index, maximizing the sum of sensitivity and specificity. Positive (PPV) and negative predictive values (NPV) are presented for each sonographic position.

Results: The empty antrum sonographic appearance is ovoid-shaped. Significant differences in pre- and post-suctioned RLD measured CSAs were found between classified grade 1 ($p < 0.001$), grade 2 ($p = 0.017$) and all subjects ($p < 0.001$). Correlations between suctioned volume and CSA difference were $\rho = 0.22$ and $\rho = 0.58$ in supine and RLD positions, respectively for any suctioned volume. The discriminatory power of ultrasound view in diagnosing an empty antrum is presented by ROC curves where the area under the supine and RLD curves were 0.54 (95% CI 0.45-0.62, $p = 0.4$) and 0.73 (95% CI 0.66-0.8, $p < 0.001$), respectively (Figure 1). The cut-off value of the empty antrum in supine position is 2.20 cm^2 with a sensitivity of 76%, specificity of 35%, PPV of 53% and NPV of 58%. The cut-off value of the empty antrum in RLD is 3.07 cm^2 with a sensitivity of 76%, specificity of 68%, PPV of 70% and NPV of 74%.

Discussion: Antral sonography is becoming an established tool to assess gastric content and volume in pediatric patients. The RLD position is both sensitive and specific to qualitatively assess the gastric antrum grade and to quantitatively measure antral CSA. An antral CSA of ≤ 3.07cm^2 in the RLD position confirms that the antrum is empty in patients 1 to 17 years of age.

References:

[1]Pediatr Anesth 2012 22: 144-149.
[2]Pediatr Anesth 2015 25: 301-308.
[3]Br J Anaesth 2016 116: 649-654.

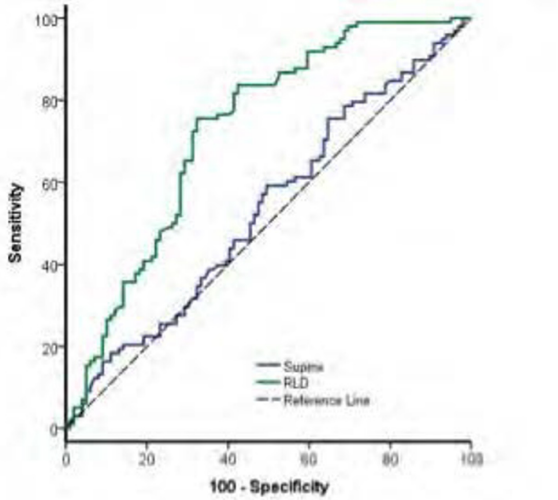

Figure 1: Receiver operator characteristic (ROC) curves represent the discriminatory power of the gastric ultrasound view in diagnosing an empty antrum in the supine (blue) and right lateral decubitus (RLD, green) positions.

280324 - MODERATE ANEMIA IS ASSOCIATED WITH RENAL TISSUE HYPOXIA AND INCREASED CEREBROVASCULAR REACTIVITY IN MICE

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Introduction: Moderate anemia, with hemoglobin concentrations (Hb) between 80-100g/L, has been associated with increased risk of organ injury (brain, kidney) and mortality by undefined mechanisms (1,2). We hypothesize that anemia–induced tissue hypoxia is a unifying mechanism for these outcomes. We measured the partial pressure of oxygen in tissues (P_tO_2), expression of hypoxia signaling molecule hypoxia inducible factor-1α (HIF-1α), and changes in cerebrovascular reactivity (CVR) to evaluate the mechanisms associated with tissue hypoxia during moderate anemia. In addition to standard measures of tissue hypoxia, we assessed CVR because clinical and experimental studies have associated reduced CVR with brain hypoxia and stroke (3-5).

Methods: With institutional animal care committee approval, a transgenic HIF-ODD Luciferase mouse model, ubiquitously expressing a HIF-1α-luciferase fusion protein, was assessed. Moderate anemia was induced with a red blood cell (RBC)-specific antibody (TER119). This antibody binds to the glycophoryn-A complex, removing red blood cells via intravascular hemolysis and splenic sequestration. Under isoflurane anesthesia (2% isoflurane, 21% O_2), Hb (Co-oximetry); peripheral arterial oxygen saturation (S_pO_2; pulse-oximetry); P_tO_2 (G4 Oxyphor phosphorescence quenching); blood flow (high-frequency ultrasound); CVR to a 5% CO_2 challenge (high-frequency ultrasound); and real-time HIF-luciferase radiance (IVIS luciferometer) were measured.

Results: RBC-specific antibody reduced Hb concentrations from baseline (143±7g/L) to a nadir of 94±11g/L at day 4 (n=22, $p < 0.001$). Anemia-induced cardiovascular adaptations included: 1) increased S_pO_2 (p=0.018); 2) increased cardiac output (26%, p=0.011); and 3) increased internal carotid blood flow (80%, $p < 0.001$). Brain P_tO_2 did not decrease in anemic mice (22.7±5.2 vs. 23.4±9.8 mmHg, p=0.935). By contrast, CVR increased during anemia relative to non-anemic controls ($p < 0.001$). During anemia, renal blood flow did not increase (p=0.239); and this was associated with a reduction in kidney P_tO_2 (13.1±4.3 vs. 20.8±3.7 mmHg, $p< 0.001$). HIF-1α expression increased in the renal (30%, p=0.006) and gut region (72%, p=0.017).

Discussion: Antibody-induced anemia was associated with adaptive cardiovascular responses to improve tissue oxygen delivery. These adaptations resulted in preferential cerebral perfusion and maintained brain P_tO_2. Under these conditions, we observed the novel finding of increased CVR. This increase in CVR may contribute to improve cerebral perfusion and oxygen delivery during anemia. By contrast, kidney blood flow did not increase during anemia, resulting in renal tissue hypoxia and increased expression of HIF-1α. The physiological significance of these responses remains yet to be elucidated. Further study is required to determine if anemia-induced renal tissue hypoxia contributes to acute kidney injury in surgical patients with moderate perioperative anemia.

References:

1)Lancet 2011;378(9800):1396-407
2)JAMA 2007;297(22):2481-88
3)J Cereb Blood Flow Metab. 2016;Epub ahead of print
4)Neurology 2014;83(16):1424-31
5)AJNR Am J Neuroadiol 2016;37(2):228-35

284809 - EFFICACY AND SAFETY OF ERYTHROPOIETIN AND INTRAVENOUS IRON TO REDUCE RED BLOOD CELL TRANSFUSION IN SURGICAL PATIENTS

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Introduction: Pre-operative anemia, including iron restricted anemia, affects up to 50% of surgical patients and increases the risk of red blood cell (RBC) transfusion. Both pre-operative anemia and perioperative RBC transfusion are associated with increased risk of adverse outcomes following surgery (1-4). Pre-operative treatment of anemia includes oral and intravenous (i.v.) iron and erythroid stimulating agents (ESA) such as erythropoietin (EPO); however, the optimal treatment strategy for pre-operative anemia remains to be established. Our objectives were to evaluate the efficacy and safety of ESA and iron therapy based on their effects on the prevalence of RBC transfusions and adverse thrombotic events. We hypothesized that ESA therapy would be more effective than iron therapy at reducing RBC transfusions.

Methods: We searched the Cochrane Central Register of Controlled Trials, MEDLINE and EMBASE from inception to July 2016; reference lists of published guidelines, reviews and associated papers, as well as conference proceedings. No language restrictions were applied.We included randomized controlled trials in which adult patients undergoing surgery received either an ESA and/or i.v iron before surgery, versus iron or no intervention. Two authors independently reviewed the studies and extracted data from included trials. Risk of bias was assessed for all included studies. Where applicable, we pooled risk ratios of dichotomous outcomes and mean differences of continuous outcomes across trials using random-effects models.Our primary outcome was the number of patients transfused with red blood cells. Secondary outcomes included risk of mortality and other thrombovascular events (stroke, myocardial infarction, deep vein thrombosis, and pulmonary embolism).

Results: A total of 79 randomized controlled trials (8,181 participants) were included. Patients that received ESAs in addition to oral or i.v. iron had a reduction in their risk for transfusion (risk ratio [RR], 0.50; 95% CI, 0.46-0.53), relative to those that only received oral or i.v. iron or no intervention. Treatment with i.v iron alone, relative to oral iron or no treatment, also reduced the risk of RBC transfusion (RR, 0.80 [95% CI, 0.63-1.01]. No clear increased risk of adverse events was observed with EPO use: mortality (RR, 1.03 [95% CI, 0.68-1.57]), myocardial infarction (RR, 1.14 [95% CI, 0.60-2.14]), deep vein thrombosis (RR, 1.43 [95% CI, 0.92-2.21]), stroke (RR, 1.49 [95% CI, 0.62-3.59]) or pulmonary embolism (RR, 0.50 [95% CI, 0.12-2.06]).

Discussion: Amongst patients undergoing surgery, the administration of an ESA in addition to oral or i.v. iron was associated with a reduction in patients requiring RBC transfusion. Intravenous iron was less effective at reducing RBC transfusion. Neither treatment was associated with any clear increase in risk of adverse thrombotic events. Additional large prospective randomized controlled trials are required to determine the optimal management strategy for patients undergoing surgery with iron restricted anemia.

References:

1. Circulation 2008; 117: 478-84
2. Anesthesiology 2009; 110: 574-81
3. Lancet 2011; 378: 1396-407
4. Br J Anaesth 2011; 107 Suppl 1: i41-59

284874 - MEDICATIONS FOR PROPHYLAXIS OF PRURITUS AFTER CESAREAN DELIVERY : A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: Intrathecal morphine provides excellent analgesia after cesarean delivery (CD), but can be associated with troublesome pruritus in 60-100% of patients.[1] A variety of medications have been used for prophylaxis against pruritus with varying success. We performed this meta-analysis to evaluate the efficacy of these medications in preventing intrathecal morphine-induced pruritus in women having CD.

Methods: This review complies with the PRISMA guidelines. A literature search of multiple electronic databases was conducted. We included randomized controlled trials (RCTs) that compared drugs used for prophylaxis of pruritus with a control group in women undergoing CD under spinal anesthesia with intrathecal morphine. The search was carried out using key words “prevention”, “treatment”, “pruritus”,“itching”, “intrathecal”, “spinal”, “morphine”, “obstetric patients”, “parturients”, “caesarian section”, “cesarean delivery.” All RCTs in the English language that reported at least one event in prophylaxis and control group were included. Quality of the studies was assessed using modified oxford scoring system. Dichotomous data were extracted and summarized using relative risks (RR) with 95% confidence intervals (CIs). Statistical analysis was conducted using Cochrane Review Manager 5.3 and forest plots were constructed for graphical representation.

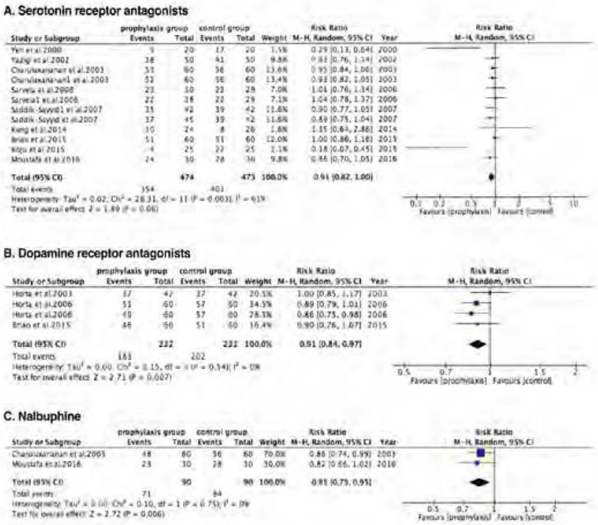
Results: Nineteen RCTs with 2435 patients (prophylaxis vs. control: 1219 vs. 1216) were included. Quality scores ranged from 6 to 7 indicating a low risk of bias. 474 patients received serotonin receptor antagonists (ondansetron^{7studies}, granisetron^{1study}, tropisetron^{1study}); 222 patients received dopamine receptor antagonists (alizapride^{2studies}, droperidol^{2studies}); 179 patients received opioid receptor agonist-antagonists (nalbuphine^{2studies}, butorphanol^{2studies}); 145 patients received opioid antagonists (naltrexone^{4studies}, nalmefene^{1study}, naloxone^{1study}); 80 patients received histamine receptor antagonists (diphenhydramine^{1study}, promethazine^{1study}); 89 patients received propofol^{1study} and 30 patients received celecoxib^{1study}.
The incidence of pruritus was not reduced with serotonin receptor antagonist prophylaxis compared with control group (RR: 0.91; 95%CI: 0.82-1.0; p=0.06). However, their use significantly reduced the incidence of severe pruritus and need for treatment of pruritus. There was a significant reduction in the incidence (RR: 0.91; 95% CI: 0.84-0.97; p=0.008) and severity of pruritus (RR: 0.39; 95% CI: 0.17-0.91; p=0.03) with dopamine receptor antagonist prophylaxis compared with control group. Nalbuphine decreased the incidence (RR: 0.85; 95% CI: 0.75-0.95; p=0.006), severity and need for treatment of pruritus (RR: 0.37; 95% CI: 0.26-0.52; p=0.00001) compared with placebo (Figure 1). There was no difference in the incidence, severity and need for treatment of pruritus with histamine receptor antagonists, propofol and celecoxib groups when compared with placebo.

Conclusion:
This systematic review comprehensively evaluates all the medications used in the English language literature for the prevention of pruritus from intrathecal morphine in women having CD. Prophylaxis with serotonin receptor antagonists reduced the severity and need for treatment, while the dopamine receptor antagonists and nalbuphine significantly reduced the overall incidence of intrathecal morphine-induced pruritus in women having CD.

References:
J Clin Anesth 2003;15:234–9.

CAS abstract 2017

Figure 1: Incidence of pruritus in prophylaxis vs. control group



285572 - A PREOPERATIVE SMOKING CESSATION INTERVENTION UTILIZING PATIENT E-LEARNING - AN OBSERVATIONAL STUDY

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Background

Interventions for preoperative smoking cessation can reduce perioperative complications and increase abstinence. It is not routinely provided due to various barriers such as a lack of time or training.[1, 2] In the general population, computer-based smoking cessation interventions have been utilized, but in the surgical population, evidence is limited on the use of patient e-learning programs.[3] The objective of this study was to develop and implement a patient e-learning program as part of a preoperative smoking cessation program in the surgical population.

Methods

REB approval and informed consent was obtained from all participants. In a prospective multicenter observational study, 459 adult patients undergoing elective, non-cardiac surgery were recruited in the preadmission clinic. The preoperative smoking cessation program consisted of a patient e-learning module, brief advice from a research assistant, referral to a tobacco quit-line, pamphlet, and/or pharmacotherapy. The patient e-learning program explained the importance of smoking cessation before surgery, benefits of quitting smoking, how to quit smoking and how to cope with quitting. Smoking status was assessed on the day of surgery, 1 month, 3 months and 6 months post-surgery. Self-reported abstinence was biochemically confirmed with urinary cotinine. The primary outcome was the 7-day point prevalence abstinence rate 6 months after surgery. Secondary outcomes included the 7-day point prevalence abstinence on the day of surgery, 1 month and 3 months after surgery. Multivariable logistic regression was used to identify independent variables related to abstinence.

Results

The 7-day point prevalence abstinence at 6 months was 22%. On the day of surgery, 1 and 3 months post-surgery, the 7-day point prevalence abstinence was 28%, 25% and 22% respectively. The variables predicting abstinence at 6 months were body mass index (OR 0.98; 95% CI: 0.93-0.99; P = 0.034), average amount of money spent on cigarettes (OR 0.69; 95% CI: 0.58-0.82; P < 0.0001), presence of other smokers in the household (OR 0.46; 95% CI: 0.25-0.84; P < 0.012), use of pharmacotherapy (OR 6.8; 95% CI: 3.5-13.2; P = 0.0001) and contact with Smokers' Helpline (OR 4.03; 95% CI: 2.3-7.0; P < 0.0001).

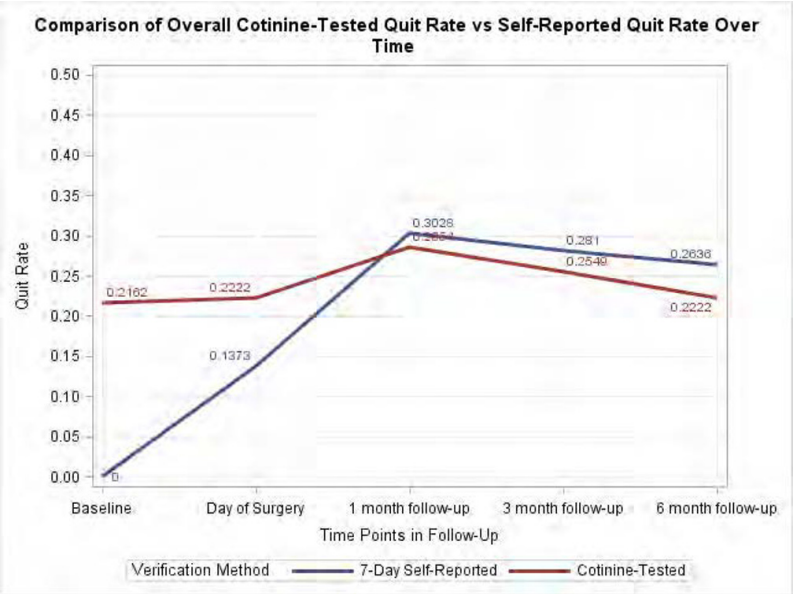
Conclusion

Intervention for preoperative smoking cessation utilizing a patient e-learning program led to a high rate of abstinence 1, 3, and 6 months after elective surgery. In overburdened preadmission clinics during routine clinical practice, the patient e-learning program may be valuable in overcoming barriers that hinder the provision of smoking cessation interventions.

References:

1. Wong J, et al. Anesthesiology 2012; 171:1-10.
2. Wong J, et al. Can J Anaesth 2012; 9(3):268-79.
3. Wolfenden L. Anaesthesia. 2005 Feb;60(2):172-9.

Overall Quit Rate – Self-Reported vs. Cotinine Tested


Comparison of Overall Cotinine-Tested Quit Rate vs Self-Reported Quit Rate Over Time
Quit Rate
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.3028
0.2861
0.281
0.2636
0.2549
0.2222
0.2162
0.2222
0.1373
0
Baseline
Day of Surgery
1 month follow-up
3 month follow-up
6 month follow-up
Time Points in Follow-Up
Verification Method
7-Day Self-Reported
Cotinine-Tested

285764 - SIDESTREAM DARK FIELD IMAGING OF SUBLINGUAL MICROCIRCULATION TO ASSESS PREECLAMPSIA MICROVASCULAR DYSFUNCTION

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Background

Preeclampsia is a multi-system hypertensive disorder of pregnancy and a significant cause of maternal mortality worldwide. Efforts to develop models for prediction of preeclampsia only yielded modest results.[1] Anti-angiogenic signalling and vascular abnormalities manifest prior to the development of clinical signs, even as early as mid-gestation.[2,3] It was hypothesized that impaired indices of microcirculatory function could be detected using sidestream dark field (SDF) imaging. The objective of this study was to examine microvascular function in women at high risk for preeclampsia at mid-gestation using SDF imaging.

Methods

With REB approval, women presenting for a prenatal clinic visit between 16 and 22 weeks gestation of pregnancy were screened for eligibility. Patients at high risk for preeclampsia were recruited if they met at least one of the following criteria: previous preeclampsia, pre-existing renal disease or diabetes mellitus, antiphospholipid syndrome, BMI ≥ 35, pre-existing hypertension, or both age > 40 years and family history of preeclampsia in a first degree relative. Participants were excluded if they were smokers, consumed caffeine within 6 hours of imaging or were non-English speaking. Investigators performed analytical non-invasive SDF imaging of the 5 different visual fields of the sublingual microcirculation. Video images were analyzed blindly following randomization to determine the microcirculatory parameters (microvascular flow index (MFI), perfused vessel density (PVD), total vessel density (TVD), and proportion of perfused vessels (PPV)). After delivery, charts were reviewed to determine if they developed gestational hypertension, preeclampsia or severe preeclampsia. The primary outcome was the difference in MFI between the normal participants and participants with preeclampsia.

Results

Data from sixty-six patients were included in the final analysis. Twelve of the participants (18.2%) developed preeclampsia or severe preeclampsia during the course of their pregnancy. Obesity was a common risk factor for inclusion across all groups, representing over 50% of participants with no preeclampsia. MFI was not significantly different between participants with normal pregnancies and participants with preeclampsia or severe preeclampsia (2.75 ± 0.38 vs. 2.80 ± 0.34, respectively; p = 0.459). Similarly, there were no significant differences in TVD, PVD and PPV between the two groups.

Discussion

We did not detect a functional difference in microcirculation between women who did develop preeclampsia and those who did not. SDF imaging of the sublingual microcirculation may remain an appropriate tool to identify women at risk for the disease, albeit later in pregnancy.

References:

1. Circulation (2012) **125***(7)* 911-9
2. N Engl J Med (2006) **355***(10)* 992-1005
3. Circulation (2010) **122***(5)* 478-87

287466 - DOCUMENTATION OF FRAILTY, CAPACITY AND CONSENT FOR ELDERLY PATIENTS HAVING ELECTIVE INPATIENT NON-CARDIAC SURGERY

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Introduction: Older people are increasingly prevalent in the perioperative setting, and advanced age is an independent risk factor for adverse postoperative outcomes.[1] Given the increasing number of older patients in the perioperative setting, and their unique risk profile, guidelines for the optimal preoperative care of geriatric surgical patients have been published.[2] Guidelines recommend that geriatric-specific risk quantification, in the form of frailty assessment, be performed. Furthermore, the guidelines recommend that decision-making capacity (DMC) assessment and the consent process be documented in a manner that reflects geriatric syndromes such as frailty and cognitive dysfunction. The objectives of this study were to (1) measure the proportion of elderly patients where frailty assessment, capacity assessment, and consent processes were documented; and (2) to evaluate whether the presence of frailty influenced documentation of DMC assessment and proper consent processes.

Methods: Ethics approval was obtained for this historical cohort study. A random sample of 240 patients, aged 65 or older, having elective inpatient surgery at a tertiary care center was identified. Preoperative surgical consultations were reviewed to identify frailty assessment and risk quantification, as well as criteria for DMC based on the American College of Surgeons/American Geriatrics Society guidelines. Legal elements required for consent, per provincial legislation, were also identified. Supporting quotes were recorded. Data extraction forms were piloted in duplicate to ensure consistency. All data was reviewed by two extractors and the senior author; disagreements were resolved by consensus. Descriptive analyses of findings were performed; risk-adjusted analyses are ongoing. Qualitative analysis of quotes will be performed.

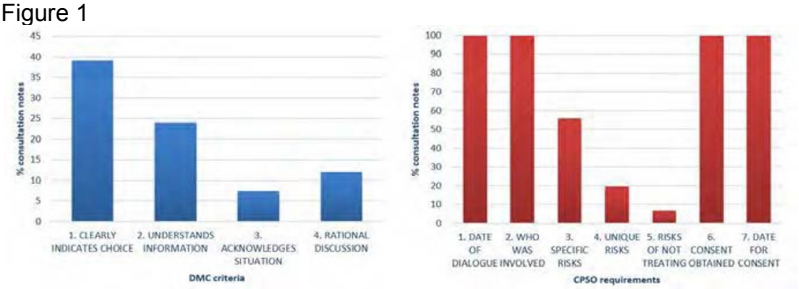
Results: Consultation notes were available for 233/240 patients. Frailty was mentioned in 1% of the charts reviewed (2/233); no formal frailty assessments were documented. Risk quantification was documented in 15% of the preoperative notes (34/233). The four legally relevant criteria for assessment of DMC were documented in 3% of the notes (7/233). All notes documented at least four of the seven elements required for informed consent; all elements were present in 1% (3/233) of the notes. Specific risks of the procedure were documented in 56%, unique risks in 20%, and the risks of not treating the diagnosed condition were documented in 6% of surgical notes. Figure 1 reports the proportion of DMC and consent elements documented.

Conclusion: Despite guidelines for optimal preoperative assessment of the geriatric patient, recommended practices such as frailty and DMC assessment are rarely documented. Furthermore, legally required elements of informed consent are regularly missing from the preoperative surgical notes. Although we cannot differentiate between elements that were discussed vs. documented, the low proportion of recommended and required elements present in the medical record highlights a key gap in the preoperative care and assessment of our growing population of older surgical patients.

References:

1. Am Surg 2003 69(11): 961–5
2. J Am Coll Surg 2012 215(4): 453–66

Figure 1



Proportion of DMC and consent elements documented in the preoperative surgical notes

285297 - SIMULTANEOUS PERCUTANEOUS TRICUSPID AND MITRAL VALVE REPAIR : A CASE REPORT

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Introduction
Percutaneous edge-to-edge mitral valve repair using the MitraClip device represents a novel, less invasive treatment option for patients with symptomatic severe mitral regurgitation [1]. Percutaneous tricuspid valve repair has been described as technically feasible in patients with severe functional tricuspid regurgitation unsuitable for surgery [2]. This case report describes a patient who received both procedures at the same intervention.

Methods and Results
A 80-year-old woman with previous history of hypertension, atrial fibrillation, multiple previous TIA's was referred to the Structural Heart Clinic for evaluation of valvular disease due to progressive functional decline and peripheral edema. Upon work up she was found to have severe tricuspid regurgitation and moderate mitral regurgitation. She underwent a Mitraclip procedure and a tricuspid clip procedure at the same intervention under general anesthesia with transesophageal echocardiography guidance. The patient tolerated the procedure well. She was extubated at the end of the procedure and discharged from the intensive care unit on post-operative day 1. A post-operative transthoracic echocardiography showed mild mitral regurgitation and mild to moderate tricuspid regurgitation.

Discussion
MitraClip procedure has become a more acceptable technique for high-risk patients with severe mitral regurgitation with over 15.000 cases done worldwide. Recently percutaneous tricuspid valve repair became an alternative for patients with severe symptomatic tricuspid regurgitation and high risk for surgery, however very few cases of simultaneously tricuspid and mitral valve repair have been reported.

References:

[1] Feldman T, Wasserman HS, Herrmann HC, et al. Percutaneous mitral valve repair using edge-to-edge technique: six month results of the EVEREST phase 1 clinical trial. J Am Coll Cardiol 2005;46:2134-2140.

[2] Wengenmayer T, Zehender M, Bothe W, Bode C, Grundmann S. First percutaneous edge-to-edge repair of the tricuspid valve using the MitraClip system. EuroIntervention 2016;Volume 11, Number 13

284057 - FACTORS WHICH ENHANCE THE IMPLEMENTATION OF A NEW ELECTRONIC MEDICAL RECORD IN THE PERIOPERATIVE ENVIRONMENT

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Introduction:

Implementing a new electronic medical record (EMR) system at an academic health institution is an expensive endeavor. Certain factors may improve this transition and allow for productivity similar to pre-implementation status sooner. Our institution has had an EMR since 2000 and an Anesthesia Information Management System (AIMS) in the perioperative environment since January 2002. A systematic review of previously reported EMR implementations from 2000-2011 demonstrated negative impacts including changes to workflow and work disruption. Mixed observations were found on EHR quality, adoption and satisfaction.[1] Another systematic review specifically addressing EMR implementations in hospitals demonstrated recommendations based on content, context, and process.[2] Our objective was to investigate which factors allowed to increase provider comfort level in the transition to a completely new EMR system. Factors that increase provider level comfort in the implementation of a new EMR system in the perioperative environment has not been investigated or published.

Methods:
After obtaining Institutional Review Board approval, anesthesia providers were selected for participation from a large academic health system implementing the EPIC system. One week prior to implementation, a pre-implementation survey was sent to all anesthesiologists and nurse anesthetists. Each survey respondent was given a unique identifier. Following a three-month transition period, a follow up survey was sent to all pre-implementation survey respondents. Respondents were given a $5 coffee card for completing each survey. Survey responses from those who responded to both surveys were analyzed. Analyses were conducted using Stata v12 (College Station, TX).
Results:
The response rate for the pre-survey was 54%(87/160). The pre-implementation survey elicited information on length of experience as an anesthesia provider,

knowledge with the EPIC system, provider comfort level, and factors which would make adoption to the new system easier at the front end. The response rate for the post-survey was 75% (65/87). Factors which were most significantly increased provider level comfort were repetitive use and interaction with a Super User. Having an on-site trainer, shadow charting, playground environment, and a training checklist were less helpful (.23-.36) than originally speculated.

Discussion:
EMRs offer tremendous potential to improve quality, productivity, and outcomes in patient care, but they also represent one of the most significant and expensive changes healthcare organizations may undertake. Implementation of a new EMR in the perioperative environment poses many unique challenges. We have identified factors which may make this transition smoother from a provider and cost standpoint for an academic health center or organization.

References:
References:

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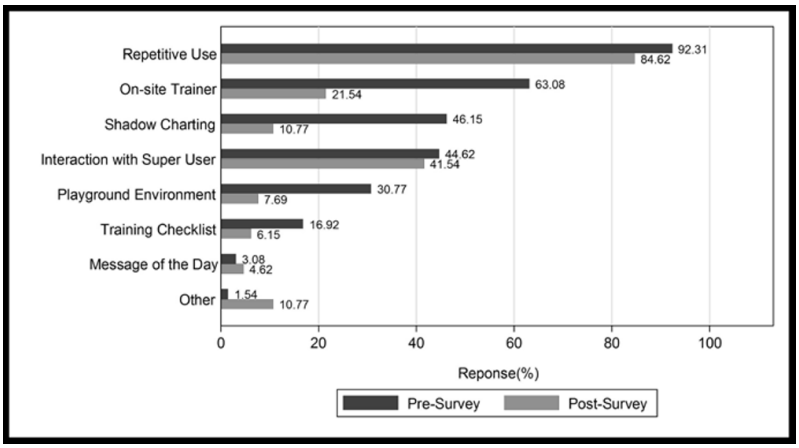
Factors which Enhance the Implementation of a New Electronic Medical Record in the Perioperative Environment



286275 - PHARMACY PREPARED EMERGENCY MEDICATION FOR CARDIAC ANESTHESIA BY. A QUALITY IMPROVEMENT & COST STUDY

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Introduction: Multiple cardiovascular emergency medications (CEM) are recommended to be ready to use before cardiac anesthesia induction(1). The objective of this study was to assess the effect of pharmacy preparation of four CEM in terms of utilization, waste, and economic impact (2).

Methods: Ethics approval was waived for this quality improvement study. A three phase design was used: Pre-pharmacy (2 weeks): anesthesiologists prepared all CEM; Pharmacy (5 weeks): Pharmacy prepared 4 CEM; and Post-pharmacy (2 weeks) anesthesiologists prepared all CEM. Anesthesiologists were free to use CEM independently. A CEM kit with four medications stable for seven days was prepared for every single case by the hospital pharmacy. Each kit contained glycopyrrolate (0.2 mg/ml, one syringe 2 ml), ephedrine (5 mg/ml one syringe 10 ml), phenylephrine (100 mcg/ml, two syringes of 20ml) and norepinephrine (16 mcg/ml one 250 ml bag). Outcomes: Medications administered were obtained from the electronic anesthesia record. Residual CEM were collected at the end of the case and only full syringes and bags minus one syringe load for boluses were considered waste. The cost of CEM administered and wasted was compared between phases.

Results: Only direct costs were analyzed. Medication used was collected in 153 cases (Pre=41, Pharmacy=73 and Post=40). The estimated cost of CEM administered was C$ 7,017.09 (C$ 45.86 per case). There were no differences in proportion of cases receiving any CEM between phases. Phenylephrine cost was significantly lower during pharmacy phase (Pharmacy C$6.75 □3.46, Pre: C$8.96 □ 3.76, Post: C$ 9.45 □ 3.19. $p < 0.001$). Other medications did not show cost differences between phases. There were significant differences between anesthesiologists and total CEM cost ($\chi 2(9) = 26.13$, $p = 0.002$). The waste information was collected in 70 cases (Pre=27, Pharmacy=35, Post=21). The estimated cost of the CEM wasted was C$ 1,420.93 (C$ 20.29 per case). There were no differences in CEM waste between phases although

there was an increasing trend during the pharmacy phase related to vasopressin use. Approximately one-quarter (26.3%) pharmacy CEM medications were returned unused and used for another case, with projected savings of C$7,674.00 for 1,000 cases.

Conclusion: Waste of CEM in cardiac anesthesia is substantial with a projected direct cost of C$20,290.00 per 1,000 cases in a year. Pharmacy preparation of CEM seems to be cost effective increasing the medications expiration.

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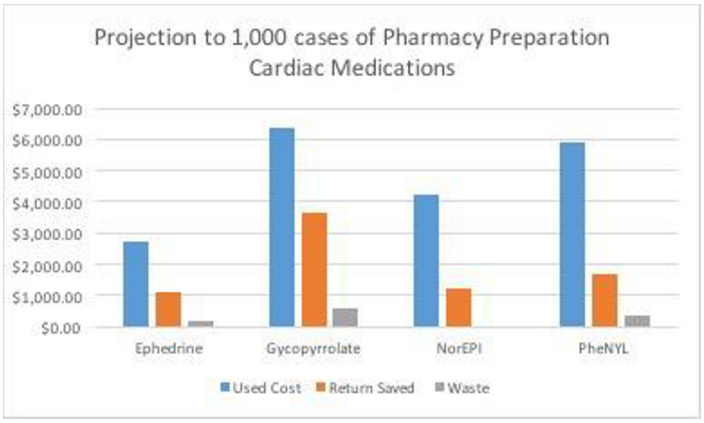

274885 - IMPACT OF DIFFERENT REMIFENTANIL DOSES ON THE NOCICEPTION LEVEL INDEX RESPONSE TO INTRA-OPERATIVE NOXIOUS STIMULI

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Introduction: Several indices have been recently used to monitor nociception intensity under general anesthesia (GA), most of them based on a single parameter. The PMD monitor (Medasense Biometrics, Israel) uses the NOL index, a multiparametric index derived from heart rate (HR), HR variability, plethysmograph wave amplitude, skin conductance, skin temperature and its fluctuations. The index ranges from 0 (no pain) to 100 (max pain). The PMD monitor has been recently shown to have a high sensitivity and specificity to discriminate nociception under GA. With the latest version PMD-200, we tested the NOL response during noxious stimuli at various doses of remifentanil (RF). The hypothesis was an inverse correlation between RF dose and NOL alteration.
Methods: After Ethic Committee approvals, 26 patients received desflurane-RF based GA with an epidural analgesia (EA) for laparotomy. A tetanic stimulation was applied to the forearm of the patients at 4 RF doses (0.005 µg/kg/min before and after EA loading, 0.05 and 0.1 µg/kg/min). Intubation and incision were processed at 0.05 µg/kg/min RF dose. Pre- and post-stimulation NOL mean values were compared. ROC curves were constructed to assess the ability of the individual parameter to discriminate between noxious and non-noxious state at RF 0.005 µg/kg/min. Correlation between RF dose and post-stimulation NOL values was assessed.
Results: AUC for discrimination between noxious and non-noxious states for NOL was 0.92 vs 0.69, 0.71, 0.64 for HR, MBP and BIS respectively. Pre-stimulation NOL values ranged for 5 to 8 with no significant difference when RF infusion increased. Post-stimulation values at RF doses of 0.005 before and after epidural load, 0.05, and 0.1 µg/kg/min were, respectively, 24, 21, 14 and 7, significantly higher than the pre stimulation values ($p < 0.0083$). Post-stimulation values significantly decreased when RF dose was higher. Correlation test between NOL values and RF doses was $r = -0.584$ ($p < 0.0001$).

Discussion: In this study, NOL index was the only parameter responding to all noxious stimuli under general anesthesia, regardless to RF dosage. NOL was better for discriminating a noxious from a non-noxious state compared to single measures. NOL values after stimulus decreased with the high dose of RF, showing a significant inverse correlation between opioid dose and NOL index. The high sensitivity and specificity of the NOL index in this study suggests it has great potential as a monitor of nociception intensity during anesthesia.

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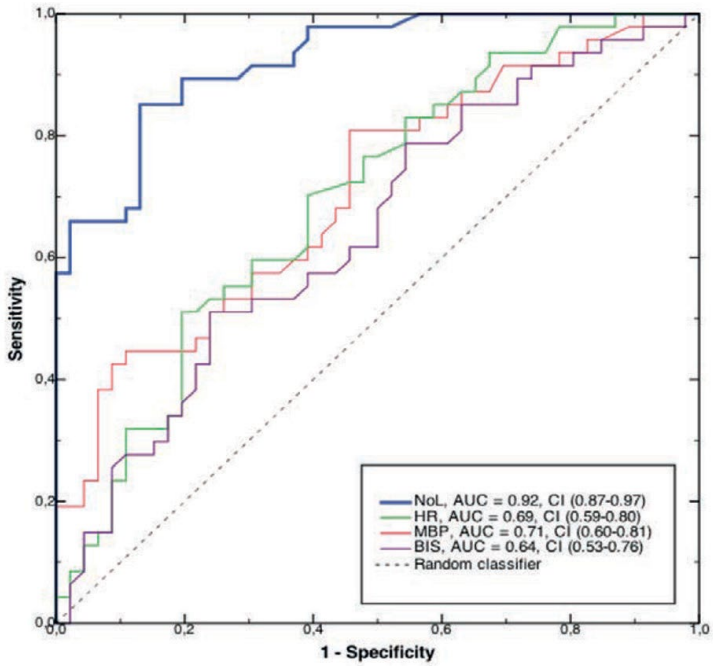
Receiver operating characteristics curve



Receiver operating characteristics curve analysis: discrimination of experimental noxious stimulus period from non-noxious stimulus period at minimal remifentanil dosage (0.005 mcg/kg/min). NOL: Nociception Level index; HR= Heart Rate; MBP= Mean arterial Blood Pressure; BIS= Bispectral index.

281133 - TRANSIENT HEART RATE CHANGES DIFFERENTIATE NOXIOUS STIMULATION DURING GENERAL ANESTHESIA

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INTRODUCTION

Administration of anesthetics depends on the surgical noxious stimulation in general anesthesia, in particular the analgesics. While the heart rate (HR) and blood pressure readings displayed on the patient monitor provide convenient information for anesthesiologists, those readings are too static to quantify the noxious stimulation or the transient changes of the physiological status. For example, by reading the HR information, it is not easy to acquire the opposite impacts of noxious stimulation on the autonomic nerve system -- the tachycardia is caused by sympathetic activation, while noxious stimulation often elicits a transient bradycardia lasting less than 10 seconds via vagal activation. It has been well known that the heart rate variability (HRV)[1], which quantifies the above-mentioned transient change or more generally the time-varying beat-to-beat intervals, serves as a portal to study the autonomic nerve system. However, traditional HRV analysis techniques are short of quantifying the dynamical information in the time varying beat-to-beat intervals[2], particularly the transient heart rate change after the noxious stimulation[3]. This drawback limits the application of HRV analysis in clinical anesthesiology. We show that this kind of transient heart rate changes caused by noxious stimulation can be detected and quantified by using a modern “time-varying power spectrum” technique, and the quantification can help differentiate several types of noxious stimulation.

METHODS

The study was approved by the local institutional Research ethics Board and written consents were collected. We conducted a prospective observational study by enrolling patients undergoing laparoscopic cholecystectomy. The physiologic recordings, including the electrocardiogram (ECG), was collected from the Philips Intellivue^{TM} patient monitor. We simultaneously recorded the accurate timestamps of noxious anesthetic events, including the moments of endotracheal intubation, skin incision and the insertion of laparoscopic trocar. A modern time-varying power spectrum called concentration of frequency and time (ConceFT)[4] is applied to analyze the beat-to-beat HR data from the ECG recording.

RESULTS

We analyzed data from 17 patients to obtain the preliminary results. The beat-to-beat HR data showed that the transient bradycardia is prominent right after different kinds of noxious stimulations, including endotracheal intubation, surgical skin incision and

the insertion of laparoscopic trocar(Fig.1). The results indicate that the “time-varying HRV indices" derived from the time-varying power spectrum performs best for detecting noxious stimulation. The results also showed that the action of laparoscopic trocar insertion produces a stronger transient bradycardia than the other types of surgical noxious stimulation.

DISCUSSION

Using ConceFT, we can quantify the transient HR change during noxious stimulation. This hidden information inside the ECG could differentiate different types of noxious stimulation; particularly, we could classify the transient HR responses by the somatic and visceral pain.

References:

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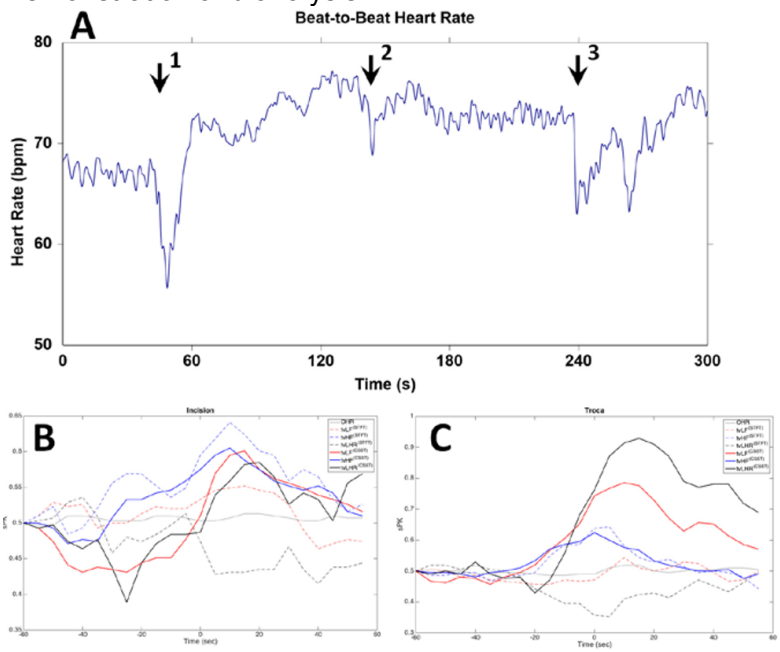
Demonstration and analysis



Subfigure A: representative beat-to-beat heart rate shows the transient bradycardia lasting less than 10s at the moment of noxious stimulation. It is more obvious during trocar insertion than skin incision. Arrow1: laparoscopic trocar insertion; Arrow 2: skin incision; Arrow 3: trocar insertion at the other site. Subfigure B,C: The serial prediction probability analysis shows better discrimination of various indices than the standard heart rate readings on the patient monitor (OHR). The Trocar insertion (subfigure C) is more prominent than the laparoscopic skin incision (subfigure B)

285352 - CONVERTING PULSE OXIMETER TONE OUTPUT TO PLAY MUSICAL INSTRUMENTS VIA MUSICAL INSTRUMENT DIGITAL INTERFACE (MIDI)

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Introduction
Medical instruments such as pulse oximeters use sound to convey important information to personnel in the operating room. These sounds are a useful way of communicating continuously, however, multiple devices outputting simultaneously can create a distracting, and difficult to distinguish, cacophony of sound. Multiple Instrument Digital Interface (MIDI) is a standard communication protocol used in the music industry. It allows for interfacing multiple devices together and for the use of powerful software tools to control these devices. To utilize the advantage of MIDI in the operating room, an adapter for a clinical Masimo Radical 7 pulse oximeter was developed in order to convert the pulse rate and SPO2 data to MIDI format. The result is the ability to connect the pulse oximeter to any music recording software directly and is the first step towards integrating an audio standard for all devices in the operating room.

Methods
The design of this novel device was exempt REB approval. A novel device termed the “Pulse Oximeter-to-MIDI Output” (POMO) was developed. The device consists of an Arduino Mega, RS232 Shield a MIDI-to-USB converter, a custom circuit, and 3D printed case. The ASCII data from a Masimo Radical 7 is transmitted via RS-232 from the RS-232 port on the pulse-oximeter to the Arduino shield. This data is then transmitted to the Arduino which has been programmed to convert the information into a corresponding pitch and tempo. This pitch and tempo are then used to create MIDI commands that are transmitted via a MIDI-to-USB converter to a computer running GarageBand. A case for the device was developed using rapid-prototyping additive manufacturing techniques. The case contains a light emitting diode (LED) which echoes the patient’s pulse rate along with a toggle button which switches the device between a single note and chord mode.

Results
The device was successful in interfacing a Masimo pulse oximeter with GarageBand (Figure 1). When connected to GarageBand, the user can, select from a multitude of musical instruments (e.g. piano, guitar) to play at each pulse. As designed, the pitch of the sound corresponds to the SPO2 value (high pitch for high SPO2 and vice versa), while the tempo corresponds directly to the measured pulse rate. In preliminary testing and simulated environment, we were able to achieve high fidelity pitch and tempo

changes which responded in real-time to changes in the physiological data.

Conclusion A device to provide MIDI interfacing to a clinical Masimo pulse oximeter was developed. Such a device demonstrates the feasibility, and potential advantages, of integrating MIDI into the operating room to reduce excessive noise and provide a standard for collecting data from multiple sound-emitting devices. Further studies are required to assess the utility of this in the clinical environment.

References:

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Figure 1: POMO Device outputting saturation tone in classical piano in real-time from pulse-oximeter to GarageBand

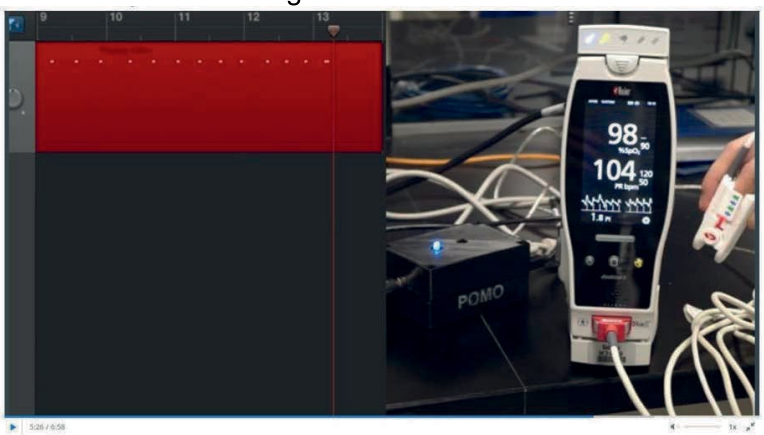

Figure 1: POMO Device outputting in real-time from pulse-oximeter to GarageBand

Figure 1: POMO Device outputting in real-time from pulse-oximeter to GarageBand

285397 - USING TRANSFER LEARNING FROM DEEP CONVOLUTIONAL NEURAL NETWORKS TO IDENTIFY VOCAL CORDS & SONO-ANATOMY REALTIME

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BAcKGROUND
We sought to assess whether the use of image recognition technology would assist in anesthesia procedures such as intubation or ultrasound-based procedures by offering realtime identification f tissues. Remarkable progress has been made in image recognition, primarily due to the availability of large-scale annotated datasets and deep convolutional neural networks (CNNs). CNNs enable learning data-driven, highly representative, hierarchical image features from sufficient training data
METHODS:
A vocal cord database (open source) of 250 images and 1500 regions of interest was used. Each ROI was labeled as vocal cords, arryteniods, false vocal cord, adenoids. Features were extracted from each ROI using pre-trained CNNs and used to train support vector machine (SVM) classifiers in the tasks of distinguishing laryngeal anatomy. For a baseline comparison, classifiers were also trained on 80 images. Five-fold cross-validation (by case) was conducted with the area under the receiver operating characteristic curve (AUC) as the performance metric.
RESULTS:
Classifiers trained on CNN-extracted features were comparable to classifiers trained on human-designed features. Both the SVM trained on CNN-extracted features and the SVM trained on human-designed features obtained an AUC of 0.90.
CONCLUSION:
We obtained strong results using transfer learning to characterize and identify vocal cords in anatomical images. This method allows us to directly classify a small dataset of area of interest and identify vocal cords in a computationally inexpensive fashion without any manual input. The incorporation of such technologies may improve the safety by guiding novices or out of hospital providers with intubation. Furthermore, the identificaiton of sono-anatomy realtime may assist with safety and accuracy and better outcomes when performing regional anesthesia blocks.

References:
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286103 - VALIDATION OF PATIENT SAFETY INDICATORS AT A TERTIARY HOSPITAL IN ONTARIO

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Introduction

A barrier to quality improvement is a lack of access to accurate and routinely collected adverse event measures. Prospectively identified complications based on standard definitions are considered the gold standard, however, these data require resource intensive data collection and are not available for most patients. Health administrative data codes, including adverse event indicators, are already collected for all inpatients in Canada. These codes represent a more efficient way to identify adverse events, but only if such codes accurately identify patients who truly experience (or truly do not experience) an adverse event.
Recently, a set of Patient Safety Indicators (PSIs) based on administrative codes were developed for Canadian data. While these indicators provide face and content validity, their diagnostic accuracy has not been tested. Therefore, we measured the accuracy of PSIs in identifying surgical patients whose adverse events were initially measured by the National Surgical Quality Improvement Program (NSQIP), which is considered the gold standard method to identify adverse events in surgical patients.

Methods

Following ethical approval, we performed a study of diagnostic accuracy to validate Canadian PSIs. We linked all patients at The Ottawa Hospital who were entered in the NSQIP database to their health administrative data record in our Data Warehouse. We then identified all NSQIP complications (the reference standard) and all PSIs from each patient's record. These data were used to measures the accuracy of the PSIs in identifying a patient who truly did (or did not) experience a complication per NSQIP data. Positive and negative likelihood ratios (+LR/-LR) were calculated, along with sensitivities and specificities to describe the accuracy of having any PSI coded on having experience any NSQIP complication, as well as each of the individual components of the PSI framework.

Results

We identified 12898 patients who were enrolled in NSQIP and successfully linked to their corresponding administrative record. NSQIP complications occurred in 2885 patients (22.4%), and PSIs were identified in 2445 (18.7%). The baseline characteristics were similar between NSQIP + patients and PSI+ patients.

The +LR for a PSI in identifying a patient who also had an NSQIP complication was 6.4; the -LR was 0.4. Sensitivity was 0.60, and specificity was 0.90. These values were similar across different surgery types and routes or hospital admission. Individual PSI components were highly specific, but had poor sensitivity. (+LR range 7.7-131; -LR range 0.39-0.90).

Discussion

Based on accepted standards for diagnostic accuracy, PSIs based on clusters of administrative data codes have adequate accuracy to identify people who truly do, or do not, experience a complication while in hospital. Therefore, PSIs could be used to monitor and study adverse event rates across all surgical patients. The generalizability of these findings to other hospital inpatients should be evaluated.

References:

N/A.

286567 - THE ANESTHESIA WORKFORCE IN 2016: ASSESSING THE CURRENT AND FUTURE NEED FOR ANESTHESIOLOGISTS IN CANADA

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Introduction: The number of required anesthesia providers in Canada continues to fluctuate. Previous studies in the past decade identified a shortage of providers, with some improvement in the national vacancy rate towards the end of the decade.[1] Interventions including increased residency training positions, utilization of anesthesia assistants and technicians, and other hospital policy changes may have contributed to this improvement. The purpose of this study was to reassess the current and near future need for anesthesiologists in Canada.

Methods: An email list of all Canadian department heads of anesthesiology was obtained from the Canadian Anesthesiologists' Society. Following ethics approval, one iteration of an online survey was sent out in December 2016. Results were compared to a similar survey from 2010.

Results: A total of 232 electronic surveys were sent to the identified department heads. Preliminary analysis is based on respondents (14%) representing anesthesiology departments providing care at 36 different sites. Of the respondents, 19% represented academic health science centres and 81% represented community centres. There were a total of 271 full time equivalent anesthesiologists (1.0 FTE) and 143 part time (< 1.0 FTE) anesthesiologists. Of these providers, 38% were general practitioner anesthetists (GPAs) and 62% were specialist anesthesiologists. When asked regarding the current availability of FTE anesthesiologists, 76% reported having about the right number, 20% reported having too few, and 4% reported having too many. A total of 13 unfilled FTE positions were identified from 5 different sites. Eight anesthesiologists from 7 departments were reported to be working past their planned retirement, with the majority doing so for personal or financial reasons (50%), while some cited staffing issues (25%). When asked to estimate the number of FTE anesthesia providers needed in the next 5 years, 48% of respondents expected no change, while 52% estimated needing more providers. This has slightly changed from 2010 when 40% expected no change and 60% estimated an increased need. Twenty-two sites reported expecting to recruit anesthesiologists in the next 5 years. Of these sites, expected recruitment of 7 GPAs and 52 specialist anesthesiologists was reported.

Discussion: These preliminary results suggest an overall current and future need for anesthesia providers. Unfilled FTE positions were identified in 14% of responding sites, while 20% reported currently having too few FTEs available. A majority of responding sites reported expecting to recruit more providers, particularly specialist anesthesiologists, in the next 5 years. We note that conclusions at this time are based on limited data, and will continue to revise the results as additional responses become available.

References:

[1] Engen DA, Morewood GH, Ghazar NJ, et al. A demand-based assessment of the Canadian anesthesia workforce – 2002 through 2007. Can J Anesth 2005 52: 18-25.

287001 - THE IMPACT OF ANESTHESIA ASSISTANTS ON ANESTHESIOLOGY IN CANADA: UPDATE TO THE 2010 HUMAN RESOURCES STUDY

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Introduction: Nationally, there continues to be wide variability in the availability and the utilization of Anesthesia Assistants (AAs) by departments of anesthesiology. The purpose of this study was to follow-up a 2010 survey, re-assessing the current number of AAs and related professions (anesthesia technicians; 'ATs') their utilization, and their impact on the specialty of anesthesiology in Canada.
Methods: Ethics approval for this project was obtained at our insitutution. An email list for Canadian Department Heads of Anesthesiology was obtained using a collection of data available from provincial authorities and CIHI. The Canadian Anesthesiologists Society assisted with this process. An online survey was distributed in both English and French in December 2016. Frequencies and percentages were calculated. Comparisons were drawn to the most recent data on this topic, collected in December 2010 using an earlier iteration of the Human Resources in Anesthesiology survey.

Results: A total of 232 surveys were sent. A preliminary analysis is based on respondents (14%) representing departments providing care at 36 different sites. By 2016, 50% of departments routinely used AAs or ATs, compared to 44% six years ago. Preliminary data from Quebec was not available for comparison. As in 2010, all institutions that employed AAs were in an urban setting (population > 10,000). Less than half of AAs (44%) assist with technical support, compared with 100% in 2010. Only one institution (4%) had access to 24/7 AA support. No institutions report a decrease in their need for full-time anesthesiologists after introducing AAs. 73% of departments allow AAs to monitor patients under General Anesthesia. Unchanged from 2010, 70% of departments allow AAs to monitor patients under Regional Anesthesia (RA). 84% of departments allow AAs to monitor patients under Monitored Anesthetic Care, up from 57%. The majority of respondents strongly agree that AA's improve efficiency, productivity, patient safety, and job satisfaction of other team members in the workplace, and that AA's are an important part of the workplace team.
Discussion: Preliminary results indicate that AAs have become more commonly used, although still only at urban centers. Patterns of practice have remained largely unchanged; with AAs monitoring more patients under MAC. Interestingly, as AAs have become more widely adopted, their scope of practice appears to have shifted, with less than half of AAs currently employed participating in room set-up, a task they

universally performed in 2010. Satisfaction with the service provided by AAs remains high, and further implementation has not led to any reduction in the need for Royal College-trained anesthesiologists.

NB: these conclusions are based on preliminary and incomplete data. A further revision will be available in advance of June 2017, as additional responses become available.

References:

Cyr et al. Impact of Anesthesia Assistants on Anesthesiology in Canada. 2011. CAS Resident's Competition Abstract.

281155 - DESIGNING A PERIOPERATIVE MOBILE APPLICATION PLATFORM: POST-OPERATIVE CESAREAN DELIVERY PILOT PROJECT

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Background: With increasingly more complex surgical patients and the trend toward decreased hospital stay after operations (1), mobile communication provides an immense opportunity for health care providers to connect with patients in the perioperative setting. Our goal is to eventually build a perioperative platform that can be easily customized to any surgery at any institution. We focused our first prototype on the postoperative care of Cesarean Delivery (CD) patients due to the prevalence of the surgery (2) and technology-savvy nature of this age group.
Objective: Through a user-centered, iterative feedback process, we performed needs assessment and designed a simple proof-of-concept prototype application to track important signs and symptoms in for anesthesiology follow up of elective Cesarean delivery (CD) patients.
Method: We obtained Research Ethics Board approval and full informed consent. This study involves three cycles of individual structured interviews with patients (total 14) and anesthesiologists (total 9). The interview first consisted of standardized questions that explore the anesthesiologists' and patients' perspectives about perioperative monitoring. Then the participants interacted with the prototype and give feedback focusing on 4 major domains: appearance, content, navigation, and overall user experience. At the end of each cycle of interviews, the data from the interviews undergoes both qualitative and quantitative analysis to facilitate prototype improvement. This iterative process has three cycles.
Results: Perioperative follow up by anesthesiologists may be the ideal but not routinely done in practice. Both anesthesiologist and patient believe a mobile application would be useful for patient education and early detection and management of anesthetic-related adverse events. A concise decision tree-based questionnaire would be helpful in identifying patients requiring anesthesiology follow-up. However, medical-legal and privacy concerns and manpower logistics are obstacles for the application to be successfully integrated into practice. While helpful for follow-up, a mobile application should not be used for medical emergencies, nor replace in-person clinical visits. **Conclusion:** There is a role for mobile application to improve perioperative communication amongst anesthesiologists and patients following Cesarean delivery. A decision-tree based questionnaire maybe helpful in identifying patients requiring closer follow-up. Concerns for privacy, medical-legal issues, and workload need to be addressed. The mobile application prototype will be displayed at the conference. The iterative process of this study demonstrates a participant-driven

method for developing user-centred mobile tools relevant to anesthesia. The results of this study will guide us in further iterative development and implementation of a mobile monitoring and communication platform for perioperative care.

References:

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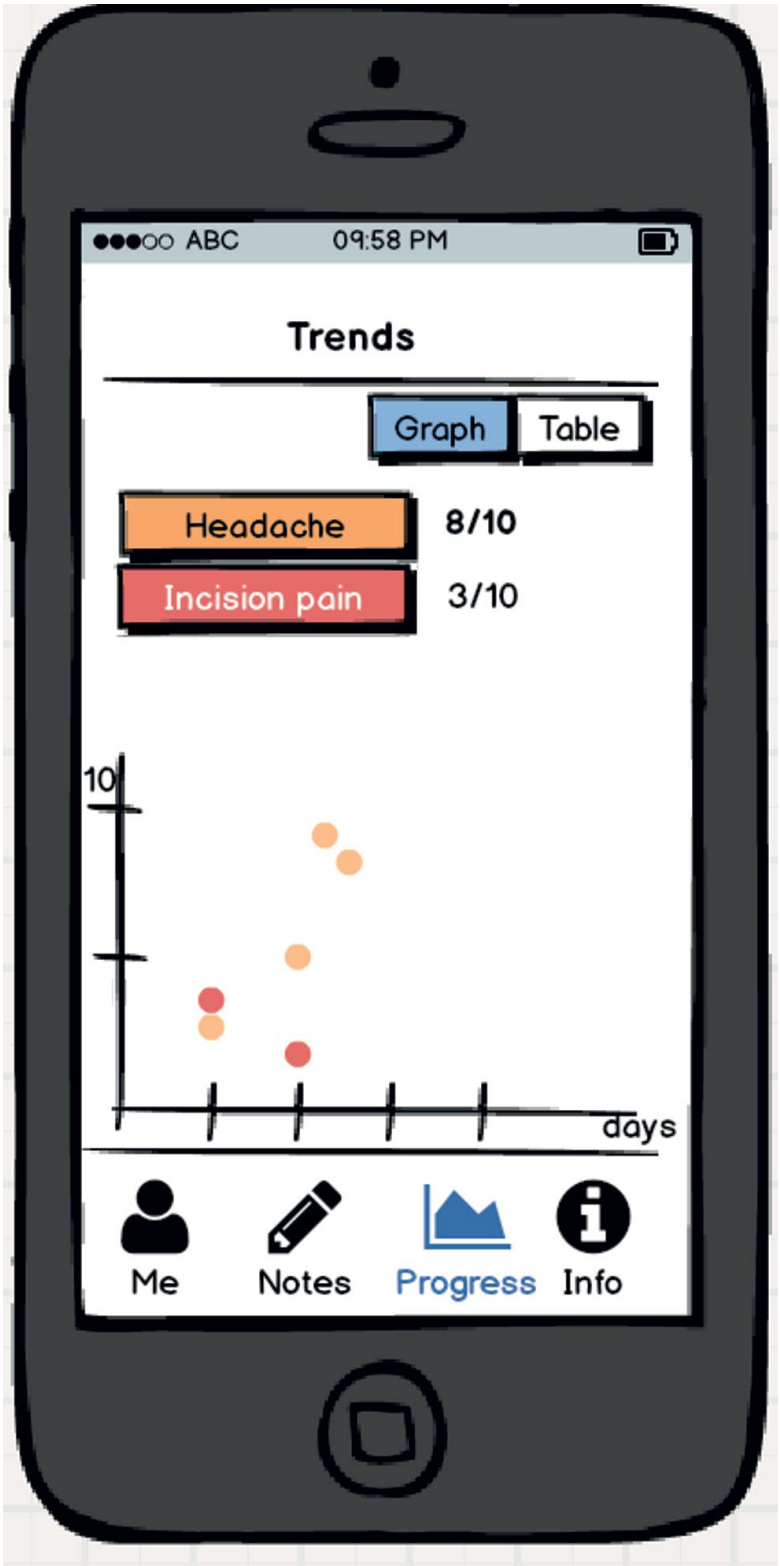
Figure 1. Prototype screenshot



This is an example screenshot of our prototype, showing the page of data trends.

284543 - CHALLENGES OF RIGID BRONCHOSCOPY FOR FOREIGN BODY RETRIEVAL IN A PREGNANT WOMAN

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Background:
Surgery in the pregnant population is uncommon. Around 0.75% - 2% of pregnant patients undergo non obstetric surgeries each year.[1] Rigid bronchoscopy is especially challenging in this group of patients who are at risk of pulmonary aspiration and difficult airway. There is currently no case reports of this procedure performed in the obstetric population. Local ethics committee approval has been obtained.

Case report:
A 30 years old female was 30 weeks into gestation when she presented after inhaling a hairpin. She was subsequently scheduled for rigid bronchoscopy for foreign body removal. Pre-operatively, she was counselled for risks of preterm labour, aspiration and awareness. Aspiration prophylaxis was given. Intravenous midazolam and glycopyrolate were given and her airway was topicalised in the induction room. A further 2mg of midazolam and 20mg of ketamine was given and target controlled infusion (TCI) of propofol at 2mcg/ml was started. The surgeons inserted the rigid bronchoscope uneventfully. After passing the vocal cords, lignocaine was given via the bronchoscope. Oxygen was connected to the side port and she was tilted to a left lateral position. Throughout the surgery, her mean arterial blood pressure and saturation were maintained. Propofol TCI ran at 2.5-3mcg/ml. The patient reacted occasionally but this was quickly suppressed by deepening anaesthesia with boluses of propofol. The post-operative cardiotocography (CTG) was normal. Two months later, she had an uneventful delivery.

Discussion:
The main goals of anaesthesia for surgery in the pregnant population are to maintain normal maternal physiology, avoid tetratoxic drugs, avoid stimulating the uterus and avoid awareness during general anaesthesia.[2,3] In airway surgery, pregnancy posts more challenges due to a higher aspiration risk, higher oxygen consumption as well as lower functional residual capacity. We have demonstrated how such a procedure can still be done safely with careful preoperative preparation and intraoperative care involving a multi-disciplinary team.

References:
1. Seminars in Perinatology 2002; 26: 136-145
2. Continuing Education in Anaesthesia, Critical Care and Pain 2006; 6: 83-85
3. British Journal of Anaesthesia 2011; 107: 72-78

284675 - ANESTHETIC MANAGEMENT FOR CESAREAN DELIVERY IN A PARTURIENT WITH A LARGE ANTERIOR MEDIASTINAL MASS

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Introduction:
The induction of anesthesia in a patient with a large anterior mediastinal mass can precipitate life-threatening compression of airway and cardiovascular structures.[1] Diagnosis of such masses can be delayed in pregnancy as symptoms may mimic the normal cardiorespiratory changes of pregnancy. We present the anesthetic management for Cesarean delivery of a parturient with a large anterior mediastinal mass at 34 weeks gestation. Written consent was obtained from the patient.

Case Description:

The patient was a 30-year-old G3P2 with a 4 month history of dyspnea and cough, attributed to asthma and physiologic changes of pregnancy. A CT scan was done the preceding week to assess for pulmonary embolus, and instead confirmed a 12 cm anterior mediastinal mass with lymphadenopathy suggestive of lymphoma. Tracheal compression and deviation was noted, along with significant compression of the left mainstem bronchus, as well as the left subclavian artery and vein. She initially denied orthopnea, chest pain or hoarseness. An echocardiogram demonstrated minor, peripheral left pulmonary artery compression. A multidisciplinary meeting was held with anesthesiology, high-risk obstetrics, medical oncology and the patient; an elective Cesarean delivery was planned for the following day. The patient was reassessed the next morning and had developed profound positional dyspnea, hoarseness, and a new “choking sensation” overnight, with no clinical evidence of SVC syndrome. Significant progression of her airway compression was suspected, thus an urgent, awake lymph node biopsy was performed for tissue diagnosis, followed by immediate administration of steroids prior to her Cesarean delivery. Otolaryngology and cardiac surgery were on standby for emergency rigid bronchoscopy and cardiopulmonary bypass (CPB), respectively. A right-sided radial arterial line and left-sided femoral central line were placed. To expedite emergent CPB in the event of cardiovascular collapse, the right femoral vessels were exposed and CPB lines were primed and readily available. Adequate epidural anesthesia was achieved with 12 mL of 2% lidocaine. The patient was hemodynamically stable until immediately following delivery; precipitous hypotension (60/20) followed by bradycardia (50 bpm) was noted prior to administration of uterotonics. She was tilted further to her left side, and given phenylephrine 300 mcg and ephedrine 10 mg IV. Her hemodynamic status returned to baseline and she was transferred to the ICU post-operatively.

Discussion:

This case highlights the severe, acute decompensation that can occur with a rapidly growing mediastinal mass, and the need for a constantly evolving, multidisciplinary plan. Previous case reports describe having CPB teams on standby.[2] However,

establishment of CPB can take several minutes, thus others have described preoperative cannulation in high-risk patients.[3-4] For our patient, in consultation with cardiac surgery, we elected to have our CPB team on standby with adequate exposure of the femoral vessels, to avoid cannulation and further complications.

References:

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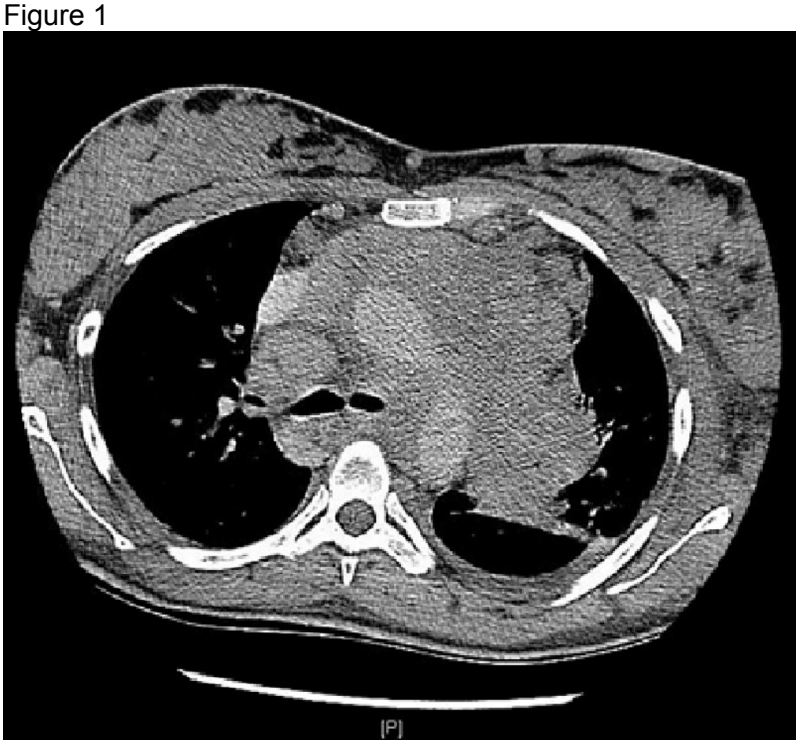
[2]Buvanendran A, Mohajer P, Pombar X, Tuman KJ. Perioperative management with epidural anesthesia for a parturient with superior vena caval obstruction. Anesth Analg 2004; 98: 1160-3.

[3]Roze Des Ordons AL, Lee J, Bader E, et al.Cesarean delivery in a parturient with an anterior mediastinal mass. Can J Anaesth 2013; 60: 89–90.

[4]Dasan J, Littleford J, McRae K, et al. Mediastinal tumour in a pregnant patient presenting as acute cardiorespiratory compromise. Int J Obstet Anesth 2002; 11: 52–56.

Figure 1



Repeat computed tomography done immediately after Cesarean section showing the large anterior mediastinal mass.

284796 - DEVELOPMENT OF A CHECKLIST TO AID HANDOVERS IN AN OBSTETRIC POST- ANESTHESIA CARE UNIT

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Introduction

Handing over patient care in the post anesthesia care unit (PACU) is an integral part of anesthesia practice. Current handover practices have been shown to be haphazard and suboptimal [(1)] and concerns have been raised regarding the potential of patient harm [(2)].

Inter-anesthesia handovers of obstetric patients in an obstetric ward have been assessed with inadequacies identified [(3)]. There are no studies regarding handover between anesthesia providers and PACU nurses after obstetric anesthesia –chiefly after cesarean delivery. Evidence supports the implementation of standardized checklists to warrant accurate information delivery to PACU nurses [(4)].

We decided to evaluate and improve our obstetric PACU handovers through a quality improvement (QI) process.

Methods

After REB approval, we commenced with a questionnaire-based survey of 20 Obstetric PACU nurses. The questionnaire explored their satisfaction using a standard 7-point satisfaction scale and asked for items commonly omitted during handovers by anesthesia providers. Five handovers were observed with respect to structure and content.

A Comprehensive search of electronic data-base (PubMed) in English-language using keywords: “cesarean delivery/section”-“handover”-“PACU” “post anesthesia care”-“recovery”-“checklist” and “obstetric anesthesia” was carried out to identify improving handovers strategies, the relevant inclusion items of a PACU handover checklist and methods for designing validated checklists. Five handovers were then observed and screened with the draft checklist.

To arrive at a consensus on the relevant checklist items, we used modified Delphi approach. 7 local expert Obstetric anesthetists, were asked to answer a -yes/no-questionnaire of items deemed relevant to be included in the checklist over two rounds. These items were derived from the literature review and the nurse questionnaire.

Results:

The nurse survey revealed 45 % slight dissatisfaction with handovers. The most commonly missed items listed by nurses were: neuraxial morphine dose and timing, total and type of intravenous fluids, uterotonic drugs and patient allergies. The PACU nurses strongly supported a standardized process for handing over patient care. The observed handovers were highly variable with respect to content and organization.

The literature search did not reveal any prior studies in Obstetric anesthesia PACU. No additional items were identified on observing handovers using the draft checklist. Data obtained from all sources facilitated the development of a standardized checklist unique for Obstetric PACU (figure 1). We observed handovers using this checklist and found it easily usable.

Discussion:

Nurse satisfaction survey and observed handovers suggested further improvements could be made with potential benefits for patient safety. We are now evaluating handovers in our Obstetric PACU using this tool. Our handover tool may be of value to other obstetric centers.

References:

References:

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2- Ugeskr Laeger 2011; 173:1412–1416.
3- Anaesthesia 2015, 70(Suppl. 3), 11–101
4- Int J Qual Health Care 2013; 25: 176-181.

obstetric pacu handover checklist

Obstetric PACU Handover Checklist

Preoperative	Name		YES		NO
	Age		YES		NO
	Allergies		YES	NO	ND
	Relevant medical/surgical history		YES	NO	ND
	Prescription medications		YES	NO	ND
Intraoperative	Anesthesia ▪ General ○ Regional	▪ Airway issues	YES	NO	ND
		▪ NMB reversal	YES	NO	ND
		○ Opioid(s) added (type/dose)	YES	NO	ND
		○ Time of Epimorph	YES	NO	ND
		○ Adverse Events	YES	NO	ND
		○ Epidural catheter removal	YES	NO	ND
	Fluid management	Input (volume/type)	YES		NO
		EBL	YES		NO
		Urine output	YES		NO
	Medications	Antibiotics	YES	NO	ND
		Aspiration prophylaxis	YES	NO	ND
		Antiemetic	YES	NO	ND
		Analgesic	YES	NO	ND
		Sedatives	YES	NO	ND
		Cardiovascular medications	YES	NO	ND
		Uterotonic medications	YES	NO	ND
		Others(e.g.: hemostatic agents)	YES	NO	ND
	Vascular access	IV peripheral/central lines	YES		NO
		Arterial lines	YES	NO	ND
	Anesthetic complications/events		YES	NO	ND
	Surgical complications/events		YES	NO	ND
Postoperative orders	IV PCA		YES	NO	ND
	Antiemetic		YES	NO	ND
	Analgesics		YES	YO	ND
	Antipruritic		YES	NO	ND
	Destination		YES		NO

Please mark items as follows:

- YES→ Item has been verbally relayed by provider to nursing staff.
- NO→ Item is recorded /documented but was omitted by provider.
- ND→ Item is not recorded /documented.

1

figure 1

285411 - IN SITU SIMULATION FOR THE EX-UTERO INTRAPARTUM TREATMENT (EXIT) PROCEDURE

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Alyshah Kaba - Quality and Patient Safety Skills Development

Introduction: The Ex-Utero Intrapartum Treatment (EXIT) procedure is used to secure the airway of neonates with congenital abnormalities prior to separation from the placental circulation. This complex interdisciplinary procedure requires closed loop and timely communication between teams and team members.[1,2] The aim of this project was to design and implement a high fidelity simulation addressing all aspects of maternal and fetal care for a planned EXIT procedure. The goal was improve the safety and efficiency of care for the mother and fetus as a result of the simulation, and to determine the value of such a simulation endeavor overall.

Methods: Patient consent was obtained for this case report. A team of adult and pediatric anesthesiologists and simulation specialists designed a scenario to simulate a planned EXIT procedure. The scenario was implemented and debriefed with all 6 teams (adult anesthesia, obstetrics, obstetrical OR nursing, pediatric anesthesia, pediatric ENT, and NICU) present. Post simulation surveys and interviews were used to evaluate the impact on team performance, communication and patient management.

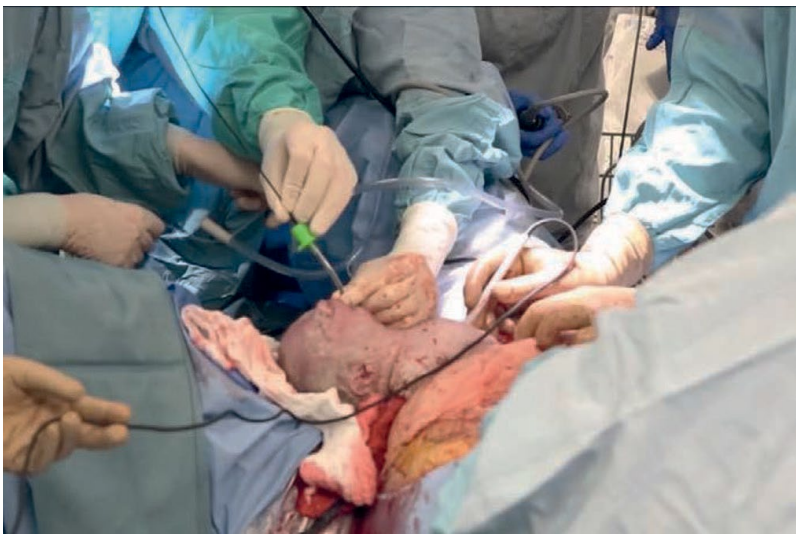
Results: The simulation provided an opportunity to refine the airway management plan for the fetus, to share mental models among and between the care teams, and to troubleshoot equipment issues prior to the actual procedure. The simulation was a high-yield exercise for each of the teams involved.

Discussion: The EXIT simulation facilitated both the practical and non-technical aspects of both maternal and fetal care in this case. Future interdisciplinary high fidelity simulations such as this may prove invaluable prior to planned complex, rare procedures at our facility.

References:

1. J Pediatric Surgery 2011 46.2: 395-398.
2. Int J Pediatric Otorhinolaryngology 2012 76.1: 20-27.

Intubation during EXIT procedure



Fiberoptic intubation of partially delivered neonate during EXIT procedure.

285459 - A CASE SERIES ON THE ANAESTHETIC MANAGEMENT OF PARTURIENTS WITH NEUROVASCULAR LESIONS UNDERGOING CAESAREAN SECTION

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Introduction: Pregnancy may aggravate the natural history of neurovascular lesions such as cerebral aneurysm and arteriovenous malformation (AVM) leading to increased risk of rupture and hence intracranial bleed. To date, there is no clear guideline in literature regarding the mode of anaesthesia for parturients with this type of intracranial pathology presenting for non-neurosurgical intervention.
Methods: Informed consent for publication had been obtained from patients. We present a series of three patients with neurovascular lesions during pregnancy who presented for elective caesarean section.
Results: In our study, the mean age was 29.3 years (range 27-32 years old). Two patients had intracranial AVM and one patient had cerebral aneurysm. They underwent different modes of anaesthesia for caesarean section: one had general anaesthesia (GA), one had spinal anaesthesia and one had epidural anaesthesia. All three cases had good maternal and neonatal outcome.
Discussion: Our case series shows that there is no conclusion for the choice of anaesthetic technique for caesarean section in this group of patient and should be decided on a case-to-case basis. The emphasis of anaesthetic management is to maintain stable systemic, cerebral and placental hemodynamics while avoiding increased intracranial pressure in the parturients.

References:
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Cases J. 2008;1: 327-329

274729 - INTRAVENOUS LIDOCAINE INFUSION FOR ACUTE PAIN MANAGEMENT IN TRAUMA PATIENTS: A CASE SERIES

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Heather Fisher - Western University
Katherine Ower - Western University

Introduction: Multimodal analgesia has largely replaced pain mono-therapy with opioids, however, opioids still remain the most commonly used medications to treat acute post-operative and trauma pain [1]. Other foundational analgesics and adjuvants might help reduce pain scores and opioid requirements[2]. For example, multiple meta-analyses found that lidocaine infusions were able to decrease post-operative pain intensity and reduce opioid consumption for some surgical procedures. However, the effects of lidocaine infusions have yet to be studied in trauma patients[3,4]. In this case series, we have documented two trauma cases in which the addition of lidocaine was found to improve pain management for these patients.

Methods: Local REB approval was waived. **Patient 1** was 60 year-old who fell from a 10 foot ladder resulting in T12-L1 fracture dislocation and multiple spinous process avulsions from T10 down. **Patient 2** was a 37 year-old involved in a motor vehicle collision resulting in multiple rib fractures (4-10) along with lung contusions and a diaphragmatic laceration. These patients were started on multimodal analgesia including acetaminophen , NSAIDs and Gapabentin in addition to Hydromorphone patient controlled analgesia (PCA) . Due to poor pain control and the high opioid requirements, the acute pain service team decided to add lidocaine infusion (1mg/kg/hour) concurrently with the PCA to control the patients' pain.

Results: Both patients showed significant improvement in their NRS scores and opioid consumption (figure). Within less than 24 hours, there was more than a 60% reduction in opioid PCA usage and more than a 75% reduction in NRS. Due to the significant improvement, lidocaine infusion and PCA were stopped within 24 hours with no report of side effects.

Conclusion: Lidocaine infusion can be a useful adjuvant in pain management for trauma patients. It was found to reduce patients' opioid consumption and improve pain scores. This suggests that lidocaine infusion has the potential to be a promising modality of pain management in patients with poor pain control post-trauma. Further studies are required to investigate the benefit of adding lidocaine infusion to poly trauma patients.

References:

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2-Koppert W, Weigand M, Neumann F, Sittl R, Schuettler J, Schmelz M, Hering W. Perioperative intravenous lidocaine has preventive effects on postoperative pain and morphine consumption after major abdominal surgery. Anesth Analg. 2004 ;98:1050-5.
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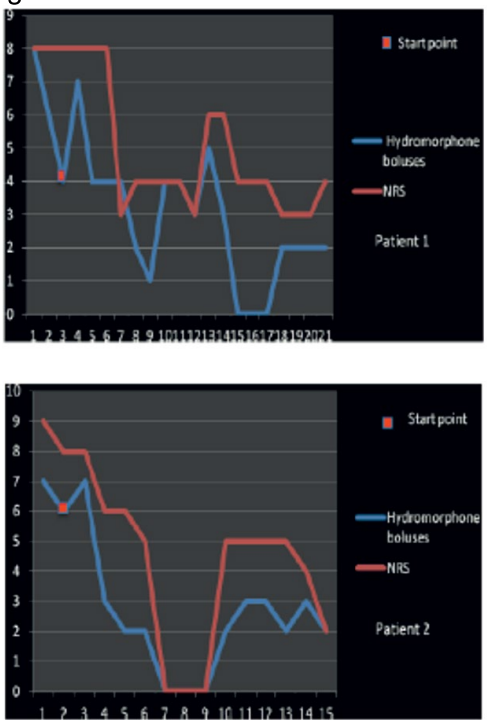
figure



Pain scores (NRS) and hydromorphone usage (0.2 mg/boluse) during lidocaine infusion

281099 - PAIN CONTROL OF A MULTIPLE PREGNANCY ON A PATIENT WITH POST-TRAUMATIC PELVIC PAIN AND HYPEREMESIS GRAVIDARUM.

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Introduction:
We describe the challenges of adequate pain management in hyperemesis gravidarum and multiple gestations
Method: Case Report
REB approved
Consent obtained
Female 31-year-old, 52kg, 5.7" (G3 T1 P1 A1 L1), severe chronic post-traumatic pelvic pain, admitted for hyperemesis gravidarum (HG), at 11th week gestation with monochorionic diamniotic twins.
PMHX: Grave's disease treated with propylthiouracil for one year, bilateral PE secondary to oral contraceptive use, MVA five years before with multiple pelvic and leg fractures, bladder perforation and splenectomy, anxiety, depression and PTSD.
Medications: Hydromorph contin 24mg q8h p.o. and hydromorphone 8mg q4h and p.r.n, amitriptyline 25mg qhs., also stemetil, gravol ondasetron, pantoprazole, enoxaparin and stool softeners.
After admission, anti-nausea medications was changed to IV; hydromorph contin 24mg tid po, hydromorphone 12mg po. q3h and lorazepam 0.5 mg qhs. Still unable to tolerate PO, pain reported > 50%, the pain service was consulted.
The patient reported multiple episodes of withdrawal at home due to HG; before the pregnancy, the dose of hydromorphone was 120mg/day total. In order to prevent withdrawal, 50% of this dose was going to be changed to fentanyl patch, aprox. 100mcg q72hr, reduced hydromorphone to 8mg q8h p.o. and hydromorph contin the same
Reevaluation at 24h: Improved pain control, better p.o. tolerance, still requiring hydromorphone 8mg consistently. We increased the fentanyl to 125mcg q72hr, hydromorph contin the same and hydromorphone 8mg q8h p.r.n. This was done to accommodate the increase in pain since the pregnancy.
Discharge, 48 hours later with what she reported as excellent pain control .
The patient was admitted three additional occasions during the pregnancy, due to HG, and in each instance the fentanyl dose was kept the same and the hydromorphone dose was changed to I.V. equivalent.
The Twins were delivered by C-section at 32 weeks. The fentanyl was reduced and then stopped. Three years later, they are all healthy.
Discussion
Pain management in pregnant women with previous pelvic fractures is challenging. Post-traumatic osteoarthritis in the loadbearing acetabulum and pelvic ring can lead to chronic pain and gait problems,(1) and considering the physiological changes of pregnancy, alterations in the composition of the pelvis, its shape, the plane of inclination and internal dimensions of the true pelvis(2), an already painful condition

can worsen.
Pain control in this patient is more dynamic, as complications may develop and the pain can increase as the fetus grows.
Changes in medications' route of administration should be addressed as required, but still provide the flexibility of p.r.n. doses. Withdrawal should be avoid as it's a source of stress for the pregnancy.

Conclusion

Chronic pain patients with high risk pregnancies require a pain service with urgent response capabilities, and as multiple gestations carry their own source of complications, the opioid withdrawal treatment requires a neonatal unit with PICU capabilities

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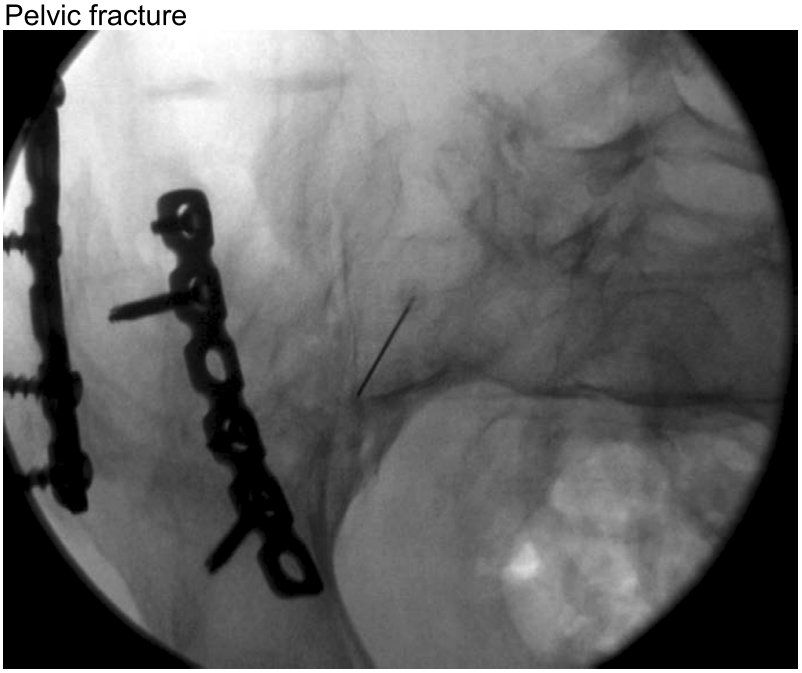
1. Loading. Greg J. Dakin, Raul A. Arbelaez, Fred J. Molz IV **Elastic and Viscoelastic Properties of the Human Pubic Symphysis Joint: Effects of Lateral Impact Loading.** J. of Biomech. Eng. JUNE 2001, Vol. 123,pg. 218-226

2. Sarita Agrawal, Prasanta Kumar Nayak, Subarna Mitra, et al, **Pelvic trauma in women of reproductive age.. J of Orth., Traumat. and Rehab. -Vol -Issue Jan-Apr 2014**

Pelvic fracture



Surgical fixation of Right pelvic fracture.

281297 - LESSER OCCIPITAL NERVE ENTRAPMENT AND THORACIC OUTLET SYNDROME MIMIC CRPS ON A PEDIATRIC PATIENT

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Introduction

To reinforce the importance of the mechanics of the lesion to determine the most possible diagnosis.

Methods

REB approved.
Consent obtained.
16-year-old-female, football player, working as a waitress, leaned forward to pick up plates from a table and simultaneously looked up, immediately presented tingling and numbness over the right eyebrow, above the upper lip, cheek, chin, temple and hairline, progressing to the scalp down to the level of the occiput right side, then "shocky pain" in the distribution of C5-C6 up to the level of the right wrist, swelling of the right arm, tenderness at the shoulder, elbow and wrist. Pain at the area of the rhomboids and trapezius from T2 to T4.
All investigations were negative/normal (whole body technetium scan, right upper extremity EMG, doppler ultrasound, MRI of head, neck, chest, right brachial plexus, C1 esterase assay, quantitative immunoglobulins, T&B cell assay, alpha fetoprotein and testosterone, LFTs, P-ANCA and c-ANCA, rheumatoid factor, CT head, chest Xray, CBC, ECG, INR and PTT, and D-dimer). Evaluated by neurology, rheumatology, dermatology, physical medicine rehabilitation and adolescent medicine.
Diagnosis: CRPS Type 1.
Treatment: toradol, naproxen, acetaminophen, and gabapentin 600mg qid with suboptimal results for a month.
Chronic pain service consult: Current diagnosis didn't follow the criteria for CRPS. On evaluation, tenderness on the lesser occipital nerve (LON) distribution and severe spasm of the elevator scapula (ES). LON block and trigger points on ES were done. Pain subsided to 2/10 for the first time.
New Diagnosis: Lesser occipital nerve entrapment and non-specific thoracic outlet syndrome (TOS). **Added treatment**: Baclofen 10mg tid and morphine SR 10mg bid and morphine IR 5 mg q/once. A day later, the face, occiput, arm pain and edema disappeared.
Six months later only taking baclofen 5-10mg qhs if needed.

Discussion

TOS remains a diagnosis of exclusion and can be present with overlapping or similar clinical pictures,(1,2) as in this case with lesser occipital nerve entrapment.
TOS can occur in pediatric patients.(1,2,4) Women are 3-4 times more likely to develop neurogenic TOS.(4) Some symptoms are: paresthesias in the upper limb, pain in the neck, trapezius, shoulder and/or arm, chest, supraclavicular, occipital headache,

and parasthesias in the fingers. Compression and irritation of the upper plexus (C5, C6, C7) can cause pain in the anterior aspect of the neck from the clavicle to the mandible, ear and mastoid area, occasionally radiating into the side of the face. The anatomical anomalies are most often located in the posterior scalenic triangle.(2) Many patients report awaking at night with paresthesias.

Conclusion

CRPS Budapest criteria was developed to ensure accurate CRPS diagnosis, steps should be taken to follow this criteria.(3)

Neurogenic TOS, especially 'disputed' neurogenic TOS, is more difficult to diagnose because there is no standard objective test to confirm clinical impressions.(2,4)

References:

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282287 - ACUTE PAIN MANAGEMENT FOR A PATIENT ON SUBOXONE

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Introduction:
Buprenorphine is a semisynthetic opioid with agonist and antagonist effects at the opioid receptor. Sublingual buprenorphine-naloxone preparations (suboxone) have a well-established role in the treatment of opioid addiction[1]. It has high affinity at the mu-opioid receptor that may offer a ''blockade effect'' to other opioids that typically last in excess of 24 hours[2,3]. There has yet to be a standardized method of treating acute pain in patients on suboxone, however, evidence in the literature suggest optimizing the multimodal analgesia by either increasing the dose of suboxone (with no other opioids) or adding higher doses of potent opioids (with or without stopping suboxone)[4]. In this case report, we present two methods of post-operative pain management for a patient who is on suboxone.

Case Report:
This report involves a 55-year-old male patient who is known to have chronic pain with a history of opioid dependence.The patient has given the proper consent to share the information in this report. The patient was receiving suboxone in 3 divided sublingual doses (4mg/1 mg, 2mg/0.5 mg and 4mg/1 mg) in addition to nabilone at 0.5 mg TID. His average pain score (NRS) was 4/10. He was admitted for an elective right side total knee arthroplasty which was complicated by a severe infection that required irrigation and debridement under general anesthesia after 3 weeks. During both procedures the patient received general anesthesia. After his primary surgery, he was kept on the same dose of suboxone that he was given preoperatively and was administered by adductor canal nerve block with a catheter for two days. He also received acetaminophen, gabapentin, nabilone, NSAIDS and hydromorphone immediate release (4 mg q3 hours per oral PRN). His pain was very much controlled with average (2/10) at discharge. In his second operation, he did not have a nerve block due to the extensive infection and the same multimodal analgesia regimen planned for him. His pain score before surgery (10/10) and became intolerable in the immediate postoperative period. The patient received boluses of intravenous ketamine (total 30 mg) and intravenous hydromorphone (total 6 mg) over a 1-hour period with additional multimodal analgesia with no response. At this point, hydromorphone was stopped and his dose of suboxone was doubled. Shortly after administering 8 mg suboxone the patient experienced a significant improvement, with his pain being reduced by 50%. No side effects were reported. His pain continued to be controlled (average 4/10) with a gradual tapering down of suboxone back to its baseline dose after 4 days.

Discussion:
This case report highlights the challenges that physicians may face when dealing with patients on Suboxone and the possible ways to manage those patients. Understanding the unique pharmacology of this drug and identifying those patients pre-operatively is crucial to formulating an appropriate pain management plan.

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282567 - ULTRASOUND GUIDED DIAGNOSTIC GENICULAR NERVE BLOCK: A CASE SERIES

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Introduction: Osteoarthiritis (OA) of knee is a major cause of pain and disability among adults [1]. Radiofrequency (RF) neurotomy of the genicular nerves supplying the knee alleviates knee joint pain and restores function. In most centres, it is performed under fluoroscopic guidance [2]. We in the present study evaluated the feasibility and efficacy of using ultrasound guided (USG) needle placement for diagnostic genicular nerve block.
Methods: 20 elderly patients with chronic knee pain (VAS > 50mm for ≥ 3 months) with advanced osteoartritis (Kellgren Lawrence grade 3-4) underwent diagnostic genicular block (24 knees) as 4 patients had bilateral knee involvement with the help of USG. The affected knee was placed in a semiflexed position with a pillow underneath. A high frequency linear USG probe (6-13 MHz) was used under aseptic precautions to identify superomedial, superolateral and inferomedial genicular artery. A 26G 1½in hypodermic needle was then inserted in an out-of-plane manner in order to reach near the artery identified. Once the needle reached the desired target 2-3 ml of 0.25% bupivacaine was injected after negative aspiration for blood. The genicular nerve lies in close proximity of the artery and hence it was assumed to be covered by the local anaesthetic. Pain was assessed using the Visual analogue score (VAS) at the time of discharge i.e. 2 hours post procedure. If pain relief was found to be > 50%, diagnostic genicular block was considered successful and patients were planned for radiofrequency neurotomy at the next visit.
Results: 24 knees (20 patients with 4 patients suffering from bilateral advanced OA), underwent USG diagnostic genicular block and were discharged after 2 hours. The mean pre procedure VAS score was 76mm which reduced to 29 mm post procedure (p 50% was documented in 22 out of the 24 knees. These were thus planned for RF neurotomy.
Discussion: RF neurotomy of the genicular nerves is a novel promising technique for pain relief of advanced osteoarthitic knees. Diagnostic genicular nerve block is generally performed under fluoroscopic guidance prior to RF neurotomy. We propose that Ultrasound is an extremely useful tool for performing the diagnostic genicular block as it be done as an OPD procedure and more so without the risk of radiation exposure.

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284851 - CAN CHRONIC COUGH WORSEN A CHIARI TYPE I MALFORMATION AND PROMOTE OCCIPITAL HEADACHES?

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Introduction

To recognize the relevance of the characteristics, complete neurological evaluation and imaging of chronic cough headaches.

Method: Case Report
REB approved.
Consent obtained.

Female, 38-year-old with asymptomatic Chiari Type I malformation(CIM), reported **occipital headaches** and **dry cough**.
MRI: worsening of CIM, cerebellar tonsils projecting 11mm below the foramen magnum with crowding.
A complete neurological and neuro-ophtalmological evaluation reported no significant findings.
Because the dry cough started at the same time as the occipital headaches, allergy testing was performed, revealing multiple environmental allergies; after the antihistaminic treatment, the dry cough and occipital headaches stopped.
MRI(a month later): CIM with mild decrease in cerebellar tonsilar descend, now 6.7 mm and less crowding.
MRI(a year after): CIM minimally noticeable.
The patient remains asymptomatic.
Key words: Chiari malformation, headaches, cough headache, allergies.

Discussion

CIM is found in 1 out of 10 MRIs and it can be asymptomatic. The most frequent symptom is cough headache, 30% of patients with CIM experience headache aggravated by cough and other Valsalva maneuvers(1), due to sudden increase in intrathecal pressure caused by obstruction to the free flow of CSF in the subarachnoid space.(2) This hindbrain malformation does not correlate with a higher incidence of primary episodic or chronic primary headaches.(1,5)

Cough headache can be a primary benign disorder diagnosed only if neuroimaging is normal(1,3)
Primary cough headache begins after age 60 and responds to indomethacin, while cough headache secondary to Chiari type I malformation usually begins before age 50, accompanied by posterior fossa sign/symptoms, does not respond to NSAIDs, tryciclics, tryptans, acetazolamide, Cox 2 inh., opiates or barbiturates.
Surgery is recommended in progressive posterior fossa or spinal cord

symptoms/signs, hydrocephalus, syringomyelia, refractory trigeminal and glossopharyngeal neuralgia.(1)

Conclusion
Chiari 1 malformation diagnosis is not enough to determine treatment.
Cough headache has a different epidemiology in comparison with Chiari type 1 headaches, even though “cough related headache” might be the only symptom in both.
Headaches triggered by coughing is an unusual clinical symptom and deserves specific attention.(4)

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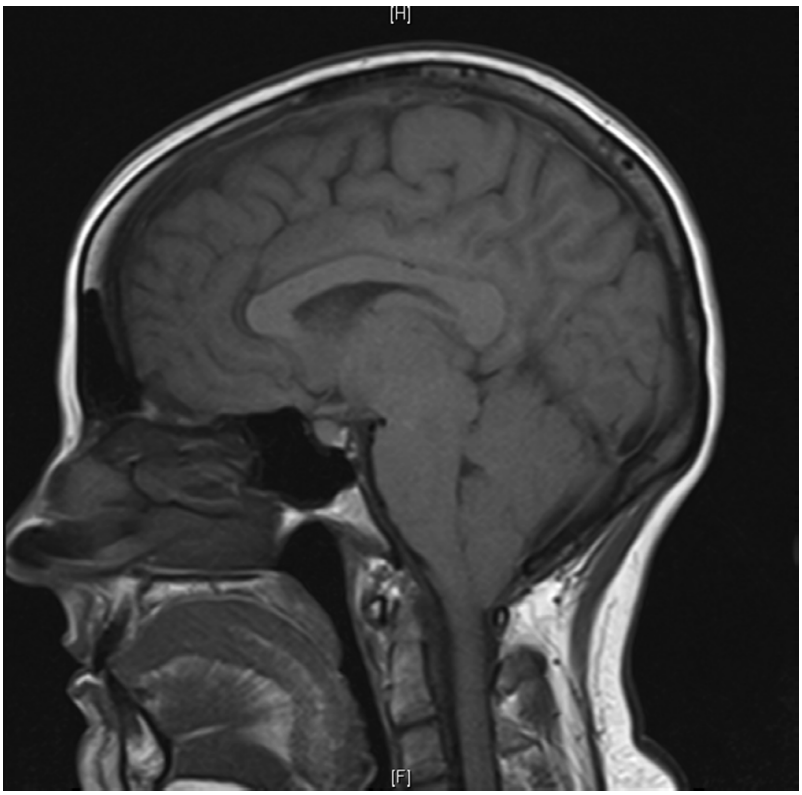
MRI



Chiari Type 1 malfornation with cerebellar tonsils proyecting, 11 mm below the foramen magnum

285964 - A SURVEY OF ACUTE PAIN SERVICE IN CANADIAN TEACHING HOSPITALS

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Introduction:
The Acute Pain Service (APS) was first developed in the USA in 1985. Since then, hospitals in Canada and around the world have begun to create their own structure for the APS. In 1991, the first survey regarding APS use in the primary Canadian teaching hospitals was performed to evaluate the prevalence, structure, and function of APS . Our research team decided to conduct a follow-up survey to assess the development of the APS in Canada.

Method:
We administered a 26 question survey to the lead personnel of the APS teams or Anesthesia Departments at the leading Canadian teaching hospitals. This survey was structured to collect information describing the structure and function of the APS in these hospitals. The questionnaire was designed by two Anesthesiologists working in APS and the content was reviewed for validity by a domain specialist. The survey was approved by our institution's Research Ethics Board and a list of targeted Canadian teaching hospitals was compiled. A copy of the survey was distributed to the lead postoperative pain management health care providers at these centres via email, and was accompanied by an explanation of the purpose of our study.

Results:
Among the 32 centres that were contacted, 21 centres (65.6%) responded. Out of the 21 responses, 18 centres (85.7%) stated that they have a structured APS (72.22% adults, 22.22% mixed, 5.56% pediatrics). Among the 18 centers with APS, 16 centres are run by an Anesthesiologists and 2 centres are ran by a Nurse or a Nurse Practitioner . Ten centres (55.55%) do not have a regional anesthesia group, while five centers (27.75%) have a regional anesthesia group that is separate from the APS team. Five centres (27.75%) have a structured APS fellowship and 11 centres (58.8%) have a structured regional anesthesia fellowship. Nine centres (50%) offer ambulatory nerve catheter analgesia after discharge home. Fifteen centre (83.33%) use standardized order set and 13 centre (72.22%) use an electronic record for APS. More than 50 % of the centres use intravenous lidocaine and ketamine as a part of their multimodal analgesia.

Discussion:
Based on our survey results, most Canadian teaching hospitals do have an APS implemented. The APS differs between centres with regards to who runs these services, type of analgesia provided, whether or not an APS fellowship is offered and the type of follow up care provided. This research project has the potential to generate additional research that aims to investigate limiting factors to APS availability in Canada, best patient outcomes with different APS, and reasons for hospitals choosing

specific APS.

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286613 - HOW MUCH ARE WE WILLING TO SPEND? METHADONE FOR ADDICTION VS. METHADONE FOR CHRONIC PAIN?

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Objectives

To highlight the use of methadone in chronic pain doses for addiction patients with chronic pain.
To highlight the need of programs that promote a closer interaction between addiction physicians and pain physicians treating chronic pain addicts.

Method: Case Report

REB approved.
Consent given.
Male 22-year-old, IV drug user, leading to endocardis requiring bivalvular repair (aortic, mitral); LV dysfunction with EF of 33%; aneurysm of the left femoral artery, required surgery #2; chronic left leg pain secondary to diabetic neuropathy (insulin-dependent diabetic with poorly controlled sugars for years); smoker, 10 cigarettes a day.
In hospital: Methadone 30mg tid and hydromorph contin 15mg bid and hydromorphone 4m qid, the patient had no coverage for methadone pills and was economically incapable to cover the costs. The methadone dosing for addiction was covered, but was not effective for pain control. A Section 8 application was made multiple times until it was covered and the argument was deemed valid, where the cost of not covering this patient's pain control would prolong his struggle with addiction, as he most likely would self medicate with other forms of narcotis. Considering the cost to the provincial health system of his multiple surgeries and pathologies, the fact that he was an addict became secondary.
Sixteen months after, he had two leg surgeries and a diagnosis of renal dysfunction(creatinine clearance of 40%) due to uncontrolled diabetes. Methadone dose was reduced to 25mg bid and 12.5mg midday, the hydromorph contin 9mg bid and hydromorphone 3mg bid. Within the same month the urine was positive to cocaine.
Before entering rehab., we reduced the hydromorph contin and hydromophone slowly until it was stopped. While in rehab., methadone 50mg once a day was not usefull for his chronic pain, prompting him to leave. The patient couldnt find an addiction centre that was willing to work with the pain clinic doing the urine test on regular basis, so the clinic took it upon themselves to do this.
A month later the patient started on dialysis 3 times/week, drug tests were negative and ongoing. Methadone 15mg tid and 5mg at nightime was enough to control his pain and withdrawals. The treatment is ongoing.

Discussion

Addicts with chronic pain are less likely to receive adequate pain management. While

relapse in a recovering individual may occur inspite of appropiate use of opioids, inadequate pain releif is also a significant risk factor for relapse.(1,4)
To provide effective pain management:
- The medication should be chosen on the basis of providing adequate pain relief (ex. the analgesic properties of methadone only last 6 to 8 hours, any pain relief obtained will not last all day) and dose accordingly.(3)
- Use the level of pain to determine the strengh of the pain medication.
- Use around-the–clock dosing (long acting with short acting) and titrate accordingly.
- Prevent withdrawal.
- Have only one physician prescribing all the pain medications.
- Reduce the medication to the minimun dose necesary to control the pain.
- When needed, wean the patient from the medication and reasses the pain síndrome.
- Regular drug tests.(1,4)

Conclusion
There are legal and medical challenges when treating addiction patients with chronic pain, but the cost to the health system is far greater in dealing with the complications of addiction than facilitating adequate coverage for the same medication on a different setting.

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283064 - TRACHEAL CUFF PALPATION TO ENSURE CORRECT ENDOTRACHEAL TUBE DEPTH

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Background

An endotracheal tube (ETT) should be placed with the tip >2.5cm above the carina and cuff below the cricoid cartilage to avoid endobronchial intubation or inadvertent extubation with neck movement. Based on current literature, the average success for oral intubation is 85.3%.[1] Palpating the ETT tip as it slides down the trachea *during intubation* is effective in pediatrics.[2] We studied palpation of the inflated ETT cuff *after intubation* while moving the ETT, which is not normal clinical practice, and hypotheses were that it may damage the tracheal mucosa, and achieve correct ETT depth. Throat pain was measured as a surrogate for upper airway damage.

Methods

With Ethics Board approval, informed consent was obtained from 150 participants.
Design: Single blind randomized controlled trial with blinded patients and assessors.
Subjects: Adult patients requiring intubation with ETT for anesthesia. (Patients undergoing head, neck, or cardiac surgery were excluded.)
Palpation group: After intubation by the attending anesthesiologist, cuff pressure was set to 50cmH_2O during palpation, then reset to ideal pressure after palpation. [3] The investigator placed three fingers along the anterior trachea from cricoid cartilage, to sternal notch, then moved the ETT down, then up while palpating until the cuff was between the cricoid cartilage and sternal notch.
Control group: The investigator taped the ETT where it was placed by the intubating anesthesiologist
ETT depth measurement: Measurements were taken with a fibre-optic bronchoscope from the carina to the tip of the ETT, to the cricothyroid membrane, and depth at the teeth.
Tracheal damage: In the recovery room, blinded nurses assessed patient-reported throat pain on a scale of 0-10. Those with a pain score of 4 or more were considered to have pain.

Results

In the palpation group, 63 of 75 patients had the ETT at the correct depth compared to 51 of 75 did (p=0.035). Ten participants in the palpation group had pain; 21 in the control group (p=0.028). The palpation group had an average pain score of 0.6 ± 1.6; the control group was 1.5 ± 2.1. To see if it was a learned technique, we compared our first 10 attempts to the rest of the study. In our first 10 patients, 4 ETT were misplaced using palpation; in the remaining attempts showed 7 of 65 (p=0.047).

Discussion Palpation of the moving tracheal cuff did not worsen throat pain, improved ETT positioning, and was learnable. It requires no equipment and can be used outside the hospital, where many errors in ETT placement occur[1]. Future research will investigate whether this technique can replace X-rays to confirm placement of the ETT in a patient in Intensive Care. This could reduce costs and avoid radiation.

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283082 - ACUTE REVERSIBLE ISCHEMIC HAND FOLLOWING RADIAL ARTERIAL LINE CANNULATION: MANAGEMENT AND LESSONS LEARNED

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Introduction: Arterial lines are a safe and commonly used invasive monitor to allow real-time blood pressure monitoring, blood gas analysis and laboratory measurements. Nonetheless, arterial lines have been associated with complications including vascular occlusion, thrombosis, digit ischemia, hematoma formation, catheter-related infection and sepsis.[1]

Clinical Features: We obtained written permission from the patient mentioned herein regarding dsiclosure and publication of this report. An 83-year-old female was scheduled to undergo a modified neck dissection and midface reconstruction with a free flap as the primary surgical management of an exophytic soft palate tumour. Due to the duration of the case and advantages of continuous intraoperative hemodynamic monitoring, a 20-guage Arrow® arterial line was inserted by palpation using an aseptic technique into the right radial artery. Within a few minutes, the patient complained that her “hand felt quite numb”. Her right hand was noticeably blanched compared to her left hand (Figure 1). Pulse and oxygen saturation were still detectable on the affected hand. We elected to remove the radial arterial line, which resulted in immediate resolution of the palor and neurologic symptoms. Surgery proceeded and patient recovery was uneventful.

Discussion: Complications arising from the insertion of arterial lines are quite rare. A retrospective study of over 60,000 arterial line insertions conducted by Nuttall and colleagues found only 21 complications in total.[2] That said, the importance of identifying acute limb ischemia associated with arterial line placement is clear. Extensive tissue necrosis may occur after six hours of complete acute limb ischemia, resulting in loss of limb function, amputation or death.[3] In this report, we review risk factors associated with arterial line complications and discuss the validity of pre-procedure examination, such as Allen's test, in planning arterial line cannulation. We also examine standard operating room flow for opportunities to efficienctly and practically prevent iatrogenic harm to our patients when invasive monitoring procedures are required.

References:

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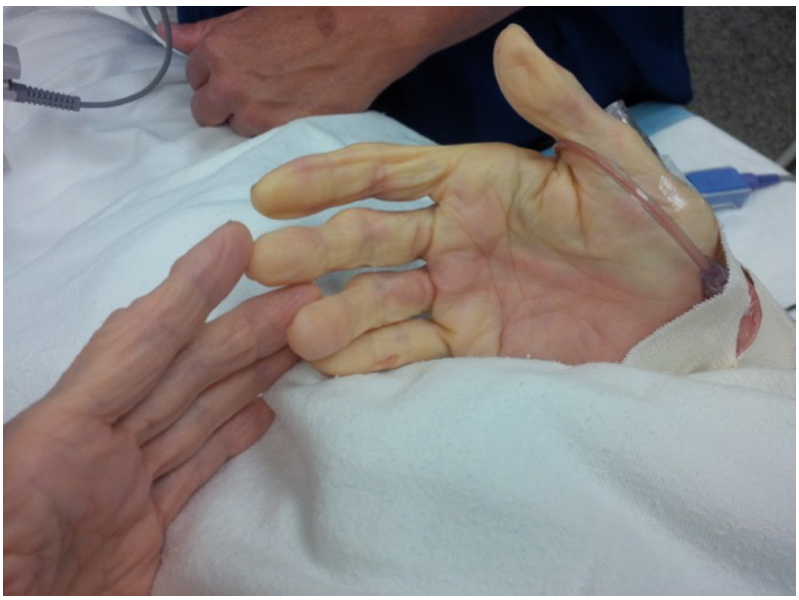
Figure 1



Comparison of the affected (right) and unaffected (left) hands of the patient 5 minutes after right radial artery cannulation.

283465 - BLOOD PRODUCT TRANSFUSION ERRORS AT A UNIVERSITY ADULT TEACHING HOSPITAL: A RETROSPECTIVE ANALYSIS.

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Introduction: Incompatible blood product transfusion is associated with major morbidity & mortality and continues to be a significant problem in spite of evolving regulations and technology (1,2). The Canadian Transfusion Error Surveillance System (TESS) reports an ABO-incompatibility transfusion rate of 1:14,000 transfusions secondary to “errors in the transfusion chain” (1). This study reviews the documented blood product transfusion errors that occurred at our institution and identifies possible risk factors.
Methods: Ethics approval for this project was certainly obtained. As this project was a review of data that had already been collected, as well as a chart review, informed consent was not an issue and was not required. Blood Bank services at our Hospital have been keeping records of blood product transfusion errors and the root cause analyses, since 1999. These, and the corresponding patient charts, were reviewed for the following information: patient age, gender, presenting illness and blood type, date & location of transfusion error, product type/group transfused, complications, and reason for error.

Results: Between 1999-2015 we estimate that 369,934 units (PRBC: 209,150; FFP: 103,833; Platelets: 51,425; Cryoprecipitate: 5,526) were transfused. A total of 12 transfusion errors were identified during this period (1:30,800; PRBC: 10 [8 ABO-incompatible], FFP: 2; Table). The incidence of ABO incompatible PRBC transfusions was 1:26,100. Patients (74±6.7 yrs; M[6]/ F[5]); surgical [7]/medical [5]) who received the wrong blood type were predominantly in acute care settings (ICU [5]; OR[3]; ER[1]). Transfusion error -related medical sequelae ranged widely, from no reaction [6], mild [2]-severe [2], and death [2]. The cause of transfusion error in all but one resulted from failure to correctly identify the patient being transfused.

Conclusion: At our institution, blood transfusion errors occur within reported standards (1). Accurate patient identification at the bedside, immediately prior to transfusion, is critical to safe transfusion practice. This crucial step would greatly reduce the likelihood of blood product transfusion errors. Hospitals must continue to develop protocols and integrate technology to ensure correct patient identification.

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283490 - INTRAOPERATIVE FLUID THERAPY AND LENGTH OF HOSPITAL STAY WITHIN AN ENHANCED RECOVERY PROGRAM IN COLORECTAL SURGERY

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Background: Although enhanced recovery after surgery (ERAS) pathways includes fluid guidelines, the relationship between length of hospital stay and volume of intraoperative fluid administered has not been well established. We developed and implemented a comprehensive ERAS program at 15 hospitals in Ontario[1]. The fluid guidelines recommended fluid restriction and administration of fluids in response to hemodynamic triggers such as hypotension or tachycardia. The guideline further suggested the use of cardiac output monitors to further guide fluid administration. The objective of this study was to determine if the volume of fluid administered intraoperatively was associated with prolonged length of hospital stay (LOS).
Methods: Following research ethics approval at each of the participating hospitals and written informed consent data were collected prospectively on all patients undergoing elective colorectal surgery who agreed to participate in our ERAS study. Data collected included demographics, perioperative compliance with the ERAS guidelines and patient outcomes length of hospital stay. A prolonged LOS was considered to be greater than the median LOS. Continuous variables were compared using design-adjusted t-tests and categorical variables using design adjusted Chi square tests. Generalized estimating equations accounting for clustering with site were used for risk adjustment in multivariable models.
Results: Between September 2012 and April 2015, 2,798 patients (1,345 females (48 %); mean age 60.3 years) were enrolled in the ERAS program. Intraoperative fluid therapy data were incomplete or unreliable on 78 (2.7%) of the population and these patients were excluded. Patients underwent colonic (n=1,802, 64.4%) or rectal (n=996) resections and 1473 (52.6%) were performed laparoscopically. The median LOS was 5.0 days (interquartile range, 4 to 8.0). Intraoperative fluid therapy was predominantly a balanced salt solution (Ringer's Lactate). The volume administered was 2.1 ± 1.2 L and advanced hemodynamic monitoring was employed in 761 (27.2%) patients. Regression analysis identified Charlson Comorbidity Score ≥ 3 (Odds ratio (OR) 1.50 (Interquartile Range; 1.13 - 2.23), intraoperative fluid volume (L) (OR 1.53, 1.36 – 1.75), preoperative anemia (Hemoglobin < 130 g/L for males and < 120 g/L for females) (OR 1.58, 1.36 to 1.82) and surgical duration (≥ median= 189 min) (OR 1.55, 1.27 - 1.89) as predictors of prolonged length of stay. An oncology diagnosis was not associated with a prolonged LOS (OR 0.54, 0.44 to 0.67)
Discussion: Despite the recommendation for fluid therapy in our ERAS program, the volume of fluid administered in the operating room continues to be associated with prolonged LOS. Fluid management remains an important modifiable predictor of patient outcome following elective colorectal surgery and the indication for fluid during

surgery needs additional attention and consideration if we are to improve patient outcome.

References:

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285823 - UNIVERSAL TRANEXAMIC ACID IN MAJOR JOINT ARTHROPLASTY; EFFICACY, SAFETY AND IMPACT OF RISK FACTORS FOR TRANSFUSION

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Introduction: The efficacy of tranexamic acid (TXA) to reduce red blood cell (RBC) transfusion has previously been demonstrated[1], yet uncertainty persists regarding the need to treat those at lower risk for transfusion[2], and assessment of overall drug safety remains incomplete[2]. We assessed the impact of a universal TXA protocol on RBC transfusion, postoperative hemoglobin (Hb) and adverse outcomes in patients undergoing hip and knee arthroplasty to determine whether TXA was effective at reducing RBC transfusion, both overall and in clinically relevant subgroups, without increasing the incidence of adverse outcomes.

Methods: REB ethics approval was obtained, and consent requirements were waived, for this retrospective observational study. All patients undergoing surgery both one year before and after implementation of a Universal TXA protocol were assessed. Protocol patients received TXA 20mg/kg iv, unless at high risk for complications. The primary outcome was the percentage of patients receiving perioperative RBC transfusion. Secondary outcomes included perioperative Hb and adverse events (death, MI, stroke, seizure, PE, DVT, and acute kidney injury). Logistic regression compared adjusted risks of transfusion post- vs pre-protocol for patients with all permutations of putative risk factors[3-6] (anemia, low BMI or female sex). Chi square and logistic regression analysis was used with statistical significance at $p < 0.05$.

Results: 1996 patients were assessed: 1084 pre- and 912 post-protocol. Patient

characteristics did not differ between groups (age, sex, body mass index, type of surgery or preoperative Hb). Overall TXA utilization increased from 32.3% to 92.2% while the transfusion rate decreased from 10.3% to 4.8% (odds ratio 0.40 [0.21, 0.59]). Reduced transfusion was observed for primary hip and knee arthroplasty (% reduction [95% CI]; -6.7% [-9.8, -3.6] and -5.5% [-7.8, -3.2] and less consistently for revision hip and knee surgery, (3.2% [-7.5, +13.9] and -12.6% [-30.3, +4.8] respectively. Pre-operative anemia increased, and obesity reduced the risk of transfusion. A transfusion sparing effect of the protocol was observed in both anemic patients [15% vs 27%] and non-anemic patients [2.9% vs 7.3%] ($p < 0.05$). Logistic regression demonstrated reduced transfusion regardless of sex, anemia or low BMI status (Figure). Postoperative day 3 Hb increased from 95.8 to 101.4 g/L after protocol implementation (difference 5.6 [4.3-6.9]) with greatest effect after primary hip and knee replacement (difference; + 8.1 [6.2-9.9] and + 4.8 g/L [4.3-6.9] ($p < 0.001$). No increase in adverse events was observed overall ($p=0.845$), or for DVT ($p=0.226$).

Discussion: The Universal TXA protocol was associated with increased TXA utilization and reduced RBC transfusion. Anemia increased transfusion risk and obesity decreased transfusion risk, but all patient subgroups benefitted from the protocol, strengthening the rationale for Universal therapy. Patients undergoing primary joint replacement experienced the most benefit and also had increased postoperative Hb. No increase in adverse events was observed.

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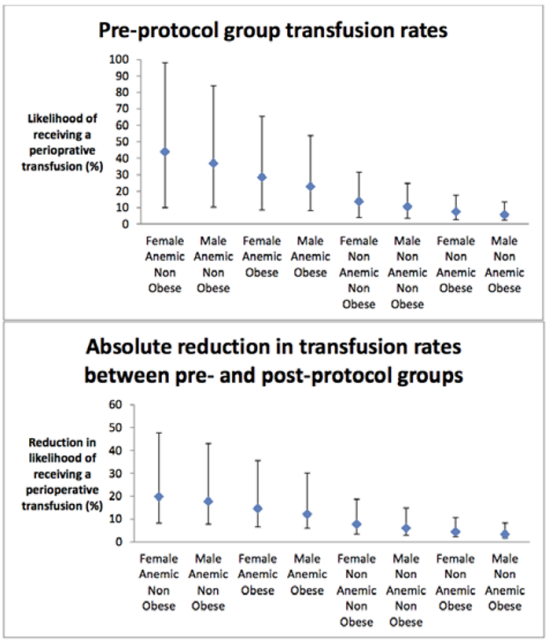
FIGURE: Effect of Protocol Based On Patient Risk Factors Category



Logistic regression is used to show adjusted transfusion risk and protocol effect for transfusion reduction for all permutations of three putative risk factors for transfusion in total joint arthroplasty.

285869 - POTENTIAL BIOMARKERS OF EARLY TISSUE HYPOXIA DURING ACUTE HEMODILUTIONAL ANEMIA IN CARDIAC SURGERY

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Introduction: Anemia and hemodilution are associated with increased morbidity and mortality in patients undergoing cardiac surgery. Measurement of tissue PO_2 and hypoxic biomarkers may provide evidence of tissue hypoxia in patients undergoing cardiac surgery who are exposed to acute hemodilutional anemia during cardiopulmonary bypass (CPB). We hypothesize that anemia causes tissue hypoxia and activates hypoxic signaling pathways, including nitric oxide (NO), methemoglobin (MetHb), free plasma hemoglobin (Hb), hepcidin and erythropoietin (EPO). These biomarkers could inform clinical decisions to treat anemic patients undergoing heart surgery.
Methods: With institutional research ethics board approval and informed consent, an observational prospective study was conducted on 64 patients undergoing cardiac surgery and CPB. Five arterial blood samples were taken including: baseline, two during CPB, following restoration of circulation, and after admission to the intensive care unit (ICU). Measurements included cerebral oximetry, arterial blood gas analysis and co-oximetry; plasma MetHb, nitrate, nitrite, hepcidin and erythropoietin (EPO) (ELISA) and plasma free Hb levels (Absorbance: $c_{Hb} = f_1A_{415} - f_2A_{450} - f_3A_{700}$).(1) Data [mean (STDEV)] was analyzed by repeated measures one-way ANOVA and Spearman correlation coefficients.
Results: Fifty two of 64 patients [81%] were male of age 61(8) and with a body mass index of 28 (5). Hb levels decreased from a baseline value of 127 (16) to 102 (14) g/L during CPB [$p < 0.05$]. Cerebral oximetry decreased during CPB [71(6) vs. 64(3)%] while MetHb increased from baseline [0.78(0.41)] to a maximum value in the ICU [1.23(0.71) ; $p < 0.001$]. Plasma free Hb increased from 0.08(0.13) to 0.29(0.27) g/L and plasma nitrate decreased ($p < 0.05$ for both). Hepcidin remained unchanged while plasma EPO levels increased from 9.4 (7.7) to 15.9 (15.9) IU/mL after ICU admission [$p < 0.05$]. Changes in MetHb correlated with changes in EPO [$r=0.3452$, $p=0.0162$]. Free Hb on CPB correlated with MetHb in the ICU [$r=0.34$, $p=0.03$] and change in EPO

[r=0.46, p=0.0039].
Discussion: Our findings suggest that hemodilutional anemia resulting from CPB and cardiac surgery is associated with changes in cerebral oximetry and increases in biomarkers of tissue hypoxia including MetHb and EPO. Changes in MetHb correlated with changes in EPO suggesting that tissue hypoxia may have contributed. Plasma free Hb increased modestly during CPB, but this change correlated with ICU MetHb and the change in EPO, supporting a role for free Hb in the hypoxia signaling cascade. Further characterization of patient-specific biomarkers of anemia-induced tissue hypoxia, in combination with Hb level, may help to define patient-specific treatment thresholds for acute anemia.

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286415 - DOCUMENTATION OF SHARED DECISION MAKING AND PATIENTS' DECISIONAL NEEDS IN THE PREOPERATIVE SURGICAL NOTE

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Introduction:
Shared decision making (SDM) promotes a partnership between the physician and the patient in health decision making, a hallmark of patient-centered care[1,3]. SDM is the optimal approach when the best treatment is unclear, and personal preferences about the risks and benefits should guide the treatment choice. Given the increased risk associated with surgery in the elderly, SDM could help to ensure high-risk older patients make surgical decisions consistent with their preferences. Best practice guidelines recommend documentation of SDM in the surgical consultation note[4]. However, little is known about how well SDM is actually documented. Therefore, we aimed to evaluate SDM and patient decisional need documentation among elderly patients having elective surgery.

Methods:
We conducted a historical cohort study on 240 randomly sampled preoperative surgical consultation notes from a single tertiary care center. Eligible patients were 65+ years and had elective surgery. Two raters independently extracted data using pre-piloted forms. Variables included 9 essential elements of SDM and the validated 4-item SURE test, which screens for patients' decisional needs[1,2]. All data was compared for interrater consistency and disagreements were resolved by consensus. We performed descriptive analyses on all variables. Risk-adjusted analysis and thematic qualitative analysis of surgical note quotes will be performed. We obtained Research Ethic Board approval for this study.

Results:
Consultation notes were available for 233/240 patients (97%). Of the 233 consultation notes reviewed, 100% documented on an actual choice being made and the plan for implementation of that choice (Figure 1A). The patient's treatment preferences (15%) and self-efficacy (3%) were least commonly documented. No consultation note documented all 9 SDM elements. Moreover, none included documentation associated with all 4 SURE test items. Patients' certainty about the decision, categorized as "Sure of myself", was documented most often (16%), while having adequate support and advice, categorized as "Encouragement" was least frequently documented (2%) (Figure 1B).

Discussion:
Our retrospective chart review demonstrates a lack of SDM documentation in elderly patients' preoperative surgical consult notes. Although we cannot comment about discussions that occurred during the consultation, a gap exists between recommended and actual SDM documentation. More research is needed to develop and evaluate interventions for improving standardization and practice of SDM documentation for the perioperative surgical consult note.

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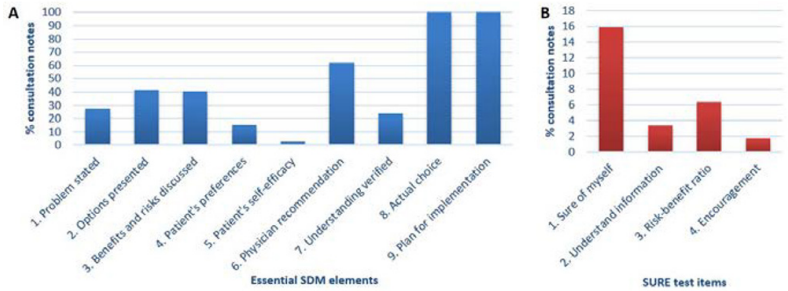
Figure 1: Documentation of SDM and SURE criteria.



A) 9 essential elements of SDM. B) Patient's decisional needs using the SURE test.

286519 - ALLEVIATING PRE-OPERATIVE ANXIETY THROUGH PATIENT EDUCATION WITH INNOVATIVE 360° IMMERSIVE VIRTUAL REALITY

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Introduction:
The prevalence of pre-operative anxiety can be as high as 80% in surgical populations. Perioperative clinical trials have revealed that pre-operative anxiety is associated with reduced short-term postoperative recovery, poor functional outcomes, increased pain scores, wound infections, increased length of stay and even mortality. The greatest anxiety has been linked with the fear of the unknown, specifically the process of physically being taken to the operating room. Strategies such as implementation of the pre-anesthetic clinic(PAC), the use of videos of what to expect leading up to surgery, calming music, and pharmacological treatments have been costly or with mixed effects. Virtual reality(VR) technology presents a new educational opportunity for patients in an effort to reduce pre-operative anxiety. Through immersive 360° simulation, patients can 'experience' the journey of being prepped for surgery and transferred to the OR. Patients learn about their pre-operative experience in an engaging/active manner by having the perception of being physically present in the pre-operative experience days/weeks prior to their procedure date. Thus, we have constructed and are evaluating an immersive 360° simulation to educate patients about the pre-operative experience, to investigate whether A) immersive 360° VR video can reduce pre-operative anxiety, and B) how this approach compares to current practice of viewing traditional educational videos.
Methods & Results:
With ethics approval, forty-five out of 100 patients have been recruited for this study during their visit to the PAC and equally randomized to two groups: 1) watching a traditional video on a television screen OR 2) viewing an immersive 360° VR simulation using Gear VR© goggles. Anxiety levels will be assed during their PAC appointment and the day of surgery using the validated Visual Analog Anxiety Scale(VAS). Secondary measures such heart rate and mean arterial blood pressure will also be analyzed at the same time points. For the immersive 360° simulation group, the change in VAS scores pre and post 360° video use will be assessed using a paired t-test, or a Wilcoxon signed rank test for the case of non-normally distributed data. To answer our second question of how this approach compares to current practice of viewing traditional educational videos, we will compare the VAS scores between the two groups. The mean VAS scores will be compared between the two groups using a two sample two sided t-test, or Wilcoxon rank sum test should the data be found to be non-normally distributed.
Discussion:
This is the first RCT to investigate the use of VR to reduce morbidity through patient education. The tool created in this trial, if effective, will serve as the foundation for the use of VR in patient education across many different realms – redefining the hospital

care experience in an attempt to improve patient outcomes.

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286562 - IMPLEMENTATION OF WHO SAFE SURGICAL CHECKLIST IN A WEST AFRICAN TEACHING HOSPITAL

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Introduction: In an attempt to improve surgical morbidity and mortality on a global scale, the World Health Organization (WHO) created the Surgical Safety Checklist (SSCL) as part of their Second Global Patient Safety Challenge. In 2015, the Cape Coast Teaching Hospital (CCTH) in Cape Coast, Ghana completed the transition from community institution to full-fledged teaching hospital. With this transition, a significant increase in the number and acuity of presenting cases was noted. In conjunction with a visiting team from Kybele non-profit humanitarian group, one of the strategies identified to help modify morbidity and mortality on entry to the institution was the implementation of the SSCL.This project is a component of an ongoing partnership between Kybele and CCTH and will continue to be evaluated and reinforced during future visits.

Methods: This Quality Improvement (QI) project was designed to implement and assess the SSCL process at CCTH and is integral to the ongoing delivery of healthcare at CCTH. REB was not sought as this is strictly QI. In keeping with the implementation guide published by the WHO, didactic information sessions as well as demonstrations in the operating rooms by Kybele members familiar with the SSCL began implementation. Data was gathered at the time of SSCL implementation via staff opinion surveys. Six months following implementation, during a return visit to CCTH, Kybele members reviewed the implementation of the SSCL. The staff opinion survey was recirculated and a random chart audit was also completed to identify both presence and completion of document for each surgical patient. Use of the SSCL was systematically observed in the operating theatres during scheduled elective cases. Information collected was synthesized to allow for revision of the SSCL to accommodate the nuances and logistics of local practice.

Results: Data collected was via 5-point Likert scale demonstrated an improvement in staff opinions of the SSCL including; endorsement of its role in improving communication, improving patient care and its use as a routine tool. In collection of additional comments it was noted that time constraints and surgeon resistance were significant barriers to the use of the SSCL. Common themes included identification of SSCL as a patient safety marker, as well as percieved improvement in nursing empowerment in the operating theatre.

Conclusion: Implementation of the SSCL at CCTH is a testament to the universality of the WHO initiative and confirmation of the described implementation plan. Initially implemented as part of a plan to reduce maternal and newborn mortality, in the hands of local leaders, the SSCL has been disseminated throughout the institution and has

become a standard of care.

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286564 - A NOVEL RESEARCH CENTRE TO IMPROVE PERI-OPERATIVE BRAIN HEALTH

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Introduction: Postoperative delirium and cognitive dysfunction occur in 30% of patients[1] and the incidence may be as high as 62% in elderly patients undergoing major orthopedic surgery.[2] It is estimated that postoperative delirium increases hospital costs approximately 2.5-fold over patients who do not experience it.[3] The annual costs of postoperative delirium secondary to prolonged hospital admission are estimated to be $164 billion dollars in the USA alone[3] and $17 million dollars at the University Health Network in Toronto.[4] Despite the high incidence and poor outcomes associated with these debilitating disorders, no effective treatment strategies currently exist.

Our long-term goal is to build the first Centre for Perioperative Brain Health, a research platform to study perioperative cognitive outcomes. This multidisciplinary, translational research center will then be used to develop mechanistic-based treatments for delirium and postoperative cognitive dysfunction (POCD). Specifically, in this first study we will determine: 1) the incidence of post-operative delirium and POCD and 2) identify risk factors for delirium and POCD, in high-risk elderly patients who are undergoing elective major orthopedic surgery

Methods and Data Analysis: Local Ethics Committee approval was obtained for this prospective, observational cohort study which will assess patients undergoing hip/knee arthroplasty in a single Canadian academic centre. Delirium will be assessed twice daily during admission using the 3D-CAM. Cognitive function will be tested with a state-of-the-art computer based cognitive assessment tool [CogState Brief Battery (CBB)][5] pre-operatively and on post-operative day 2, 6-weeks and 4.5-months. The primary outcome is a change in CBB score from baseline to 4.5 months. The secondary outcomes are: the incidence of postoperative delirium, proportion of patients with severe cognitive dysfunction (CBB ≤ 80) at 4.5 months, proportion of patients with mild cognitive impairment (MCI) at 4.5 months, effect of preoperative MCI, preoperative chronic inflammatory states, post-operative delirium, and post-operative complications on the postoperative cognitive changes at 4.5 months. A linear mixed effects model will be used to analyze the scores and to determine the effect of predictor variables. With 6 predictor variables and an estimated 10% incidence of POCD, a 600-participant sample size will be necessary. Our hospital performs approximately 3,000 arthroplasties yearly so this sample population is achievable. A pilot study to assess recruitment rates yielded 95 participants in 3 months, suggesting that the full sample size could be enrolled in approximately 18 months. The study is underway.

Significance and Innovation: We will build the first Centre for Perioperative Brain Health in the world. We will use this platform to develop strategies to predict, prevent and treat delirium and POCD in patients undergoing elective surgery. Our

interventions will ultimately improve patient outcomes, shorten length of stay and reduce the immense costs, monetary and social, of delirium and cognitive dysfunction.

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286609 - A PROVINCIAL SURVEY OF ANESTHESIA QUALITY ASSURANCE PROGRAMS IN COMMUNITY HOSPITALS

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Introduction: The last few decades has seen an increase in the number of quality and safety monitoring programs in healthcare. Owing to the nature of the work, Anesthesia Quality Assurance (QA) and Quality Improvement (QI) programs are well recognized in their importance towards minimizing morbidity and mortality in the perioperative setting[1,2]. Such programs can be resource intensive and in spite of their importance, administering them outside of an academic medical setting can prove to be very challenging. Furthermore, smaller case volumes in community centres make it difficult to track measures of quality care, especially for more rare events. The purpose of this study was to investigate the extent of QA/QI programs in community Anesthesia Departments across a Canadian province.
Methods: After obtaining local REB approval, a structured survey questionnaire was sent to the Anesthesia Chiefs of Staff at the seven secondary/regional community hospitals serving the province. Surveys were distributed electronically and via post with reminder emails sent at 1 and 3 months. The survey consisted of qualitative and quantitative questions covering 33 standard QA/QI indicators[3] over three temporal domains (pre-, intra- and post-operative time periods). It also addressed potential barriers to local QA/QI practices such as lack of support, staffing resources or time allocation.
Results: Five responses were obtained from the seven surveyed hospitals (response rate 71%). All respondents indicated their department had some form of QA/QI initiative. Morbidity and Mortality rounds were most common (60%) quality activity amongst respondents. Province-wide, the QA/QI programs were very heterogeneous in terms of which specific QA/QI indicators were monitored. No one single QA/QI indicator was consistently measured by all centres. Across all five centres who responded, a sum total of 46 standard QA/QI indicators were reported as being monitored. Of those, intra-operative (19/46) and post-operative (20/46) indicators accounted for the vast majority of initiatives. Independent of the extent of their QA/QI programs, several departments (3/5) reported insufficient resources and time as a barrier. Some programs were physician-lead on a volunteer basis (2/5), while others were dependent upon hospital administration or other departments in the hospital for QA/QI support (2/5). **Discussion:** This study demonstrates that community anesthesia departments across the province are working with limited resources to run QA/QI programs that are heterogeneous when compared to one another. Having a more uniform province-wide QA/QI program may improve the efficiency of these efforts, increasing the quality of such programs and ultimately improving the safety of patients undergoing anesthetic care.

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284596 - FACTORS INFLUENCING HOSPITAL ADMISSION FOLLOWING ELECTIVE ADENOTONSILLECTOMY IN CHILDREN: NORTH AMERICAN SURVEY

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Introduction: Adenotonsillectomy (AT) is one of the most common pediatric surgeries in North America (NA)[1]. The usual indication for AT is obstructive sleep apnea (OSA)[2]. Our goals were to survey NA pediatric anesthesiologists and otolaryngologists about AT management in terms of their confidence in perioperative decision-making and identifying key factors warranting elective overnight observation.

Methods: This study was approved by Research Ethics. The survey was deployed using SurveyMonkey™ to the following affiliated members: American Society of Pediatric Otolaryngologists, Canadian Pediatric Anesthesia Society, anesthesiologists at all 16 Canadian pediatric tertiary care centers, Canadian Society of Otolaryngology-Head and Neck Surgery and the Society for Pediatric Anesthesia. Confidence in clinical practice and perceived usefulness of published clinical guidelines were assessed using a 5-item Likert scale (range-"strongly agree-disagree"). Other AT-related questions addressed preoperative evaluation, tools to diagnosis OSA and factors influencing elective admission. The survey design accounted for reliability and content validity. To achieve a $\pm$3% sampling error for a 95% confidence level, 588 (13.9%) responses were required.[3] All data are reported as proportions or medians.

Results: Survey response-rate was 14.7% (623/4238) and ranged from 11.5-61% by society/group. Most respondents were pediatric anesthesiologists (78.5%) from the United States (US), had pediatric subspecialty training (88.6%) and practiced in a pediatric tertiary care setting (57.2%). US compared with Canadian physicians were more confident in their process to determine appropriate postoperative care (Table 1). Canadian anesthesiologists were the least confident to clinically diagnose severe OSA. Polysomnography (PSG) ranked first for preoperative OSA diagnostic tools utilized by anesthesiologists and otolaryngologists, regardless of their country of practice, however, nasal endoscopy was favored by US physicians and overnight pulse-oximetry by Canadians; sleep-questionnaires and smart-phone home-sleep audio-recordings were favored by anesthesiologists and otolaryngologists, respectively. "Witnessed apnea" was common to both anesthesiologists and surgeons as a key preoperative symptom/sign warranting elective admission, however, reported "fatigue" and "medical comorbidities" were specific to anesthesiologists and surgeons, respectively. Respondents were split between "moderate-severe" (40.0%) and "severe" (40.2%) PSG-diagnosed OSA requiring admission; oxygen-saturation nadir threshold for admission was 80-85%. The majority (61%) of respondents reported 1-3 hours of required post-AT monitoring, however, Canadian anesthesiologist's requirements were longer (3-4 hours).

Discussion: Canadian compared with US pediatric physicians, particularly anesthesiologists, appeared more conservative in their perioperative care of children undergoing AT. Preoperative PSG and witnessed apneas were key determinants of postoperative disposition following AT. Respondents were divided regarding threshold of PSG-determined OSA severity warranting an overnight stay.

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Table 1. Respondents in agreement to questions related to perioperative care of children undergoing adenotonsillectomy for OSA, by specialty and country sub-groups

Statement	Anesthesiologists "Somewhat/strongly agree with statement" (%)			Otolaryngologists "Somewhat/strongly agree with statement" (%)		
	Canadian	U.S.A	p value	Canadian	U.S.A	p value
Q3. Published guidelines are helpful to determine post-op disposition*	70.2	76.5	p=0.12	85.7	88.6	p=0.68
Q4. Confident in local process to determine overnight admission*	67.4	82.3	p=0.0003	67.9	95.2	p<0.0001
Q5. Confident to diagnose severe OSA based on Hx/Px*	36.2	54.8	p=0.0002	60.7	51.4	p=0.38
Q11. 3 yo healthy child with moderate OSA (AHI <10) is suitable for ambulatory AT**	58.8	72.5	p=0.004	42.9	67.3	p=0.02

Note : AT = adenotonsillectomy; AHI = Apnea Hypopnea Index; Hx = History; OSA = Obstructive Sleep Apnea; Post-op= postoperative; Px = Physical Exam; Q=question; USA=United States of America; yo=year-old; *For Q3-5 Anesthesiologist and Otolaryngologist, n=475 and 133, respectively **For Q11 Anesthesiologist and Otolaryngologist, n=445 and 126, respectively

284771 - COMPARISON OF SEIZURE DURATION USING SUCCINYLCHOLINE VS. CISATRACURIUM IN ANESTHESIA DURING ECT IN PEDIATRIC

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Abstract
Background: Succinylcholine is commonly used as a muscle relaxant in patients who are candidates for receiving electroconvulsive therapy (ETC). Our objective was to compare the variations caused by two drug regimens of cisatracurium and succinylcholine on seizure duration during ECT. Hemodynamic values were also observed for probable alterations.
Methods:Consent was obtained from all legal guardians and the research was approved by the institutional ethics committee**.** The study was a randomized, double blinded clinical trial conducted on 64 patients, divided into two groups of 32 patients, using simple randomization method. The muscle relaxant cisatracurium was used in the first group and succinylcholine was used in the second group undergoing ETC. The durations of the tonic phase, clonic phase and seizure duration were compared in the two groups.
Findings: The mean duration of the tonic phase in the cisatracurium and succinylcholine groups were 6.87 ±1.98 and 27.37 ±4.99 seconds, respectively which was significantly shorter in the cisatracurium group(P=0.001). On the other hand, the mean duration of the clonic phase in the succinylcholine and cisatracurium groups were 15.78 ±5.96 and 29.84 ±6.55 seconds respectively, which was significantly shorter in the succinylcholine group (P=0.001).
Discussion: Although cisatracurium is considered a muscle relaxant with intermediate duration of action, its low dose administration in ECT is not only without any limitations, but may also be a more appropriate alternative to succinylcholine. On the other hand, if the duration of seizures is reduced in ECT, it may no longer be an effective treatment, and as a result, since cisatracurium increases the seizure duration, it could have better therapeutic effects in ECT and prevent undesirable complications of succinylcholine.
Key words: electroconvulsive therapy, tonic phase, clonic phase, cisatracurium, succinylcholine
.

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Table 1 | Mean (SD), seizure duration, tonic phase, and clonic phase

Table 1 | Mean (SD), seizure duration, tonic phase, and clonic phase

Mean (SD)	**cis** ($n = 32$)	**suc** ($n = 32$)	***P* value**
Seizure duration (s)	36.72±6.09	27.37±4.99	<0.001
Tonic phase (s)	6.87±1.98	11.59±3.47	<0.001
Clonic phase (s)	29.84±6.55	15.78±5.96	<0.001
***Independent t-test**			

S, second

282565 - EFFECT OF TWO DIFFERENT DOSES OF DEXMEDETOMIDINE ON STRESS RESPONSE IN LAPAROSCOPIC PYELOPLASTY; A CLINICAL STUDY

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Introduction: There has been little research into stress and laparoscopic procedures in urology with majority of studies concentrating on nephrectomy[1]. Many drugs have been tried to decrease stress response during laparoscopic surgery like clonidine, high doses of opioids, β-blocking agent and dexmedetomidine. Dexmedetomidine decreases renin release and decreases BP. Dexmedetomidine infusion did not inhibit adrenal steroidogenesis in humans after major surgery[2]. We planned to evaluate the efficacy of dexmedetomidine in two different doses in reducing the stress response in patient undergoing laparoscopic pyeloplasty.
METHODS: After local ethics committe approval and informed patient consent ,90 ASA I and II patients were assigned to one of three groups: Group B patients received dexmedetomidine 1μg/kg body weight(BW) loading dose, then 0.7 μg/kg BW/hour for maintainance).Group C patients received dexmedetomidine 0.7μg/kg BW loading dose, then 0.5 μg/kg BW/hour for maintainance.Group A patients received normal saline (placebo) in the same volume and rate. Stress response were measured in the form of hemodynamic response (Heart rate HR and Mean Arterial Blood Pressure MAP), blood sugar and serum Cortisol.
RESULTS: The HR and MAP were found to be statistically significant ($p < 0.05$) and higher in group A as compared to group B and C throughout the intraoperative and postoperative period. The HR, MAP values were statistically insignificant and comparable throughout perioperative phase during the comparison of group B with group C. RBS at post intubation and extubation was statistically significant ($p < 0.05$) and higher in group A when compared with group B and Group C while it was statistically insignificant when group B was compared with group C. Serum Cortisol at postintubation, during midsurgery and 2 hrs after extubation was statistically significant ($p < 0.05$) and higher in group A when compared with group B and group C while it was statistically insignificant when group B was compared with group C
Discussion: In our study, dexmedetomidine was used in two different doses and we found a statistically significant decrease in stress response in two groups when compared with control group but a insignificant difference in stress response when comparison was done between two doses hence the advantages of dexmedetomidine can be achieved with lower doses and possibility of bradycardia and hypotension due to higher doses can be diminished.

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2. Clin Exp Pharmacol Physiol 2015: 828–836

283762 - HEMODYNAMIC EFFECTS OF ANGIOTENSIN SYSTEM INHIBITORS IN PATIENTS UNDERGOING ELECTIVE JOINT ARTHROPLASTY

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Introduction: Angiotensin-converting-enzyme inhibitors (ACEIs) and angiotensin II receptor blockers (ARBs) are commonly prescribed medications. In the perioperative setting, these medications may exacerbate the hypotensive effects of anesthesia, and recent guidelines from the Canadian Cardiovascular Society (CCS) have recommended withholding ACEIs/ARBs for 24 hours before surgery [1]. This retrospective study documents the local practice of preoperative ACEI/ARB discontinuation, and examines the effects of discontinuation on the development of intraoperative hypotension in patients undergoing elective joint arthroplasty.

Methods: This study was approved by the local Research Ethics Board and all study participants consented to the use of their personal health information for research purposes. Consecutive patients who underwent total knee or total hip arthroplasty between January 2015 and December 2015 were retrospectively reviewed. Only patients taking ACEI/ARB medication were included. We divided patients into two groups: those who were instructed to discontinue their ACEI/ARB on the morning of surgery, and those who continued their medication. We compared the two groups' incidences of intraoperative hypotension requiring vasopressor support.

Results: Of 276 patients, 214 (78%) were instructed to discontinue ACEI/ARB therapy on the morning of surgery. There were no significant differences between the ACEI/ARB discontinuation and continuation groups with regards to baseline demographics, comorbidities, or surgery type (hip vs. knee). Intraoperatively, the ACEI/ARB discontinuation group had a decreased incidence of hypotension requiring vasopressor support (26% vs. 37%), although this difference was not statistically significant ($p=0.079$). Postoperatively, there was no difference between the groups in postoperative hypertension or other complications. In the multivariate logistic regression analysis, ACEI/ARB continuation ($p=0.007$), older age ($p=0.020$), and hip arthroplasty ($p=0.001$) were independent predictors of intraoperative hypotension. ACEI/ARB continuation remained an independent predictor of hypotension in the subset of patients who underwent surgery with spinal anesthesia ($n=215$, $p=0.008$).

Discussion: In patients undergoing elective total hip or total knee arthroplasty, ACEI/ARB continuation is an independent risk factor for the development of intraoperative hypotension requiring vasopressor support. ACEI/ARB discontinuation on the day of surgery did not lead to increased incidence of postoperative hypertension. Other risk factors for vasopressor use include age and hip arthroplasty. These findings support recent CCS guidelines, although randomized controlled trials are needed to further strengthen the current recommendations.

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286597 - NEOSTIGMINE-INDUCED CHOLINERGIC CRISIS: A CASE REPORT

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Purpose:
To describe a case of cholinergic crisis due to reversal of neuromuscular blockade with neostigmine after a laparoscopic appendectomy.
Clinical Features:
Patient consent and ethics approval were obtained in accordance with local institutional guidelines prior to the submission of this case report.
A 76 year old female underwent a laparoscopic appendectomy. She had hypertension and type 2 diabetes mellitus. She was 70 kg and 163 cm. There was no history or evidence of cerebrovascular disease or dementia. General anesthesia was induced with fentanyl 75 mcg, propofol 120 mg, and rocuronium 30 mg and maintained with air, oxygen and desflurane. After 30 minutes of surgery, ulnar train-of-floor revealed four twitches with fade. Intravenous neostigmine 2.5 mg and glycopyrrolate 0.4 mg were administered. With removal of volatile, the patient opened her eyes and moved her head from side to side. She was extubated but exhibited poor respiratory effort and wasn't following commands. A second, identical dose of reversal was given. She continued to produce low tidal volumes and became less responsive. She remained hemodynamically stable but due to desaturation was reintubated with propofol 50 mg and succinylcholine 140 mg. Subsequently, she became unresponsive despite a lack of sedation and had pin point pupils. She was moving all her limbs but her muscle activity was reminiscent of residual paralysis with sporadic twitches. She became persistently hypoxemic requiring intermittent alveolar recruitment maneuvers. She was sedated with propofol and ventilated in the recovery room. There were no lateralizing signs suggestive of a stroke and her metabolic workup was normal. Her chest X-ray revealed evidence of atelectasis. After 3 hours her muscle tone and ventilatory effort allowed for extubation. It took an additional hour for her mentation to recover. On discharge to the floor she continued to require oxygen supplementation by nasal prongs.
Conclusion: A presumptive and unifying diagnosis of a cholinergic toxidrome was made due to the neurologic, musculoskeletal, and respiratory signs that are consistent with this disorder. Interestingly, cholinergic crisis is described in the treatment of myasthenia gravis with anticholinesterase medications. However, there is a dearth of literature in the context of reversal of paralysis with neostigmine. We hypothesize that higher doses of anticholinesterases, especially in the elderly, stimulates central receptors resulting in meiosis, restlessness, confusion, or unresponsiveness. It also stimulates pulmonary secretions, bronchospasm and muscle weakness. Prospective studies are required to test this theory.

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285807 - A VOICE ACTIVATED, AUGMENTED REALITY REAL-TIME COACH FOR PERFORMING ULTRASOUND BLOCKS USING HOLOLENS

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BACKGROUND
The performance of ultrasound guided regional anesthesia has expanded but is still limited by unfamiliarity with sono-anatomy. As a result anesthesiologists will refer to text books and videos on Youtube to remember how to perform blocks in a 'just-in-time' manner. The use of real-time reference to videos in a coaching manner has not been studies and is limited due to lack of appropriately designed videos and the difficult with having too many screens in the operating room. We propose that the use of augmented reality goggles may allow for the viewing of patient site, patient sono-anatomy and a reference/coaching video all at the same time in one field of view.

METHODS
This project was exempt from institutional ethics approval. We designed an augmented reality layout that used the Hololens device, open source femoral nerve block videos and a Sonosite ultrasound machine. The reference/coaching video was preloaded onto the augmented reality device. A second virtual screen depicted a static reference image. We streamed simulated ultrasound image from the Sonosite machine. The anesthesiologist then wore the Hololens device while simulating the performance of a femoral block on a manikin and using the SonoSite Ultrasound Machine. Following several iterations, we were able to have the reference video/coach respond to the following voice activated commands (play, pause, rewind 3 seconds, rewind 5 seconds, restart).

RESULTS

We have successfully developed a real-time voice activated augmented reality reference/coach for use when performing regional anesthesia blocks. We have been able to demonstrate that it is feasible to use augmented reality to depict the patient sono-anatomy, a reference coaching video, an illustrated anatomy image all in one field of view over the patient's operative site. We are now investigating the efficacy of our system for impact on learning, safety and performance in a simulated clinical study. Our system may demonstrate the role of realtime augmented reality coaching in the absence of other peers.

References:
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