Queen's University
43rd Annual Anesthesiology Research Day

Scientific Program Director and Residency Research Coordinator:

Ian Gilron, MD, MSc, FRCPC

Research Day Co-organizer:

Glenio Mizubuti, MD, MSc

Queen's Moderators:

Imelda Galvin
MB BaO BcH, MRCPCH, FRCA, MSc

Jordan Leitch
MD, MSc, FRCPC

The Galway Visiting Lecturer: **Manoj Lalu, MD, PhD, FRCPC**

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Ramiro Arellano, MD, MSc, FRCPC

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Research Coordinator:
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Research Coordinator:
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Institutional support:

• Queen's University • Kingston Health Sciences Centre (KGH & HDH Sites) • Providence Care

Held on April 8, 2022 – Donald Gordon Centre, Kingston, Ontario, Canada.

Supported by Educational Support from:

The Galway Visiting Lectureship

VIRTUAL SCIENTIFIC PROGRAM OUTLINE

*** SESSION 1: INTRODUCTION & GUEST LECTURE ***

0800 – 0805 **Opening Remarks**

– Dr. Ramiro Arellano

0805 – 0815 **Research Day Introduction**

– Dr. Ian Gilron & Dr. Glenio Mizubuti

0815 – 0915 **Dr. Manoj Lalu,**
Assistant Professor, Department of Anesthesiology & Pain Medicine,
Associate Scientist, Clinical Epidemiology Program and Regenerative Medicine Program,
University of Ottawa

"How meta-research has improved research and clinical care"

0915 – 0930 **Wellness break**

*** SESSION 2: RESEARCH TRAINEE PRESENTATIONS ***

0930 – 1045 **Oral presentations (5)**

1045 – 1100 **Wellness break**

1100 – 1200 **Oral presentations (4)**

1200 – **Virtual lunch on your own**

EACH 10-MINUTE ORAL PRESENTATION WILL BE FOLLOWED BY A 5-MINUTE QUESTION PERIOD

The Queen's Moderators will be:

Dr. Imelda Galvin, Assistant Professor, Queen's Dept of Anesthesiology & Perioperative Medicine

Dr. Jordan Leitch, Assistant Professor, Queen's Dept of Anesthesiology & Perioperative Medicine

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Oral Presentations (alphabetical order)

Marielle BALANASER, MD Candidate (Queen's)
Combination pharmacotherapy for the treatment of neuropathic pain in adults: A systematic review and meta-analysis (update)

Courtney BANNERMAN, PhD Candidate (Queen's Department of Biomedical & Molecular Sciences)
The role of the gut microbiome in spinal cord injury pain and neuroinflammation (update)

Jesse CHEN, PGY-2
The role of pre-labour education in epidural understanding, satisfaction, and use (proposal)

Taryn DAVIDSON, PGY-1
Validation of B-type natriuretic peptide with N-terminal pro B-type natriuretic peptide in Perioperative Risk Assessment (Proposal)

Derek DIONNE, PGY-1
Do organization fatigue risk management interventions decrease fatigue risks in residents? (proposal)

Hailey GOWDY, MSc Candidate (Queen's Department of Biomedical & Molecular Sciences)
Examining the circadian control of chronic pain through a Canada-wide cross-sectional study: the CircaPain Project (proposal)

Elizabeth HORE, PhD Candidate, Queen's University
Frailty index to predict mortality, resource utilization and costs in patients undergoing coronary artery bypass graft surgery in Ontario (update)

Amy JIANG, PGY-4
Surgical Sensation During Cesarean Section (update)

MacKenzie KOSAK, PGY-1
Overview of reviews of clinical trials of dexmedetomidine as an adjuvant medication in regional nerve blocks (proposal)

Dawson LAFLEUR, PGY-1
Central Line Tutor: Deep Learning as an Aid in Achieving Competency in Central Venous Lines (proposal)

Matthew MACHINA, PGY-2
Dexamethasone as an adjunct in regional anesthesia techniques: an overview of systematic reviews (proposal)

Landon MONTAG, MSc Candidate (Queen's Centre for Neuroscience Studies)
Examining the Effects of Patient Expectations on Treatment Response to Lidocaine Infusion in an Interdisciplinary Chronic Pain Clinic (update)

Jessica NGUYEN, MD Candidate, Queen's University
Intersectionality and the Training Experiences of Canadian Anesthesiology Residents (proposal)

Matthew PASQUALI, BSc (Queen's), MD Candidate, McMaster University
Chronic opioid use after joint replacement surgery in seniors is associated with increased healthcare utilization and costs: a retrospective cohort study (update)

Sarah RABI, BSc Hons Candidate, Queen's University
Post-discharge opioid use following lumbar spine surgery in older adults in Ontario: a population-based cohort study (update)

Sergiy SHATENKO, PGY-3
Development and validation of competency-based assessment tools for point of care ultrasound (POCUS) in perioperative anesthesia (update)

Devin STIRLING, PGY-2
Can a quick reference learning tool improve regional anesthesia block efficiency and documentation? (proposal)

Theunis VAN ZYL, PGY-3
Improving Rib Fracture Analgesia: Implementation of a QI Standardized Protocol (update)

Poster Presentations

*Presenter in alphabetic order (supervisor)

***Aidan Booker** (Ghasemlou) **Circadian Regulation of Nociceptive Channels and Receptors**

***Aurélie Brécier** (Ghasemlou) **Sensory Neurons Mediate Activation of Skin-Resident Dendritic Cells in a Model of Postoperative Pain**

***Jayne Dent** (Ghasemlou) **Advanced Dynamic Weight Bearing as an observer-independent measure of acute pain**

***Narges Jamali** (Parlow) **Long-term opioid use in seniors following hip and knee arthroplasty in Ontario: a historical cohort study**

***Landon Montag** (Bisson) **The Impact of Socioeconomic Status on Chronic Pain Management of Adults at an Interdisciplinary Chronic Pain Clinic**

***Landon Montag** (Bisson) **Pain Self-Efficacy Moderates the Relationship between Pain Catastrophizing, Depression, and Quality of Life in Adults with Chronic Pain**

***Vincent So** (Gilron) **Association between postoperative pain and altered heart rate variability**

***Gursharan Sohi** (Gilron) **Combination therapy for cancer pain**

***Amanda Zacharias** (Ghasemlou) **Analyzing transcriptomic data to identify circadian genes and pathways regulating neuropathic pain**

Combination pharmacotherapy for the treatment of neuropathic pain in adults: systematic review and meta-analysis

Marielle Balanaser, Meg Carley, Ralf Baron, Nanna B. Finnerup, R. Andrew Moore, Michael C. Rowbotham, Luis E. Chaparro, Ian Gilron*

BACKGROUND Neuropathic pain is typically characterized as shooting or burning pain arising from a wide variety of etiologies [5]. Chronic neuropathic pain causes significant morbidity in the general population each year, and lack of efficacious treatments increases strain on healthcare systems [4,5]. First-line pharmacologic treatments for chronic neuropathic pain include antidepressant and anticonvulsant monotherapies, which are often subtherapeutic and demonstrate dose-related side effects [3]. Combining different medications can sometimes provide superior analgesia and/or tolerability. Over half of patients concurrently receive 2 or more analgesics, and neuropathic pain trials evaluating combination therapy have continued to emerge over the past decade [1]. A 2012 Cochrane collaboration systematic review identified 21 studies (1,965 participants) of various drug combinations, some of which reported superiority of combination versus monotherapy. Taken together, the quality, number and size of included trials were insufficient to support the recommendation of any one specific combination for neuropathic pain [2]. Since the 2012 review, the number of combination trials has nearly doubled, emphasizing the need for this review update.

METHODS Electronic searches were conducted to identify randomized controlled trials (RCTs) of various drug combinations used in the treatment of neuropathic pain from CENTRAL, MEDLINE, EMBASE, and clinical trial registries. Included studies are double-blinded RCTs assessing combination therapy with two or more drugs compared to placebo and/or at least one single agent comparator used in the treatment of chronic neuropathic pain in adults. Data extracted included all study drug and combination therapy specifics, as well as data related to outcomes of efficacy, tolerability, and safety. Risk-of-bias assessment was conducted for all included studies using the Cochrane risk-of-bias tool. Studies were grouped based on drug class into the following categories: opioid-antidepressant, opioid-gabapentinoid, gabapentinoid-antidepressant, NMDA blocker-other analgesic, topical combinations, and other combinations. Meta-analyses were conducted to assess efficacy of opioid-gabapentinoid, gabapentinoid-antidepressant, and opioid-antidepressant combination therapy wherever two or more similar studies were available.

RESULTS A total of 40 studies (4,741 participants) were included in this review. Studies were heterogenous with respect to various characteristics such as dose titration methods and administration of the combination, including both parallel and cross-over study designs. Very few of the 36 different combinations across included studies involved a non-sedating drug, and several methodological problems were identified in a number of trials. 19 of 40 (48%) studies had at least four of seven items that qualified as low risk of bias. For opioid-antidepressant, opioid-gabapentinoid and gabapentinoid-antidepressant combinations, meta-analyses failed to demonstrate superiority over both monotherapies. In general, adverse event profiles were not significantly different for combination therapy compared to monotherapy.

CONCLUSIONS Despite widespread clinical use and an increasing number of trials, convincing evidence has not yet emerged to suggest superiority of any one combination over its respective monotherapies. Therefore, implementing combination therapy as second- or third-line treatment in clinical situations where monotherapy is ineffective should involve closely monitored individual dosing trials to confirm tolerability and overall added benefit. More research is required to further elucidate the specific role, if any, that combination therapy might effectively play in the treatment of chronic neuropathic pain in adults. Future studies would ideally include trials of combinations involving non-sedating agents, and seek to identify clinical settings and specific combinations that safely provide superior analgesia compared to respective monotherapies.

REFERENCES

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[3] Finnerup NB, Attal N, Haroutounian S, McNicol E, Baron R, Dworkin RH, Gilron I, Haanpää M, Hansson P, Jensen TS, Kamerman PR, Lund K, Moore A, Raja SN, Rice ASC, Rowbotham M, Sena E, Siddall P, Smith BH, Wallace M. Pharmacotherapy for neuropathic pain in adults: a systematic review and meta-analysis. Lancet Neurol 2015;14:162–173.

[4] Gaskin DJ, Richard P. The Economic Costs of Pain in the United States. The Journal of Pain 2012;13:715–724.

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The role of the gut microbiome in spinal cord injury pain and neuroinflammation

Courtney Ann Bannerman, Katya Douchant, Shawn S Kim, Prameet Sheth, Nader Ghasemlou
Presenter Supervisor

Introduction

Spinal cord injuries affect more than 10,000 Canadians every year, with 60-80% developing chronic pain. Aside from opioids, which have multiple side effects, few effective treatment options exist. Therefore, there is a clear need for safer and more effective pain therapeutics for this population and all suffering from chronic neuropathic pain. Recent work has shown that the collection of bacteria in the gut, called the gut microbiome, may play a role in pain processing. This collection of bacteria normally plays an essential role in helping us properly digest food and the maturation of our immune system. Many studies have also shown that the diversity of the gut microbiome is altered after a person experiences a spinal cord injury (SCI). This change in gut microbiome diversity is called gut dysbiosis. Gut dysbiosis is not unexpected, as many people who experience a SCI will also have an extended hospital stay with extensive surgery and antibiotic use to prevent infection, which will most certainly affect the gut microbiome.

Methods

Mice were anesthetized using a ketamine:xylazine:acepromazine cocktail (50:5:1 mg/kg), and a partial laminectomy was performed at the vertebral levels T10-11. Moderate contusion (50 kdyn) injury with or without sustained compression (60 seconds) of the spinal cord was carried out on female C57BL/6J mice; sham-injured mice only received a laminectomy. Flow cytometry was used to assess myeloid and lymphoid immune cell infiltration and changes in the spinal cord and small intestine. 16S sequencing was used to quantify changes in the microbiome after injury for the three groups.

Results

Mice treated with antibiotics experience gut dysbiosis and with it more severe mechanical hypersensitivity, whereas mice who care treated with defined microbial communities experience less mechanical hypersensitivity. Antibiotic treatment also appears to affect the in infiltration and activation states of macrophages into the spinal cord.

Conclusions

I hope from this work I will be able to bring on a new line of pain therapeutic for people with spinal cord injuries, one that is not only safer with fewer side effects but is also more effective. This work will also allow for us to better understand the gut-brain axis and its role in pain development and severity.

Study Title: The role of pre-labour education in epidural understanding, satisfaction, and use.
Presenter: Dr. Jesse Chen, PGY-2
Principal Investigator: Jessica Burjorjee (MD, FRCPC) Department of Anesthesiology and Perioperative Medicine, Queen's University
Co-Investigator(s): Ms Maegan Chen (MD Candidate), Rachel Phelan (Clinical Research Facilitator) Department of Anesthesiology and Perioperative Medicine, Queen's University

BACKGROUND: In 2007, Public Health Canada published a survey called the 'Maternal Experiences Survey' and found that 57.3% of all women with a vaginal birth had an epidural[1]. Although it is a safe method of labour analgesia, many women who decline epidurals may be doing so based on inaccurate understandings of the risks of the procedure. Such misgivings revolve around misconceptions around epidurals. These include epidurals slowing labour, affecting the fetus through transfer of drugs, causing profound paralysis, and/or worsening back pain[2,3]. Prior studies in Kingston have found that women wanted to know all risks of epidural analgesia prior to proceeding and that they prefer to know these risks in advance of consenting to one[4,5]. Therefore, it becomes imperative to provide evidence-based information to parturients regarding the risks and benefits of epidural analgesia. There exists a variety of information for patients on the internet. However, they are not consistent nor accessible to all patients[6]. There exists an opportunity to supply patients with reliable evidence based information in advance of labour to improve understanding of, and satisfaction with epidurals.
HYPOTHESIS: A Consolidated epidural education material of reputable sources prior to labour onset will improve patients' understanding of, and satisfaction with future epidural use. It will secondarily affect timing, and use of epidurals.
STUDY DESIGN: This will be a single centre prospective cohort study. An epidural education pamphlet will be delivered to parturients in the Kingston area in the third trimester. A postpartum survey will be conducted 2 months later on all labouring women at KHSC. The survey used to evaluate the epidural experiences of patients who have reviewed the pamphlet and those who have not to compare findings.

References

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Validation of B-type natriuretic peptide with N-terminal pro B-type natriuretic peptide in Perioperative Risk Assessment (Study Protocol)

Davidson, Taryn[1]; Parlow, Joel[1]; McMullen, Mike[1]; Dion, Joanna[1]; DuMerton, Deborah[1]; Roshanov, Pavel[2]; Devereaux, Philip[2]; Leitch, Jordan(supervisor)[1]

[1]Anesthesiology and perioperative Medicine, Queen's University, Kingston, Canada
[2]Population Health Research Institute, McMaster University, Hamilton, Canada

Introduction: Myocardial injury after noncardiac surgery (MINS), defined as a postoperative high sensitivity troponin >30 ng/L, is a strong and independent predictor of 30-day mortality[1]. Recent guidelines recommend testing of brain natriuretic peptide (BNP) or N-terminal pro-brain natriuretic peptide (NT-ProBNP) to identify those patients at increased risk of MINS[2]. Four prognostically important NT-ProBNP categories have been established that enhance perioperative risk prediction[3], however, stratification using BNP values remains dichotomous, with a single BNP threshold used to predict increased risk. Thus, there is a need to establish BNP categories to better stratify patients and inform risk discussions. Kasahara and colleagues developed a BNP to NT-ProBNP conversion formula[4]. This abstract describes the protocol for our study that aims to validate this conversion formula in the perioperative period and correlate BNP levels with established NT-ProBNP thresholds[3]. A secondary outcome will be combined MINS and vascular death at post-operative day (POD) 30.

Methods: This is a single-centre, prospective study to determine the correlation and comparative thresholds between BNP and NT-ProBNP tests. This will involve simultaneous preoperative serum sampling for both BNP and NT-ProBNP. High sensitivity troponin measurements will be taken on POD 0, 1 and 2, and the outcome of MINS or vascular death will be determined at POD 30. Patients will be identified by screening daily pre-surgical screening (PSS) clinic lists and daily surgical lists, and informed consent will be obtained at PSS or on the day of surgery. The study population will include patients undergoing elective noncardiac surgery requiring at least one-night admission who are >65 years old, RCRI ≥1, or >45 years old with significant cardiovascular disease. To determine the external validation of the BNP to NT-proBNP conversion formula[4], the proportion of explained variation (r^2) and the root mean squared error (RMSE) will be used to quantify the agreement between values of NT-proBNP predicted by the formula and actual measured values. BNP levels that correlate with established NT-ProBNP thresholds will be determined using the validated formula. In multivariate analysis, the predictive power of BNP and NT-proBNP will be assessed for combined MINS and vascular death at POD 30.

Clinical Importance: As more studies continue to emerge and refine cardiovascular risk prediction using NT ProBNP, external validation of a formula that converts BNP to NT-proBNP in the preoperative setting may have several critical applications including, 1) utilizing the best available guidelines to inform perioperative risk regardless of whether BNP or NT-proBNP testing is available at a specific hospital, 2) better informing clinical decisions for individual patients (including the type of surgery or anesthesia the patient will undergo, whether additional preoperative consults are required, and how much monitoring is needed postoperatively), and 3) improving perioperative risk discussions with patients and equipping patients and their families with the information they need to make informed decisions.

References

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Do organization fatigue risk management interventions decrease fatigue risks in residents?

Resident: Derek Dionne
QI Project Supervisors: Marta Cenkowski & Chris Haley

QI Research Question:

Do organization fatigue risk management interventions decrease fatigue risks in residents.

Project abstract:

Studies investigating the effects of fatigue on health care worker performance indicate that fatigue increases risk of medical error, compromises patient safety, increases the risk to personal safety and wellbeing (1). The multiple causes of fatigue have been described in dimensions including physical, emotional and social/cultural. Some of the impacts of shift work on wellbeing include increased occupational accidents, fatal car accidents, increased risk of obesity, type 2 diabetes, coronary artery disease, breast prostate and colorectal cancer (2). As the knowledge of the risks of fatigue has grown, as have the various strategies for risk management, general standards of accreditation of Canadian residency programs now require education and policies for management of fatigue risks including individual as well as team-based strategies to manage these risks. Unsurprisingly fatigue risk management strategies cannot be done with a 'one-size fits all' strategy as there are many regional and departmental factors that can have large impacts on fatigue risks. There have been no studies done at Queen's looking at what those specific local factors are. We plan to assess the level of fatigue among the anesthesia residents on at least a yearly basis using a 2-week sleep-work diary and a fatigue and burnout survey. We will host structured discussions with residents and other stakeholders to determine potential fatigue risk management strategies that we can implement within our department. We will implement determined strategies and reassess fatigue for evaluation of improved risk management.

References

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Examining the circadian control of chronic pain through a Canada-wide cross-sectional study: the CircaPain Project

Presenter: Hailey Gowdy
Supervisor: Dr. Nader Ghasemlou

Hailey Gowdy[1], Mitra Knezic[1], Doriana Taccardi[1], Lesley Norris Singer[2], Mary Brachaniec[2], Jennifer Daly-Cyr[2], Ian Gilron[3], M. Gabrielle Pagé[4], Zihang Lu[5], Manon Choinière[4], Etienne Bisson[3], and Nader Ghasemlou[1,3,6]. [1]Department of Biomedical and Molecular Science, Queen's University, Canada. [2]Chronic Pain Network, McMaster University, Canada. [3]Department of Anesthesiology and Perioperative Medicine, Queen's University, Canada. [4]Department of Anesthesiology and Pain Medicine, Université de Montréal, Canada. [5]Department of Public Health Sciences, [6]Centre for Neuroscience Studies, Queen's University, Canada.

Introduction: Approximately one fifth of the Canadian population lives with chronic pain.[1] However, the experience of this pain varies among individuals. Pain intensity can fluctuate throughout the day in some people, following a circadian rhythmicity, while it remains constant in others. 24-hour circadian rhythms play a role in regulating the function of our nervous and immune systems, which are both involved in the experience of pain. Being able to address pain rhythmicity might help in the management of chronic pain. Our study CircaPain used an online survey to study the circadian control of chronic pain in the Canadian population.
Methods: Following a baseline questionnaire, participants completed a series of electronic symptom-tracking diaries (ecological momentary assessments) in which they rated their pain intensity, negative affect, and fatigue on a 0-10 scale at 3 timepoints (8:00AM, 2:00PM, 8:00PM) each day for one week.
Results: Using this data, patterns of pain fluctuation will be identified (e.g., constant, increasing, or decreasing throughout the day). Further analysis will identify associations between specific pain rhythmicity patterns and other variables, such as those associated with underlying conditions or lifestyle factors.
Discussion: This work will deepen our understanding of 24-hour pain fluctuations by uncovering potential predictors for their occurrence, which may help to develop new treatments, management, and preventive strategies for different chronic pain conditions. Furthermore, our lab is working on expanding this study on a global scale by collecting data from different countries to see whether pain rhythmicity varies across latitudes.

(Supported by the CIHR-SPOR Chronic Pain Network)

Reference:

1 Campbell, F. *et al.* Working Together to Better Understand, Prevent, and Manage Chronic Pain: What We Heard. 75 (Health Canada, Ottawa, ON, 2020).

Title: Frailty index to predict mortality, resource utilization and costs in patients undergoing coronary artery bypass graft surgery in Ontario
Name: Elizabeth Hore
Supervisors: Dr. Joel Parlow, MD, FRCPC; Dr. Ana Johnson, PhD
Collaborators: Dr. John Muscedere, MD FRCPC; Dr. Brian Milne, MD; Dr. Paul Peng, PhD

Introduction: Frailty is a state of increased vulnerability to adverse health events and has been associated with poor post-operative outcomes including high healthcare costs. In the coronary artery bypass graft (CABG) surgery setting, many patients are considered frail, and these patients have been shown to incur higher healthcare costs than non-frail patients. Frailty-defining instruments for use in population-level research using administrative data in the CABG surgery setting have not been established.

Objectives: (i) to develop a preoperative frailty index for the CABG surgery setting (pFI-C) in Ontario using administrative data; **(ii)** to assess the suitability of the pFI-C in predicting mortality, resource utilization and costs of cardiac surgery; **(iii)** to compare the predictive capabilities of the pFI-C to other established indices.

Methods: A retrospective cohort study was conducted using linked health administrative data of 50743 OHIP-eligible adults who underwent isolated CABG surgery between 2008 and 2015 in Ontario. Using established methodology, the pFI-C was constructed comprised of 27 frailty-related patient health deficits. Predictive capabilities of the pFI-C were evaluated using concordance-statistics and Akakie Information Criterion (AIC) values and were compared with the Charlson and Elixhauser comorbidity indices, and the Johns Hopkins Adjusted Clinical Groups (ACG) system. The outcomes of mortality, hospital length of stay, readmissions within one year and post-operative healthcare costs (in 2021 CAD) were assessed. Multivariable regression models were used to model primary outcomes with patient index scores and baseline characteristics.

Results: Using the pFI-C, 22% of the cohort were considered frail. Mean annual post-operative healthcare cost was $18764.77. During initial hospitalization, 2% of the cohort died and 4% died within one year of surgery. When the pFI-C was incorporated in a regression model, all outcome predictions were significantly improved compared to baseline models. The predictive performances of all indices were similar, with the Charlson index marginally outperforming others in modelling healthcare expenditures and readmissions.

Conclusions: The pFI-C, adapted for the cardiac surgery setting, is useful for predicting CABG patient mortality, resource utilization and costs within one year of surgery date. This index could aid in identifying those individuals who could benefit from targeted pre- and post-operative healthcare interventions which may pre-emptively offset subsequent (and avoidable) healthcare utilization and costs.

Surgical Sensation During Caesarean Section: A Qualitative Study

Lead author: Dr. Amy Jiang; Project Supervisor: Dr. Lindsey Patterson
Other Contributors: Taylor Mouliakis, Kailey Walker, and Dr. Annette Burfoot

Introduction

Caesarean section (CS) is a major abdominal surgery performed on typically young, healthy patients with minimal, if any, sedation. Anesthesiologist routinely warn patients about the risk of intraoperative the risk of intraoperative pain or discomfort[1], however there is little literature on the quality of surgical sensations patients actually perceive during their CS. Patient education is a key component in providing anesthetic care as it plays a role in relieving maternal anxiety, avoiding a general anesthetic[2], reducing distress, and improving patient satisfaction[3]. This study aims to provide a descriptive assessment of subjective surgical experience during CS under neuraxial anesthesia. The information gained in this study will enhance our current understanding and allow us to better alleviate patient anxiety through informed counselling**.**

Methods

This was a qualitative descriptive study conducted at Kingston Health Sciences Centre. Twenty patients who underwent CS (elective or non-elective) with neuraxial anesthesia were included; patients who received general anesthesia were excluded. A semi-structured telephone interview was conducted with each participant within one week of CS using a novel interview guide. Demographic and medical information was collected from the patients' electronic medical record. Thematic analysis using NVivo was conducted to identify major themes in the description of surgical sensation and patient education.

Results

Thematic analysis identified the following themes:

What surgical sensation do Caesarean section patients perceive under regional anesthesia?

1. Most patients did not have surgical pain
2. There was variation in the intensity of sensation that patients experienced
3. The greatest number of patients experienced sensation with delivery, the least number of patients experienced sensation after delivery
4. Patients most frequently experienced pressure and internal movement sensations during surgery (including pushing, pulling, tugging, movement in the abdomen)
5. Emotions and environmental factors affected perception of surgical sensation

What education do patients wish to receive perioperatively from their anesthesiologist about surgical sensation?

1. Preoperatively, patients are primarily concerned about surgical sensation and anesthetic failure
2. Patients want to be warned that they will likely feel surgical sensations of pressure and movement, and occasionally discomfort, pain, or nonsurgical sensations including shaking or nausea
3. Patients appreciate ongoing communication, reassurance, and invitation of questions
4. The anesthesiologist is an important physical presence, medical expert, and "translator" for patient

Conclusions & Next Steps

Our study demonstrated some common experiences felt by patients undergoing neuraxial anesthesia for CS. This information in combination with the themes collected on patient education can be used in the development of better patient education practices. Next steps include further review of themes and crosstab analysis with patient demographic and medical information.

References

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Overview of reviews of clinical trials of dexmedetomidine as an adjuvant medication in regional nerve blocks

Resident's Name: **Mack Kosak**
Research Supervisor: **Ian Gilron**
Collaborators: **Matthew Machina**
Suggested funding sources: **No external funding needed; data readily available in accessible research databases in the form of completed systematic reviews**

Research Question: What is the quality of evidence to support the use of dexmedetomidine as an adjuvant medication to increase the efficacy and/or duration of regional nerve blocks?

Related area of Clinical "Need": Postsurgical pain is highly prevalent and is often difficult to manage. The opioid epidemic has directly and indirectly pointed to the need to develop better non-opioid treatments for postsurgical pain, including regionally administered neural blockade. Commonly used regional anesthesia techniques using local anesthetics have limited efficacy and duration of action. Adjuvant medications given together with local anesthetics during regional anesthetic blocks may provide better analgesic efficacy and/or longer duration of action. Several adjuvants to local anesthetics have been widely employed in recent years, such as magnesium, dexamethasone, dexmedetomidine, etc. It is important to appraise the quality of evidence supporting favourable risk-benefit and cost-benefit profiles for these interventions.

Current knowledge gaps in this area: The body of evidence surrounding regional anesthesia adjuvants is recent and emerging, and no consensus has been reached on the quality of evidence supporting the ongoing use of dexmedetomidine as an adjuvant mixed into local anesthetic solution which is injected perineurally to produce a regional anesthetic nerve block.

Hypothesis to be tested: There is a need for more high quality evidence to support the use of dexmedetomidine as a regional anesthetic adjuvant to justify its widespread used in clinical practice.

Proposed study design: An overview of systematic reviews, appraising the methods and results of the available systematic reviews and their included randomized controlled trials. A secondary review would be performed by another researcher (Dr. Machina) who is performing an overview of systematic reviews for a different adjunct. I would in turn perform a secondary review of Dr. Machina's overview.

Possible pitfalls, feasibility and expected project timeline: High feasibility given ethics review not needed and data readily available in research databases. The intention would be to complete study, manuscript, and submission for publication within three years.

Project Proposal Title: Central Line Tutor: Deep Learning as an Aid in Achieving Competency in Central Venous Lines
Presenter: Dawson Lafleur
Supervisor: Dr. Jason Erb
Collaborators: Rebecca Hisey, MSc, PhD Candidate, Dr. Daniel Howes, MD, Dr. Tamas Ungi, MD, PhD and Dr. Gabor Fichtinger, PhD, Dr. Francis Nguyen-Do, MD, and Dr. Daenis Camire, MD

Background: Simulation is being increasingly incorporated into medical training. A significant benefit of simulation-based training is the ability to practice invasive medical procedures without risking patient harm. A drawback is that expert clinicians are required to supervise and teach learners as they practice their skills, and these experts are not always available for simulation experiences. Central venous catheterization (CVC) is an example of a complicated, invasive procedure with serious potential complications.
Study Objective: Our study aims to validate a novel system – the Perk Tutor – to teach CVC without the requirement of an expert observer.
What is the Perk Tutor? An iteration of previously validated electromagnetic tracking technology [1] coupled with an ultrasound machine, a central line mannequin, and a display screen for prompting and real time feedback.
Proposed study design: Participants will be invited from the Queen's School of Medicine undergraduate program. If they consent to participate, they will be randomized to groups with varying numbers of insertion attempts (ie. 5 or 10,) either using the Perk Tutor with active feedback based on a procedural checklist, or ultrasound and paper-based procedural checklist without feedback from the Perk Tutor. All participants will receive an educational video on performing internal jugular venous cannulation and a copy of the procedural checklist prior to performing their assigned number of insertion attempts. They will be assigned a unique identifier number for anonymous data collection and video recording for their trials. After the participants have completed their assigned insertion attempts on the Perk Tutor, they will be required to fill out a survey about their level of education, previous relevant experience, and feedback on the usability of the simulator. Performance of central line insertions will be compared in all the groups to assess the level of competence as determined by expert evaluators using a previously validated scoring system [2].

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TITLE: Dexamethasone as an adjunct in regional anesthesia techniques: an overview of systematic reviews

Resident researcher: Dr. Matthew Machina
Supervisor: Dr. Ian Gilron
Collaborators: Dr. Mackenzie Kosak

Introduction

Dexamethasone has been widely used and studied as an adjunct medication in peripheral nerve blocks (PNB) to improve the duration and/or efficacy of the local anesthetic. Numerous RCTs, and many systematic reviews and meta-analyses (1-3), have examined the effects of dexamethasone on various aspects of pain management, including duration of sensory block, motor block, and time to first analgesia rescue administered (4). Additional systematic reviews have attempted to determine the optimal dose of dexamethasone required in peripheral nerve blocks to increase the duration of effect of local anesthetics (5).

Concerns about the quality and validity of medical literature have existed for some time (6), including with systematic reviews and meta-analyses (7,8). This concern extends to the duplication or redundancy of systematic reviews examining the same topic (8), with a relevant example being several recent systematic reviews examining the use of perineural vs intravenous dexamethasone for duration of PNB (1-3).

Thus, with many systematic reviews examining dexamethasone in PNBs, we propose to conduct a thorough, rigorous overview of these systematic reviews and meta-analyses examining the use of dexamethasone in PNBs to evaluate these reviews for quality and adherence to PRISMA reporting standards (9,10) , similar to other overview of systematic reviews (11).

Proposed Methodology

An extensive search will be conducted of in PubMed, EMBASE, DARE, and the Cochrane Controlled Register of Trials (CENTRAL) for systematic reviews and meta-analyses examining the use of dexamethasone in PNBs. Two reviewers will screen titles and abstracts for inclusion, and perform data extraction, and where necessary, a 3rd reviewer will settle any discrepancies. Included studies will be evaluated for adherence to PRISMA standards, and for the confidence in the quality of evidence and conclusions they provide.

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Title: Examining the Effects of Patient Expectations on Treatment Response to Lidocaine Infusion in an Interdisciplinary Chronic Pain Clinic

Presenting author: Landon Montag

Supervisors: Dr. Tim Salomons & Dr. Etienne Bisson

Collaborators: Dr. Scott Duggan, Dr. Christopher Haley, Dr. Rosemary Wilson, Dr. Ian Gilron, Dr. Thomas Gregory

Introduction/Aim:
Patients' beliefs in their clinical team and expectations of pain relief may interact with drug effects to significantly impact chronic pain treatment outcomes. This study uses a lidocaine infusion model to better understand how psychological factors can enhance and extend the treatment response. This study had 2 objectives: 1) Investigate whether patients' trust in their clinical team (also known as their therapeutic alliance) and expectations of treatment efficacy were associated with better treatment response; 2) Determine whether central sensitization partially mediates the association between treatment expectations and treatment response.

Methods:
Patients scheduled for a lidocaine procedure at the Kingston Health Sciences Centre, Chronic Pain Clinic or Kingston Orthopedic Pain Institute were recruited. Health- and pain-related measures, as well as scales examining therapeutic alliance (Trust in Physician Scale and Working Alliance Inventory), expectations of treatment efficacy (EXPECT scale), and self-reported measures of central sensitization (Central Sensitization Inventory and Pain Sensitivity Questionnaire) were collected pre-treatment and 8 weeks post-treatment. Patients also reported their pain intensity daily for 8 weeks post-treatment to measure treatment response. Average pain relief was computed by subtracting patients' pre-treatment pain rating by their average pain intensity over 8 weeks post-treatment. Comparative analyses and Pearson correlations were performed.

Results:
25 patients who completed baseline measures and 8 weeks of the pain diary were included in this preliminary analysis. Average pain intensity over the 8 weeks post-treatment (M=4.39, SD=1.89) was significantly lower compared to average pre-treatment pain intensity (M=6.22, SD=1.91), $t(24)=3.61$, $p<0.001$. Patients' expectations were significant and positively correlated with their average pain relief over 8 weeks (r=0.44, p=0.02, N=25). However, neither measure of therapeutic alliance was significantly correlated with their average pain relief (Trust in Physician: r=0.29, $p>0.05$, N=25; Working Alliance Inventory: r=0.04, $p>0.05$, N=24). In addition, patients' Pain Sensitivity Questionnaire scores were significant and positively correlated with their average pain relief over 8 weeks (r=0.47, p=0.02, N=23), but was not significantly correlated with their Central Sensitization Inventory scores (r=0.21, $p>0.05$, N=24).

Conclusions:
This preliminary analysis found that patients with high expectations of treatment efficacy and greater pain sensitivity show greater pain relief over 8 weeks following a lidocaine infusion. Ultimately, this study may elucidate the role of expectation effects in enhancing lidocaine infusion treatment response and may allow for the optimization of clinical protocols to maximize these benefits.

Intersectionality and the Training Experiences of Canadian Anesthesiology Residents

Jessica Nguyen, Sean Leung, Kai Chen, Tarit Saha* (Supervisor)

Introduction

Intersectionality represents the overlapping disadvantage applied to an individual as their social categorizations, such as gender, race, ethnicity, and sexual orientation, interact. A lack of diversity negatively impacts patient care, wellness, workplace atmosphere, and physician burnout, and it has been suggested that the best way to develop true social and cultural competency in the healthcare sector is to increase the diversity of the physician workforce itself.[1,2] Across Canada, anesthesiology residency programs vary in their resident selection process, curriculum, faculty, and learners. As of 2019, less than one-third of 3393 practicing anesthesiologists in Canada were female.[3] There is limited data about the ethnic and racial diversity of Canadian anesthesiologists and anesthesiology residency programs. There is also limited research surrounding the implication of diversity on resident training experiences, however, existing studies have found that gender, racial, and ethnic biases can have negative implications for resident experiences during surgical training.[4] Furthermore, residency is a demanding and stressful time for learners. The learning environment, support systems, and accommodations that residency programs offer are integral to resident wellness.

Objectives

On this background, our project aims to determine how intersectionality impacts the training experiences of residents in Canadian anesthesiology programs. Our secondary objective is to understand how residents believe their programs can become more equitable, diverse, and inclusive.

Methods

From March 2022 to April 2022, a survey was open to all learners enrolled in Canadian anesthesiology residency programs. Survey questions encompassed seven themes: 1) demographic data, 2) importance and presence of diversity in anesthesia training, 3) importance and availability of mentorship, 4) equity in training opportunities, 5) personal experiences of discrimination during training, 6) resident wellness, and 7) suggestions on how training programs can improve diversity, equity, and resident mental well-being. Basic demographic data collected included clinical year, medical graduate status, age, sex, gender, sexual orientation, ethnic origin, visible minority status, immigrant status, and first spoken language. Short answer responses data undergo a thematic analysis.

Impact

By studying the role that intersectionality plays in anesthesia residency training, we hope to elucidate areas for improvement in Canadian anesthesiology residency programs to ensure that future generations of anesthesiologists accurately represent the population they will serve.

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Title: Chronic opioid use after joint replacement surgery in seniors is associated with increased healthcare utilization and costs: a retrospective cohort study

Presenter: Matthew Pasquali

Supervisor Name: Dr. Joel Parlow

Project collaborators/authors: Ana Johnson PhD, Brian Milne MD, Narges Jamali, Matthew Pasquali, Ian Gilron MD, Steve Mann MD, Kieran Moore MD, Erin Graves MSc, Joel Parlow MD (corresponding author)

Abstract

Purpose: Postoperative opioid use may be associated with increased healthcare utilization and costs. This study examined the relationship between duration of postoperative opioid prescriptions and healthcare costs and resource utilization in senior patients following hip and knee replacement.

Methods: This was a retrospective, observational cohort study evaluating postoperative opioid use and healthcare costs in patients over the age of 65 undergoing primary total hip or knee arthroplasty over a ten-year period, beginning April 1, 2006, with follow up to March 31, 2017. Preoperative and postoperative opioid prescriptions, patient characteristics, and healthcare costs were identified using de-identified Ontario administrative databases (Institute of Clinical Evaluative Sciences). Duration of postoperative opioid use was divided into 4 categories: short-term (1-90 days), prolonged (91-180 days), chronic (181-365 days) and undocumented.

Results: The study included 49,638 hip and 85,558 knee replacement patients. Although the initial hospitalization accounted for the greatest cost in all patients, over the following year patients in the short-term opioid use group incurred the lowest average costs, and those in the chronic group incurred the highest (hip: $17,528 vs. $26,736; knee: $16,043 vs. $23,007), driven by increased healthcare resource utilization.

Conclusion: Chronic opioid use after arthroplasty is associated with higher resource utilization and healthcare costs during the year following surgery. The results of this study can be used to help develop predictors of increased duration of opioid use and costs. Further research is planned to determine whether recently implemented opioid reduction strategies can also lead to decreased healthcare resource utilization.

Title: Post-discharge opioid use following lumbar spine surgery in older adults in Ontario: a population-based cohort study

Presenter Name: Sarah Rabi
Supervisor's Names: Dr. Joel Parlow, MD, FRCPC; Dr. Ana Johnson, PhD
Names of all other project collaborators: Francis Nguyen, MPH; Melissa Richardson, BSc; Steve Mann MD, MMEd, FRCSC; Ian Gilron MD, FRCPC; Jeff Yach MD, FRCSC; Brian Milne MD FRCPC; Gerald Evans MD, FRCPC

Purpose: Prescription opioid use has been identified as contributing to the ongoing opioid crisis in North America which continues to place a significant economic burden on the national healthcare system. This is a particularly significant contributor to opioid misuse in older patients experiencing age-linked physiologic changes and those undergoing orthopedic procedures. Therefore, this study was designed to explore the following: 1) the predictors of long-term postoperative opioid use in older patients following lumbar spinal surgery, and 2) the relationship between the duration of postoperative opioid use and healthcare resource utilization and cost in a publicly funded healthcare system.

Methods: A retrospective population-based cohort study was conducted using Ontario administrative data on older adults aged 65 years and older who underwent anterior or posterior lumbar decompression surgery with or without fusion between April 1, 2006, and March 31, 2017. Data were analyzed from 90 days before surgery to 1 year following hospital discharge, using multivariate ordinal logistic regression to identify predictors of long-term opioid use, and generalized linear models to interpret resource utilization and healthcare costs. The study was conducted from a healthcare system perspective, with costs presented in 2021 Canadian dollars.

Results: A total of 15,109 patients were included, of which 6,165 (40.8%) had received opioid prescriptions in the 90-day lookback period. Of patients with preoperative opioid prescriptions, 48.3% (n=2,976) had documented postoperative opioid use more than 9 months after hospital discharge, relative to 12.7% (n=1,135) of opioid naïve patients. Preoperative opioid use was the most significant predictor of long-term postoperative use [Odds Ratio (OR)= 4.47, 95% Confidence Interval (CI)= 4.16 to 4.79]. Additionally, relative to the comparator group (patients who used opioids for 1-90 days postoperatively), those who used opioids for 270-365 days following hospital discharge incurred significantly greater costs (CR=1.49, 95% CI = 1.44 to 1.54).

Conclusion: In patients undergoing spinal procedures, preoperative opioid use was identified as a strong predictor of long-term opioid use postoperatively. Short-term use of opioids postoperatively (less than 90 days) was associated with fewer healthcare costs and resource utilization, compared to long-term use. These results will assist in building modules to educate physicians about the dangers of unneeded prescriptions, reduce opioid prescriptions through substitutions, and provide harm-reduction plans for those unable to stop consuming opioids. This study will also serve as a reference for prescription policy makers who wish to create opioid stewardship programs that resemble those used for antibiotic resistance.

Development and validation of competency-based assessment tools for point-of-care ultrasound (POCUS) in perioperative anesthesia

Presenter: Sergiy Shatenko
Supervisor Name: Dr. Glenio B. Mizubuti

Collaborators: Dr. Ramiro Arellano, Dr. Sarah Maxwell, Rachel Phelan, Dr. Faizal Haji, Dr. Adam Szulewski, Dr. Hailey Hobbs, Dr. Rene Allard, Dr. Robert Tanzola, Dr. Anthony Ho, Dr. Klodiana Kolomitro, Dr. Nancy Dalgarno, Dr. Heather Braund

Point-of-care ultrasound (POCUS) is a tool that allows for rapid bedside clinical assessment, diagnosis and guidance of resuscitation across a variety of clinical presentations. As POCUS becomes ubiquitous, the importance of appropriate training has recently gained significant interest among medical authorities. As a result, POCUS training is being increasingly integrated as a mandatory field into the core curriculum of several Royal College-recognized specialties such as anesthesiology.[1] Unfortunately, however, there is no consensus on how to best teach POCUS and evaluate POCUS competencies in anesthesiology training. The lack of validated tool(s) to evaluate POCUS competencies, especially in the context of the current competence by design curriculum constitutes a barrier to effective POCUS training in anesthesiology in Canada and prevents adequate training standardization. This study therefore aims to establish and validate POCUS competencies and will be divided into 2 phases: (i) the creation of competencies through a Delphi process involving POCUS experts from all Anesthesiology programs across the country which will serve as the foundation for the development of standardized POCUS assessment tool(s); and subsequently (ii) validation of this assessment tool through high-fidelity simulation as well as real-life patient settings. This project has been funded by the 2020 SEAMO Endowed Education Grant and approved by the Queen's University Health Sciences & Affiliated Teaching Hospitals Research Ethics Board. Presently, experts from each Anesthesiology training programs in Canada have been contacted and accepted to collaborate in this effort, and the POCUS training statements (developed by our local research group comprised of POCUS experts in anesthesiology, emergency medicine, and intensive care medicine, as well as members with strong background (i.e., PhD degrees) in medical education and previous experience with Delphi studies) have been uploaded onto the online platform (Qualtrics) that will be used to carry out the Delphi process. This research day presentation will outline in detail the progress of this project so far and discuss future directions.

[1]Royal College of Physicians and Surgeons 2020 National Curriculum for Canadian Anesthesiology Residency. Available at URL: https://www.royalcollege.ca/rcsite/documents/ibd/anesthesiology-national-curriculum-e.pdf. Chapter 25: Point-of- care Ultrasound (POCUS), pages 145-148.

Can a quick reference learning tool improve regional anesthesia block efficiency and documentation?

By Dr. Devin Stirling Supervised by Dr. Gregory Klar Collaborators: Dr. Glenio Mizubuti

Inadequate documentation practices have been linked to medicolegal risks in many areas of medicine including with regional anesthesia (1). Recently a group including experts in the field from Europe, North America, Australia, and Asia collaborated to define international standards for documentation of regional anesthesia (2). The international standards included documentation of specific risks of regional anesthesia that were discussed with the patient whenever a regional anesthetic procedure is done. Zarnegar et al. also highlight the importance of documenting specific risks as patients do not have good recall of regional anesthetic risks. In their study they found that while 95% of patients recalled a risk discussion for a shoulder surgery only 68% recalled the risk discussion for the corresponding regional anesthetic. Similarly, 52% of patients could recall at least 2 risks of the surgery while only 20% could recall at least 2 risks of the regional technique (3).

A preliminary chart review was conducted of 21 charts that showed only 64% of charts listed specific risks when a regional block was preformed, showing there was room for improvement in our department. On further follow-up of 13 more patients which had their charts associated with a pre-intervention QI survey only 54% of charts listed specific risks.

Lorenzetti et al. analyzed many methods to improve medical documentation finding that, among others, using reminders seemed to be an effective way to achieve this goal (4). We therefore decided to use a learning tool for regional anesthesia that would incorporate documentation reminders within it in our first PDSA cycle for a QI project aimed at improving this aspect of documentation. Our secondary goal was to improve the efficiency of reviewing blocks before conducting them as this is something that is often done by residents and staff at teaching centres such as ours. While this review time is important to ensure safety and effectiveness of blocks, it can also cause delays if it is not done efficiently. By having an easily available and locally based summary of multiple nerve blocks in quick-view formats with these built-in reminders we also aimed to reduce the time it takes for our anesthesia providers to review blocks before conducting them.

This project is currently ongoing and in it's first PDSA cycle. We hope to see some improvements in review time and documentation with our initial intervention, and further refine both moving forward in future PDSA cycles.

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Title: Improving Rib Fracture Analgesia: Implementation of a QI Standardized Protocol
Name: Theunis van Zyl
Supervisors: Drs. Chris Haley, Greg Klar
Other Collaborators: Dr. Wiley Chung, Sue Vasily, Ashley Furevik

Rib fractures are a common injury with significant morbidity and an all-cause mortality of 6% for single fractures to more than 33% for multiple fractures in the elderly.[1] Epidurals and peripheral nerve blocks in rib fractures improve pain control compared to IV opioids.[2-4] The APMS at KGH is often involved with post-rib fracture pain, but analgesic management of rib fracture pain varies. In addition, APMS involvement is at the discretion of the admitting service, and APMS is not always involved in care of rib fracture patients.

Given the risk of complications and the benefits of epidurals and regional anesthesia, a QI project was undertaken to implement a standardized protocol for identification of high risk patients and for analgesia in rib fractures. The goals are to increase identification of high risk rib fracture patients, increase APMS involvement, and ensure multimodal and regional anesthesia uptake. Patients were identified with the validated STUMBL score to determine those at high risk of mortality and complications after rib fracture.[5,6] Baseline chart review of rib fracture patients at KGH revealed that of medium-high risk patients with ≥30% risk of complications, only 43% were seen by APMS, 38% had epidural or regional blocks, and 71% had full multimodal analgesia.

A standardized rib fracture analgesia protocol was developed for nursing, Thoracic Surgery, and APMS. The protocol includes a rib fracture admission order set with multimodal analgesia and STUMBL risk stratification, and guidelines for epidural vs. peripheral nerve block utilization for the APMS team. Nurse educators were involved for bedside nursing education on identifying patients failing conservative management who may benefit from APMS involvement. After implementing nursing education, standardized order sets and APMS protocols, a repeat chart review will be carried out to reassess APMS involvement, multimodal analgesia and regional uptake. Further PDSA cycles will then be planned based on data, with ultimate goal to extend the project to ER and ICU patients.

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