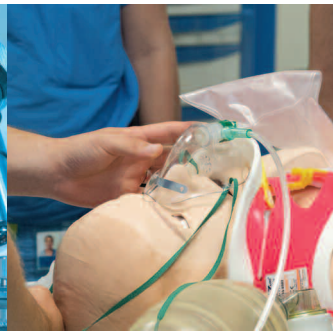
Department of Anesthesia, Pain Management and Perioperative Medicine

Annual Report

2020-2021



DALHOUSIE UNIVERSITY

Vision

Responsive to the anesthesia care needs of our Maritime community while simultaneously providing international leadership in anesthesia education and research.

Mission

Serving the public good through excellence in anesthesia clinical practices, research and education.

DALHOUSIE UNIVERSITY
FACULTY OF MEDICINE
Department of Anesthesia,
Pain Management and
Perioperative Medicine

Beliefs & Values

The Department of Anesthesia, Pain Management and Perioperative Medicine believes:

- Patients are entitled to safe, evidence-based and patient-centred care.
- Lifelong learning is a prerequisite to safe, competent care and professional, compassionate clinicians.
- Transparency and accountability in combination with creative thinking and leadership are foundational to the Department's vision.
- Development of future generations of anesthesia care providers able to contribute to excellence in patient care, research and education is a professional responsibility and commitment.
- Scholarly curiosity and the advancement of knowledge are fundamental to the improvement and enhancement of patient care.
- Sharing our expertise regionally, nationally and internationally is a professional obligation.
- Stewardship of local and global resources is a departmental responsibility.

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Message from Department Head

As I began my tenure as Department head in March 2020, the world was impacted by a global pandemic that resulted in significant challenges to how the Department provided anesthesia care, delivered education to learners and conducted research. The year was dominated by unprecedented uncertainty, new and ever-changing public health measures, and a series of challenges brought on by three consecutive waves of the COVID-19 pandemic.

As a result, I witnessed Department members – faculty, physicians, administrative staff and healthcare workers – step up in extraordinary ways. With agility and resilience, our teams mobilized quickly to develop and implement patient care protocols, organize vaccination strategies and don protective equipment and monitor safety procedures. The need for communication in a virtual environment was paramount and we worked diligently to provide information and resources to our staff to support them as their ways of working changed, and they dealt with their own concerns regarding the welfare of family and friends during the pandemic.

From an operational standpoint, I am thrilled with the strides the team has made thanks in large part to the co-leadership of the Associate Head and Cabinet Chair, **Dr. André Bernard**, as well as the appointment of **Ms. Carmelle d'Entremont** in the new role of Chief Operating Officer.

Clinically, I am extremely proud of the leadership role that the Department played in developing and executing COVID-19 protocols on behalf of the perioperative team, to ensure the utmost safety of staff and the patients we serve. In parallel, our research and education teams went above and beyond to continue mission critical pursuits, pivoting to support our researchers and learners carry out a large portion of their activities in a virtual setting with tremendous success.

I am truly in awe of the comradery and cohesion demonstrated by Department members over the past year. Although we are not out of the pandemic yet, we continue to learn and, in some ways, have thrived during this trying time. I want to extend my sincerest gratitude to the entire team for rising to the occasion in the face of adversity, to do what needed to be done to prioritize patient care, while delivering on our academic mandate.

As I look to the future, I commit to continuing to position the Department as a leader of clinical and academic innovation and excellence. We will explore what role we can play in supporting anesthesia services locally and provincially, as well as initiate a new strategic planning process. We will continue to foster a positive culture that is high-performing and promotes wellness and supports principles of equity, diversity and inclusion.

Janice Chisholm, MD, FRCPC
Professor and Head
Dalhousie University
Department of Anesthesia, Pain Management and Perioperative Medicine

I am truly in awe of the comradery and cohesion demonstrated by Department members over the past year.

Message from Chief Operating Officer

I admire the dedication and resilience this Department has shown navigating the three waves of the pandemic.

It's my great pleasure to write this message in the annual report as its first chief operating officer of the Department.

I joined the Department in September 2020, following the first wave of the pandemic. I admire the dedication and resilience this Department has shown navigating the three waves of the pandemic.

This year, we have worked diligently to put in place policies and procedures to shore up our administrative support functions, enabling our clinicians and faculty to focus on what they do best. As a part of a finance renewal project, we clarified roles and responsibilities, updated job descriptions and contracts, implemented new finance policies and revised our financial reporting processes, all in an effort to improve financial accountability and stewardship of the Department's resources. We also focused on strengthening committee structures and provided enhanced information to support good decision-making.

With a focused effort on people and culture, the Department issued a call for expressions of interest for funding supports for leadership development. Four emerging and existing physician leaders were supported to further develop their leadership skills. Department members continued to explore how to better prioritize wellness and the promotion of equity and diversity within the Department.

The Department's Awards of Excellence deferred from the previous year, were celebrated virtually in late 2020 to acknowledge individuals and teams for their outstanding efforts throughout the year.

With the leadership of our scheduling and finance teams, we successfully implemented a new physician scheduling software system and continue to explore opportunities for enhanced systems improvements with our finance and billing functions.

I sincerely thank all faculty, administrative and leadership staff for their gracious hospitality and quick acceptance of my arrival. A special thank you to **Dr. Janice Chisholm** and **Dr. André Bernard** for welcoming me with open arms (six feet away; masks on, of course).

Sincerely,

Carmelle d'Entremont

Carmelle d'Entremont
Chief Operating Officer
Department of Anesthesia, Pain Management & Perioperative Medicine
and APMPM Administration Inc.

About Us

Who We Are

The Department of Anesthesia, Pain Management and Perioperative Medicine is a clinical and academic department affiliated with Dalhousie University's Faculty of Medicine and primarily two health authorities: Nova Scotia Health (NSH) and IWK Health Centre in Nova Scotia. The academic man-date supporting research and education is also offered in conjunction with Horizon Health in New Brunswick.

Working in collaboration with health authority clinical staff and leadership, our Department comprises:

- Over 140 Dalhousie faculty in PEI, Nova Scotia and New Brunswick, with the majority within NSH Central Zone, IWK Women's & Obstetrics and IWK Pediatrics.
- More than 25 administrative staff, who are employees of the various partner institutions and support research, education, finance and administration offices.

Our Executive Committee

The Department of Anesthesia, Pain Management and Perioperative Medicine is overseen by the Dalhousie University Department Head, **Dr. Janice Chisholm**, who also serves as the NSH Central Zone Head, assisted by **Dr. André Bernard** in the role of associate head. Complementary leadership is provided by the IWK Pediatric and W&O Anesthesia Department Chiefs, **Dr. Scott Drysdale** and **Dr. Dolores McKeen**, respectively. Strategic oversight and management of the day-to-day administrative, financial, and operational functions of the Department are provided by the Chief Operating Officer, **Ms. Carmelle D'Entremont**.

The Department's Cabinet Committee advises the Department head on financial and academic matters and plays a central role in strategic planning, priority and policy setting.

Cabinet

- Dr. André Bernard, Chair, Associate Head[1]
- Dr. Janice Chisholm, Head[2]
- Dr. Adam Law, Senior Advisor to the Head[3]
- Dr. Colin Audain, Scheduler for Adult Services
- Dr. Claudio Diquinzio, Member at Large
- Dr. Robyn Doucet, Program Director, Postgraduate
- Dr. Scott Drysdale, Chief, Pediatric Anesthesia, IWK Health Centre
- Dr. Blaine Kent, HI Site Chief, QEII Health Sciences Centre
- Dr. Andrei Khorovets, Member at Large[4]
- Dr. Christian Lehmann, Medical Director, Research[5]
- Dr. Bruce Macaulay, Member at Large
- Dr. Dolores McKeen, Chief, Women's and Obstetric Anesthesia, IWK Health Centre
- Dr. Allana Munro, Member at Large[6]
- Dr. Parvinder Sodhi, Member at Large[7]
- Dr. Narendra Vakharia, Medical Director, Education

Ex-Officio

- Ms. Carmelle d'Entremont, Chief Operating Officer[8]
- Mr. Carl Stevens, Managing Director of Finance
- Ms. Maggie Marwah, Communications Advisor

1 Dr. André Bernard became Associate Head as of April 28, 2021. He was Interim/Acting VG Site Chief, QEII Health Sciences Centre for the period of March 16 to May 14, 2020.
2 Dr. Janice Chisholm became Department Head as of March 15, 2020. She was formerly VG Site Chief, QEII Health Sciences Centre.
3 Dr. Adam Law held the role of Associate Head until April 27, 2020, after which he became Senior Advisor to the Head.
4 Dr. Andrei Khorovets assumed his role on Cabinet on October 20, 2020.
5 Dr. Christian Lehmann became Medical Director, Research on November 30, 2020.
6 Dr. Allana Munro assumed her role on Cabinet on October 20, 2020.
7 Dr. Parvinder Sodhi assumed her role on Cabinet on October 20, 2020.
8 Ms. Carmelle d'Entremont assumed her role as Chief Operating Officer on September 28, 2020, following the retirement of Ms. Marilyn Girouard.

About Us (Cont'd.)

Where We Work

Department faculty can be found throughout the Maritimes. Within Nova Scotia, the staff work primarily within six main facilities:

IWK Health Centre

NSH Central Zone

- Dartmouth General Hospital, Dartmouth
- Scotia Surgery, Dartmouth
- Hants Community Hospital, Windsor

QEII Health Sciences Centre

- Halifax Infirmary (HI) site, Halifax
- Victoria General (VG) site, Halifax

Horizon Health Network

- The Department also works with the Saint John Regional Hospital (SJRH), St. Joseph's Hospital (SJH), and the Sussex Health Centre (SHC), through Horizon Health Network in New Brunswick.

What We Do

Working within quaternary and tertiary care centres, the Department provides a full spectrum of specialty anesthesia care to patients in Atlantic Canada, as well as nationally and internationally through outreach initiatives and innovation in airway management.

Our patient care services include:

- Administering leading-edge programs and services in perioperative medicine, perioperative blood management and chronic and acute pain management.
- Providing general, neuraxial, regional and monitored anesthesia care to patients undergoing surgery, including:

General	ENT
Obstetrics/Gynecology	Plastic
Orthopedics	Neuro
Ophthalmology	Thoracic
Oral and Maxillofacial	Transplantation
Cardiac	Urology
Vascular	

- Managing adult and pediatric trauma cases and administering epidural analgesia to mothers in labour
- Providing anesthesia care to patients receiving procedures outside of the operating rooms, such as:
  - Electrophysiological ablation procedures
  - Transcatheter aortic valve implants
  - Cardioversion
  - General and neuro-interventional radiologic procedures
  - Diagnostic imaging and radiotherapy

To deliver the Department's education mandate, the team welcomes learners annually, who receive on-the-job clinical teaching from faculty, including:

- Undergraduate medical students
- Over 30 postgraduate anesthesia residents (anesthesiologists in training) in the five-year Anesthesia Residency Program, with six new entry spots a year through the Canadian Residency Matching System (CaRMS)
- Up to eight one-year fellowship opportunities for anesthesiologists seeking additional sub-specialty training
- The Department also assists in the education of other health professions such as nurses, paramedics and respiratory therapists, through established agreements.

The Department is committed to fostering relevant research that leads to impactful patient care, with a research program that comprises over 20 researchers, including clinicians, scientists, and investigators at Dalhousie University and beyond. Much of the focus of research efforts are in areas of pain, airway management and perioperative care, spanning bench to bedside and across all ages.

A Year in Review

PATIENT INTERACTIONS BY SUBSPECIALTY AND SPECIALIZED PROGRAM

Acute Pain Management/Regional Anesthesia	**1,271** new consults
Adult Chronic Pain Management	**685** patient visits
Pediatric Pain Management	**1,496** patient visits
Perioperative Blood Management	**515** patient visits
Perioperative Medicine	**539** patient visits
Cardiac Anesthesia	**1.274** cases
Liver Transplantation Anesthesia	**25** cases
Neuroanesthesia	**982** cases
Thoracic Anesthesia	**1,051** cases
Women's & Obstetric Anesthesia	**1,534** cases

SURGERIES / PROCEDURES

The Department provided anesthesia services for thousands of surgeries and procedures across various disciplines in 2020-21, including:

Cardiovascular	**1,274**	Orthopedics	**6,196**
Ear, Nose & Throat (ENT)	**1,317**	Ophthalmology	**5,891**
General Surgery/Trauma	**4,570**	Pediatrics	**4,962**
Gynecological Oncology	**366**	Plastic	**1,299**
Neurosurgery	**982**	Thoracic	**1,072**
Obstetrics/Gynecology (Births)	**4,264**	Transplantation (Kidney, Liver, Heart)	**89**
Obstetrics/Gynecology (OB, Gyn, Breast)	**1,844**	Urology	**4,206**
Oral Maxillofacial Surgery	**818**		

EDUCATION

212	Faculty members in Maritimes, comprised of primary, cross-appointed and adjunct appointments
30	Professors (18 primary, 7 cross-appointed and 5 adjunct)
27	Associate Professors (21 primary, 5 cross-appointed and 1 adjunct)
148	Assistant Professors (144 primary, 2 cross-appointed and 2 adjunct)
7	Lecturers (all primary)

RESEARCH

20	Faculty researchers (total equivalent protected time = **5.88** FTE)
8.1 M	Received in grants and industry funding
19	New funded projects
90%	Collaborative projects
52	Peer review publications
54	Invited presentations


3M
Andrew Aucoin

Clinical Excellence

Meeting the Needs of Our Patients

IWK Health Centre

4962 pediatric cases

4264 live births

1844 Obstetrics/Gynecology (OB, Gyn, Breast) Cases

IWK Pediatric Anesthesia Department

Dr. Scott Drysdale, Department Chief of Pediatric Anesthesia, leads the team at the IWK Health Centre responsible for providing anesthesia consultation and pain management services to neonates, infants, children and adolescents of the Maritime provinces. The group also provides anesthetic care for emergency procedures throughout the year.

The dedicated team of 11 have been working diligently over the past year amidst clinical limitations and human resources challenges, heightened by the Covid-19 pandemic. Clinical work has decreased as a result of the restrictions imposed on elective surgery, but new and different work has ramped up. Team members have focused their efforts on defining and refining patient sedation practices throughout the hospital, and improving the monitoring of children's care, centre wide. In addition, a comprehensive review of acute pediatric pain practices across the hospital has been carried out, including improving clinical order sets and a greater standardization of practice elements, to optimize patient care.

Planning for the redevelopment of the emergency department has remained a priority for all units at the IWK, and progress has continued to advance steadily over the past year. This redevelopment will help to address the demands of current and future increase in patients, better suit the needs of complex cases and mental health concerns and enhance innovative care among providers.

Looking ahead, the pediatric anesthesia team is focused on continuing to work collaboratively towards their common goal, ensuring the highest quality of care is made available for the benefit of the patients they care for.

IWK W&O Anesthesia Department

Under the helm of Department Chief, **Dr. Dolores McKeen**, the Women's and Obstetric (W&O) Department of Anesthesia provides comprehensive obstetric and adult surgery (gynaecology/urogynaecology and breast health) anesthetic services within the IWK Women's and Newborn Health Program. This team provides a dedicated 24-hour in-house labour analgesia and obstetric anesthesia service to the IWK birth unit. There are three dedicated birth unit operating room (ORs) theatres. There is one daily dedicated elective cesarean delivery OR list.

Elective and emergency anesthesia services are provided for the gynecology, urogynaecology and breast health programs in two dedicated ORs for gynaecology / urogynaecology and a third shared OR theatre with the Breast Health Program.

The IWK PACU Team won the Department's 2020 Team Award of Excellence

Thousands of children go through the IWK operating rooms every year and the day surgery/PACU team does an amazing job to help relieve the tremendous stress and fear that the patients and their families experience. A child requiring an operation can be one of the most stressful things a family will experience, and this award is an acknowledgment of the hard work the Day Surgery/PACU team does on a regular basis to make the experience as positive as possible.

4,264 live births were recorded at the IWK Health Centre in 2020/21

W&O anesthesia staff are an integral part of the IWK cardiac arrest team, provide resuscitation services to the women's program and lead any adult critical events or cardiorespiratory arrest situations when they occur. **Dr. Drysdale** and **Dr. Prasad Bolledulla** co-chair the IWK Cardiac Arrest Committee.

Medically compromised or critically ill obstetric patients, who typically require advanced monitoring or adult surgical services not available at the IWK such as trauma, cardiac and neurosurgery are admitted directly to the NSH QEII Health Sciences Centre sites. Where possible, elective and urgent obstetric anesthesia care at QEII is provided by IWK W&O department members.

W&O Anesthesia also has an active acute pain service at the IWK, which provides consults for complex highly opioid tolerant patients and routine postoperative analgesia care. This service includes the provision of neuraxial narcotic pain relief, 24-hour supervision of these narcotic protocols for post-operative monitoring, as well as intravenous patient-controlled analgesia (IV PCA) pumps. The APS also provides an analgesia service (usually IV PCA) and 24-hour supervision of these narcotic monitoring protocols for pregnancy termination and fibroid embolization.

W&O anesthesia also provides an active anesthesia consultation service at the IWK. This service provides multi-disciplinary planning and service to high-risk obstetric, gynecologic and breast health patients. The IWK pre-admission clinic sees routine obstetrics, gynaecology / urogynaecology and breast health patients where pre-operative assessment is indicated as part of their planned delivery or surgery.

Elective adult surgery anesthesia clinical service at the IWK was impacted due to the COVID-19 pandemic, particularly March to June 2020, with the initial complete cancellation of elective ORs and then gradual service reopening as public health guidance permitted. Breast health anesthesia services at the IWK were minimally impacted as services for cancer / oncology care continued. Overall, given the non-elective nature of obstetric anesthesia, services remained stable for fiscal year 2020.

Looking forward, the W&O anesthesia team has set an ambitious goal to achieve the Obstetric Anesthesia Center of Excellence designation from the Society for Obstetric Anesthesia and Perinatology for 2022. This international organizational recognition will further affirm that the team is providing the best, leading-edge, evidence-informed, patient-centred obstetric anesthesia care available.

4,264 live births were recorded at the IWK in fiscal 2020/21, with **2,932** vaginal deliveries

1,534 obstetrical surgical procedures

1,332 operative caesarean deliveries (40% elective, 60% non-elective)

1,884 newborn health program adult surgeries: **503** breast health, 1,341 gynaecology surgical procedures

Nova Scotia Health – Central Zone

Dartmouth General Hospital

3,905 cases

Site Chief **Dr. Kevin Bent** oversees anesthesia services at the Dartmouth General Hospital, which comprises a team of seven anesthesiologists that cover four operating rooms daily, in addition to Preoperative Clinics and an Acute Pain Service. Anesthesia surgery support is offered for hospital services including general surgery, plastics, oral and maxillofacial surgery (OMF), ear, nose and throat (ENT), gynecology, urology and orthopedics. Team members also cover electroconvulsive therapy (ECT) services at the Nova Scotia Hospital.

As COVID-19 precautions dictated, the team worked to allow resources to quickly be mobilized to support the pandemic effort. Team members were onsite 24/7 as the primary airway team for the entire hospital facility and were involved in daily simulation training to ensure all emergency room personnel gained a greater level of comfort with video laryngoscopy. Advanced care paramedics were also given the opportunity to practice these skills in the operating suites with the anesthesiologists.

Despite COVID-19 restrictions slowing construction and renovation plans on-site, the anesthesia team were able to open their new day surgery and Post Anesthesia Care Unit (PACU).

The physical building layout and pathways will still improve as the last of the construction barriers come down and the final three operating rooms open their doors. The last clinical services plan for the expansion of services at the Dartmouth General Hospital is expected to be realized in 2021. The full complement of acute care beds is scheduled to be complete by December, which will facilitate the ability of surgical services to move from the NSH QEII VG site.

The first signs of a transition of work from the VG site to Dartmouth General Hospital has begun. The hospital has received the new lithotripsy table which enables the provision of shock wave lithotripsy for the Central Zone. This year also saw the beginning of regular operating room coverage at the Dartmouth General by anesthesiologists who would typically work at the QEII sites.

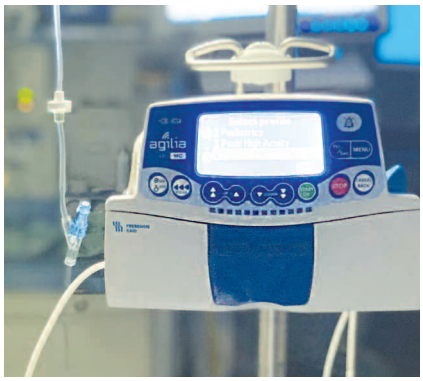
Hants Community Hospital

1,039 cases

Site Lead **Dr. Jocelyn Foran** supervises the anesthesia services at Hants Community Hospital, which has two operating rooms and an endoscopy suite. As the pandemic began, the hospital experienced a total shut down of service and rapidly re-opened to elective service in May, with a return to 100% capacity by June 2020. Through it all, safe and compassionate care continued to be provided into both the second and third waves of the pandemic.

These phenomenal new spaces offer a refreshing level of safety, privacy and comfort for patients and staff. The team have been living in a construction zone for years now and are finally seeing the resulting benefits that, until now, they had only been able to imagine.

Dr. Kevin Bent
Site Chief, Dartmouth General Hospital



The anesthesia team at the Halifax Infirmary provides support to the site's 15 operating rooms dedicated to neuro, orthopedic, plastic, vascular, general and cardiac surgery.

The staffing level of anesthesiologists continues to grow, with more staff and services expanding the Hants team. The new role of the preoperative screening nurse has been invaluable. The Hants Community Hospital operating rooms have experienced 100% use in the last year, and the hospital has added urology and plastics to their surgical team.

2020 has also seen Hants add Agilia pumps and spinal trays to their equipment roster, in addition to implementing staff huddles and nurse training into their practice. In order to provide education and Continuing Medical Education (CME) for physicians and the nursing staff, the team has implemented late starts to their Wednesdays, providing a much-appreciated opportunity for all members to stay up to date on the latest measures and advancements.

QEII Health Sciences Centre, Halifax Infirmary

10,194 cases

Site Chief **Dr. Blaine Kent** leads the anesthesia team at the Halifax Infirmary (HI) providing support to the site's 15 operating rooms dedicated to neuro, orthopedic, plastic, vascular, general and cardiac surgery. Anesthesia support is also provided to off-site areas for electrophysiologic cardiac ablation procedures, transcatheter aortic valve implants (TAVIs), structural heart disease, cardioversions, interventional neuroradiologic procedures (acute stroke protocol, aneurysms, and carotid stenting), and a variety of interventional procedures that require significant procedural sedation/general anesthesia.

Following the reduction in services after the first pandemic wave, the team rallied to open additional ORs and work closely with surgical and nursing teams to streamline the surgical experience for patients, including pre-op testing, virtual visits, an increase in utilization of regional anesthesia, and the introduction of outpatient arthroplasty.

Overall, the number of OR cases decreased significantly during the first wave of the pandemic, resulting in the OR workload at the HI shifting to emergency/urgent cases, cardiac, and cases that could be done as outpatient surgery. Much less disruption was experienced at the HI site during the second wave in the Fall of 2020.

Throughout the year, team members stepped up to provide assistance with ever-changing COVID-19 guidelines to ensure the safety of patients, staff and providers. Specific OR rooms were designated for COVID-positive/suspect cases, and the team worked with plant engineering and nursing to reverse airflow in several ORs for operative care of those patients. Team members worked collectively to develop specific carts for PPE, airway equipment and supply packs, to minimize disposables in the OR for suspect or known COVID-19 cases.

From a clinical equipment perspective, the team facilitated the rapid implementation of large volume infusion pumps into the cardiac OR. They also ensured the full implementation of both LVI and syringe pumps throughout the ORs by the end of the year. HI team members witnessed the initial use of the link system for charging and transport of the new FK pump, and several new video laryngoscopes were purchased to

ensure that COVID-19 intubation recommendations could be followed throughout the ORs and off-site.

Despite numerous delays in site redevelopment projects due to the pandemic, the new pre-op / PACU B space has been completed, along with the first of two isolation rooms in PACU A. The new third-floor interventional radiology (IR) suite was finalized in November 2020 and is the new patient care location for all code strokes. The team has worked closely with other departments to minimize the presentation to clot extraction time and pivot to the new out-of-OR location with minimal logistic issues. The new IR suite is also home to the first clinical use of a Pyxis-based system for access to medications at the HI site.

QEII Health Sciences Centre, Victoria General Hospital

13.948 cases

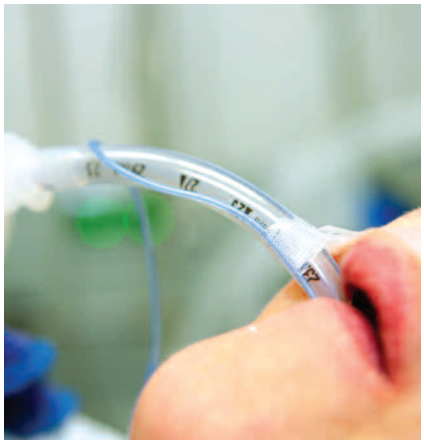
As of May 2020, **Dr. Colin Audain** has provided leadership to the anesthesia team as the site chief at the Victoria General Hospital (VG), which delivers patient care in 11 operating rooms and a lithotripsy unit. Subspecialty activity at the VG includes thoracic anesthesia, liver transplantation anesthesia and the acute pain service. The anesthesia team is also primarily responsible for patients recovering from anesthesia in the post anesthesia care Unit (PACU).

At the start of the 2021 academic year, there was a significant reduction in operating room services.

The pandemic required new safety protocols be developed to minimize the risk of COVID-19 transmission to staff and patients during the perioperative period. The Decision & Management Protocol for Surgical Procedures Requiring General Anesthesia during COVID-19 Pandemic, now in its 10th iteration, was developed primarily by **Dr. Janice Chisholm** and **Dr. André Bernard**, to provide an evidence-based approach to the care of surgical patients in the Central Zone.

Another key accomplishment was the establishment of a new OR operations committee. This committee met almost daily during the first wave of the pandemic and continued to meet regularly through the entirety of fiscal 2021. The committee was comprised of surgical division heads, OR anesthesia nurse managers and was chaired by members of the anesthesia team. The purpose of this committee was to plan for and react to, in real-time, any COVID-related impacts to the OR portfolio. Among other factors, it was as a direct result of the work of this committee that, despite an unprecedented reduction in clinical services, the VG was able to mitigate the impact of the pandemic to surgical oncology patients.

The QEII redevelopment project has started to have a tangible impact on the delivery of clinical services. The decommissioning of the lithotripsy machine at the VG and the subsequent purchase of a new lithotripsy machine at the Dartmouth General Hospital, represents a major shift in the delivery of care under the QEII redevelopment project.



The Covid Airway Resource Team (CoVART) was developed by a group of committed clinicians who were then responsible for high-risk intubations throughout the entire HI for suspected or known COVID-19 patients. During the initial wave, this team provided 24/7 coverage at the HI site consisting of anesthesia staff, residents and OR nurses. This team was awarded an Award of Excellence for their outstanding contributions.

Acute Pain Management and Regional Anesthesia

- The number of regional anesthesia procedures in 2020-21 decreased by 17% (2,939) compared with the last reporting period. The reason for this decrease is likely due, almost exclusively, to the decreases in elective surgeries related to the COVID-19 pandemic OR closures.
- The Acute Pain Service at the HI saw 516 new consults, which is a decrease of 5.9% over last reporting period.
  - Highly Opioid Tolerant (HOT) patients represented 21% of consults (was 25% last reporting period).
  - The consulted patients had 315 continuous peripheral nerve blocks, 71 PCAs, 14 epidurals (29 last reporting period) and 87 subcutaneous opioids orders. Thirty-four patients were treated with home-based peripheral nerve blocks (31 last reporting period).
- At the VG site APS team saw 755 new consults, which is an increase of 2% from last reporting period.
  - Highly Opioid Tolerant (HOT) patients represented 9% of new consults (8% last reporting period). There were 412 peripheral nerve blocks (a 20% increase over last reporting period), 198 epidurals (208 last reporting period), 208 PCAs and 101 subcutaneous opioid orders.

Throughout the last fiscal year, the team participated actively in the Perioperative Point of Care Ultrasound (POCUS) initiatives, using ultrasound for routine assessments of gastric volume, lung pathology, basic heart function, volume status and vascular access. They have been innovators in teaching some of these modalities to residents and staff. The PNB2 group has continued to expand, with the team striving to be inclusive by allowing many department members to learn and maintain skills in ultrasound guided peripheral nerve block.

The team is continuing to engage other clinical departments on the best ways to implement patient care education videos that they have produced, including a video on spinal anesthesia, and a teaching video for Patient Controlled Analgesia (PCA) created by team member, **Ms. Paula Hammond**, to assist in the teaching of the floor nurses.

The team worked with others to implement protocols for the administration of Ketamine as analgesia for burn patients and to create more standardized pathway for patients with rib fractures and optimize quality assurance assessments. They are also supporting Emergency Medicine and Orthopedics produce a pathway for early peripheral nerve block-based analgesia protocols for patients with hip fractures. The team is continuing to work closely with orthopedic counterparts to facilitate optimal anesthesia and analgesia protocols, including short-acting subarachnoid blockade, to help optimize patient care.

A clear clinical pathway has been established for patients with home perineural catheters, including standard patient materials and teaching. This pathway has continued to expand, allowing patients to recover from their surgeries in their homes with excellent analgesia and supports via daily phone calls, while preventing unnecessary hospital days.

The post block follow-up telephone questionnaire has been updated, and the team has implemented a computerized database. This successful project has improved consistent clinical care and has been a resource for quality assurance research, which has already led to high-impact publications.

Adult Chronic Pain Management

685 new patients

The Pain Management Unit, led by Subspecialty Chief **Dr. Ian Beauprie**, encompasses a large clinical and research space and a block room with portable ultrasound and fluoroscopy at the VG site, and clinic and procedural space with portable ultrasound at Hants Community Hospital. Inpatient consults, including palliative care, are screened and seen, as appropriate, at both the VG and HI sites, and a satellite pain clinic in Dartmouth since April 2021.

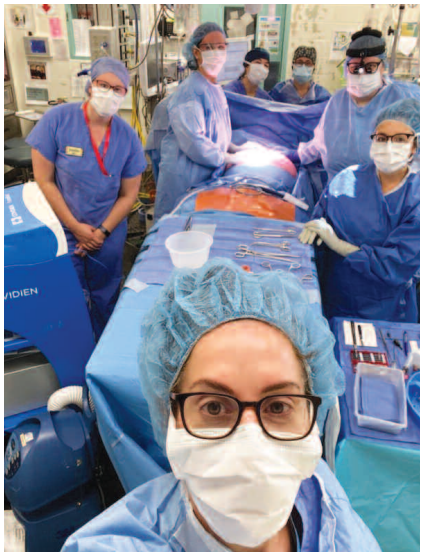
The pain management service overcame many pandemic-related obstacles this year such as reassignment of staff, the re-booking of patient appointments at a moments' notice and the increased workload associated with multiple patient screenings before each visit. They initiated and adapted to new processes in the nerve block room, ensuring they could continue to provide procedures without pre-op or post-op (same day surgery) support. The team was also able to deliver an entirely virtual Atlantic Pain Conference this year, which was very well-received and well-attended. Additionally, after several months of not being able to offer patients their standard group medical visit, **Dr. Patricia Livingston** took the lead to create a virtual version of the introductory session.

A recent feat for the team includes the establishment of the Pain and Addictions Albro Lake clinic, a new community clinic set up in Dartmouth in collaboration with MOSH Housing First and the North End Community Health Centre. The opening of the clinic was a major accomplishment by **Ms. Vicky Mills**, **Ms. Jessica Howe**, and **Dr. John Fraser**. This location was offered to Nova Scotia Health free of charge, to provide a collaborative community clinic to the underserviced population in Dartmouth.

Although this clinic did not open until April 2021, the "behind-the-scenes" work by the team was carried out throughout 2020, which included furnishing the clinic, meeting infection control standards, implementing safe and secure processes, staffing the location with clerical and nursing staff, installing technology, acquiring heating and cooling systems, and communication to patients.

Dr. Beauprie's letter to the Chronicle Herald titled "*Clinic Takes Great Pains to ease Patient's Plight*" was accepted as the Letter of the Week in February 2021, outlining the great lengths that the pain management team has taken to ease the suffering of chronic pain patients amidst the compounding hurdles of the pandemic.

COVID-19 has impacted patient care, with the team only consulting with 685 new patients despite receiving 955 new referrals.



Anesthesiologists Dr. Adrienne Carr and Dr. Dolores McKeen were part of Nova Scotia's very first all-female transplant team.

The seven-member team was made up of a surgeon, a general surgery resident, two anesthesiologists and three nurses. Nova Scotia Health says the all-female transplant team was a first for the province and it is believed to be a first for the country.

The only man in the operating room that day was the patient.

"*It has been great to recognize this milestone and promote women in medicine, but I look forward to the day when this is the norm and not newsworthy*," said Carr.

From left to right are Jennifer Kidson, Dr. Ashley Drohan, Dr. Adrienne Carr, Dr. Dolores McKeen, Dr. Stephanie Hiebert and Antonia Mavrogiannis. Amber Kelly is in front. (*NSHA*)

Cardiac Anesthesia

Under the helm of Subspecialty Chief **Dr. Paula Kolysher**, the Cardiac Anesthesia team provides anesthesia care for all cardiovascular surgeries, including coronary bypass grafting (CABG), valve replacements and repairs, redo sternotomies, open and endovascular repair of thoracic / thoracoabdominal aortic aneurysms (TAA/TAAA), aortic root and/or arch repairs with deep hypothermic circulatory arrest (DHCA), insertion of right and/or left ventricular assist devices (RVAD/LVAD), and heart transplantation. The team has a comprehensive practice for transesophageal echocardiography (TEE) including 3-D TEE capability. They provide TEE service in the cardiac OR as well as in the cath lab, the main OR CVICU, and for all ECMO insertions.

In addition, the team provides anesthetic coverage in the cardiac cath lab for transcatheter aortic valve implantation (TAVI) as well as pacemakers and EP ablations. They also provide care in the emergency department with the cardiac surgery team for E-CPR, putting cardiac arrest patients on ECMO. This year additional anesthetic services were provided for structural heart closure, and the team will soon be carrying out mitral clip procedures. The team's services have also expanded during the pandemic to provide support for patients with COVID-19 requiring ECMO insertion/support in the ICU.

This year **Dr. Myron Kwapisz** finished up his role as chief of cardiac anesthesia. The team is grateful to Dr. Kwapisz for his excellent leadership over the last five years. **Dr. Kolysher** took over the role of Chief in April of 2021, for a three-year term.

During the last reporting period, the team implemented new large-volume smart pumps, which have been successful. New Agila syringe pumps were implemented in the fall of 2020. They are now used in all ORs and all ICUs. The team also secured three new Phillips EPIQ machines (one for each cardiac OR) to replace the old TEE machines resulting in significant improvements in picture quality and 3-D imaging.

Liver Transplantation Anesthesia

Led by Subspeciality Chief **Dr. Arnim Vlatten**, the Liver Transplantation Anesthesia team provides high quality, state-of-the-art care for patients undergoing liver and combined liver kidney transplantation. During the pandemic, the transplant program continued, only being placed on hold for a very brief period. The team maintains excellence in hemodynamic management by using TEE in all cases, unless contraindicated. It is continuously maintaining internal training opportunities, using teaching rounds and mini workshops.

The transplant anesthesiologist's assessment plays a significant role within the transplant team and the perioperative decision-making process. Compared with previous years, 2020 saw patients screened virtually, which removed a significant travel burden, especially for patients outside of Nova Scotia. The number of liver transplantations remained stable. As many as 30 liver transplants were performed last fiscal year, and this year saw 25 liver transplants, with patients being screened across all four maritime provinces.

Neuroanesthesia

Under the guidance of Subspecialty Chief **Dr. Carlo Mariotti**, the neuroanesthesia team provides 24 hour, high-quality, subspecialty anesthesia care for all patients undergoing neurosurgery at the QEII Health Sciences Centre. This involves a variety of cases including spine, cerebrovascular (CEAs, coil embolization, aneurysms/AVM), craniotomies (tumors/burr holes) and functional cases (SCS, transsphenoidal, DBS). Other cases such as biopsies, trigeminal compression, shunts, and vagal nerve are also performed, as well as the recent provision of anesthetics leadership for clot evacuations during code strokes for all after-hours cases.

The skilled team works closely with the neurosurgeons, interventional radiologists and nurses to provide exceptional patient care. They also provide care to patients needing MRI sedation/general anesthesia.

The team continues to strive to improve communication and efficiency in the neuro OR and performing more cases during the day shift, with less at night and after-hours. Surgical time-outs, communication, mutual respect, and high-quality care persist as great strengths for the group, with a focus on improving patient flow, standard exceptions around OR start times and turnover, and appropriate booking of cases as areas for enhancement.

An estimated 10-15% year-over-year increase in the number of code strokes is anticipated at the QEII. Neuroanesthesia has continued to cover the code stroke cases after-hours at night and on weekends. The new 24-hour AA coverage at the HI site has been a wonderful addition to the team and a great help with the after-hours code stroke cases.

The team has also introduced a pause and decompress discussion after a stressful event or a case that was particularly challenging or traumatic. This ensures that all the team members have a chance to debrief before moving on to the next case.

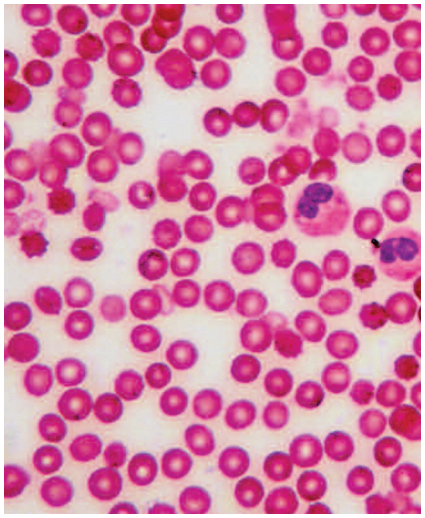
Looking forward, Neuroanesthesia priorities will remain centred on providing excellent patient care. The team will continue to ensure that all cases get started on-time and that there is excellent communication amongst all staff, particularly regarding surgical time-outs.

Blood Management Services

The Perioperative Blood Management (PBM) Program at the QEII Health Sciences Centre, led by Medical Director **Dr. Blaine Kent**, is a consult program that has become a standard of care over the past few decades, serving surgical patients 16 years of age and older. PBM patients may be inpatients or outpatients and are generally clients of the QEII Health Sciences Centre, Dartmouth General or the IWK Health Sciences Centre. As a quaternary care facility, the program occasionally provides services to other NSH sites outside of the QEII, and facilities in other Atlantic provinces.

The PBM program involves the use of multidisciplinary, multimodal, individualized strategies to minimize red blood cell (RBC) transfusion with the aim to improve the perioperative management of blood transfusion and adjuvant therapies and reduce the risk of adverse outcomes associated with transfusions, bleeding or anemia.

An estimated 10-15% year-over-year increase in the number of code strokes is anticipated at the QEII.



A primary focus of the program is preoperative anemia screening and management by initiating therapy weeks before elective surgery to optimize Hgb preoperatively and reduce transfusion risks. The newly approved use of Iron Isomaltoside in the perioperative setting has been a big accomplishment for the team in this respect.

- There were 515 new patients referred to the program April-2020 - March 2021 compared to 475 new patients the previous reporting period. (This includes patients from HI, VG, IWK W&O, and DGH*).

- Total number of both inpatient and outpatient iron infusions performed at the QEII (HI & VG) was 325.

* *Currently, DGH patients are assessed at the Halifax Infirmary (HI) site.*

The pandemic has caused disruptions in blood donation and a reduction in blood inventory. Blood utilization plans were instituted to adjust for the reduction in inventories and anemia by preoperatively optimizing hemoglobin for both the urgent and cancelled elective surgical patients. Blood management interventions have resulted in reduced exposure to allogenic blood components and products, length of stay, and morbidity.

Telehealth and virtual phone consults provided an innovative option for the team to offer assessment and patient care during the pandemic. This reduction in face-to-face contact helped to prevent and contain the spread of COVID-19.

Even with the COVID-19 pandemic, elective surgical patient referrals have increased over the past year. The number of urgent waitlist and emergency referrals have also increased, along with orthopedic referrals, as more arthroplasty surgeries are performed, annually.

The upcoming year is set to be a pivotal one for the program, with the development of a PBM program database and establishment of a perioperative anemia clinic.

Perioperative Medicine

Under the leadership of Medical Director **Dr. David MacDonald**, the Perioperative Medicine team operates pre-anesthesia clinics at both the HI and VG sites of the QEII, to evaluate, risk stratify and optimize outcomes for patients scheduled for elective surgery. While the function of these clinics is predominantly to assess patients scheduled for admission following surgery (same-day admission), clinic staff also assess high-risk or medically complex ambulatory surgical patients, based on screening.

Due in large part to Health Service Managers **Ms. Patty Jennex** (recently retired) and **Ms. Tanya Rodgers**, the pre-anesthesia clinics at the VG and HI sites made significant strides in 2020.

During the pandemic, the team was able to transition smoothly to conducting preoperative assessments via telephone. Depending on the risk profile at the time and the case load in the community, all or most patients were assessed via telephone.

The team worked with transfusion medicine to extend the timeline for preoperative type and screens. This allows patients of elective surgeries with very long wait times (e.g., total knee and total hip arthroplasty) to be booked into the clinics earlier and allows more time for optimization by extending the time between anesthesia assessment and surgery.

To reduce surgical site infections and improve the perioperative care of their diabetic patients, a preoperative diabetes management pre-printed order was created. This protocol was a multidisciplinary project with anesthesiology, general Internal medicine, endocrinology, pharmacy, and nursing. It allows for appropriate preoperative, long-acting insulin administration on the day of surgery, and correction-dosing when patients arrive hyperglycemic.

Looking forward to the year ahead, the perioperative medicine team has plans to focus on enhanced recovery after surgery (ERAS) and clinic modernization, setting their sights on rolling out a new questionnaire and testing grid provincially.

- On average, 297 patients were seen monthly (including phone consults) at the VG and 242 patients at the HI in 2020*.

  * *The discrepancy in patient numbers reflects the different case mix between sites. Total volume was down from the last reporting period as a result of the COVID-19 pandemic.*

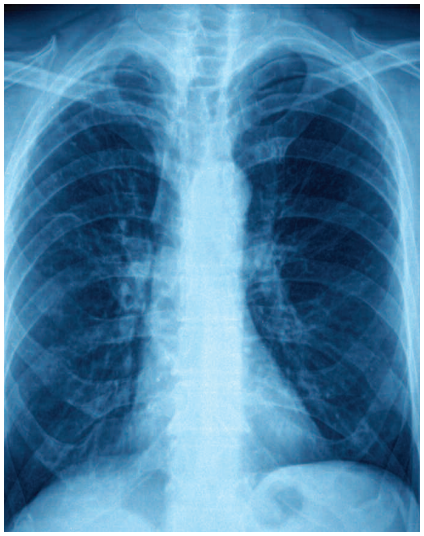
Thoracic Anesthesia

1.072 cases

Led by Subspeciality Chief **Dr. George Kanellakos**, the thoracic anesthesia team is dedicated to the care of all thoracic surgery patients at the QEII, the referral centre for adult thoracic surgery services in the Atlantic region. Surgical procedures facilitated by the team include, but are not limited to lung resection, bronchoscopy, pleuroscopy, decortication surgery, esophageal surgery, mediastinal mass resection, hiatal hernia reduction surgery, and thymectomy.

The Department is a leader in regional anesthesia services. This is reflected in thoracic surgical cases, with postoperative pain management being achieved with the use of surgically placed thoracic paravertebral catheter blocks. The thoracic anesthesia team continues to be a forerunner in Canada in the development and implementation of these blocks.

This year saw the introduction of new anesthesia machines in the thoracic anesthesia ORs. With the QEII redevelopment project, there is excitement brewing among team members regarding the creation of a new OR theatre. This significant change will go a long way in overcoming the challenge of modernizing how thoracic anesthesia services will be delivered.



The increased demand for thoracic anesthesia services has been met with an expansion of the team to a new high of 17 anesthesiologists

The increased demand for thoracic anesthesia services has been met with an expansion of the team to a new high of 17 anesthesiologists, with an additional team member expected to join the ranks in the near future. With an expanded group size and an influx of great people, the thoracic anesthesia team represents the largest subspecialty group in the Department.

The year ahead will mark a significant milestone for the thoracic anesthesia team. **Dr. David Watton**, who completed his thoracic anesthesia fellowship training at the University of Ottawa, will become the new head of the group, replacing Dr. Kanellakos who has led the team since 2012.

Horizon Health Network

Saint John Regional Hospital

6,498 OR cases
(SJH - **4,377** cases,
SHC - **1,470** cases)

In New Brunswick, anesthesia services are provided at the Saint John Regional Hospital (SJRH), St. Joseph's Hospital (SJH), and the Sussex Health Centre (SHC) under the leadership of **Dr. Todd Chedore**, Chief of Anesthesiology. The SJRH provides surgical services to the Saint John region and tertiary services to New Brunswick and some areas of Prince Edward Island. SJH and SHC are primarily used for outpatient day surgery, although, as of November 2020, the SJH has provided surgical services for total joint arthroplasties, which has significantly reduced waiting times for these procedures. The anesthesia team also provides coverage for an acute pain service, chronic pain clinic, obstetrical anesthesia and a preoperative assessment clinic in the region.

Daily anesthesia coverage is provided by 20 anesthesiologists for nine operating rooms at SJRH, including two cardiac operating rooms. Other services covered by the anesthesia team include neurosurgery, thoracic, vascular, orthopedics, general surgery, gynecology, urology, ENT, plastic surgery, and ophthalmology. Anesthesia services are also provided outside of the operating room, for cardiac electrophysiology procedures, ECTs, TAVIs, interventional radiology, MRI, neonatal hearing tests and pediatric oncology.

Despite the COVID-19 pandemic restrictions, the anesthesia team welcomed several anesthesia residents from Dalhousie University to complete rotations in Saint John throughout the year. The team also had several medical students and non-anesthesia residents complete rotations. A number of team members were preceptors for first- and second-year medical student electives through the Dalhousie Medicine New Brunswick program, and many respiratory therapy students from the New Brunswick Community College completed rotations with the anesthesia team.

The team is excited to recruit additional cardiac and chronic pain specialists in the near future.

Prioritizing Quality Improvement and Patient Safety

The Department focuses on patient quality and safety by having designated resources and anesthesia quality leads within the health authorities.

Nova Scotia Health Central Zone

Under the co-leadership of **Dr. Greg Dobson**, **Dr. Andrew Milne** and **Dr. Vanessa Sweet**, the office of Quality and Patient Safety monitors the quality and safety of all anesthesia care delivered through outcome and adverse event data collection, morbidity and mortality conferences, practice guideline development, quality office safety alerts and memos.

"As part of our team's ongoing quality monitoring, dozens of cases per year undergo very careful review for a variety of indications," explains Dr. Dobson. "This includes all patient deaths in the perioperative period and cases put through the Office's Critical Incident Review committee process." When required, the team makes recommendations to the Chair and to other disciplines for changes to policy and procedures as a result of their case review process.

The office maintains its own adverse/unexpected event reporting structure for staff to use and participates actively in the Safety Improvement and Management System (SIMS). Team members review case event entries that are referred to the office for review and follow-up by the hospital quality and risk management group. They track quality indicators and physiological data using data from their Automated Information Management System (AIMS) and uses the Intraoperative and Postoperative Nursing Database (HSM) to support data collection. The team continues to expand their ability to access laboratory data, such as blood transfusions, troponins and others as part of their outcome measurements and to support research.

This year, Dr. Dobson and Dr. Milne contributed to the updating and new release of the Guidelines to the Practice of Anesthesia. The team also created a "QTIPS" information bulletin board for issues identified from rounds and QI reviews. The bulletin boards are a useful source of educational information, guidelines, and key QIPS reference sources for our staff.

Looking forward, the team intends to expand its communication among department staff members. "This will keep staff up to date on our clinical outcomes and trends, both celebrating improvements as well as areas that may deserve focused QI projects and process change in the future," says Dr. Milne.

The team also intends to advance its refinement of the Innovian data to permit easily generated reports of common anesthesia clinical indicators and collaborate with strategic partners to enhance broader surgical data with Innovian data, including antibiotic prophylaxis timing and unexpected reintubations.

Nova Scotia Health Anesthesia QI and Patient Safety Team

Dr. Greg Dobson
Co-Medical Director

Dr. Andrew Milne
Co-Medical Director

Dr. Vanessa Sweet
DGH Quality Physician Lead

Mr. Paul Brousseau
Quality Officer and Data Analyst

"The Nova Scotia Health's Office of Quality Improvement and Patient Safety carries out work that is critical to the continuous improvement of patient care and safety and we are proud to be recognized as leaders in this regard within Anesthesia both locally and nationally."

Dr. Greg Dobson

IWK Health Centre

IWK Health Centre Quality Improvement & Patient Safety Team

Pediatric Anesthesia

Dr. Sally Bird
Medical Director of QI & Patient Safety, Pediatric Anesthesia

Women's and Obstetric Anesthesia

Dr. Ana Sjaus
Medical Director of QI & Patient Safety, W&O Anesthesia

Dr. Bruce Macaulay
Medical Director of Informatics, W&O Anesthesia

Both the IWK Women's and Obstetric Department of Anesthesia and the IWK Pediatric Department of Anesthesia have a long-standing commitment to patient safety and quality improvement with ongoing departmental and institutional participation in formal Quality Assurance (QA) / Quality Improvement (QI) programs.

The W&O and the pediatric QI & patient safety teams both track adverse events, critical incidents and patient centred outcome measures related to the provision of anesthesia services.

The W&O team conducts periodic review of these events during monthly anesthesia morbidity and mortality rounds that are conducted in conjunction with the Nova Scotia Health Anesthesia Office of Quality Improvement and Patient Care, as cases arise. The team participates in formal institutional QA / safety reviews with the Child/ Birth Care Team (CBCT) and the Quality & Patient Safety Committees. Many of these activities were curtailed by the pandemic, although some continued to be conducted virtually, where possible.

The Children's Health Program Perioperative QI/PS Committee is multi-disciplinary and meet every second month to review adverse event data, review specific cases as necessary, and create corrective action plans to address any identified deficits. This is a relatively young committee as the process and committee were completely revised in late 2019, just before the onset of the pandemic.

In addition to work on this committee, the pediatric anesthesia department has instituted an anonymous adverse event card reporting system which allows any staff member to report an event of concern completely anonymously. This initiative has been adopted enthusiastically by both the OR and day surgery/PACU team. Different from official SIMs, it allows **Dr. Sally Bird** and team to review and collect data on events such as emergence agitation, poorly timed sedation/analgesia, and other issues of importance to pediatric anesthesia, but not necessarily at the level of official SIMs reporting.

Despite the sweeping impacts of the pandemic both QI & PS teams at the IWK have had many successes.

Despite the sweeping impacts of the pandemic both QI & PS teams at the IWK have had many successes. Most notably for the W&O team is the longstanding work by **Dr. Macaulay** on data collection of post-partum post dural puncture headache (PDPH) and neurologic complication. This year the W&O anesthesia team also worked, and continue to work, towards establishing a robust obstetric anesthesia quality improvement audit program. Missing data and inconsistent paper collection/ data entry were identified as barriers to generate quality metrics of reported post-partum complications of PDPH and neurologic injuries. As a result, an initiative to migrate from paper and create an electronic data base was undertaken. RedCap, a secure institutionally supported electronic online database was utilized with collection instruments developed by **Dr. Ana Sjaus**.This ensured patient confidentiality and ease of analysis, in addition to improving the consistency of the data collection process.

Elective obstetric caesarean delivery processes and case booking was also flagged as a priority for the W&O group. The team undertook several initiatives to identify efficiencies toward optimal staffing and OR bookings and prevent sequential impacts causing preadmission clinic delays. Improvements in care, patient comfort and minimizing prolonged fasting/preoperative wait times were also a main area of focus.

Since the onset of the pandemic, the pediatric anesthesia quality improvement & patient safety team has devoted much of its time to learning about COVID-19 and developing best practice protocols for how to deliver safe, excellent patient care, while maintaining the personal safety of all the health care professionals involved. Airway management situations, such as intubation, pose one of the most high-risk times for aerosol generation and the potential spread of the virus. To address this, training and simulation exercises on airway management in a COVID-safe manner was provided by Dr. Bird and **Dr. Scott Drysdale**, through a newly formed COVID-19 Airway Team (CAT), ensuring that all hospital staff were ready to respond safely whenever they were called upon.

Looking forward, the IWK Health Centre quality improvement & patient safety teams have several upcoming initiatives. The W&O group has agreed to pursue a centers of excellence (COE) designation for anesthesia care of obstetric patients. Dr. Sjaus who co-facilitates IWK EPIQ workshops has plans to qualify as a master facilitator in the future.

The pediatric team is dedicated to the development of perioperative checklists for urgent NICU cases to address some gaps in care recently identified. The team is also developing a simulation program for the perioperative team that targets rare but also catastrophic perioperative events.

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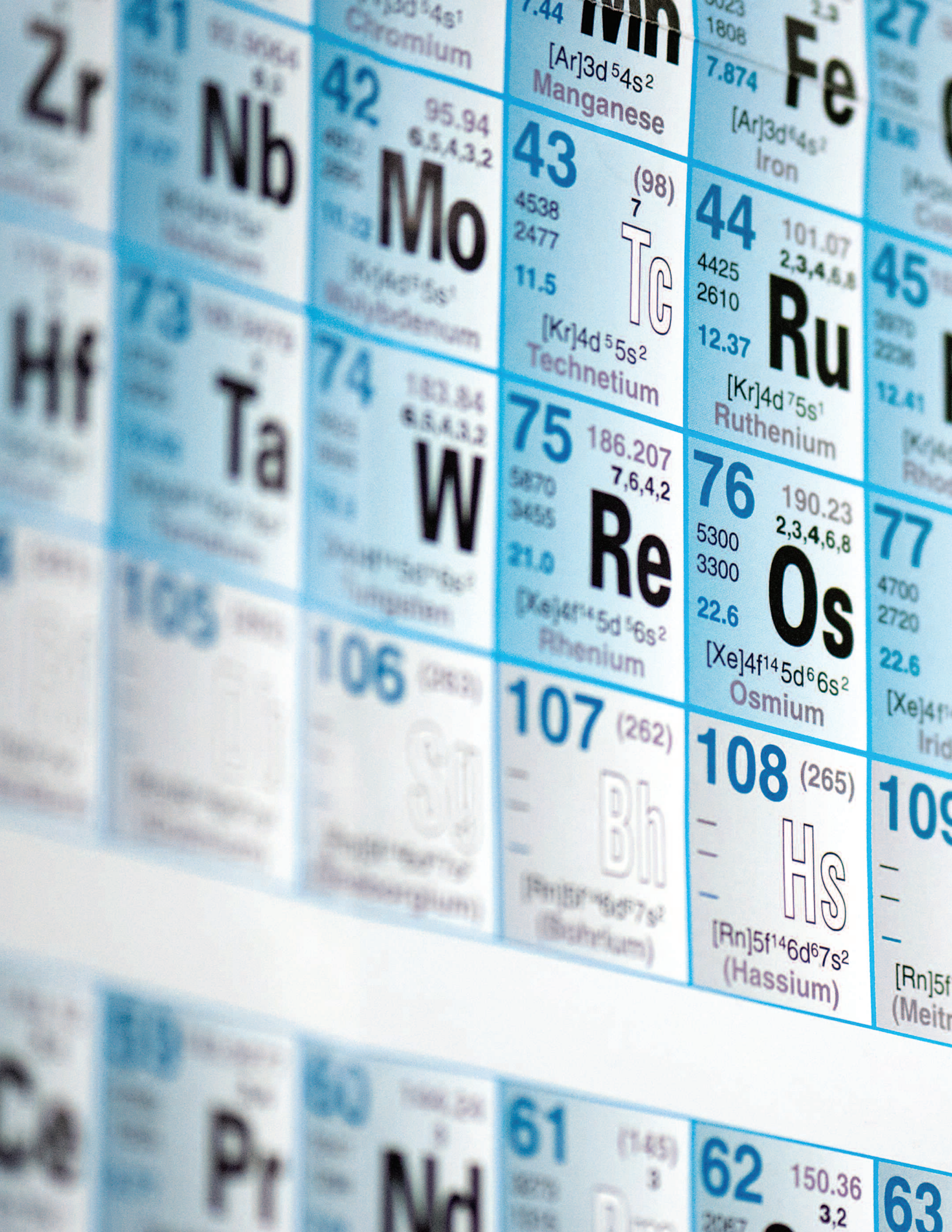
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Transformational Education

Office of Education

The Office of Education coordinates anesthesia educational opportunities for undergraduate students, residents, fellows and faculty.

As the prolonged realities of the pandemic set in, the office worked promptly and passionately to safeguard the exceptional educational experiences that others have come to expect in the Department.

"With my term as medical director of education coming to a close, I could not be more proud of the tenacity and dedication demonstrated by the members of the education team, particularly over the last 12 months," says **Dr. Narendra Vakharia**. "Despite the unavoidable impacts that the COVID-19 pandemic has had on our regular programming – having to transition both CaRMS and our Grand Rounds to a virtual environment – the team switched gears and were able to accommodate new training and facilitation demands in a matter of weeks."

"On top of responding to the additional demands of the pandemic, the education team were successful in carrying out a record number of achievements this year, thanks in large part due to the active leadership of Dr. Vakharia" says **Ms. Laura Harris Buffett**. "I am incredibly grateful to Dr. Vakharia for his commitment and mentorship during his tenure as medical director of education."

When COVID prevented in-person grand rounds, Dr. Mullen spearheaded the considerable undertaking of transitioning the educational sessions to a virtual environment. The grand rounds have been held virtually since May 2020, with great success, enabling greater accessibility for presenters and participants. The transition to virtual has received such great praise from department members, that we will likely continue to employ a virtual (or a hybrid model) for the grand rounds into the future.

Fellowship Program

- **5** fellowships

Postgraduate Education

- **5** anesthesia residents
- **41** Off service and visiting elective postgraduate residents in NSH Central Zone
- **11** Off service and visiting elective postgraduate residents at the IWK (peds)
- **1** Off-service resident, SJRH in Saint John, NB

Undergraduate Education

- **78** medical students (**37** Med 1 and 2, **20** Med 3, **21** Med 4)
- **687** Undergraduate teaching hours
- **40** Faculty involved in undergrad teaching

Subspecialties – **53** learners

- **10** Anesthesia Assistants – **4** NSH and **6** IWK
- **15** Advanced Care Paramedic/ Primary Care Paramedic
- **1** Practice Ready Assessment
- **1** Maxillofacial surgeon
- **12** Respiratory Therapy
- **12** Registered Nurses
- **2** Dentistry learners (IWK)
- **39** Grand round sessions
- **2** Journal clubs hosted

Leadership Team

Ms. Laura Harris Buffett, Managing Director, Education

Dr. Narendra Vakharia, Medical Director, Education

Dr. Robyn Doucet, Program Director, Postgraduate

Dr. Shannon Bradley, Associate Program Director, Postgraduate

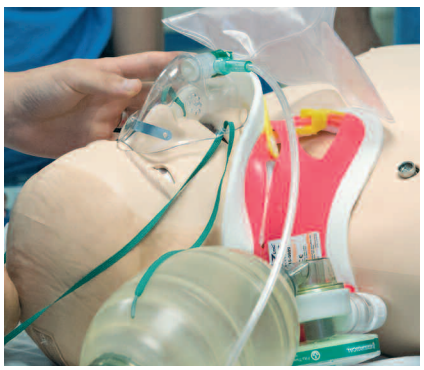
Dr. Adrienne Carr, Medical Director, Undergraduate

Dr. Cathy Delbridge, Medical Director, Simulation

Dr. Patty Livingston, Medical Director, Global Health

Dr. Tim Mullen, Medical Director, Fellowship and Continuing Professional Development

Dr. Karim Mukhida, Post Graduate Program Scholarly Project Director



The team worked hard to improve the existing Competency-based Medical Education Program (CBME) to ready a fully updated CBME 2.0.

Transitioning to a virtual reality

Last year, border closures due to COVID-19 restrictions limited the Department to welcoming only elective students who were attending Dalhousie University and residing in Nova Scotia. As a national requirement, the Canadian Resident Matching Service (CaRMS) also needed to be conducted entirely online. The education team researched virtual platforms and employed a solution to synchronize live multiple mini-interviews. They were one of the first to use this format, which was well-received as an easy-to-use, intuitive platform in feedback from both candidates and interviewers.

Optimizing care in times of COVID-19 and beyond

In addition to adjusting regular programming, 2020-2021 saw team members facilitate simulations and continuing professional development activities around point of care ultrasound (POCUS) and crisis resource management related to COVID-19, to meet the developing needs of the Department and optimize patient care.

Filling the national talent gap for anesthesia services

In response to a call from provincial leaders to help rectify the current national shortage of anesthesia services, **Dr. Robyn Doucet** and **Dr. Adrienne Carr** and team have worked diligently over the past year, ramping up training for anesthesia assistants and co-ordinating a distributed residency pilot program. The transfer resident that has to participate in the pilot program will be based in Halifax, but will be completing much of their residency in community settings, with rotations in Cape Breton and New Brunswick within the first year.

Ms. Jessie Purvis has also worked hard behind the scenes to ensure a rewarding experience for an internationally-training anesthesiologist who underwent a 12-week practice ready assessment (PRA) with the Department from April to June 2021. This process enabled individuals who are internationally trained, but not Royal College exam eligible, to obtain a defined license to practice in Nova Scotia.

Improving outcomes-based curriculum

The team worked hard to improve the existing Competency-based Medical Education Program (CBME) to ready a fully updated CBME 2.0. This involved a fulsome review of the program, included two retreat-style events with participation of staff and residents, as well as a documentation audit and solicited feedback from those enrolled in the Fundamental Innovations in Residency Education grant, which enabled the team to launch CBME a year ahead of the national roll-out. The review resulted in a revamp of all modules with the goal of maintaining the educational value while reducing the overall administrative load on residents, faculty, the competence committee, and office administrative staff. The team has successfully streamlined the ePortfolio and created a system to ensure an appropriate transition, and created a number of new assessments, in addition to refining existing ones to improve the feedback that residents receive and make it easier for them to collect their evidence to achieve required entrustable professional activities.

Prioritizing wellness in the workplace

Led by **Dr. Tracy Kok**, this past year the wellness committee has grown to encompass 16 members, including representatives from the residents, Saint John and Hants sites. The main goals have been to determine the wellness needs of the Department and address what was felt to be beneficial to the various groups.

In order to increase the feeling of community during isolation, the committee created a private department Facebook group. Well-attended wellness grand round sessions were held on topics of physician suicide (**Dr. Simon Sherry**) and burnout (**Dr. Michael Leiter**). Resident R&R (reflection and rejuvenation) sessions began in July 2020, allowing a safe space for residents to discuss experiences during their training with a staff anesthesiologist. Upcoming projects include an informal recognition strategy to increase appreciation within the Department and focused interventions to deal with burnout. The pandemic has been tough for many, in different ways. The wellness committee hopes to move forward and continue to improve the wellness of the Department members in tangible ways.

Residents and Fellows

In 2021, five residents and five fellows completed learning milestones with the Department.

CONGRATULATIONS TO:

FELLOWS

Dr. Ahmed Al Faraj

Cardiac Anesthesia & Perioperative Transesophageal Echocardiography

Dr. Osama Al-Nasser

Pediatric Anesthesia

Dr. Akua Gyambibi

Regional Anesthesia & Acute Pain

Dr. James McAlpine

Airway Management

Dr. Graeme McBride

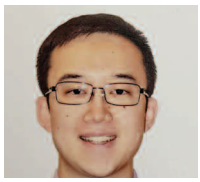
Academic Advanced Clinical Practice with a focus on trauma

RESIDENTS

Dr. Leo Fares

Dr. Stephen Middleton

Dr. Andrew Suen



Dr. Haotian Wang

Dr. Chrison Wong

This is the first cohort to graduate under the new Competency-based medical education (CBME) model.

Research, Innovation and Discovery

Relevant research, impactful patient care – that's what the Department's office of research is all about. The office of research consists of a purposefully driven team that strives for quality research, best ethics and equity, diversity, and inclusion practices. As researchers, they are committed to working together with statistical consultants and patients to find evidence-based solutions leading to the best possible pain management and perioperative care for our Maritime families and global communities.

The last year was unprecedented, different, and unique. Unprecedented, since the world faced a new virus responsible for COVID-19 pandemic. Different, because the team had to change the way they live, work – and do research. As a result, the Department experienced an increase in research activities – clinical and experimental – based on a culture of curiosity and research support established by the leadership of **Dr. Orlando Hung**, former Medical Research Director.

'When I took over his responsibility in December 2020, I joined a team of highly qualified, motivated staff and researchers" said **Dr. Christian Lehmann**, Medical Director, Research. "The work with this team is inspiring, rewarding, fun – and very successful so far! I am happy to give some of the support I received from the Department in the past back to young investigators and collaborate with all the researchers in the Department to continue successful research in the future."

Leadership Team

Dr. Heather Butler, PhD
Managing Director, Research

Dr. Christian Lehmann
Medical Director, Research (Dec '20)

Dr. Tristan Dumbarton
Associate Director, Pediatric Anesthesia

Dr. Orlando Hung
Medical Director, Research

Dr. Jason McDougall, PhD
Associate Director, Tupper site

Dr. Allana Munro
Associate Director, Women's and Obstetric Anesthesia

Dr. Vishal Uppal
Associate Director, Central Zone Adult

As the pandemic drastically altered the Department's day-to-day operations, our team quickly and collectively transformed their practices to accommodate and prioritize relevant research that would bear significant impact on the quality of care provided to patients during these extraordinary times.

Dr. Heather Butler

Dr. Ana Sjaus conceived a design for an intubation/extubation shield to protect anesthesia staff from a potential Covid-19 exposure during the most high-risk points of interoperative anesthesia.

Airborne pathogen containment device – development and testing

Dr. Ana Sjaus conceived a design for an intubation/extubation shield to protect anesthesia staff from a potential Covid-19 exposure during the most high-risk points of interoperative anesthesia.

With support from colleagues **Dr. Allana Munro**, **Mr. Matt d'Entremont**, **Dr. Orlando Hung**, and **Dr. Dolores McKeen**, Dr. Sjaus designed an actively vented device that is easy to store and could be deployed readily. In addition, the device is fully disposable and ergonomically designed while protecting both the person performing intubation/extubation and the assistant.

Following successful proof of concept stage, the prototype development is now complete. Containment testing has revealed that the device is effective in a multitude of ambient ventilation environments (both the negative and positive pressure rooms). Large scale simulation testing is well under way and will be followed by a randomized clinical trial in the fall of 2021. Regulatory approval will be sought once safety data is available.

Device development and testing have been generously supported by the Nova Scotia COVID Coalition Grant, Canadian Anesthesiologists' Society and Canadian Anesthesia Research Fund, IWK Research Project Grant and the Dalhousie Anesthesia Research Fund.

Neuraxial anesthesia and peripheral nerve blocks during the COVID-19 pandemic

Dr. Vishal Uppal published international consensus – recommendations for performing regional anesthesia procedures in patients with suspected or confirmed COVID-19 infection.

The undertaking involved hundreds of hours of work within a short period of time and was part of an international collaboration involving contributors from USA, UK and Canada (including members from ASRA and SOAP). It was felt that regional anesthesia is the preferred choice for providing anesthesia care as it reduces the associated risk from aerosol-generating procedures.

The recommendations focus on seven specific domains, including: planning of resources and staffing; modifying the clinical environment; preparing equipment, supplies, and drugs; selecting appropriate personal protective equipment; providing adequate oxygen therapy; assessing for and safely performing regional anesthesia procedures; and monitoring during the conduct of anesthesia and post-anesthetic care.

The guidelines were extremely timely and have been used extensively worldwide. They have already been cited more than 50 times.

Managing patients with chronic pain during the Covid-19 outbreak

Along with pain management peers, **Dr. Mary Lynch** studied considerations for the rapid introduction of remotely supported (e-health) pain management services as a means of managing chronic pain for patients during the pandemic.

The study determined that COVID-19 public health restrictions, and the resulting reductions in access to care led to significant collateral damage for people with chronic pain conditions. Despite the efforts of clinics scrambling to put distance treatment options into place to deliver care, patients ended up waiting longer for access to care with increased levels of pain, stress, and medication use (particularly opioids and cannabinoids). Consequently, in their work, Dr. Lynch and her colleagues emphasized the importance of developing distance treatment options further.

Computerized assessment for Post-Operative Cognitive Decline (POCD) in elderly populations

Older adults are most at risk of significant post-operative changes in cognition after surgery with anesthesia. Despite potential long-lasting complications and costs of post-operative cognitive dysfunction (POCD), there is no consistent and easy method of assessment to identify risk of developing POCD and monitor long-term outcomes. **Dr. Michael Schmidt** and team are working to change that. They are developing a standard cognitive test to measure a patient's risk of development of POCD. This test can provide the attending anesthesiologist information so that they can work together with older patients to make more informed decisions regarding their care pathway.

The team has been conducting research using the Dalhousie Computerized Attention Battery (DalCAB) to measure a patient's risk of developing POCD. DalCAB is a short, validated, computerized and web-based assessment tool for cognition that can be completed remotely.

Another phase of the study was funded this year via a Translating Research into Care (TRIC) grant. In this phase of the research, the team will also be comparing surgical patients to a community sample. Targeted efforts to reach a diverse community sample will help ensure that the DalCAB is usable by the general population and will improve the generalizability of the research findings.

Orlando Hung Innovation Fund

This year, the Department announced the establishment of a new funding award called the Orlando Hung Innovation Fund (OHIF). In recognition of Dr. Hung's insatiable spirit for innovation, invention, and continuous improvement, this award will offer $10K, with possible protected time, to a successful applicant in support of a research initiative related to clinical, educational, or administrative innovation.

Pandemic-related factors predicting physician burnout beyond established organizational factors

Dr. Jon Bailey and team conducted a study to determine which pandemic-specific factors contribute to physician burnout during the COVID-19 pandemic response. Dr. Bailey was joined by other members of the Department of Anesthesia, Pain Management & Perioperative Medicine, including **Dr. Michael Wong**, **Dr. Jillian Banfield**, **Dr. Garrett Barry**, and **Dr. Allana Munro**.

The study surveyed Canadian physicians during the early months of COVID-19 and focused on pandemic-specific factors that may be particularly important during a prolonged pandemic response. Key findings of the study concluded that physician burnout is associated with negative personal consequences and has a negative effect on patient care.

To mitigate physician burnout, the study concluded that organizations should focus on improving working conditions, ensure adequate resources, foster perceived control of risk of transmission, and communicate clearly regarding level of risk.

Key findings of the study concluded that physician burnout is associated with negative personal consequences and has a negative effect on patient care.

Key Findings:

- 309 respondents from across the country (43% from Nova Scotia).
- 34.6% respondents indicated they were burned out: showing high levels of exhaustion, cynicism, and inefficacy.
- Improved work life is associated with decreased levels of burnout among physicians.
- Each item within the Areas of Work life Scale represents a target for intervention: manageable workhours, working within one's area of competence, decisions are supported by the institution, one's efforts are appreciated, respect of colleagues, fair work assignments, and alignment of priorities between the physician and the hospital/government.
- Decreased preparation, increase contact with the virus, and increased perception of risk were associated with greater levels of burnout.

Celebrating Achievements

Teaching Awards

Dr. Vanessa Sweet
Undergraduate Teacher of the Year

Dr. Jon Bailey
Clinical Teacher of the Year Award

Dr. Ben Cairns
New Brunswick Clinical Teacher of the Year Award

Dr. Karim Mukhida
Mentor/Role Model

Dr. Shannon Bradley
Resident Advocate of the Year

Dr. Haotian Wang
Resident Teacher of the Year

Dr. Hilary MacCormick
Certificate of Appreciation – DEC

Dr. Parvinder Sodhi
Certificate of Appreciation – ITAR

Thank you to all members of the Department whose commitment and hard work are fundamental to the Department's ability to deliver high-quality training and education.

Awards of Excellence

In 2020-21, several Department members were singled out for their expertise and leadership:

Dr. Vishal Uppal
Individual Award of Excellence (internal)

Pediatric Day Surgery/Recovery Team
Team Award of Excellence

Mr. Sergey Burkovskiy
Dale Morrison Memorial Award for an Anesthesia Technician

Mr. Corry Fitzgerald
Dale Morrison Memorial Award for an Anesthesia Assistant

Dr. Dolores McKeen
Dr. Tom Marrie Leadership Award

Ms. Jean Murray
Individual Award of Excellence (external)

A new award was bestowed in 2020 to recognize team members for their achievement during the pandemic:

CoVART Team
Pandemic Preparedness Team Award of Excellence


nova scotia
health authority
Department of Anesthesia and Pre-Admission Anesthesia Clinic
Perioperative Assessment and
Anesthesia Record
Surgery / Procedure Planned:
Sx Date
Meds:
None
Allergies:
Previous Surgery:
Anesthetic Hx/FHx:
Neg Hx
PONV
Functional Inquiry (circle
Cardiovascular
Angina
MI
CHF
Hypertension
Valvular
Conduction Block
Arrhythmia
Other
Gastrointestinal
"Full Stomach"
Gastritis/Ulcer
Reflux
Hiatal Hernia
Hepatitis
Liver Dysfunction
Central Nervou
Raised ICP
CVA/TIA
Epilepsy
Psychological Illness
Narcotic Tolerance
Musculoskeletal
Rheumatoid Arthritis
Osteoarthritis
Cervical Spine
Other
Sleep Apnea
Anaesthesia Record
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MADE IN GERMANY

Appendix A

2020 New Funded Research Projects

1. D'Entremont M, Milne AD (2020-2021). COVID Intubation Hood [Grant] – Springboard – $25,000.

2. 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.

3. 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 Rochwerg, 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.

4. 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.

5. 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.

6. Lynch M (2020). Annual Atlantic Pain Conference (virtual) [Donation] – Exhibitor support and registrations – $9,462.

7. Lynch M, Curwin G (2020-2021). Identifying Sensory Properties of meal replacement beverage [Grant] – NSBI Productivity Innovation Voucher Program – $15,000.

8. Lynch M, Curwin G (2020-2021). Sterile Plant Based Beverage [Grant] – IRAP/NRC IRAP Program – $78,805.

9. Lynch M, Curwin G (2020). Plant Based Meal Replacement Beverage Consultation [Grant] – ACOA/CEED Consultant Advisory Services (CAS) – $5,000.

10. Lynch M, Curwin G (2020). Website & E-Commerce platform development [Grant] – Natural Products Canada Fast Track to Financing – $11,250.

11. Milne AD, Uppal V, Gillis A, Brousseau P (2021-2022). A comparitive cost analysis of Memsorb and Dragersorb for routine anesthesia use at NSHA: A pragmatic observational study [Grant] – NSHARF – $25,104.

12. Mukhida K (2020). Chronic pain management for patients with addictions [Grant] – Royal College of Physicians and Surgeons of Canada – $1,500.

13. 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.

14. Schmidt M, Dunnington J, Eskes G (2021-2023). Computerized Assessment for Post-Operative Cognitive Decline (POCD) in Elderly Populations [Grant] – NSHA – $59,771.

15. 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.

16. 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.

14. 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.

18. 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.

19. 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.

Scholarly Projects (Unfunded)

1. Atkins N, Mukhida K (2020-2022). The effect of socio-economic status and COVID-19 on chronic pain management in Nova Scotia [Clinical]
2. 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]
3. Bonin K, Oprea A, Mukhida K (2020 -2021). The effects of COVID-19 on chronic pain management for patients with addictions [Clinical]
4. 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]
5. 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]
6. Kwofie MK (2020-2022). COVID Airway Provider PPE Use and Outcomes Registry (Intubate-COVID.org) [Database]
7. 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]
8. Lynch M (2020-2021). Development of a Transitional Pain Service [Development and Innovation]
9. Lynch M (2020-2021). National survey of pain clinic responses during Covid-19 [Clinical]
10. Poltarowicz J, Mukhida K (2021). Airway management for patients undergoing surgery for cervical myelopathy [Database]
11. Sedighi S, Mukhida K (2020-2021). Cinemeducation and chronic pain [Medical Education or Training]
12. Verge A, Mukhida K (2021). Analysis of closed civil legal cases involving interventional pain management in Canada [Clinical]
13. 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]
14. Wiseman L, Mukhida K (2020-2021). The effect of preoperative cannabis use on postoperative visceral pain [Clinical]

Appendix B

Peer Reviewed Journal Publications

1. Aali M, Caldwell A, Li A, Hobein B, Chappe V, Lehmann C (2020). DIBI, A Novel Polymeric Iron Chelator Modulates IL-6 and IL-8 Secretion from Cystic Fibrosis Airway Epithelial Cells in Response to Endotoxin Induction. *Journal of Cellular Biotechnology*, 1-10. [published].
2. Abadesso C, Pacheco S, Machado MC, Finley GA (2020). Pain in Children and Adolescents with Sickle Cell Disease: Multi-dimensional Assessment. *Journal of Pediatric Hematology and Oncology*, 42(8), 455-462. [published] DOI: 10.1097/MPH.0000000000001941.
3. Alizadeh-Tabrizi N, Hall S, Lehmann C (2020). Intravital Imaging of Pulmonary Immune Response in Inflammation and Infection. *Frontiers in Cell and Developmental Biology*, 8, 620471. [published] PubMed ID: 33520993.
4. Bailey JG, Morgan C, Christie R, Ke J, Kwofie MK, Uppal V (2020). Continuous Peripheral Nerve Blocks (CPNBs) Compared to Thoracic Epidurals or Multimodal Analgesia for Midline Laparotomy: A Systematic Review and Meta-Analysis. *Korean Journal of Anesthesiology*. [published] PubMed ID: 32962328.
5. Barry G, Bailey JG, Sardinha J, Brousseau P, Uppal V (2020). Factors Associated with Rebound Pain After Peripheral Nerve Block for Ambulatory Surgery. *British Journal of Anaesthesia*. [published] DOI: 10.1016/j.bja.2020.10.035.
6. Barry G, Uppal V (2020). Management of Pain After Cesarean Delivery Without Intrathecal Morphine: Networking for the Best Answer. *Canadian Journal of Anaesthesia*. *Journal Canadien d'Anesthesie*. [editorial - published] PubMed ID: 33021726.
7. Choinière M, Peng P, Gilron I, Buckley N, Williamson O, Janelle-Montcalm A, Baerg K, Boulanger A, De Renna T, Finley GA, Intrater H, Lau B, Pereira J (2020). Accessing Care in Multidisciplinary Pain Treatment Facilities Continues to be a Challenge in Canada. *Regional Anesthesia and Pain Medicine*, 45, 943-948. [published] DOI: 10.1136/rapm-2020-101935.
8. Chrimes N, Higgs A, Law JA, Baker PA, Cooper RM, Greif R, Kovacs G, Myatra SN, O'Sullivan EP, Rosenblatt WH, Ross CH, Sakles JC, Sorbello M, Hagberg CA (2020). Project for Universal Management of Airways - Part 1: Concept and Methods. *Anaesthesia*, 75(12), 1671-1682. [published] PubMed ID: 33165958.
9. d'Eon B, Hackmann T, Wright S (2020). The Addition of Intravenous Propofol and Ketorolac to a Sevoflurane Anesthetic Lessens Emergence Agitation in Children Having Bilateral Myringotomy with Tympanostomy Tube Insertion: A Prospective Observational Study. *Children* (Basel, Switzerland), 7(8). [published] PubMed ID: 32824173.
10. Dickson K, Malitan H, Lehmann C (2020). Imaging of the Intestinal Microcirculation During Acute and Chronic Inflammation. *Biology* (Basel), 9(12), 418. [published] DOI: 10.3390/biology9120418.
11. Eccleston C, Blyth FM, Dear BF, Fisher EA, Keefer FJ, Lynch ME, Palermo TM, Reid MC, Williams AC de C (2020). Managing Patients with Chronic Pain During Covid-19 Outbreak: Considerations for the Rapid Introduction of Remotely Supported (E-health) Pain Management Services. *Pain*, 161(5), 889-893. [published] DOI: doi: 10.1097/j.pain.0000000000001885.
12. Fokam D, Aali M, Dickson K, Scott C, Holbein B, Zhou J, Lehmann C (2020). The Novel Iron Chelator, DIBI, Attenuates Inflammation and Improves Outcome in Colon Ascendens Stent Peritonitis-induced Experimental Sepsis. *Clinical Hemorheology and Microcirculation*, 76(2), 241-261. [published] PubMed ID: 32925011.
13. Fokam D, Dickson K, Kamali K, Holbein B, Colp P, Stueck A, Zhou J, Lehmann C (2020). Iron Chelation in Murine Models of Systemic Inflammation Induced by Gram-Positive and Gram-Negative Toxins. *Antibiotics* (Basel, Switzerland), 9(6). [published] PubMed ID: 32466384.
14. Higgins KS, Chambers CT, Rosen NO, Sherry S, Mohammadi S, Lynch ME, Campbell-Yeo M, Clark AJ (2020). Child Catastrophizing About Parent Chronic Pain: A Potential Child Vulnerability Factor. *Br J Health Psychology*. [published].
15. Hung O (2020). Can't See for Looking: Tracheal Intubation Using Video-laryngoscopes. *Canadian Journal of Anesthesia*, 67, 505-510. [editorial - published] DOI: 10.1007/s12630-020-01585-9.
16. Hung O, Hung D, Hung C, Stewart R (2020). A Simple Negative Pressure Protective Barrier for Extubation of COVID-19 Patients. *Canadian Journal of Anesthesia*, 67(10), 1478-1480. [published] DOI: 10.1007/s12630-020-01720-6.
17. Hung O, Lehmann C, Coonan T, Murphy M, Stewart R (2020). Personal Protective Equipment During the COVID-19 Pandemic (Letter #2). *Canadian Journal of Anaesthesia. Journal Canadien d'Anesthesie*, 67(11), 1649-1650. [letter to the editor - published] PubMed ID: 32779004.
18. Johnston DF, Sondekoppam RV, Uppal V, Litchfield R, Giffin R, Ganapathy S (2020). Effect of Combining Peri-Hamstring Injection or Anterior Obturator Nerve Block on the Analgesic Efficacy of Adductor Canal Block for Anterior Cruciate Ligament Reconstruction: A Randomised Controlled Trial. *British Journal of Anaesthesia*. [published] PubMed ID: 31980156.
19. Ke JXC, Kothari R, McKeen D, Bainbridge D (2020). Assessing Resident Member Needs at the Canadian Anesthesiologists' Society: A National Survey. *Canadian Journal of Anaesthesia. Journal Canadien d'Anesthesie*. [published] PubMed ID: 32803469.
20. Kothari R, Ke J, McKeen DM, Bainbridge D (2020). Professional Advocacy and Citizenship: A Continuing Journey that Begins During Residency. *Canadian Journal of Anesthesia*, 1-4. [published] PubMed ID: 32794064.
21. Kwofie MK (2020). Effective Treatments for Pain in the Older Patient (book review). *Anesthesia & Analgesia*, 130(5), 128. [published] DOI: 10.1213/ANE.0000000000004685.
22. Kwofie MK, Uppal V (2020). Wrong-site Nerve Blocks: Evidence-review and Prevention Strategies. *Current Opinion in Anesthesiology*. [review - published] PubMed ID: 32826627.
23. Latimer M, Sylliboy JR, Frances J, Amey S, Rudderham S, Finley GA, MacLeod E, Paul K (2020). Co-creating Better Healthcare Experiences for First Nation Children & Youth: The FIRST Approach Emerges from Two-Eyed Seeing. *Paediatric & Neonatal Pain*, 2,104-112. [published] DOI: 10.1002/pne2.12024.
24. Lim M, O'Grady C, Cane D, Goyal A, Lynch M, Beyea S, Hashmi JA (2020). Schemas Induce Enduring Perceptual Bias in Pain Perception. *Journal of Neuroscience*, 40(7), 1538-1548. [published].
25. Lucena F, McDougall JJ (2020). Pain Responses to Protease-activated Receptor-2 Stimulation in the Spinal Cord of Naive and Arthritic Rats. *Neuroscience Letters*, 739. [published].

26. Lynch ME, Williamson OD, Banfield JC (2020). COVID-19 Impact and Response by Canadian Pain Clinics: A National Survey of Adult Pain Clinics. *Canadian Journal of Pain*, 4(1), 204-209. [published] DOI: 10.1080/24740527.2020.1783218.

27. Malpas G,Kovacs G, Mackinnon SP, Hung O, Phipps S, Kovac G, Law JA (2020). The Videoscopic View may not be Significantly Superior to the Directly Sighted Peroral View During Macintosh-style Videolaryngoscopy: A Randomized Cadaver Trial. *Canadian Journal of Anaesthesia. Journal Canadien d'Anesthesie*, 67(7), 827-835. [published] PubMed ID: 32291634.

28. McKeen DM, Banfield JC, McIsaac DI, McVicar J, McGavin C, Earle MA, Ward C, Burns KK, Penner D, Blaise G, de Greef T, Cowan K, Laupacis A (2020). Top Ten Priorities for Anesthesia and Perioperative Research: A Report from the Canadian Anesthesia Research Priority Setting Partnership. *Canadian Journal of Anaesthesia/Journal Canadien d'Anesthesie*, 67(6), 641-654. [published] PubMed ID: 32157588.

29. McKenna MK, McDougall JJ (2020). Cannabinoid Control of Neurogenic Inflammation. *British Journal of Pharmacology*, 177, 4386-4399. [published].

30. Milne AD, D'Entremont MI, Law JA (2020). COVID-19 Airway Management Enclosure Evacuation Flow Rates and Post-Aerosol Pause Times. *Canadian Journal of Anesthesia*, 67(11), 1670-72. [letter to the editor - published] PubMed ID: 32588271.

31. Mosier JM, Sakles JC, Law JA, Brown CA, Brindley PG (2020). Tracheal Intubation in the Critically Ill: Where We Came from and Where We Should Go. *American Journal of Respiratory and Critical Care Medicine,* 201(7), 775-788. [published] PubMed ID: 31895986.

32. Mukhida K, Carroll W, Arseneault R (2020). Does Work Have to be so Painful? A Review of the Literature Examining the Effects of Fibromyalgia on the Working Experience from the Patient Perspective. *Canadian Journal of Pain*, 268-286. [review - published] DOI: 10.1080/24740527.2020.1820858.

33. Mukhida K, Stewart J, Mehrpooya R, Fraser J (2020). Virtual Care for Patients with Chronic Pain and Addictions During the COVID-19 Pandemic. *Canadian Journal of Pain*. [letter to the editor - published] DOI: 10.1080/24740527.2020.1785856.

34. Munro A, MacCormick H, Sabharwal A, George RB (2020). Pharmacologic Labour Analgesia and its Relationship to Postpartum Psychiatric Disorders: A Scoping Review. *Canadian Journal of Anaesthesia*. [Published] PubMed ID: 32020416.

35. Neira VM, Fagan B, Milne AD (2020). Valve Failure in the Gas Monitor. An Unusual Case of Falsely Low Capnography Values Under General Anesthesia. *Anesthesia and Analgesia Practice*, 14, e01173, 1-3. [case report - published] PubMed ID: 32132358.

36. O'Brien MS, McDougall JJ (2020). Neurophysiological Assessment of Joint Nociceptors in the Rat Medial Meniscus Transection Model of Post-traumatic Osteoarthritis. *Osteoarthritis & Cartilage*, 28, 1255-1264. [published].

37. Panchaud A, Favre G, Pomar L, Vouga M, Aebi-Popp K, Baud D, COVI-Preg group [including Sjaus A] (2020). An International Registry for Emergent Pathogens and Pregnancy. *The Lancet*, 395, 1483-1484. [published] DOI: 10.1016/s0140-6736(20) 30981-8.

38. Philpott HT, McDougall JJ (2020). Combatting Joint Pain and Inflammation by Dual Inhibition of Monoacylglycerol Lipase and Cyclooxygenase-2 in a Rat Model of Osteoarthritis. *Arthritis Research & Therapy*, 22, 9. [published].

39. Ritchie KC, Sjaus A, Munro A, George RB (2020). An Interpretive Phenomenological Analysis of Formative Feedback in Anesthesia Training: The Residents' Perspective. *BMC Medical Education*, 20(1), 493. [published] PubMed ID: 33287808

40. Saghayi M, Varno F, Matwin S, Greenberg J, Bracken B, Hashmi A, Lazar S, Hashmi JA (2020). Resting Brain Connectivity States Predict Participant Adherence to Mental Training Programs. *Network Neuroscience*, 1-28. [published].

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