RD 2025 APRIL 8

SCHEDULE & ABSTRACTS

2025 ANESTHESIA RESEARCH DAY

A PARTNERSHIP WITH DALHOUSIE PAIN NETWORK

Innovation | Collaboration | Scientific Discovery

FEATURING PRESENTATIONS BY
Department of Anesthesia, Pain Management & Perioperative Medicine trainees and Dalhousie trainees conducting pain-related research

KEYNOTES

- **Dr. Muhammad Mamdani:** Applied Artificial Intelligence in Healthcare
- **Dr. Karim Ladha:** Opioids, Cannabis and Psychedelics: Important Therapeutics or Just Getting High?

DR. MUHAMMAD MAMDANI
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Halifax Convention Centre
1650 Argyle Street, Halifax

Department of Anesthesia, Pain Management & Perioperative Medicine – **2025 RD**

SCHEDULE OF EVENTS

Time	Event	Details
08:30 - 08:45	**REGISTRATION & COFFEE**	[Convention Hall Pre-Function] [Room C4]
08:45 - 09:00	**OPENING REMARKS**	[Room C4]

	Dr. Hilary MacCormick	Event Facilitation
	Dr. Janice Chisholm	Department Opening Remarks
	Dr. Christian Lehmann	Welcome Address
	Dr. Andre Bernard	Land Acknowledgement
	Dr. Javeria Hashmi	Keynote Introduction

Time	Event	Details
09:00 - 10:00	**ANESTHESIA KEYNOTE ADDRESS** **Dr. Karim Ladha**	**Opioids, Cannabis and Psychedelics: Important Therapeutics or Just Getting High?** [Room C4] – 15 minutes Q&A
10:00 - 10:20	**MORNING BREAK**	[Room C4]
10:20 - 10:45	**PRESENTATIONS (2):**	**START WITH THE FOUNDATION!** [6min presentation + 4 min Q&A, Room C4]

	Grad - PhD	**1. Bashir Bietar**	CB2R agonism is Neuroprotective and Protects Against Immune Dysregulation Post-Stroke
	Undergrad - BSc	**2. Pouria Abdolmohammadi**	Exploring Propofol's Role in Modulating Microglial Immune Response

Time	Event	Details
10:45 - 11:45	**PRESENTATIONS (5):**	**THE FUN IS IN THE LEARNING!** [6min presentation + 4 min Q&A, Room C4]

	Resident	**3. Jinessa Lane**	Viability of an Anesthesiologist and Anesthesia Assistant Peripherally Inserted Central Catheter (PICC) Program
	Resident	**4. Clémence Côté**	Expanding and Organizing the VAST Scenario Bank to Enhance Global Anesthesia Education
	Undergrad - BSc	**5. Zoe Takacs**	A Pragmatic Observational Study of Anesthetic Gas Flows and Waste Generation: A Comparison of the Memsorb™ Reusable CO_2 Filter with Standard Disposable CO_2 Absorbers
	Fellow	**6. Loran Morrison**	Knowledge and Attitudes of Anesthesiologists Surrounding Perioperative Care for Lactating Patients: A Survey
	Undergrad - BSc	**7. Tom Lorenz**	Measurement of Extubation Forces Generated by Inflated Versus Deflated Tracheal Tube Cuffs in a Porcine Model

11:45 - 12:45	**LUNCH BREAK**		[Room C5]
12:00 - 12:45	**TRAINEE SESSION WITH KEYNOTES** **Dalhousie Pain Network's Trainee Eat, Greet & Speak**		[Pick-up Lunch in Room C5; Meeting Room 106]
			Please join keynote speakers for a networking session. Space is limited RSVP required.
12:45 - 13:30	**COLLABORATIVE KEYNOTE ADDRESS** **Dr. Muhammad Mamdani**		**Applied artificial intelligence in healthcare** [15 minutes Q&A, Room C1-C2]
13:30- 14:00	**3-D PRESENTATIONS**		**A spotlight on Interdisciplinary Research in the Departments of Anesthesia, Ophthalmology and Surgery** [7min presentation + 3min Q&A, Room C1-2]
	Surgery	**Vibha Gaonkar**	Predicting programming thresholds in subthalamic nucleus deep brain simulation using intraoperative motor evoke potentials: General vs local anesthesia
	Anesthesia	**Parnian Hosseini**	Implementation of Enhanced Recovery After Cardiac Surgery at the QEII - Initial Phase and Baseline Data
	Ophthalmology	**Ellen Zhou**	Proteomic analyses for different stages of primary open angle glaucoma – A pilot study of 8000 markers with stringent criteria
14:00 - 14:15	**Buffer for Room Change**		
14:15 - 15:15	**PRESENTATIONS (5):**		**LET'S TAKE A LOOK BACK!** [6min presentation + 4 min Q&A, Room C4]
	Resident	**8. Kevin Choi**	A Three-year Retrospective Review of Intrathecal Chloroprocaine Use After Its Re-introduction To A Tertiary Referral Center in Canada
	Resident	**9. Stella Kang**	Pneumothorax Rates Following Cardiac Surgery with and Without Serratus Anterior Plane Blocks: A Retrospective Cohort Study
	Resident	**10. Tommy Zhang**	Assessment of the Effectiveness of An Anesthesia Clinic Care Directive for NT-proBNP Testing Before Elective Non-cardiac Surgery
	Undergrad - MD	**11. Kennedy Brittain**	Mode of Anesthesia and Post-partum Discharge: A Secondary Analysis of a Historical Population-based Cohort
	Resident	**12. Michelle Trenholm**	Impact Of Desflurane Removal from Anesthetic Workstations On Volatile Purchasing Trends at A Single Center
15:15 - 15:30	**AFTERNOON BREAK**		[Room C4]
15:30 - 16:40	**PRESENTATIONS (7):**		**WHAT ABOUT PAIN?** [6min presentation + 4 min Q&A, Room C4]
	Resident	**13. Jensen Doucet**	A Review of Botulinum Toxin-A Prescribing Practices for the Management of Chronic Migraine in the QEII Pain Management Unit
	Grad - PhD	**14. Jennika Veinot**	PTSD Impairs Working Memory Systems and Disrupts Pain Regulation Pathways in Chronic Pain

	Grad - MSc	**15. Alireza Aleali**	High Chronic Pain Severity Is Linked with Abnormalities In Expectation-driven Pain Modulation and In Periaqueductal Gray Connectivity
	Undergrad - BSc	**16. Rafiah Mir**	Sex & Gender Differences in Chronic Pain Experiences: Moving Beyond Binary Sex Classifications
	Grad - MSc	**17. Cameron Calder**	Large-scale Brain Networks Increase in Integration with High Prediction Error During Pain Processing
	Undergrad - BSc	**18. Isabelle LeBlanc**	Does Hypervigilance and Associated Neural Circuitry Alter the Effects of Expectations On Pain?
	Undergrad - BSc	**19. Abbygael Columbus**	New ICD11 category of nociplastic chronic pain is related to PTSD symptoms
16:40 - 16:45	**EVALUATION SURVEYS**		https://nsanesthesia.ca/s/research-day-evaluation
16:40 - 17:00	**WINE & CHEESE SOCIAL**		[Room C5]
17:00 - 17:30	**AWARD PRESENTATIONS & CLOSING REMARKS**		[Room C5]

ABSTRACTS

Presentation: 1

Title: CB2R agonism is Neuroprotective and Protects Against Immune Dysregulation Post-Stroke

Presenting Author: Bashir, Bietar

Presenter's Affiliation: Dalhousie University, Anesthesia, Pharmacology

Other Authors and Affiliations: Christian Lehmann, Department of Anesthesia, Pain Management & Perioperative Medicine, NSH

Abstract

Background:

CNS injury-induced immunodepression syndrome (CIDS) is a major complication following ischemic stroke, contributing to increased susceptibility to infections such as stroke-associated pneumonia (SAP). The interplay between neuroinflammation and immune suppression remains poorly understood, necessitating targeted therapeutic strategies to modulate post-stroke immune dysregulation.

Methods:

A photothrombotic stroke (PTS) model was employed to induce ischemic injury. CB2R activation was achieved using HU-308. Infarct size was assessed using TTC staining, while microglial polarization was evaluated through flow cytometry and ELISA. Leukocyte adhesion and rolling were quantified via intravital microscopy, with LPS challenge used to probe immune competence.

Results:

PTS+LPS animals exhibited a ~60% reduction in leukocyte adhesion compared to SHAM+LPS, reinforcing the role of stroke in immunosuppression. CB2R activation significantly reduced infarct volume, promoted an anti-inflammatory microglial phenotype, and improved leukocyte rolling and adhesion post-stroke.

Conclusion:

CB2R activation offers a promising therapeutic avenue for mitigating CIDS by reducing infarct size and modulating post-stroke immune responses. These findings underscore the potential of cannabinoid-based interventions in improving stroke recovery and preventing secondary complications.

ABSTRACTS

Presentation: 2

Title: Exploring Propofol's Role in Modulating Microglial Immune Response

Presenting Author: Pouria Abdolmohammadi

Presenter's Affiliation: Department of Microbiology and Immunology, Dalhousie University

Other Authors and Affiliations: Bietar, B. [1,2] ; Zhou, J. [1]; Lehmann, C. [1,2].

[1] **Department of Anesthesia, Pain Management & Perioperative Medicine, Dalhousie University.** [2] **Department of Pharmacology, Dalhousie University**

Abstract

Background:

Propofol is well-known for its inhibitory effects in the central nervous system as an intravenous anesthetic. Less is known about propofol's impact on microglial activity. Studies have suggested a link to the endocannabinoid system (ECS): propofol causes activation of cannabinoid type 1 (CB1) and type 2 (CB2) receptors, both expressed on microglia, by inhibition of endogenous cannabinoid degradation. In particular, CB2 activation is involved in the immune response as an anti-inflammatory pathway. The goal of this study was to evaluate potential anti-inflammatory effects of propofol on microglia and to determine whether any observed effects are associated with the ECS.

Methods:

To validate this hypothesis, we treated LPS-stimulated SIMA9 microglial cells with propofol, both in the presence and absence of antagonists for CB2R and CB1R, and assessed the resulting changes in cell viability and the production of the cytokines TNF and IL-6.

Results:

The results demonstrated that cell viability was most stable at lower propofol concentrations of 20, 40, and 80 µM. TNF and IL-6 ELISA results indicated the downregulation of TNF and IL-6 upon propofol treatment. This effect was still present following administration CB1 and/or CB2 antagonists.

Conclusion:

In conclusion, the results demonstrated that propofol exhibits anti-inflammatory effects, which do not appear to be mediated through CB1 and CB2 receptors. This highlights the potential involvement of alternative mechanisms or signaling pathways, warranting further investigation to fully elucidate the processes underlying its anti-inflammatory properties.

Presentation: 3

Title: Viability of an Anesthesiologist and Anesthesia Assistant Peripherally Inserted Central Catheter (PICC) Program

Presenting Author: Jinessa Lane

Presenter's Affiliation: Department of Anesthesia, Dalhousie University

Other Authors and Affiliations: Kiberd, Mathew [1,2] , Dumbarton, Tristan [1,2]

[1] **Department of Anesthesia, Dalhousie University;** [2] **IWK Health Centre, Halifax, Nova Scotia, Canada**

Abstract

Background:

Peripherally inserted central venous catheters (PICCs) are commonly inserted in hospitalized infants and children to administer intravenous fluids and medications and to provide access for blood draws without the need for repeated needle sticks. Anesthesia providers are skilled in obtaining vascular access and providing sedation and are therefore well suited to lead PICC teams. This approach may reduce attempts while maintaining safety and complication rates comparable to non-anesthesia providers. We aim to share our experience with this model to improve outcomes and streamline pediatric care.

Methods:

This study includes pediatric patients that had a PICC line of any size and brand placed at our centre from 2017-2023. Our study utilized data extracted from a pre-existing database.   Data included provider type (anesthesia vs non-anesthesia provider), patient demographics, number of attempts, and complications.   The difference in complication rates and number of attempts for success were analyzed using Wilcoxon signed-rank test, Pearson Chi Square, and independent sample t-test. IBM SPSS Statistics 28 was used for all analyses and statistical significance will be set to $p < 0.05$.

Results:

1579 PICC insertions were included in data. 86% were inserted by nurse practitioners and 14% were inserted by anesthesia providers. There were no statistically significant differences in overall complication rates between groups. Nurse practitioners were 1.6 times more likely to require additional insertion attempts than anesthesia providers.

Conclusion:

PICC insertions by anesthesia providers subject pediatric patients to fewer needle sticks while maintaining safety and complication rates comparable to nurse practitioners. This demonstrates that a PICC team led by anesthesia providers is feasible.

Presentation: 4

Title: Expanding and Organizing the VAST Scenario Bank to Enhance Global Anesthesia Education

Presenting Author: Clémence Côté

Presenter's Affiliation: Department of Anesthesia, Pain Management & Perioperative Medicine, Dalhousie University

Other Authors and Affiliations: Mossenson, A. [1,2,3] Livingston, P. [1]

[1] **Department of Anesthesia, Pain Management & Perioperative Medicine, Dalhousie University;** [2] **St John of God Midland Public and Private Hospitals, Perth, Western Australia,** [3] **Curtin Medical School, Curtin University, Perth, Australia**

Abstract

Background:

Simulation is essential in anesthesia education, allowing learners to manage uncommon clinical scenarios, refine technical and non-technical skills, and receive structured feedback. The Vital Anesthesia Simulation Training (VAST) program offers portable and adaptable simulation training, focusing on diverse low-resource settings. The VAST community would benefit from access to a bank of contextually-appropriate scenarios. This project aimed to begin the process of building a VAST Scenario Bank.

Methods:

A needs assessment was conducted to identify high-priority topics for scenario development and target learning objectives. Existing scenarios were reviewed and revised using the VAST scenario template, and new scenarios were developed. A detailed indexing system was created to improve scenario organization and searchability. One newly developed scenario was piloted during an international meeting in Kenya, SIMposium, where facilitators and participants provided structured feedback. Throughout the process, reflexive notes were maintained to document key learning moments.

Results:

1. A coding scheme was developed to enhance usability and long-term sustainability of the scenario bank. 2. New scenarios were created, and existing scenarios were revised to align with the updated framework. 3. Feedback from SIMposium in Kenya highlighted scenario strengths and provided recommendations for improvement.

Conclusion:

This project expands the VAST scenario bank and enhances its accessibility. Key insights include the importance of realism, clear objectives, structured debriefing, and stakeholder-driven feedback in simulation development. Next steps include writing additional scenarios, exploring user-friendly hosting options on the VAST website, and establishing a process for ongoing user feedback and scenario refinement.

Presentation: 5

Title: A Pragmatic Observational Study of Anesthetic Gas Flows and Waste Generation: A Comparison of the Memsorb™ Reusable CO2 Filter with Standard Disposable CO2 Absorbers

Presenting Author: Zoe, Takacs

Presenter's Affiliation: School of Biomedical Engineering, Dalhousie University, Halifax, Nova Scotia

Other Authors and Affiliations: Milne, Andrew D. [1,2] , Berry, Melissa A. [1] , Maksym, Geoff [2] , Panek, Izabela [1] , Arsenault, Megan [1] & Uppal, Vishal [1]

[1] **Department of Anesthesia, Pain Management & Perioperative Medicine, Dalhousie University, Halifax, NS** [2] **School of Biomedical Engineering, Dalhousie University, Halifax, NS**

Abstract

Background:

Volatile inhalational anesthetic agents are known contributors to green house gases and global warming. The Memsorb™ reusable membrane-based CO_2 filter has the environmental advantages of eliminating the risk of toxic compound A byproduct formation at low fresh gas flow settings (FGF) and reduces disposable waste volume.

Methods:

The REB granted a waiver for this quality improvement study. This prospective observational study compared disposable CO_2 absorbers to the reusable Memsorb™ device. The 12 week-long study was conducted in two neurosurgery suites, with a CO_2 device cross over between operating rooms after six weeks. Staff were given an orientation to the Memsorb™ device prior to initiating the study. The FGF rates, $FiCO_2$, and $ETCO_2$ were collected from our electronic anesthetic records. Custom software differentiated the steady-state maintenance phase from induction and emergence periods for each case. The number of disposable circuits, water traps, filters and CO_2 absorbers used were also recorded.

Results:

A total of 63 Memsorb™ and 82 disposable CO_2 absorber cases were analysed. There were no significant differences in the FGF between devices (Memsorb™ - median 1.3 l/min [IQR 1.1 to 1.5], Disposable - 1.2 l/min [IQR 1.0 to 1.5], Kruskal-Wallis ANOVA $p=0.11$). A total of 21 disposable CO_2 absorbers were consumed in the control rooms over the 12 weeks.

Conclusion:

Although we did not find a difference in FGF rates between devices, the disposable CO_2 absorbers resulted in 42 L of medical waste over a 12-week period. The initial costs of the Memsorb™ system must be considered along with its environmental advantages.

Presentation: 6

Title: Knowledge and Attitudes of Anesthesiologists surrounding Perioperative Care for Lactating Patients: A Survey

Presenting Author: Loran Morrison

Presenter's Affiliation: Department of Women's & Obstetric Anesthesia

Other Authors and Affiliations: MacCormick, H. [1,2,3] & Graham, M. E. [3,4]

[1] Department of Anesthesia, Pain Management & Perioperative Medicine, Nova Scotia Health, Halifax; [2] Department of Women's & Obstetric Anesthesia, IWK Health, Halifax; [3] Dalhousie University, Halifax; [4] Otolaryngology, Department of Surgery, Dalhousie University, Halifax.

Abstract

Background:

Health benefits of breastfeeding are well established. Emerging perioperative guidelines emphasize strategies to prevent maternal discomfort, engorgement, mastitis, reduced milk supply, or unintentional weaning. As national and global recommendations advocate breastfeeding up to two years and beyond, anesthesiologists will increasingly encounter lactating patients. This survey study aims to map the current attitudes, knowledge, and clinical practice of anesthesiologists around lactating patients to potentially inform the development and implementation of future educational initiatives and best-practice guidelines.

Methods:

The survey will be structured into 4 sections: personal breastfeeding experience; educational and clinical experience; attitudes and comfort; knowledge and expertise. Following REB approval, a 3-phase modified Delphi method will guide survey development. Fifteen content experts will be asked for feedback in two iterative rounds. Survey targets are a 50 question maximum and 10-15 minute survey completion time. The finalized survey will be uploaded to REDCap and piloted by 4 individuals. The survey will be distributed electronically by the Canadian Anesthesiologists' Society to its membership of approximately 1350 Anesthesiologists, with a 30% response rate goal.

Results:

Analysis will consist of descriptive statistics. Means and standard deviations will be reported.

Conclusion:

We hypothesize anesthesiologists will have supportive and positive attitudes toward breastfeeding. However, we expect this will not be fully reflected in their knowledge or clinical practice, which may fall short of current guidelines. We anticipate personal experience with breastfeeding may influence both attitudes and knowledge. Through describing the knowledge and practices of anesthesiologists in Canada, we can identify areas for improvement to better support lactating patients.

Presentation: 7

Title: Measurement of Extubation Forces Generated by Inflated Versus Deflated Tracheal Tube Cuffs in a Porcine Model

Presenting Author: Tom, Lorenz

Presenter's Affiliation: Department of Anesthesia, Dalhousie University

Other Authors and Affiliations: Haslam, Scott [1], Law, J Adam [1], Milne, Andrew D [1,2]

[1] Department of Anesthesia, Pain Management & Perioperative Medicine, Dalhousie University, Halifax, NS;   [2] School Biomedical Engineering, Dalhousie University, Halifax, NS

Abstract

Background:

Extubation with the tracheal tube cuff partially or fully inflated has been proposed to help carry secretions away from the glottis and reduces aspiration risk in dog studies. However, excessive forces from inflated cuffs may pose the risk of laryngeal trauma. The purpose of this study was to quantify the extubation forces generated by differing cuff deflation techniques in an animal model.

Methods:

This in-vitro animal study was approved by the animal REB. Two larynges from food grade pigs weighing 60-68 kg, were obtained from a local abattoir. Each larynx was sutured to a custom-built test fixture with an inline load cell. The peak forces generated by 7.0 mm tracheal tubes during extubation were measured for three different cuff conditions: fully deflated, fully inflated (30 cmH2O), and with the pilot tubing broken just before extubation.

Results:

A total of 36 tracheal extubation tests were performed. The peak extubation force (mean +/- SD) generated with the cuff fully inflated (4.8 +/- 0.7 N) was significantly higher than the cuff partially deflated (3.3 +/- 0.5 N, Holm-Sidak ANOVA p<0.001) and fully deflated condition (3.4 +/- 0.6 N, p<0.001). We were unable to detect a difference in peak extubation forces between partial and fully deflated cuffs (p=0.915).

Conclusion:

Laryngeal forces generated by full and partial cuff deflation during extubation were equivalent and significantly lower than extubation with fully inflated cuffs. Our animal model study provides further evidence towards the safety of partial cuff deflation during extubation, allowing for potential future in-vivo clinical trials of this technique.

Presentation: INTERDISCIPLINARY SESSION

Title: Implementation of Enhanced Recovery After Cardiac Surgery at the QEII - Initial Phase and Baseline Data

Presenting Author: Parnian Hosseini

Presenter's Affiliation: Department of Anesthesia, Dalhousie University

Other Authors and Affiliations: Rosa, A. [1], Barry, M [2], de Jager, P. [2]

[1] **Perioperative Services Network, Nova Scotia Health, Halifax;**   [2] **Department of Anesthesia, Dalhousie University, Halifax**

Abstract

Background:

ERAS protocols optimize perioperative care, improving patient outcomes and resource utilization. In cardiac surgery, ERAS guidelines have demonstrated reductions in hospital/ICU length of stay, mechanical ventilation duration, and postoperative opioid use. However, implementation remains inconsistent. This study represents the initial phase of a multidisciplinary quality improvement study to implement ERAS for cardiac surgery at the QEII Health Sciences Centre.

Methods:

Following the Plan-Do-Study-Act cycle methodology, a multidisciplinary team identified three key priorities: (1) surgical site infection reduction, (2) perioperative red blood cell management, and (3) early extubation and mobilization. Baseline morbidity outcomes and intervention feasibility were assessed through prospective data collection and chart review. A qualitative survey evaluated frontline staff perspectives and implementation barriers.

Results:

Between August 1st and November 19th, 2024, 129 patients were included, with partial data available for all patients. Surgical site infections occurred in 13%, and postoperative pulmonary complications in 17.4%. ICU stays >48 hours and hospital stays >5 days were observed in 23.6% and 74.3%, respectively. Only 50% of eligible patients were referred to preoperative blood management, and no patients received smoking cessation interventions. Early extubation in the operating room was achieved in 7.5%, with an additional 9% extubated within three hours postoperatively. Mobilization within three hours of extubation occurred in 29.5%, but no patients ambulated within six hours. Staff surveys highlighted need for improved education, standardized protocols, and interdisciplinary communication.

Conclusion:

Findings support the need for structured ERAS implementation, including standardized protocols, enhanced perioperative education, and improved data collection methods. Future PDSA cycles will refine interventions and optimize adherence.

Presentation: 8

Title: A Three-year Retrospective Review of Intrathecal Chloroprocaine Use After Its Re-introduction To A Tertiary Referral Center In Canada

Presenting Author: Kevin, Choi

Presenter's Affiliation: Department of Anesthesia, Dalhousie University

Other Authors and Affiliations: Uppal, V. , Department of Anesthesia, Dalhousie University

Abstract

Background:

Intrathecal chloroprocaine has a short duration of action, making it a suitable agent for ambulatory spinal anesthesia for short surgeries. Its availability in Canada ceased in 2012 due to the shortage of raw materials, but Health Canada approved its importation in 2021. This study examined spinal chloroprocaine use since its re-introduction.

Methods:

We included all adult patients who received chloroprocaine spinal anesthesia between November 2021 and January 2024. There were no exclusion criteria. We reviewed the anesthetic record and Post-Anesthesia Care Unit (PACU) nursing assessments to record patient medical history and chloroprocaine characteristics.

Results:

We identified 112 patients who received spinal chloroprocaine during the study period. The mean (SD) patient age was 70 (13). The mean (SD) chloroprocaine dose used was 49 (10) mg. The mean (SD) time to Bromage score of one (free movement of legs) was 114 (39) minutes. The mean (SD) duration of patient time in PACU was 144 (72) minutes. Ephedrine or phenylephrine was used in 23/112 (21%) cases. Two patients needed general anesthesia due to inadequate neuraxial block. There were six unplanned hospital admissions, with four for surgical complications and one for rapid atrial fibrillation. One patient was admitted because of social factors.

Conclusion:

Spinal chloroprocaine was primarily used for older patients undergoing short surgical procedures. No major complications such as neurological deficits were observed or self-reported. We did not specifically screen for transient neurologic symptoms (TNS). Larger studies are needed to confirm chloroprocaine's safety and compare its performance to other spinal anesthetics on outcomes such as TNS.

Presentation: 9

Title: Pneumothorax Rates Following Cardiac Surgery With and Without Serratus Anterior Plane Blocks: A Retrospective Cohort Study

Presenting Author: Stella, Kang

Presenter's Affiliation: Department of Anesthesia, Dalhousie University

Other Authors and Affiliations: Saeed, H. [3], Uppal, V. [1,2], Ho, L. [1,2] & Bailey, J. [1,2]

[1] Department of Anesthesia, Nova Scotia Health, Halifax; [2] Dalhousie University, Halifax; [3] College of Medicine, University of Saskatchewan

Abstract

Background:

Moderate to severe pain is a common challenge after cardiac surgery, with the worst pain occurring during the first two postoperative days. Pain originates from sternotomy, chest tubes, rib fractures, and vein harvesting. Ineffective pain management prolongs ICU stays, increases healthcare costs, and often leads to chronic pain. Enhanced recovery after surgery (ERAS) protocols prioritize multimodal analgesia and reduced opioid reliance, with regional anesthesia techniques playing a key role. Serratus anterior plane blocks (SAPB) offer effective pain control in thoracic surgery, and were being investigated for effectiveness in sternotomy patients. Patients in a randomized trial had higher than expected rates of pneumothoraxes. However, cardiac surgery patients may have a higher pneumothorax risk due to pleural disruption, barotrauma, and COPD. This study evaluates pneumothorax rates and respiratory complications in cardiac surgery patients receiving SAPB compared to standard analgesia, aiming to assess its safety and feasibility.

Methods:

We conducted a retrospective cohort study comparing patients from the Cardiac-SAP randomized controlled trial (N=50, 2021-2023) with a historical control cohort (N=1498, 2017-2020) at our institution. Both cohorts included adults (>18 years) undergoing valvular replacement/repair and/or coronary artery bypass grafting (CABG) via median sternotomy. Exclusion criteria included emergency surgeries (<2 hours), ejection fraction <30%, ECMO, IABP, preoperative vasopressors or inotropes, severe liver disease, severe kidney disease, or planned circulatory arrest. Pneumothorax was defined as clinically relevant, requiring chest tube insertion. Secondary outcomes including ICU readmissions, ventilation duration, and hospital length of stay. Trial patients were matched to controls using propensity score matching (1:20) to balance variables such as age, sex, smoking status, surgery type, and COPD, with a caliper of 0.2. Univariate analyses used chi-square and Fisher exact tests for dichotomous outcomes. Continuous medians were compared using the percentile bootstrapping method with 2000 repetitions. A prior study reported a 1.5% pneumothorax rate in cardiac surgery patients. With alpha 5% and power 80%, 817 patients were needed to detect a 1% increase.

Results:

The 50 patients in the Cardiac SAP trial were matched to The pneumothorax rate was significantly higher in the SAPB cohort compared to the historical control group (12% vs. 2.5%; OR 5.3, 95% CI 2.1-13.6, p<0.001). ICU readmissions and ventilation

requirements were comparable. Notably, SAPB patients had shorter ventilation durations (18.1 vs. 35.5 hours, p=0.03) and hospital stays (9.4 vs. 9.7 days, p=0.03). There were no significant differences in the overall rate of chest tube placement, CVICU readmissions, or ventilation on readmission. There was also no difference in the length of ventilation, CVICU stay, or hospital stay.

Conclusion:

We found that matched patients receiving SAP catheter in the Cardiac-SAP pilot study had higher rates of pneumothoraxes compared to historic controls. While there are several reasons for pneumothorax following cardiac surgery, this raises safety concerns around SAP catheters. We cannot be sure of the etiology of the pneumothoraxes and there were potential differences in the monitoring inside the trial compared to usual practices. Uncertainty about procedural complication rates is a drawback of double blinded trials. Heightened vigilance and maintaining careful needle visualization during chest wall blocks is recommended.

ABSTRACTS

Presentation: 10

Title: Assessment of the Effectiveness of An Anesthesia Clinic Care Directive for NT-proBNP Testing Before Elective Non-cardiac Surgery

Presenting Author: Tommy, Zhang

Presenter's Affiliation: Department of Anesthesia, Dalhousie University

Other Authors and Affiliations: MacDonald, D. B. [1] & Milne, A. D. [1]

[1] Department of Anesthesia, Dalhousie University

Abstract

Background:

The 2016 Canadian Cardiovascular Society (CCS) guidelines recommend preoperative cardiac biomarker testing, namely NT-proBNP, for patients at higher risk of perioperative cardiac complications during non-cardiac surgery. In January 2022, the QEII Perioperative Anesthesia Clinic implemented a nursing care directive to automate NT-proBNP testing based on CCS criteria, replacing anesthesiologist-initiated testing.

Methods:

We have conducted a retrospective audit comparing pre- and post-implementation data from September 2021 and September 2022, involving 160 patients who are eligible for NT-proBNP testing (80 per period). The primary outcome was the percentage of eligible patients who had preoperative NT-proBNP ordered in each period.

Results:

Results showed a more than six-fold increase in appropriate NT-proBNP testing rates post-implementation, from 13% to 79% ($p<0.001$). Positive NT-proBNP rates remained stable (30% vs. 27%, $p=0.87$). However, documentation of results in anesthesia records remained sporadic (0% to 13%, $p=0.23$). Postoperative cardiovascular monitoring (ECG and troponin testing) and detection of myocardial injury after non-cardiac surgery (MINS) also did not significantly improve, with MINS detected in 6% of patients pre-implementation and 10% post-implementation ($p=0.38$). MINS was more frequently detected in patients with positive NT-proBNP compared to those with negative results (25% vs 5.8%, $p=0.02$).

Conclusion:

The study highlights the success of the nursing directive in increasing NT-proBNP testing, but underscores the need for better documentation and postoperative monitoring to enhance perioperative cardiovascular care. Future steps include improving documentation processes and collaborating with surgical teams to ensure compliance with recommended monitoring protocols.

Presentation: 11

Title: Mode of Anesthesia and Post-partum Discharge: A Secondary Analysis of a Historical Population-based Cohort

Presenting Author: Kennedy, Brittain

Presenter's Affiliation: Dalhousie University, Faculty of Medicine

Other Authors and Affiliations: Munro, A. [1] & Sjaus, A [1]

[1] Department of Women's & Obstetric Anesthesia, IWK Health Centre, Dalhousie University, Halifax, Nova Scotia, Canada

Abstract

Background:

Cesarean delivery (CD) rates in Canada reached 28% in 2016, having surpassed the WHO's recommended 10-15%. CDs are linked to maternal complications and increased healthcare costs. Although neuraxial anesthesia (NA) is the gold standard for CDs due to its safety profile, general anesthesia (GA) is sometimes necessary. Maternal length-of-stay (LOS) and location-of-discharge (LOD) are quality indicators of maternal complications and directly related to cost. This study examines the impact of anesthesia type on LOS and LOD using population-level perinatal data.

Methods:

Using validated database (Atlee) of CDs in Nova Scotia (01/01/2014-01/01/2022) we assessed maternal LOS and LOD (home vs. hospital) as the primary and secondary outcomes. Mode of anesthesia was the main predictor, mutually adjusted for sociodemographic factors, comorbidities, pregnancy complications, and hospital-level variables in robust regression models (LOS) and generalized estimating equations (LOD), with and without hospital clustering (mixed-effects).

Results:

Among 18925 CDs, median LOS was 3.1 days, slightly longer for GA (3.3 vs 3.1 days), though the difference was not clinically or statistically significant. Among predictors of longer LOS were hospital, post-partum hemorrhage, transfusion, emergency CD and prematurity. Hospital discharge was rare (1%), predicted by lower Apgar scores, preterm birth, and maternal heart disease. GA predicted hospital discharge in bivariate analysis, but not after adjustment in multivariable models.

Conclusion:

GA was not independently predictive of LOS or LOD as maternal and neonatal factors were primary drivers of these outcomes. The findings may inform individual and systems-level mode of anesthesia decisions for parturients delivering by CD.

Presentation: 12

Title: Impact Of Desflurane Removal From Anesthetic Workstations On Volatile Purchasing Trends At A Single Center

Presenting Author: Michelle Trenholm

Presenter's Affiliation: Department of Anesthesia, Pain Management & Perioperative Medicine, Dalhousie University, Halifax

Other Authors and Affiliations: Genevieve McKinnon, Department of Anesthesia, Pain Management & Perioperative Medicine, Dalhousie University, Halifax

Abstract

Background:

Volatile anesthetics contribute to the greenhouse gas effect and global warming, with desflurane having the greatest impact. In 2019, the Queen Elizabeth II Health Sciences Centre (QEII) in Halifax, Canada, removed desflurane from anesthetic workstations to mitigate its environmental impact, though it remained available for use.

Methods:

This study evaluates changes in volatile anesthetic usage at QEII following this intervention by analyzing the purchasing data from 2016 to 2023.

Results:

The results showed a significant reduction in desflurane purchasing after 2019, while sevoflurane purchasing remained unchanged.

Conclusion:

These findings suggest that limiting access to an anesthetic that has a negative environmental impact is associated with reduced use. This highlights the potential for targeted interventions to encourage more environmentally sustainable anesthesia practices.

Presentation: 13

Title: A Review of Botulinum Toxin-A Prescribing Practices for the Management of Chronic Migraine in the QEII Pain Management Unit

Presenting Author: Dr. Jensen S Doucet

Presenter's Affiliation: Department of Anesthesia, Pain Management & Perioperative Medicine, Dalhousie University

Other Authors and Affiliations: Dr. Franziska Miller [1], Dr. Melissa O'Brien [2], Lauren Mills [3] and Sharon Amey [2], supervised by Dr. Ian Beauprie [2]

[1] Division of Pain Medicine, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University; [2] Department of Anesthesia, Pain Management & Perioperative Medicine, Dalhousie University; [3] Dalhousie Medical School, Dalhousie University

Abstract

Background:

Migraine is a neurological disorder characterized by severe headaches, often requiring pharmacologic management. While Botulinum Toxin type A (BoNTA) has become a mainstay of prophylactic chronic migraine treatment, the optimal dosing and administration of BoNTA remains unclear. A standardized injection pattern (PREEMPT) was proposed in 2010 outlining 7 injection sites using either 155U or 195 U of BoNTA. A 2020 study revealed that over 75% of surveyed physicians modified the protocol voicing concerns about product waste, cost, and patient satisfaction. Our goal was to assess BoNTA prescribing practices in the QEII Pain Management Unit (PMU).

Methods:

Medical charts of patients with chronic migraine that received their first treatment of BoNTA between November 2011 and March 2023 were reviewed. Data abstracted included age, sex, headache classification, date of first visit, BoNTA dose, injection pattern, headache frequency, severity, medication use, and adverse events. Charts were reviewed for up to 4 visits within the abstraction timeframe.

Results:

160 charts met the inclusion/exclusion criteria. Common headache diagnosis included migraine without aura (53%) and migraine with aura (21%). Most patients received either 100U (35%) or 200U (48%). Patients with both chronic and episodic migraine have received BoNTA treatment. Most injection patterns varied from the standard PREEMPT protocol. Adverse events occurred in approximately 5% of cases. Only 19% of charts listed headache free days.

Conclusion:

In the PMU, most injection patterns and dosing varied from the standardized PREEMPT protocol. The use of standardized reporting tools may help improve tracking of patient outcomes and help guide clinical decision making.

Presentation: 14

Title: PTSD Impairs Working Memory Systems and Disrupts Pain Regulation Pathways in Chronic Pain

Presenting Author: Jennika, Veinot

Presenter's Affiliation: Department of Anesthesia, Dalhousie University

Other Authors and Affiliations: Hashmi, J. A., Department of Anesthesia, Dalhousie University

Abstract

Background:

Post-traumatic stress disorder (PTSD) symptoms are common among people with chronic pain, but its role in pain etiology is unclear. Both involve working memory deficits. Successful working memory depends on dorsolateral prefrontal cortex (dlPFC) function, which provides top-down signals to brainstem regions like the periaqueductal gray (PAG) to regulate pain. We have recently shown that low working memory predicts abnormalities in how these two regions respond during pain modulation and also predicts chronic back pain severity (Veinot et al., 2025, JPAIN). Here we test whether high PTSD symptoms disrupt working memory processes in the dlPFC and dlPFC connectivity with PAG in people with chronic back pain.

Methods:

60 participants with chronic back pain underwent functional MRI while performing a working memory task, and completed questionnaires assessing trauma, PTSD, and chronic pain.

Results:

Higher number of traumatic events endured were associated with a greater experience of affective pain and low working memory performance. High PTSD symptoms resulted in decreased dlPFC activity during demanding events of the working memory tasks and increased dlPFC - PAG functional connectivity. These metrics predicted higher affective load and abnormal pain modulation.

Conclusion:

These findings show that PTSD may deplete neural resources for working memory, impairing the ability to contextualize pain cues. This can weaken top-down inhibition from the dlPFC to the brainstem, altering threat vigilance and pain perception. Taken together with previous findings, high affective load of PTSD alters working memory circuitry, and results in abnormalities in pain regulation and in turn, more resistant forms of chronic pain.

Presentation: 15

Title: High Chronic Pain Severity Is Linked With Abnormalities In Expectation-driven Pain Modulation And In Periaqueductal Gray Connectivity

Presenting Author: Alireza, Aleali

Presenter's Affiliation: Department of Medical Neuroscience, Dalhousie University

Other Authors and Affiliations: Dr. Douglas Cane [1], Dr. Javeria Ali Hashmi [1]

[1] Department of Anesthesia, Pain Management & Perioperative Medicine, Dalhousie University

Abstract

Background:

Chronic pain (CP) is a complex condition with variable severity and impact, and its underlying mechanisms remain poorly understood. Many CP patients experience more severe symptoms and heightened pain aversion, contributing to treatment refractoriness. This phenotype may be linked to impaired pain regulation and disruptions in pain modulation circuitry, such as in the periaqueductal gray (PAG). However, no studies have yet investigated whether abnormalities in pain regulation and modulation circuitry predict severe CP phenotypes. Understanding these mechanisms is crucial for identifying biomarkers and developing targeted therapies for treatment-resistant patients.

Methods:

We examined whether CP patients stratified by severity exhibit variations in treatment refractoriness, pain aversion, pain modulation impairments, and aberrant PAG connectivity. A total of 159 CP patients and 72 healthy controls (HC) participated. Using a schema-based expectancy task, we tested participants' capacity to modulate pain based on prediction errors (PEs). Resting-state functional MRI assessed group differences in connectivity of the dorsolateral/lateral (dl/lPAG) and ventrolateral (vlPAG) PAG columns.

Results:

High-severity CP patients showed significantly greater treatment refractoriness, pain aversion, and impaired pain modulation ($P < 0.05$). Resting-state analyses revealed significant abnormalities in dlPAG connectivity with cognitive appraisal networks. Connectivity differences between dlPAG/vlPAG and sensory/ventral attention networks correlated with poor pain modulation.

Conclusion:

These findings suggest that severe CP constitutes a distinct phenotype characterized by neurobehavioral disruptions, highlighting the need for targeted interventions.

Presentation: 16

Title: Sex & Gender Differences in Chronic Pain Experiences: Moving Beyond Binary Sex Classifications

Presenting Author: Rafiah, Mir

Presenter's Affiliation: Department of Psychology & Neuroscience, Dalhousie University

Other Authors and Affiliations: Hashmi, J. [1,2]

[1] **Department of Anesthesia, Pain Management & Perioperative Medicine, Dalhousie University;** [2] **Nova Scotia Health**

Abstract

Background:

Pain perception has long been shown to differ between biological sexes. However, gender variables, shaped by societal and cultural expectations, has also been shown to contribute to pain experiences. Research examining how gender identity and gender expression influences chronic pain, and its psychological comorbidities remains inadequate.

Methods:

Sex and gender influences on pain were examined across three separate domains: experimentally induced pain behavior, clinical pain behavior, and psychological pain behavior. A total of 228 participants assigned to either the Healthy Control (HC) group (69 Participants, 46 Females) or Chronic Pain (CP) group (159 Participants, 124 Females) completed assessments of clinical pain, pain sensitivity, experimentally induced pain modulation, and gender identity and expression.

Results:

Analyses revealed that in the clinical domain, biological women reported greater widespread pain as compared to men in the CP group. Results from pain behavior revealed that CP men had women showed higher levels of pain sensitivity relative to men. Additionally, CP women reported higher levels of depression than men. In the HC group, men demonstrated higher pain tolerance, but no other significant differences in pain behavior or psychological factors were observed between sexes.

Conclusion:

Currently, we are investigating whether the role of gender identity and expression in pain research can reveal nuanced factors influencing pain experience, rather than the binary classifications of sex. By integrating gender variables, this research contributes to a more comprehensive understanding of biopsychosocial factors in pain and supports the development of personalized pain management strategies for diverse populations.

Presentation: 17

Title: Large-scale Brain Networks Increase In Integration With High Prediction Error During Pain Processing

Presenting Author: Cameron, Calder

Presenter's Affiliation: Department of Medical Neuroscience, Dalhousie University

Other Authors and Affiliations: Hashmi, J. [1,2]

[1] **Department of Medical Neuroscience, Dalhousie University, Halifax, NS, Canada.** [2] **Department of Anesthesia, Pain Management, and Perioperative Medicine, Nova Scotia Health, Halifax, NS, Canada.**

Abstract

Background:

System segregation (SS) refers to the independent functioning of brain modules, with lower SS indicating large-scale networks functioning together. SS enables specialized processing, while integration supports communication between networks, with both adapting to task demands. SS predicts individual differences in cognition and can change flexibly during learning. Recent findings suggest network integration decreases as task learning progresses, potentially minimizing prediction errors. Perceptual learning relies on using prediction errors to reduce discrepancies between expected and actual outcomes. According to the free energy principle, systems minimize error by regulating entropy. Higher prediction errors may increase entropy, leading to greater network integration. Abnormalities in the capacity to regulate prediction errors may underpin neuropsychiatric conditions.

Methods:

During functional MRI neuroimaging, 51 healthy controls performed a schema-based expectancy task. Participants first learned to associate visual cues (0-100% predicted noxious heat intensity) with ensuing heat stimuli (43.8°C-47°C). In experimental trials, cues predicting intensities from 0-100% were sometimes paired with a fixed high-intensity stimulus (47°C, 100%), generating prediction errors of 0 to 3.2°C. SS was calculated from fMRI data and compared across four prediction error levels, matched trials, and control conditions without expectancy cues.

Results:

SS significantly decreased (integration increased) for task blocks with increases in prediction error. These results were replicated when using the Integration Segregation Difference (ISD) index.

Conclusion:

These results show that decreased SS tracks prediction error magnitude, suggesting prediction errors drive the brain toward integration. This integrative shift could promote learning through distributed processing and inter-network communication.

Presentation: 18

Title: Does Hypervigilance And Associated Neural Circuitry Alter The Effects Of Expectations On Pain?

Presenting Author: Isabelle, LeBlanc

Presenter's Affiliation: Department of Medical Neuroscience, Dalhousie University

Other Authors and Affiliations: Aleali, Alireza [1] & Hashmi, J. A. [1,2]

[1]**Department of Medical Neuroscience, Dalhousie University, Halifax.** [2]**Department of Anesthesia, Pain Management & Perioperative Medicine, Nova Scotia Health, Halifax.**

Abstract

Background:

Chronic pain (CP), persisting without observable tissue damage, significantly reduces quality of life. Increased attention to pain (hypervigilance) may amplify pain, by affecting expectations and related neural pathways, but this remains to be investigated. We investigated this by testing Expectation-Induced Pain Modulation (EIPM) using expectation cues signaling matched or mismatched noxious heat intensities and compared responses across hypervigilance levels. Additionally, we assessed how dorsolateral prefrontal cortex (dlPFC) connectivity in baseline resting-state functional MRI (rsfMRI) scans correlates with hypervigilance.

Methods:

Hypervigilance was measured using the Pain Vigilance and Awareness Questionnaire (PVAQ) in 151 CP patients. The EIPM task presented visual cues predicting incoming heat intensity (0-100%) followed by heat stimuli that were either matched or mismatched, with participants providing pain ratings. Baseline rsfMRI analyses evaluated average dlPFC connectivity with five canonical networks: subcortical, sensory, default mode, attention/executive, and language/memory.

Results:

Results showed that higher hypervigilance predicted 1. greater CP intensity, 2. sensitivity to amplified responses to cues predicting increased pain (bottom-up prediction error response) and 3. greater right dlPFC connectivity to the language/memory network.

Conclusion:

These findings suggest that hypervigilance increases the sensitivity to bottom-up prediction errors and is associated with heightened connectivity between attention and semantic memory processes, potentially amplifying pain perception in CP patients.

ABSTRACTS

Presentation: 19

Title: New ICD11 category of nociplastic chronic pain is related to PTSD symptoms

Presenting Author: Abbygael Columbus

Presenter's Affiliation: [1] **Department of Psychology and Neuroscience, Dalhousie University, Halifax.** [2] **Department of Anaesthesia, Pain Management & Perioperative Medicine, Nova Scotia, Halifax.** [3] **Department of Medical Neuroscience, Dalhousie University, Halifax.**

Other Authors and Affiliations: Hashmi, J.A, Department of Medical Neuroscience, Dalhousie University, Halifax.

Abstract

Background:

The recently revised chronic pain classification by International Association on the Study of Pain (IASP) the ICD-11 includes a new branch of chronic pain termed nociplastic pain. This type of chronic pain occurs when the central nervous system alters how it processes pain, even when there is no obvious tissue damage. The symptoms observed in nociplastic pain include multifocal pain that is more widespread or intense, or both, than would be expected given the amount of identifiable tissue or nerve damage, as well as affective symptoms. Symptoms of post-traumatic-stress-disorder (PTSD), may play a major role in the aetiology of nociplastic pain, but needs to be investigated. The objective of this study is to confirm whether nociplastic categorisation via an established grading classification tree (Kosek et al, 2021) can be used effectively to understand mechanisms and to distinguish people with different treatment needs.

Methods:

Based on data availability, we used the presence of widespread pain and the absence of a secondary chronic pain condition for distinguishing nociplastic participants.

Results:

As expected, the nociplastic showed higher chronic pain intensity, affect, depression and pain catastrophisation in the nociplastic group suggesting a distinct phenotype with specific clinical needs. Surprisingly, no differences were observed in pain sensitivity measures. The nociplastic group showed a significantly high rate of PTSD symptoms (PCL-5) thus indicating a distinct aetiology of nociplastic pain.

Conclusion:

Thus, nociplastic pain may be a distinct chronic pain phenotype that as a category may help us understand new mechanisms and may serve as useful phenotype for targeted clinical interventions

2025 RESEARCH DAY: LEARNING OBJECTIVES

1. Participants will review and discuss research in the Department of Anesthesia
2. Participants will identify innovative research approaches for impactful health care (keynote)
3. To develop oral presentation skills needed to effectively present scientific research data.
4. To develop skills related to defending their research results (through Q&A format)

DR. KARIM LADHA, KEYNOTE: LEARNING OBJECTIVES

1. Evaluate the potential role of opioids for treating acute pain.
2. Provide examples of ongoing studies that re-purpose existing drugs for therapeutic purposes.
3. Assess the limitations of current evidence related to emerging therapies for chronic pain.

DR. MUHAMMAD MAMDANI, KEYNOTE: LEARNING OBJECTIVES

1. Review AI and machine learning applications and their relevance to clinical and surgical environments.
2. Describe key opportunities and challenges in the implementation of AI in clinical practice.
3. Critically examine the implications of increasingly available AI solutions for clinicians, researchers, educators and trainees

Educationally approved by Dalhousie University Continuing Professional Development and Medical Education.

This activity is an Accredited Group Learning Activity (Section 1) as defined by the Maintenance of Certification Program of the Royal College of Physicians and Surgeons of Canada and approved by Dalhousie University Continuing Professional Development and Medical Education. You may claim a maximum of **5.75** hours (credits are automatically calculated).

Through an agreement between the Royal College of Physicians and Surgeons of Canada and the American Medical Association, physicians may convert Royal College MOC credits to AMA PRA Category 1 Credits™. Information on the process to convert Royal College MOC credit to AMA credit can be found at: edhub.ama-assn.org/pages/applications.

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