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BCMJ
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Innovative use of point-of-care ultrasound improves health care on Haida Gwaii

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ON THE COVER
Haida Gwaii's provincially renowned, innovative POCUS program arose from a people-centred process that is akin with an Indigenous world view. It can be summarized by the Haida saying *Gina 'waadluxan gud ad kwaagid* ("Everything depends on everything else"). Article begins on page 204.

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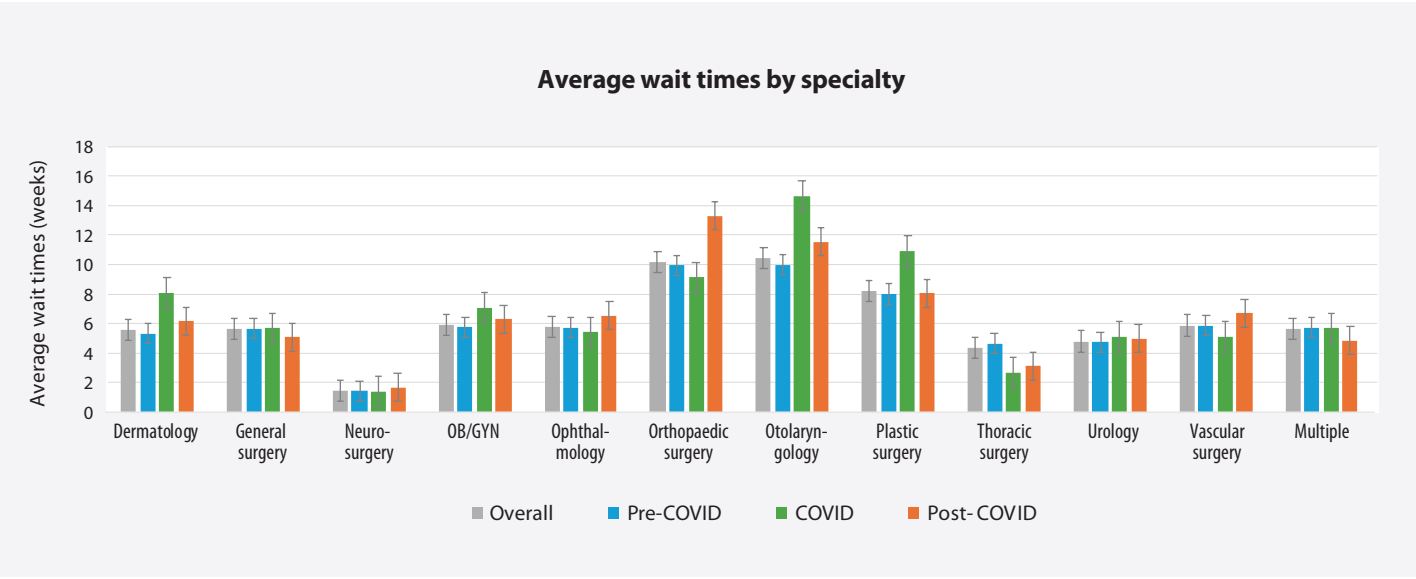

An analysis of the period 2009–2022 shows otolaryngology, orthopaedic surgery, and plastic surgery had the longest wait times across British Columbia. The article "Trends in wait times for scheduled surgeries in British Columbia" begins on page 210.

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Artificial intelligence scribes—Are we ready?

Artificial intelligence (AI) has made the leap from blue-sky theory to bedside tool, yet many of us remain unsure how to use it safely. One application gaining traction is AI scribe technology—tools designed to generate medical notes from physician–patient conversations. The Doctors Technology Office recently published an article on choosing between the various machine learning models that can be tailored for clinical use.[1] Over the coming months, it will be interesting to see how our colleagues choose, or refuse, to integrate AI scribes and what lessons we might learn.

AI has been present in medicine for over 50 years. Early examples included programs like MYCIN, developed in the 1970s to diagnose and treat serious infections.[2,3] In more recent decades, AI applications in digital pathology[4] and radiology[5] have been proposed as physician partners, although implementation, ethics, and performance concerns remain.[6,7]

In April 2025, Doctors of BC released a policy statement on the use of AI in medical settings.[8] Among its commitments is a call for input from physicians, Indigenous Peoples, patients, medical learners, and other health care professionals to ensure all interest holders' views are reflected. The statement also notes that although Health Canada uses a risk-based approach, "this framework has not been responsive to the evolving AI landscape. Common AI tools, like scribes . . . are largely unregulated." It recognizes the need for a comprehensive set of standards—a laudable goal, but perhaps idealistic, given the pace of development in AI and the tremendous push for market adoption.

The College of Physicians and Surgeons of BC (CPSBC) published an interim guidance statement in October 2024.[9] It outlines six principles for using AI in practice:

1. Privacy, confidentiality, and consent, including familiarity with the Personal Information Protection Act as it relates to AI.
2. Accuracy and reliability—using critical thinking and clinical expertise when applying AI tools.

It's up to physicians to define how these tools fit into our practices.

3. Transparency—being open with patients about the extent to which AI is used in their care.
4. Interpretability—understanding and interpreting AI-generated outputs appropriately.
5. Bias—recognizing issues around equity, diversity, and inclusion and algorithmic bias.
6. Monitoring and oversight—ensuring tools are used safely and appropriately over time.

The CPSBC makes it clear that these principles also apply to AI scribes, including the need for a physician to review documentation before entering it into the medical record. If the software stores audio recordings, physicians should reference the photographic, video, and audio recording of patients practice standard.[10] The CPSBC also refers readers to additional guidance from the Law Society of British Columbia[11] and the Canadian Medical Protective Association.[12] After all, the responsibility for a medical record remains with the physician, even if AI drafts it.

While writing this editorial, I thought it appropriate to ask a large language model about integrating AI scribes into clinical practice. ChatGPT, perhaps surprisingly, began by suggesting that physicians start with a clear goal. Are you trying to improve patient flow? Reduce documentation burden and burnout? Setting an intention helps determine whether the intervention is actually useful. It also noted that AI cannot detect emotional tone or nonverbal cues—something we may take for granted, but worth emphasizing as we grow more reliant on AI-generated notes. Last, it recommended piloting the tool before a full rollout to gather feedback and make adjustments.

If you're already using an AI scribe, the *BCMJ* would love to hear about it. How do you approach consent? Does AI enhance your workflow or communications? Has its presence changed how you supervise or teach learners? Have you encountered bias? How do your patients feel about being recorded?

In the title of this editorial, I didn't ask "should we" use AI scribes, because their presence in medicine now seems inevitable. The real questions are: When will this happen? Who will shape how they're used? Ultimately, it's up to us—physicians—to define how these tools fit into our practices. And it may also fall to us to monitor, challenge, and guide AI developers to ensure these technologies evolve in ways that genuinely serve our patients. ■

—Caitlin Dunne, MD

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Vaccine-hesitancy conversations

Measles outbreaks in several countries, including Canada, have exposed the ongoing struggle physicians face with vaccine hesitancy. Measles was declared eliminated in Canada in 1998.[1] As of 23 June 2025, there were 3381 cases of measles reported in Canada, and numbers continue to rise in several provinces[2]—a stark contrast to the three reported cases in Canada in 2022.[2] Despite our immunization levels remaining high as a country, there are pockets of undervaccinated populations, whether due to barriers in access, vaccine hesitancy, or misinformation, allowing outbreaks to be possible.

Vaccine hesitancy is something I encounter every day as a family physician. From routine childhood immunizations to prevention of shingles, pneumonia, and respiratory syncytial virus in older populations, vaccines impact every patient we encounter. Along with administering and discussing vaccines, there is also the uphill battle of debunking the misinformation patients hear from other sources, whether the Internet, acquaintances, or, more significantly, governing officials. In the US, the antivaccine rhetoric from the Secretary of Health and Human Services, Robert F. Kennedy Jr., has grown increasingly concerning. False claims that vaccines cause autism and questions about the safety and efficacy of the measles-mumps-rubella vaccine have gained traction in the media. The recent measles outbreak in Texas, with reported fatalities, highlights the very real outcomes of vaccine hesitancy and misinformation.

During influenza season, I hear "I don't believe in the flu vaccine" several times a day. I try to encourage discussion and explore patients' beliefs about why they think the flu vaccine does not work. Unfortunately, with the reality of a busy practice, I pick and choose my battles. Sometimes I spend 15 minutes discussing a vaccine and answering a patient's questions and concerns, only to be met with continued skepticism. It can be exhausting.

During influenza season, I hear "I don't believe in the flu vaccine" several times a day.

There *are* a few things I find helpful to generate discussion, or at least plant a seed that we can revisit later.

I deliver a strong, confident recommendation and listen to concerns without judgment. I have had instances where a patient comes back to request a vaccine several months after I had a seemingly futile discussion with them. Having educational materials like pamphlets and posters in our office has encouraged patients to ask questions about vaccines and do more research if they wish.

I try to increase convenience for the patient. When a patient comes in for a routine visit like a medication refill, I always ask, "We also have the flu vaccine in office; would you like one?" I have also worked in offices with drop-in vaccine clinics to increase convenience. The availability of vaccines in pharmacies with administration by pharmacists has also been extremely valuable. As many patients reach out to social media for information, trusted sources like our public health agencies and organizations can continue to promote vaccine information and encourage vaccination.

Even when it feels like a struggle to address vaccine hesitancy in a busy practice, I hope we can continue to encourage thoughtful discussion with our patients and believe that we are making a difference. As we brace for another respiratory illness season in the fall, what are some beneficial ways you have found to promote vaccine uptake in your practice? ■

—Yvonne Sin, MD

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Letters to the editor

We welcome original letters of less than 500 words; we may edit them for clarity and length. Email letters to journal@doctorsofbc.ca and include your city or town of residence, telephone number, and email address. Please disclose any competing interests.

Re: Infertility among physicians

I am writing in response to the editorial "Infertility among physicians," published in the April 2025 issue of the *BCMJ*. It is staggering that 24% to 33% of physicians experience infertility, double or more the proportion of the general population.

The majority of fertility challenges are related to advanced maternal age. In 1992, 54% of medical school applicants in Canada were under the age of 22. In 2021, that number had fallen to 40%. In the same time period, specialty training programs evolved to obligate medical graduates to commit to a specialty program varying in length from 2 to 6 or more years. Most medical schools require applicants to have graduated from at least an undergraduate program prior to entry into the 4-year medical school. Many students complete additional years of research or master's programs to better their chances of medical school acceptance. This journey can take 9 to 15 years.

Is all this really necessary? Do older medical school graduates who have accrued more than a decade of student debt, with long-term partners and aging parents, really serve the medical needs of the Canadian population? Or would we have a more robust workforce by returning to undergraduate programs, graduating younger students with less debt and fewer familial obligations who are willing and able to work in rural and remote areas, complete specialty training, and still have time in their precious fertility windows to have children themselves?

Physicians make countless sacrifices in their personal lives for their profession. Having the choice to have children, ideally without reproductive technology, is a basic human right. Women shoulder the burden of childbearing and child-rearing in the early years of a child's life. Over 60% of medical school students are women. The current paradigm of seeking perfection in medical school applicants, to the detriment of good enough, is harming our profession in ways that cannot be measured. We should not be asking this of our graduates, and we should be ensuring they enter medical training fully informed of the risk of being childless without choice.

—Deena Case, MD
Fernie

A season of belonging: Celebrating the power of diversity and connection

Recently, on a bright and warm spring day, I was walking through my local park and was struck by the incredible diversity of life happening around me. In one area, a family was setting up a picnic filled with dishes from a cuisine I couldn't quite name but that smelled delicious. Nearby, a group of elders chatted in a language I didn't recognize, their laughter spilling out like music. Children from different backgrounds chased soccer balls together while parents sat nearby on blankets, chatting and trading snacks. It was both ordinary and extraordinary all at once. It also reminded me that BC is a province like no other—rich in natural beauty and vibrant communities, and a living mosaic of cultures, languages, and traditions.

As physicians, we are privileged to work in one of the most culturally rich provinces in Canada. Our patients—and our colleagues—bring with them a wide array of traditions, perspectives, and lived experiences. Diversity adds depth to our communities, insight to our practices, and creativity to how we solve problems in health care. When we honor and uplift the diverse voices within our profession and among our patients, we elevate the quality and humanity of our work.

At the heart of equity, diversity, and inclusion (EDI) lies the desire to be seen, heard, and valued. That's as true in medicine as it is everywhere else. Patients seek care that respects their identities. Physicians desire to work in environments where they feel safe to express themselves. Ultimately, we all benefit from relationships grounded in mutual respect and cultural humility.

This summer, I encourage you to step outside—literally and figuratively. Embrace the many opportunities to connect with the people, patients, and cultures around you. Attend a festival that's new to you. Try food you've never had before. Ask questions with curiosity and openness. These small acts of engagement can spark joy, build understanding, and remind us that connection is at the heart of health. Let this summer also serve as a time to reflect on how we embed inclusion into the fabric of our profession and reconnect with one another and the shared values that unite us as physicians, caregivers, and community members. Are we amplifying underrepresented voices? Are we creating space for colleagues from all backgrounds to thrive? Are there steps we can personally take to become ambassadors for EDI?

Physicians desire to work in environments where they feel safe to express themselves.

At Doctors of BC, we continue to advance EDI in our work through policy development, leadership training, and meaningful dialogue with members. One of the guiding principles in our strategic plan is equity, which aims to ensure that all members can access the same participation opportunities within the organization without barriers, while simultaneously helping the association apply an equity lens to all aspects of our work. In our policy statement *Gender Equity in the Medical Profession*,[1] we commit to supporting efforts to address the gender pay gap and to applying gender-based analysis plus in decision making, among other measures. Our Inclusion, Diversity, and Equity Advisory Committee, composed of physicians, provides advice and guidance for physicians and the association on addressing EDI issues and will support physician members in driving our EDI framework. These are just a few of the initiatives that Doctors of BC has undertaken to address EDI. It's an ongoing journey, and we are committed to walking it together.

Let us celebrate what makes BC extraordinary—not just its mountains and coastlines, but also the incredible diversity of the people who call this place home. Let us honor the cultures that shape our province and the stories that shape our patients. And let us continue to build a medical community where diversity is not only respected, but also recognized as essential to compassionate, high-quality care.

When we embrace diversity, we create space for everyone to thrive—patients, physicians, and communities alike. And in doing so, we don't just build a better health care system—we build a better BC. ■

—Charlene Lui, MD
Doctors of BC President

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The psychology of antimicrobial prescribing behaviors

How cognitive biases may impact antibiotic prescribing practices.

Davie Wong, MD, FRCPC

Antibiotic prescribing habits are more complex than one might expect. Up to 40% of antibiotic prescriptions are inappropriate, for reasons including the wrong drug, duration, dose, or indication.[1] Excessive antimicrobial prescriptions can harm patients, the health care system, and the environment, and there continues to be overuse and misuse of antibiotics in an era in which we are quickly running out of effective treatment options against the global rise of antimicrobial resistance. For example, the increasing resistance to carbapenems among Gram-negative organisms worldwide is alarming, and the global mortality from antibiotic resistance increased slightly from 1990 to 2019, with forecasts predicting a surge of deaths attributable to drug resistance in 2050.[2] Despite the expansion of antimicrobial stewardship efforts and heightened awareness of antibiotic resistance, inappropriate prescriptions remain common. In a study of outpatients being treated for community-acquired pneumonia, only 31% of antibiotic prescriptions were consistent with guideline recommendations. The most common reasons for inappropriate prescriptions were the wrong choice and excessive duration.[3] In this article, I explore related cognitive biases and the possible ways they may influence prescribing practices.

Dual-process thinking theory

Psychologists assert that humans possess two systems of thinking for making decisions.[4] Type 1 is fast and intuitive, operating on pattern recognition for problem-solving. It requires low cognitive resources and allows one to make accurate decisions rapidly, which is useful in disciplines that function at a fast pace. Type 2 is slow and analytical, operating on methodical and thoughtful processes. Consequently, it places a higher cognitive strain on the user but allows one to appraise data more critically and look beyond patterns, and it may be more advantageous for complex problem-solving. Experts claim that we spend 95% of our time in type 1 thinking.[4] Cognitive biases are more likely to occur in the type 1 system. Stress, fatigue, sleep deprivation, and cognitive overload can also increase the risk of cognitive errors. One system is not better than the other; both are required for optimal mental performance.

Cognitive biases

A cognitive bias, or heuristic, is a mental shortcut used to make quick and efficient decisions, similar to a rule of thumb.[5] These heuristics protect us against cognitive burnout from the sheer number of decisions we make every day. These biases likely conferred a survival advantage during human evolution and are a normal part of the human brain.[6] When making important clinical decisions, these mental shortcuts can be either assets or liabilities. There are well over 100 identifiable biases. Some common biases are commission bias, optimism bias, decision fatigue, tolerance of uncertainty, loss aversion, illusory correlation, aggregate bias, affective bias, availability bias, bandwagon effect, and base-rate neglect.[7,8] I will examine the biases that can influence antibiotic prescribing habits.

Commission bias

Commission bias is the tendency toward action over inaction, because doing something is perceived to be better than doing nothing.[6] Therefore, prescribing an antibiotic is perceived to be a more appropriate intervention than watchful waiting, even when the prescription is inappropriate or harmful. As another example, antimicrobial stewardship recommendations are more likely to be accepted if they broaden instead of narrow the antibiotic spectrum or increase rather than decrease antibiotic exposure.[6] Education about the overuse and harms of antibiotics and careful consideration of the pros and cons when prescribing these medications can help overcome this bias.

Optimism bias

Closely tied to commission bias is optimism bias, which overestimates the benefit of an intervention when little to none exists, while downplaying the harm.[6] Parents of pediatric patients greatly overestimate the utility of antibiotics on the duration of symptoms in viral respiratory tract infections.[6] Although physicians recognize antimicrobial resistance as a problem, they tend to believe that it

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is driven by other prescribers in different practice settings.[6] To combat this bias, clinicians should engage in shared decision making with patients, discussing the risks and benefits of all available treatment options.

Decision fatigue

Decision fatigue refers to the decline in self-control after making repeated decisions. In a study of antibiotic prescribing patterns in primary care offices, the portion of visits resulting in an antibiotic prescription for acute respiratory conditions that never require antibiotics (e.g., acute bronchitis, other viral infections) increased as the day went on.[9] The cumulative cognitive demand from making multiple decisions can lead physicians to take the path of least resistance, which may be an inappropriate prescription. Possible solutions to address decision fatigue are mandatory breaks, modified schedules, and reduced workload.

Tolerance of uncertainty

Quite often, the diagnosis of infection is ambiguous, leading to uncertainty.[10] Some noninfectious conditions can mimic common infections. For example, venous stasis is often misdiagnosed as cellulitis.[11] When unsure, some physicians prefer to offer antibiotics to cover the possibility of an evolving infectious process. Those who have difficulty tolerating uncertainty tend to overprescribe antibiotics.[10] Improving a clinician's ability to cope with diagnostic uncertainty by encouraging transparency with patients and collaboration with colleagues may reduce unnecessary antibiotic prescriptions.[10]

Loss aversion

The tendency to avoid missing or losing something is greater than the tendency to gain something. This is known as loss aversion.[5] This can result in the prescription of antibiotics to avoid missing the small risk of a bacterial infection or using inappropriately broad-spectrum antibiotics to reduce the risk of missing the culprit pathogen.[12] To reduce loss aversion, it would be helpful to properly ascertain the risk of a particular intervention or outcome by reviewing the epidemiology of the topic or educating oneself about statistics.[13]

Illusory correlation

Another common mistake is falsely attributing an event to an intervention, known as illusory correlation.[14] When a patient experiences an improvement in symptoms after taking an antibiotic, the outcome is generally attributed to the medication, although there may be other reasons for improvement, such as natural resolution over time or the placebo effect. To combat this bias, careful consideration of confounding variables that may affect the outcome is warranted.[14]

Aggregate bias

Clinicians who believe that population studies used to inform guideline development do not apply to their patients are experiencing aggregate bias.[5] For instance, multiple national guidelines recommend against routine antibiotic prophylaxis prior to dental procedures in patients with prosthetic joints; nevertheless, many of these patients are offered antibiotics.[15] To address this bias, it is important to remind oneself that any practice that deviates from a guideline should be supported by evidence.

Affective bias

Affective bias refers to our feelings toward a patient, situation, medication, or intervention.[5] A perceived negative outcome makes a greater impact than an equally positive outcome. For example, infection relapses or treatment failures may be more easily recalled and lead to less judicious antibiotic prescribing practices (e.g., longer duration, broader spectrum).[6] Consultation with a specialist and careful review of the literature may limit the impact of this bias.[6]

Availability bias

Availability bias occurs when the ease of recall of certain events leads to an overestimation of their true probabilities.[6] For example, there is a tendency to choose an antibiotic that had recent perceived success and avoid alternatives with recent perceived failure.[6] Adherence to guidelines and re-evaluation of predictions can help mitigate this bias.

Bandwagon effect

The bandwagon effect is a form of groupthink—the tendency to do or believe something because many other people do or believe the same.[16] For example, one study found that over 80% of hospitalized elderly patients are treated with antibiotics unnecessarily, which may lead people to think this practice is the standard of care.[17] To counter this bias, it is important to revisit current practice standards to ensure they align with best available evidence.

Base-rate neglect

Base-rate neglect is the tendency to ignore the true prevalence of a disease, either inflating or reducing its base rate.[18] In a survey assessing practitioner estimates of probability of infections in a given clinical scenario, both urinary tract infections and pneumonia were overestimated, at 80% and 95%, respectively, when the true probabilities were 0% and 55%, respectively.[19] Consequently, this can lead to overprescribing antibiotics. Rather than assessing risk based on intuition, it is best to use epidemiological data and evidence-based tools or algorithms to risk stratify patients.

Summary

Antibiotic prescribing behaviors are complex. They are shaped by our personal and clinical experiences, values, beliefs, culture, emotions, desires, knowledge, education, and training. The interplay between these elements results in distinct prescribing habits among individuals, such that a straightforward infection could be treated in many different ways. Rational, evidence-based prescribing should be the goal with every antibiotic prescription. To overcome bias, some debiasing strategies are attending bias-specific teaching sessions, engaging in metacognition (e.g., questioning your thinking, having awareness of your thought processes), slowing down, and using checklists or preprinted orders. ■

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School avoidance: Improving child and youth mental health care

You have seen these kids. She sits silently, looking down at her feet. Occasionally, she shuffles them back and forth. Her bangs hang over her eyes. She is 12 years old. Her mom, exhausted, does her best to relay the story, dripping with a lack of resources for a child who was first avoiding and is now refusing to attend school. Or the 7-year-old crouching in the corner of the exam room, who is known to avoid school and has become physically aggressive with a teacher. Or the 15-year-old who rarely leaves their bedroom, especially for school.

Let's not mince words. Many of our children are suffering. This often presents in our offices with a chief concern of school avoidance or refusal.

As with all our patients, we want to make the correct diagnosis to provide appropriate treatment. There are numerous underlying causes of school avoidance, including anxiety and mood disorders, neurodevelopmental conditions, eating disorders, learning disabilities, chronic medical conditions, social environment, and bullying. Learning disabilities and neurodevelopmental conditions have an increased risk of associated anxiety disorders, in which case both the underlying cause and the anxiety need to be addressed.[1,2]

In 2023, more than 20% of youth missed school because of mental health challenges, up from 15% in 2018.[3] The rate of anxiety disorders in children and youth and the proportion who rate their mental health as fair or poor have been increasing for over a decade. An estimated 42 000 children in BC have a diagnosed anxiety disorder, and 95 000 have a diagnosed mental health disorder. Less than half receive treatment.[1-3]

In 2023, more than 20% of youth missed school because of mental health challenges, up from 15% in 2018.

As physicians, we may feel overwhelmed or underequipped to provide the appropriate team-based care for our young patients with school avoidance and mental health difficulties. These are complex situations and conditions with multifaceted treatment recommendations that may include psychoeducation, cognitive-behavioral therapy, pharmacotherapy, and specific supports and/or interventions to address the underlying causes.

Fortunately, in BC, we have some effective resources for physicians and patients:

- Pathways has clinical guidelines and referral information for child and youth mental health (https://pathwaysmedicalcare.ca).
- Compass Mental Health provides clinical advice and educational resources, including a three-part series for supporting students with school avoidance (www.compassbc.ca).
- If school avoidance is being caused by anxiety or attention-deficit/hyperactivity disorder, then consider a referral to Confident Parents: Thriving Kids, a free telephone-based parent coaching program for elementary school–aged students (https://welcome.cmhacptk.ca).
- Assessment at the local child and youth mental health intake clinic can assist by providing recommendations leading to diagnosis, treatment, and support (www2.gov.bc.ca/gov/content/health/managing-your-health/mental-health-substance-use/child-teen-mental-health/mental-health-intake-clinics).
- Foundry provides comprehensive mental health services for young people aged 12 to 24 years, virtually and as walk-ins, with no referral required (https://foundrybc.ca).
- Involving the patient's school counselor can help address difficulties at school, provide individual counseling, and link to community resources.
- Kelty Mental Health Resource Centre is a valuable resource for patients, families, and school professionals to support students with school avoidance (https://keltymentalhealth.ca).
- Joining the Shared Care Committee's Child and Youth Mental Health and Substance Use Community of Practice enables physicians to participate in educational sessions and interact with others who have an interest in child and youth mental health (https://sharedcarebc.ca/our-work/spread-networks/cymhsu-community-of-practice).

As the Council on Health Promotion's most recent policy statement points out, BC's current mental health system is complex and fragmented, as it falls under the shared

This article is the opinion of the authors and not necessarily the Council on Health Promotion or Doctors of BC. This article has not been peer reviewed by the BCMJ *Editorial Board.*

responsibility of three ministries: health, children and family development, and education and child care. To ensure families can access services when and where needed, the BC government should prioritize seamless, collaborative, and multidisciplinary care through the development of a child and youth mental health framework, with measures to improve access to timely, effective, and culturally safe care.[2]

What can we do right now to help our patients? Even with the current inadequate system of care, we as individual physicians can provide a great deal of support to our young patients with school avoidance, including exploring the underlying causes. We can listen, validate, diagnose, provide psychoeducation, and mobilize resources. We can reinforce positive routines, such as healthy eating, regular sleep patterns, sufficient exercise, and limited screen time. We can stay connected with our patients as they travel what is a slow and tortuous journey.

School avoidance is solvable. System changes to achieve this are an ethical imperative. ■

—Selena Lawrie, MD, CCFP
Council on Health Promotion member

—Aven Poynter, MD, FRCPC
Council on Health Promotion member

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Patient in distress?

If a patient is experiencing emotional distress, anxiety, loneliness, fear, uncertainty, or mental health concerns, support from the Crisis Centre of BC is just a phone call away.

BC Crisis Line: 310-6789
(no area code needed, available 24/7 across BC)

Who it's for: Anyone in BC

Additional Resources in BC:

1-800-SUICIDE (1-800-784-2433) is the BC suicide prevention and intervention phone line.

9-8-8 is the national suicide crisis phone and text line.

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Innovative use of point-of-care ultrasound improves health care on Haida Gwaii

Physician champions of point-of-care ultrasound, along with educational and administrative supports, have significantly enhanced the provision of cost-effective, compassionate, patient-centred care on Haida Gwaii.

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ABSTRACT: Point-of-care ultrasound (POCUS) can improve patient care by reducing diagnosis, treatment, and transport times; reducing transfers; and providing medical care closer to home. However, barriers to acquiring and maintaining proficiency with POCUS result in widespread underuse of this technology. The medical community on Haida Gwaii, a remote archipelago off the coast of British Columbia, is using POCUS in innovative and sustainable ways. Employing an interpretive description methodology and the theoretical framework of the Eco-Normalization Model, we conducted semi-structured interviews with a community physician, a local hospital administrator, and a patient to discover the factors that led to the successful implementation of POCUS. Drivers included local physician "POCUS champions" and the desire to provide better and more compassionate medical care. Enablers included specific medical education, excellent administrative support, a culture of learning and collaboration, and patient satisfaction.

Point-of-care ultrasound (POCUS) can improve patient care by expediting the diagnosis and treatment of traumatic and other medical conditions. From its origins in the emergency department, its use has now spread to critical care, hospital, and clinic settings. This important tool is especially valuable in rural health care settings, which often lack immediate access to consultative diagnostic imaging and definitive specialist care.[1,2] Additionally, the use of POCUS can reduce the volume of transfers to referral centres and ease the challenges of patient transport,[2-4] which is the largest barrier in practice for rural emergency department practitioners.[5] Furthermore, patients' satisfaction with care improves due to immediate access to information on their clinical condition.[4,6] A recent survey on POCUS use among rural health care providers in British Columbia revealed that 43% of those surveyed used it more than once per day.[7]

In 2015, recognizing the barriers to acquiring and maintaining proficiency in POCUS, the University of British Columbia's Rural Continuing Professional Development program, with the support of the Rural Coordination Centre of BC (RCCbc), launched the Hands-On Ultrasound Education (HOUSE) program, an innovative traveling education program on POCUS designed to meet the unique needs of rural physicians in BC.[8] The program was developed with an understanding and appreciation of *potato ethics*, a "particular rural health care sensibility" described as "an ethics rooted in the duty to make oneself useful . . . cooperating in the service of whatever is necessary and actively learning whatever is needed to do so."[9]

The HOUSE program teaches a wide variety of POCUS applications, and communities customize their learning by creating an agenda from a menu of options **[Table]**. This can include thematically based learning, such as the multisystem workup of trauma, shock, or dyspnea; specialty-based agendas, such as obstetrics or pediatrics; and agendas based on applications that are not clinically linked, such as exams relevant to the clinic setting (e.g., IUD placement, screening for the presence of an asymptomatic abdominal aortic aneurysm). The course length is determined by the community and can be between half a day and 2 days. Residents and allied health practitioners can be included, at the discretion of the community.

The HOUSE program was piloted on Haida Gwaii in 2015 and was offered again in 2022. HOUSE course instructors, which include experienced rural physicians, have a unique window into rural POCUS patterns of practice across the province. Instructors noted a significant advancement of POCUS skills in the years between the two courses. They were particularly impressed by the depth and breadth of those skills among local practitioners and by the innovative use of POCUS to address challenges in access to health care. We aimed to discover the factors that led to this, in the hopes that this information might be of value to both the HOUSE program and medical communities interested in expanding local POCUS skills.

Haida Gwaii's population of approximately 5000 (50% Haida and 50% non-Haida) is served locally by two hospitals: Xaayda Gwaay Ngaaysdll Naay (Haida Gwaii Hospital and Health Centre) in Daajing Giids (formerly Queen Charlotte City) and Northern Haida Gwaii Hospital and Health Centre in Gaw (formerly Masset). Xaayda Gwaay Ngaaysdll serves 3000 residents and provides inpatient, clinic, emergency, obstetric, and oncology services. At the time of this research, six family physicians and two midwives were working there. All providers were using POCUS, and two of the physicians, self-described "POCUS champions," were supporting their colleagues as well.

Haida Gwaii is a remote group of islands off the coast of BC, approximately 200 km by water from the nearest referral centre, in Prince Rupert. Because there is no access to radiology department ultrasound service on Haida Gwaii, patients face expensive and inconvenient travel for this service. Additionally, the difficulties of being without family support during times of illness and uncertainty cannot be understated.

TABLE. Hands-On Ultrasound Education (HOUSE) program educational options.

POCUS* use by presenting problem	**Trauma:** lungs (pneumothorax, hemothorax), cardiac (pericardial effusion), inferior vena cava (IVC; volume assessment), abdominal scan (free fluid), long bones (for fractures), plus procedures as indicated
	Shock: cardiovascular (reduced ejection fraction, pulmonary embolism, pericardial effusion), lungs (pneumothorax, consolidation, hemothorax), IVC (volume assessment), deep vein thrombosis (DVT), aorta (abdominal aortic aneurysm), abdomen (free fluid), central line insertion
	Dyspnea: Lungs (pneumothorax, consolidation, hemothorax), cardiac (reduced ejection fraction, pulmonary embolism, pericardial effusion), IVC (volume assessment)
	Abdominal pain: gallbladder (gallstones, cholecystitis), kidneys (hydronephrosis), aorta (aneurysm), free fluid (trauma or ruptured ectopic), uterus to rule out ectopic pregnancy, bladder for obstruction
POCUS applications by system	**Cardiovascular:** chamber size, gross ejection fraction, right heart strain and pulmonary embolism, pericardial effusion **Vascular:** intravascular volume assessment (IVC and jugular venous pressure), DVT
	Pulmonary: consolidation, pulmonary edema, pneumothorax, pleural effusion or hemothorax
	Abdominal: free fluid (traumatic or ascites), hydronephrosis, gallstones and cholecystitis, bladder volume, appendicitis, abdominal aortic aneurysm
	Genitourinary: testicular masses and torsion, IUD placement, first trimester (confirming intrauterine pregnancy and viability, dating, free fluid), third trimester (fetal presentation, rule out placenta previa, amniotic fluid volume assessment)
	Musculoskeletal: joints for effusion or aspiration, fractures, tendon rupture, muscle tears, soft tissue abscess, foreign body **Eye:** trauma evaluation, retinal detachment
POCUS for procedures	Peripheral venous catheter or central line placement
	Pericardiocentesis
	Surgical airway
	Thoracentesis or chest tube placement
	Paracentesis
	Suprapubic bladder aspiration or catheter placement
	Fracture reduction
	Nerve blocks
	Foreign body removal or abscess drainage

* POCUS = point-of-care ultrasound.

Note: HOUSE course modules are customized to the needs of the community by the combination of any of these options and can be practice specific, with a pediatric, obstetric, internal medicine, emergency medicine, or family practice focus. Course fees are currently $2200 per participant, per day, in the rural community. For further details, see https://ubccpd.ca/house.

Thus, innovations that provide more services locally are of significant value for Haida Gwaii residents.

"We have no [radiology department] ultrasound services on Haida Gwaii, so for a mother to get an ultrasound for her baby, it's a 7-hour ferry ride. You have to get in a lineup for the ferry 2 hours before it sails. It takes about 45 minutes to unload the ferry. So it's like 10 hours one way to get to Prince Rupert. And then . . . you're there anywhere from 2 to 4 nights in a hotel. And if you have your vehicle . . . it's $700 now, and then there's hotels and then your meals." (Physician)

Methods

We conducted a retrospective evaluation of the factors that led to the emergence of the innovative use of POCUS on Haida Gwaii. Traditional models of program evaluation were not a good fit, because they were generally prospective and focused on programs that were intentional rather than emergent. The Eco-Normalization Model, a theoretical framework derived from implementation science theories, examines the longevity of an innovation within the context of the local ecosystem and explores features of the ecosystem that may enhance (or detract from) the innovation's longevity.[10] The model gives rise to six critical questions to consider **[Figure]**. We contextualized the original model to account for this unique application and expanded the original domain of "people doing the work" to "people involved in the innovation" to include the patient perspective.

We employed an interpretive description methodology—a methodology well suited to medical education. This is a highly adaptable qualitative approach that "captures the subjective experience of individuals while drawing on lessons from broader patterns within the phenomenon being studied,"[11] which aligned well with the intentions of our study.

The questions arising from the Eco-Normalization framework guided the creation of an interview process. Semi-structured one-on-one interviews approximately 1 hour in duration were conducted by a research assistant via videoconference. Using purposeful sampling, a family physician, a senior hospital administrator, and a local resident who had received POCUS as part of their medical care were interviewed. Transcribed interviews were shared with the research team. Each team member reviewed the interview data independently, recorded reflections, and noted recurring themes. The team convened after each interview to discuss individual reflections, which expanded our collective understanding of the data. Team members included two rural physicians with extensive experience in POCUS education, a HOUSE course program manager with UBC Continuing Professional Development (CPD), a research assistant with UBC CPD, a research scientist with RCCbc, and a rural research facilitator with RCCbc. The diverse perspectives and backgrounds of the research team contributed to the depth of the data analysis. As the findings of the group were collated, the team combined the data into key thematic categories, based on consensus among team members. Ethical approval for our study was obtained from the University of British Columbia's Behavioural Research Ethics Board.

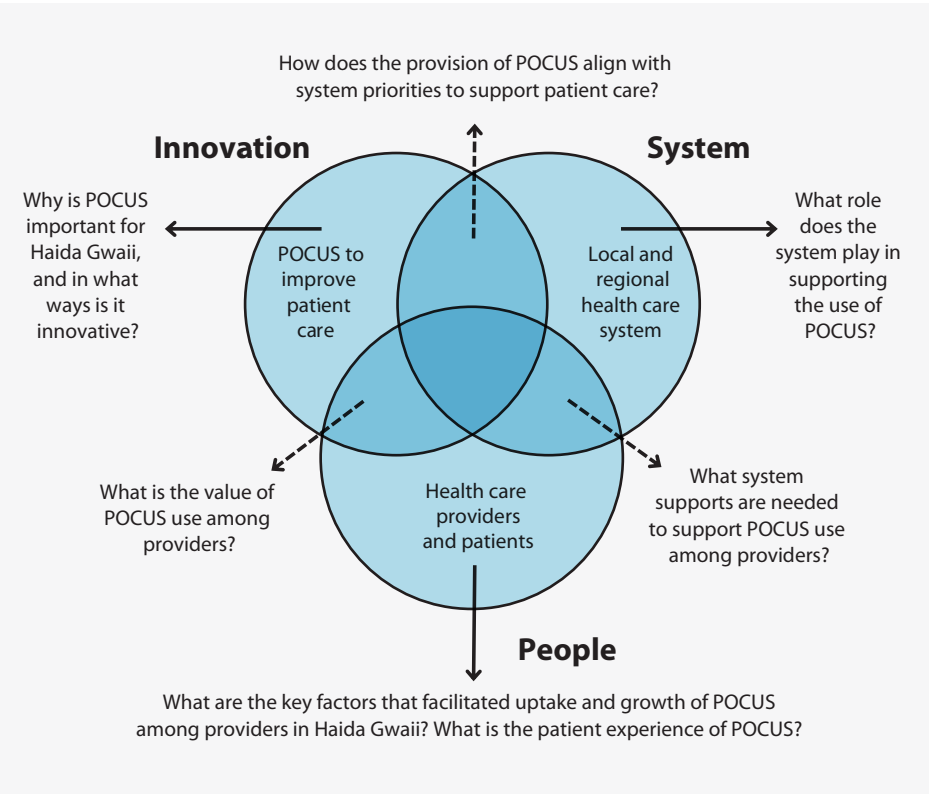

FIGURE. Eco-Normalization Model and the six critical questions. Adapted from Hamza and Regehr.[10] (POCUS = point-of-care ultrasound.)

Results

Innovative use of POCUS

POCUS is embedded throughout the health care system on Haida Gwaii: there are ultrasound units in the emergency department, on the inpatient ward, in the outpatient clinic, and in outreach clinics to smaller communities. All POCUS users have support for ongoing learning, in that some physicians, "POCUS champions," make themselves readily available to support colleagues. Three more experienced users regularly record and upload their POCUS images to the electronic medical records system, which makes them available to other members of the health care team (e.g., nurses, physiotherapists,

distance-based specialists). Surgeons use the images to assist with pre-op planning, and other specialists (e.g., cardiologists, radiologists, obstetricians) use the images to guide the creation of patient care plans. Local physicians also use POCUS to support local midwives. To our knowledge, no other community in the province is archiving and sharing POCUS images to this degree.

"It's probably used 10 to 12 times a day, at least, in the clinic." (Physician)

"When I did have to go for the surgery, the surgeon met me, and he was, like, up to snuff, and he actually had little pictures from the ultrasound." (Patient)

"Both of [the midwives] are using it. We used to be called in to do the dating and they would watch. And then it became 'All right; here's how you do it,' and [now they] do the dating and we watch." (Physician)

Drivers of innovation

POCUS champions: A POCUS champion is an informal designation for a highly motivated local physician who has or is acquiring proficiency in POCUS; recognizes the value of it; and supports its integration into the health care system in a variety of ways, such as by providing educational opportunities, access to machines, and one-on-one collegial support. This role is generally not formally recognized or supported outside of crossover from other leadership roles, such as an educational or departmental lead position. For example, the physician we interviewed invested considerable time to work out the process for archiving POCUS images, which involves saving them to and downloading them from the POCUS unit and then manually uploading them into the electronic medical records system. Additional work included supporting the process of acquiring POCUS units, which involved a team-based decision-making process, community fundraising, and administrative support at both the local and health authority levels. This physician was quick to describe their role as building on the work done by the previous champion, a retired physician. Due to the depth and breadth of support provided by this champion, it is unlikely that significant and sustainable POCUS innovation could have developed without this strong driver.

"There are probably two champions, me and [X]. I mean *champions* in the sense [that] we use [POCUS] all the time. When we're teaching, we're promoting it to our colleagues, and we're also available for consult as well. So, very frequently, we're asked to review a scan or do a scan as a second opinion, probably several times a week . . . sometimes in the middle of the night, especially if it's a really important scan . . . especially if it's going to save a transfer for a procedure." (Physician)

"That's an additional huge learning curve . . . to get the information off the device and into the record." (Physician)

"I realized . . . that [POCUS] was going to improve patient care more than any other kind of learning I could do. . . . But most importantly, people are going to get better care in community by me doing this."

Compassionate care: The understanding that POCUS might allow patients to stay home and avoid a difficult transfer for further investigations was an essential driver of the innovation. When a patient was able to stay home as a result of the use of POCUS, their medical experience was more compassionate and more patient centred. Both providers and patients valued this.

"Is the baby going to survive? That's a key [indication for POCUS]. . . . Ensuring that there was a heartbeat and that things were looking healthy [was] very much a game changer, because every one of those women would be so nervous. We'd put them on a ferry, and they'd have a miscarriage on the ferry, or in Prince Rupert, away from their family. Very tragic, tragic stuff . . . and then they'd have to come back bleeding and cramping on the ferry—like, brutal. And I could tell you, like in 5 minutes, [that the baby was alive]." (Physician)

"My granddaughter . . . had an ultrasound at the hospital here as an outpatient, and again it was invaluable. . . . [It] saves a lot of stress, you know, wondering what's happening or how serious something is. If it's not something real serious, that really helps bring the stress level down on everybody." (Patient)

"I realized . . . that [POCUS] was going to improve patient care more than any other kind of learning I could do, like, hands down, be more effective, be more time efficient, be more satisfied myself. But most importantly, people are going to get better care in community by me doing this and being as good as possible." (Physician)

"To come and go from here during the winter months is not so easy, because we have the ferry three times a week. So, certainly, [POCUS] saves a lot of worry, and it also saves a big trip. The average person has a tough time financially to do all of that." (Patient)

Apart from logistic and financial considerations, the physician interviewed emphasized the cultural impact of providing services in community, especially those related to birth and death.

"It is also important for cultural reasons, especially for services around birth and end of life. It is more important for Haida people culturally to want to be born here and to die here." (Physician)

"As far as dying goes, how does ultrasound help in that experience? There are lots of conditions . . . an Elder will come in with that are life threatening, that we can kind of give them a sense of how . . . likely they are to die if they go out. And that's a key factor in their decision making [to be transferred or not] . . . because being sent away . . . you're alone, you don't know what's going on. And then to die there. . ." (Physician)

Enablers of innovation

Educational considerations: POCUS education that is learner focused, that inspires curiosity over fear, and that is taught locally

to the community of physicians was reported as a driving factor in the adoption of POCUS and in ongoing skill acquisition. The HOUSE course, which is taught in rural communities by a mix of rural physician peers and sonographers with an emphasis on a learner-centred, relaxed, and collegial learning environment, was highly valued for its approach.[8] Longitudinal POCUS education through provincial rounds and conferences helps solidify the culture of a POCUS-integrated practice.

"It was really the HOUSE course . . . that kickstarted us big time. You could pick and choose what you want to learn. You learn as a group, and you learn in community. It's you learning with the people that you're going to be continuing to work with, and you're all taking a common course in community with your own machines. If you do it on [your] machines in [your] town, you're golden." (Physician)

Administrative and system-level support: The local administrator worked alongside health care providers to support POCUS use and ultrasound acquisition. The administrator described that role as "an enabler of [the] physician group" and as being "able to get [the group] through the bureaucracy." For example, the administrator deferred to the local physicians in the selection process of purchasing a new POCUS unit and then stepped in to ensure the procedures for device sterilization were developed in a way that minimized clinician workload. Northern Health, the regional health authority, was also supportive.

"[The local administrator is] incredible. . . . We need to give kudos and thanks to really good administrators . . . [with] openness to just let it flourish and not get in the way." (Physician)

"We're the size of France, and we have less than half a million people. Geographically, we've always been spread out. Northern Health, I think, is . . . doing pretty good as far as being innovators." (Administrator)

Learning and collaboration: Positive aspects of the culture of medicine on Haida Gwaii were highlighted by all three study participants. Local physicians, allied health professionals, and administrators all work together to foster a collaborative and supportive approach, where asking for help is encouraged. Medical learners also seek out electives on Haida Gwaii because of its reputation as a hub for leading POCUS users, innovators, and teachers. As physicians teach the ongoing wave of new learners, a culture develops of POCUS being integral to family practice.

"[My doctor] was able to share those images with the surgeon in Prince Rupert. . . . When I got there, the surgeon said it saved him a lot of time. . . . The images [he] had were adequate for him to be able to set me up for the surgery."

"We're a small site . . . we're the smallest maternity program in British Columbia, we're the smallest systemic IV therapy BC Cancer site in the province. There's a reason why these GPs . . . punch heavier than their weight limit. Not only are they invested in the community . . . but they also are invested in providing better patient care." (Administrator)

"I noticed that they also reached out to the broader medical community if they saw something that they weren't sure about. . . . They would ask me 'Can I send this off?' So they were able to get more input, and that's without me leaving Haida Gwaii. That whole part just enhances care." (Patient)

"You know, we know each other's skills and support each other well, and there's no shyness around connecting with each other for that." (Physician)

"Every single [resident] wants and craves as much ultrasound as possible. . . . If I have a case that's interesting, I'll grab the resident no matter where they are . . . have them come in and do it with me. . . . It's the number one learning thing that they say, because we're kind of known for ultrasound." (Physician)

Patient and provider satisfaction: Both patients and physicians reported increased satisfaction with the addition of POCUS to the patient encounter. Physicians felt empowered by the extra knowledge gained through POCUS findings, and patients readily appreciated the many ways in which POCUS positively impacted their health care experience.

"We're fortunate that we have access to that machine. . . . That really enhanced my care and enhanced treatment for me, so I think that's pretty amazing for a little community that they're able to do that." (Patient)

"[My doctor] was able to share those images with the surgeon in Prince Rupert. . . . When I got there, the surgeon said it saved him a lot of time. . . . The images [he] had were adequate for him to be able to set me up for the surgery." (Patient)

"You speed up healing, because at the moment you see them, you diagnose the problem and then you do a procedure right away. I mean, that's amazing. It feels so good to be able to do that." (Physician)

"You feel almost like a magician sometimes to be able to see inside. And like in 5 seconds you can see a problem, which it would [instead] take all these blood tests and lots of exams and guessing and tries to treat and see if they get better, and ultimately an ultrasound . . . [in] Prince Rupert." (Physician)

Discussion

The use of POCUS on Haida Gwaii is an example of how grassroots-led innovation can arise to meet local needs in sustainable and impactful ways. The enthusiasm and vision of a physician champion, educational supports that are responsive to community needs, and clear-sighted administrative support led to the creation of a system of care that is cost-saving, provides better medical care, improves patient

and provider satisfaction, and significantly enhances the provision of compassionate and patient-centred care on Haida Gwaii.

The innovative and valuable POCUS practice arose from the combination of the innovation itself, the right people, and the right level of system support to meet the needs of the community. This process has much more in common with an Indigenous world view than conventional approaches to scaling up health care services. It can be summarized by the Haida saying *Gina 'waadluxan gud ad kwaagid* ("Everything depends on everything else"). Needs and gaps in rural health care arise from local resource scarcity and geography and are unique to each community. These needs are intimately known to local providers and patients, and solutions to navigating these barriers should include local knowledge.

In this challenging time in health care, it is refreshing to see a medical community flourishing and a health care system becoming more compassionate. Some of the most vulnerable patients in our health care system, residents of an exceptionally isolated island, are benefiting from a readily available and cost-saving innovation that provides compassionate and closer-to-home care. This is an example of how rural health potato ethics—"cooperating in the service of whatever is necessary and actively learning whatever is needed to do so"[9]—can guide us in building a better, kinder, and more equitable health care system for everyone.

Study limitations

This study was not a comprehensive evaluation of the development of the POCUS program on Haida Gwaii, but rather an overview of key factors that led to its emergence and sustainability. It is possible that there are other aspects of the program that remain unexamined. Additionally, the program emerged from the confluence of locally based needs, providers, and administration; therefore, the specifics may not be generalizable to other sites.

Suggestions for future research

Further research into potato ethics as a driver in rural health care and innovation could be valuable for learning how we might further support the process of valuable innovation in rural medical communities and health care system transformation in general. ■

It is refreshing to see a medical community flourishing and a health care system becoming more compassionate. Vulnerable patients, residents of an exceptionally isolated island, are benefiting from a readily available and cost-saving innovation that provides compassionate and closer-to-home care.

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Competing interests

None declared.

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Trends in wait times for scheduled surgeries in British Columbia

An analysis of the period 2009–2022 suggests that small hospitals had the shortest wait times and that the demand for surgery was greatest in small hospitals, rural communities, and the Interior Health Authority. The longest wait times were for otolaryngology, orthopaedic surgery, and plastic surgery.

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ABSTRACT

Background: Canada has substantially longer surgical wait times than several other Organisation for Economic Co-operation and Development member countries with universal health care. In British Columbia, lengthy surgical wait times are an ongoing problem.

Methods: We used the BC Surgical Wait Times database to examine trends in wait times and surgical demand across hospitals ($n = 59$), cities, surgical specialties, and health authorities in BC from 2009 to 2022.

Results: In general, small hospitals had the shortest wait times. Before 2013 and after 2018, medium-sized hospitals generally had longer wait times than large hospitals. Small and medium-sized cities generally had the longest wait times, and rural communities had the shortest. There were no trends in wait times by health authority. Demand was highest in small hospitals, rural communities, and the Interior Health Authority; it was lowest in large hospitals, large cities, and the Provincial Health Services Authority. Across all specialties, otolaryngology, orthopaedic surgery, and plastic surgery had the longest wait times, while neurosurgery and thoracic surgery had the shortest. Demand for ophthalmology was almost eightfold that of any other specialty. Spikes in wait times and decreases in demand occurred during the COVID-19 pandemic across almost all analyses.

Conclusions: Overall, our analysis suggests that demand does not predict wait times for scheduled surgery in BC. Further investigation should be conducted to better understand predictors of wait times in BC.

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This article has been peer reviewed.

Background

While lengthy wait times for scheduled surgeries are a global problem, Canada has substantially longer surgical wait times than other Organisation for Economic Co-operation and Development (OECD) member countries with universal health care.[1] Among eight such countries, Canada was consistently below average for all timelines-of-care indicators and ranked last for surgical wait times, with the largest proportion of patients waiting more than 2 months for elective surgery.[2] In a study conducted between March and June 2020, 38% of Canadians reported having to wait 4 months or longer for scheduled surgery, a far larger percentage than citizens of the Netherlands (13%), France (10%), Switzerland (6%), and Germany (1%).[1] Within Canada, British Columbians in particular face long wait times for scheduled surgical procedures.[3] As of 2022, more than 82 000 patients were on British Columbia's elective surgical wait lists, with more than 40% waiting longer than the federal government's benchmark limit of 26 weeks.[4,5]

These increased wait times have consequences for patient health and wellness. From a physiological perspective, increased wait times can lead to deterioration in a patient's medical condition, heightened pain, increased surgical complexity, and poorer health outcomes.[6,7] Psychologically, increased wait times can lead to diminished quality of life and reduced capacity to engage in daily activities;[8,9] economically,

they can lead to lost wages and increased health care costs.[10,11] These impacts are further exacerbated in rural and remote communities and among Indigenous populations and other marginalized groups.[12,13]

The publicly available BC Surgical Wait Times (BCSWT) database tracks quarterly data on scheduled surgical wait times by hospital, health authority, and procedure, for patients of all ages.[14] Health authorities submit patient booking and postoperative information from their operating room booking system to the registry daily.[14] Therefore, the database is limited to scheduled inpatient and day surgeries and does not include people waiting for surgery that is yet to be scheduled; further, it is subject to institution-specific booking practices. Surgeries are reported using a standardized set of procedure codes across the province. Our objective was to provide an overview of the recent state of surgical wait times in BC using BCSWT data.[15]

Methods

Data were analyzed from Q2 2009 (i.e., April to June) to Q1 2022 (i.e., January to March). The BCSWT database reports wait times using four main metrics: cases waiting, cases completed, 50th percentile (median) wait time, and 90th percentile wait time.

A full list of hospitals included in the database is provided in the **Supplementary Table (available on bcmj.org).**

Median wait times by hospital size, city size, specialty, and health authority were plotted over time using Microsoft Excel. Hospital size was based on the number of beds: small (1 to 99 beds), medium (100 to 499 beds), or large (500+ beds). For the hospital size analysis, outpatient-only surgical centers (0 beds; day surgeries only) were excluded, as their surgical capacity cannot be estimated by number of beds. City size was determined from the population census in 2021 and was divided into four groups based on Statistics Canada's classification of community size: rural (1000 to 29 999 people), small (30 000 to 99 999 people), medium (100 000 to 499 999 people), and large (≥ 500 000 people).[16] For the city size analysis, hospitals that serve the entire province (e.g., BC Children's Hospital, BC Women's Hospital and Health Centre) were excluded from the analysis, because their city size does not reflect the population served. A single hospital that serves a population of fewer than 1000 was also excluded, because the output was not considered to be generalizable. For specialty, the 83 surgical procedures included in the BCSWT database were matched to the surgical subspecialties that perform them **[Table 1]**. Health authorities included the Fraser Health Authority, Interior Health Authority, Island Health Authority, Northern Health Authority, Vancouver Coastal/Providence Health Authority, and Provincial Health Services Authority.

Demand was defined as the number of patients waiting for a procedure plus the number of patients who underwent that procedure in a given quarter. To standardize demand by population, this number was converted to an index (i.e., demand per 1000 people) using the population served by each hospital. To perform this standardization, the population per city per year was estimated by using the population censuses from 2016 and 2021 to calculate the compound annual growth rate, assuming stability in growth rates over time. For surgical procedures that had a demand of less than 5, a value of 2 was input for calculability.

All data were publicly available; thus, no ethics approval was needed for this study.

Results

Of the 62 hospitals in the BCSWT, 59 were included in our analysis **[Table 2]**. Two hospitals were excluded due to insufficient data. Another hospital was closed and replaced by a newer institution; they were treated as one hospital.

Overall wait times

Before 2013 and after 2018, medium-sized hospitals generally had longer wait times than large hospitals. At large hospitals, wait times increased sharply between 2013 and 2016, then declined steadily to 2019. Wait times increased steadily between 2009 and 2019 at medium-sized hospitals and remained comparatively low at small hospitals throughout the study period **[Figure 1a]**.

In general, small and medium-sized cities had the longest wait times, and rural communities had the shortest. Wait times did not vary meaningfully by city size until 2017, when rural communities and large cities began to show a decline in wait times relative to small and medium-sized cities. Wait times in small cities steadily increased between 2009 and 2017 and increased in large cities between 2013 and 2018 **[Figure 1b]**.

There was a sharp increase in wait times in the Provincial Health Services Authority from 2016 to 2017, followed by a return to approximately baseline levels **[Figure 1c]**. As of 2021, the Provincial Health Services Authority had the shortest wait times, followed by the Vancouver Coastal/Providence Health, Fraser Health, Island Health, Interior Health, and Northern Health Authorities.

During the COVID-19 pandemic (April 2020 to March 2021), wait times spiked across all categories of hospital size, city size, and health authority **[Figures 1a, 1b, 1c]**.

Overall demand

To determine whether wait times were related to the demand for surgery, average demand over time by hospital size, city size, and health authority was plotted **[Figure 2]**.

In contrast to wait times, demand per 1000 people was highest in small hospitals and lowest in large hospitals **[Figure 2a]** and was highest in rural communities and lowest in large cities **[Figure 2b]**. While demand remained relatively constant in small, medium-sized, and large cities, it steadily declined in rural communities from 2009.

The highest demand was recorded in the Interior Health Authority, but it steadily declined from 2009 **[Figure 2c]**. Demand in the Fraser Health, Island Health, Northern Health, and Vancouver Coastal/Providence Health Authorities was relatively stable over

TABLE 1. Procedures included in the BC Surgical Wait Times database, by specialty.*

Surgical specialty	Procedure
Dermatology	• Skin surgery
General surgery	• Appendectomy • Bowel resection • Breast biopsy • Cholecystectomy • Colostomy/ileostomy • Gastrostomy/ jejunostomy • Hernia repair, abdominal • Laparotomy • Mastectomy • Rectal surgery • Sphincterotomy • Bariatric surgery • Hernia repair, hiatal
Neurosurgery	• Cranial surgery • Cerebrospinal fluid drainage • Shunt insertion/ removal
Obstetrics/ gynecology	• Cone biopsy • Dilation and curettage and related surgery • Fallopian tube/ovarian surgery • Uterine surgery • Vaginal repair
Ophthal-mology	• Cataract surgery • Lens and vitreous (noncataract) surgery • Other eye surgery
Orthopaedic surgery	• Foot/ankle surgery • Fracture repair • Hip replacement • Knee, anterior cruciate ligament repair • Knee, meniscectomy • Knee arthroscopy • Knee replacement • Other joint reconstruction • Other orthopaedic surgery • Shoulder surgery
Otolaryn-gology	• Mastoidectomy • Myringotomy • Nasal surgery • Oral cavity and pharynx surgery • Other ear surgery • Parotidectomy • Sinus surgery • Tonsillectomy/ adenoidectomy • Tympanoplasty
Plastic surgery	• Abdominoplasty • Breast reconstruction • Breast reduction • Excision gynecomastia • Facial bone reconstruction • Free flap graft • Lipectomy • Nerve surgery • Wound/laceration care
Thoracic surgery	• Esophagectomy • Hernia repair, chest wall • Lung surgery • Rib resection • Scope of chest • Thoracotomy
Urology	• Bladder surgery • Kidney/bladder stone removal • Male reproductive surgery • Other urology surgery • Prostate surgery
Vascular surgery	• Aortic aneurysm repair • Endarterectomy • Varicose veins ligation/ stripping • Vascular bypass graft, noncardiac • Vascular surgery, other
Multiple	• Biopsy in operating room • Cyst/ganglion removal • Examination under anesthesia • Excision lesion/tumor • Fistula repair, nonvascular • Foreign body removal • Hand/wrist surgery • Laparoscopy • Ligament surgery • Skin tumor removal • Spinal/back surgery • Tendon surgery • Thyroidectomy
Non-medical	• Dental surgery

* The BC Surgical Wait Times database includes 83 classifications of surgical procedures. Many of the classifications include several types of surgery (e.g., "Cranial surgery," as classified in the database, covers any elective surgery that occurs in the brain). Each classification was assigned to a responsible specialty. In cases where multiple surgical specialties could perform a procedure, they were specified as "Multiple." Nonmedical surgical classifications were covered by dentistry; thus, those procedures were excluded from the analysis done by surgical specialty. However, they were included in the overall analyses where all procedure types were grouped.

TABLE 2. Number and size of hospitals included in the BC Surgical Wait Times database.*

Hospital size	Number of hospitals							Number of hospital beds, mean (SD)
	Total	Vancouver Coastal Health/Providence Health Authority	Fraser Health Authority	Island Health Authority	Interior Health Authority	Northern Health Authority	Provincial Health Services Authority	
Small	27	2	1	2	11	10	1	37.7 (23.2)
Medium	25	5	8	6	4	1	1	236.0 (100.0)
Large	3	1	1	1	0	0	0	693.0 (235.2)
Outpatient only	4	0	1	0	2	0	1	N/A

* The BC Surgical Wait Times database includes 62 hospitals; however, only 59 were included in our analysis. Two hospitals had insufficient data to include, and one hospital closed and was replaced with a newer hospital; these two hospitals were treated as one for the purpose of analysis. The "Number of hospitals" columns indicate the number of hospitals by health authority. Vancouver Coastal Health and Providence Health were combined, because only two hospitals were included in Providence Health, and they serve the Vancouver population, which overlaps with Vancouver Coastal Health.

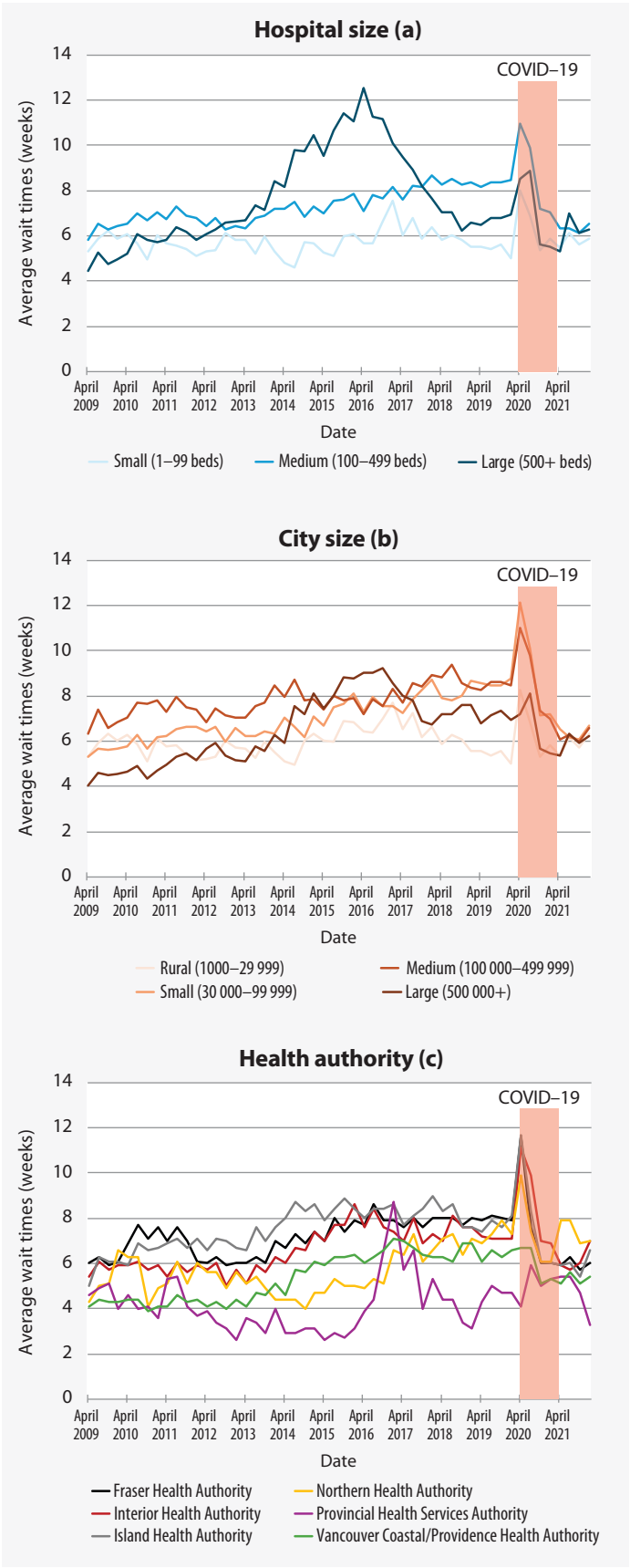

FIGURE 1. Average wait times across all procedures, by hospital size (a), city size (b), and health authority (c).

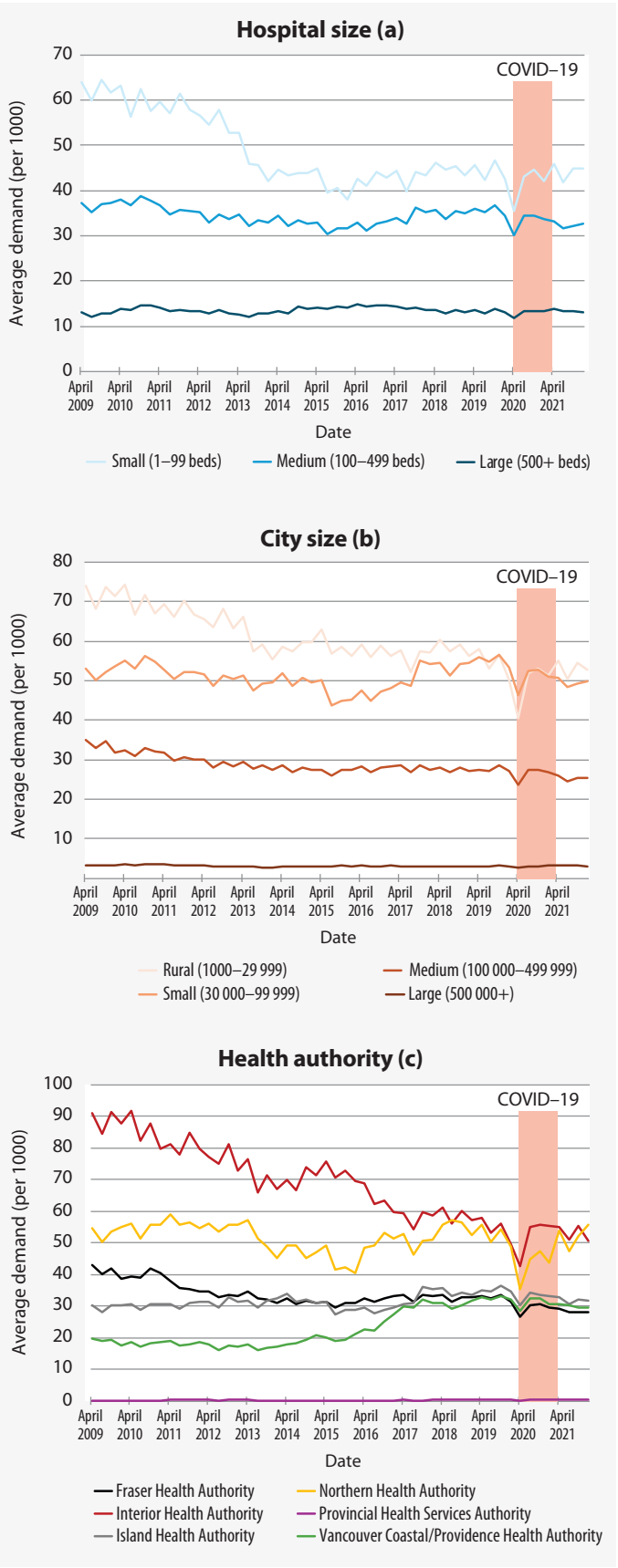

FIGURE 2. Average demand per 1000 people across all procedures, by hospital size (a), city size (b), and health authority (c).

time. Demand in the Provincial Health Services Authority was close to zero, given the population served is the entire province, which skewed the demand per 1000.

During the COVID pandemic, demand decreased across all categories of hospital size, city size, and health authority.

Wait times and demand by specialty

Not all hospitals have all specialties; therefore, results are reported only for hospitals that offer each procedure type.

Across all specialties, otolaryngology, orthopaedic surgery, and plastic surgery had the longest wait times, while neurosurgery and thoracic surgery had the shortest **[Figure 3a]**. For most specialties, the error bars between the overall, pre-COVID, COVID, and post-COVID time points overlapped. However, otolarygology, dermatology, and plastic surgery showed a spike in wait times during COVID, whereas orthopaedic surgery showed a spike post-COVID.

The demand for ophthalmology was almost eightfold that of any other specialty **[Figure 3b]**. There was no difference in demand by time point (i.e., overall, pre-COVID, COVID, or post-COVID) for any specialty.

Discussion

In our study, medium-sized and large hospitals and small and medium-sized cities had longer wait times for surgeries relative to other hospitals and cities; small hospitals and rural communities had shorter wait times. However, small hospitals and rural communities had higher demand per 1000 people relative to other hospitals and cities; large hospitals and large cities had lower demand. Wait times for medium-sized hospitals and small cities increased during the study period, but demand remained relatively constant. There were no trends in wait times by health authority, but the Interior Health Authority had the highest demand, and the Provincial Health Services Authority had the lowest.

Although it is difficult to hypothesize about what caused these trends, the following key findings can be used to frame our results. Our analysis showed that surgical wait times in BC were not reflective of a simple supply–demand mismatch. The longest wait times often occurred in places that had the lowest demand—that is, despite a higher proportion of the patient population requiring surgery in smaller cities and hospitals compared with larger cities and hospitals, the wait times for surgery were lower

FIGURE 3. Average wait times (a) and demand (b), by specialty, across British Columbia.
Pre-COVID is defined as January 2009 to March 2020, *COVID* as April 2020 to March 2021, and *post-COVID* as April 2021 onward.

in smaller hospitals. This suggests that factors beyond demand drive wait times. Our indexed measure of demand was chosen to allow comparisons between cities where raw patient numbers may vary by an order of magnitude and because hospital resources were most likely allocated in proportion to the size of the patient population served.

Despite the limitations of indexed demand, raw demand may also not completely explain the results of our analysis. A prime example of this was during COVID, when almost all analyses of the data showed spikes in wait times, with corresponding dips in demand. Because population sizes did not change meaningfully during COVID, this indicates that the declines in demand per 1000 people were driven by a reduction in raw demand, which suggests that increased wait times during the pandemic were due to non-demand-based challenges.

To hypothesize about what factors aside from demand may have caused increased wait times, we considered pre-COVID spikes in wait times. Between 2013 and 2016, large hospitals showed a prominent increase in wait times from baseline; between 2013 and 2018, wait times in large cities also increased. According to a Fraser Institute report on Canadian wait times in 2016 (the peak of the increase), this represented a nationwide trend whereby wait times were the highest ever recorded.[17] In BC, this was reflected by increases in the time from seeing a family physician to seeing a specialist and from seeing a specialist to obtaining treatment.[17] The cause of this peak was multifactorial. Notably, the time to imaging represented a significant choke point; in 2016, BC had the second-longest wait time for a CT scan (5.0 weeks versus the national average of 3.7 weeks) and the longest wait time for MRI (24.0 weeks versus the national average of 11.1) weeks.[17] Further, reports by the BC Ministry of Health and Doctors of BC acknowledged that operating room capacity was not being maximized: 18% of operating rooms were understaffed due to inadequate funding, and 23% were closed during the summer.[18] Inefficient use of operating room resources and long imaging wait times likely had a disproportionate effect on BC's largest hospitals due to the volumes of surgery and imaging performed there. Thus, the individual resources, access, and context across different hospitals, cities, and health authorities need to be examined in more detail to account for the trends we identified.

In our study, otolaryngology, orthopaedic surgery, and plastic surgery had the longest wait times; neurosurgery and thoracic surgery had the shortest; and ophthalmology had a much higher demand than other specialties. However, this may have been due to how the procedures were divided in the database, which does not match real surgical booking and may have skewed the data, and/or how demand was calculated, which may have favored specialties with short cases and a high throughput. Our results also suggest that there was little variation in wait times by specialty before, during, and after COVID; the exceptions to this were otolaryngology and plastic surgery, which had longer wait times during COVID, and orthopaedic surgery, which had longer wait times post-COVID.

The need for surgical services has grown in BC. Between 2001 and 2018, there was a 54.4% increase in patients waiting for surgery—three times the province's population growth in the same period.[4] This trend is anticipated to escalate with the ongoing growth and aging of the population.[1] Further, many small-volume surgical programs have closed in the last decade, which has placed further strain on existing services.[19] This can be seen in the relatively high demand for surgical services in smaller cities and hospitals. However, considering that our study shows that wait times and demand are stable or decreasing across the province, the BC health care system may be keeping pace with the increase in surgical need.

Even if wait times are largely stable, various strategies can be used to further reduce wait times. Wennberg and colleagues examined initiatives for reducing elective surgical wait times across Canada from 2000 to 2018.[20] They found that several strategies had already been implemented, such as increasing funding (either conditional or unconditional), increasing surgical infrastructure (e.g., staff, surgical units, equipment), outsourcing minor procedures to private surgical hospitals, increasing operating room efficiency (e.g., reducing time between cases, minimizing sedation use), and improving referral management systems.[20] While improvement in any of these areas could reduce wait times, the efficacy of these initiatives has not been quantified. Innovative strategies for increasing surgical efficiencies are under investigation, including using machine learning to predict procedure lengths to improve surgical bookings,[21] creating triage tools to better prioritize surgeries,[22,23] and developing just-in-time bed assignments to better manage patients postoperatively.[24] Regardless of the methods chosen, a synergistic strategy for increasing surgical capacity and improving process efficiency will be required to adequately address all underlying factors that contribute to current wait times.

Some of our findings differ from those in the literature. A 2023 report on wait lists by health authority showed decreases in wait list size in the Fraser Health Authority (23%), Island Health Authority (6%), and Vancouver Coastal Health Authority (10%), but increases in more rural regions, including the Interior Health Authority (4%) and Northern Health Authority (44%).[25] On the other hand, our study showed a decline in demand per 1000 patients in the Interior Health Authority and relatively stable demand across all other health authorities. However, we defined demand as the number of patients waiting for surgery plus the number of surgeries completed per quarter per 1000 people, whereas other reports considered total wait list volume; therefore, these disparities in results may be due to variation in definition rather than actual differences.

Study limitations

There are several limitations to our study. The BCSWT relies on self-reported data

from hospital operating room booking systems, which may introduce inaccuracies. The BCSWT data are also reported on a quarterly basis, which limits granularity. Additionally, a patient's actual wait time is often longer than what is reported, because the BCSWT registry records only the time between when a patient is added to a hospital's surgical wait list and when they undergo surgery. In reality, wait times include time spent waiting to see a primary health care provider, acquiring additional testing, and waiting for a referral to see a surgeon. Also, procedures are grouped as "all procedures" or are divided in a way that does not necessarily reflect surgical bookings and occasionally overlap between multiple specialties (e.g., "biopsy in OR"). Additionally, our analysis compared many different types of surgeries, which can limit interpretability, because the breadth of surgical offerings and the infrastructure dedicated to each type of surgery can vary dramatically across hospitals. Finally, determining the impact of COVID was constrained by the limited availability of 1-year post-COVID data, which posed challenges in discerning meaningful trends and drawing conclusive insights.

Conclusions

Surgical wait times pose a significant challenge in BC. We analyzed changes in scheduled surgical wait times over 13 years and provided insights into the landscape of scheduled surgical procedures in BC. Identifying variations across hospital size, city size, specialty, and health authority offered insights into access to surgical care and elucidated the exacerbation of these challenges by the COVID pandemic. ■

Competing interests

None declared.

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Workplace concussion recovery is everyone's responsibility

Primary care providers have an important role in supporting patients in the early diagnosis and management of concussion-related symptoms, as well as their return to activity and function. According to WorkSafeBC data, there were 2754 work-related concussion claims that required ongoing benefits in 2023.[1]

An early and evidence-based approach by primary care to concussion, or mild traumatic brain injury (mTBI), can go a long way toward supporting injured workers in their return to function and work. One study found that up to 20% of those diagnosed with concussion experience persisting symptoms and related disability, impacting their quality of life and potentially delaying their return to work.[2] And it is estimated that one in six adults with concussion have symptoms that persist beyond 4 weeks.[3]

The importance of early intervention was highlighted in a recent pilot by WorkSafeBC. In 2021–2022, WorkSafeBC began an early referral pilot, in which injured workers with concussion were referred to the Early Concussion Assessment and Treatment program approximately 10 days earlier than when the program first began in 2020. Findings indicated that when workers received this early intervention even earlier, they were 3.1 times more likely to return to work within 12 weeks and 1.4 times more likely to return to work within 26 weeks. The data showed that this earlier intervention also decreased long-term sequalae, with 13% fewer referrals to long-term disability.

This article is the opinion of WorkSafeBC and has not been peer reviewed by the BCMJ *Editorial Board.*

New clinical practice guideline for concussion

A new British Columbia clinical practice guideline, published in 2024, provides recommendations for the assessment, diagnosis, and management of concussion/mTBI that can be applied to all patients with concussion, including those with work-related concussion.[4]

It is estimated that one in six adults with concussion have symptoms that persist beyond 4 weeks.

The guideline provides resources on the diagnostic approach to concussion, the role of and approach to investigations, things to look for during follow-up screening and assessment, indications for referral, resources for symptom management and a gradual return to activity, and special considerations. Some key recommendations from the guideline are:

- Assess anyone with a suspected concussion as soon as possible, ideally within 72 hours, and before potential re-exposure to head trauma.
- Rule out serious injury (see Table 1, "Head injury red flags," in the guideline).
- Confirm a diagnosis.
- Provide patient education and direct early management.
- Screen patients to identify those at risk of persisting symptoms.
- Evaluate patients for other conditions and manage these while also treating/managing concussion.

The guideline also recommends counseling patients about relative rest for the first 24 to 48 hours. It highlights the benefit of early activation and advising patients they can gradually return to activities even in the presence of mild symptoms, while avoiding activities that risk reoccurrence of head trauma. Providing written and verbal recommendations is also suggested. The Concussion Awareness Training Tool (CATT) has handouts for physicians that can help support your communication with patients. These and other resources are available at https://cattonline.com.

New legislation for BC employers and workers

Recent amendments to the Workers Compensation Act in BC include the legal duty that employers and workers have in working together to ensure a worker's safe and timely return to work after any workplace injury, including concussion or mTBI. Employers with 20 or more workers also have a legal obligation to maintain employment of injured workers who have been employed for at least 12 months.[5] This means that employers must provide alternate or modified duties that allow injured workers to use current levels of functional abilities in the workplace.

Employers and workers are encouraged to collaborate in creating a safe and suitable return-to-work plan that includes a gradual, step-by-step process to return to pre-injury activity levels. This plan would begin based on the worker's current abilities and include a modified schedule to allow for gradual reintegration and adaptation of more challenging tasks, as well as time to engage in symptom-management activities.

Supporting your patient's return to work

In the clinic, supporting your patient's return to work includes making an accurate assessment and diagnosis at the initial

visit, regularly evaluating recovery progress and the patient's tolerance of activities, encouraging them to follow safe increases in activity levels, and providing educational resources. As detailed in the BC Guideline on concussion/mTBI, a patient's sleep and mood should also be considered and addressed. The guideline also refers to the association between high initial symptom severity and persisting symptoms. In addition, it is recommended that all patients have a primary care follow-up within 2 weeks of their diagnosis to screen for persisting symptoms and determine whether referrals to secondary care providers are needed.

CATT and the BC Injury Research and Prevention Unit have developed a helpful resource that offers guidance for managing an individual's return to work following concussion.[6] The four steps of the process help support a worker's progress through a graduated return-to-work strategy **[Figure]**.

More resources to help you support patients with work-related concussion

WorkSafeBC has two programs for workers who have accepted claims for work-related concussion.

The Early Concussion Assessment and Treatment program is delivered by a core team of a physical therapist and an occupational therapist, with additional support from a kinesiologist and a clinical counselor, as indicated. The primary focus of the program is early assessment, education, and focused intervention to facilitate an early and safe return to work and pre-injury function (www.worksafebc.com/en/health-care-providers/rehabilitation/early-concussion-assessment-treatment).

The Post-Concussion Management Program is an interdisciplinary outpatient program where workers receive individualized treatment plans that are implemented in a group environment. The plans are developed by a clinical team including a physician, a psychologist, a clinical counselor, a physical therapist, an occupational therapist,

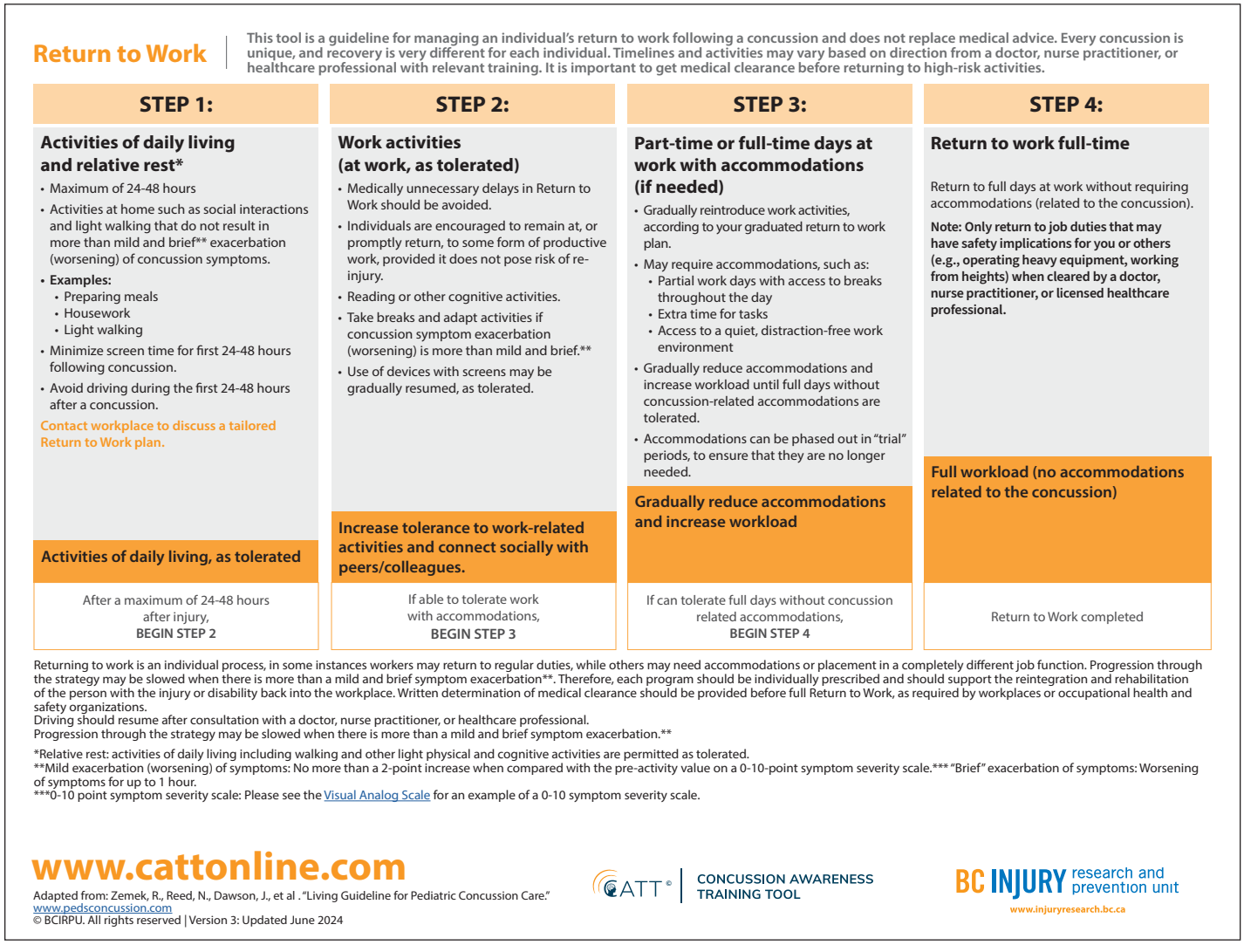

FIGURE. Tool for managing a patient's return to work following concussion. Source: https://resources.cattonline.com/files/return-to-work-strategy.

and a kinesiologist (www.worksafebc.com/en/health-care-providers/rehabilitation/post-concussion-management-program).

CATT also has additional resources for you and your patients, including the following e-learning courses:

- Concussion Awareness Training Tool for Medical Professionals (free and eligible for Mainpro+ and Maintenance of Certification credits): https://cattonline.com/course/concussion-awareness-training-tool-for-medical-professionals
- Concussion Awareness Training Tool for Workers and Workplaces: https://cattonline.com/course/concussion-awareness-training-tool-for-workers-and-workplaces

WorkSafeBC is here to support you. If you have questions or concerns about a patient with work-related concussion, speak with a WorkSafeBC medical advisor via the RACE app: www.raceconnect.ca/get-raceapp. ■

—Shelina Babul, PhD
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Director, BC Injury Research and Prevention Unit

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PREMISE

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Competing interests

None declared.

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The value that a team-based approach brings to family practice

Team-based primary care offers many benefits to patients, physicians, and others, including enhanced access to care, increased comprehensive care, stronger relationships with patients, and improved satisfaction.

For physicians who are able to access the services of primary care network–funded team members or who independently hire allied health providers or nurses for their clinics or other primary care settings, the Family Practice Services Committee's (FPSC's) Practice Support Program (PSP) offers coaching, programs, and financial assistance to strengthen and optimize team-based primary care.

Improving comprehensive family practice

In New Westminster, Dr Paras Mehta has seen measurable improvements in accessible, comprehensive, and coordinated care in his clinic for patients who need rapid follow-up after a visit to the emergency department. Dr Mehta and his team—including medical office assistants, a registered nurse, a pharmacist, and a community health nurse—recently completed a quality improvement project focused on improving access and care for these patients.

The clinic was averaging six calls per week for patients discharged from the emergency department, all being seen by Dr Mehta. He approached the PSP for coaching support to help enhance communication within his interdisciplinary team, clarify roles, and increase coordination with health authority home care support teams and resources.

This article is the opinion of the FPSC and has not been peer reviewed by the BCMJ *Editorial Board.*

Since January 2024, the PSP's team-based care coaches have used patient panel and electronic medical record (EMR) data to help more than 200 family physicians and 750 team members. The PSP also collaborates closely with local divisions of family practice and primary care networks to address community priorities and implement practice-based quality improvement projects.

High-functioning teams improve access and continuity by expanding clinical capacity, improving after-hours coverage, and extending the range and speed of accessing health services.

Now at Dr Mehta's clinic, staff connect patients postdischarge with the registered nurse, who determines each patient's specific needs: an appointment with Dr Mehta, connection to the health authority's home care support team, or a call with the pharmacist.

Dr Mehta says this approach has also significantly improved postdischarge support, particularly for frail patients. The team can address patients' immediate needs more quickly, and patients receive coordinated follow-up from both home health and the clinic, reducing their stress. According to Dr Mehta, staff feel more confident about ensuring patients will get timely access to care and are less worried about patients falling through the cracks because their team is now communicating regularly.

Although the pharmacist and community health nurse are not located within the clinic, they can access Dr Mehta's EMR and add notes directly in patient charts. This provides valuable context for clinical decisions and facilitates more efficient team communication and collaboration.

Dr Mehta says the PSP coach, Ruthann Robinson, helped the team create a workflow with direct communication, regular team meetings, and the ability to connect in real time. Rather than simply sharing space, their team is now working to each member's strengths. They support and rely on each other to deliver the best care possible.

The value of team-based care, in numbers

At Rocky Mountain Health Centre in Fernie, BC, six family physicians have contributed data to FPSC's Health Data Coalition (HDC) since 2021. During the 18 months between Q1 2021 and Q3 2022, the percentage of diabetic patients who had a glycated hemoglobin test in the preceding 6 months increased from approximately 25% to approximately 75% **[Figure]**. These efforts have been well sustained over time, which is a tremendous feat.

Dr Shelley Forrest says the significant improvement in diabetic care is directly correlated with their clinic acquiring a chronic disease team, particularly two chronic disease registered nurses, Lynn Walker and Leah Folkmann. Dr Forrest's patients are supported and followed more comprehensively than a family physician can do alone.

The team usually sees a patient for the first 30 to 45 minutes of an appointment to conduct an in-depth assessment; then the physician joins them. Together, the team and the patient make a plan that includes diet, exercise, and medication recommendations. The patient receives foot care education; optometry and dental care recommendations; and information on how

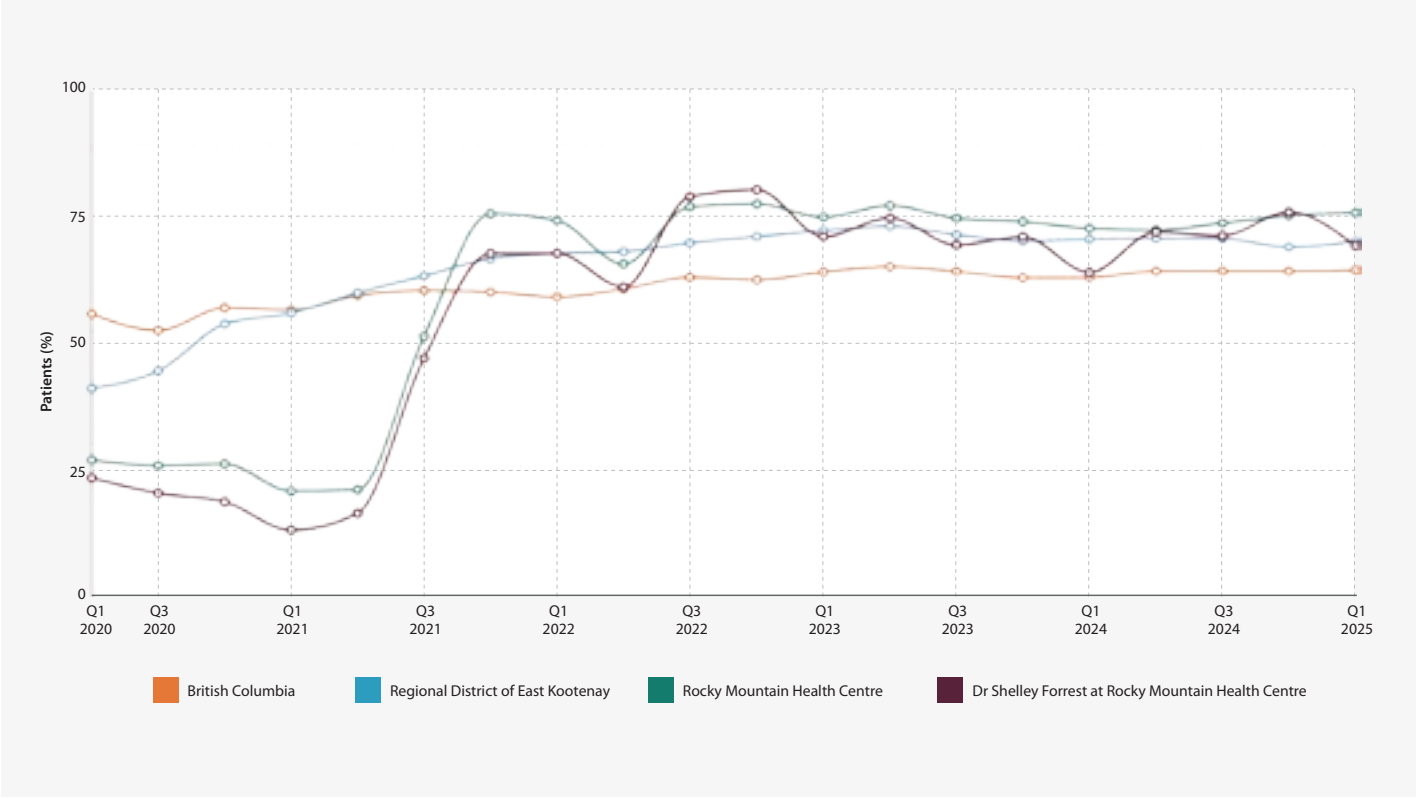

FIGURE. The percentage of active patients with diabetes (based on the problem list and excluding gestational diabetes) with a glycated hemoglobin test result in the electronic medical record in the preceding 6 months. Data shown for all of British Columbia, the Regional District of East Kootenay, all patients at Rocky Mountain Health Centre, and Dr Shelley Forrest's patients at Rocky Mountain Health Centre.

to recognize and treat hypoglycemia, how to plan for sick-day medication changes, and how to drive safely.

Results in the HDC Discover application clearly show that this 45-minute conversation between a registered nurse and the patient is time well spent.

How to advance your team-based approach

Initiating a team-based care model is a complex, multifaceted effort. In addition to practice supports provided by the PSP, FPSC offers team-based care grants of up to $15 000 to eligible family practices.[1] The grant helps with recruitment and onboarding costs, which are often a barrier to developing team-based practices.

High-functioning teams improve access and continuity by expanding clinical capacity, improving after-hours coverage, and extending the range and speed of accessing health services. Patients experience more timely care and greater satisfaction, while physicians realize a more sustainable practice model.

Patients experience more timely care and greater satisfaction, while physicians realize a more sustainable practice model.

Learn more about how FPSC's PSP team can optimize team-based care in your practice on the PSP (https://fpscbc.ca/psp) and Doctors Technology Office (www.doctorsofbc.ca/advice-support/doctors-technology-office) web pages, or submit a service request at www.doctorsofbc.ca/service.

HDC Discover helps physicians and clinics improve clinical practice, enhance patient care, and understand the impact of changes. Learn how FPSC's HDC can help you plan and evaluate team-based care at https://hdcbc.ca. ■

—Jaron Easterbrook, MD
—Baldev Sanghera, MD
—Janet Evans, MD
—Greg Costello, MD
—Kevin Martin, MD
Family Practice Services Committee members

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Novel treatment of spasticity: International success through collaborative care

Paul Winston, MD, FRCPC

In 2018, our small Victoria clinic won a $10 000 South Island Facility Engagement Initiative Society grant, with the audacious title "Creating a world-leading centre in novel treatment of spasticity through collaborative care."[1] So began our journey to launch what is now an internationally acclaimed innovation program for patients with spasticity. Fast-forward 6 years, and our cryoneurolysis for spasticity protocol has entered the international nomenclature.

Our goal of being a global centre of innovation was attained via many further engagement grants and the licensing of dozens of physicians from outside BC by the College of Physicians and Surgeons of BC (CPSBC). Our tiny clinic has raised close to $1 million from donors to the Victoria Hospitals Foundation, industry partners, Island Health Research grants, and other awards, including the 2024 *Medical Post* Innovative Practice Award and the Victoria Hospitals Foundation Caring Spirit award. We have published over 30 peer-reviewed publications. Our *Atlas of Ultrasound-Guided Nerve-Targeted Procedures for Spasticity* sold nearly 900 copies in 2 years before being translated into Mandarin and Japanese. Over 200 000 people have streamed our documentaries (here is one example: https://youtu.be/hpuD2cv85E4).

Team members received a Victoria Hospitals Foundation Caring Spirit award from a grateful patient's family. From left to right: Dr Mahdis Hashemi, physical medicine and rehabilitation (PMR) head of research; Dr Daniel Vincent, anesthesiologist and inventor of cryoneurolysis for spasticity; Mr Danny Gatenby, University of Victoria co-op student; Dr Paul Winston, PMR; Ms Julie Connor, administrative lead; and Ms Laura Schatz, BSc, research kinesiologist.

Our clinic is full of University of Victoria and University of British Columbia co-op students, UBC Flexible and Enhanced Learning (FLEX) research students, and medical students and residents from across Canada.

Each month, via our educational platform (https://arcryo.ca), up to five doctors from dozens of institutions around the world come to our patient treatment and training course, held in Victoria. Combined with the cities overseas where I have provided training, there are now centres worldwide **[Figure]** using our novel breakthrough treatment of freezing the nerves implicated in spasticity at temperatures as low as −88 °C. Clinics across North America and Europe, including at Harvard, Yale, and Oxford, and in Copenhagen and Luxembourg, offer the made-in-Victoria treatment. The CPSBC grants licences for patient care and works with physicians from all over the world. By allowing licensing for fellowships from 1 day to 6 months, access to educational opportunities around the world is streamlined.

Through Doctors of BC and Island Health Research grants, we now treat children as young as 3 years old at Victoria General Hospital, with sedation support from the Division of Pediatrics; at Children's Healthcare of Atlanta; and at the Hospital de Calahorra in La Rioja, Spain. Wascana Physiatry in Regina; Stanford Medicine Children's Health Specialty Services in Sunnyvale, California; and Shriners

Dr Winston is a clinical associate professor at the University of British Columbia and in the Island Medical Program.

This article has been peer reviewed.

FIGURE. Maps demonstrating the global reach of our cryoneurolysis innovation for spasticity and pain.

- Purple pins: Locations with centres offering cryoneurolysis for spasticity.
- Green pins: Locations where physicians have been trained by our team.
- White pins: Locations of patients who traveled to receive treatment by our team.
- Pink pins: Locations where training for centres was provided on site.

Children's Northern California will soon launch their own pediatric programs. A multicentre sham-controlled adult trial is also underway in the US. Our long-term care contracture study and nonoperative osteoarthritis initiatives and studies see patients well into their 90s.

The support from CPSBC and Doctors of BC is especially crucial. I am a UBC clinical faculty member, and most granting agencies do not favor applications from full-time clinicians. As we offer instantaneous changes to spastic muscle patterns, this ultrasound-guided procedure cannot be taught in a lab only. Our most recent facility engagement grants include virtual reality to reduce the pain of procedures and Indigenous visual storytelling to improve access to informed consent. With our anesthesia pain service grant, we created a mobile cryoneurolysis service for severe acute pain at two hospitals in Victoria, led by Dr Garrett Barry. One workshop attendee, Dr Michael Jew, launched a similar service at Providence Health Care in Vancouver. Dr Timothy Murray, an attendee from the Division of Radiology, is treating patients at St. Paul's Hospital. We treat acute rib fractures and shoulder, hip, knee, and amputee pain, and we send patients home quickly.

In 2024, the Ministry of Health conducted an analysis of cost savings, led by Ms Barbara Tencer, prescription monitoring program manager, and found significant savings over an 18-month follow-up period for all patients evaluated. At the highest end, a spasticity patient can cost $9600 per year in medications, compared with $630 for the vast majority of patients treated with cryoneurolysis, who receive one treatment per year (double that amount if they have a second treatment). In addition, Providence Health Care has received funding from the Ministry of Health's Innovation Pathway program (www.innovarium.org/en/putting-pain-ice-medical-innovation-changing-pain-management).

UBC clinical faculty on Vancouver Island face geographical disparity in access to research and educational support. UBC is not yet set up to offer distributed faculty the same access that is available to faculty in the Lower Mainland. Hence, funding from the Canadian Institutes of Health Research and similar agencies is currently geocentric to Vancouver. In contrast, funding from Doctors of BC is available equitably throughout the province.

Thanks to the support we've received from numerous dedicated organizations, we've treated over 1200 patients in Victoria. Every month, patients travel from across BC and the far reaches of North America to receive care. A commitment to innovation has changed lives around the world.

Our goals for the next several years are clear: no patient having to travel far to access this breakthrough drug-free therapy, an increase in opioid-free pain care, faster discharges, millions of dollars saved, and better patient outcomes. All backed by evidence and publications. ■

Acknowledgments

Dr Winston thanks the CPSBC and Doctors of BC for supporting knowledge translation and helping launch the clinic's innovation program. He also gratefully acknowledges the support from Island Health and Island Health Research; the Victoria Hospitals Foundation; industry partners including Pacira BioSciences, AbbVie, and BioTalent Canada; the University of Victoria's co-operative education program; UBC FLEX; the UBC Summer Student Research Program; and the Ministry of Health.

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1. BC Medical Journal. The Victoria Combined Peripheral Nerve and Spasticity Clinic. 2019;61:158,182.

Correction: This article has been revised. The author requested the following change postpublication: Dr Timothy Murray was incorrectly named as Dr Michael Murray.

Obituaries

We welcome original tributes of less than 700 words; we may edit them for clarity and length. Email obituaries to journal@doctorsofbc.ca. Include birth and death dates, full name and name deceased was best known by, key hospital and professional affiliations, relevant biographical data, and a high-resolution head-and-shoulders photo.

Dr John Anthony (Tony) Tercier

1953–2025

It brings great sadness to report that Dr Tony Tercier passed away on 4 April 2025. Tony spent more time in hospital than in his home over the last 6 months as his physical illness ramped up. He dealt with constant pain and progressive loss of mobility, to the point where no relief could be found. He chose to take control and died a medically assisted death.

Tony was born on 13 July 1953 in Edmonton, Alberta. He was an excellent student. His mother recognized his intellect at a young age and began taking him to the library to read books together on a wide range of topics. This interest in reading widely and acquiring knowledge continued throughout his life. Over the years, Tony impressed many people with his expansive knowledge base, and he was always humble and modest in doing so.

Tony completed high school at St. Joseph Catholic High School in Edmonton, graduating as the valedictorian of his class, then entered the University of Alberta. He began medical school 2 years later, also at the University of Alberta; in 1977, he graduated from medical school with the highest honors and went on to train at Holy Cross Hospital in Calgary. There, Tony cemented lifelong friendships with Drs Chris Godfrey and David Rhine. These friendships included many medical and mountain adventures, such as practising emergency medicine together in Saudi Arabia and Dubai and the second-ever recorded crossing of the world-famous Haute Route in the European Alps on telemark skis.

After Holy Cross Hospital, Tony's medical training continued in emergency medicine under the tutelage of Dr Peter Rosen, the godfather of emergency medicine, at Denver General Hospital. Tony became one of Peter's favorite residents. Tony's impact as the first Canadian resident paved the way for another group of Canadians to follow and train in this program. Those trainees became pillars of Canadian emergency medicine and owe a lot to Tony, who helped start them on their paths to medical prominence. After a few years, Tony's enthusiasm for learning led him to the University of Chicago, where he completed a master of arts degree in philosophy. This in turn found him moving to London, England, where he enrolled at Birkbeck, University of London, in a specialized PhD program referred to as the London Consortium, in humanities and cultural studies. He excelled. On completing his PhD, he acted as a lecturer at the University of London, eventually following his teacher and mentor Dr Dorothy Porter to the University of California, San Francisco, where he taught the history of medicine. When grants for teaching disappeared during the economic downturn of 2008, Tony returned to Canada and retrained in emergency medicine. He then joined the emergency medicine group at Kelowna General Hospital.

Tony lived in a West Kelowna community called Traders Cove, with an expansive view of the lake and a huge garden, which he loved and tended tirelessly. His sister Paulette joined him there, and they shared the house and gardening for 12 years. Tony's health declined over these years, forcing him to retire from emergency medicine and eventually move to a smaller Kelowna property with his dog, Arrow. Arrow became his constant companion, his daily activity, and his life focus.

In the end, Tony's health issues reached a point of no improvement. He courageously dealt with unremitting pain and progressive loss of feeling and strength, and he rarely complained. He was brave and courageous, and he remained sharp and interested in all about him. Tony's thesis at the University of London was about death. As an expert on the topic, he courageously took control of his deteriorating physical condition and departed this world while he still had a choice in the matter.

His friends and family will hold him in their memories and miss him dearly.

—David Rhine, MD, FRCPC
Kelowna

Dr William Gregory (Greg) MacDougall

1947–2025

Trying to golf on a nine-hole sand course at the edge of the Sahara Desert is difficult. The ball can bounce off rocks and bury itself in the brush between the oiled greens. But Dr Greg MacDougall, intrepid family doctor and enthusiastic golfer, found enjoyment in this when he worked in Africa.

Like that golf ball, Dr MacDougall bounced around the world for most of his life. The son of a Canadian career diplomat, he was born in Halifax but grew up in Glasgow, Belfast, and Ottawa. After graduating from high school in Ottawa, he returned to Scotland to study medicine. He graduated from the University of Glasgow in the class of 1971, then interned in Toronto, where he met Barbara, a British midwife.

After Greg and Barbara married, they were determined to raise their children in just one location, so they settled in Ottawa for 25 years, where Greg started a family practice. They had a son, Andrew, and a daughter, Anne (Lankin). On the side, Greg enjoyed golfing but also learned to speak French, served as an Ottawa city councilor and a police commissioner, and was an active Liberal Party member. He also learned to fly and completed master's degrees in health administration and international affairs.

When their two children left the nest, Greg and Barbara ricocheted around the world again. Greg served 3 years as senior medical advisor for Mobil Oil Corporation in Doha, Qatar; 3 years at the International SOS Medical Clinic in Hanoi, Vietnam; and another 2 years at the ExxonMobil clinic in N'Djamena, Chad.

In 2005, Greg and Barbara's ball finally came to rest on a green in Victoria, BC. Greg quickly accumulated a very large family practice at Doctors Medical Clinic. After 10 years, he retired from clinical work, much to the disappointment of his patients and colleagues, who greatly admired and sought his wisdom and experience. Despite his failing health in recent years, he managed to fly to the UK many times to visit his son's and daughter's families and enjoy time with his three grandchildren. At his request, his ashes were spread by the sea, close to his favorite hole at the Victoria Golf Club.

—Eugene R. Leduc, MD
Victoria

Dr Margaret (Peggy) Manson Johnston (née Mouat)

1928–2024

Dr Peggy Johnston passed away peacefully in Vancouver, in her 96th year, surrounded by the love of her family and the devoted care of her caregivers. Her life was defined by intellectual achievement, professional leadership, and deep connections to her family and island roots.

Born in Ganges on Salt Spring Island, Peggy was the youngest of six children in the Mouat family. Her parents operated Mouat's Trading Company and Mouat Brothers Store, institutions of island life. When her father began using a wheelchair due to polio, 12-year-old Peggy was granted a special driver's licence to chauffeur him across the island—a formative expression of her responsibility and resolve.

Peggy excelled academically, completing high school at age 16, earning a bachelor of science degree from the University of British Columbia in 1948, and graduating from McGill University in 1952—one of only six women in her medical school class. She maintained a strong connection to her roots, returning each summer to work in the family store.

At McGill, she met her future husband, Dr Albert (Al) Johnston. Following internships in Montreal and Vancouver, they trained at Henry Ford Hospital in Detroit—Peggy in dermatology, Al in ophthalmology—and began their family.

In 1959, they returned to BC. Peggy became Nanaimo's first practising dermatologist before the couple settled in Vancouver, where they shared an office for over 30 years. She was the first practising female dermatologist in Vancouver and the first pediatric dermatologist at UBC, and she served as head of dermatology at BC Children's Hospital. A devoted clinician and passionate educator, Peggy was a clinical professor who mentored generations of students and residents with wisdom and warmth.

Peggy and Al balanced their demanding careers with family life, raising four children and instilling in them a love of learning, nature, and community. Their shared joy was the Saltspring Island cottage, a family retreat that remained central to their lives. There, Peggy found great enjoyment in gardening, fishing, and welcoming the next generation—her beloved grandchildren.

After retiring in 1989, they returned to the island full-time. Peggy carried forward

Continued on page 226

Classifieds

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We are looking for a new family doctor to join our team! Una is a lovely family practice located in the central Vancouver area. We are also a UBC teaching clinic and are open to provisionally licensed candidates. We support supervision, immigration, relocation, and health benefits. International medical graduates are also welcome. Contact una.drtodorovic@gmail.com.

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OBITUARIES

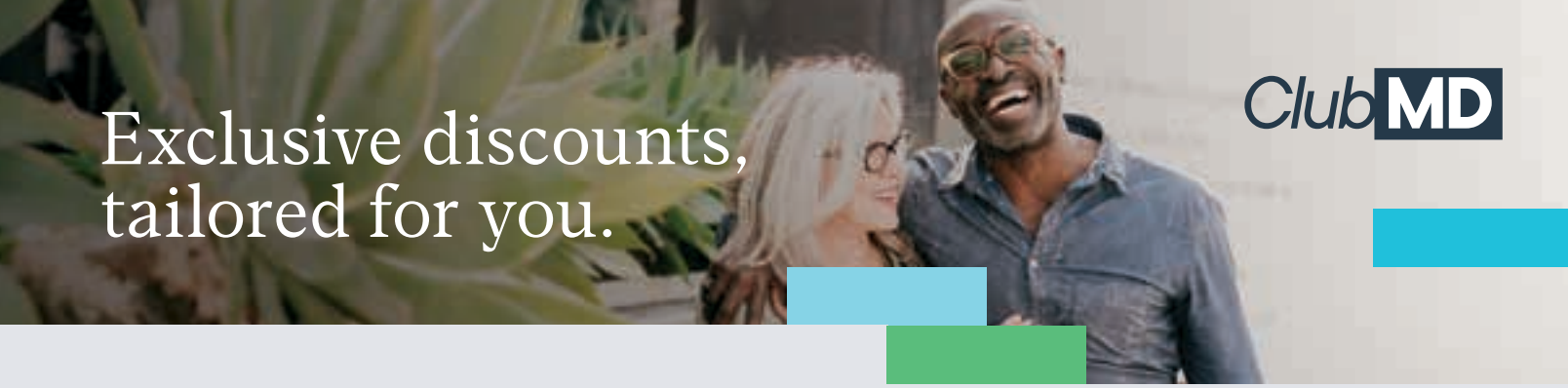
Continued from page 225

a legacy of quiet generosity, community involvement, and enduring family bonds. She and Al shared 61 years of marriage before his passing in 2013.

Peggy is survived by her children, Kathy, Jim (Barb Melosky), Bill (Diane Ross), and Tom (Deanne Lawder), and her grandchildren, Alexander, Robert, James, and Daniel. She was predeceased by her husband, Al; her parents; and her five siblings.

Dr Peggy Johnston will be remembered for her pioneering contributions to medicine, her devotion to family and community, and her deep affection for the island that shaped her.

—William H. Johnston, MD
Lantzville



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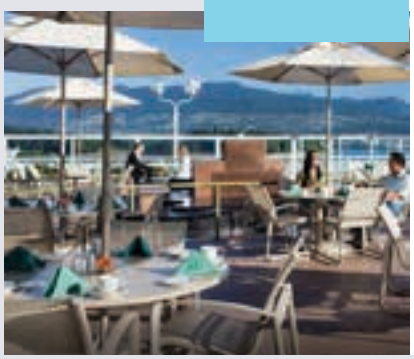

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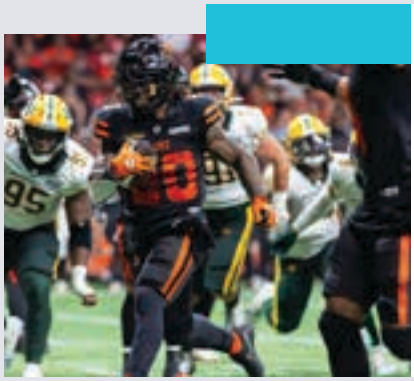

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