

Detection of pre-extensively drug-resistant tuberculosis by molecular testing



IN THIS ISSUE

Celebrating 65 years of the *BC Medical Journal*

How can we improve competence in conducting pelvic exams?

HEPA filtration reduces transmission of SARS-CoV-2 and prevents nosocomial infection: A call to action

65
YEARS

Sharing knowledge
Building connections

VIRTUAL SYMPOSIUM

7th Annual Fertility and Reproductive Medicine Symposium

NOVEMBER 8, 2023 12:00-16:30 PT

Earn CME Section II Credits

Registration Complimentary RSVP - CME@pacificfertility.ca

➤ **Prescribing Nature for Patient
and Planetary Health**

*Dr. Melissa Lem, Director of Park
Prescriptions, BC Parks Foundation*

➤ **Common Fertility Concerns
- Community-Based Management**

Dr. Caitlin Dunne

➤ **Thyroid Management During
Preconception and Pregnancy**

Dr. Sawyer Huget-Penner

➤ **Donor Sperm, Donor Egg &
Surrogacy**

Dr. David Smithson

➤ **Digital Literacy and Internet Safety
for Parents and Those Who Work
with Youth**

*Brandon Laur, CEO & Instructor of
The White Hatter*

➤ **Ozempic Uses and Safety in the
Reproductive Aged Women**

Dr. Sandra Cortina

➤ **Menopause - A Review of Routine
& Complex Case Management**

Dr. Kelsey Mills



BCM J

BC Medical Journal

November 2023
Volume 65 | No. 9
Pages 321–360



Providing family physicians with appropriate resources to diagnose and treat attention-deficit/hyperactivity disorder in adults ensures patients receive timely and accurate care and reduces societal and health care costs. Article begins on page 334.

325 Editorials

- Celebrating 65 years of the *BC Medical Journal*
Caitlin Dunne, MD
- Downstream effects of medical care abroad, Yvonne Sin, MD

327 Letters

- Saving primary care
Robert H. Brown, MD
- Re: Does the Longitudinal Family Physician Payment Model improve health care, including sustainability?
Alister Frayne, MB ChB

- Re: Health care providers' perspectives on medical travel in northwestern BC
B.E. Driedger, MD
- Correction: "Justice, rights, and unnecessary suffering"

328 President's Comment

Follow my lead; lead me to follow
Joshua Greggain, MD

329 BCMD2B

How can we improve competence in conducting pelvic exams?
Larissa Steidle, MD,
Emily Lostchuck, MD

331 Premise

HEPA filtration reduces transmission of SARS-CoV-2 and prevents nosocomial infection: A call to action, Susan M. Lee, MD, Jean Warneboldt, MD

CLINICAL

334 Diagnosing and treating adult attention-deficit/hyperactivity disorder

Elisabeth Baerg Hall, MD,
Cynthia Buckett, RD

Contents continued on page 324

Environmental impact

The *BCM J* seeks to minimize its negative impact on the environment by:

- Supporting members who wish to read online with an e-subscription to bcmj.org
- Avoiding bag and envelope use, and using recyclable paper envelopes when needed
- Working with Mitchell Press, ranked second in North America for sustainability by canopyplanet.org
- Printing with vegetable-based inks
- Using FSC-certified paper
- Printing locally in British Columbia

doctors
of bc



Postage paid at Vancouver, BC. Canadian Publications Mail, Product Sales Agreement #40841036. Return undeliverable copies to *BC Medical Journal*, 115–1665 West Broadway, Vancouver, BC V6J 5A4; tel: 604 638-2815; email: journal@doctorsofbc.ca.

Advertisements and enclosures carry no endorsement of Doctors of BC or the *BCM J*. The *BCM J* reserves the right to refuse advertising.

The *BCM J* and Doctors of BC operate from the traditional territories of the Coast Salish peoples including the Musqueam, Squamish, and Tsleil-Waututh Nations, whose relationship with the land continues today. Doctors of BC is committed to the provision of culturally safe care to First Nations, Inuit, and Métis people.

© 2023 by article authors or their institution, in accordance with the terms of the Creative Commons Attribution (CC BY-NC-ND 4.0) licence. See <https://creativecommons.org/licenses/by-nc-nd/4.0/>. Any use of materials from the *BCM J* must include full bibliographic citations, including journal name, author(s), article title, year, volume, and page numbers. If you have questions, please email journal@doctorsofbc.ca.

Statements and opinions expressed in the *BCM J* reflect the opinions of the authors and not necessarily those of Doctors of BC or the institutions they may be associated with. Doctors of BC does not assume responsibility or liability for damages arising from errors or omissions, or from the use of information or advice contained in the *BCM J*.



ON THE COVER

Molecular testing can detect the presence of mutations and confirm resistance to rifampin, isoniazid, pyrazinamide, and quinolones, suggesting the presence of pre-extensively drug-resistant tuberculosis. Article begins on page 340.

Mission: The *BCMJ* is a general medical journal that shares knowledge while building connections among BC physicians.

Vision: The *BCMJ* is an independent and inclusive forum to communicate ideas, inspiring excellent health care in British Columbia.

Values

Quality: Publishing content that is useful, current, and reliable.

Connections: Sharing diversity of thought and experiences from across the province and promoting communication between BC doctors.

Impact: Striving for healthier patients and communities by amplifying physicians' voices, opinions, research, and news.

Print: The *BCMJ* is distributed monthly, other than in January and August.

Web: Each issue is available at www.bcmj.org.

Subscribe to print: Email journal@doctorsofbc.ca.

Single issue: \$8.00

Canada per year: \$60.00

Foreign (surface mail): \$75.00

Subscribe to notifications:

To receive the table of contents by email, visit www.bcmj.org and click on "Free e-subscription."

Prospective authors: Consult the "Guidelines for authors" at www.bcmj.org for submission requirements.

Editor-in-chief
Caitlin Dunne, MD

Editorial Board
Terri Aldred, MD
Jeevyn K. Chahal, MD
David B. Chapman, MBChB
David J. Esler, MD
Sepehr Khorasani, MD
Michael Schwandt, MD
Yvonne Sin, MD

Managing editor
Jay Draper

Associate editor
Joanne Jablkowski

Editorial and production
Tara Lyon

Copy editor, scientific content
Tracey D. Hooper

Proofreader and web/social media coordinator
Amy Haagsma

Cover concept and art direction
Jerry Wong,
Peaceful Warrior Arts

Design and production
Laura Redmond,
RetroMetro Designs Inc.

Printing
Mitchell Press

Advertising
Tara Lyon
604 638-2815
journal@doctorsofbc.ca

ISSN 0007-0556 (Print)
ISSN 2293-6106 (Online)
Established 1959



Patients who required emergency bowel surgery fared worse in multiple dimensions during the COVID-19 pandemic compared with prepandemic. Article begins on page 345.

Contents continued from page 323

CLINICAL (Continued)

340 Detection of pre-extensively drug-resistant tuberculosis by molecular testing

Eugene Y.H. Yeung, MD, Denise Werry, PharmD, Patrick H.P. Wong, MD, Yazdan Mirzanejad, MD, Inna Sekirov, MD, William J.A. Connors, MD, Dale Purych, MD, Shazia Masud, MD

345 The impact of the COVID-19 pandemic on the severity of emergency bowel surgery

Lisa Jeffery, MD, Alexis Ryley, RN, Hamish Hwang, MD

351 WorkSafeBC

Performing a return-to-work consultation for patients with a workplace injury or illness
Olivia Sampson, MD,
Celina Dunn, MD

352 BCCDC

Simple ways to stay up-to-date on antibiotic prescribing guidelines
Lynsey Hamilton, MSc, Tracy Monk, MD, Nick Smith, MPH

353 College Library

Physician wellness reading list
Niki Baumann

354 Obituaries

Dr Patrick Yoshiro "Pat" Miki

355 Classifieds

356 Proust for Physicians

Dr Beata Byczko

Looking for the News?

Our News section has moved online so that it can be more timely. Find it at bcmj.org/article-type/news.

Celebrating 65 years of the *BC Medical Journal*

In 2023, the *British Columbia Medical Journal* is marking a significant milestone: its 65th year of publication. This anniversary invites us to contemplate what it means for an organization to reach the mature age of 65. With age comes reflection, and an opportunity to celebrate past accomplishments and consider the impact an institution has had on its community (and vice versa). For the *BCMJ* this journey is significant, not only for the journal team but also for the entire medical community it serves—the doctors of BC, its dedicated readers, and the contributors who have shared their knowledge in its pages.

The origins of the *BCMJ* can be traced back to its predecessor, the *Vancouver Medical Association Bulletin*, which saw its inaugural issue published in October 1924. A glimpse into its editor's page from that time reveals the *VMA Bulletin's* aspiration to be the “first attempt at systematic medical publication in the Canadian West,” embodying the progressive spirit of its leaders.¹ It also emphasized an intention to distribute the *VMA Bulletin* to doctors (then composed of “medical men”) across the province, laying the foundation for the *BCMJ's* commitment to broad dissemination of medical knowledge.

The transition from the *VMA Bulletin* to the *British Columbia Medical Journal* in 1959 marked a pivotal moment in the journal's history. This reorganization and renaming signified the birth of a publication that would become an integral part of the medical landscape in British Columbia. In 1963, the British Columbia Medical Association (now Doctors of BC) assumed ownership of the journal, solidifying its position as the official publication of our medical community.

Today, the *BCMJ* proudly stands as the sole provincial medical journal in Canada, a testament to its enduring relevance,

community participation, and Doctors of BC support. Over the years, the journal has reached a circulation of over 16 000 readers, and remarkably, the cost of each issue to members has remained at \$2 for over 37 years, thanks in part to advertising support (see www.bcmj.org/history for more about the journal's history). While the *BCMJ* embraced the digital age with the launch of

65 YEARS | Sharing knowledge
Building connections

bcmj.org in 2000, it continues to offer a print edition in response to feedback from our 2022 survey. Since its inception, the *BCMJ* has had only seven editors: Drs Jack MacDermot, Sid Hobbs, A.F. Hardymont, W.A. Dodd, James A. Wilson, and David R. Richardson. I have had the privilege of being the editor-in-chief for just over a year now, overseeing the continued growth and evolution of the *BCMJ*. In cooperation with Doctors of BC, I introduced term limits for Editorial Board members, humorously noting that I am the first woman and the new limits will make me one of its shortest-serving editors. When our close friends and colleagues Drs David Richardson, Brian Day, and Cindy Verchere retired in the last 2 years, I was honored to welcome Drs Terri Aldred, Michael Schwandt, and Sepehr Khorasani to our Editorial Board.

Behind the scenes, the *BCMJ* possesses a brilliant yet unassuming team of three who have served the journal for between 10 and 24 years. Authors frequently email me to laud the *BCMJ* for making their contributions shine—a credit owed to the hardworking *BCMJ* editorial teams, past and present.

The *BCMJ* was born with a noble objective: to “strengthen the ideals of unity

and organization among members of the profession.” In 2023, the journal revisited its strategy and refined its mission, becoming “[a] general medical journal focused on sharing knowledge and building connections among BC physicians.” Additionally, the *BCMJ* established its first vision and set of values, displayed above the masthead of each issue.

The *BCMJ* has borne witness to numerous health care eras in British Columbia, from the inception of the BC Medical Plan in 1965 to a pandemic in 2020. Together we have chronicled the evolving landscape of medicine in our province throughout 65 years of publication.

I believe the *BCMJ* stands as a testament to the power of collaboration and community building. Through its pages, it has fostered dialogue and networking among BC physicians, creating a space for exchange of ideas, best practices, and innovations. This sense of unity is particularly significant in a time when health care systems face unprecedented challenges.

As we honor the 65th anniversary of the *BC Medical Journal*, I want to acknowledge the dedicated individuals who have contributed to its success over the years. From the committed editors and authors to the readers and steadfast supporters, this journal owes its enduring impact to the collective efforts of a community passionate about advancing medicine and improving patient care. ■

—Caitlin Dunne, MD

References

1. Vancouver Medical Association. The Vancouver Medical Association Bulletin: October, 1924. Accessed 10 October 2023. <https://open.library.ubc.ca/collections/historyofnursinginpacifccanada/vma/items/1.0214304>.

Downstream effects of medical care abroad

With COVID-19 restrictions lifting and traveling becoming a norm again, there seem to be more and more patients electing to seek investigations and medical care abroad. In my opinion, many patients are seeking over-investigations and providing us with full-body MRI reports and a panel full of lab results to dig through and deem what is necessary for follow-up in our publicly funded system.

The issue is multifaceted. Patients traveling for medical care and paying out of pocket expect thorough examinations and specific tests or scans. The providers ordering the tests do so because that's what patients expect when they present to their clinic or hospital, especially when patients may have other places they can choose to go. With advances in medical technology, it has become easy for providers to order a wide array of tests and scans without having to ask questions about medical symptoms or putting things in context. Often, the more tests ordered, the more financial incentives there are as well.

Patients then bring back long reports of their findings from different countries, and as family practitioners we are obligated to follow up on pertinent findings. The difficulty lies in identifying what is medically necessary and balancing that with patient expectations and wise use of resources. With our medical system already strained, over-investigation contributes to increased health care costs and allocation of limited resources. In turn, this can divert resources away from patients who require more urgent care. Excessive testing can also lead to high rates of false positives, leading to more invasive procedures or treatments that may not be needed, potentially causing physical harm and unnecessary anxiety. Not to mention the limited time we have in the

office: a 15-minute appointment is not sufficient to address the multiple concerns these reports can highlight. I struggle to be efficient when trying to interpret these medical reports, and it can be time-consuming to explain to patients what is and isn't deemed necessary. As a clinician, it has been helpful

With our medical system already strained, over-investigation contributes to increased health care costs and allocation of limited resources.

to use evidence-based medicine and support from various practice guidelines to guide these discussions. For example, I found the Choosing Wisely Canada campaign (<https://choosingwiselycanada.org>) helpful in guiding my clinical decisions about whether to pursue certain tests.

In the end, what matters most is patient health outcomes. Has over-investigation been shown to lead to better health outcomes? Not necessarily. Although the

comparison is obviously more complex, as an example, in the US, where there is a multipayer system and patients with the financial means can easily access tests and scans directly, it has not been shown to improve life expectancy on a population level. As per World Health Organization data, the healthy life expectancy at birth is 71.3 years in Canada, compared with 66.1 years in the US.¹ This highlights the importance of focusing on health outcomes rather than simply the availability of tests and scans.

Even armed with knowledge and evidence to support clinical decisions, it is still a delicate balance between patient expectations, evidence-based medicine, and resource management. Often it feels impossible to fulfill all aspects, especially given the constraints of our medical system. The problem of seeking over-investigations has impacts not only at the patient level, but also for clinicians and the system as a whole. ■

—Yvonne Sin, MD

Reference

1. World Health Organization. Healthy life expectancy (HALE) at birth. Accessed 30 September 2023. www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-ghe-hale-healthy-life-expectancy-at-birth.



Via HDC Discover, you are contributing to your neighbourhood's ability to advocate for appropriate resourcing for your community's wellness.

Dr. Lawrence Yang
Family Doctor, Surrey



Scan to Learn More

Letters to the editor

We welcome original letters of less than 500 words; we may edit them for clarity and length. Letters may be emailed to journal@doctorsofbc.ca or submitted online at bcmj.org/submit-letter and must include your city or town of residence, telephone number, and email address. Please disclose any competing interests.

Saving primary care

As a family physician in practice in BC for 35 years, it is nice to see that our incomes may be rising with recent negotiations with our government. However, I believe that the core problems in primary care go well beyond that. To me, the biggest issues are an appalling lack of physical infrastructure and a lack of proper organization of primary care practitioners.

I feel that government needs to partner with physicians to build large physical offices that can house 15 to 20 practitioners and accommodate nurse practitioners, registered nurses, and social workers. The physical spaces should be equipped with the equipment needed to allow family physicians to offer expanded services, which will take pressure off hospital emergency rooms. We can do many more procedures, such as outpatient IV therapy, minor surgery, cast application and removal, and skin lesion removals. These physical spaces should be leased (on at least a 10-year term) for zero dollars to attract groups of physicians. The physicians need to own and operate the practices, and private business must be excluded from any portion of ownership.

In return, the respective physicians must agree to offer prompt 24/7 access to the patients registered in a particular practice. They need to have enough members that there is no need to attract locums. These groups are self-sustaining. They need to use all allied health professionals in such a manner as to expand their attachment capabilities. Their manner of billing can remain exactly as it is presently, whether that be fee for service or the new Longitudinal Family Physician Payment Model.

This arrangement would bind together all the practitioners into large functional groups, which would be much more efficient and cost-effective than the small, scattered groups that exist presently. We would see economies of scale give big rewards to all participants. It is a practical way to close the loop on the patient medical home model, which we all believe in but is not operational across the board. Governments and practitioners are struggling to find the best solution, and I feel this is a good one.

—**Robert H. Brown MD, CCFP**
North Saanich

Re: Does the Longitudinal Family Physician Payment Model improve health care, including sustainability?

I read with interest the recent Premise article by Dr Tevaarwerk, “Does the Longitudinal Family Physician Payment Model improve health care, including sustainability?” [*BCMJ* 2023;65:242-247]. The aims listed are laudable; indeed, who could argue with them?

However, it is doubtful they could be achieved simply by adjusting individual physician payment levels. As the author correctly notes, “[t]he new model has no incentives to build primary care teams, a way of increasing capacity at lower cost.” This is a fatal oversight. My working experience in 2000–2020 under a capitated blended-funding model¹ (based on the Johns Hopkins Primary Care model and Dr Barbara Starfield’s ideas)² suggests that by taking an organizational approach to funding, this missing incentive could be realized.

The province-wide network of small organizations (i.e., practices or clinics) is an ideal (and existing) framework for physician-led primary care teams. Direct funding to such group practices, based on several predetermined principles, would allow such organizations to arrange themselves to best deliver care within that funding envelope, using a mixture of physicians, nurses, and other providers best suited to that practice, location, and population. Patient volume and complexity become the drivers of revenue, creating market demand for patients, specifically elderly, complex patients. Outflow rules minimize the duplication of services. Suboptimal or delayed care is similarly penalized by market forces.

—**Alister Frayne, MB ChB, MBA, CCFP, FCFP**
Vancouver

References

1. Frayne AF. Population-based funding: A better primary care option? *BCMJ* 2012;54:250-251.
2. Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. *Millbank Q* 2005;83:457-502.

Re: Health care providers’ perspectives on medical travel in northwestern BC

Having practised orthopaedics in the East Kootenays for 35 years, I was most interested in this article [*BCMJ* 2023;65:160-164]; however, I was disappointed in its focus. For some years now, there has been no Greyhound passenger bus service in Canada. The Regional District of East Kootenay provides bus service, but only 2 days per week. As a result, for surgery, a patient may need to

Continued on page 328



Follow my lead; lead me to follow

Music has always inspired me. It's a universal language that can move emotions, memories, thoughts, and ideas. One of my favorite folk bands, The Tequila Mockingbird Orchestra, has a song called "Canoe Song," in which the chorus is "Follow my lead, lead me to follow." In practical terms, it refers to canoeing, where you need to follow the person sitting in front of you and lead the person sitting behind you. A common purpose and synchronization are needed to make the canoe travel in one direction. The same is true of leadership. You need others to follow your lead, just as you concurrently follow theirs.

November is when the general membership votes for our next president-elect and our physicians at the Representative Assembly. I urge you to vote, to raise your voice and help shape the future. This is your opportunity to ensure the people you want representing you in leadership roles at

Doctors of BC are the ones who are chosen to lead. These are the individuals who will keep your voice front and centre as we navigate and help build the future of BC's health care system. We need those who can lead

**To all who are currently
in leadership roles,
I thank you.**

with humility and, simultaneously, those who follow and listen with intention.

I attended a leadership course where the question "What does a leader look like?" was answered from the vantage point of third graders. In their minds, a leader was their teacher, and they described the three most important characteristics: big ears to hear all that goes on in class and determine who needs guidance and who is doing well, long

arms to give hugs to one or more people when they are struggling, and high heels to be seen at the front of the class. I would suggest these qualities apply to medical leaders as well. Use your big ears and your heart to listen with intention. Use your long arms to extend compassion to your patients and your colleagues. And ensure you are visible so that others can see where to follow and ultimately where to lead.

To all who are currently in leadership roles, I thank you. I have no doubt you embody many of these qualities already. I value that you are taking time to have others follow your lead, while at the same time being led to follow by those you serve. I look forward to continuing to work together to move our province and Doctors of BC along this ever-improving journey, just as if we were all paddling together in a canoe. ■

—Joshua Greggain, MD
Doctors of BC President

LETTERS

Continued from page 327

travel several days in advance. Patients must find private transport. If they have no vehicle, they must rely on their social circle or hitchhike (remember, Northwest BC is the location of the Highway of Tears). This is unacceptable. I am surprised these obstacles were not discussed in this article.

Let us start with the focus of the article. Let us fight for travel justice for rural Canadians, for health care, and for all other needs. Amazon, eBay, and Purolator can bring us any number of items daily. They

should provide similar transport services to our rural citizens. Greyhound did this. It needs to be replaced.

—B.E. Driedger, MD, FRCSC
Cranbrook

Correction: "Justice, rights, and unnecessary suffering"

While proofreading the article "Justice, rights, and unnecessary suffering" by Dr Jan Hajek in the October 2023 issue of the *BCMJ*, we made two edits that undermined a point Dr Hajek was trying to make. The original sentence, with edits marked, is: "We

shudder to think of the philosopher René Descartes theorizing that animals are just like machines, calmly nailing a dog's feet to a board and dissecting ~~them~~ **it** alive while ~~they~~ **it** only appeared to be in pain."

Not changing an author's meaning is editors' "first, do no harm," so we sincerely apologize to Dr Hajek for this error; in attempting to clarify what is the object of the action, we reversed Dr Hajek's very intentional word choice (that is, using "they" instead of "it"). The online version of the article, as well as the accompanying PDF, has been restored to the original wording.

How can we improve competence in conducting pelvic exams?

Provider discomfort with sensitive examinations of people assigned female at birth persists in our health care system and has implications on patient care. Change is needed to optimize medical student education and begin to alter the culture of reluctance around gynecological evaluations.

Larissa Steidle, MD, Emily Lostchuck, MD, MSc

A young female-identifying patient presented to an emergency department in British Columbia with several years of debilitating abdominal pain. She described severe, cramping pain in her lower abdomen that increased with menstruation. She had previously seen several physicians in the United States, including two hospital admissions, during which extensive investigations were completed. No source of her symptoms had been identified and she was relying on opioid medications to control her pain. On further history, it became apparent she had never previously been offered a pelvic examination. As a medical student with a passion for patient advocacy, hearing this story from a fellow physician shocked me. I found it difficult to conceive that despite all her assessments, admissions, and expensive tests,

a simple pelvic examination had never been offered. This patient proceeded to have a complete assessment in the BC emergency department, including her first-ever pelvic examination, which led to a gynecological consultation and a diagnosis of stage 4 endometriosis.

Throughout the early stages of my medical training, I have too often encountered similar, though less egregious, situations, where the care of people assigned female at birth is compromised. Experiences like this have prompted me to consider the degree of provider discomfort with sensitive examinations that persists in our health care system and the implications it has on patient care. A search of the literature reflected this discomfort, with a median patient pickup time of 12 minutes for the chief complaint of vaginal bleeding, compared with a median of 6 minutes for all other complaints in United States emergency departments.¹ Additionally, retrospective chart reviews demonstrate that 33% to 74% of patients fail to receive a pelvic exam when one is clinically indicated.^{2,3} Clearly, female patients presenting with abdominal and pelvic complaints are not receiving pelvic examinations as frequently as they should be. This raises the question: what holds physicians back from performing this vital examination?

A critical factor in determining whether a patient is offered a pelvic examination is the practising physician's ability to recognize

when the exam is indicated and accurately and comfortably conduct a gynecological evaluation. To better understand the competence and perceptions toward pelvic exams that physicians hold, it is essential to explore the way in which the skill is taught and how our perceptions develop initially as medical students.

Students experience several concerns prior to performing their first pelvic examination. Sources of student anxiety include patient discomfort and fear of hurting the patient.⁴ However, students who completed training with a gynecological teaching associate (GTA) experienced reduced anxiety and greater confidence while performing their first pelvic examination.^{5,6} I personally found this teaching method to be very helpful, as GTAs are trained to provide real-time feedback during the examination. Learning with a GTA allowed me to gain confidence in my technique and eliminated the tendency to rush through the exam due to fear of patient discomfort.

For students to consolidate their skills, it is important for us to conduct multiple pelvic examinations in the clinical setting.^{7,8} There is a strong correlation between the number of exams completed and the competence of the student.⁹ However, students are allowed to participate in only approximately 60% of encounters requiring a gynecological examination during our clinical clerkship.¹⁰ Medical students perceive several barriers

Dr Steidle recently completed her medical degree in the University of British Columbia's Southern Medical Program. She is now a resident physician in family medicine. Dr Lostchuck completed a master of science and a medical degree at UBC and is now completing her residency in emergency medicine. She has a strong interest in women's health in the emergency department and performs research in several related areas.

This article has been peer reviewed.

to our involvement, including provider discomfort with the pelvic exam, residents' lack of interest in teaching, resident and staff time constraints, and patient reluctance to have a student involved.⁸ Patient factors that frequently inhibit student involvement are a desire for privacy, history of sexual assault, fear of pain, and cultural beliefs.¹⁰

A common, modifiable concern for medical students is the way in which supervising physicians perceive and introduce us.¹⁰ Supervisory staff expect a higher degree of patient reluctance than students do, and they frequently perceive students as less competent than we perceive ourselves.⁸ Medical students have suggested that being introduced by our supervising physician as future colleagues or members of the health care team increases patient confidence and comfort in having students involved in their care.^{7,8} A Canadian study also suggested the benefit of educating nurses involved in obstetric and gynecology rotations about medical student objectives

to increase overall participation and skill enhancement.⁸

An additional well-known barrier to medical students performing pelvic exams is male gender. Compared with students identifying as female, students identifying as male experience a significantly higher incidence of being denied involvement in a gynecological consultation, perform fewer pelvic examinations, and report a higher incidence of discrimination by their supervising physician based on their gender.^{7-9,11} The gender bias exhibited by some supervising physicians can have a significant impact on the opportunity for male students to develop their skills and build confidence in conducting pelvic examinations.

Numerous times, when a gynecological evaluation was required during my clinical clerkship, I was asked, "Will you be 100% confident in your findings, or will I have to repeat the exam?" For other examinations, I was not routinely asked this question. As I tried to advocate for opportunities to practise my skills, my supervising staff would often decline my request to perform the pelvic examination because of my lack of experience. It was a recurring and frustrating paradox that my lack of experience was a barrier to me gaining experience and confidence in conducting this crucial exam. In these circumstances, I thought there was an unsuitable balance between patient privacy and advocacy for student learning, contributing to an overall sense of discomfort and reluctance surrounding sensitive exams. Conversely, when preceptors decisively offered indicated pelvic exams and encouraged student involvement, it served to reinforce the importance of completing sensitive examinations without hesitation.

To uphold the quality of women's medical care, it is imperative that graduating medical students are comfortable performing pelvic examinations. GTA-led teaching is an impactful educational tool; however, there is clearly room for improvement in the culture surrounding gynecological evaluations in clinical practice. It is of utmost importance for physicians to clearly understand the indications for a pelvic

examination and possess the ability to conduct the exam accurately and confidently, without hesitation. By intentionally exhibiting this competence and involving learners wherever possible, we can optimize medical student education and begin to change the culture of reluctance around gynecological evaluations. ■

References

1. Patterson BW, Batt RJ, Wilbanks MD, et al. Cherry picking patients: Examining the interval between patient rooming and resident self-assignment. *Acad Emerg Med* 2016;23:679-684.
2. Mohart AE, Banet GA, Katz ED. Resident sex and the pelvic exam: The effect of physician sex on selection and management of patients who may require a pelvic exam. *Ann Emerg Med* 2005; 46:55-56.
3. Onwuka AJ, Knaus ME, Lawrence AE, et al. Comparing the evaluation of abdominal pain in adolescent females at a pediatric vs general emergency department. *J Pediatr Adolesc Gynecol* 2022; 35:562-566.
4. Orsi TD, Ribeiro Valadares AL, Esteves Orsi PM, et al. Simulation-based training for pelvic and breast physical examination: Effect on the anxiety and self-confidence of medical students. *Rev Bras Ginecol Obstet* 2020;42:739-745.
5. Siwe K, Berterö C, Wijma B. Unexpected enlightening of a "female world". Male medical students' experiences of learning and performing the first pelvic examination. *Sex Reprod Healthc* 2012;3:123-127.
6. Kirubarajan A, Li X, Got T, et al. Improving medical student comfort and competence in performing gynecological exams: A systematic review. *Acad Med* 2021;96:1353-1365.
7. Danielsson J, Hadding C, Fahlström M, et al. Medical students' experiences in learning to perform pelvic examinations: A mixed-methods study. *Int J Med Educ* 2021;12:233-242.
8. Bossé J, Woolcott C, Coolen J. Barriers preventing medical students from performing pelvic examinations during obstetrics and gynaecology clinical clerkship rotations. *J Obstet Gynaecol Can* 2019;41:1093-1098.
9. Bhoopatkar H, Wearn A, Vnuk A. Medical students' experience of performing female pelvic examinations: Opportunities and barriers. *Aust N Z J Obstet Gynaecol* 2017;57:514-519.
10. van den Einden LCG, te Kolste MGJ, Lagro-Janssen ALM, Dukel L. Medical students' perceptions of the physician's role in not allowing them to perform gynecological examinations. *Acad Med* 2014;89:77-83.
11. Zahid AZ, Ismail Z, Abdullah B, Daud S. Gender bias in training of medical students in obstetrics and gynaecology: A myth or reality? *Eur J Obstet Gynecol Reprod Biol* 2015;186:17-21.

Nuance® Dragon® Medical One

Capture the Complete Patient Story

- Easy to learn & easy to use.
- Document visits quickly & accurately.
- Increase productivity with voice-activated text macros.
- One user profile synchronized across all your PC devices.
- Automate repetitive EMR & computer tasks with custom voice commands.

Contact us for a free demo!
604.264.9109 | 1.888.964.9109

speakeasysolutions.com

Professional Speech
Technology Specialists



HEPA filtration reduces transmission of SARS-CoV-2 and prevents nosocomial infection: A call to action

HEPA filtration is beneficial in reducing bioaerosols, including SARS-CoV-2, as well as other respiratory pathogens in the hospital environment. It should be used in combination with other prevention strategies, including improved ventilation; appropriate isolation; and, during periods of high community transmission, widespread testing and N95 masking.

Susan M. Lee, MD, FRCPC, MAS, Jean Warneboldt, MD, CCFP(PC), FCFP

Dr Lee is an anesthesiologist, research lead, and National Surgical Quality Improvement Program anesthesia champion at Royal Columbian Hospital and Eagle Ridge Hospital. Her research and quality improvement interests include how best to optimize patients prior to elective surgery, including engaging patients in perioperative smoking cessation and ensuring good preoperative patient education. Since the pandemic, she has participated in research and quality improvement activities to help ensure a safe perioperative and inpatient environment. Dr Warneboldt has been practising hospital medicine since 2006 and is the first quality improvement leader for the Fraser Health Regional Department of Hospital Medicine. She started the resident elective program at Eagle Ridge Hospital and obtained certification in palliative medicine. She has an interest in quality improvement and undertook further training from Fraser Health's Physician Quality Improvement initiative and the Institute for Healthcare Improvement. She lives with her family and is ruled by a tuxedo cat.

This article has been peer reviewed.

Like everyone, I want the pandemic to be over, but I want it to end in the safest way possible for our most vulnerable members of society. A conversation in mid-2022 with Dr Jean Warneboldt, my friend, hospitalist, and quality champion, reminded me that for some of these most vulnerable patients, the air in the hospital can be deadlier than the diagnosis that brought them in. Dr Warneboldt had just finished a devastating time managing a multi-unit inpatient COVID-19 outbreak where three of her patients died of nosocomial COVID, all within 1 week. To the undiscerning observer looking at the statistics, these were a handful of the many incidental COVID hospitalizations; the patients were admitted with another diagnosis and later tested positive for COVID. However, COVID for them couldn't be further from incidental, as it was in fact the cause of their deaths. It saddened us that these patients sought help and died of nosocomial COVID, something potentially preventable. We felt a moral imperative to do whatever we could to ensure that, as a health care system, we were doing everything we could to prevent similar iatrogenic deaths. There was and continues to be little motivation or funding for reintroducing or reinforcing the

behavior-related changes that could potentially quell outbreaks (for example, physical distancing, masking, and testing).

However, in my search for something we could do, I found there were some measures we could take that required no frontline behavior changes. For example, cleaning the air! Dr Warneboldt and I worked hard to advocate for improved indoor air quality to reduce the risk of nosocomial spread of respiratory pathogens on inpatient units. We presented evidence from the literature, we filled out Patient Safety and Learning System event forms, we attended quality review meetings, and we met with anyone who would listen to us. Unfortunately, there were many barriers in implementing something as simple as portable HEPA filtration units on inpatient wards. Some were due to general fatigue in pandemic management (such as the belief that a certain segment of society would need to be sacrificed in this new phase of the pandemic), some were from misinformation (such as the belief that an air-cleaning unit would somehow blow viruses around), and some were that high-level guidance was missing ("there's no policy for that" or "it's not in my portfolio"). We've been at a loss as to what else we can do to induce change in the hospital setting.

PREMISE

Recently, we stopped getting replies from our institutional leaders.

The review that follows was first presented during safety briefings but was largely ineffective in evoking change. I was ecstatic when, after months of advocacy, our hospital purchased air filters, then woefully disappointed when we were never given the regional clearance to use them. Despite the end to the emergency era of the pandemic, sadly, Dr Warneboldt still regularly sees nosocomial COVID cause significant morbidity and mortality in her most vulnerable patients. If we are to learn to live with COVID, we ought to be doing our best to ensure that we've safeguarded our most vulnerable.

I've updated this rapid review with the latest evidence and hope that it may help further the conversation in terms of simple measures we can take to protect our most vulnerable.

Let's clear the air about HEPA filtration. When adequate air exchange rates are not achievable, the addition of HEPA filtration reduces respiratory particles and has the potential to reduce nosocomial COVID, as well as other pathogens. I hope someone with the power to implement HEPA filtration will read the state of the evidence and find it a call to action. I hope that my friend will never have to go through another week when three of her patients die from a pathogen they breathed in the hospital air.

This rapid review of the literature was performed in response to high levels of COVID transmission in the inpatient setting.¹ The original search of Medline, Embase, and LitCovid was performed on 10 November 2022 and updated on 13 March 2023 with the assistance of a College of Physicians and Surgeons of BC librarian.

A systematic review conducted in 2021 identified 11 studies on the effectiveness of portable HEPA filters for eliminating airborne SARS-CoV-2.² A HEPA filter filters 99.97% of aerosols with a size of 0.15 µm, with even greater efficiency for other particle sizes (larger and smaller). SARS-CoV-2 is thought to be around 0.1 µm. All 11 studies showed that portable HEPA purifiers were able to significantly

reduce airborne SARS-CoV-2 surrogate particles and augmented other decontamination strategies such as ventilation. Seven of the studies were performed in settings with minimal or no additional ventilation. Placement of the portable air cleaner in front of the subject removed more particles, although placement both in front of and behind the subject were effective. Portable air cleaners with HEPA filtration should be placed in open space near the source of the pollutant, near the breathing zone of residents, and not behind furniture.

Another systematic review of heating, ventilation, and air conditioning (HVAC) for indoor bioaerosols in hospitals was performed in 2021.³ The use of HEPA filtration reduced bacteria and fungi concentrations. The review did not find any evidence for increased transmission of SARS-CoV-2 related to HVAC systems,⁴ nor did a 2021 systematic review of 21 studies on air-conditioning systems in hospitals.⁵ The studies found that properly managed HVAC systems reduced microbial loads compared with naturally ventilated areas, although poorly maintained HVAC systems increased infections. HEPA filtration decreased the concentration of airborne bioaerosols (most pathogens, including fungi, bacteria, and encapsulated viruses) and reduced the risk of infections. The review concluded that HEPA filters appear to be an indispensable part of air-conditioning systems and have the theoretical potential to eliminate airborne SARS-CoV-2.

More recent studies have confirmed the above findings of improved clearance of bioaerosols in older hospital infrastructure with HEPA filtration and natural ventilation compared with only natural ventilation.⁶ A 2022 study of a COVID hospital ward detected SARS-CoV-2 in the air during weeks when air filtration was turned off but did not detect SARS-CoV-2 in the air sampled when air was being filtered,⁷ consistent with other recent studies indicating efficient and fast (within 5.5 minutes) clearance of bioaerosols using portable air cleaners with HEPA filtration.⁸ Similarly, in a natural experiment, particle sensors were set up during commissioning of an air

cleaning unit (ACU) on an older multibed bay in a UK hospital in 2022.⁹ Interestingly, when the ACU was inadvertently shut off, particle counts increased dramatically (notably in the size range associated with respiratory viruses), returning to low levels only once the ACU was turned on again. The authors hypothesized that ACUs had the potential to reduce nosocomial spread of not only respiratory viruses, but also fungal and bacterial pathogens. A 2022 comprehensive review¹⁰ of strategies to prevent SARS-CoV-2 and respiratory viral infections in health care settings included the following key points and recommendations:

- Traditional binary categorization of droplet versus airborne precautions is outdated.
- Tachypnea, heavy breathing, and coughing can increase respiratory emissions and transmission.
- High viral loads, proximity, prolonged exposure, lack of masking, and poor ventilation are all risk factors for in-hospital transmission.
- Testing all patients on admission and potentially periodically during admission is recommended when community transmission rates are high due to the large number of occult infections and the high transmissibility (viral loads) prior to symptom onset.
- HEPA filtration should be used in combination with ventilation to achieve more than six air changes per hour.
- Minimize shared rooms, use N95 masks more widely, and maintain universal vaccination policies for health care workers.

A recent review based on international guidelines concluded that while mechanical ventilation with the requisite air exchange rates should be met, in situations where this is not achieved, HEPA filtration is recommended over taking no measures.¹¹ In these situations, the HEPA filter should be operated continuously, placed close to the source (in the patient breathing zone), and placed away from the door.

Data from simulations of an indoor school environment¹² indicate that HEPA filtration is effective in reducing modeled

SARS-CoV-2 cumulative dose absorption by exposed individuals, with one HEPA filter as effective as two windows partly open all day in winter (threefold decrease in transmission). A study of school transmission rates indicated that improved ventilation and air filtration reduced cases of COVID by about half.¹³ A real-world study of HEPA filtration in homeless shelters showed that portable air cleaners were effective in reducing indoor particle levels.¹⁴

Internationally, since at least 2021, the World Health Organization has been recommending HEPA filtration in settings where adequate ventilation cannot be achieved, as part of its road map to improve and ensure good ventilation in the context of COVID.¹⁵ Federally, the Canadian government encourages the use of HEPA filtration when adequate ventilation cannot be achieved.^{16,17} The United States Centers for Disease Control and Prevention recently released clear guidelines for improving indoor air quality, which include improving both ventilation and air filtration.¹⁸ Despite national and international guidance and an abundance of evidence that HEPA filtration reduces bioaerosols, regional and provincial guidance continues to be either lacking or conflicting. The BC Centre for Disease Control¹⁹ emphasizes the importance of environmental controls, including “suitable indoor ventilation,” in its hierarchy for infection prevention and exposure control measures for communicable diseases, but specific ventilation guidance refers to federal recommendations mentioned above or predates the COVID pandemic, as do the latest guidelines from the Provincial Infection Control Network of BC.²⁰ Regionally, without clear provincial guidance, health authorities have been reluctant to lead with standardized indoor air quality standards, with at least one actively removing the availability of HEPA filtration (Keeping You Informed newsletter, Fraser Health Authority, 2 March 2023).

In summary, HEPA filtration reduces bioaerosols, including SARS-CoV-2, and is an important component of a multipronged prevention strategy for reducing in-hospital transmission of respiratory pathogens. In

BC, public health policies such as universal masking and universal admission testing are no longer in effect. We know from other jurisdictions that discontinuation of universal admission testing was associated with a significant increase in hospital SARS-CoV-2 transmission and that nosocomial transmission remains common in the Omicron era, with infections that carry a 3% to 13% mortality risk.²¹ Updated, evidence-based, and precautionary provincial guidance is urgently needed to improve indoor air quality throughout BC’s acute care settings, particularly in settings where nosocomial COVID poses a risk to the lives of those under our care. ■

References

- Balzer K. Fifth COVID-19 outbreak in place at Port Moody’s Eagle Ridge Hospital. *Tri-City News*. 13 April 2022. Accessed 19 June 2023. www.tricitynews.com/local-news/fifth-covid-19-outbreak-in-place-at-port-moodys-eagle-ridge-hospital-5261733.
- Liu DT, Phillips KM, Speth MM, et al. Portable HEPA purifiers to eliminate airborne SARS-CoV-2: A systematic review. *Otolaryngol Head Neck Surg* 2022;166:615-622.
- Dai R, Liu S, Li Q, et al. A systematic review and meta-analysis of indoor bioaerosols in hospitals: The influence of heating, ventilation, and air conditioning. *PLoS One* 2021;16:e0259996.
- Chirico F, Sacco A, Bragazzi NL, Magnavita N. Can air-conditioning systems contribute to the spread of SARS/MERS/COVID-19 infection? Insights from a rapid review of the literature. *Int J Environ Res Public Health* 2020;17:6052.
- Ting Wu H, Shuang Li Q, Chen Dai R, et al. Effects of air-conditioning systems in the public areas of hospitals: A scoping review. *Epidemiol Infect* 2021;149:e201.
- Fennelly M, Hellebust S, Wenger J, et al. Portable HEPA filtration successfully augments natural-ventilation-mediated airborne particle clearance in a legacy design hospital ward. *J Hosp Infect* 2023;131:54-57.
- Conway Morris A, Sharrocks K, Bousfield R, et al. The removal of airborne severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and other microbial bioaerosols by air filtration on coronavirus disease 2019 (COVID-19) surge units. *Clin Infect Dis* 2022;75:e97-e101.
- Lee JH, Rounds M, McGain F, et al. Effectiveness of portable air filtration on reducing indoor aerosol transmission: Preclinical observational trials. *J Hosp Infect* 2022;119:163-169.
- Butler MJ, Sloof D, Peters C, et al. Impact of supplementary air filtration on aerosols and particulate matter in a UK hospital ward: A case study. *J Hosp Infect* 2023;135:81-89.
- Rhee C, Baker MA, Klompas M. Prevention of SARS-CoV-2 and respiratory viral infections in healthcare settings: Current and emerging concepts. *Curr Opin Infect Dis* 2022;35:353-362.
- Chen C-Y, Chen P-H, Chen J-K, Su T-C. Recommendations for ventilation of remodeled negative-pressure isolation wards for COVID-19 patients: A comparison of international guidelines. *J Formos Med Assoc* 2023;122:91-97.
- Villers J, Henriques A, Calarco S, et al. SARS-CoV-2 aerosol transmission in schools: The effectiveness of different interventions. *Swiss Med Wkly* 2022;152:w30178.
- Gettings J, Czarnik M, Morris E, et al. Mask use and ventilation improvements to reduce COVID-19 incidence in elementary schools—Georgia, November 16–December 11, 2020. *MMWR Morb Mortal Wkly Rep* 2021;70:779-784.
- Huang C-H, Bui T, Hwang D, et al. Assessing the effectiveness of portable HEPA air cleaners for reducing particulate matter exposure in King County, Washington, homeless shelters during the COVID-19 pandemic: Implications for community congregate settings. Accessed 28 March 2023. www.medrxiv.org/content/10.1101/2023.01.20.23284493v1.
- World Health Organization. Roadmap to improve and ensure good indoor ventilation in the context of COVID-19. 1 March 2021. Accessed 19 June 2023. www.who.int/publications/i/item/9789240021280.
- Government of Canada. At home: Using ventilation and filtration to reduce the risk of aerosol transmission of COVID-19. Accessed 19 June 2023. www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/guide-home-ventilation-covid-19-pandemic.html.
- Government of Canada. Using ventilation and filtration to reduce aerosol transmission of COVID-19 in long-term care homes. Accessed 19 June 2023. www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/guide-ltch-ventilation-covid-19-pandemic.html.
- Centers for Disease Control and Prevention. Improving ventilation in buildings. Updated 11 May 2023. Accessed 19 June 2023. www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/improving-ventilation-in-buildings.html.
- BC Centre for Disease Control. Infection control. Updated 11 June 2023. Accessed 19 June 2023. www.bccdc.ca/health-professionals/clinical-resources/covid-19-care/infection-control.
- Provincial Infection Control Network of British Columbia. Respiratory infections. November 2018. Accessed 19 June 2023. <https://picnet.ca/guidelines/gastrointestinal-respiratory-illness/respiratory-infections>.
- Pak TR, Rhee C, Wang R, Klompas M. Discontinuation of universal admission testing for SARS-CoV-2 and hospital-onset COVID-19 infections in England and Scotland. *JAMA Intern Med* 2023;183:877-880.

Elisabeth Baerg Hall, MD, CCFP, FRCPC, Cynthia Buckett, RD, MBA

Diagnosing and treating adult attention-deficit/hyperactivity disorder

Providing family physicians with appropriate resources to diagnose and treat attention-deficit/hyperactivity disorder in adults ensures patients receive timely and accurate care and reduces societal and health care costs.

ABSTRACT: Attention-deficit/hyperactivity disorder (ADHD) is a common neurodevelopmental condition that is increasingly understood to continue into adulthood. Family physicians are well positioned to diagnose ADHD in adults, due in part to their longitudinal relationship with their patients. Treating adult ADHD supports the unique strengths of these individuals. A reliable diagnosis takes several visits and should focus on gathering information, obtaining collateral from others, conducting diagnostic interviews, identifying functional impairments, and reviewing comorbidities. Treatment for adults with ADHD is most effective when it focuses on a combination of pharmacotherapy and nonpharmacological treatments, such as executive function cognitive-behavioral therapy training. Psychostimulant medications are commonly used to treat ADHD in adults and are highly effective in managing ADHD. After making a

diagnosis, family physicians continue to provide important supports in psychoeducation and psychosocial interventions to reduce functional impairment and improve quality of life throughout the patient's lifespan.

Attention-deficit/hyperactivity disorder (ADHD), a lifespan disorder with potentially significant impairment throughout adulthood, has attracted increasing clinical attention over the past 20 years.¹⁻³ The prevalence of ADHD in children is estimated to be 7%; in adults, it is estimated to be 2.4% to 4.0%.⁴ The rate of ADHD identification, diagnosis, and treatment in adults has increased in recent years; however, diagnostic rates still remain well below prevalence.⁵ Awareness of ADHD in the general population has risen, which has led to concern that it is a post-COVID-19 popular-press-driven phenomenon.⁶ Given that ADHD is a highly prevalent, previously underdiagnosed condition associated with significant impairment and treatment benefits, it is worth taking the time to assess for ADHD in adults.

Comorbid psychiatric disorders are frequently associated with ADHD: approximately 80% of individuals present with at least one comorbidity.^{7,8} These include anxiety, mood disorders, substance use disorders, personality disorders such as borderline and antisocial, binge eating, and impulsive suicide risk.⁹ The higher incidence

of comorbidities in adults can contribute to a misdiagnosis and can mask the underlying ADHD,¹⁰ which can result in unnecessary, ongoing impairment.

Adult ADHD imposes a significant burden on society and affected individuals.⁹ Functional challenges in academic achievement, financial well-being, relationships, and psychological instability are well known. Occurrences of sexually transmitted infections, unwanted pregnancies, motor vehicle and other accidents, and even premature death are also associated with ADHD.^{10,11} Physical health issues associated with reduced capacity to manage chronic illnesses, such as diabetes, are of concern.^{10,11} Identification and management of adult ADHD help improve patient health outcomes and reduce societal costs associated with the disorder.

Diagnosis

According to the *Diagnostic and Statistical Manual of Mental Disorders* (5th edition), a diagnosis of adult ADHD requires symptoms to be present in at least two settings, such as home and work, with clear evidence of impairment as indicated by interference or reduced functioning in arenas such as occupation, relationships, or academic.^{12,13}

Trends toward increased diagnosis are influenced by several factors, including improvements in medications (e.g., long-acting stimulants), improved public and physician

Dr Baerg Hall, an adult attention-deficit/hyperactivity disorder program consultant and specialist, is the executive director of The ADHD Centre. Ms Buckett is the program manager for health care initiatives with the North Shore Division of Family Practice.

Corresponding author: Dr Baerg Hall, info@ebhallmd.com.

This article has been peer reviewed.

awareness, and better training of physicians.¹⁴ Canadian trends indicate that ADHD is more frequently diagnosed by family doctors than by specialists.¹⁴ Family physicians are well positioned to diagnose ADHD due to their longitudinal relationship with their patients, which allows them to identify patients who accurately present with ADHD symptoms, understand their relevant family history, and identify symptoms that affect at least two areas of function.⁵

A reliable primary care diagnosis of ADHD requires several patient consultations to gather information, obtain collateral from others, conduct an in-depth diagnostic interview, identify functional impairment in at least two domains, and review comorbidities. While important, a diagnosis of ADHD in adults is *not* urgent. Whether or not ADHD has been previously diagnosed, symptoms of this chronic neurobiological condition will have been present since childhood. Multiple clinical factors need to be considered, and it takes time to ensure accuracy and reliability.

Outlined below are practical steps that family physicians can follow to accurately diagnose ADHD in adult patients. When following these steps, physicians should plan for and document three to four visits in a primary care setting.

Step 1. Identify adults at risk

Any adult patients who were diagnosed with ADHD in childhood or those for whom an ADHD assessment was recommended at any age by professionals such as teachers, professors, and athletic coaches should be assessed for symptoms of adult ADHD. At least 60% of those with childhood ADHD are considered to have ongoing symptoms as adults.¹⁵

Adult patients of all genders who have a child, sibling, or parent who has been diagnosed with ADHD or for whom ADHD is suspected need to be screened.

Consider individuals with a chronic mental health condition, such as depression or anxiety, especially those who have not improved as expected after treatment for the condition.

There are qualitative differences between individuals who present for ADHD diagnosis as adults and those who present in childhood. For example, physical hyperactivity is less common in adults, whereas behavioral impulsivity remains a prominent, ongoing issue.

Consider a diagnosis of ADHD in adults with obesity, multiple driving infractions, online addictions, frequent job changes, job loss, moves, and frequent relationship changes, because many of these conditions are associated with behavioral impulsivity.

Women and individuals assigned female at birth often present with ADHD symptoms later in life. This population often presents with less physical hyperactivity, even in childhood, which makes ADHD symptoms less noticeable to teachers and adults who provide care. This will affect the reliability of childhood collateral information, if it is available. Impairment may be difficult to identify, even on elementary school report cards. Characteristics such as comorbid social anxiety, the need for external validation, socialization to behavioral norms, and proficiency in attending to socio-emotional and environmental cues also confound diagnoses of childhood ADHD in girls.¹⁶ Expand the diagnostic focus to symptoms and functional impairment around the time of puberty and early adolescence in this population.

Although a high percentage of patients will identify as having had ADHD symptoms since childhood, consider the presentations of ADHD described above, where functional impairment sometimes occurs without even the patient identifying ADHD as the underlying condition. Physicians are encouraged to build diagnostic skills by focusing on diagnosing and treating patients who present with a high likelihood of ADHD.

Step 2. Gather information

The diagnostic process is assisted by gathering multiple data, which is best achieved by using standardized questionnaires,¹⁰ such as the Adult ADHD Self-Report

Scale and the Wender Utah Rating Scale. The Adult ADHD Self-Report Scale is a World Health Organization–validated screening tool that has high specificity (99.5%) and moderate sensitivity (68.7%) in general population surveys.¹² While other conditions that affect executive function are not ruled out, the family physician is alerted to a possible ADHD diagnosis. The Adult ADHD Self-Report Scale is a helpful screening tool that can be used in the contexts described in step 1.¹⁷ If the patient has no childhood ADHD diagnosis, the Wender Utah Rating Scale (short form) has well-established reliability for the self-report of ADHD symptoms in childhood.¹⁸ While these questionnaires are helpful in guiding the clinical history, they do not confirm or rule out an ADHD diagnosis.¹⁰

Psychoeducational testing for other conditions such as learning disabilities can be helpful but are not necessary for making an ADHD diagnosis.

Step 3. Conduct a diagnostic interview

Conducting an interview is fundamental to making an ADHD diagnosis.¹⁹ Information obtained from using the Adult ADHD Self-Report Scale and Wender Utah Rating Scale can help guide clinical questions about childhood and current behavioral symptoms to assess the level of functional impairment.

For example, consider asking “How much time in your day do you spend looking for items?” rather than “Do you frequently lose things?” If your patient has methods to keep track of items, such as the use of electronic tags or habitual storage places, this would be considered an executive function adaptation. Listen for the functional impairment beneath these adaptations. In the interview, explore varying presentations of impairment in different environments and under different stress levels and the presence of other mental health conditions. Assess the cognitive demands required to maintain function in challenging environments. For example, your patient may work on projects for 2 to 3 hours when others take only 1 hour to complete the same task.

They may also express higher levels of cognitive fatigue in accomplishing tasks and may develop behavioral avoidance associated with these additional demands. Note that these are frequently not identified as ADHD symptoms, and patients will likely have long-standing beliefs about their impairments that lead to low self-evaluation and self-derogatory terms, such as calling themselves lazy or dumb.

Although patients are best positioned to provide an account of their symptoms, a diagnosis based on self-report alone may lead to overdiagnosis or underdiagnosis of ADHD.¹⁹ Obtain corroborating information on current behaviors and childhood symptoms from at least one family member, partner, or close friend, if possible. Consider making a phone call to family or friends for collateral information in the presence of your patient or obtaining questionnaires (e.g., Adult ADHD Self-Report Scale) from these sources.

Step 4. Review comorbidities

ADHD symptoms can overlap with those of mental health conditions, including anxiety, depressive disorders, personality disorders, learning disorders, and substance use disorders, which makes it challenging to identify and manage ADHD.^{10,12} Impulsivity, a key feature of ADHD, also occurs in other mental health conditions. Consider impulsive risks, such as suicide, when developing a care plan. Prison settings have a high incidence of ADHD. Treatment reduces recidivism.²⁰ Physical conditions such as sleep disorders and epilepsy are associated with ADHD.¹⁸ For complex comorbidities such as bipolar disorder, referral is recommended. The prevalence of ADHD in people with bipolar disorder can be more than 20%.²¹

Individuals with ADHD are at high risk for substance misuse, including nicotine, cannabis, and alcohol. Conversely, approximately 23% of individuals who have a substance use disorder also meet the criteria for ADHD.²² Screen for these conditions during the diagnostic interview. A comprehensive clinical interview can differentiate

ADHD symptoms from those related to other conditions. ADHD symptoms typically worsen when comorbid mental illnesses such as depression and anxiety disorders are present, but rarely does full functional improvement return with treatment of the underlying conditions alone. When these conditions have improved, approach the ADHD diagnosis again. Severe comorbid conditions such as bipolar and psychotic disorders are treated first.¹²

Treatment

Treatment for adults with ADHD is effective and includes a combination of pharmacotherapy, if tolerated, and nonpharmacological treatments to achieve optimal health outcomes.²³ The Canadian ADHD Resource Alliance has published expert guidelines to assist physicians with the assessment and treatment of ADHD. For the purposes of this article, minor modifications to those guidelines have been made to take into account a family practice-targeted adult population.

Severe mental health conditions such as major depressive disorder, psychotic disorders, and some substance use disorders should be treated first, for at least a few weeks, after which ADHD can be managed.¹² A discussion of harm reduction treatments for substance use disorder is beyond the scope of this article; however, physicians are encouraged to identify and treat ADHD in adult patients with substance use disorder if there is ADHD functional impairment in at least two areas. Treating ADHD will benefit the management of other conditions. By treating impairment from ADHD, patients with severe mental health conditions are better able to participate in their ongoing treatment programs for other mental health conditions (e.g., by remembering appointments, managing impulsivity, and sitting in therapy sessions).

Cannabis is known to have amotivational qualities, which can be counterproductive for ADHD patients. To date, cannabis has not been proven to be an evidence-based treatment.²²

Medications

Psychostimulant medications, such as methylphenidate and amphetamine-based compounds (e.g., lisdexamfetamine), are commonly used to treat ADHD in adults and are highly effective in managing ADHD symptoms.²⁴ When taken as prescribed, stimulant medications can improve attention and reduce impulsivity and hyperactivity in adults with ADHD. These medications work by increasing the levels of dopamine and norepinephrine in the prefrontal cortex.

However, medications are not a cure for ADHD. They help manage symptoms and improve functioning. Long-acting stimulants may improve adherence to treatment, have fewer side effects (e.g., rebound symptoms) compared with short-acting medications, and are generally less desirable for diversion.¹²

Prior to starting medication, obtain a patient and family cardiovascular history to ascertain genetic predisposition to cardiac events, especially arrhythmias. Other medical conditions and potential drug interactions should be reviewed. A risk and benefit discussion with your patient is helpful.

Some patients respond preferentially to one medication class or another. Physicians should become familiar with one long-acting medication in each of the two classes so they can readily try a different medication if medications from one class are poorly tolerated.

Stimulant medications are generally well tolerated when titrated incrementally, with small dose increases every 5 to 7 days and regular evaluation of the side effects and benefits. Common side effects include insomnia, reduced appetite, increased heart rate, and mild increases in blood pressure. These side effects are usually temporary but can impact patient tolerance, compliance, and evaluation of medication effectiveness. Transient side effects can be managed with dose adjustments and by educating patients before starting the medication. The Canadian ADHD Resource Alliance's one-page medication summary sheet includes a medication titration schedule, including starting and target doses [Box].

BOX. Attention-deficit/hyperactivity disorder resources for physicians and patients.**Physician resources and education**

- **Special Authority** (www2.gov.bc.ca/gov/content/health/practitioner-professional-resources/pharmacare/prescribers/special-authority)
The BC government provides full or partial coverage for medications not otherwise covered or partially covered. After a week of reasonable doses of immediate-release amphetamine or methylphenidate, application for long-acting methylphenidate or lisdexamfetamine is possible. Atomoxetine is also available on Special Authority, especially where addiction is a concern. Use Special Authority eForms to submit requests (www2.gov.bc.ca/gov/content/health/practitioner-professional-resources/pharmacare/prescribers/special-authority/special-authority-eforms).
- **Skills for Success: ADHD Strategies for Adults** (<https://cbtskills.ca/about-us/what-we-offer/>)
An MSP-covered 8-week executive function and evidence-based skills program created by Drs Elisabeth Baerg Hall and Candice Murray with Shared Care Committee support, delivered by trained physicians throughout BC. Eligible patients can be referred to this program using the Cognitive Behavioural Therapy Skills Group Program Referral Form (<https://cbtskills.ca/wp-content/uploads/CBT-SKILLS-GROUP-PROVINCIAL-REFERRAL-FORM-FILLABLE-2021.pdf>) and indicating an ADHD diagnosis.
- **Canadian ADHD Resource Alliance** (<https://adhdlearn.caddra.ca>)
Assessment and treatment guidelines are available free for members and for purchase for nonmembers.
- **Canadian ADHD Resource Alliance: Medication Chart** (www.caddra.ca/resources/medication-chart/)
Free to download.
- **Canadian ADHD Resource Alliance: ADHD in Practice** (<https://adhdlearn.caddra.ca/courses/adhd-in-practice/>)
A free, accredited 1-hour program that offers a step-by-step walk-through of an ADHD assessment and management process using the Canadian ADHD Resource Alliance's ADHD Treatment, Education and Assessment Tool (ADHD TrEAT).
- **Canadian ADHD Resource Alliance: ADHD TrEAT** (www.caddra.ca/adhd-treat1/)
An online resource designed to support health care practitioners in assessing and treating ADHD. Provides

guidance based on the Canadian ADHD Practice Guidelines. Free for Canadian ADHD Resource Alliance members. All questionnaires discussed in this article are available from this site.

- **North Shore Adult ADHD Education Project** (contact northshore@nsdivision.ca)
- **Provincial Academic Detailing service** (www2.gov.bc.ca/gov/content/health/practitioner-professional-resources/pad-service/medications-for-adhd)
Up-to-date resources on prescribing ADHD medications and instructions on how to apply for Special Authority.
- **Pathways** (<https://pathwaysbc.ca/login>)
Canadian ADHD Resource Alliance resources, including diagnostic and treatment algorithms, questionnaires (e.g., Adult ADHD Self-Report Scale, Wender Utah Rating Scale, Weiss Functional Impairment Rating Scale), and a patient handout on psychoeducation.

Patient resources

- **Centre for ADHD Awareness, Canada** (<https://caddac.ca/>)
Provides programs and resources for parents and individuals affected by ADHD.
- **How to ADHD** (<https://howtoadhd.com/>)
Website and YouTube channel supporting individuals with ADHD.
- **ADDitude** (www.additudemag.com/)
Website and magazine providing expert guidance and support for living with ADHD and related mental health conditions.
- **Rolling with ADHD for parents** (<https://healthymindslearning.ca/rollingwith-adhd-for-parents/>)
ADHD education for parents, from the BC Children's Hospital.
- **Rolling with ADHD for teachers** (<https://healthymindslearning.ca/rolling-with-adhd-for-teachers/>)
ADHD education for teachers, from the BC Children's Hospital.
- **Types of classroom accommodations** (<https://caddac.ca/find-a-resource/for-physicians/>)
Centre for ADHD Awareness, Canada guidelines on school accommodations.

Self-reflection, an executive function that is commonly impaired in ADHD patients, is addressed by encouraging self-monitoring of medication-associated changes. Invite your patients to check in with their spouses, roommates, or trusted colleagues to help evaluate the efficacy of the medications. The Adult ADHD Self-Report Scale is helpful for reviewing changes from baseline. Have your patient identify four target symptoms they want to change, and follow up on this, which helps teach them to monitor progress over time.

In the family practice setting, ADHD is managed as a chronic condition. In the first 6 to 8 weeks of treatment with medications, or until a workable dose is established, regular follow-up is recommended to assess the effectiveness of the medications, titrate doses, and manage side effects to prevent premature discontinuation of the medications. Once a reasonable effective dose has been established, there will rarely be a need to increase the dose unless your patient has had a contextual change that causes further functional impairment (e.g., attending a training program). If your patient wonders about the need for a medication change outside of these conditions, reassess them for other mental health conditions, comorbid physical conditions, and new environmental stressors. The development of tolerance happens but is rare.

A diagnosis of adult ADHD is not made by psychostimulant trial alone. A positive or negative response to an isolated stimulant medication can occur for many reasons. Some patients respond preferentially to one medication class or another. Stimulant medications are cognitive enhancers, so some benefits are likely. The primary effect is to improve wakefulness, and perceived performance enhancement is often disproportionate to actual response.^{25,26}

Diversion and misuse. Diversion and misuse of prescription stimulants is a concern. Physicians who treat ADHD should note high-risk settings and behaviors associated with misuse.²⁷ It is common for ADHD patients to lose their prescriptions, as may

also be common with other items. When the family doctor knows the patient, this challenge can be understood in the patient context, anticipated, and mitigated. Having a conversation with your patient when prescribing medication will set the stage for effective collaboration. This should include a discussion about safe medication storage in the home and in contexts associated

People with ADHD have unique strengths, such as increased energy, drive, creativity, and resilience, which are enhanced with diagnosis and therapeutic support.

with medication diversion and misuse, such as post-secondary settings.²⁸ Sometimes a standard clinic-patient agreement is used. Patients typically want to help their peers and do not realize that sharing one or two pills with someone they believe will benefit from them constitutes diversion. Invite your patient to consider withholding sharing their ADHD treatment success stories in high-diversion settings.

Immediate-release stimulant medications are readily diverted. If this is a concern, provide long-acting preparations or atomoxetine, which can be useful as a psychostimulant alternative medication. Consider requiring your patient to make regular visits to obtain prescription renewals.

Individuals who misuse ADHD medications are likely to have ADHD, a substance use disorder, or both.²⁸ In these cases, screen for substance use disorders and manage accordingly. Physicians who work with patients that have severe substance use disorders might consider witnessed medication dispensing.

Special Authority provides access to a few long-acting ADHD medications and atomoxetine [Box].

Nonpharmacological treatments

Psychoeducation and psychosocial interventions are two key approaches that improve overall functioning when used alone or in combination with medication as treatment for adults with ADHD.

Psychoeducation involves education about ADHD symptoms, functional impairment, and comorbidities.^{11,12} This will support your patient's understanding of the disorder, aid in relationship management, and offer insights into past difficulties.¹² Many adult patients experience grief associated with a later ADHD diagnosis.

Psychosocial interventions can help reduce functional impairment and improve quality of life.¹⁸ Behavioral interventions that target executive function challenges include creating routines, setting priorities, breaking tasks into smaller steps, and using visual aids, reminders, and planners.

Lifestyle recommendations can support the use of executive function skills and include promoting exercise, healthy sleep hygiene, and stress management techniques and minimizing distractions in the environment. Social prescriptions can also be helpful.

Cognitive-behavioral therapy treatment for adults with ADHD is an evidence-based approach that addresses executive dysfunction, which, when used alone or in combination with medication, can significantly improve function.¹²

Skills for Success: ADHD Strategies for Adults, an 8-week cognitive-behavioral therapy psychoeducational program, is available through the Cognitive Behavioural Therapy Skills Group program [Box].

There are initiatives in BC that address the lack of resources to build physician capacity in diagnosing and treating adult ADHD. For example, the North Shore Adult ADHD Education Project, a Shared Care Committee-funded pilot project, trained family physicians on how to diagnose and treat uncomplicated adult ADHD in a primary care setting [Box]. The findings of this project demonstrated that participants were more confident in their ability and more likely to recognize,

diagnose, and treat uncomplicated ADHD in their adult patients.²⁹

Summary

People with ADHD have unique strengths, such as increased energy, drive, creativity, and resilience, which are enhanced with diagnosis and therapeutic support.³⁰ Family physicians diagnose many chronic conditions in their daily practice, and they are well positioned to diagnose and treat adults with ADHD, which further embeds the delivery of care for these patients within primary care.

Providing family physicians with appropriate ADHD resources, education, and supports to diagnose and treat the adult population not only improves patients' quality of life by ensuring timely and accurate care but also reduces societal and health care costs. ■

Competing interests

Dr Baerg Hall is a Canadian ADHD Resource Alliance board member and past Education Committee co-chair. This is a volunteer position. Dr Baerg Hall leads and participates in several Shared Care projects that address ADHD in adults. She is a co-author of Skills for Success, a psychoeducational program referred to in this article. This program is physician-delivered through MSP via the Cognitive Behavioural Therapy Skills Group program.

Acknowledgments

The authors wish to thank fellow members of the North Shore ADHD Shared Care project team: Dr Betty Tang, Dr Genevieve Lauzon, Dr Dean Brown, and Ms Alex Moroz-Witek (project coordinator), and the North Shore Division of Family Practice. Dr Baerg Hall wishes to thank the James Family Foundation, which has generously contributed to adult ADHD programming in BC and Canada. The James Family Foundation provided a grant to develop Successful ADHD Skills Builder, a video education program for patients, which will be released in 2024.

References

- Klein RG, Mannuzza S. Long-term outcome of hyperactive children: A review. *J Am Acad Child Adolesc Psychiatry* 1991;30:383-387.
- Weiss G, Hechtman LT. *Hyperactive children grown up: ADHD in children, adolescents, and adults*. Guilford Press; 1993.
- Barkley RA. International consensus statement on ADHD. *J Am Acad Child Adolesc Psychiatry* 2002;41:1389.
- Faraone SV, Biederman J, Mick E. The age-dependent decline of attention deficit hyperactivity disorder: A meta-analysis of follow-up studies. *Psychol Med* 2006;36:159-165.
- Wilens TE, Spencer TJ. Understanding attention-deficit/hyperactivity disorder from childhood to adulthood. *Postgrad Med* 2010;122:97-109.
- BBC News. ADHD: Private clinics exposed by BBC undercover investigation. 15 May 2023. Accessed 16 May 2023. www.bbc.com/news/health-65534448.
- Sobanski E, Brüggemann D, Alm B, et al. Psychiatric comorbidity and functional impairment in a clinically referred sample of adults with attention-deficit/hyperactivity disorder (ADHD). *Eur Arch Psychiatry Clin Neurosci* 2007;257:371-377.
- Choi W-S, Woo YS, Wang S-M, et al. The prevalence of psychiatric comorbidities in adult ADHD compared with non-ADHD populations: A systematic literature review. *PLoS One* 2022;17: e0277175.
- Thapar A, Cooper M. Attention deficit hyperactivity disorder. *Lancet* 2016;387(10024):1240-1250.
- Sibley MH. Empirically-informed guidelines for first-time adult ADHD diagnosis. *J Clin Exp Neuropsychol* 2021;43:340-351.
- Faraone SV, Banaschewski T, Coghill D, et al. The World Federation of ADHD international consensus statement: 208 evidence-based conclusions about the disorder. *Neurosci Biobehav Rev* 2021;128:789-818.
- Kooij SJJ, Bejerot S, Blackwell A, et al. European consensus statement on diagnosis and treatment of adult ADHD: The European Network Adult ADHD. *BMC Psychiatry* 2010;10:67.
- Goodman DW, Mitchell S, Rhodewalt L, Surman CBH. Clinical presentation, diagnosis and treatment of attention-deficit hyperactivity disorder (ADHD) in older adults: A review of the evidence and its implications for clinical care. *Drugs Aging* 2016;33:27-36.
- Espinete SD, Graziosi G, Toplak ME, et al. A review of Canadian diagnosed ADHD prevalence and incidence estimates published in the past decade. *Brain Sci* 2022;12:1051.
- Harpin VA. The effect of ADHD on the life of an individual, their family, and community from preschool to adult life. *Arch Dis Child* 2005;90 (Suppl 1):i2-i7.
- Hinshaw SP, Nguyen PT, O'Grady SM, Rosenthal EA. Annual research review: Attention-deficit/hyperactivity disorder in girls and women: Underrepresentation, longitudinal processes, and key directions. *J Child Psychol Psychiatry* 2022;63: 484-496.
- Kessler RC, Adler L, Ames M, et al. The World Health Organization Adult ADHD Self-Report Scale (ASRS): A short screening scale for use in the general population. *Psychol Med* 2005;35:245-256.
- Canadian ADHD Resource Alliance. *Canadian ADHD practice guidelines*, 4.1 edition. 2020. Accessed 9 May 2023. <https://adhdlearn.caddra.ca/wp-content/uploads/2022/08/Canadian-ADHD-Practice-Guidelines-4.1-January-6-2021.pdf>.
- Kooij JJS, Boonstra AM, Swinkels SHN, et al. Reliability, validity, and utility of instruments for self-report and informant report concerning symptoms of ADHD in adult patients. *J Atten Disord* 2008;11:445-458.
- Faraone SV, Asherson P, Banaschewski T, et al. Attention-deficit/hyperactivity disorder. *Nat Rev Dis Primers* 2015;1:15020.
- Hassan A, Agha SS, Langley K, Thapar A. Prevalence of bipolar disorder in children and adolescents with attention-deficit hyperactivity disorder. *Br J Psychiatry* 2011;198:195-198.
- Young S, Abbasian C, Al-Attar Z, et al. Identification and treatment of individuals with attention-deficit/hyperactivity disorder and substance use disorder: An expert consensus statement. *World J Psychiatry* 2023;13:84-112.
- Subcommittee on Attention-Deficit/Hyperactivity Disorder Committee on Quality Improvement. Clinical practice guideline: Treatment of the school-aged child with attention-deficit/hyperactivity disorder. *Pediatrics* 2001;108:1033-1044.
- Cortese S, Bernardina BD, Mouren M-C. Attention-deficit/hyperactivity disorder (ADHD) and binge eating. *Nutr Rev* 2007;65:404-411.
- Bagot KS, Kaminer Y. Efficacy of stimulants for cognitive enhancement in non-attention deficit hyperactivity disorder youth: A systematic review. *Addiction* 2014;109:547-557.
- Urban KR, Gao W-J. Psychostimulants as cognitive enhancers in adolescents: More risk than reward? *Front Public Health* 2017;5:260.
- Canadian ADHD Resource Alliance. Chapter 7: Pharmacological treatment of ADHD. In: *Canadian ADHD practice guidelines (CAP-guidelines)*. 3rd ed. 2011 pp. 7.1-7.34. Accessed 1 August 2023. <https://caddra.ca/pdfs/caddraGuidelines2011Chapter07.pdf>.
- Faraone SV, Rostain AL, Montano CB, et al. Systematic review: Nonmedical use of prescription stimulants: Risk factors, outcomes, and risk reduction strategies. *J Am Acad Child Adolesc Psychiatry* 2020;59:100-112.
- North Shore Division of Family Practice. Shared Care project: Enhancing access for adult ADHD care on the North Shore evaluation report. 2022. Accessed 13 September 2023. https://divisionsbc.ca/sites/default/files/Divisions/North%20Shore/Shared%20Care/ADHD%20evaluation%20report_FINAL_07.12.22.pdf.
- Sedgwick JA, Merwood A, Asherson P. The positive aspects of attention deficit hyperactivity disorder: A qualitative investigation of successful adults with ADHD. *Atten Defic Hyperact Disord* 2019;11:241-253.

Eugene Y.H. Yeung, MD, MSc, BSc(Pharm), FCCM, FRCPC, Denise Werry, PharmD, ACPR, Patrick H.P. Wong, MD, FRCPC, Yazdan Mirzanejad, MD, DTM&H, FRCPC, FACP, Inna Sekirov, MD, PhD, FRCPC, William J.A. Connors, MD, MPH, FRCPC, Dale Purych, MD, CCFP, FRCPC, Shazia Masud, MD, FRCPC

Detection of pre-extensively drug-resistant tuberculosis by molecular testing

The use of molecular testing for tuberculosis aids early diagnosis and allows for the prompt initiation of effective antimycobacterial therapy and isolation precaution measures.

Dr Yeung is a medical microbiology resident physician at the University of Ottawa. Dr Werry is a clinical pharmacy specialist working in the infectious diseases service at Surrey Memorial Hospital. Dr Wong is a staff infectious diseases physician at Surrey Memorial Hospital and a clinical associate professor in the Division of Infectious Diseases at the University of British Columbia. Dr Mirzanejad is a staff infectious diseases physician at Surrey Memorial Hospital and a clinical professor in the Division of Infectious Diseases at UBC. Dr Sekirov is a staff medical microbiology physician at the BC Centre for Disease Control and a clinical assistant professor in the Department of Pathology and Laboratory Medicine at UBC. Dr Connors is a staff infectious diseases physician at the Tuberculosis Clinic at the BC Centre for Disease Control and a clinical assistant professor in the Division of Infectious Diseases at UBC. Dr Purych is a staff medical microbiology physician at Surrey Memorial Hospital. Dr Masud is a staff medical microbiology physician at Surrey Memorial Hospital.

This article has been peer reviewed.

ABSTRACT: A 20-year-old female student from India presented to the emergency department with a 3-week history of nonproductive cough, fever, and shortness of breath. On examination, she was febrile with a temperature of 38.2 °C and a heart rate of 124 and was saturating at 91% with room air. A chest X-ray showed bilateral innumerable nodules in her lungs, which was a concern for miliary tuberculosis. A sputum sample was tested using the GeneXpert MTB/RIF cartridge, which not only confirmed the *Mycobacterium tuberculosis* complex infection diagnosis but also identified rifampin-resistance-related genetic mutation. This triggered further molecular testing, which detected the presence of mutations and confirmed resistance to rifampin, isoniazid, pyrazinamide, and quinolones, which suggested the presence of pre-extensively drug-resistant tuberculosis. The patient's respiratory status deteriorated rapidly, which necessitated intubation and transfer to a high-acuity unit; however, as a result of rapid molecular diagnosis and drug resistance detection, effective therapy (an antimycobacterial regimen consisting of amikacin, bedaquiline, clofazimine, cycloserine, ethambutol, linezolid, and meropenem with amoxicillin/clavulanate) was promptly initiated and ultimately a positive outcome achieved. This case highlights the benefit of molecular mycobacterial resistance

testing for appropriate early therapeutic management of drug resistance and disseminated tuberculosis.

Between 2009 and 2020, 20 546 people in Canada were reported to have tuberculosis.¹ However, multidrug-resistant (defined as resistance to isoniazid and rifampin) and pre-extensively drug-resistant/extensively drug-resistant tuberculosis were detected only 206 and 6 times, respectively.¹ In 2022, a World Health Organization report led to an update to the Canadian Tuberculosis Standards to revise the definitions of different categories of resistance [Table 1].² Extensively drug-resistant tuberculosis is now divided into pre-extensively drug-resistant tuberculosis (defined as multidrug-resistant tuberculosis with additional resistance to any fluoroquinolone) and extensively drug-resistant tuberculosis (defined as pre-extensively drug-resistant tuberculosis with additional resistance to bedaquiline or linezolid).² The typical antimicrobial duration of treatment for tuberculosis is 6 months, even for disseminated tuberculosis, but extension may be considered with central nervous system involvement, immunocompromised patients, and drug-resistant tuberculosis, depending on medications

used.^{2,3} The definition of disseminated tuberculosis is provided in Table 2.³

From 1989 to 1998, 3553 (77.1%) of 4606 notified cases of tuberculosis in British Columbia and Alberta were culture-positive.⁴ Of those cases, 365 (10.3%) were drug resistant, and 24 (6.6%) of those drug-resistant cases were multidrug resistant.⁴ Twenty (83%) of the multidrug-resistant patients were foreign-born, and five (21%) died.⁴ In the past 2 decades, Western Canada has had the second-highest active tuberculosis incidence rates (5.6 to 6.4 cases per 100 000 population), behind the territories.¹ According to the 2020 annual report of the BC Centre for Disease Control (BCCDC), the rate of active tuberculosis in BC was 6.1 per 100 000 population (315 cases); 7.3% (23 cases) of all active tuberculosis cases had isoniazid resistance, including 2 cases of multidrug-resistant tuberculosis (0.6%).⁵

The microbiology and infectious diseases services at Surrey Memorial Hospital encountered a case of disseminated tuberculosis caused by a pre-extensively drug-resistant strain. With molecular testing, our teams promptly recognized the severity of the disease and initiated optimized therapeutic management to allow the timely implementation of infection control measures and improve the likelihood of a successful clinical outcome.

Case data

A 20-year-old female student visiting from India was seen in the emergency department for a 3-week history of nonproductive cough, fever, and increasing shortness of breath. She had arrived in Canada 6 months prior to presenting to care. Several months before coming to Canada, she was exposed to her uncle, who had been diagnosed with pulmonary tuberculosis. She herself denied hemoptysis, weight loss, and night sweats. She self-reported having a negative tuberculin skin test and a normal chest X-ray result on immigration screening 6 to 8 months prior to her arrival in Canada.

In Canada, she initially presented to her family physician with dyspnea and received a 1-week course of prednisone

but no antibiotics or a clear diagnosis; the treatment provided no improvement in her symptoms. Later, she presented to a community hospital in BC, where, upon chest X-ray, she was found to have innumerable nodules in her lungs, which was a concern for miliary tuberculosis [Figure]. Airborne precautions were initiated. A sputum specimen was smear-negative for acid-fast bacilli, and *Mycobacterium tuberculosis* was not detected upon polymerase chain reaction molecular testing conducted at the BCCDC Public Health Laboratory.

During her stay at the emergency department, the patient rapidly worsened, with fever (38.2 °C), tachypnea (respiratory rate of 40), tachycardia (heart rate of 124), and oxygen desaturation (91% on

room air), and required up to 15 L of oxygen delivered via a nonrebreather mask. She was started on intravenous ceftriaxone and azithromycin for coverage of possible community-acquired pneumonia pathogens while awaiting respiratory and infectious diseases consultation to determine further investigations and management of a working diagnosis of tuberculosis. The next day, she was transferred to a tertiary site at Surrey Memorial Hospital, where

she was assessed by the respiratory and infectious diseases services on day 2 and day 4 of her hospital presentation, respectively. The patient was started on a standard empiric regimen for tuberculosis consisting of weight-based rifampin, isoniazid/pyridoxine, pyrazinamide, and ethambutol

In the past 2 decades, Western Canada has had the second-highest active tuberculosis incidence rates, behind the territories.

TABLE 1. Definitions of different types of drug-resistant tuberculosis, as per the 2022 Canadian Tuberculosis Standards.²

Type of tuberculosis (TB)	Definition
Mono-resistant TB	Resistance to only one of the four first-line drugs.*
Polydrug-resistant TB	Resistance to at least two first-line drugs without resistance to rifampin.
Multidrug-resistant TB	Resistance to isoniazid and rifampin with or without resistance to other first-line anti-TB drugs.
Pre-extensively drug-resistant TB	Multidrug-resistant TB with additional resistance to any fluoroquinolone.
Extensively drug-resistant TB	Pre-extensively drug-resistant TB with additional resistance to bedaquiline or linezolid.

*First-line drugs: isoniazid, rifampin, pyrazinamide, and ethambutol.

TABLE 2. Definitions of disseminated tuberculosis, as per the 2022 Canadian Tuberculosis Standards.³

Type of tuberculosis (TB)	Definition
Disseminated TB	Tuberculosis occurring in two or more noncontiguous organs or the isolation of <i>Mycobacterium tuberculosis</i> in blood, bone marrow, or liver biopsy.
Miliary TB	A distinct subset of disseminated TB. Hematogenous dissemination of TB causing formation of minute tubercles throughout multiple organs, often resulting in characteristic uniform micronodular (1–5 mm) changes on lung imaging and life-threatening systemic illness.



FIGURE. The chest X-ray of the patient on arrival to hospital showed innumerable nodules distributed throughout both lobes of the lungs.

TABLE 3. Phenotypic antimicrobial susceptibility results for first- and second-line drugs, at CLSI-recommended critical concentrations of the drugs.

Drug	Concentration	Susceptibility
Ethambutol	5.0 mg/L	Resistant
Isoniazid	0.4 mg/L	Resistant
Moxifloxacin	0.25 mg/L	Resistant
Pyrazinamide	100 mg/L	Resistant
Rifampin	1.0 mg/L	Resistant
Amikacin	0.1 mg/L	Susceptible
Capreomycin	2.5 mg/L	Susceptible
Ethionamide	5.0 mg/L	Resistant
Kanamycin	2.5 mg/L	Susceptible
Linezolid	1.0 mg/L	Susceptible
Ofloxacin	2.0 mg/L	Resistant
Para-aminosalicylic acid	4.0 mg/L	Susceptible
Rifabutin	0.5 mg/L	Resistant
Streptomycin	1.0 mg/L	Resistant
Cycloserine	60 mcg/mL	Susceptible*
Clofazimine	≤ 0.12 mcg/mL	Susceptible*
Bedaquiline	1.0 mcg/mL	Susceptible

CLSI = Clinical and Laboratory Standards Institute.

* The CLSI provides the minimum inhibitory concentrations for cycloserine and clofazimine only; the rest of the drugs are critical concentrations provided by the CLSI.

daily. Her course in hospital was as follows [Table 3]:

- On day 4 of the patient’s presentation, CT imaging of her chest showed diffuse and extensive parenchymal opacification with innumerable nodular densities and confluence in the dependent lungs. Three more sputum samples for acid-fast bacilli smear, polymerase chain reaction testing, and mycobacteria culture were performed at the BCCDC. The infectious diseases service also ordered Xpert MTB/RIF assay using GeneXpert platform (Cepheid, Sunnyvale, California) molecular testing of her sputum specimen. The three sputum specimens were collected on day 4, day 7, and day 8 of her presentation. Of note, her HIV antibody and antigen testing was negative.
- The sputum collected on day 8 following presentation showed a positive result for *M. tuberculosis* complex DNA, in addition to rifampin-resistance-related genetic mutation, based on the GeneXpert MTB/RIF assay conducted at Surrey Memorial Hospital. The molecular testing conducted at the BCCDC also identified mutations that confirmed resistance to rifampin, isoniazid, pyrazinamide, and quinolones. This resistance pattern was consistent with pre-extensively drug-resistant tuberculosis. The infectious diseases service promptly requested special access to bedaquiline, clofazimine, and cycloserine, which are preferred medications for pre-extensively drug-resistant tuberculosis.
- On day 17 of her presentation, in consultation with the BCCDC’s Tuberculosis Clinic, the patient was started on an antimycobacterial regimen consisting of amikacin, bedaquiline, clofazimine, cycloserine, ethambutol, linezolid, and meropenem with amoxicillin/clavulanate.
- On day 22 of the patient’s presentation, due to clinical suspicion of central nervous system involvement by tuberculosis, a lumbar puncture was performed.

Her cerebrospinal fluid showed a white blood cell count of $264 \times 10^6/L$, 82% neutrophils, 1280 mg/L of protein, 1.2 mmol/L of glucose, and lactate of 79 U/L, with acid-fast bacilli seen on the smear; the GeneXpert MTB/RIF testing of her cerebrospinal fluid was also positive for *M. tuberculosis* complex DNA, which was indicative of central nervous system tuberculosis.

- On day 23 of the patient's presentation, CT imaging of her abdomen and pelvis showed mild multifocal confluent wedge-shaped hypoattenuation within the renal cortices bilaterally, which suggested renal involvement of disseminated tuberculosis.
- On day 36 of the patient's presentation, the BCCDC confirmed the growth of *M. tuberculosis* complex in her sputum (collected on day 4) by phenotypic culture methods. Subsequent phenotypic resistance testing confirmed the presence of pre-extensively drug-resistant tuberculosis, and second-line drug susceptibility testing was pursued.

The patient was subsequently extubated after being intubated for less than 1 month, and her multiple pneumothoraces gradually improved on chest radiography. She was discharged from hospital in stable condition after 148 days of inpatient stay and will be closely followed by the Vancouver Tuberculosis Clinic. She was prescribed the following antimycobacterial medications upon discharge:

- Bedaquiline: 200 mg orally every Monday, Wednesday, and Friday.
- Clofazimine: 100 mg orally once daily.
- Cycloserine: 250 mg orally twice daily.
- Delamanid: 100 mg orally twice daily.
- Linezolid: 600 mg orally once daily.

Benefits of molecular testing

Traditionally, mycobacterial culture can take up to 8 weeks to grow in specialized selective media.⁶ During this waiting time when the diagnosis has not been established, clinicians are obliged to order multiple investigations to look for alternative diagnoses.^{7,8} In Surrey Memorial Hospital, where the

Fraser Health regional microbiology laboratory is located, GeneXpert MTB/RIF molecular assay has been implemented as the standard preliminary diagnostic test for samples on which tuberculosis testing is requested. It requires minimal laboratory

The 2022 Canadian Tuberculosis Standards recommend that molecular detection of drug resistance be performed on all new diagnoses of tuberculosis.

processing and can provide results within 2 hours from the time of specimen arrival in the laboratory.⁹ A second advantage is the simultaneous detection of *M. tuberculosis* complex and genotypic rifampin resistance markers.

However, there are arguments against overuse of molecular testing of tuberculosis. The GeneXpert MTB/RIF molecular assay may provide a false negative up to 11% of the time, failing to provide early diagnosis.⁹ Molecular assays do not replace the need for mycobacterial culture using liquid broth and solid culture media, which is considered the criterion standard for diagnosis of tuberculosis and is required for complete phenotypic drug susceptibility testing.¹⁰ Eckbo and colleagues found that of the 5484 acid-fast smear-negative specimens submitted to the BCCDC for tuberculosis testing in 1 year (1 October 2016 to 30 September 2017), only 36 (0.7%) were culture-positive.¹¹ The authors estimated that the annual cost of molecular testing of acid-fast smear-negative specimens was \$247 000 (based on \$45 per test) and questioned whether this special testing should be reserved only for physicians specialized in managing tuberculosis patients.¹⁰ However, the 2022 Canadian Tuberculosis Standards recommend that molecular detection of drug resistance be performed on all new diagnoses of tuberculosis.²

Implications for therapeutic management

A rifampin-isoniazid-pyrazinamide-ethambutol regimen is the usual antimycobacterial therapy initiated for suspected and confirmed tuberculosis.¹² This regimen would need to be changed if drug resistance was suspected or confirmed. For instance, an initial regimen for multidrug-resistant tuberculosis may include bedaquiline, linezolid, clofazimine, cycloserine, and levofloxacin or moxifloxacin.² The regimen for pre-extensively drug-resistant and extensively drug-resistant tuberculosis may require five or more drugs selected based on the susceptibility and adverse effect profile of each of the antimycobacterials. As per the 2022 Canadian Tuberculosis Standards, for multidrug-resistant tuberculosis, a treatment duration of 18 to 20 months, guided by medications used and response to therapy, is recommended.² In Canada, novel and repurposed drug-resistant tuberculosis drugs (e.g., bedaquiline, cycloserine, clofazimine) are often available only several days to weeks after an application to Health Canada's Special Access Program has been submitted and drug procurement has been arranged. The application can be denied if it lacks strong evidence to support the indications of these special access medications, such as a lack of laboratory confirmation of drug resistance or susceptibility.²

Traditional phenotypic testing can take several weeks to complete. Without the quick turnaround time of molecular testing results, clinicians could unknowingly commit their patients to ineffective therapies, face delays accessing effective therapies, and ultimately delay the time to cure. These ineffective therapies could induce random mutations that lead to antimicrobial resistance and extrapulmonary complications.² Tuberculous meningitis, for example, has a global mortality rate of 20% to 40%; prompt initiation of effective antimycobacterial therapies may reduce short-term mortality to less than 10%.³ Furthermore, rapid diagnostic testing has been proposed to aid antimicrobial stewardship through early discontinuation of

unnecessary antimicrobials,¹³ which in turn may save drug costs and preserve patients' microbiome. On a health care system level, early molecular microbiological diagnosis prompts timely involvement by infectious diseases and respiratory physicians, clinical pharmacists, microbiologists, and infection preventionists and can facilitate a multidisciplinary approach to the management of patients.

Summary

The management of tuberculosis involves a multidisciplinary approach that includes clinical pharmacology expertise from pharmacists, diagnostic support from microbiologists, procedural support from respiratory physicians, consulting support from infectious diseases physicians, and day-to-day care from the admitting service and unit nurses. The availability of molecular testing for both detection and resistance markers of tuberculosis not only aids multidisciplinary teams in making an early diagnosis but also allows the prompt initiation of effective antimycobacterial therapy and isolation precaution measures. We acknowledge the cost of molecular testing and the rarity of rifampin-resistant tuberculosis in Canada. However, when used appropriately, under guidance of clinicians with tuberculosis-specific expertise and by experienced microbiology laboratory staff, these costs may be mitigated while providing the significant patient and health system benefits outlined herein. This case report

highlights the beneficial role of molecular testing for tuberculosis, informs medical practitioners about the availability of this diagnostic tool, and encourages further development of local and regional algorithms to guide effective integration of molecular testing for tuberculosis as an early and cost-effective intervention. ■

The availability of molecular testing for detection and resistance markers of tuberculosis aids multidisciplinary teams in making an early diagnosis and allows the prompt initiation of effective antimycobacterial therapy and isolation precaution measures.

Competing interests

None declared.

References

- Mounchili A, Perera R, Lee RS, et al. Chapter 1: Epidemiology of tuberculosis in Canada. *Can J Respir Crit Care Sleep Med* 2022;6(Suppl 1):8-21.
- Brode SK, Dwilow R, Kunimoto D, et al. Chapter 8: Drug-resistant tuberculosis. *Can J Respir Crit Care Sleep Med* 2022;6(Suppl 1):109-128.
- Barss L, Connors WJA, Fisher D. Chapter 7: Extrapulmonary tuberculosis. *Can J Respir Crit Care Sleep Med* 2022;6(Suppl 1):87-108.
- Hersi A, Elwood K, Cowie R, et al. Multidrug-resistant tuberculosis in Alberta and British Columbia, 1989 to 1998. *Can Respir J* 1999;6:155-160.
- BC Centre for Disease Control. TB annual report 2020. Accessed 18 September 2023. www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/TB/BCCDC_TB_Annual_Report_2020_final.pdf.
- Pfyffer GE, Wittwer F. Incubation time of mycobacterial cultures: How long is long enough to issue a final negative report to the clinician? *J Clin Microbiol* 2012;50:4188-4189.
- Naito T, Mizooka M, Mitsumoto F, et al. Diagnostic workup for fever of unknown origin: A multicenter collaborative retrospective study. *BMJ Open* 2013;3:e003971.
- Appold K. 10 Choosing Wisely recommendations by specialists for hospitalists. *The Hospitalist. Society of Hospital Medicine* 2014. Accessed 21 August 2023. www.the-hospitalist.org/hospitalist/article/126201/10-choosing-wisely-recommendations-specialists-hospitalists.
- Clinical and Laboratory Standards Institute. POCT15: Point-of-care testing for infectious diseases. 1st ed. 2020.
- Behr MA, Lapierre SG, Kunimoto DY, et al. Chapter 3: Diagnosis of tuberculosis disease and drug-resistant tuberculosis. *Can J Respir Crit Care Sleep Med* 2022;6(Suppl 1):33-48.
- Eckbo EJ, Rodrigues M, Hird T, et al. Needle in a haystack: Looking for tuberculosis in a low-incidence setting. *J Assoc Med Microbiol Infect Dis Can* 2021; 6:49-54.
- Johnston JC, Cooper R, Menzies D. Chapter 5: Treatment of tuberculosis disease. *Can J Respir Crit Care Sleep Med* 2022;6(Suppl 1):66-76.
- Apisarnthanarak A, Bin Kim H, Moore LSP, et al. Utility and applicability of rapid diagnostic testing in antimicrobial stewardship in the Asia-Pacific region: A Delphi consensus. *Clin Infect Dis* 2022;74:2067-2076.

Lisa Jeffery, MD, Alexis Ryley, RN, MPH, Hamish Hwang, MD, FRCSC, FACS

The impact of the COVID-19 pandemic on the severity of emergency bowel surgery

Patients who required emergency abdominal surgery fared worse in multiple dimensions during the COVID-19 pandemic compared with prepandemic.

ABSTRACT

Background: The COVID-19 pandemic was declared on 11 March 2020. This had an unprecedented impact on both primary and specialty care that went beyond patients directly infected with the SARS-CoV-2 virus. Visits to emergency departments declined precipitously during the pandemic due to hospital avoidance, and when patients did present to the emergency department, it was with more advanced diseases. The objective of this quality improvement project was to compare the severity of emergency abdominal surgery before and during the pandemic.

Methods: We conducted a retrospective chart review of all emergency general surgeries performed at Vernon Jubilee Hospital in the fiscal year prepandemic (2019–2020) and in the first 2 years of the pandemic period (2020–2022). Appendectomies, cholecystectomies, and hernia operations that did not involve the bowel were excluded, as were emergencies following elective surgery. Patient demographics and

outcomes were recorded, including two previously validated scores that measure surgical disease severity: the Hospital length of stay, Readmission, and Mortality rates (HARM) score, scored from 0 to 11, and the World Society of Emergency Surgery (WSES) score, scored from 0 to 18. We also tested whether having a family doctor, being admitted to hospital while COVID-19 admissions were higher than five per month, and presenting more than 72 hours after the onset of symptoms affected outcomes and analyzed results for the 3-month periods following “restrictive” and “permissive” elective surgery shutdowns.

Results: There were 85 cases prepandemic and 147 cases during the pandemic: 78 in the first year and 69 in the second year. Age, sex, Charlson Comorbidity Index scores, and whether the patient had a family doctor were similar prepandemic and during the pandemic. During the pandemic, patients were more likely to have a presentation more than 72 hours after the onset of symptoms (61.2% vs 30.6%, $P < .001$), a colon resection (48.3% vs 32.9%, $P = .023$), ischemic bowel (9.5% vs 1.2%, $P = .013$), overall complications (49.0% vs 15.3%, $P < .001$), Clavien–Dindo 3 to 5 complications (15.0% vs 5.9%, $P = .016$), a longer operating time (135 minutes vs 107 minutes, $P = .001$), a higher HARM score (2.4 vs 1.6, $P = .015$), and a higher WSES score (5.8 vs 3.2, $P < .001$) compared with prepandemic. Complications, the HARM score, and the WSES score were not affected by the lack of a family doctor or by more than

five COVID patients admitted concurrently to hospital per month, but presentation after 72 hours was associated with higher HARM and WSES scores. There was a trend toward higher overall complications (51.4% vs 44.4%, $P = .59$), Clavien–Dindo 3 to 5 complications (27.0% vs 22.2%, $P = .66$), a higher HARM score (2.6 vs 1.9, $P = .18$), and a significantly higher WSES score (6.9 vs 4.8, $P = .025$) following restrictive versus permissive elective surgery shutdowns.

Conclusions: Patients who required emergency abdominal surgery fared worse in multiple dimensions during the pandemic compared with prepandemic. We could not demonstrate an association between concurrent COVID-19 admissions or lack of a family doctor with worse outcomes; however, there was a strong association between the pandemic period and delayed presentation and an association between delayed presentation and increased disease severity. Moreover, periods in which outpatient surgery and endoscopy were shut down may have contributed to delays in diagnosis and increased disease severity during the pandemic.

Background

The World Health Organization declared the COVID-19 outbreak as a pandemic on 11 March 2020.¹ This led to subsequent unprecedented lockdown restrictions and public health interventions that varied widely, even between health authorities within the same province. The pandemic

Dr Jeffery is a general surgery resident in the Faculty of Medicine at the University of British Columbia. Ms Ryley is a surgical process improvement lead at Vernon Jubilee Hospital. Dr Hwang is a general surgeon at Vernon Jubilee Hospital and a clinical associate professor in the Faculty of Medicine at UBC.

This article has been peer reviewed.

had widespread deleterious effects on health care delivery and resources, not only directly from respiratory illnesses caused by the SARS-CoV-2 virus but also indirectly due to reduced or delayed presentations to the emergency department for other acute diseases.² Patients who required emergency general surgery were no exception: delayed presentations resulted in longer hospital stays³ and increased morbidity during the pandemic compared with the prepandemic period.⁴ There was a significant decrease in the number of emergency surgeries performed at several institutions worldwide during the pandemic.⁴⁻⁷ Emergency general surgery patient outcomes included increased sepsis scores, morbidity, and mortality rates, as well as more advanced acute and malignant disease processes during the pandemic compared with the prepandemic period.^{2-4,8,9}

Vernon Jubilee Hospital in the interior of British Columbia is a 196-bed regional hospital that experienced three periods in which elective (nonurgent) surgery and endoscopy were suspended due to the pandemic. During two restrictive periods, 17 March to 19 May 2020 and 1 January to 28 February 2022, all elective surgeries and endoscopies were postponed. During a third period, 20 August to 25 September 2021, inpatient elective surgery was postponed, but day-care elective surgery and endoscopy were permitted to proceed. The BC Colon Screening Program was also suspended from 1 April to 8 June 2020. Preoperative screening and testing were inconsistent across the province; universal asymptomatic COVID-19 testing was not instituted in the Interior Health Authority, where Vernon is located, until 31 March 2021.

Among general surgeons who delivered acute care surgery services at Vernon Jubilee Hospital, there was a sense that patients were presenting with more advanced pathology during the pandemic compared with prepandemic. A postulated etiology for pandemic collateral damage in the acute general surgery patient population was a delay from symptom onset to presentation to

the emergency department.^{2,4} This may have been a consequence of both patient hesitancy due to fear of COVID-19 infection and public health measures that discouraged patients from leaving their homes.^{2,10} The objective of this quality improvement project was to compare the severity of emergency general surgery cases at Vernon Jubilee Hospital during the prepandemic and pandemic periods and examine potential influencing factors.

The pandemic had widespread effects on health care delivery, not only directly from the virus but also indirectly due to reduced or delayed presentations.

Methods

This project was screened for ethics using the ARECCI screening tool,¹¹ it was deemed to be low risk by the Interior Health Authority with assistance from the Vernon Jubilee Hospital site quality improvement lead (author A.R.); therefore, it did not require formal ethics review.

We conducted a retrospective chart review and compared emergency general surgery performed during the prepandemic period with emergency general surgery performed in the pandemic period. The prepandemic period was defined as 1 April 2019 to 10 March 2020, and the pandemic period was defined as 11 March 2020 to 10 March 2022, to capture all three periods of elective surgery shutdowns. Due to time and resource limitations regarding the number of charts that could be reviewed, we chose to review only 1 rather than 2 years of charts in the prepandemic period, because the additional data likely would not have affected the results. Appendectomies, cholecystectomies, and hernia operations that did not involve the bowel were excluded because this would have doubled the number of charts that had to be reviewed; therefore, this shifted the focus of the study

to complex bowel emergencies. Unscheduled surgeries following elective surgery, such as treating anastomotic leak, were also excluded, because we were interested only in cases that presented to the emergency department.

We recorded patient age, sex, and Charlson Comorbidity Index score¹² and whether the patient had a family doctor. We also recorded the dates of admission and discharge, diagnosis on admission and discharge, whether the patient presented more than 72 hours after the onset of symptoms, the date of surgery, operative procedure, operative time, and histological diagnosis where applicable.

We analyzed the following outcomes: ICU admission, complications, mortality, readmission within 30 days, and hospital length of stay. Complications were graded according to the Clavien–Dindo classification.¹³ To objectively assess the severity of emergency surgical conditions, we used two previously validated scoring systems: the Hospital length of stay, Readmission, and Mortality rates (HARM) score, scored from 0 to 11,^{14,15} and the World Society of Emergency Surgery (WSES) score, scored from 0 to 18.¹⁶

The Interior Health Authority provided records of COVID-19 hospital admissions by month during the study period and a summary of periods of shutdowns of elective surgeries and endoscopy and other important dates. We conducted secondary analyses to test whether having a family doctor, being admitted to hospital while COVID-19 admissions were higher than five per month, and presenting more than 72 hours after the onset of symptoms affected outcomes. We also analyzed results for the 3-month periods following “restrictive” and “permissive” elective surgery shutdowns.

Statistics were calculated using an online calculator.¹⁷ Categorical comparisons were conducted using the chi-square test. Continuous variables were compared using the two-tailed *t* test or Mann-Whitney *U*-test, where appropriate. A *P* value of .05 or less was considered significant.

Results

There were 85 cases in the pre-pandemic group and 147 in the pandemic group: 78 in the first year and 69 in the second year of the pandemic. There were no significant differences between the pre-pandemic and pandemic groups in terms of patient sex, age, Charlson Comorbidity Index, or family doctor status [Table 1].

Compared with the pre-pandemic group, the pandemic group had significantly fewer cases of small bowel obstruction but higher incidences of delayed presentation (more than 72 hours), ischemic bowel, colon resection, overall complications, and severe complications (Clavien–Dindo 3 or higher) [Table 1]. Additionally, surgeries in the pandemic group were longer by an average of 28 minutes, and the mean HARM and WSES scores were both higher than in the pre-pandemic group [Table 1]. The pandemic group also had increased oncologic emergency presentation, complicated inflammatory bowel disease, new stoma creation, ICU admissions, mortality, and hospital length of stay compared with the pre-pandemic group, but the results were not statistically significant [Table 1].

There were no differences in complications, mean HARM score, or mean WSES score based on family doctor status for the entire study period. COVID-19 admissions were recorded by the Interior Health Authority only when five or more patients were admitted in each month. We found no significant differences in outcomes when there were fewer than five versus five or more concurrent admissions for COVID-19 per month.

Patients who experienced a delay of more than 72 hours from the onset of symptoms to presentation to the emergency department showed a trend toward increased complications, although the results were not statistically significant, but had significantly higher HARM and WSES scores than patients who presented within 72 hours [Table 2].

We compared the 3-month periods following restrictive elective surgery shutdowns (n = 37), in which day-care surgery

TABLE 1. Patient demographics and outcomes in the pre-pandemic period versus the pandemic period.

	Pre-pandemic	Pandemic	P value
n	85	147	
Male sex (%)	48 (56.5)	65 (44.2)	.072
Mean age (95% CI)*	65.6 (62.2,69)	66.7 (64.3,69.1)	.60
Mean Charlson Comorbidity Index	3.2	3.3	.91
Had a family doctor (%)	76 (89.4)	124 (84.4)	.28
More than 72 hours before presentation (%)	26 (30.6)	90 (61.2)	< .001
Oncologic emergency (%)	13 (15.3)	34 (23.1)	.89
Complicated IBD† (%)	1 (1.2)	6 (4.1)	.21
Small bowel obstruction (%)	31 (36.5)	29 (19.7)	.005
Ischemic bowel (%)	1 (1.2)	14 (9.5)	.013
Colon resection (%)	28 (32.9)	71 (48.3%)	.023
New stoma (%)	19 (22.4)	42 (28.6)	.30
Overall complications (%)	13 (15.3)	72 (49.0)	< .001
Clavien–Dindo complications ≥ 3 (%)	7 (8.2)	33 (22.4)	.016
ICU‡ admission (%)	10 (11.8)	24 (16.3)	.34
Mortality (%)	2 (2.4)	11 (7.5)	.10
Mean LOS§ (days; 95% CI)	9.4 (7.4,11.4)	10.8 (8.9,12.7)	.30
Mean operative time (minutes; 95% CI)	107 (98,116)	135 (121,149)	< .001
Mean HARM score (0–16)	1.6	2.4	.015
Mean WSES¶ score (0–18)	3.2	5.8	< .001

* CI = confidence interval.
 † IBD = inflammatory bowel disease.
 ‡ ICU = intensive care unit.
 § LOS = hospital length of stay.
 || HARM = Hospital length of stay, Readmission, and Mortality.
 ¶ WSES = World Society of Emergency Surgery.

TABLE 2. Outcomes based on time of presentation after onset of symptoms.

	72 hours or less	More than 72 hours	P value
n	116	116	
Overall complications (%)	48 (41.4)	58 (50.0)	.19
Clavien–Dindo complications ≥ 3 (%)	16 (13.8)	25 (21.6)	.12
Mean HARM* score (0–16)	1.7	2.6	.0013
Mean WSES† score (0–18)	3.9	5.8	< .001

* HARM = Hospital length of stay, Readmission, and Mortality.
 † WSES = World Society of Emergency Surgery.

and endoscopy were also postponed, with permissive periods (n = 27), in which only inpatient elective surgery was postponed but day-care surgery and endoscopy were allowed. The restrictive periods showed a trend toward higher overall complications (51.4% vs 44.4%, *P* = .59), Clavien–Dindo 3 to 5 complications (27.0% vs 22.2%, *P* = .66), and mean HARM score (2.6 vs 1.9, *P* = .18) and were associated with a significantly higher mean WSES score (6.9 vs 4.8, *P* = .025) compared with permissive periods.

The Figure shows a timeline with 3-month average HARM and WSES scores. Notable spikes in the WSES scores occurred during restrictive shutdown periods but not during the permissive shutdown period. The following are key dates on that timeline:

- 11 March 2020 – Pandemic declared.
- 17 March 2020 – All elective surgeries postponed; only urgent and semi-urgent surgeries permitted.
- 1 April 2020 – Provincial Colon Screening Program suspended.
- 19 May 2020 – Elective surgery resumes.
- 8 June 2020 – Colon Screening Program resumes.
- 21 December 2020 – First COVID-19 vaccines deployed in BC.
- 31 March 2021 – Universal asymptomatic pre-op testing implemented in

high-prevalence areas in the Interior Health region.

- 20 August 2021 – Elective inpatient surgery suspended due to the White Rock Lake wildfire and the Delta wave. Endoscopy and day-care elective surgery are allowed to proceed.

Restrictive periods showed a trend toward higher complications and were associated with significantly higher severity scores.

- 25 September 2021 – All elective surgery resumes.
- 1 January 2022 – Omicron wave. All elective surgery and endoscopy postponed. Only urgent and semi-urgent surgeries permitted.
- 28 February 2022 – Elective endoscopy resumes.
- 6 March 2022 – Elective surgery resumes.

Conclusions

In general, our study showed that patients who required emergency abdominal surgery

faced worse outcomes during the pandemic compared with the prepandemic period. This agreed with other studies that examined emergency general surgery before and during the pandemic.^{3,4,6-8} Our study showed twice the rate of delayed presentations during the pandemic compared with the prepandemic period and that this was associated with more severe disease. Hospital avoidance due to COVID-19 lockdowns and a reduction in the number of emergency general surgery operations has been previously described.⁶ This phenomenon extended to all visits to the emergency department⁵ and caused delays in nongeneral surgical emergencies.² We were not able to determine the reason why patients in our study delayed their presentation and can only speculate that it was due to “stay at home” and “shelter in place” pandemic messaging, especially early in the pandemic period, as previously documented.¹⁰ Access to in-person care was also difficult during the pandemic, though we found no differences in outcomes based on whether or not patients had a family doctor. Despite there being no COVID-19 admissions to hospital, there was an increase in complications and disease severity immediately after the pandemic was declared [Figure]. This supports the “collateral damage” theory that increased disease severity and worse

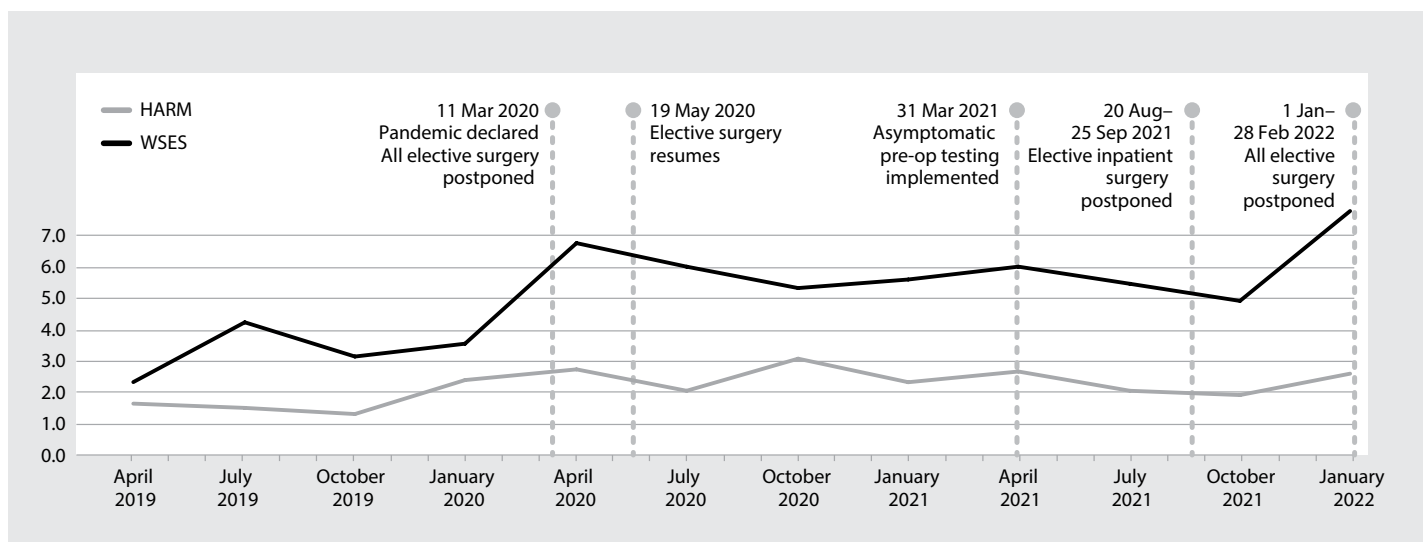


FIGURE. Timeline with 3-month average Hospital length of stay, Readmission, and Mortality (HARM) and World Society of Emergency Surgery (WSES) scores.

outcomes were not a direct result of the SARS-CoV-2 virus but were due to a combination of public health communications and fear of presenting to hospital, which led to delays in emergency department presentation and poorer outcomes.^{2,5,6,8,10}

Although the highest number of COVID-19 hospital admissions occurred in the fall of 2021, which also coincided with a partial evacuation of the hospital in August 2021 due to the White Rock Lake wildfire, which reached the outskirts of Vernon,¹⁸ this was not accompanied by an increase in disease severity as measured by the HARM and WSES scores. It is notable that during this period, elective day-care surgery and endoscopy were permitted to proceed. However, disease severity spiked after all elective surgeries and endoscopies were postponed in March 2020 and then again in January 2022 when the restrictions allowed only urgent and semi-urgent cases [Figure]. We found a trend toward increased complications and higher HARM scores and significantly higher WSES scores in the 3-month periods following restrictive periods compared with the permissive periods. During restrictive periods, some diseases, such as colon cancer, inflammatory bowel disease, and ischemic colitis, could not be identified at an early stage during outpatient colonoscopy, and some of these cases may have progressed and eventually culminated in an emergency operation. Also, some conditions, such as hernias, that required elective day-care surgery may have become complicated by incarceration and intestinal strangulation as a result of postponements, which would have prompted emergency surgery.

In terms of colorectal cancer, the COVID-19 pandemic was shown to be associated with fewer operations, a later stage of the disease, more stomas, more urgent and emergent surgeries,¹⁹ more obstructions at presentation,⁹ and more complications.²⁰ Increased colon cancer obstructions were shown to be associated with a decrease in early detection due to suspended screening colonoscopies.⁹ Other studies have predicted an increase in colorectal cancer

cases and eventual excess deaths from even a short interruption in colon screening.²¹ Our study showed a nonsignificant trend toward greater oncologic emergencies and new stomas during the pandemic period and a greater number of colon resections, but not all for cancer. Our study showed an increase in complications and disease

In the early days of the pandemic there were no COVID-19 admissions, yet there was an immediate increase in disease severity at our hospital.

severity in general following suspension of the Colon Screening Program from 1 April to 8 June 2020, though it is difficult to isolate the effect of this from other factors, such as hospital avoidance, delayed disease presentation, and inability to access in-person primary and specialty care during COVID-19 lockdowns.

Surgical patients who test positive for SARS-CoV-2 in the perioperative period have a higher risk of complications and mortality.⁴ None of the patients in our study had a documented co-infection with COVID-19 during their admission. We found no correlation between burden of COVID-19 hospital admissions and surgical outcomes. In the early days of the pandemic there were no COVID-19 admissions, yet there was an immediate increase in disease severity at our hospital [Figure]. There was a decline in overall complications after the introduction of universal pre-op COVID testing in March 2021. The reason for this is uncertain. Other studies have shown a higher complications rate, including ICU admission and mortality, among asymptomatic patients infected with the SARS-CoV-2 virus.²² We were not able to determine whether this played any role in our study due to the constraints of a retrospective review and the lack of universal testing during the first year of the pandemic, but this would justify future study.

Virtual health care was a sudden adaptation following declaration of the pandemic, which had the advantage of keeping patients from coming into contact with others and becoming infected with SARS-CoV-2.⁵ However, the disadvantage was the possibility of misdiagnosis or delayed diagnosis because of the lack of physical examination. We did not find a correlation between the lack of a family doctor and worse outcomes. We were not able to determine whether patients had recently seen their family doctor in person, so the question of whether the lack of in-person care impacted outcomes remains unanswered. However, it is logical to consider that being unable to see one's family doctor may have compounded delayed presentation to the emergency department, because patients with serious conditions would not have been identified and referred urgently at an early stage of illness.

Study limitations

The limitations of this study were the result of its retrospective, single-centre design. The collection of much of the data through the chart review relied on the completeness of dictated reports to accurately capture patients' presentation to and course in hospital. We were unable to include additional data points, such as whether patients had been seen in person by their family physician prior to presentation, because this was not a routine question posed to patients, and it is impossible to determine this retrospectively. Finally, we explored data only from our own centre; however, most shutdowns, restrictions, and precautions were mandated at a provincial level and were similar at other hospitals in BC, so our experience is likely generalizable to other communities.

Summary

Patients who required emergency abdominal surgery fared worse in multiple dimensions during the pandemic compared with pre-pandemic. We could not demonstrate an association with the number of concurrent COVID-19 admissions or the lack of a family doctor. However, there was a

strong association between the pandemic period and delayed presentation and between delayed presentation and increased disease severity. This reinforces that public health directives need to be balanced with the needs of symptomatic patients who require urgent surgical attention; those patients should be encouraged rather than discouraged from presenting to acute care. Moreover, shutdowns of outpatient surgery and endoscopy may have contributed to delays in diagnosis and increased disease severity during the pandemic period. Future pandemic directives should focus on being as permissive as possible to maximize access to preventive health care while balancing public health requirements. ■

Funding

Funding for this project was provided by the Vernon Jubilee Hospital Physician Society, a branch of the Specialist Services Committee's Facility Engagement Initiative.

Competing interests

None declared.

References

- World Health Organization. Coronavirus disease (COVID-19) pandemic. Accessed 22 December 2022. www.who.int/europe/emergencies/situations/covid-19.
- Mogharab V, Ostovar M, Ruzskowski J, et al. Global burden of the COVID-19 associated patient-related delay in emergency healthcare: A panel of systematic review and meta-analyses. *Global Health* 2022;18:58.
- Karlafti E, Kotzakioulafi E, Peroglou D-C, et al. Emergency general surgery and COVID-19 pandemic: Are there any changes? A scoping review. *Medicina* 2022;58:1197.
- Cano-Valderrama O, Morales X, Ferrigni CJ, et al. Acute care surgery during the COVID-19 pandemic in Spain: Changes in volume, causes and complications. A multicentre retrospective cohort study. *Int J Surg* 2020;80:157-161.
- Friedman AB, Barfield D, David G, et al. Delayed emergencies: The composition and magnitude of non-respiratory emergency department visits during the COVID-19 pandemic. *J Am Coll Emerg Physicians Open* 2021;2:e12349.
- McGuinness MJ, Hsee L. Impact of the COVID-19 national lockdown on emergency general surgery: Auckland City Hospital's experience. *ANZ J Surg* 2020;90:2254-2258.
- Reinke CE, Wang H, Thompson K, et al. Impact of COVID-19 on common non-elective general surgery diagnoses. *Surg Endosc* 2023;37:692-702.
- McLean RC, Young J, Musbahi A, et al. A single-centre observational cohort study to evaluate volume and severity of emergency general surgery admissions during the COVID-19 pandemic: Is there a "lockdown" effect? *Int J Surg* 2020;83:259-266.
- Mizuno R, Ganeko R, Takeuchi G, et al. The number of obstructive colorectal cancers in Japan has increased during the COVID-19 pandemic: A retrospective single-center cohort study. *Ann Med Surg* 2020;60:675-679.
- Wong LE, Hawkins JE, Langness S, et al. Where are all the patients? Addressing Covid-19 fear to encourage sick patients to seek emergency care. *NEJM Cataly* 2020.
- Alberta Innovates. ARECCI ethics screening tool. Accessed 24 December 2022. <https://arecci.albertainnovates.ca>.
- Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: Development and validation. *J Chronic Dis* 1987;40:373-383.
- Dindo D, Demartines N, Clavien P-A. Classification of surgical complications: A new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg* 2004;240:205-213.
- Keller DS, Chien H-L, Hashemi L, et al. The HARM score: A novel, easy measure to evaluate quality and outcomes in colorectal surgery. *Ann Surg* 2014;259:1119-1125.
- Crawshaw BP, Keller DS, Brady JT, et al. The HARM score for gastrointestinal surgery: Application and validation of a novel, reliable and simple tool to measure surgical quality and outcomes. *Am J Surg* 2017;213:575-578.
- Sartelli M, Abu-Zidan FM, Catena F, et al. Global validation of the WSES Sepsis Severity Score for patients with complicated intra-abdominal infections: A prospective multicentre study (WISS study). *World J Emerg Surg* 2015;10:61.
- Social Science Statistics. Statistics calculators. Accessed 25 December 2022. www.socscistatistics.com/tests.
- MacPherson M, Dickson C. Paradise lost. *CBC News*. 15 September 2021. Accessed 14 January 2023. <https://newsinteractives.cbc.ca/longform/white-rock-lake-fire>.
- Williams E, Kong JC, Singh P, et al. The impact of the COVID-19 pandemic on colorectal cancer diagnosis and management: A binational colorectal cancer audit study. *ANZ J Surg* 2021;91:2091-2096.
- Uyan M, Özdemir A, Kalcan S, et al. Effects of COVID-19 pandemic on colorectal cancer surgery. *Sao Paulo Med J* 2022;140:244-249.
- Harber I, Zeidan D, Aslam MN. Colorectal cancer screening: Impact of COVID-19 pandemic and possible consequences. *Life* 2021;11:1297.
- Hendrickson NR, Kesler K, DeMik DE, et al. Asymptomatic pre-operative COVID-19 screening for essential and elective surgeries: Early results of universal screening at a Midwestern academic medical center. *Iowa Orthop J* 2021;41:33-38.

Future pandemic directives should focus on being as permissive as possible to maximize access to preventive health care while balancing public health requirements.

Performing a return-to-work consultation for patients with a workplace injury or illness

Primary care physicians play an important role in the recovery, return to work, and disability management of patients who have a workplace injury or illness.^{1,2} Evidence shows that having conversations early and maintaining connections and communication with the workplace can facilitate a positive return-to-work journey for patients. Having conversations and encouraging your patient to stay in touch with their workplace is helpful in protecting their livelihood.

For physicians interested in helping with return-to-work coordination by reaching out to your patient's workplace, there is a fee code (19950) to support this. We recommend that you use this code in the first few weeks of the claims process. With your patient's consent, you can contact their employer or supervisor to develop a return-to-work plan. This can be done during the first or a subsequent office visit, on a phone call, or using whatever method of communication you and your patient decide on. Larger employers may be more likely to have alternative duties for your patient.

In developing a return-to-work plan, your patient's employer needs to understand how your patient's workplace condition affects their ability to work and for what length of time, so the employer can provide accommodations. They do not need to know confidential medical information (although patients may share this with employers). Employers receive the accepted claim diagnosis from WorkSafeBC, but they

otherwise receive only the information necessary to run their workplace.

Tips to create a return-to-work plan

- With patient consent to contact their place of employment, arrange a call with an individual your patient identifies at the workplace to discuss the plan and find opportunities for safe work for your patient. If you have questions about contacting the employer, speak with a medical advisor from WorkSafeBC. Don't hesitate to make a RACE request by phone or through the app to reach a medical advisor to discuss, and bill WorkSafeBC fee code 19930 for the discussion (please do not bill an MSP fee code for a WorkSafeBC RACE call). Visit www.raceconnect.ca for more information.
- Document that you had a call/conversation with the workplace on a Form 11 (in the clinical information area).
- If you are able to have the employer and the patient on the same call (best practice for all parties to provide information and find consensus), do not bill for the patient encounter. Instead, bill 19950 and the form fee. If you bill for a patient encounter, the 19950 fee code will be rejected.
- Ask your patient what they could do today/tomorrow at the workplace—they may be helpful in identifying tasks or duties for you and the employer—but remember that the employer may not be able to accommodate all the patient's requests. Be open to whatever meaningful jobs the workplace has available to connect your patient back to their workplace in a timely way.

New legislation to support patients with a workplace injury or illness

The provincial government made amendments to the Workers Compensation Act that affect return to work. Starting 1 January 2024, employers and workers will have a legal duty to cooperate with each other and with WorkSafeBC in timely and safe return to work following a worker's injury, and certain employers will have an obligation to return injured workers to work in specific circumstances. Visit worksafebc.com and search "employers: duty to cooperate" for more information.

- The plan should specify hours, activities, and progression of activity, including the expected date of full return to work. A plan is typically not started at fewer than 4 hours per day. For most conditions, a plan would not last longer than 4 to 6 weeks.
- The plan does not need to start at the beginning of your patient's workweek. In fact, arranging the return to work for midweek allows your patient a break after the first couple days back.
- Ensure you have a start date, graduated duties, and an end date documented on a Form 11 (in the clinical information area). WorkSafeBC will not end or close the claim if the plan does not work out as anticipated and will look at other options with the patient/claimant.

Continued on page 353

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

Simple ways to stay up-to-date on antibiotic prescribing guidelines

The World Health Organization (WHO) declared 18–24 November as World Antimicrobial Resistance Awareness Week. Antimicrobial resistance is one of the WHO's top 10 threats to global health and was estimated to be directly responsible for 5400 deaths and \$1.4 billion in health care costs in Canada in 2018.¹

The misuse and overuse of antibiotics from inappropriate prescribing accelerates antibiotic resistance.^{2,3} It is essential to prescribe antibiotics only when needed and according to current evidence-based guidelines. Staying up-to-date on prescribing guidelines can be challenging, but there are tools to make it easier for prescribers.

Bugs & Drugs

Bugs & Drugs is a regularly updated, local, evidence-based prescribing guideline for antimicrobial therapy in frontline practice. The guide is available as a website (www.bugsanddrugs.org) and an app (on iOS and Android) and is free for all BC prescribers. Bugs & Drugs contains the latest evidence-based, peer-reviewed, antibiogram-directed guidelines and recommendations. It offers empiric management advice for more than 140 clinical syndromes in adult and pediatric patients (including fungal, parasitic, and ophthalmic infections), clinical significance and management of 172 potential pathogens, and information on over 70 antimicrobials (e.g., spectrum of activity and/or dosing recommendations).

Pathways

Pathways (<https://pathwaysbc.ca/login>) is a quick-to-use curated repository of websites,

handouts, forms, and clinical tools that acts as a gateway to the Internet to make it quick and easy to find the handouts, websites, and services that patients need. Users can also access links to Bugs & Drugs treatment recommendations for common infections. For community-based infections, simply type the name of the infection in the Pathways search bar.

Pathways also contains Bugs & Drugs information for patients, which can be shared via email from the secure Pathways website during an office visit. When patients ask for an antibiotic but do not need one for a viral illness, the helpful patient-facing documents about self-care without antibiotics can validate patients' concerns while giving them a way to manage their symptoms.

When searching for the infection you are treating in Pathways, Choosing Wisely Canada recommendations often come up as well. Sometimes patients with a urinary tract infection will request ciprofloxacin, and a Pathways search quickly reveals recommendations from the Provincial Antimicrobial Clinical Expert group to avoid fluoroquinolones. Check these specific recommendations by typing a drug name in the Pathways search bar.

Community Antimicrobial Stewardship continuing education course

An online continuing education course (www.antibioticwise.ca/course) developed by the Community Antimicrobial Stewardship program at the BCCDC provides community-based practitioners with the latest evidence and treatment guidelines for the use of antibiotics in primary care and basic principles and strategies for antimicrobial stewardship. The course features 13 modules with case studies for some of

the most common conditions requiring or leading to antibiotic prescribing in primary care settings.

Penicillin allergy delabeling

Up to 98% of patients who are identified as penicillin allergic are actually able to safely receive it.⁴ A simple decision-making tool⁵ (<https://app.firstline.org/en/clients/39-bc-womens-hospital/steps/61581>) available through BC Women's Hospital and Health Centre and BC Children's Hospital can help you work with your patient to determine if they are among those who have grown out of a penicillin allergy or never truly had one. An enhanced version of the penicillin allergy delabeling tool is available in Pathways.

Drop the Label (www.dropthelabel.ca) also has great information for patients and providers to help patients understand why delabeling is beneficial.

Wise use of antibiotics in primary care combats antibiotic resistance and allows effective treatment while protecting patients from harm caused by inappropriate prescribing. Using Pathways or Bugs & Drugs during a client consultation allows you to quickly find evidence-based recommendations and provide health promotion materials. These tools also allow for a thorough review of the recommendations to strengthen your understanding of antibiotic prescribing. ■

—Lynsey Hamilton, MSc

Knowledge Translation and Exchange Specialist, BCCDC

Member, BCCDC Community Antimicrobial Stewardship Team

—Tracy Monk, MD

Physician Lead, Pathways BC

Member, Pathways BC Provincial Resource Committee

This article is the opinion of the BC Centre for Disease Control and has not been peer reviewed by the BCMJ Editorial Board.

Continued on page 353

Physician wellness reading list

Finding literature about physician wellness has always been surprisingly challenging. To assist, the Library has created the physician wellness reading list, available at www.cpsbc.ca/files/pdf/Library-Physician-Wellness-Resources.pdf. As with all reading lists, there is an emphasis on material with a practical focus.

Due to the abundance of review articles on this topic, they have been organized

into sections: overviews, articles for specialists, pandemic-related stressors, inclusivity and equity, occupational hazards, technology-related stressors, violence and conflict, and an “other” section containing less ubiquitously published topics, such as financial well-being and surviving lawsuits.

Most materials are available to read online, with one audiobook listed in the e-books section. There are also several physical books, which can be mailed out with free return postage. Likewise, any of the articles or e-book chapters can be printed and mailed out; unfortunately, this is not possible with entire e-books due to copyright law. All e-books can be read via an Internet

browser, and some can be downloaded for offline reading.

Additionally, there is a new rural and remote medicine reading list, and other reading lists have been updated for 2023, including planetary health, race and health equity, and virtual care. These may be accessed on the Reading Lists web page: www.cpsbc.ca/registrants/library/reading-lists. Reading lists are freely available to view, but the majority of links require logging into the College of Physicians and Surgeons of BC website for access to the content. ■

—Niki Baumann
Librarian

This article is the opinion of the Library of the College of Physicians and Surgeons of BC and has not been peer reviewed by the BCMJ Editorial Board.

BCCDC

Continued from page 352

—Nick Smith, MPH
Project Manager, BCCDC
Member, BCCDC Community
Antimicrobial Stewardship Team

References

1. The Expert Panel on the Potential Socio-Economic Impacts of Antimicrobial Resistance in Canada. When antibiotics fail. Council of Canadian Academies, 2019. Accessed 15 August 2023. <https://cca-reports.ca/reports/the-potential-socio-economic-impacts-of-anti-microbial-resistance-in-canada>.
2. Chatterjee A, Modarai M, Naylor NR, et al. Quantifying drivers of antibiotic resistance in humans: A systematic review. *Lancet Infect Dis* 2018;18:e368–e378.
3. Holmes AH, Moore LS, Sundsfjord A, et al. Understanding the mechanisms and drivers of antimicrobial resistance. *Lancet* 2016;387(10014):176–187.
4. Saravanabavan S, Aulakh A, Douglas J, et al. Penicillin de-labelling in Vancouver, British Columbia, Canada: Comparison of approaches, outcomes and future directions. *Allergy Asthma Clin Immunol* 2023;19:30.
5. BC Women’s Hospital and Health Centre. Penicillin allergy de-labelling tool. Accessed 15 August 2023. <https://app.firstline.org/en/clients/39-bc-womens-hospital/steps/61581>.

WORKSAFEBC

Continued from page 351

- Your fee will be paid even if the claim is ultimately not accepted.

For more information, visit our return-to-work information page for health care providers at www.worksafebc.com/en/claims/recovery-work/health-care-providers-return-to-work-information. ■

—Olivia Sampson, MD, CCFP, MPH, RCPC
Medical Services Manager, WorkSafeBC

—Celina Dunn, MD, CCFP, CIME
Medical Services Manager, WorkSafeBC


References


1. Furlan AD, Harbin S, Vieira FF, et al. Primary care physicians’ learning needs in returning ill or injured workers to work. A scoping review. *J Occup Rehabil* 2022;32:591–619.
2. Canadian Medical Association. The treating physician’s role in helping patients return to work after an illness or injury (update 2013). Accessed 29 September 2023. <https://policybase.cma.ca/link/policy10754>.

Attn: BC Doctors

PRACTICE CLOSURE

Retiring, Relocating,
Transitioning & Estates







RECORD SCANNING

Document Conversion -
Fully Searchable


RECORD STORAGE

Paper & EMR Record Storage
in accordance with CPSBC





www.RecordSolutions.ca
1.888.563.3732



Obituaries

We welcome original tributes of less than

700 words; we may edit them for clarity and length. Obituaries may be emailed 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 Patrick Yoshiro “Pat” Miki 1929–2023

Dr Pat Miki, in his 93rd year, passed away peacefully at home on 16 August 2023, surrounded by his loving wife of 50 years, Diane, and his family.

Following graduation in medicine from the University of Manitoba in 1955, Pat entered residency in radiology at Vancouver General Hospital, completing his training in 1959. Later that year he joined the radiology practice of Dr Henry Brown in Chilliwack. In those early years, they provided radiology services to the small rural communities and cottage hospitals of the Fraser Valley, from Langley to Chilliwack. Following the departure of Dr Brown several years later, the practice became Dr Miki and Associates, and eventually Valley Medical Imaging. Pat was the senior partner in the practice for much of his 45-year career as a radiologist and was instrumental in overseeing and guiding the practice through enormous growth, including technological advances in imaging,

several new and expanded hospitals, and a rapidly growing population in the Fraser Valley.

At occasions such as retirements, Pat could often be coaxed into entertaining the gathering with stories of his early days in practice. His description of the hours he spent driving on country roads between cottage hospitals to do small numbers of studies always fascinated newly graduated radiologists and technologists. He often wore light-adapting goggles while driving so that time wouldn't be wasted at the next site waiting for his eyes to adjust to the low-light conditions for fluoroscopy equipment of that era. So much has changed in such a short time.

Pat had an inquisitive nature and enjoyed and embraced the technological challenges that accompanied the growth in the practice. He was an early adopter of computers in the practice and at home. When a new issue was presented to the partnership for discussion, you could be sure he had done his homework and came prepared to discuss things in detail. His advice was always worth listening to.

Pat remained loyal to his roots. He was born and raised on a farm on the western border of Matsqui, the eldest of three children. Until grade 6 he attended classes in a two-room school in Bradner. As the family was of Japanese descent, at the outbreak of World War II, their farm was confiscated and the family was relocated to a sugar-beet farm in Dufrost, Manitoba. Following Pat's completion of high school and medical school in Manitoba, the family returned to the Fraser Valley, where Pat practised his entire career.

Pat was one of the kindest and most humble, caring, and thoughtful individuals I have ever had the pleasure of knowing. His daughters, Kathy, Laureen, and Nancy, describe him as the epitome of the eldest Japanese son—he was a loving patriarch, his family was the primary focus of his life, and he was always putting the needs of others above his own. In his professional life, as the senior partner in what became a large radiology practice, he led by example. Everyone he worked with, no matter their position or seniority, was treated with the same respect and kindness. Pat and Diane's summer and Christmas social gatherings for staff and spouses at their home were always well-attended affairs where everyone was made to feel like they were part of the family.

Outside of his professional life, Pat enjoyed woodworking, gardening, reading, walking his dogs, researching anything he found interesting, and watching sports, particularly games that involved his grandsons.

Pat is survived by his wife of 50 years, Diane; his three daughters; four grandchildren; and three great-grandchildren. He was predeceased by his sister, Joan, and brother, Henry.

Pat's family would like to extend their appreciation and gratitude to the doctors, nurses, and staff of Langley Memorial Hospital and Langley Hospice for the care and compassion he received in his final days.

—John Matheson, MD
Langley

Classifieds

Pricing: There is a two-tier pricing structure for classified ads. Choose to run an ad online only at our monthly online rates or pay a \$25-per-month surcharge for an ad to be included in a print issue as well as online.

Online rates: Doctors of BC members: \$50 + GST per month for each insertion of up to 350 characters. \$75 + GST for insertions of 351 to 700 characters. Nonmembers: \$60 + GST per month for each insertion of up to 350 characters. \$90 + GST for insertions of 351 to 700 characters.

Deadlines: Ads must be submitted or canceled by the first of the month preceding the month of publication, e.g., by 1 January for February publication.

Place a classified ad: www.bcmj.org/classified-advertising. Payment is required at the time that you place the ad.

PRACTICES AVAILABLE

COQUITLAM—FAMILY MEDICINE/ WALK-IN CLINIC FOR SALE

Established clinic with four equipped treatment rooms. Close to Coquitlam Centre. Four years old, modern design, and fully built. Long-term lease (7 years plus 5-year option to renew). Low rent with an income from the sublease to a pharmacy. Perfect opportunity for physicians who want to own an established clinic without increased prices of build. Contact of info@pbmac.ca for more information.

RICHMOND/STEVESTON—PRACTICE OWNERSHIP OPPORTUNITY

Two turnkey strata FP automated practices. FPs can manage practice with six current FP practices contributing to overhead. Guaranteed income or LFP/FFS billing and turnkey service agreement with potential to buy real estate. Three million GRIP-eligible dividend bonus. Mentorship PRN. Visit www.weststevestonmedicalclinic.com or contact msinghalmd@gmail.com.

EMPLOYMENT

ACROSS CANADA—PHYSICIANS FOR YOU: YOUR SOLUTION FOR RECRUITMENT

Are you a physician looking for work? Or a medical facility requiring physicians? Our team works with independently licensed Canadian physicians, CFPC/RCPSC-eligible physicians, and clinics and hospitals across Canada. Contact

Canada's trusted recruitment firm today to experience the benefits of our specialized service that is tailored for your success! Visit our website for our excellent reviews, to learn about our team, and more! Visit www.physiciansforyou.com, email info@physiciansforyou.com, or call 1 778 475-7995, and our team will be happy to assist you.

MULTIPLE LOCATIONS (YOURNEWCLINIC.CA)—VIRTUAL/ IN-PERSON, WALK-IN OR FP

Join the health care evolution with Enhanced Care Clinic, where doctors thrive. Set your own schedule/number of visits, per hour or per day. Efficient medical admin and backend support (billing, scheduling, callback). Collegial environment with experienced peers. EMR on site with remote access. Over a decade of practice support experience. Attractive compensation. For more info, visit <https://yournewclinic.ca>, call 647 254-5578, or email jobs@enhancedcare.ca.

PORT COQUITLAM—FP FULL-TIME OR PART-TIME, EXCELLENT INCENTIVE AND OVERHEAD

MD Medical Clinic is looking for a full-time or part-time family physician. There are currently more than 2700 patients on a wait list. The clinic uses Oscar EMR and offers billing support. Split arrangement is 80/20. Potential annual earnings are \$400 000 to \$600 000. Overhead includes everything, such as MOA, EMR, and equipment. Incentives include dental/medical extended health

benefit, \$350K/year income guarantee, and a \$20 000 signing bonus for a 2-year full-time contract. Alternatively, if the physician needs a living space, there is a new one-bedroom apartment available above the clinic, which we offer rent-free for the first 12 months. Please call 604 518-7750 or email mdmedicalclinicbc@gmail.com.

MEDICAL OFFICE SPACE

COQUITLAM—MEDICAL OFFICE SPACE

Two equipped treatment rooms available for rent, suitable for family physicians, psychotherapists, or specialists. Equipped with new otoscope, ophthalmoscope, automatic BP machines, and exam beds in a newly built clinic. Located in a busy plaza near Coquitlam Centre. Free parking for patients and staff, hydro utilities, fast Wi-Fi, and cleaning included. Contact info@pbmac.ca for more information.

Find more classified ads online at
<https://bcmj.org/classifieds>.

CME calendar

NEW: CME listings are available at bcmj.org/cme-event. Please see bcmj.org/cme-advertising for information on how to advertise.

Dr Beata Byczko

Dr Byczko answers the Proust Questionnaire to share a little about herself with *BCMJ* readers.



Where do you live?

I'm a family physician in Vancouver and have worked in community practice for many years. My practice is focused on sexual and reproductive health. I've been the medical director of an abortion clinic for 20 years.

What profession might you have pursued, if not medicine?

As a child I wanted to become a film director to showcase the injustices wielded upon me by unfair schoolteachers, the Communist regime, etc. Realistically, I would have become a microbiologist.

Which talent would you most like to have?

If I must limit myself to just one wish, it would be to have effortless conflict resolution skills.

Any BC physician is welcome to submit a Proust Questionnaire. Complete the questionnaire online at www.bcmj.org/submit-proust-questionnaire.

What do you consider your greatest achievement?

I appreciate the focus and determination I had as an adolescent; this facilitated my adjustment to a new country, culture, and language and catapulted me all the way through university and medical school.

Who are your heroes?

Those who speak truth to power, like Jody Wilson-Raybould, Greta Thunberg, Malala Yousafzai, and Ai Weiwei.

What is your idea of perfect happiness?

Deep practice during my annual yoga retreat: senses awake, mind clear, heart open. Done in a community of like-minded friends, it is profoundly restorative and rejuvenating. Alternatively, skiing 7th Heaven on Blackcomb on a bluebird day with friends.

What is your greatest fear?

Personally, becoming debilitated by incurable illness and losing my autonomy. Professionally, the spread of fanaticism and misinformation leading to loss of reproductive freedom in Canada.

What is the trait you most deplore in yourself?

I'd like to be less risk averse and cautious in pursuing the true desires of my heart. So, you could say cowardice.

Which living physician do you most admire?

Those physicians and health care workers who strive for excellence and continue to provide care in armed conflict and disaster zones, showing up again and again despite their own difficulties.

What is your favorite activity?

Yoga retreat—the longer the better. “When the soul lies down in that grass the world is too full to talk about.”—Rumi.

On what occasion do you lie?

Rarely; to avoid hurting another person's feelings (if the situation is banal enough that a little white lie won't really matter).

What is your favorite place?

Pristine nature, even during inclement weather. Sometimes actually despite it. Long Beach in Tofino.

What medical advance do you most anticipate?

Effective, reversible male contraception. Surely, we should have had it long ago.

What is your most marked characteristic?

Balance: left/right (I'm ambidextrous), intuitive/logical, spontaneous/organized, creative/analytical.

What do you most value in your colleagues?

Emotional intelligence and well-honed communication skills. When these are in place, the synergy of collaboration and a sense of belonging become an inherent part of team dynamics. Luckily, I work with colleagues who embody these qualities.

What are your favorite books?

Too many to name every one. *The Books of Jacob* by Olga Tokarczuk. *The Body Keeps the Score* by Bessel van der Kolk. *The Luminaries* by Eleanor Catton. Anything by Michael Ondaatje, Rumi, Pablo Neruda, and e.e. cummings.

What is your greatest regret?

The loss of connection with old friends that happens over time and space as we move along our lives' trajectories.

What is the proudest moment of your career?

Getting the clinic through the College of Physicians and Surgeons of BC's Non-Hospital Medical and Surgical Facilities accreditation program every 4 years.

What is your motto?

"Compassion is the keen awareness of the interdependence of all things." –Thomas Merton

How would you like to die?

Swiftly, peacefully, and surrounded by love. Preferably at the end of a very long life and with a full sensorium, to better appreciate stepping through the veil. ■

Travel insurance that's ready to go.



With MEDOC® you can enjoy an unlimited number of trips¹ during the policy year, including coverage for COVID-19 related medical costs during your trip for up to \$5 million.

Contact Johnson today.

1.855.473.8029
or visit Johnson.ca/MEDOC



Johnson Insurance is a tradename of Johnson Inc. ("JI"), a licensed insurance intermediary, and operates as Johnson Insurance Services in British Columbia and Johnson Inc. in Manitoba. MEDOC® is a Registered Trademark of JI. MEDOC® Travel Insurance is underwritten by Royal & Sun Alliance Insurance Company of Canada ("RSA") and administered by JI. Valid provincial or territorial health plan coverage required. Travel Assistance provided by Global Excel Management Inc. JI and RSA share common ownership. ¹Maximum duration of 17 or 35 consecutive days applies to each trip outside of Canada, depending on your plan selection.

GROW YOUR PRACTICE WITH INJECTABLES

For Therapeutic & Aesthetic Treatments



Train to the highest Standard of Practice in Canada for facial aesthetics.



The most clinically based training - Inject 8+ patients at the hands-on.



Anatomy-based training incl. 20+ hrs in Level 1.



START TODAY WITH THE ONLINE LEVEL 1 COURSE (20 CME)
USE "BCMJJ" PROMO CODE. EXP DECEMBER 1, 2023

HANDS-ON COURSES HELD MONTHLY IN BC



PACIFIC TRAINING INSTITUTE
for FACIAL AESTHETICS & THERAPEUTICS

PTIFA.com | 1-855-681-0066

2024 Advertising Rate Card

Reach your colleagues—
in print and online

PRINT AND
ONLINE RATES
UNCHANGED
FROM 2023

Print | 10 issues per year

RATES PER ISSUE

NUMBER OF INSERTIONS	1 X	5 X	10 X
FOUR-COLOR PROCESS			
Outside back cover	\$3500	\$3300	\$2800
Inside front cover	3300	3000	2700
Inside back cover	3100	2900	2600
Full page	2800	2500	2300
2/3 page	2300	2100	1900
1/2 page	2000	1800	1600
1/3 page	1700	1500	1300
1/4 page	1400	1200	1000
1/6 page	1000	950	850

GUARANTEED POSITION: Space rate plus 20%.

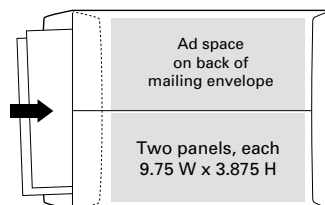
All rates are net and in Canadian dollars, subject to applicable taxes.

ENVELOPE PRINT AD SPACE AND ENCLOSURES

Enclose your pamphlets or other promotional materials with a print issue of the *BCMJJ*, and advertise on the delivery envelope.

The *BCMJJ* uses recycled and recyclable paper envelopes, giving you the option to print an ad on the back of the envelope to accompany your enclosure.

Our rates are competitive with Canada Post and your mailing will be delivered along with the publication members trust, at the same cost as an independent mailing.



Enclosure: 8.5" x 11" 20 lb. sheet, folded or flat \$1.95/enclosure*

Mailing envelope (2 panels on back side) \$2000/issue

*Canada Post standard charges for additional weight will apply for heavier enclosures.

Online | bcmj.org

RATES PER MONTH

PRICING

- Rates shown are for 1 calendar month
- Rates for a 2-week period are 25% off the monthly rate
- Periods run from either 1–15 or 15–31 of any month
- Three spots are available for each position
- Ads (either static or animated) rotate every 10 seconds (see full rate card at bcmj.org/advertise for details)

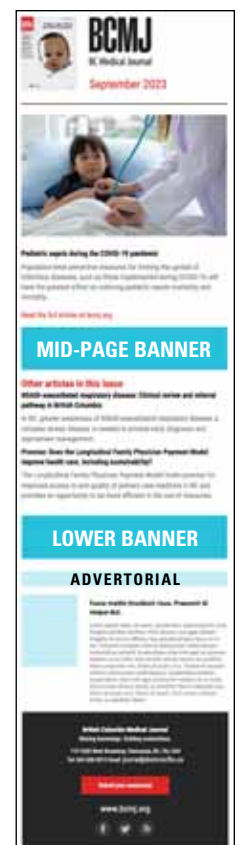
POSITION	RATE/MO
Leaderboard	\$825
Vertical Banner 1	\$605
Vertical Banner 2	\$495

BCMJJ E-NEWSLETTER AD SPACE

The *BCMJJ Headlines* e-newsletter is sent out 10 times per year, highlighting the content featured in our print issue.

You now have the option to purchase advertising space in *BCMJJ Headlines* in the mid-page banner and lower banner positions. You can also submit a paid advertorial to be included in the issue.

POSITION	RATE/MO
Mid-page banner	\$400
Lower banner	\$350
Advertorial (100 words + 1 image)	\$500





Finally, a pension
plan exclusively
for physicians

It's time to get started
medicuspensionplan.com

ESTABLISHED BY



Medicus Pension Plan™ is a trademark of The Bank of Nova Scotia (Scotiabank), used under licence. The Scotiabank and MD Financial Management logos are trademarks of Scotiabank, used under licence. Scotiabank is the sponsor of the Plan, which is a registered pension plan and is registered under the *Pension Benefits Act* (Ontario) and the *Income Tax Act* (Canada). To determine if Medicus is appropriate for your retirement planning needs and retirement income objectives, please consult with a financial advisor.

ANTARCTICA 2025 MEDICAL CONFERENCE UNCONVENTIONAL CONVENTIONS

Current speakers and topics include:

Dr Simon Lee – Dermatologist, Mohs Surgeon
Clinical A/Prof Peter Katoularis – Gastroenterologist
Mr Bill Fleming – Endocrine and General Surgeon
Dr Gerard Bourke – Orthopaedic Surgeon
Dr Richard Sullivan – Pain Specialist and Anaesthetist
A/Prof Zarnie Lwin – Oncologist
Dr Raj Tanna – Psychiatrist

**MORE
INFO:**



WWW.UNCONVENTIONAL.COM.AU