

OFFICE OF RESEARCH

2021 ACCOUNTABILITY REPORT

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Executive Summary

The Department of Anesthesia, Pain Management & Perioperative Medicine **2021 Research Accountability Report** includes research-related achievements with respect to established targets and goals stated in the *Research Accountability Framework*. The information in this report highlights research productivity from January to December 2021 as well as data from previous years for comparative and trending purposes. Targets that were met, partially met, or not met in 2021 are outlined below in summary.

Areas in which the department *met its targets* in 2021:

- The total number of publications reached is 94 in 2021 (Figure 3), whereas 82 publications were published in 2020. All publications were peer reviewed.
- The proportion of collaborative projects and publications remains high at 93%.
- Ninety percent of researchers are members on research related administrative committees with 80%, 50% and 30% serving on local, national, and international committees, respectively.
- Sixty percent of researchers chair research related committees with 35%, 30% and 10% serving on local, national, and international committees, respectively.
- Thirty-five percent of researchers perform editorial activities with 20% and 30% serving on national and international committees, respectively.
- Eighty percent of researchers reviewed papers in 2021.
- Seventy-five percent of abstracts were presented as a podium.
- Sixty percent of researchers supervise learners as the primary supervisor and 15% supervise graduate students.
- Five recognition awards were conferred in 2021.

Area in which the department *did not reach its targets* in 2021:

- The number and value of grants and industry contract funded research are 43 and \$4.9M, respectively (Figure 1 and Table 1), a decrease from \$9.8M in 2020.
 - Fourteen *new* research projects were initiated in 2021.
 - Sixty percent of researchers are at the rank of Associate Professor or higher, whereas *the target is 75% of researchers have academic rank of Associate or higher*.
 - There were 16 abstracts accepted in 2021, whereas 27 abstracts were accepted in 2020.
 - Fifty percent of all researchers presented an abstract in 2021, whereas 65% of researchers presented an abstract in 2020. *The target is 100%*.
 - Thirty percent of researchers reviewed funding applications in 2021, whereas 35% of researchers reviewed funding applications in 2020. *The target is 80%*.
 - Thirty-five percent of researchers were invited to present their work in 2021 as a keynote, plenary and symposium speaker. *The target is 50%*.
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Introduction

The annual **Research Accountability Report** reports on the Department's research activities in relation to predetermined targets outlined in the Anesthesia, Pain Management & Perioperative Medicine Research Accountability Framework. The **Research Accountability Framework** was developed by a working group of departmental researchers and administrative staff. Through it, the Department attempted to structure the ongoing measurement of the value of the full scope of scholarly research activity, from engaging in the process of creativity to implementing research projects, communicating the results, and influencing clinical best practice.

The framework ties resources devoted to research to the outcomes; identifies the most appropriate indicators of research activity and productivity, identifies current targets and how to measure indicators as well as how to report the results. It also outlines an evaluation strategy.

This Research Accountability Report (2021) covers the time period from January to December 2021 for all deliverables with the exception of funding which corresponds to the period of April 1, 2021– March 31, 2022 based on Department of Health and Wellness new documented requirements. It is the product of the Framework's *Measurement and Reporting Plan* in which key indicators and targets were identified in 2010 and revised in 2014 for subsequent measurement and reporting. The results of this report will be used in the implementation of the *Evaluation Strategy*. Consistent with the *Results Chain*, this report reflects the activity of research-oriented clinicians or other professional faculty with protected time (time funded by the department) for research.

The following outlines the 2021 research-related results for each predetermined target. It also provides a comparison to the data from previous years. This is done in graphical and table formats. Lists of protected time for research (FTE), currently held, research grants/contracts and peer-reviewed publications are found in **Appendix A, B and C**, respectively.

Engage in the process of creativity

Indicator:	Number of new proposals that are developed into research endeavours
Target:	New research projects reflects maintenance or increase from previous year (33 new projects in 2020)
Result	Fourteen (14) <i>new</i> research projects are underway (funded and unfunded)

Fourteen new research projects began in 2021: 4 funded and 10 unfunded. In general, these studies examined important questions in health research. (**Appendix B**).

To summarize:

Five clinical studies focus on pain: Three projects are examining novel treatments (cannabis, light therapy) and medical education (contemporary music) for chronic pain. Two projects are investigating the quality and effectiveness of regional anesthesia for acute pain in surgical patients.

One patient-centered project examines surgical patients' experience during the informed consent process for regional anesthesia.

Four studies focus on airway management including impacts of endotracheal tube cuffs during in/extubation, optimized lung mechanic during prone positioning and effective emergency pediatric airway training with the goal for developing clinical best practices for surgical patients.

Three projects contribute to build capacity in resource-limited and remote environments for sustainable delivery of simulation-based medical education and healthcare worker well-being.

Of note, several ongoing research projects focus on:

1. The fundamental study of inflammatory mechanisms of pain-related diseases and other projects examining novel clinical interventions and treatments for optimal pain management.
2. Novel neuroimaging approaches with the departmental CRC Tier II in pain as the Principal Investigator or a co-Principal Investigator.
3. Perioperative surgical outcomes in a variety of marginalized populations including 2SLGBTQIA+ and those with mental illness. Also, two perioperative clinical trials examine the impacts of surgery on recovery pathways, cognitive functioning.

The 2021 Anesthesia Research Day saw 20 research studies presented. These were generated by a variety of trainees, including ten residents/fellows: seven graduate/post doc students and three undergraduate students. The presentation topics were 70% clinical and 30% fundamental research.

Engage in the process of research

- Indicator:** Number & value (\$) of grants & industry contracts received
- Target:** Total funding (\$) reflects maintenance or increase from previous year (44 funded projects totaling \$9.8M in 2020-21)
- Result:** **43 funded projects totaling over \$4.9M**

Please note for reporting purposes the fiscal calendar (April 1, 2021 – March 31, 2022) is used for research funding only based on Department of Health and Wellness requirements.

There are 43 ongoing and new grant/industry funded projects amounting to over \$4.9M (**Figure 1** and **Table 1**). National and international funds make up approximately 51% of this total with 49% of funds from regional, institutional and department organizations. Major contributors to this success are the availability of protected time (**Table 2** and **Appendix A**), national collaborations as well as the support provided by the Office of Research. Grant funded research underway in the Department includes 11 projects funded by the Tri-Council Agencies (CIHR, NSERC, SSERC), accounting for 59% of the total funds. Five Tri-Council funded projects are led by department members totaling over \$2.9M. A list of the grants is found in **Appendix B**.

Peer Reviewed Research Funding

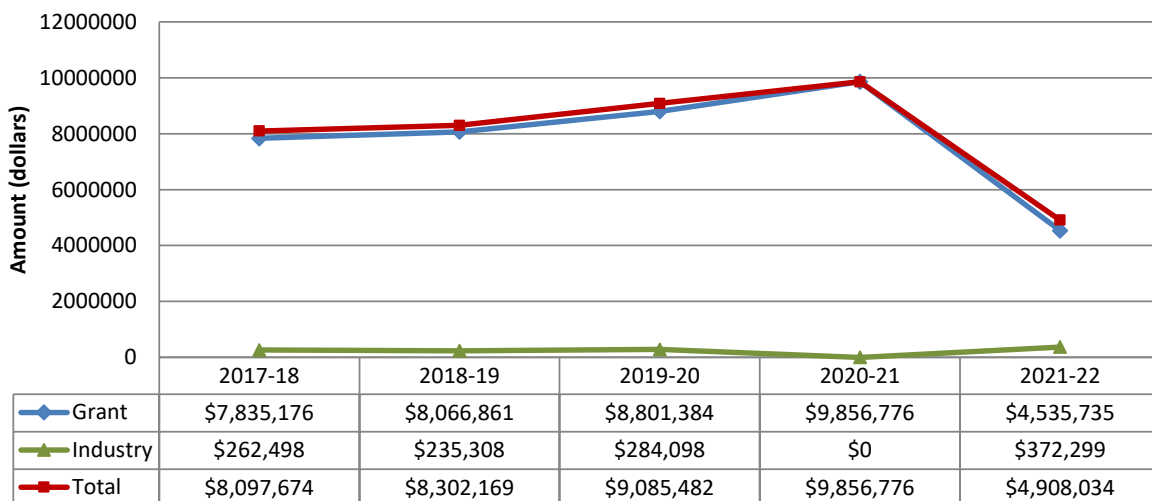


Figure 1: The amount (\$) in external research grant/industry contract funding received (2016-2021). One large scale collaboration grant ended in 2021-22 and accounts for the decrease in funding this year:

*Note: The value of research funding each year includes revenue from all research awards generating funds in that year (for multi-year awards, the revenue is reported in the year it is budgeted). All research projects in which a Department researcher is a team member are included. Also, the number of grants received reflects the number of grants and contracts generating funds that year (which may be continuing from earlier years).

Table 1: Number of grants and industry contracts received (2017-2021)

	2017-18	2018-19	2019-20	2020-21	2021-2022
Grant	57	48	47	44	41
Industry	6	4	3	0	2
Total	63	52	50	44	43

While there is consistent FTE assignment for research for the past two years (**Table 2**), there is a notable increase in funding dollars per FTE for 2021-21 (**Figure 2**). See **Appendix A**.

Table 2: Protected time (FTE) for research activities (2017-2021)

	2017-18	2018-19	2019-20	2020-21	2021-2022
Protected Time	6.9	6.1	5.7	5.9	5.9

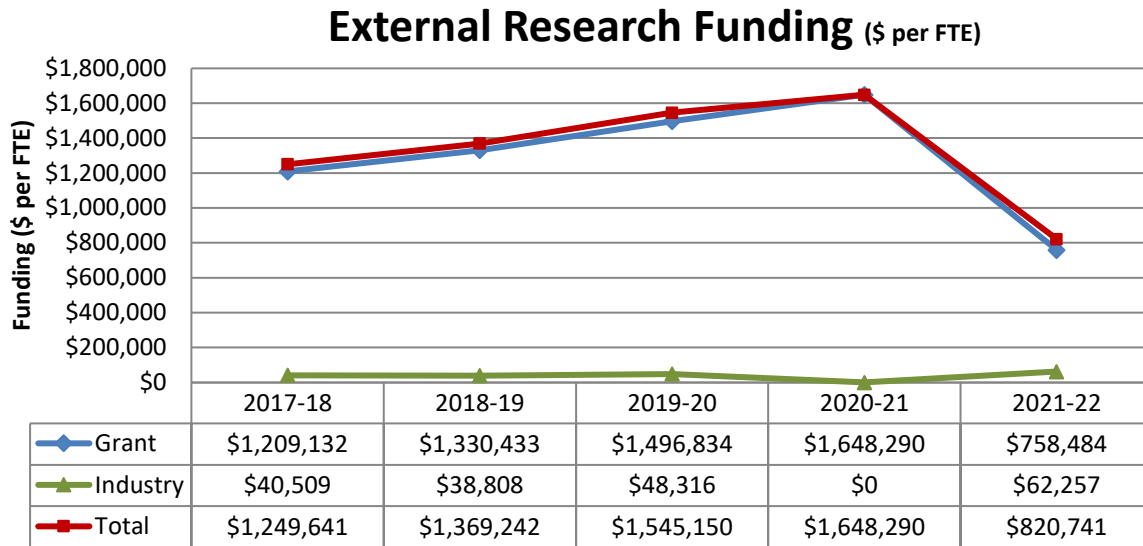


Figure 2: The amount (\$/FTE) in external research grant/industry relative to FTE (**Table 2**) of protected time for research

Indicator: Annual value (\$) of grants and industry contracts received by departmental principal investigators

Target: External funding dollars obtained as a *principal investigator* reflects maintenance or increase from previous year
(\$1.7M from department Principal Investigators in 2020-21)

Result: **\$1.4M was obtained by departmental principal investigators**

Ten of 20 researchers (50%) with protected time were designated as principal investigators for at least one grant or contract totaling almost \$1.4M.

Indicator: Annual value (\$) of grants & industry contracts received by departmental co-investigators

Target: External funding obtained as a *co-investigator* reflects maintenance or increase from previous year
(\$8.1M from co-investigators in 2020-21)

Result: **\$3.5M was achieved by departmental co-investigators**

An additional \$3.5M in external grants and contract funding was achieved by researchers with protected time designated as co-investigators.

SCHOLARLY SYNTHESIS

Actively seek collaborative opportunities with interdisciplinary colleagues

Indicator: Number of collaborative projects and publications

Target: 80% of all projects and publications are collaborative

Result: **93% of all projects and publications are collaborative**

Of 94 publications, 93 have co-authors (99%). Of 43 funded grants and industry contracts, 35 have co-investigators (81%). Therefore, 128 out of 137 projects and publications are collaborative (93%).

Members of scientific and organizing committees

Indicator: Number of researchers who participate in research committee work

Target: 80% of all researchers are members of research related administrative committees: 50% local, 40% national and 10% international

Result: **90% of all researchers are members of research related administrative committees: 80% local, 50% national and 30% international**

Eighteen of 20 researchers are members of research related administrative committees (90%).

Indicator: Number of researchers who chair research related committees

Target: 25% chair research related committees

Result: **60% of researchers chair research related committees**

Twelve of 20 researchers were invited to chair research related committees (60%): 35% local, 30% national and 10% international.

Indicator: Number of researchers who review journal articles

Target: 80% review journal articles

Result: **80% of researchers review journal articles**

Sixteen of 20 researchers were invited to review journal manuscripts (80%).

Indicator: Number of researchers who review funding applications

Target: 80% review funding applications: 50% at the local, 40% at national level and 10% at international level

Result: **30% review funding applications: 10% local, 20% national and 0% international**

Seven of 20 researchers were invited to review funding applications (30%).

Indicator: Number of researchers who perform editorial activities

Target: 25% perform editorial activities

Result: **35% of researchers perform editorial activities: 20% national and 30% international**

Six of 20 researchers perform editorial activities (35%).

Engage in the administrative process

Indicator: Engage in planning activities to advance the research mission of excellence

The department strives for a culture of excellence in our clinical practice and programs, research, and education. In supporting this, the Office of Research (OoR) and its researchers strive for research excellence through working together with patients to find evidence-based solutions leading to the best possible pain management and perioperative care for our families and global communities. For 2021, the research priorities are outlined in Table 7.

Table 7: OoR Strategic priority alignment with relevant institutions’ strategic plans.

2021-22 Strategic Priorities	Dal Med Forward	IWK	NSHA
<ul style="list-style-type: none"> Continue to support ongoing research projects and foster partnerships opportunities for investigators resulting in enhanced clinical research/trial participation 	Aligned	Aligned	Aligned
<ul style="list-style-type: none"> Take advantage of opportunities for building collaborative research teams, both internal and external 	Aligned	Aligned	Aligned
<ul style="list-style-type: none"> Enhance knowledge translation of scientific discovery by department members 	Aligned		
<ul style="list-style-type: none"> Revitalize research events and communications with relevant approaches and hot topics in anesthesia 	Aligned	Aligned	Aligned
<ul style="list-style-type: none"> Establish information management processes for department IM/IT systems 	Aligned	Aligned	Aligned
<ul style="list-style-type: none"> Use the Anesthesia Research Fund to foster feasible, equitable and quality research that impacts patient care 	Aligned	Aligned	Aligned
<ul style="list-style-type: none"> Develop strategies for enhanced patient engagement and apply EDI best practices throughout the research process 	Aligned	Aligned	Aligned

Indicator: Number of associate and full professors

Target: 75% of all researchers are associate professor or higher and 60% of research related promotions are successful

Result: **60% of all researchers are ranked as associate professor or higher**

There are eight full, four associate and eight assistant professors who receive protected time to conduct research in the Department of Anesthesia, Pain Management and Perioperative Medicine.

SCHOLARLY COMMUNICATION

Write and publish

Indicator: Number of accepted and published publications (peer reviewed & non-peer reviewed)

Target: Trending of accepted and published peer and non-peer review papers reflects maintenance or increase from previous year
(82 publications in 2020)

Result: **94 publications have been submitted and accepted**

In 2021, 82 publications have been submitted and accepted (**Figure 3**) with 71 peer-reviewed manuscripts published online (**Appendix C**). **Table 8** shows the relative protected time with respect to number of publications.

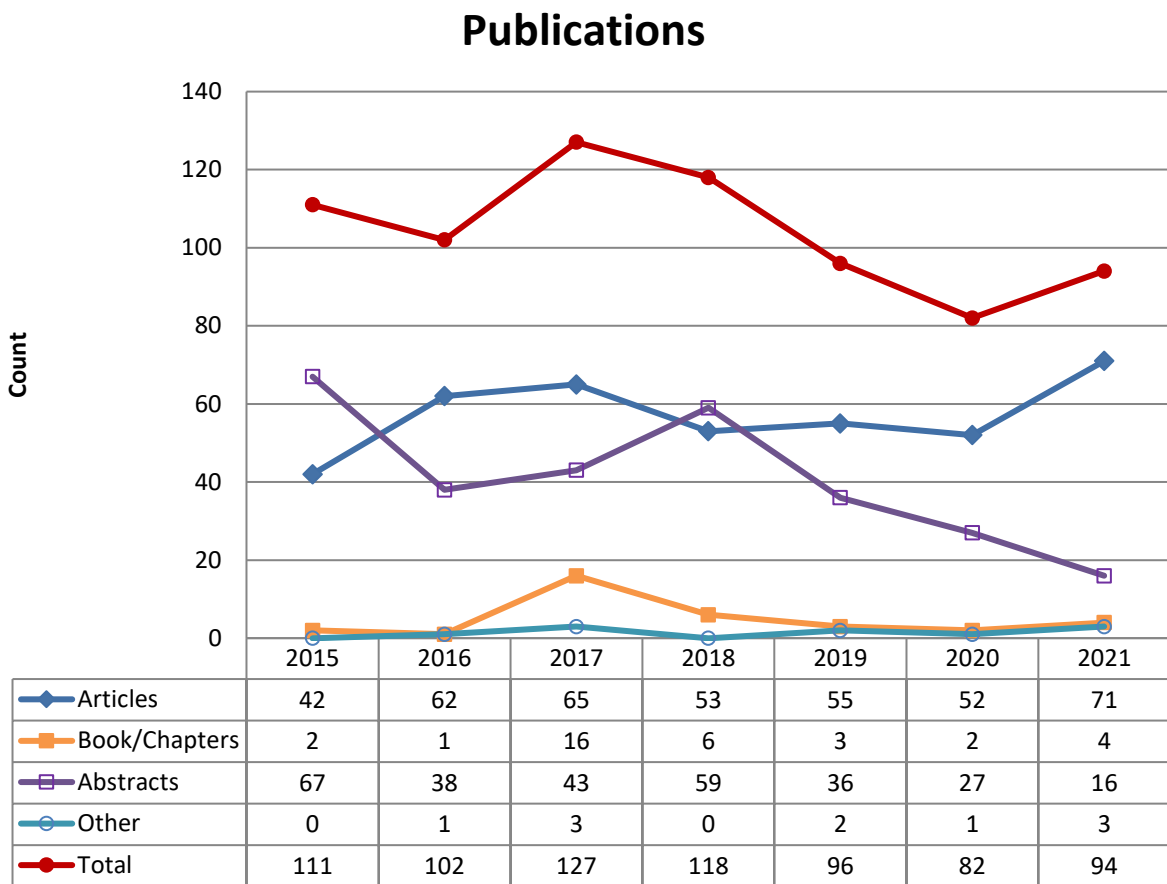


Figure 3: Number of submitted and accepted publications (peer reviewed & non-peer reviewed)

Table 8: Number of submitted and accepted publications (peer reviewed & non-peer reviewed) relative to FTE of protected time (**Table 2**) for research

	2017	2018	2019	2020	2021
Articles	9	9	10	9	12
Books/Chapters	2	1	1	0	1
Abstracts	6	10	6	5	3
Other	0	0	0	0	0
Total	18	19	17	14	15

Indicator: Number of peer-reviewed publications
Target: 90% of publications are peer-reviewed
 (100% publications were peer reviewed in 2020)
Result: **100% of the articles were peer reviewed**

Indicator: Number of accepted abstracts
Target: Trending of accepted abstracts reflects maintenance or increase from previous year
 (27 abstracts accepted in 2020)
Result: **16 abstracts were accepted**

SCHOLARLY COMMUNICATION

Prepare and deliver presentations

Indicator: Number of all presentations (local, national, international)

Target: Trending of presentations reflects maintenance or increase from previous year (21 local, 12 national and 21 international invited presentations in 2020)

Results: **21 local, 9 national and 9 international invited presentations**

The total number of presentations by researchers is found in **Figure 4** with adjustments relative to protected time for research shown in **Table 9**. While the number of local and national presentations slightly decreased, international level presentations have noticeably increased.

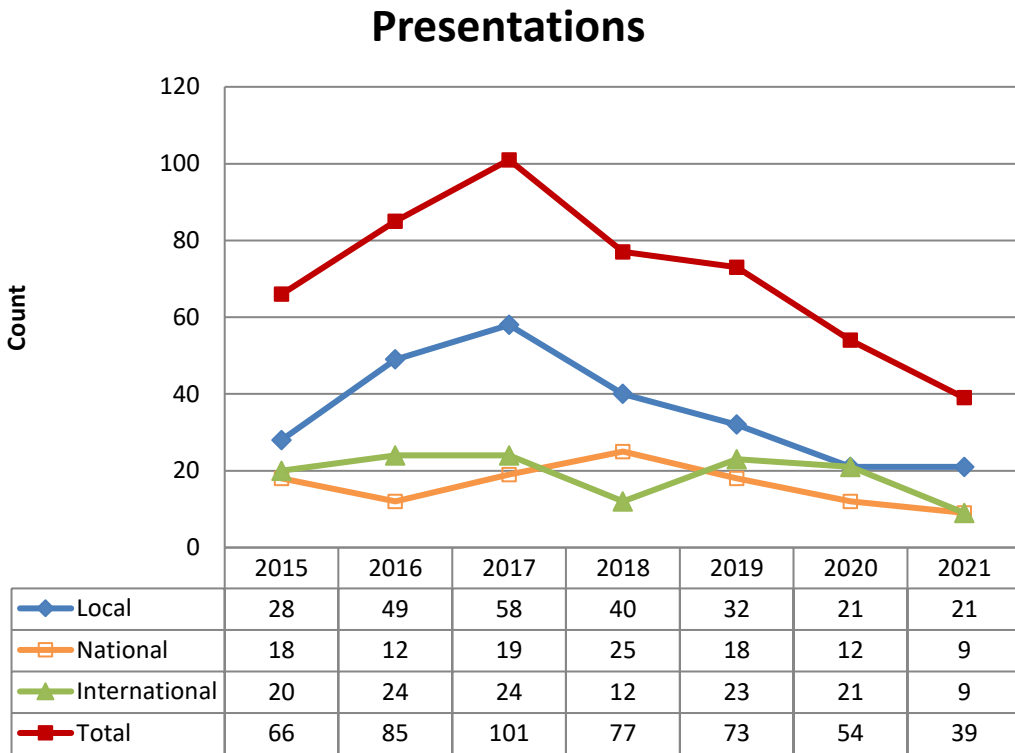


Figure 4: Presentations (count) for local, national and international audiences

Table 9: Number of presentations relative to FTE protected time (**Table 2**) for research

	2017	2018	2019	2020	2021
Local	8	7	6	4	4
National	3	4	3	2	2
International	3	2	4	4	2
Total	15	13	13	10	7

Indicator: Number of **invited presentations**

Target: 50% of all researchers are invited to present (plenary, keynote or symposium)
(30% of researchers were invited to present in 2020)

Result: **35% of all researchers are invited to present (plenary, keynote or symposium)**

Several researchers (35%) were invited to present their work in 2021 as a keynote, plenary or symposium speaker.

Indicator: Number of abstracts presented annually

Target: 100% of all researchers have an abstract presented annually
(65% of all researchers presented an abstract in 2020)

Result: **50% of all researchers presented an abstract in 2021**

Indicator: Number of abstracts presented as a podium presentation

Target: 20% of abstracts are invited to present a podium
(52% of abstracts were podium presentations in 2020)

Result: **75% of abstracts were invited to present a podium presentation**

Thirty percent of all researchers presented a podium abstract presentation in 2021. There were 16 abstracts accepted in 2021 with 75% of abstracts invited to present as a podium presentation.

SCHOLARLY COMMUNICATION

Strategically Engaging with External Stakeholders

Indicator: Number of interviews provided to the media
Target: Number of media interviews reflects maintenance or increase (Two media interviews were provided in 2020)
Result: **Five media interviews were provided by researchers**

Allana Munro:

- Putting an end to the pain: ALUMNAE LAUNCH MARITIMES' FIRST ENDOMETRIOSIS CLINIC 2021-07-01
- 'Phenomenal': Patients welcome Atlantic Canada's first multidisciplinary endometriosis clinic 2021-03-22
- IWK to open first multidisciplinary endometriosis and chronic pelvic pain clinic in the Atlantic Provinces 2021-03-16
- Atlantic Canada's first multidisciplinary endometriosis and chronic pelvic pain clinic coming to IWK 2021-03-16
- IWK to open Atlantic Canada's first endometriosis clinic 2021-03-16

Indicator: Number of recognition awards
Target: FTE reflects maintenance or increase of research *recognition awards* from previous year
Result: **Five research recognition awards were conferred in 2021**

Members	Name	Type	Scope	OrgName
Mukhida K	Resident Mentor / Role Model of the Year	Honorary Award	Department	Department of Anesthesia, Pain Management and Perioperative Medicine
Bailey JG	Clinical Teacher of the Year Award	Honorary Award	Department	Dalhousie Department of Anesthesiology, Pain Management & Perioperative Medicine
Bailey JG	Resident Advocate of the Year Award Nominee	Honorary Award	Department	Dalhousie Department of Anesthesiology, Pain Management & Perioperative Medicine
Uppal V	Nominated-Role Model of the Year	Honorary Award	Department	Department of Anesthesia, Pain Management and Perioperative Medicine
Uppal V	Resident/Fellow research award, 1st prize (supervisor)	Honorary Award	Department	Department of Anesthesia, Pain Management and Perioperative Medicine

Table 10: Number of recognition awards (2017-2021)

2017	2018	2019	2020	2021
1	1	0	5	5

Mentoring, Teaching and Supervision

Indicator: Number of researchers supervising trainees (undergraduate, graduate, postgraduate students and research projects for residents and fellows)

Target: 50% of researchers supervise trainees as the primary supervisor (70% reported in 2020)

Result: **60% of researchers supervise trainees as the primary supervisor**

Indicator: Number of researchers supervising graduate students (MSc and PhD)

Target: Number of graduate students reflects maintenance or increase (15% reported in 2020)

Results: **15% of researchers are supervising graduate students.**

Appendix A – 2021 Protected Time for Research

Central Zone - Adult	FTE	Pediatric	FTE	Women & Obstetrics	FTE
J. Bailey	0.20	T. Dumbarton	0.10	D. McKeen	0.20
A. Finley	0.20	A. Finley	0.20	A. Munro	0.30
J. Hashmi	1.00	A. Vlatten	0.05	A. Sjaus	0.25
O. Hung	0.40	S. Wright	0.10	V. Uppal	0.10
K. Kwofie	0.20				
A. Law	0.40				
C. Lehmann	0.50				
M. Lynch	0.20				
J. McDougall	0.33				
D. McKeen	0.20				
A. Milne	0.20				
K. Mukhida	0.20				
M. Schmidt	0.40				
E. Tan	0.10				
V. Uppal	0.30				
A. Vlatten	0.05				
<i>Total</i>	4.88		0.45		0.85

Please note the research deliverables captured in this report include 20 researchers (5.88FTE) that have protected time to conduct research in the Department of Anesthesia, Pain Management and Perioperative Medicine.

Appendix B – 2021-22 Research Projects

Funded Projects: Note that the bracketed dollar amount is the total value of the award whereby annual amounts are provided in Figure 1.

NEW Funded Projects (4)

1. Haslam S, Law JA, Milne AD (2021 - 2022). Effects of endotracheal cuff volume on larynx extubation forces. An In-vitro study [Grant] - Dalhousie - \$268.
2. McDougall J (2022 - 2024). Management of osteoarthritis pain using green light therapy [Grant] - The Arthritis Society - \$110,000.
3. Sjaus A, Nicolls S (2021). IWK Summer Studentship – Sofia Nicolls – Feasibility Study of Application of Surface Electromyography and Electrodermal Activity for Assessing the Quality and Extent of Neuraxial Blockade [Grant] - IWK - \$5,000.
4. Wright J, Maksym G, Milne AD (2021 - 2022). Using Oscillometry to Quantify the Effects of Prone Positioning on Lung Mechanics [Grant] - Dalhousie - \$528.

NEW Scholarly Projects (unfunded)

1. Bailey J, Mossenson A, Nyirigira G, Whynot S, Livingston P (2021 - 2022). The VAST Wellbeing Course for reducing burnout and improving wellbeing amongst healthcare providers working in resource-limited settings: a mixed methods study [Medical Education or Training]
2. Bonin K, Livingston P (2022). Can compassion reduce burnout for anesthesia providers while also helping patients? [Medical Education or Training]
3. ELIPTO-2 Group (Including Carr A) (2021 - 2022). Intraoperative hemodynamic management and postoperative outcomes in liver transplantation: a multicenter prospective cohort study [Clinical]
4. Fakuade A, Mukhida K (2022 - 2023). The depiction of pain and addiction in contemporary Canadian hip hop and implications for medical education [Medical Education or Training]
5. Hackmann T., Sami Jreige (AA) (2021 - 2022). The use of flow- volume loops to determine endotracheal tube cuff leak [Clinical]
6. Ho L, Uppal V, Bailey J, Gyambib A (2021 - 2022). Patient Perspectives of Informed Consent for Regional Anesthesia for Ambulatory Surgery [Clinical]
7. Smyth M, Mukhida K (2021 - 2022). Evaluating the effect of preoperative cannabis use on pain management following orthopaedic surgery [Clinical]
8. Tuyishime E, Skelton T, Nyirigira G, Irazkoze A, Mossenson A, Livingston P (2021 - 2022). Can the VAST Course enhance resuscitation skills in a resource-limited setting? [Medical Education or Training]
9. Uwinza JB, Nyandwi JD, Nzarora J, Rutayisire L, Mvukiyeha JP, Szerb J (2021). COST-EFFECTIVENESS AND SAFETY OF REGIONAL ANESTHESIA VERSUS GENERAL ANESTHESIA FOR UPPER EXTREMITY SURGERY FOR PATIENTS AT CHUK [Clinical]
10. Vlatten A (2021 - 2024). Comparison of pediatric airway training and available airway equipment in EMS [Clinical]

CONTINUING Ongoing Funded Projects (39)

1. Bailey JG, Uppal V, Dib K (2020 - 2022). Continuous Serratus Anterior Blockade for Sternotomy Analgesia following Cardiac Surgery: A pilot feasibility study [Grant] - NSHARF - \$23,561.
2. Calkin C, Friedman A, Hashmi J (2019 - 2023). Neuroanatomical and neurofunctional assessment in acquired brain injury [Grant] - Global Affairs Canada - \$3,600,000.

3. Chambers, CT & Maynard DJ (co-Directors), & Ali S, Barwick M, Campbell F, Campbell-Yeo M, Carter N, Finley GA, Jordan I, Larocque L, Mogil J, Noel M, Oberlander T, Stevens B, Stinson J, Taddio A (2019 - 2023). Solutions for Kids in Pain (SKIP) [Grant] - Networks of Centres of Excellence: Knowledge Mobilization initiative (NCE-KM) - \$1,600,000.
4. Cheng Zhenyu, Lehmann Christian (2019 - 2023). Pseudomonas aeruginosa protease promotes chronic inflammation and immune evasion [Grant] - CIHR - \$963,900.
5. D'Entremont M, Milne AD (2020 - 2021). COVID Intubation Hood [Grant] - Springboard - \$25,000.
6. Fok P, Dahn T, Campbell S, Kwofie MK, MacDonald K, Avery H, Coles C (2021 - 2023). A quality improvement (QI) initiative to increase the performance of femoral nerve blocks for acute hip fracture patients in the emergency department [Grant] - NSHA - \$3,000.
7. Fox-Robichaud A, Mark Ansermino, Catherine Cook, Kirsten Fiest, Patricia Fontela, Allan Garland, Michelle Kho, Paul Kubes, Manoj Lalu, Francois Lamontagne (Co-Director), Osama Loubani, Claudio Martin, Bradeon McDonald, Lauralyn McIntyre, Melissa Parker, Jeanna Parsons-Leigh, Jeff Perry, Bram Rochweg, Lisa Schwartz, Diana Sherifali, Orla Smith, Elizabeth Wilcox, Bryan Yipp, Lehmann C, Zhou J et al and the Canadian Sepsis Research Network (2020 - 2025). Canadian Sepsis Research Network: Improving care before, during and after sepsis [Grant] - CIHR - \$6,789,630.
8. Hanly JG, Beyea S, Fisk JD, Friedman A, Hashmi JA (2018 - 2021). Characterization of brain dysfunction with multi-modal functional neuroimaging in patients with SLE and cognitive impairment [Grant] - NSHA - \$615,826.
9. Hashmi J, Cane D, Matwin S, Beauprie I, Fisk J, Kelland A, Lynch M, Mukhida K, Beyea S, Bowen C, Matharoo G (2020 - 2023). Strategy for understanding how expectations interfere with chronic pain management: a multi-modal neuroimaging study [Grant] - CIHR - \$466,651.
10. Hashmi JA (2016 - 2021). Canada Research Chair Tier II (Pain) [Grant] - CIHR - \$500,000.
11. Hashmi JA (2017 - 2021). Title [Grant] - CFI - \$364,599.
12. Hashmi JA, Lynch M, Beaupre I, Mukhida K (2017 - 2021). Brain mechanisms of expectation and their role in pain sensitivity and hypervigilance in fibromyalgia [Grant] - CDHA - \$175,000.
13. Juan Zhou, Christian Lehmann, (2019 - 2021). Novel Treatments for bladder inflammation and pain [Grant] - Mitacs - \$186,666.
14. Kelly L, Chambers CT, Finley GA, Lacaze T, Oberlander T, Huntsman R, Alcorn J (2020 - 2023). Cannabis for chronic daily headaches in adolescents [Grant] - SickKids Foundation - \$293,335.
15. Kelly L, tJong, Moore, Hepburn, Alcorn, Finkelstein, Lacaze, Oberlander T, Rassekh, Tsang, Balneaves, Balshaw, Burns, Crooks B, Drogemoller, Dupuis, Dyson, Finley GA, et al (2020 - 2024). Cannabis for symptom management in children with cancer: a demonstration project by the Canadian Childhood Cannabinoid Clinical Trials (C4T) platform [Grant] - CIHR - \$1,499,000.
16. Kwofie MK, Uppal V, Szerb J, Coles C, Colish J (2017 - 2022). A Randomized Controlled Trial of Regional Anesthesia Versus General Anesthesia for Promoting Independence After Hip Fracture (REGAIN Trial) [Grant] - Patient-Centered Outcomes Research Institute (PCORI) - \$56,566.
17. Lalu MM, Fergusson DA, Fiest K, Gill S, Macala K, McDonald B, Fox-Robichaud A, Liaw P, Mendelson A, Lehmann C, Arora J, Bourque S, Cailhier J-F, Cepinskas G, Charbonney E, Ellis C, Kristof A, Kubes P, Marshall J, Mawdsley L, Medeiros S, Sharma N, Sohrabipour S, Stewart D, Tieu A, Vazquez-Grande G, Veldhuizen R, Welsh D, Winston B, Zarychanski R, Zhang H, Griffin G, Hendrick K, Kowalewska P, Sunohara-Neilson J, Zhou J (2020 - 2021). Sex differences in preclinical models of sepsis: a systematic review [Grant] - CIHR - \$112,500.
18. Lehmann C (2019 - 2023). Interstitial Cystitis and IBD research [Grant] - CRA with Tetra Bio-Pharma - \$489,195.
19. Lehmann C (2020 - 2022). Novel treatments for inflammatory bowel disease [Grant] - MITACS - \$100,000.
20. Lehmann C (2020 - 2023). ARDS [Industry Contract] - Dalhousie - \$500,000.
21. Livingston P, Mossenson A, Bailey J (2020 - 2023). VAST faculty development: building capacity for sustainable delivery of simulation-based medical education in low-resource and remote settings [Grant] - Royal College International - \$90,000.

22. MacCormick H, Johnson LT, Cyr JD, George RB, Bould MD, Munro A (2020 - 2021). Lived experiences of transgender and nonbinary persons in the perioperative context: a qualitative study [Grant] - Department of Anesthesia, Pain Management and Perioperative Medicine - \$20,002.
23. McDougall J (2017 - 2022). Contribution of proteases and protease activated receptors to joint neuropathy and arthritis pain [Grant] - CIHR - \$761,175.
24. McDougall J (2019 - 2023). Regulation of microglial pannexin-1 channels in arthritis pain [Grant] - CIHR - \$875,925.
25. McDougall J (2021 - 2022). Control of osteoarthritis pain in rats using green light therapy [Grant] - Department of Anesthesia, Pain Management and Perioperative Medicine - \$2,960.
26. McIsaac DI, Boland LS, Gill M, Hutton BE, Aucoin S, Carli F, et al, and the Umbrella Review Group including McKeen D (2021 - 2022). An umbrella review of prehabilitation interventions in surgery to inform policy and practice [Grant] - CIHR - \$103,275.
27. Milne AD, Uppal V, Gillis A, Brousseau P (2021 - 2022). A comparative cost analysis of Memsorb and Dragorsorb for routine anesthesia use at NSHA: A pragmatic observational study [Grant] - NSHARF - \$25,104.
28. Morgan B, Munro A, George B, Carvalho B (2020 - 2022). A Retrospective Cohort Review Comparing Catheter Failure Rates with Programmed Intermittent Epidural Bolus and Continuous Epidural Infusion [Grant] - Department of Anesthesia, Pain Management and Perioperative Medicine - \$4,840.
29. Munro A (2020 - 2021). MDSAS IWK Health Leadership Grant 2020 [Grant] - IWK - \$3,000.
30. Munro A, George RB, Andreaou P (2019 - 2022). A novel approach to optimize Programmed Intermittent Epidural Bolus (PIEB) for labour analgesia [Grant] - Dalhousie - \$3,044.
31. Munro A, Randle E, Dryden T (2019 - 2021). Interdisciplinary approach to managing Chronic Pelvic Pain [Grant] - TRIC IWK - \$3,000.
32. Ricciotti S, French D, Crocker C, Bailey JG, Simon P, Tibbo P (2021 - 2022). Investigation of outcomes after thoracic surgery for malignancy in patients with severe and persistent mental illness [Grant] - NSHRF - \$6,885.
33. Schmidt M, Dunnington J, Eskes G (2021 - 2023). Computerized Assessment for Post-Operative Cognitive Decline (POCD) in Elderly Populations [Grant] - NSHA - \$59,771.
34. Schmidt M, Roach D (2020 - 2021). Greening anaesthesia: reducing anaesthetic vapour use and release in a perioperative hospital setting through manufacturing scale-up of membrane based CO2 filter, memsorb™ [Grant] - Sustainable Development Technologies Canada (SDTC) - \$598,447.
35. Sjaus A, d'Entremont M, Haelssig J (2020 - 2021). Development of airborne pathogen containment device for airway instrumentation [Grant] - Nova Scotia Health Research Funding Coalition - \$30,000.
36. Sjaus A, Munro A, D'Entremont M, Hung O, McKeen D (2020 - 2022). Preliminary evaluation of a novel COVID-19 containment device design: safety and acceptability during aerosol generating medical procedures [Grant] - Department of Anesthesia, Pain Management and Perioperative Medicine - \$24,961.
37. Sjaus A, Munro A, d'Entremont M, Hung O, McKeen D (2020 - 2022). Preliminary evaluation of a novel COVID-19 containment device design: safety and acceptability during aerosol generating medical procedures [Grant] - IWK - \$20,000.
38. Sjaus A, Munro A, Hung O, d'Entremont M, McKeen D (2020 - 2022). Preliminary evaluation of a novel airborne pathogen containment device; reduction of ambient contamination during aerosol generating medical procedures [Grant] - Canadian Anesthesiologists's Society - \$20,000.
39. Stinson J, Noel M (Co-PI), Birnie K, Chonière M, Poulin P, Lalloo C, Campbell F, Finley A, Lamontagne C, Ali S, Nicholas D, Oberlander T, Dick B, Rasic V, Baerg K, Findlay S, Baerveldt A, Poolacheria R, Doré M, Ingelmo P, Pagé G, Swidrovich J, Montgomery L, Mesaroli G, Killackey T, Kelly L, Smith A, Szatmari P, Battaglia M, Kopala Sibley D, Bélanger R, Victor C, Singh M, Mohabir V, Marianayagam J, Jordan I, Benayon M, Taylor A (2020 - 2021). Stepped care solutions to

reduce the impact of the COVID-19 pandemic on pain, mental health, and substance use in youth living with chronic pain and their families: A pan-Canadian study [Grant] - CIHR - \$200,000.

CONTINUING Scholarly Projects (unfunded)

1. Atkins N, Mukhida K (2020 - 2022). The effect of socioeconomic status and COVID-19 on chronic pain management in Nova Scotia [Clinical]
2. Bailey J, Mossenson A, Nyirigira G, Whynot S, Livingston P (2021 - 2022). The VAST Wellbeing Course for reducing burnout and improving wellbeing amongst healthcare providers working in resource-limited settings: a mixed methods study [Medical Education or Training]
3. Bailey J, Mossenson A, Skelton T, Nyirigira G, Livingston P (2021 - 2022). Competencies of Vital Anesthesia Simulation Training (VAST) facilitators for simulation-based education in resource-limited settings: course participants' perspectives [Medical Education or Training]
4. Bailey JG, Banfield J, Bailey K, Wong M, Barry G, Munro A, Kirkland S, & Lieter M (2020 - 2022). COVID Pandemic short interval National Survey gauging psychological distress among physicians (COPING survey): A longitudinal survey [Clinical]
5. Bonin K, Oprea A, Mukhida K (2020 - 2021). The effects of COVID-19 on chronic pain management for patients with addictions [Clinical]
6. Ellis M, Meisner J, Mukhida K (2019 - 2021). Chronic pain post-craniotomy [Clinical]
7. Fakuade A, Mukhida K (2022 - 2023). The depiction of pain and addiction in contemporary Canadian hip hop and implications for medical education [Medical Education or Training]
8. Fomer D, Rigby M, Wiemer H, Bailey JG, Smyth D (2020 - 2021). Medical versus surgical treatment for peritonsillar abscesses [Clinical]
9. George RB, Munro A, Nash CM, Carvalho B (2018 - 2022). A pragmatic single centre randomized controlled trial of programmed intermittent epidural bolus (PIEB) compared to continuous epidural infusion (CEI) for labour analgesia [Clinical]
10. Ho L, Uppal V, Bailey J, Gyambib A (2021 - 2022). Patient Perspectives of Informed Consent for Regional Anesthesia for Ambulatory Surgery [Clinical]
11. King A, Mukhida K (2021). Patient Perspectives on Contributory Factors to Non-attendance at a Tertiary Academic Chronic Pain Clinic in Halifax, Nova Scotia [Clinical]
12. Kovacs GK, Goldstein J, Campbell S, Baro B, Sowers N, Law JA, Walker M, DeMone C, Hebert S (2021 - 2022). The Use of Tracheal Clicks During Direct Laryngoscopy: A Cadaveric Simulated Study [Clinical]
13. Kwofie MK (2020 - 2022). COVID Airway Provider PPE Use and Outcomes Registry (IntubateCOVID.org) [Database]
14. Law JA (2016 - 2021). Project for the Universal Management of Airways (PUMA) [Clinical]
15. Law JA, Thana A, Milne A (2021 - 2022). Use of awake tracheal intubation in anesthetic practice is [decreasing?]: a database review of years 2011-2020 at a single tertiary-care institution [Database]
16. Lynch M (2020 - 2021). Development of a Transitional Pain Service [Development and Innovation]
17. Lynch M (2020 - 2021). National survey of pain clinic responses during Covid-19 [Clinical]
18. MacDonald S, Mukhida K (2019 - 2021). Pneumorrhachis complicating acute pain management using a thoracic epidural catheter [Clinical]
19. Maclean E, Verge A, Mukhida K (2021). Analysis of closed civil legal cases involving interventional pain management in Canada [Clinical]
20. Mossenson A, Bailey J, Tuyishime E, Livingston P (2020 - 2021). 4. Competency-based performance assessment of simulation facilitation in health professional education: a narrative review [Medical Education or Training]
21. Mukhida K (2014 - 2022). The influence of Wilder Penfield's experiments in Europe on the development of his surgical techniques [Clinical]
22. Mukhida K (2019 - 2022). iCanCope with Pain: an integrated smartphone and web-self-management program for adolescents and young adults with chronic pain [Clinical]

23. Poltarowicz J, Mukhida K (2021). Airway management for patients undergoing surgery for cervical myelopathy [Database]
24. Schmidt M (2019 - 2021). Real-Time Detection and Automated Prediction of Apnea and Hypopnea Events by Measuring Airway Impedance via the Forced Oscillation Technique in an Observational Study [Clinical]
25. Sedighi S, Mukhida K (2020 - 2022). Cinemedication and chronic pain [Medical Education or Training]
26. Sjaus A, Ritchie K (2019 - 2021). Cognitive skills for decision making in anesthesiology: Qualitative analysis of structured oral examinations [Medical Education or Training]
27. Smyth M, Mukhida K (2021 - 2022). Evaluating the effect of preoperative cannabis use on pain management following orthopaedic surgery [Clinical]
28. Stanzel R, Chedrawy E, Sardiwalla Y, Hirsch G, Dulong B, Henderson M, Schmidt M (2017 - 2021). The impact of deviations of mean arterial pressure during surgery on neurological/renal outcomes [Database]
29. Verge A, Kocum L, Mukhida K (2018 - 2022). Barriers to and facilitators of workplace accommodation for patients with complex regional pain syndrome [Clinical]
30. Vlatten A (2021 - 2024). Comparison of pediatric airway training and available airway equipment in EMS [Clinical]
31. Wafa K, Mukhida K (2020 - 2021). Emergency department management of patients with chronic pain [Clinical]
32. Ward C, Munro A, Houser C, Brousseau P (2020 - 2021). A Survey of the Anesthesia Assistant Profession in Canadian Teaching Hospitals: 12 Years Later [Clinical]
33. Wiseman L, Mukhida K (2020 - 2021). The effect of preoperative cannabis use on postoperative visceral pain [Clinical]

Appendix C – 2021 Publications

Note that this list of publications includes *peer-reviewed* articles that are currently *published* and accessible online by ALL members of the department (71).

1. Astapenko D, Ticha A, Hyspler R, Tomasova A, Navratil P, Maly O, Parizkova RC, Dana C, Huey SC, Lehmann C, Malbrain MLNG, Cerny V (2021). A porcine model of endothelial glycocalyx damage by enzymatic digestion: A pilot study. *Clinical hemorheology and microcirculation*. [Published] PubMed ID: 33843666.
2. Baerg K, Tupper S, Chu LM, Dick B, Doré-Bergeron M-J, Findlay S, Ingelmo PM, Lamontagne C, Mesaroli G, Oberlander T, Poolacherla R, Spencer A, Stinson J, Finley GA (2021). Canadian surveillance study of Complex Regional Pain Syndrome in children. *PAIN*. [Published] DOI: 10.1097/j.pain.0000000000002482.
3. Bailey JG, Donald S, Kwofie MK, Sandeski R, Uppal V (2021). Critical Structures in the Needle Path of the Costoclavicular Brachial Plexus Block: A Cadaver Study. *Canadian Journal of Anesthesia*, 68(8), 1156-1164. [Published] PubMed ID: 33880729.
4. Bailey JG, Wong M, Bailey K, Banfield JC, Barry G, Munro A, Kirkland S, Leiter M (2021). Pandemic-related factors predicting physician burnout beyond established organizational factors: cross-sectional results from the COPING survey. *Psychol Health Med*. [Published] PubMed ID: 34649468.
5. Begin G, Al-Tamini K, Hanafi H, Roach D, Schmidt M, El-Sankary K (2021). Respiratory Bidirectional Ultrasonic TOF Flow Sensor Resilience to Ambient Temperature Fluctuations. *IEEE Sensors Journal*. [Published] DOI: 10.1109/JSEN.2021.3088713.
6. Bietar B, Lehmann C, Stadnyk AW (2021). Effects of CNS Injury-Induced Immunosuppression on Pulmonary Immunity. *Life (Basel, Switzerland)*, 11(6). [Published] PubMed ID: 34207063.
7. Bietar B, Zhou J, Lehmann C (2021). Utility of intestinal intravital microscopy for the study of CNS injury-induced immunodepression syndrome (CIDS). *Clinical hemorheology and microcirculation*. [Published] PubMed ID: 34487026.
8. Chuan A, Jeyaratnam B, Iohom G, Shorten G, Lee P, Miglani S, Kwofie MK, Szerb J, Niazi AU, Jin R, Jen T, McCartney CJ, Ramlogan R (2021). Using psychometric ability to improve education in ultrasound-guided regional anaesthesia: a multicentre randomised controlled trial. *Anaesthesia*. [Published] PubMed ID: 33458816..
9. COVIDSurg Collaborative, IWK Health, Munro A, McKeen, Helyer L (2021). Effect of COVID-19 pandemic lockdowns on planned cancer surgery for 15 tumour types in 61 countries: an international, prospective, cohort study. *Lancet Oncology*. [Published] PubMed ID: PMC8492020.
10. Dhanani S, Hornby L, van Beinum A, Scales NB, Hogue M, Baker A, Beed S, Boyd JG, Chandler JA, Chassé M, D'Aragon F, Dezfulian C, Doig CJ, Duska F, Friedrich JO, Gardiner D, Gofton T, Harvey D, Herry C, Isac G, Kramer AH, Kutsogiannis DJ, Maslove DM, Meade M, Mehta S, Munshi L, Norton L, Pagliarello G, Ramsay T, Rusinova K, Scales D, Schmidt M, Seely A, Shahin J, Slessarev M, So D, Talbot H, van Mook WNKA, Waldauf P, Weiss M, Wind JT, Shemie SD (2021). Resumption of Cardiac Activity after Withdrawal of Life-Sustaining Measures. *The New England journal of medicine*, 384(4), 345-352. [Published] PubMed ID: 33503343.
11. Dobson G, Chow L, Filteau L, Hurdle H, McIntyre I, Milne A, Milkovich R et al (2021). Guidelines to the Practice of Anesthesia - Revised Edition 2021. *Canadian Journal of Anesthesia*, 68, 92-129. [Published] DOI: 10.1007/s12630-020-01842-x.
12. Downey AW, Duggan LV, Law JA (2021). A systematic review of meta-analysis of direct laryngoscopy versus videolaryngoscopy. *Canadian Journal of Anesthesia*. [Review - Published] PubMed ID: 33512660.

13. Eissa M, Wafa K, Hung O, Lehmann C (2021). The use of the Fluid IV Alert monitor to decrease the incidence of undetected empty intravenous bags in dimmed operating rooms. *Canadian journal of anaesthesia = Journal canadien d'anesthesie*, 68(8), 1266-1267. [Published] PubMed ID: 33942241.
14. El-Boghdadly K, Wolmarans M, Stengel AD, Albrecht E, Chin KJ, Elsharkawy H, Kopp S, Mariano ER, Xu JL, Adhikary S, Altıparmak B, Barrington MJ, Bloc S, Blanco R, Boretsky K, Børglum J, Breebaart M, Burckett-St Laurent D, Capdevila X, Carvalho B, Chuan A, Coppens S, Costache I, Dam M, Egeler C, Fajardo M, Gadsden J, Gautier PE, Grant SA, Hadzic A, Hebbard P, Hernandez N, Hogg R, Holtz M, Johnson RL, Karmakar MK, Kessler P, Kwofie MK, Lobo C, Ludwin D, MacFarlane A, McDonnell J, McLeod G, Merjavy P, Moran E, O'Donnell BD, Parras T, Pawa A, Perlas A, Rojas Gomez MF, Sala-Blanch X, Saporito A, Sinha SK, Soffin EM, Thottungal A, Tsui BCH, Tulgar S, Turbitt L, Uppal V, van Geffen GJ, Volk T, Elkassabany NM (2021). Standardizing nomenclature in regional anesthesia: an ASRA-ESRA Delphi consensus study of abdominal wall, paraspinal, and chest wall blocks. *Regional anesthesia and pain medicine*, 46(7), 571-580. [Published] PubMed ID: 34145070.
15. Hagn G, Holbein B, Zhou J, Lehmann C (2021). Anti-inflammatory iron chelator, DIBI, reduces leukocyte-endothelial adhesion and clinical symptoms of LPS-induced interstitial cystitis in mice. *Clinical hemorheology and microcirculation*. [Published] PubMed ID: 34250933.
16. Halperin I, Malcolm J, Moore S, Houlden RL, Canadian Standards for Perioperative/Periprocedure Glycemic Management Expert Consensus Panel [Including MacDonald DBS] (2021). Suggested Canadian Standards for Perioperative/Periprocedure Glycemic Management in Patients With Type 1 and Type 2 Diabetes. *Canadian journal of diabetes*. [Published] PubMed ID: 34210609.
17. Hanafi Alamdari H, Hacquebard L, Driscoll S, El-Sankary K, Roach D, Leblanc R, Lowe S, Oore S, Penzel T, Fietze I, Schmidt M, Morrison D (2021). High Frequency-Low Amplitude Oscillometry: Continuous Unobtrusive Monitoring of Respiratory Function on PAP Machines. *EEE Transactions on Biomedical Engineering*. [Published] DOI: 10.1109/TBME.2021.3138965.
18. Harlow M, Kovacs G, Brousseau-P, Law JA (2021). An in-vitro assessment of light intensity provided during direct laryngeal visualization by video laryngoscopes with Macintosh geometry blades. *Canadian Journal of Anesthesia*. [Published] PubMed ID: 34498231.
19. Holbein BE, Ang MTC, Allan DS, Chen W, Lehmann C (2021). Iron-withdrawing anti-infectives for new host-directed therapies based on iron dependence, the Achilles' heel of antibiotic-resistant microbes. *Environmental chemistry letters*, 1-20. [Published] PubMed ID: 33907538.
20. Hung O, McAlpine J, Murphy MF (2021). Averting Catastrophic Outcomes: The fundamentals of impossible airways. *Canadian Journal of Anesthesia*. [Published] DOI: 10.1007/s12630-021-02117-9.
21. Islam S, Akand AR, Nova TT, Lehmann C, Chisti MJ (2021). Sensitivity Patterns of Bacterial Pathogens Isolated from Blood Cultures of Under-Five Children with Pneumonia and Clinical Sepsis. *Life (Basel, Switzerland)*, 11(5). [Published] PubMed ID: 34069789.
22. Islam S, Nasrin N, Tithi NS, Lehmann C, Chisti MJ (2021). Clinical features of pneumonia in severely malnourished children with diarrhoea compared to those without diarrhoea. *Frontiers in bioscience (Landmark edition)*, 26(10), 717-722. [Published] PubMed ID: 34719200.
23. John K Peel, Thomas Prasloski, Garrett Barry, Jack Huang, Lawrence Sham, Bassam A Masri, Jacqueline D Trudeau (2021). Rationalized preoperative management of hip and knee arthroplasty patients: a retrospective cohort study. *Perioperative Care and Operating Room Management*. [Published] DOI: 10.1016/j.pcorm.2021.100177.
24. Johnstone J, Meade M, Lauzier F, Marshall J, Duan E, Dionne J, Arabi YM, et al for the Prevention of Severe Pneumonia and Endotracheal Colonization Trial (PROSPECT) investigators and the Canadian Critical Care Trials Group (CCCTG), Hall RI (2021). Effect of probiotics on incident ventilator-associated pneumonia in critically ill patients. A randomized clinical trial. *JAMA*, 326(11), 1024-1033. [Published] DOI: 10.1001/jama.2021.13355.
25. Jung F, Connes P, Lehmann C (2021). A.L. Copley Best Paper Prize 2020. *Clinical hemorheology and microcirculation*. [Published] PubMed ID: 33720877.

26. Kalagara K, Nair H, Kolli S, Thota G, Uppal V (2021). Ultrasound Imaging of the Spine for Central Neuraxial Blockade: a Technical Description and Evidence Update. *Current Anesthesiology Reports*. [Review - Published] DOI: 10.1007/s40140-021-00456-3.
27. Kamintsky L, Beyea S, Fisk J, Hashmi JA, Omisade A, Bardouille T, Bowen C, Quraan M, Mitnitski A, Friedman A, Hanly JG (2021). Blood-brain barrier leakage in systemic lupus erythematosus is associated with gray matter loss and cognitive impairment. *Annals of the Rheumatic Disease*. [Published].
28. Kaneva MK, Muley MM, Krustev E, Reid AR, DeSousa PRS, Del'Accio F, McDougall JJ, Perretti M (2021). Alpha-1-antitrypsin reduces inflammation and exerts chondroprotection in arthritis. *FASEB Journal*, 35, e21472. [Published].
29. Ke J, George RB, Wozney L, Munro A (2021). Perioperative Mobile Application for Mothers Undergoing Cesarean Delivery: A Prospective Cohort Study on Patient Engagement. *Canadian Journal of Anesthesia*. [Published] DOI: 10.1007/s12630-020-01907-x.
30. Ke J, Waslen A, Park C, Hung O (2021). Accelerating Innovation in Medicine: A wake-up call amidst the COVID pandemic. *Canadian Journal of Anesthesia*, 68(12), 1744-1746. [Published].
31. Keenan S, Kramer A, Healey A, Weiss MJ, Dhanani S, Beed S, Djogovic D, Sullivan K, Shemie SD (2021). The variable impact of the overdose crisis on organ donation among five Canadian provinces: a retrospective study. *Canadian journal of anaesthesia = Journal canadien d'anesthesie*. [Published] PubMed ID: 33564994.
32. Killackey T, Noel M, Birnie KA, Stinson J, et al; Finley GA (included in the COVIDChildPain Team) (2021). COVID-19 Pandemic impact and response in Canadian pediatric pain care: A national survey of medical directors and pain professionals. *Can J Pain*, 5(1). [Published].
33. Kwok CH, Kohro Y, Mousseau M, O'Brien MS, Matyas J, McDougall JJ, Trang T (2021). Role of primary sensory afferents in arthritis induced spinal microglial reactivity. *Frontiers in Immunology*, 12, 626884. [Published] DOI: 10.3389/fimmu.2021.626994.
34. Ladha KS, McLaren-Blades A, Goel A, Buys MJ, Farquhar-Smith P, Haroutounian S, Kotteeswaran Y, Kwofie MK, Le Foll B, Lightfoot NJ, Loisel J, Mace H, Nicholls J, Regev A, Rosseland LA, Shanthanna H, Sinha A, Sutherland A, Tanguay R, Yafai S, Glenny M, Choi P, Ladak SSJ, Leroux TS, Kawpeng I, Samman B, Singh R, Clarke H (2021). Perioperative Pain and Addiction Interdisciplinary Network (PAIN): consensus recommendations for perioperative management of cannabis and cannabinoid-based medicine users by a modified Delphi process. *British journal of anaesthesia*, 126(1), 304-318. [Published] PubMed ID: 33129489.
35. Law JA, Duggan LV, Asselin M, Baker P, Crosby E, Downey A, Hung OH, Jones PM, Lemay F, Noppens R, Parotto M, Preston R, Sowers N, Sparrow K, Turkstra TP, Wong DT, Kovacs G (2021). Canadian Airway Focus Group updated consensus-based recommendations for management of the difficult airway: Part 1. Difficult airway management encountered in an unconscious patient. *Canadian Journal of Anesthesia*, 68, 1373-1404. [Published] PubMed ID: 34143394.
36. Law JA, Duggan LV, Asselin M, Baker P, Crosby E, Downey A, Hung OH, Kovacs G, Jones PM, Lemay F, Noppens R, Parotto M, Preston R, Sowers N, Sparrow K, Turkstra TP, Wong DT, Jones PM (2021). 2. Canadian Airway Focus Group updated consensus-based recommendations for management of the difficult airway: Part 2. Planning and implementing safe management of the patient with an anticipated difficult airway. *Canadian Journal of Anesthesia*, 68(9), 1405-1436. [Published] PubMed ID: 34105065.
37. Law JA, Kovacs GK (2021). Video laryngoscopy 2.0. *Can J Anesthesia*. [Editorial - Published] DOI: 10.1007/s12630-021-02162-4.
38. Lehmann C, Aali M, Zhou J, Holbein B (2021). Comparison of Treatment Effects of Different Iron Chelators in Experimental Models of Sepsis. *Life (Basel, Switzerland)*, 11(1). [Published] PubMed ID: 33466819.
39. Leite-Avalca MCG, Zampronio A, Lehmann C (2021). Cannabinoid Receptor 1 and 2 Signalling Pathways Involved in Sepsis. *Shock (Augusta, Ga.)*. [Published] PubMed ID: 33625115.

40. Lucena F, McDougall JJ (2021). Protease activated receptors and arthritis. *International Journal of Molecular Sciences*, 22, 9352. [Published] DOI: 10.3390/ijms22179352.
41. Luhning K, MacCormick H, Macaulay B, Saunders M, Craig C (2021). Subcapsular hepatic hematoma as a complication of severe preeclampsia: a case report. *Journal of medical case reports*, 15(1), 625. [Case Report - Published] PubMed ID: 34920754.
42. McDougall JJ, McConnell M, Reid A (2021). Intracellular versus extracellular inhibition of calpain I causes differential effects on pain in a rat model of joint inflammation. *Molecular Pain*, 17, 1-6. [Published].
43. McKeen DM, Zaphiratos V (2021). Lack of evidence that epidural pain relief during labour causes autism spectrum disorder: a position statement of the Canadian Anesthesiologists' Society. *Canadian journal of anaesthesia = Journal canadien d'anesthésie*, 68(2), 180-182. [Published] PubMed ID: 33108637.
44. Mendelson AA, Lansdell C, Fox-Robichaud AE, Liaw P, Arora J, Cailhier JF, Cepinskas G, Charbonney E, Dos Santos C, Dwivedi D, Ellis CG, Fergusson D, Fiest K, Gill SE, Hendrick K, Hunniford VT, Kowalewska PM, Krewulak K, Lehmann C, Macala K, Marshall JC, Mawdsley L, McDonald B, McDonald E, Medeiros SK, Muniz VS, Osuchowski M, Presseau J, Sharma N, Sohrabipour S, Sunohara-Neilson J, Vázquez-Grande G, Veldhuizen RAW, Welsh D, Winston BW, Zarychanski R, Zhang H, Zhou J, Lalu MM (2021). National Preclinical Sepsis Platform: developing a framework for accelerating innovation in Canadian sepsis research. *Intensive care medicine experimental*, 9(1), 14. [Published] PubMed ID: 33738642.
45. Milne AD, Brousseau PA, Mullins GS (2021). Use of a provincial prescription monitoring database to characterize perioperative opioid prescribing for hip and knee arthroplasty. *Canadian Journal of Anesthesia*. [Published] DOI: 10.1007/s12630-022-02213-4.
46. Mossenson A, Bailey J, Whynot S, Livingston P (2021). Qualities of effective Vital Anaesthesia Simulation Training facilitators delivering simulation-based education in resource-limited settings. *Anesthesia and Analgesia*, 133(1), 215-225. [Published] PubMed ID: 34127590.
47. Mossenson A, Mukwesi C, Elaibaid M, Doherty J, May A, Murray M, Livingston P (2021). Vital Anaesthesia Simulation Training (VAST); immersive simulation designed for diverse settings. *International Journal of Surgery: Global Health*, 4. [Published] Available here.
48. Munro A, George RB, Mackinnon SP, Rosen NO (2021). The association between labour epidural analgesia and postpartum depressive symptoms: a longitudinal cohort study. *Canadian journal of anaesthesia = Journal canadien d'anesthésie*. [Published] PubMed ID: 33403538.
49. Neira VM, Scheffler M, Wong D, Wang V, Hall RI (2021). Survey of the Preparation of Cardiovascular Emergency Medications for Adult Cardiovascular Anesthesia. *Journal of cardiothoracic and vascular anesthesia*, 35(6), 1813-1820. [Published] PubMed ID: 33020001.
50. Neuman MD, Feng R, Carson JL, Gaskins LJ, Dillane D, Sessler DI, Sieber F, Magaziner J, Marcantonio ER, Mehta S, Menio D, Ayad S, Stone T, Papp S, Schwenk ES, Elkassabany N, Marshall M, Jaffe JD, Luke C, Sharma B, Azim S, Hymes RA, Chin K-J, Sheppard R, Perlman B, Sappenfield J, Hauck E, Hoelt MA, Giska M, Ranganath Y, Tedore T, Choi S, Li J, Kwofie MK, Nader A, Sanders RD, Allen BFS, Vlassakov K, Kates S, Fleisher LA, Dattilo J, Tierney A, Stephens-Shields AJ, Ellenberg SS, for the REGAIN Investigators (2021). Spinal anesthesia or general anesthesia for hip surgery in older adults. *New England Journal of Medicine*. [Published] DOI: 10.1056/NEJMoa2113514.
51. O'Brien MS, McDougall JJ (2021). Targeting proteinase activated receptor-4 reduces mechanonociception during the acute inflammatory phase but not the chronic neuropathic phase of osteoarthritis in rats. *Frontiers in Pharmacology*, 12, 756632. [Published] DOI: 10.3389/fphar.2021.756632.
52. Parotto M, Cavallin F, Bryson GL, Chin KJ, intubateCOVID Canadian collaborators [Kwofie MK] (2021). Risks to healthcare workers following tracheal intubation of patients with known or suspected COVID-19 in Canada: data from the intubateCOVID registry. *Canadian journal of anaesthesia = Journal canadien d'anesthésie*. [Published] PubMed ID: 33432495.

53. Robinson A, Wilson MN, Hayden JA, Rhodes E, Campbell S, MacDougall P, Asbridge M (2021). Health Care Provider Utilization of Prescription Monitoring Programs: A Systematic Review and Meta-Analysis. *Pain medicine (Malden, Mass.)*. [Published] PubMed ID: 33484144.
54. Scott C, Arora G, Dickson K, Lehmann C (2021). Iron Chelation in Local Infection. *Molecules (Basel, Switzerland)*, 26(1). [Published] PubMed ID: 33401708.
55. Shanthanna H, Uppal V, Joshi GP (2021). Intraoperative Nociception Monitoring. *Anesthesiology clinics*, 39(3), 493-506. [Review - Published] PubMed ID: 34392881.
56. Singh M, McKeen D (2021). Supporting vulnerable physicians at high risk from COVID-19 during the pandemic: a call for action. *Canadian journal of anaesthesia = Journal canadien d'anesthésie*, 68(7), 943-952. [Published] PubMed ID: 33709261.
57. Sjaus A, Kaligara H (2021). POCUS Spotlight: Focused Cardiac Ultrasonography (FoCUS). *ASRA News*, 46. [Review - Published] DOI: 10.52211/asra080121.047.
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