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Current approaches to infectious diseases

PART 1

Current approaches to infectious diseases, Part 1

The subspeciality of adult infectious diseases in BC

Outpatient parenteral antimicrobial therapy in BC

Management of common infections in solid organ transplant recipients in BC

Sexually transmitted infections in BC: An update

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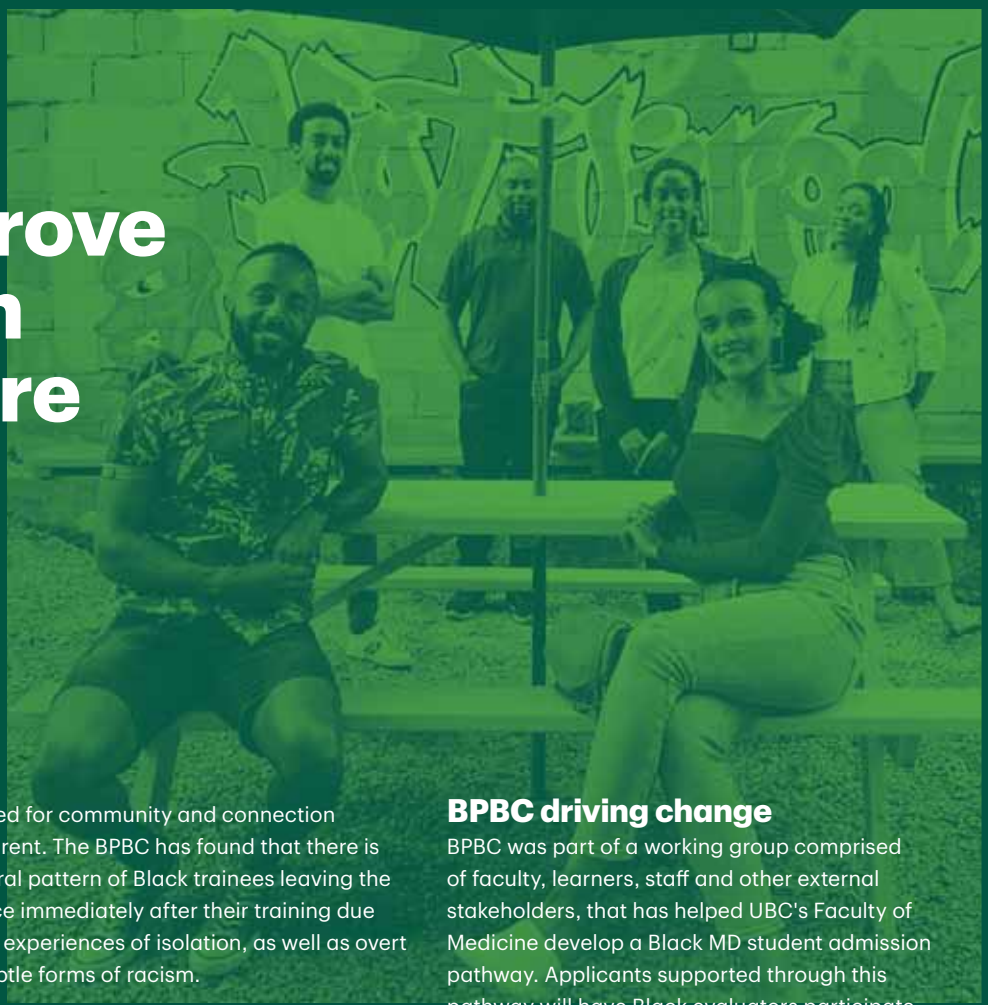

Between seeing patients and balancing life outside her residency, Dr. Ruth Habte has another important duty: serving as a mentor.

"Just this week alone, I spent several hours leading prep sessions for a Black residency candidate who is interviewing for CaRMS," Dr. Habte says. "Everyone in the medical field knows how nerve-wracking these interviews can be, and so I'm happy to help bring out the confidence in others to help them succeed."

Dr. Habte, who is an obstetrics and gynaecology resident physician at UBC, is a leader of an advocacy group, Black Physicians of British Columbia (BPBC), formed to address bias in healthcare across the province.

BPBC began as a grassroots effort in 2020 to help address issues of underrepresentation and systemic racism in medicine. The association's membership comprises of Black medical students, residents, fellows and staff physicians who are training and practising in BC.

In addition to helping Black medical trainees with interview preparation and guiding them on navigating professional interactions, BPBC leaders also make themselves available to prospective medical students to provide support with their application forms, CVs, and to answer questions they might have about life in medical training and practice.

"Black medical trainees and students often feel relieved to know there are people with similar lived experience that they can turn to for help with the process," Dr. Habte says. "The connections are long-lasting, and for students and trainees to know they have access to a community willing to help lift them up – that is extremely valuable."

The need for community and connection is apparent. The BPBC has found that there is a general pattern of Black trainees leaving the province immediately after their training due to their experiences of isolation, as well as overt and subtle forms of racism.

"If the province cannot recruit and retain Black physicians, it deprives all physicians – no matter their heritage – of a group of scholars enriched with lived experiences and diverse perspectives," Dr. Habte says.

While the BPBC does not refer patients or provide a physician matching service, the group receives emails on a weekly basis from Black patients in BC, specifically asking for help to find a Black GP or specialist.

"Patients who are Black often find that trust is more easily established when their medical provider is also Black," she says. "And that can lead to better therapeutic relationships, and ultimately better health outcomes."

The connections are long-lasting, and for students and trainees to know they have access to a community willing to help lift them up – that is extremely valuable.

BPBC driving change

BPBC was part of a working group comprised of faculty, learners, staff and other external stakeholders, that has helped UBC's Faculty of Medicine develop a Black MD student admission pathway. Applicants supported through this pathway will have Black evaluators participate in the assessment of their application.

"It's about allowing for the same rigorous process that is also fair and culturally safe for Black applicants," Dr. Habte said. "We believe this will help to level the playing field."

BPBC is looking to streamline its mentoring process to keep up with increasing demand, with support from organizations including TD.

"TD applauds the BPBC's efforts to help drive important change through their advocacy, mentorship and community outreach," says Gelila Mast, One TD regional manager, Black Community Business Development for Western Canada. "TD is proud to support BPBC as they work to help create a more equitable healthcare experience for all British Columbians."

To learn more about the BPBC, visit www.blackphysiciansofbc.ca

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In order to deliver respectful, safe health care to Indigenous people, BC physicians are striving to understand and include traditional Indigenous ways of healing. *See page 179.*

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ON THE COVER
With infectious diseases epidemics such as SARS-CoV-2, HIV, tuberculosis, and malaria, as well as the rapid spread of multidrug-resistant bacteria, all physicians should have basic updated knowledge about general clinical infectious diseases approaches so they can provide good patient care. Theme issue begins on page 154.

The *BCMJ* is published by Doctors of BC. The journal provides peer-reviewed clinical and review articles written primarily by BC physicians, for BC physicians, along with debate on medicine and medical politics in editorials, letters, and essays; BC medical news; career and CME listings; physician profiles; and regular columns.

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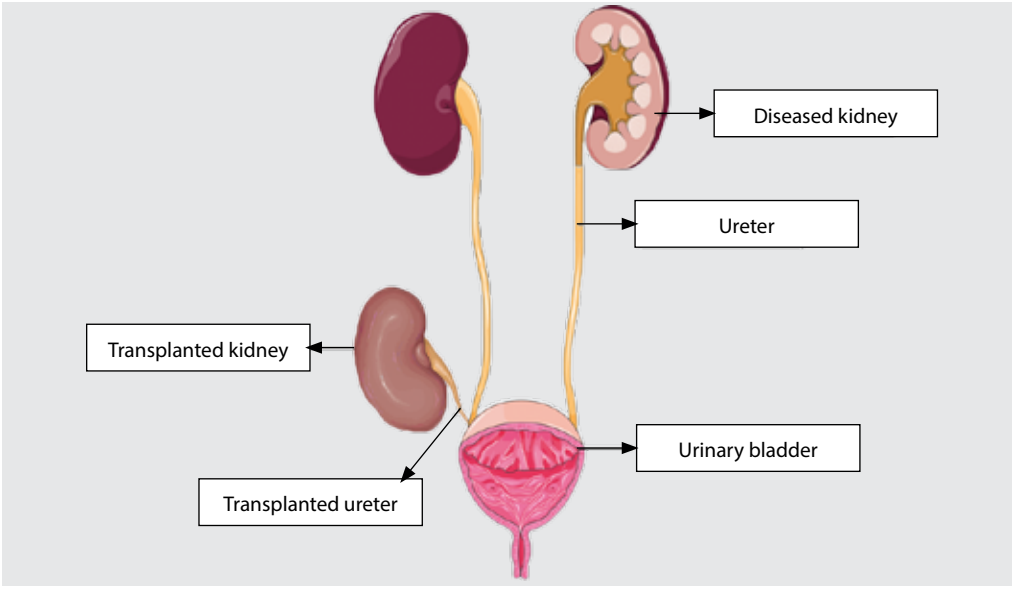

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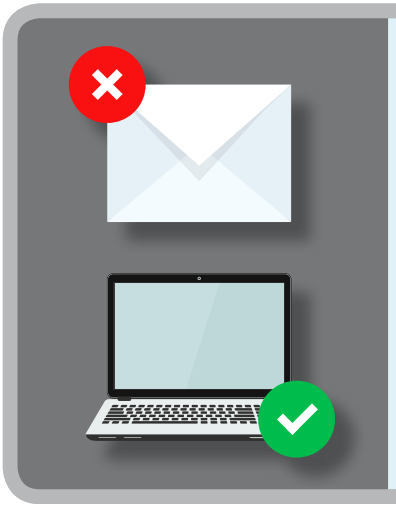

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What about me?

The questions my patients ask me have changed subtly over the years. Initially it was "Do you know you look too young to be a doctor?" Then that became "Why are you always so weird?" And lately it's been "When are you going to retire?" Therefore, as I inch closer to my golden years, I think more about who is going to take care of my future health care needs and what primary care will look like in British Columbia over the next few decades.

There has been a lot of discussion about the lack of family physicians in our province and the vast number of BC residents who are unable to find a doctor. Despite a significant increase in the number of UBC Medical School spots, and programs like A GP for Me, the goal of linking the population with physicians remains elusive.

Invariably, the subject of different physician payment approaches comes up and arguments are made for replacing the standard fee-for-service method with a different scheme. Those against this method of physician remuneration believe it encourages high-volume practices, with as many patients as possible seen in the shortest amount of time, to maximize the physician's income. The concern is that patients are not given adequate time to express their concerns, nor to be examined thoroughly or treated appropriately. I have worked in this fee-for-service environment for 30 years, so I may be a little biased against the alternatives.

Expanding walk-in clinics will only encourage a high volume of brief patient encounters without longitudinal follow-up; therefore, this is not a direction we should explore. Any payment system that involves a for-profit intermediary, whether in a clinic situation or a telehealth model, seems counterintuitive as the best way to fund primary care. In that model, money is siphoned away from health care providers into the pockets of businesspeople. By all accounts, that is a poor use of the public funds used for health care in British Columbia.

A lot has been said about a new model of patient care referred to in our province as the patient medical home, which is part of a larger primary care network. The idea is that a patient becomes part of a family practice where they can access primary care providers such as physicians and nurse practitioners along with other allied health practitioners such as counselors, dietitians, and therapists. All the services a patient might require are available in one location. This model of care sounds ideal, but I wonder about the costs involved. A physical space and administrative staff will be required, and if this is run by the government, I suspect some inefficiencies may creep in. Also, most allied health care providers are not currently publicly funded, so would patients have to pay for these added services, or would this also be funded with health care dollars? Lastly, how would physicians be compensated? If they would work for a salary, the pressure to work quickly and move briskly from patient to patient would be relieved. I suspect that the number of physicians required to treat the same volume of patients would increase within this system.

What I do know is that my colleagues who work in full-service longitudinal care fee-for-service family practices work exceptionally hard, and despite the large volume provide an excellent and highly efficient service.

In conclusion, I really have no idea what the best approach will be moving forward; therefore, I have decided to leave this problem for greater minds than mine to solve. I do know that replacing the current system will be a huge challenge, and I hope this is worked out before my patients start asking, "Isn't it time you hung up your stethoscope, old man?" ■

—David R. Richardson, MD

The evolving crisis in primary care

While the two leading health crises in BC remain opioids and COVID-19, a third—the declining access to primary care—is rapidly gaining ground.

Statistics Canada figures from 2019 indicate that 17.7% of BC residents (897 567) lacked a regular health care provider.[1] The situation in Greater Victoria is of particular note: notwithstanding the ideal climate, natural beauty, and many cultural amenities of the province's capital, it is held that 100 000 residents lack a family physician.[1]

On 20 January 2022, *Victoria Times Colonist* journalist Cindy Harnett explored in detail the resignation of two family physicians practising at Eagle Creek Medical Clinic in View Royal.[2]

The husband-and-wife team "cited burnout, lack of adequate compensation and support, overhead costs, inefficient use of their expertise, and trying to balance the demands of parenting toddlers with the need to work unpaid hours each day."

Dr Chelsie Velikovsky stated, "Having to tell patients, 'Sorry, there is not currently a psychiatrist accepting new patients right now' or that 'you're going to be waiting 18 months to see this type of specialist,' that is just embarrassing. I don't know how else to say it."

In the same article, clinic director Dr David Ward said, "But we're dying out here. We just cannot get doctors to come in and take on patient panels right now. . . . Mark my words, you are never going to see a new privately built family practice in Victoria again."

Nonetheless, recruiting efforts to replace the departing pair are ongoing, with a full-time vacancy currently posted on Health Match BC (VIHA-4788).[3] The job posting indicates that the clinic was built in 2016 and expanded in 2020 to include 17 exam rooms. An RN and social worker practise on site. The fee-for-service split is 70/30, with the option of 75/25 if the applicant can practise from home using telehealth for a couple of days per week. Annual billings are estimated at $400 000 to $500 000. The incoming physician is not required to take on maternity care, ER/hospitalist coverage, or long-term care. Call is 1 month annually and not onerous, with 10 to 15 calls per month.

At first glance, this appears an attractive opportunity. Why, then, would family physicians not line up to work in View Royal or elsewhere in Greater Victoria?

A significant factor is likely the fee-for-service payment scheme, which remains the primary method of physician payment in Canada. The staple of primary care fee-for-service billing in BC remains the venerable "0100," which currently pays $31.62 per visit for adults up to 49 years of age. This fee item, which was $17.65 in 1985, has since fallen behind the average annual Canadian inflation rate (2.34%). Factoring in overhead of 30% to 40%, fee-for-service physicians must see patients quickly and efficiently to make ends meet. Consequently, a degree of rushing is inevitable, contributing to patient dissatisfaction and physician burnout.

The patient profile for the Eagle Creek Medical Clinic vacancy may also dissuade incoming physicians. The successful full-time applicant to replace Dr Velikovsky and her husband is expected to "build a practice panel from the more elderly and complex patients of these two practices (~1500 patients)." While such patients have always been part of general practice, they require considerable expertise, patience, and time to manage, with the latter commodity being in particularly short supply in the fee-for-service setting. Historically, such patients were considered loss leaders in a rounded practice that included the young and healthy—a cohort requiring less time and cognitive burden—who effectively underwrote care of the complex. Committing to a fee-for-service practice panel chosen from the most needful 1500 of 3000 legacy patients poses a significant clinical, professional, and economic challenge to a new physician, and doubtless motivates them to look elsewhere.

Starting a career in such a fashion contrasts sharply with my own debut as a GP locum in 1986. Following completion of a rotating internship, I practised in the Fraser Valley, Okanagan, and West Kootenays. Newly qualified and inexperienced GPs like me were accommodated and mentored by senior colleagues and allowed full run of hospitals. I recall a specialist in Trail stating that his "idea of heaven" was being a GP in Trail. There were enough GPs to allow patients to shop around until they found a simpatico physician, or to part ways if difficulties

arose. The absence of walk-in clinics ensured that quick and simple complaints were managed by a given patient's own GP or clinic colleagues, providing professional and economic relief from the burden of complex cases. GPs served as attending physicians for most hospitalized patients and could assume as much responsibility as they wished. They covered the hospital emergency, performed minor surgeries, assisted at major ones, and practised low-risk obstetrics. It was possible for GPs to develop a defined clinical expertise and focus their practice on areas of interest accordingly (e.g., low-risk obstetrics, sports medicine, dermatology, emergency medicine). Physicians regularly rubbed shoulders at the hospital and were (mostly) on a first-name basis, immeasurably easing the consultation process. Significant knowledge acquisition occurred by osmosis alone, given the need to practise in varied settings featuring face-to-face interactions with GP and specialist colleagues. Practising as a GP in such circumstances was varied, stimulating, and economically viable.

Four decades later, the health care landscape has changed dramatically. The number of available drugs and the use of laboratory tests and diagnostic imaging have mushroomed. Investigatory and management algorithms are more numerous, complex, and detailed, and sophisticated procedural interventions are now routine in specialty care. Clearly, the general licence bestowed on physicians following a year-long rotating internship in BC until 1994 would now be insufficient to permit adequate management of primary care or hospital patients.

In short, the professional opportunities for newly minted GPs wishing to pursue longitudinal care were more attractive professionally and economically when I qualified. Today's GPs are forced to spend more time compiling and sifting through thicker electronic charts. Problem summaries include chronic medical illnesses interwoven with psychiatric concerns, addictions, and psychosocial problems. Such complexity mandates input and co-management by collaborating specialists, but as noted above by Dr Velikovsky, consultation now must frequently be requested from specialists the GP has no rapport with or has never met, and often entails a wait that is clinically unhelpful. Primary care of complex and elderly patients increasingly requires the practitioner to engage in medical social work that goes uncompensated in the fee-for-service environment.

Family physicians are understandably gravitating away from traditional longitudinal primary care and toward employment that entails less responsibility and provides more predictable hours as well as clearly defined deliverables and compensation.

We are witnessing a shifting primary care landscape where patients whose GPs have retired or moved on are left scrambling to find a new GP, while remaining GPs scramble to orchestrate and coordinate care for aging and increasingly complex patients. Ultimately, such a free-for-all must give way to a functionally integrated system using one EMR, incorporating primary medical care, community health, allied health, specialty care, hospital care, and long-term care. Successful and cost-effective models of this kind of care currently exist in the UK, in the US, and elsewhere.

Until that day arrives, we will witness the ongoing exodus of GPs from longitudinal primary care in BC's population centres. As the clinic doors shut behind them, I hear their voices collectively raised in song to the words of the great blues guitarist BB King's "The Thrill Is Gone," crying out that we'll be sorry someday. ■

—David J. Esler, MD

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Letters to the editor

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Re: The crisis that COVID-19 exposed, highlighted, and worsened (but did not cause)

I read with pleasure Dr Brian Day's lament about the mounting inadequacies of the hospital, physician, and nursing sectors over recent decades [*BCMJ* 2022;64:53-54]. The burning reality in BC, and certainly in Victoria, is the astonishing deficiency of family doctors, which has resulted in more than 750 000 individuals across the province finding basic health care to be inaccessible. Yet nobody is doing much about it.

The recent BC budget failed to immediately increase funding for family doctors' low fees. Were there supplemental overhead cost allowances? Was there an enthusiastic endorsement for a realistic alternative to the fee-for-service salary structure? Could an obligation be created for medical schools to channel and support students entering family medicine residencies? How does our BC government justify collecting taxes to support medical services that are simply unavailable? We seem to have few answers that satisfy.

—Neil Finnie, MD (retired)
Victoria

What do we do when our systems are sick?

How do we promote health when our health care system—its design and implementation, structure and policies, and internal operating system—needs dire attention? The very system that is supposed to set us up for success and healthy outcomes is perpetuating illness. And while there are parts of our system that work when we need them to, is this the best we can do?

When the foundation of our health care system depends on primary care access, yet delivery is broken, the system becomes challenging to navigate and we hinder our ability to provide the care and outcomes we, and our patients, deserve. And both patients and providers are growing increasingly frustrated with their lack of influence to cure it.

There is not a sole entity to blame for the constraints we experience. Some would say the manner in which physicians are paid and the resources available to take care of patients are archaic and do not reflect the needs of our ever-changing population with increasing complexities and disease burden. Our system pays to take care of the sick and injured; it doesn't pay to prevent them from becoming unwell to begin with. A system that does not consider the needs or real-time input of the physicians providing care or promote a healthy culture best suited for its patients is itself not well. A system free from power dynamics, racism, and gender inequity is also necessary, as all these factors affect health and outcomes.

Imagine a reality in which we had robust access, where social drivers of illness were addressed, deterioration of chronic disease states was intercepted, and patients moved back into the community from acute care. An ideology based not in reactivity or urgency but rather in laying the groundwork for a commitment to primary prevention and health.

We are making inroads to address these difficulties, and yes, it is slow going. The Joint Collaborative Committees (JCCs) (www.doctorsofbc.ca/collaboration)—where family medicine, specialist care, and rural medicine meet to collaboratively effect system change—is a first-of-its-kind partnership in Canada. Involving government, health authorities, patients, and other stakeholders, all work is grounded in the principles of the quality improvement methodologies from the Institute for Healthcare Improvement and framed around the Triple Aim.

The very system that is supposed to set us up for success and healthy outcomes is perpetuating illness.

Through the Engagement and Quality Improvement team, and in conjunction with the JCCs, Doctors of BC is working to address some of what is broken in our health care system by supporting physician-led quality improvement initiatives, leadership training, and other programs that benefit doctors. And through the support of these initiatives, physicians are accomplishing world-class results here in BC. One example is the Surgical Patient Optimization Collaborative, which helps patients improve their health in preparation for surgery. The work of this collaborative has led to a marked reduction in adverse events during surgery, improved outcomes and recovery for patients, and an increase in patient and caregiver satisfaction. Another example is the new provincial cognitive-behavioral therapy skills initiative, which is currently underway and supports physicians to learn skills to manage their own health and wellness, as well as teaching them how they can use those skills to support patients. These are just two of many examples that illustrate the good work that results from bringing physicians and care teams together to collaborate, influence the health care system, and become directly involved in leading change.

We are committed to continuing to advance the many quality improvement initiatives across the province and our shared learnings from the Institute for Healthcare Improvement, and we actively look for opportunities to streamline services from a client-based perspective. I am reminded that there are inspirational physician leaders, patient partners, and health care workers fearlessly devoted to this work. The insurmountable pandemic has been a testament to what we can accomplish when forced to change and adapt in our system. The eternal optimist in me feels there is great opportunity and potential for growth in our system. After all, we can only go up from here. ■

—Ramneek Dosanjh, MD
Doctors of BC President

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Are you making these TFSA mistakes?

There are few free rides in personal finance, but Canada's Tax-Free Savings Account (TFSA) program is one of the most generous to investors. Your interest, dividends, and capital gains can grow tax-exempt, and there's no tax on withdrawals.

Anyone who is 18 or older and has a valid social insurance number can open a TFSA. Since 2009, your personal contribution has been accumulating for every year that you were eligible. That means if you've never contributed to a TFSA, you may be able to put in up to $81 500 in 2022. The annual TSFA limit is $6000 in 2022.

Beware, though: there are some TFSA blunders that will trigger harsh penalties from the Canada Revenue Agency (CRA), or at least unravel the benefits of tax-free investing. See if you're making any of these TFSA mistakes.

Have you claimed your BC CPRSP benefits?

Each year, eligible doctors in British Columbia receive a unique benefit entitlement to help fund their retirement savings through the BC Contributory Professional Retirement Savings Plan (CPRSP). Doctors of BC will notify you of the amount you can claim each fall, but you'll need to apply online for the CPRSP. If you don't apply for the CPRSP, your basic benefit will expire in 3 years. For example, the CPRSP benefit for 2021 expires on 31 March 2024. You can invest the money in an RRSP, a spousal RRSP, a TFSA, an individual pension plan, or a combination. Contact Doctors of BC if you have any questions about your benefit.

Have you contributed too much to your TFSA?

The CRA keeps close tabs on every penny moving in and out of your TFSA. If you inadvertently contribute more than your allowable limit, expect what's known as an "excess amount letter." This provides information about TFSA rules and what you need to do to resolve the issue. You could be penalized with a tax of 1% per month on the excess amount until it is withdrawn.

Did you move any TFSA money from one financial institution to another?

You may have any number of TFSA accounts across multiple institutions. But if you withdraw money from one to put into another, be aware that this counts as a TFSA contribution. Yes, the withdrawal increases your TFSA room—but not until the following year, so you could be over-contributing. If you need to move money between financial institutions, ask for a direct transfer—it won't count as a TFSA withdrawal or impact your contribution room. To manage your TFSA account more easily, consider keeping your TFSA money at one financial institution.

Have you bought investments that aren't allowed in a TFSA?

TFSAs allow a wide range of qualified investments, but there are some general restrictions. For instance, prohibited investments include any property that you're closely connected to—say, shares of a company or a partnership in which you have a significant interest (10% or more). This can trigger two special taxes: 50% on the value of the investment, and 100% on any income or capital gains derived from the investment. The issuer of your TFSA must take reasonable care to ensure that the account does not hold nonqualified investments, but you should still exercise caution and monitor your TFSA.

Have you invested in too much fixed income?

Despite the name, it's better not to think of the TFSA as a savings account. To enjoy the tax savings of a TFSA, your investments need to have meaningful growth. If your TFSA holds mostly cash and other low-interest-bearing investments, you erode the main benefit of investing in a TFSA

Are you using your TFSA for day trading?

It is perfectly okay to build and manage your own investment portfolio in a self-directed TFSA account if you prefer to, but be aware that high-frequency or aggressive day trading may draw the attention of CRA auditors. If a TFSA account is determined to be used for "carrying on a business," all gains could end up being taxed as business income. So, if you dream of hanging up your scrubs to trade full-time, chat with a tax professional first.

—Andrea Cross, CFP
Senior Financial Consultant, MD Management Limited

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Yazdan Mirzanejad, MD, DTM&H, FRCPC, FACP

Current approaches to infectious diseases, Part 1

"Knowing is not enough; we must apply.
Willing is not enough; we must do." —Goethe

Dr Yazdan Mirzanejad

Infectious diseases are the most common diagnoses in inpatient and outpatient medicine.[1,2]

We are facing many emerging infectious diseases challenges in the light of current epidemics such as SARS-CoV-2, HIV, tuberculosis, and malaria, as well as the rapid spread of multidrug-resistant bacteria around the world.[3-6] Therefore, it is imperative that various practitioners have basic updated knowledge about general clinical infectious diseases approaches in order to provide good patient care.

As the guest editor for this theme issue, I selected eight important and practical topics and matched them with eight groups of experts in those fields to provide the most up-to-date information.

The first article in part 1 of this theme issue provides an overview of the development of infrastructure for the subspecialty of infectious diseases in BC since 1978 (Chow).[5-8] The second article describes the evolving roles for outpatient parenteral antimicrobial therapy, which could provide an alternative path to more cost-effective care by alleviating crowded acute care settings without compromising the safety and quality of care delivery (Azhir and Chapman).[9-11] The third article presents a state-of-the-art review on the principles of transplant medicine and the highlights of an excellent service approach provided within this highly sophisticated discipline (Fakhredine and colleagues).[12-14]

The last article describes the state of various sexually transmitted infections in BC, including soaring rates of some diseases, the improvement in diagnosis due to new molecular testing and treatment strategies, and available consultancy to the practitioners for early guidance in due course of management (Zewude and colleagues).[15-17] ■

Dr Mirzanejad is a clinical professor in the Division of Infectious Diseases, University of British Columbia, and an infectious diseases consultant at the Surrey campus/Jim Pattison Outpatient Care and Surgery Centre.

This editorial has been peer reviewed.

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Anthony W. Chow, MD, FACP, FRCPC

The subspecialty of adult infectious diseases in British Columbia: A personal perspective

The evolution of the infectious diseases subspecialty in BC illustrates the dynamic nature of infectious diseases and the challenges and opportunities they present to the discipline.

ABSTRACT: The current COVID-19 pandemic has intensified the public's and medical community's interest in the discipline of infectious diseases. The evolution of this relatively new subspecialty in BC over the past 40 years is highlighted. Major milestones include the establishment of an infectious diseases clinical pharmacy program, an infectious diseases fellowship program, an inpatient HIV/AIDS unit, a transplant infectious diseases service, a fellowship in reproductive infectious diseases program, and an Immunity and Infection Research Centre, as well as outpatient parenteral antimicrobial therapy and home intravenous antimicrobial treatment programs, outpatient clinics for tropical medicine and travel-acquired diseases, and cross-appointments with the BC Centre for Disease Control.

Dr Chow is a professor emeritus in the Division of Infectious Diseases, Department of Medicine, University of British Columbia and Vancouver General Hospital, Vancouver Coastal Health. He is a pioneer of infectious diseases in BC and Western Canada.

This article has been peer reviewed.

In 1980, I wrote an editorial for the *BC Medical Journal* entitled "The subspecialty of infectious disease (ID) and the multifaceted role of the ID physician."[1] The current theme issue offers a unique opportunity to reflect upon the evolution of the discipline of infectious diseases in our province within the past 40 years and to speculate about its future.

Historical perspective

With the eradication of many classic communicable diseases in the 1950s, the clinical discipline of infectious diseases vanished in Canada. Medical microbiologists who replaced general pathologists in directing the clinical microbiology laboratory became the main source of advice to clinicians on antimicrobial therapy and for undergraduate and postgraduate education. However, it became obvious that bedside consultations by specially trained clinicians in the management of complex diseases were needed. In the 1960s, several luminaries who had trained in the United States returned to Canada to assume academic positions within departments of medicine and/or pathology (notably, Drs Allan Ronald at the University of Manitoba, George Goldsand at the University of Alberta, and Hugh Robson at McGill University). The Canadian Infectious Disease Society was established in 1976, and the subspecialty of infectious diseases was formally approved by the Royal College of Physicians and Surgeons of Canada in 1980, with certification in 1983. Thus, a new clinical subspecialty of infectious diseases was born. It should be noted that the development of infectious diseases as a subspecialty of internal medicine or pediatrics in Canada lagged behind the United States by a decade.[2]

In the 1980s, due to health care reform and managed care in the United States, there was some concern about an oversupply of infectious diseases trainees to meet clinical needs. In contrast, the need for infectious diseases expertise in Canada has continued to escalate. Compared with the United States, where one infectious diseases physician served 110 000 people in 1987, Canada delivered only one infectious diseases physician per 220 000.[3] It is clear that not all infections require the services of an infectious diseases specialist. Approximately 80% of infections in the community can be managed adequately by family physicians or general internists and other specialists.[3] However, life-threatening and complicated infections should receive care from physicians with formal infectious diseases training **[Table 1]**. Furthermore, there is conclusive evidence that infectious diseases consultations are associated with improved outcome in terms of patient survival, shortened hospitalization, and cost savings.[4,5] The diversity and specialized nature of many infectious diseases have led some infectious diseases trainees to extend their fellowships by

TABLE 1. Some complicated or life-threatening infections that may benefit from an infectious diseases consultation.

Cardiovascular and pulmonary infections
• Native or prosthetic valve endocarditis, myocarditis, pericarditis
• Endovascular infections, mycotic aneurysms, cardiac implantable device infections
• Fulminant or refractory pneumonia
Neurologic infections
• Meningitis, brain or spinal abscess
• Subdural or epidural empyema
• Encephalitis, transverse myelitis, Guillain-Barre syndrome
Life-threatening head and neck infections
• Bacterial or fungal endophthalmitis
• Orofacial and odontogenic infections with potential for airway obstruction
• Ludwig angina and Lemierre syndrome
Musculoskeletal infections
• Acute and chronic osteomyelitis or septic arthritis
• Prosthetic joint infections
Life-threatening sepsis
• Bloodstream infections
• Infections requiring intensive care (e.g., necrotizing fasciitis)
• Disseminated mycobacteriosis and fungal infections
Infections in the immunocompromised host
• Solid organ or stem cell transplant recipients
• Cancer patients undergoing chemotherapy
• Opportunistic infections associated with HIV/AIDS or IV drug use
• Acquired or congenital immune deficiencies
Chronic or recalcitrant infections
• Antiretroviral resistance, hepatitis antiviral treatment failure, multidrug-resistant TB
• Diabetic gangrene, chronic wound infections
Miscellaneous, infections in pregnancy
• Imported exotic infections and tropical medicine
• Infections in pregnancy and other reproductive infections

1 to 2 years in order to pursue dual subspecialty certification. Examples include the following:

- Combined infectious diseases/medical microbiology: Many teaching and non-teaching hospitals are actively seeking well-trained physicians who can direct the clinical microbiology laboratory and provide leadership in antimicrobial stewardship, hospital infection control, quality assurance, and cost containment programs. The introduction of multiplex nucleic acid–based diagnostic tests and MALDI-TOF technologies in the microbiology laboratory has also revolutionized clinical virology and diagnostic microbiology by providing the ability to detect previously noncultivable or unrecognized pathogens, which makes this an exciting field for clinical and laboratory investigation.
- Combined infectious diseases/critical care medicine: Infections continue to maintain a conspicuous presence in ICUs worldwide, where rapid control of sepsis and shock, appropriate empirical antimicrobial therapy, and containment of antimicrobial resistance are of paramount importance. Although traditionally dominated by pulmonologists, formal training in infectious diseases by intensivists has strong appeal and potential for synergy in patient care, clinical investigation, and epidemiological research.[6]
- Infectious diseases/HIV medicine/chronic diseases: Due to the increasing societal burden of chronic diseases, including the need for continuing care and antiviral therapy for HIV/AIDS, viral hepatitis B and C, infections associated with injection drug use, and other opportunistic infections in marginalized populations, there is increasing demand for specialization in this arena.
- Transplant infectious diseases: With the expansion of solid organ and stem cell transplantation, there is increasing demand for infectious diseases physicians who are specially trained in the management of transplant recipients and other immunocompromised patient populations, including those with oncologic and rheumatologic conditions. The transplant infectious diseases physician is expected to be well versed not only in the epidemiology and risk assessment of uncommon infections, and unique clinical presentations associated with graft rejection and different phases of transplant progression or cancer chemotherapy, but also in the knowledge of specific immunosuppressive regimens and their toxicities, and the ability to deploy specialized diagnostic tools and administer appropriate empiric treatment or clinical trials.
- Finally, opportunities abound for infectious diseases physicians to pursue specialized training in areas such as public health and epidemiology, sexually transmitted infections, multidrug-resistant tuberculosis, travel-acquired diseases or tropical medicine, surgical infections, and reproductive or gynecologic infectious diseases.

Evolution of the Division of Infectious Diseases in BC

The University of British Columbia and Vancouver General Hospital (VGH) Division of Infectious Diseases was established in 1979 when I was recruited from the Harbor-UCLA Medical Center to join two outstanding young faculty members: Drs William Bowie and Irving Salit. Since all three of us had a similar training background in the clinician-teacher-investigator mode, our collective goal for the division was to develop a model that integrated excellent patient care with quality teaching and scholarly research. Our priority was to maximize the visibility of the clinical and teaching services through the provision of high-quality consultations that also served as an educational tool in the principles and practice of infectious diseases. High standards were expected from each written consultation note, which not only provided clear management recommendations but also included a discussion of rationale based on available evidence, possible pathogenetic mechanisms, and a brief list of key references. To broaden the scope of exposure, inpatient consultations were provided throughout the hospital rather than on a dedicated hospital ward in isolation. Telephone consultations were accepted from throughout the province. The funding model was another strategic decision point that was well ahead of its time. The division negotiated with the Medical Services Commission to provide inpatient consultations for geographic full-time funding in lieu of fee-for-service billing. This allowed faculty to rotate off busy clinical services in order to attend to research and other academic pursuits.

The subspecialty of infectious diseases in BC underwent substantial growth over the past 40 years, under the successive headships of Drs Anthony W. Chow (1978–1993), Neil E. Reiner (1994–2010), and Peter Phillips (2011–2020).

The current UBC head is Dr Theodore Steiner. Division members are distributed within hospitals across all five health regions of the province [Table 2]. VGH, St. Paul's Hospital, and Surrey Memorial Hospital are the major tertiary referral centres for the most complicated infectious diseases in the province. All these centres maintain active inpatient consultative services, outpatient clinics for patients with special needs such as tropical or parasitic infections, HIV/AIDS care, hepatitis B and C, chronic recalcitrant infections such as prosthetic infections, and skin and soft tissue infections, as well as outpatient parenteral antimicrobial therapy. The BC Infectious Diseases Society within the BC Medical Association (now Doctors of BC) was established in 2006 and currently has a membership of 79 practising infectious diseases physicians in the province. A full listing of the UBC-affiliated infectious diseases faculty and associate members is provided on the division's website (https://id.med.ubc.ca/faculty-members). The following summarizes the major milestones of the division over the past 40 years.

Linkages with medical microbiology and clinical pharmacy

Critical liaisons were created with both the Division of Medical Microbiology within the Department of Pathology and Laboratory Medicine and the Division of Clinical Pharmacy within the Faculty of Pharmaceutical Sciences, both at VGH and UBC Hospital. These productive collaborations were pivotal for allowing the Division of Infectious Diseases to gain influence in the provision of key laboratory services for the management of difficult infectious diseases, and to share leadership in hospital infection control and antimicrobial stewardship. Together with the Division of Clinical Pharmacy, the Division of Infectious Diseases also pioneered the establishment of an infectious diseases clinical pharmacy program at VGH in which clinical pharmacy residents joined the infectious diseases faculty on daily consultation rounds and assisted in antimicrobial stewardship, drug–drug interactions, pharmacokinetic monitoring, and quality assurance activities.

TABLE 2. Geographic distribution of adult infectious diseases services in BC.

Hospital	Attending infectious diseases specialists	Consultation services and specialty clinics
Vancouver Coastal Health		
VGH, UBC Hospital, BC Cancer Agency, GF Strong Rehabilitation Centre	Ted Steiner, William Bowie, Richard Lester, Robert Reynolds, Neil Reiner, Jan Hajek, Alissa Wright, Allison Mah, Sara Belga, Jennifer Grant, Katherine Plewes	General infectious diseases (ID) Tropical diseases Transplant ID OPAT† and home IV
UBC-BC Centre for Disease Control (epidemiology, STI‡, TB, antimicrobial resistance)	Robert Brunham, Mark Tyndall, David Patrick, William Connors, Miriam Torchinsky, Troy Grennan	Sexually transmitted infections Tuberculosis COVID-19 testing Parasitology reference laboratory
St. Paul's Hospital	Peter Phillips, Val Montessori, Natasha Press, Mary Kestler, Melanie Murray, Alissa Wright, Queenie Dinh, Victor Leung, David Harris, Mark Hull, William Connors, Julio Montaner, David Moore	General ID Transplant ID HIV/AIDS, hepatitis B and C Addiction medicine
BC Women's Hospital and Health Centre and Oak Tree Clinic	Neora Pick, Melanie Murray, Mary Kestler, Katherine Plewes, Deborah Money,* Julie van Schalkwyk,* Chelsea Elwood*	Women with HIV/AIDS Obstetric and gynecologic infections Human papilloma virus
Richmond Hospital	Jerry Vortel, Clement Kwok	General ID OPAT
Lions Gate Hospital	Joshua Douglas, Gannon Yu, Miriam Torchinsky	General ID OPAT
Fraser Health		
Surrey Memorial Hospital (includes coverage for Peace Arch, Langley Memorial, and Delta Hospitals)	Yazdan Mirzanejad, Michael Chapman, Greg Deans, Patrick Wong, Kevin Afra	General ID Tropical diseases HIV/AIDS, hepatitis B and C OPAT and home IV
Royal Columbian Hospital	Yasemin Arikan, Sangita Malhotra, Davie Wong, Emilie Stevens, Steven Reynolds (ICU)	General ID OPAT
Abbotsford Regional Hospital and Cancer Centre	Yiannis Himaras, Sarah Hennie	General ID OPAT
Burnaby Hospital	Laurenna Peters	General ID OPAT
Mission Hospital	Anurag Markanday	General ID
Island Health		
Royal Jubilee Hospital and Victoria General Hospital	Wayne Ghesquiere, Eric Partlow, Karsten Hammond, Siobhan Holland, Divya Virmani, Ryan LeBlanc	General ID Sexually transmitted infections OPAT and home IV
Nanaimo Regional General Hospital	David Forrest (ICU), Alastair Teale	General ID Sexually transmitted infections HIV/AIDS, hepatitis OPAT and home IV

* Obstetrics and gynecology
† OPAT = outpatient parenteral antimicrobial therapy
‡ STI = sexually transmitted infection

Table continued on page 158

TABLE 2 *(continued from 157).* **Geographic distribution of adult infectious diseases services in BC.**

Hospital	Attending infectious diseases specialists	Consultation services and specialty clinics
Interior Health		
Kelowna General Hospital	Dwight Ferris, Boingotlo Masake, Issa Ephtimios	General ID HIV/AIDS, hepatitis OPAT
Royal Inland Hospital, Kamloops	Elizabeth Parfitt, Kaveri Gupta, Caitlyn Marek	General ID HIV/AIDS, hepatitis OPAT
Northern Health		
Prince George general hospital (University Hospital of Northern British Columbia)	Abu Hamour	General ID HIV/AIDS, hepatitis Tuberculosis OPAT

Cross-appointments with the BC Centre for Disease Control

These cross-appointments greatly strengthened training and research opportunities in public health epidemiology, outbreak investigation, antimicrobial resistance, sexually transmitted infection control, and multidrug-resistant tuberculosis. Members at the BCCDC who had infectious diseases training were extraordinarily successful in the provincial response to the SARS-CoV-1 outbreak; the SARS-CoV-1 accelerated vaccine initiative; the H1N1 pandemic; the expansion of immunization programming and drug addiction, overdose, and harm reduction programs; sexually transmitted infection and TB control; surveillance of antimicrobial resistance within BC; and most recently, surveillance and testing for SARS-CoV-2 infection.

Fellowship training program

The UBC infectious diseases fellowship program, first established in 1982 as one of three programs in the country that was fully accredited by the Royal College of Physicians and Surgeons of Canada, is designed to attract candidates who have completed internal medicine training and are motivated toward a career as clinician-scientists, clinician-educators, or consultant specialists in the community. The program provides integrated inpatient and outpatient rotations within various affiliated institutions, as well as training in epidemiological and microbiological research. The program also provides clinical rotations for residents from disciplines other than internal medicine, such as obstetrics and gynecology, general surgery, neurosurgery, and dermatology. It has become the premier training program in the country. An unexpected benefit of the current COVID-19 pandemic is the creation of a phenomenally successful and well-attended weekly infectious diseases conference that is accessible by Zoom to all infectious diseases physicians throughout the province.

Outpatient parenteral antimicrobial therapy and home intravenous antimicrobial treatment programs

One of the earliest outpatient parenteral antimicrobial therapy clinics in the country was started at VGH in 1982 by Dr H. Grant Stiver, who demonstrated that this mode of antimicrobial delivery was both safe and cost-effective.[7] Candidates include patients with bone and joint infections; selective cases of infective endocarditis; some acute infections such as skin and soft tissue infections; and urinary, respiratory, and gastrointestinal infections without prior hospitalization. With few exceptions, outpatient parenteral antimicrobial therapy clinics are available at all UBC-affiliated teaching hospitals and are supervised by infectious diseases specialists.

HIV/AIDS and the Urban Health Acute Care Unit

In 1992, at the height of the HIV/AIDS epidemic, Drs Michael O'Shaughnessy, Martin Schechter, and Julio Montaner established the BC Centre for Excellence in HIV/AIDS at St. Paul's Hospital and led an interdisciplinary team that targeted the treatment and prevention of HIV/AIDS and opportunistic infections. Dr Montaner and his group were lead researchers on the highly active antiretroviral treatment and "treatment as prevention" strategies that have since been adopted worldwide. The inpatient HIV/AIDS unit at St. Paul's Hospital was established in 1997. It was unique in Canada and attracted undergraduate and postgraduate trainees from across the country for preceptorships in epidemiological investigations and care of marginalized populations. The success of highly active antiretroviral treatment and treatment as prevention strategies transformed the rapidly fatal condition of HIV/AIDS into a manageable chronic disease. However, the number of patients with complications from infections due to injection drug use that require hospitalization and other marginalized patient populations have continued to escalate. The Urban Health Acute Care Unit was established at St. Paul's Hospital in 2014 to meet these needs; it supersedes the former HIV/AIDS unit. The facility provides inpatient care for all patients, both HIV-positive and negative, with complex infections and serves as a provincial tertiary care resource for addiction medicine and other acute and chronic conditions in marginalized populations. In addition, the Hope to Health Research & Innovation Centre was established in 2019 to provide integrated and accessible ambulatory health care to clients in the Vancouver Eastside inner city who have complex needs.

Transplant infectious diseases

The transplant infectious diseases service at VGH was established in 2016 and provides both inpatient and outpatient consults for solid organ transplant and leukemia, and for bone marrow transplant recipients. The service also attends to outpatient consults for solid organ recipients from St. Paul's Hospital. Currently, approximately 500 solid organ transplants, including heart, lung, kidney, liver, and pancreas, are performed annually. The service is also linked administratively with BC Transplant for clinical trials and quality improvement projects.

Reproductive infectious diseases and the Oak Tree Clinic

In partnership with the UBC Division of Infectious Diseases, Dr Deborah Money established the first fellowship in reproductive infectious diseases program in Canada within BC Women's Hospital and Health Centre, with a focus on subspecialty training for obstetricians and gynecologists. She also established the Infectious Diseases Clinic within BC Women's to provide unique expertise in the management of women with HIV/AIDS, hepatitis B or C, human papillomaviruses, infections during pregnancy, and other complex gynecologic infections. The Oak Tree Clinic, also housed within BC Women's, is a multidisciplinary facility that provides specialized care to women, children, and their families who are living with HIV/AIDS. It is a provincial resource and provides educational support for health care workers, organizations, institutions, and the public. There is a strong research program focused on clinical trials in HIV/hepatitis co-infections, human papillomaviruses, and reproductive, endocrine, and metabolic health of women with HIV/AIDS.

Global health, tropical diseases, and GeoSentinel surveillance

The Division of Infectious Diseases conducts weekly outpatient clinics at VGH and Surrey Memorial Hospital for tropical medicine and travel-acquired diseases. These clinics are supported by the BC Centre for Disease Control's parasitology laboratory and zoonotic and emerging pathogens program. The division also offers an annual tropical and geographic medicine course at UBC, the first of its kind in Western Canada. The UBC Division of Infectious Diseases has had a strong international presence, including a Canadian International Development Agency (CIDA)–funded training and treatment program for chronic hepatitis B in mainland China (1988–1992), a CIDA-Peru-Canada biomedical training program in Lima, Peru (1989–1994), and multiple CIDA-sponsored projects to establish a network of sexually transmitted infection clinics for low-income sex trade workers in southern Vietnam (1998–2010). More recent international connections include investigations into the use of cell phones and text messaging to improve antiretroviral therapy in Nairobi, Kenya,[8] malaria research in Bangladesh,[9] and training and research on tropical diseases in Gulu, northern Uganda. Division members also co-direct the UBC Neglected Global Diseases Initiative (http://ngdi.ubc.ca), which addresses 18 neglected tropical diseases designated by the World Health Organization, including HIV/AIDS, tuberculosis, and malaria, and the GeoSentinel surveillance network (www.istm.org/geosentinel), a worldwide communication and surveillance network for tracking geographic and temporal trends in morbidity among travelers, immigrants, and refugees.

Immunity and Infection Research Centre

Several scientists were recruited to VGH to investigate the pathogenesis and molecular mechanisms in tuberculosis, leishmaniasis, toxoplasmosis, *Clostridioides difficile*, *Staphylococcus* spp., *Streptococcus* spp., *Escherichia coli* and inflammatory bowel disease, fecal transplantation, and more recently the prevention and treatment of SARS-CoV-2 infections. The success of these research programs culminated in the creation of the Immunity and Infection Research Centre within the Vancouver Coastal Health Research Institute in 2011. This virtual centre brought together approximately 20 principal investigators and 50 to 60 graduate students, postdoctoral fellows, and research associates in a highly productive and collaborative research environment.

Key infectious diseases pioneers in BC

Several individuals played key roles in the development of the infectious diseases specialty in British Columbia. Dr Robert M.T. Chan was the first infectious diseases specialist in Vancouver in 1975 and practised at St. Paul's Hospital until retirement in 2011. He was also among the first in BC to be accredited in infectious diseases by the Royal College of Physicians and Surgeons of Canada. Dr Frank Jagdis was the first and only infectious diseases consultant on Vancouver Island in 1976 when he attended the Royal Jubilee and Victoria General Hospitals in Victoria until retirement in 2010. Although trained as a pediatrician, he treated both adults and children in his practice. Dr Christopher Wong was the first infectious diseases specialist to join Fraser Health in 1977 and practised in Royal Columbian Hospital until retirement in 2016.

Summary

It has been most gratifying to see how the subspecialty of infectious diseases has flourished in BC within the past 40 years. It is particularly rewarding to witness how well our trainees have fared and are continuing to contribute to this relatively new but important discipline across our province. In the current COVID-19 pandemic, the subspecialty of infectious diseases is finally getting the attention it is due, both in the public and the health care community. With continued support from the Province and UBC, I have no doubt our subspecialty will continue to mature and provide invaluable service to our patients and community for generations to come. ■

Competing interests

None declared.

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Ava Azhir, BSc Pharm, ACPR, Michael Chapman, MD, FRCPC

Delivery models, efficacy, safety, and cost reduction of outpatient parenteral antimicrobial therapy in British Columbia

For nearly 50 years, outpatient parenteral antimicrobial therapy has been proven to benefit both the health care system and patients with severe infections.

ABSTRACT: Outpatient parenteral antimicrobial therapy is an important medical service that allows for the treatment of complex infections outside acute care hospitals. In BC, the practice has evolved over many decades to include both hospital-based and outpatient infusion centres, as well as home intravenous programs. Numerous publications demonstrate the safety, efficacy, and cost reduction of outpatient parenteral antimicrobial therapy, while reducing congestion in emergency departments. With increasing strain on inpatient facilities due to increased numbers of drug-resistant organisms and high-risk immunosuppressed patients with complex infections, outpatient parenteral antimicrobial therapy is a treatment modality that improves patient care and flow through the health care system.

Ms Azhir is a clinical pharmacist in the outpatient antimicrobial therapy clinic at the Jim Pattison Outpatient Care and Surgery Centre (JPOCSC) and a PharmD candidate at the Leslie Dan Faculty of Pharmacy, University of Toronto.
Dr Chapman is a clinical assistant professor in the Division of Infectious Diseases, University of British Columbia. He is a full-time infectious diseases physician at Surrey Memorial Hospital and JPOCSC. He is also the local head of the Department of Medicine at JPOCSC and the regional head of the Division of Infectious Diseases in Fraser Health.

This article has been peer reviewed.

The practice of administering IV antibiotics in an outpatient setting was first described in Houston, Texas, in 1974, when an indwelling IV infusion set was used to treat chronic bronchopulmonary infection associated with cystic fibrosis in a pediatric population.[1] Numerous Canadian and international studies have evaluated the benefit of outpatient antimicrobial therapy in a variety of settings, including home administration and outpatient infusion centres.[2-4] In 1978, Dr Grant Stiver reported on the first Canadian IV antibiotic therapy at-home model, which involved 23 patients in Winnipeg over 12 months. Once infection had begun to resolve, patients who no longer required hospitalization could safely receive treatment through a home care program. The therapeutic efficacy and considerable cost savings of the model were also demonstrated.[5] In 1995, BC formally incorporated outpatient antimicrobial therapy into the regional home care program at the Vancouver Hospital and Health Sciences Centre.[6] These models have provided many benefits to health care systems, including reducing the length of hospital stay and avoiding unnecessary hospitalization, minimizing the risk of nosocomial complications, and improving patient quality of life.[2] Over the decades, the use of outpatient antimicrobial therapy has become a routine practice, with infectious diseases specialists expanding its application in managing increasingly complex infectious diseases.

The Infectious Diseases Society of America defines outpatient parenteral antimicrobial therapy (OPAT) as the administration of at least two doses of antimicrobial on different days without intervening hospitalization.[3] Over time, three main models of OPAT have been created: infusion centre, home-based administration, and skilled nursing facility. These different settings facilitate the delivery of medication and minimize the duration of patient hospitalization for antimicrobial therapy. Each modality operates under different criteria: some require patients to return to a health care facility such as a hospital clinic or outpatient centre for antimicrobial therapy, while in others, patients can receive antimicrobial treatment at home.

Delivery models

In the infusion centre model, antimicrobial therapy can be delivered in outpatient health care facilities. This model involves the greatest degree of clinical oversight by a multidisciplinary care team, which includes regular assessments by infectious diseases specialists and other physician groups, nursing administration of antimicrobial therapy and wound care, and

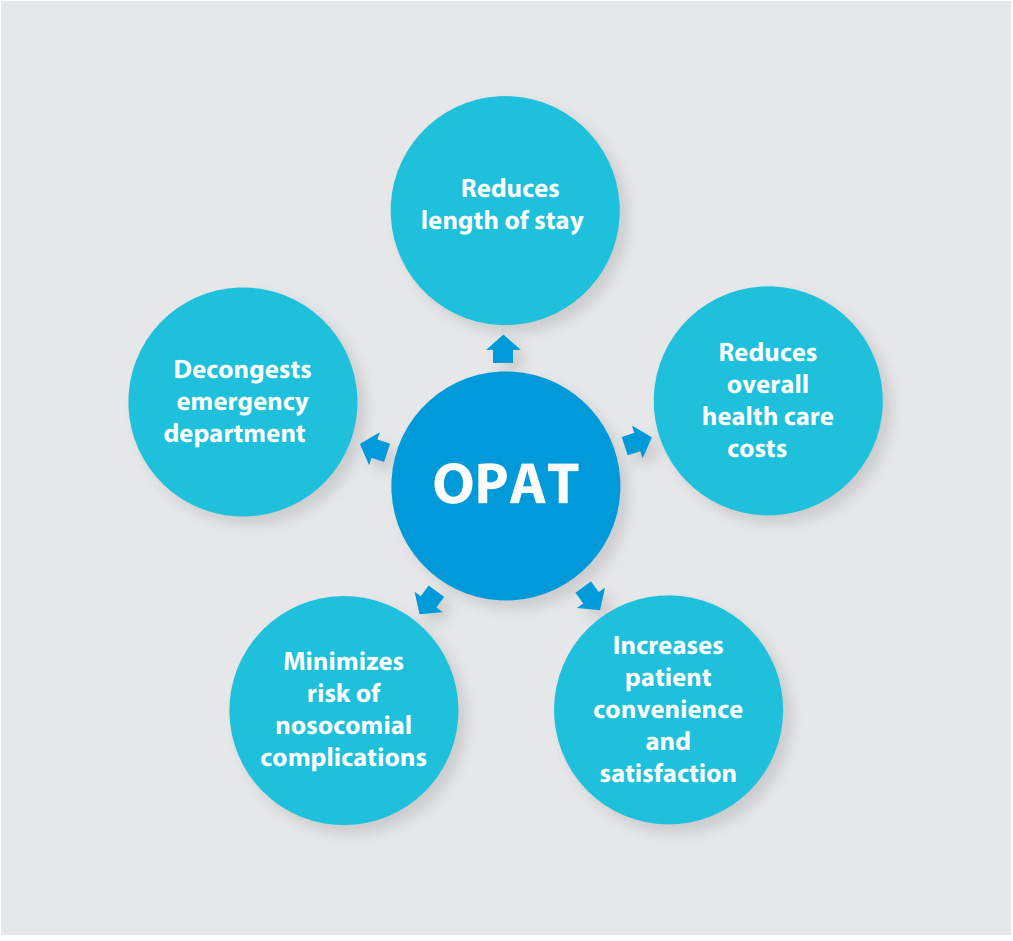

FIGURE 1. Outpatient parenteral antimicrobial therapy (OPAT) model for treating infections.

TABLE 1. Common antimicrobials used in outpatient parenteral antimicrobial therapy.

Common antimicrobial therapy	
Infusion centre	**Home IV therapy**
Amphotericin B	Amikacin
Cefazolin + Probenecid	Amphotericin B
Ceftriaxone	Ampicillin
Daptomycin	Cefazolin
Ertapenem	Ceftazidime
Ganciclovir	Ceftriaxone
Gentamicin	Cloxacillin
Micafungin	Daptomycin
Vancomycin	Ertapenem
	Ganciclovir
	Gentamicin
	Meropenem
	Penicillin G
	Piperacillin-Tazobactam
	Tigecycline
	Tobramycin
	Vancomycin

clinical pharmacist support for patient education and monitoring. The infusion centre can also be part of the acute care hospital setting, as an extension of the emergency department.[3]

The nurse administration model was developed for patients who are eligible to receive antimicrobial therapy at home.[3] In this setting, patients can receive visits from home nursing staff once or twice a day to administer antimicrobial therapy and conduct clinical assessments, or select patients can also be educated about aseptic techniques for antimicrobial self-administration at home. This model requires a certain level of patient or caregiver competency.

In the skilled nursing facility model, registered nurses administer antimicrobial therapy and provide other nursing needs, such as wound care.

The outpatient approach to antimicrobial therapy is highly cost-effective for the health care system.[2] At Surrey Memorial Hospital and the Jim Pattison Outpatient Care and Surgery Centre, the infectious diseases specialist-led infusion centre model with connections to the community for home IV therapy was originally created by Dr Yazdan Mirzanejad in 2005 and serves as a successful model for treating outpatient infections **[Figure 1]**. Patients are referred from the emergency department and inpatient wards and directly from the community for infectious diseases consultation. Following assessment, the infectious diseases physician determines a care plan that is carried out with the support of a multidisciplinary team in the most appropriate setting.

Antimicrobials

A wide range of antimicrobial therapy is used in OPAT; **Table 1** lists common antimicrobials that are used. The choice of antimicrobial agent depends on the OPAT model and the pharmacokinetic properties of the antimicrobial. For example, in infusion centres, due to specific hours of operation, it is practical to use only antimicrobials that require administration once or twice a day. Consequently, the home IV therapy model is a favorable option because a greater variety of antimicrobial therapies can be administered via a programmable pump with different dosing frequencies and narrower spectrums of activity.

The OPAT setting can be used to practise antimicrobial stewardship. The optimal practice consists of a timely transition from intravenous to oral antibiotics. This needs to be considered both at the point of referral to OPAT and during the course of therapy. General principles for when to step down from IV to suitable oral options include assessing the patient's clinical condition and ability to absorb oral antibiotic therapy, the pharmacokinetic/pharmacodynamic properties of oral agents, the availability of

an appropriate choice of oral agent, and the potential drug–drug and drug–host interactions.[7] Therefore, patients should be counseled when a change to another intravenous agent is being considered or when transition to oral therapy is deemed appropriate **[Table 2]**.

Efficacy

Emergency department flow and decongestion

Emergency department overcrowding, and prolonged wait times to receive treatment and specialist visits are persistent problems for many hospitals in different countries.[8] Congestion in the emergency department affects flow through the health care system, and in times of global crisis such as the COVID-19 pandemic, it becomes essential to use resources such as infusion centres to help ease congestion. Changes in admitting patterns have been one way of reducing demand for hospital beds.[9] Patients who require IV antibiotics may receive care in infusion centres. In this model, the appropriate specialty services at each facility are responsible for disease management and minimizing the need for general internal medicine physicians or hospitalists to admit patients to hospital and occupy emergency department beds.[8] The initial model of patient referral from the emergency department to infusion centre was created for adults with nonpurulent skin and soft tissue infection, which avoided hospitalization if patients were not septic.[10] Previous emergency department–based studies indicated that IV antibiotics are one of the most frequently administered medications in those settings.[11,12] The infusion centre model benefits the health care system because fewer return visits are made to emergency departments and family physician clinics. It also reduces emergency department overcrowding and helps identify adverse effects or treatment failures in a timely manner, which further reduces repeat presentations to the emergency department. The three main goals achieved by this model are reduced hospital admissions, increased patient convenience, and reduced number of emergency department visits.[13] A 2013 retrospective study of 1900 patients referred from the Surrey Memorial Hospital emergency department to the infusion centre at the Jim Pattison Outpatient Care and Surgery Centre for treatment of a variety of conditions revealed a median stay of 6.1 days, resulting in 3456 patient-days diverted from the emergency department and inpatient beds.[14]

Minimizing extended antibiotic exposure

Advances in infusion centre device technology and drug stability have made it possible to administer a wider range of antimicrobial therapies that previously were not practical in an OPAT setting.[3] However, appropriate treatment begins with the correct diagnosis. Many "infectious mimickers" present in these settings; therefore, it is essential to correctly identify the infection being treated in order to determine appropriate management **[Table 3]**. Timely administration of appropriate antibiotics in the emergency department can be

TABLE 2. Common infectious diseases treated with commonly used intravenous and oral antibiotic therapies.

Infectious disease condition	Home IV/infusion centre antibiotic therapy	Potential oral antimicrobial* (depending on culture results)
Osteoarticular infection		
Septic arthritis (native joint) *Staphylococcus aureus*	Cefazolin/cloxacillin/vancomycin	Cefadroxil/clindamycin/ doxycycline
Septic arthritis (prosthetic joint) *Staphylococcus aureus*	Cefazolin/cloxacillin/vancomycin + rifampin (orally)	(Doxycycline/levofloxacin) + rifampin
Osteomyelitis	Ceftriaxone + vancomycin	Doxycycline/trimethoprim-sulfamethoxazole
Diabetic foot infection	Ceftriaxone + metronidazole/ ertapenem	Amoxicillin clavulanic acid/ doxycycline
Skin and soft tissue infection		
Nonpurulent cellulitis	Cefazolin/ceftriaxone	Cephalexin
Purulent cellulitis/abscess	Daptomycin/vancomycin	Clindamycin/doxycycline/ trimethoprim-sulfamethoxazole
Intra-abdominal infection		
Diverticulitis/liver abscess/ peritonitis	Piperacillin/tazobactam	Amoxicillin clavulanic acid
Genitourinary infection		
Prostatitis/pyelonephritis	Ceftriaxone/ertapenem	Ciprofloxacin/trimethoprim-sulfamethoxazole

* Examples of the most common therapy; other antibiotics may be suitable depending on the microbiological results.

TABLE 3. Frequent "infectious mimickers."

Infectious diseases	Infectious mimickers
Cellulitis/skin and soft tissue infection	• Contact dermatitis • Deep vein thrombosis of lower or upper extremities • Eosinophilic cellulitis • Lipodermatosclerosis • Lymphedema • Papular urticaria • Pyoderma granulosum • Stasis dermatitis
Intra-abdominal infection	• Acute pancreatitis
Pneumonia	• Eosinophilic pneumonia • Pulmonary embolism • Pulmonary edema • Radiation pneumonitis
Septic arthritis	• Gout (urate crystals) • Pseudogout (calcium pyrophosphate)
Urinary tract infection	• Atrophic vaginitis • Drug-induced cystitis • Interstitial cystitis • Radiation cystitis

lifesaving. At the same time, antibiotics are not benign interventions, and unnecessary or inappropriate therapy can lead to community and patient harm, including antimicrobial resistance or harm associated with adverse effects.[15] In the OPAT setting, regardless of the model chosen, it is the treating physician's responsibility to direct and manage antimicrobial therapy. In the Surrey model and elsewhere around the province, the infectious diseases specialist is responsible for selecting the antimicrobial agent and duration of treatment in OPAT. Patients on IV antimicrobials may be discharged from the emergency department to infusion centres. They subsequently have a visit with the infectious diseases specialist in 1 to 3 days, at which time their treatment is further modified or, in some cases, discontinued if an infection is no longer present. In a study conducted in Queensland, Australia, the pattern of antibiotic prescribing in the emergency department and its overall appropriateness were evaluated by a panel of experts from the fields of infectious disease, microbiology, and emergency medicine, and by a senior antimicrobial stewardship pharmacist. It showed that in 1 in 3 patients who were prescribed an antibiotic regimen, the regimen was assessed as either suboptimal or inadequate. The antibiotic prescription was most commonly deemed to be inappropriate when the agent chosen was too broad, there was an unnecessary overlap of spectrums, or antibiotics were not required at all.[15] In 2013, a single-centre study in an infusion centre in Surrey, BC, showed that infectious diseases specialists modified the initial antibiotic therapy in 373 (66%) episodes of OPAT. The most common interventions were transitioning to oral antibiotic therapy (34%), discontinuation of antibiotic therapy (5%), and other changes including changes to alternative IV antibiotics (27%). This resulted in early antibiotic de-escalation in 211 patients.[14] A similar OPAT study conducted over 10 years with 7000 patients in Victoria, BC, showed that changes to initial antibiotic therapy given in the emergency department were made in 35% of patients.[16]

Safety

Adverse events

Outpatient antimicrobial therapy allows patients to receive parenteral therapy outside acute care settings. While hospitalized, patients have ready access to clinical assessments and laboratory testing to detect potential adverse drug events, whereas in OPAT settings, the frequency of this testing is reduced.[17] The types of adverse events associated with antimicrobials are not expected to be different for OPAT patients compared with hospital patients, but the incidence of reactions may differ.[3] In OPAT settings, patients may require long durations of antimicrobial therapy (weeks or months) because the outpatient service provides an opportunity to treat more complex infections (e.g., prosthetic joint infections and osteomyelitis), which will increase the cumulative incidence of adverse events to a variety of medications as treatment lengths increase. A readmission rate of 14% to 27% is common among OPAT patients.[14,18,19] A patient's readmission to hospital can be related to a variety of factors, including age, history of a drug-resistant organism, prior hospitalization in the past 12 months, and adverse events. In the Surrey, BC, infusion centre study of 2013, treatment failure occurred in 14.0% of patients and consisted of the following: 1.0% worsening infection, 5.2% related hospitalization, 4.0% unrelated hospitalization, 2.6% relapse, 4.6% absconded from therapy, and 0.6% mortality; the total success rate was 82.0%.[14] A study conducted at Tufts Medical Center in Boston showed that the most common reasons for 30-day readmission in 207 patients were not related to infection (30%) or the result of infection worsening (30%); however, 14% of patients were readmitted due to adverse events associated with antimicrobial treatment.[19] In a prospective study of 339 patients in Israel who were discharged to OPAT, 14.5% had significant adverse drug events that required a change in therapy, early termination of therapy, or readmission, or that resulted in *Clostridioides difficile* infection. Patients were at higher risk of developing significant adverse drug events in their first 2 weeks of OPAT, known as the hospital-to-home transition period, which highlights the importance of prudent prescribing of OPAT, ensuring proper dosing of medication, educating patients, and careful monitoring of adverse drug events.[18]

Patients were at higher risk of developing significant adverse drug events in their first 2 weeks of OPAT, known as the hospital-to-home transition period, which highlights the importance of prudent prescribing of OPAT, ensuring proper dosing of medication, educating patients, and careful monitoring of adverse drug events.

Even though *Clostridioides difficile* infections are one of the adverse drug events related to readmission, the occurrence of these infections in patients receiving OPAT is rare. A retrospective study of 1514 patients in the UK who received antimicrobial therapy in teaching hospitals from 2006 to 2011 and who completed 16 750 OPAT days reported only seven patients with *Clostridioides difficile* infection; all but one of those patients had other possible causes of *Clostridioides difficile* infection.[20] The detection rate for *Clostridioides difficile* infections among OPAT patients is sufficiently low (2%) that with proper monitoring and clinical assessment, receiving prolonged courses of antimicrobial therapy in an OPAT setting is safe for patients.[21]

Peripheral line complication

The delivery of antimicrobial therapy in OPAT requires the use of vascular access devices. The type of device used varies based on different practice settings, the anticipated duration of treatment, and the antimicrobial selected.[22] The principal central devices used in OPAT are peripherally inserted central catheters and long-term central catheters. There are two main types of long-term central catheter: tunneled

central venous catheters and ports.[3] Peripherally inserted central catheters are inserted by a clinical nurse specialist; long-term central catheters need to be inserted by the radiology department. Each OPAT model, whether it involves home infusion, a hospital or outpatient facility infusion centre, or community centres, has specific vascular access requirements. Peripherally inserted central catheter lines are the most common type of vascular access used in an outpatient setting. In a large 13-year cohort study in the UK, peripherally inserted central catheter lines were used in 64% of patients who received antimicrobial therapy in infusion centres and in 71% of patients who received therapy at home.[23] Vascular catheters can put patients at risk of complications. Common complications are vascular catheter–related infection, occlusion, and venous thrombosis. Vascular catheter–related infection is defined as positive blood cultures or obvious purulence at the catheter site, which requires catheter removal. Vascular occlusions occur when the patient or caregiver is unable to infuse the IV antimicrobial due to lack of flow. Venous thrombosis is identified by clinical imaging evidence of deep or superficial venous thrombosis in the blood vessels.[22] In a retrospective study of 2766 OPAT patients in Scotland, line infection limited to midlines, peripherally inserted central catheters, and tunneled central venous catheters occurred in 2.3% of all line episodes (0.8 per 1000 line-use days).[24] In another retrospective cohort study in the United States, line complications in 3161 OPAT patient encounters were analyzed. Only OPAT courses that were conducted at home were included. The study identified 131 (9%) patients who had one or more vascular access complications, for a total of 144 complications, with an overall rate of 4.29 complications per 1000 OPAT days.[20] The most common complication was line occlusion, at a rate of 2.26 events per 1000 OPAT days. Thrombosis and line infection each occurred in less than 1% of OPAT courses overall, with only five line infections and 12 thrombotic complications.[22] Line complications can occur in the OPAT setting; however, the rate of severe complications such as line infections and thrombotic events is low in both infusion centres and home IV therapy.

Cost

Cost reduction of outpatient therapy

Outpatient parenteral antimicrobial therapy is associated with a low risk of adverse events such as hospital readmission and line complications, and is an effective model for easing hospital congestion and minimizing extended antibiotic exposure. Cost analysis from a local study conducted at Vancouver General Hospital in 1995 indicated that from a hospital perspective, the cost of therapy through the OPAT program was approximately 13% of the cost estimated if the patient received the same therapy as an inpatient.[25] The estimated cost of providing outpatient antimicrobial therapy in a hospital setting was $1 997 923, of which $1 659 303 was attributed to the cost of hospitalization. The cost of outpatient parenteral antibacterial therapy was $267 403, which included the cost of labor (pharmacy and nurse educator), laboratory blood tests, catheters, and complications.[26] A cost analysis study in the UK that compared the expense of different OPAT models showed that treatment at infusion centres (£973) was more expensive than at-home infusion by a general nurse (£788) or specialist nurse (£710) for short-term treatments of 4 to 7 days. For patients who required a longer duration of antibiotic therapy, the cost associated with infusion centres (£5135) was also greater than that of home infusions by a general nurse (£2957) or specialist nurse (£2379).[26] The analysis showed that home infusion for both long- and short-term therapy was highly cost-effective. Another major economic benefit of OPAT is the reduction in the cost of nosocomial infections associated with hospitalization. In the United States, 5% of hospitalized patients may develop an infection during their hospitalization; each infection is estimated to cost US$2100, with a cumulative annual cost of more than US$2 billion.[27] OPAT settings are

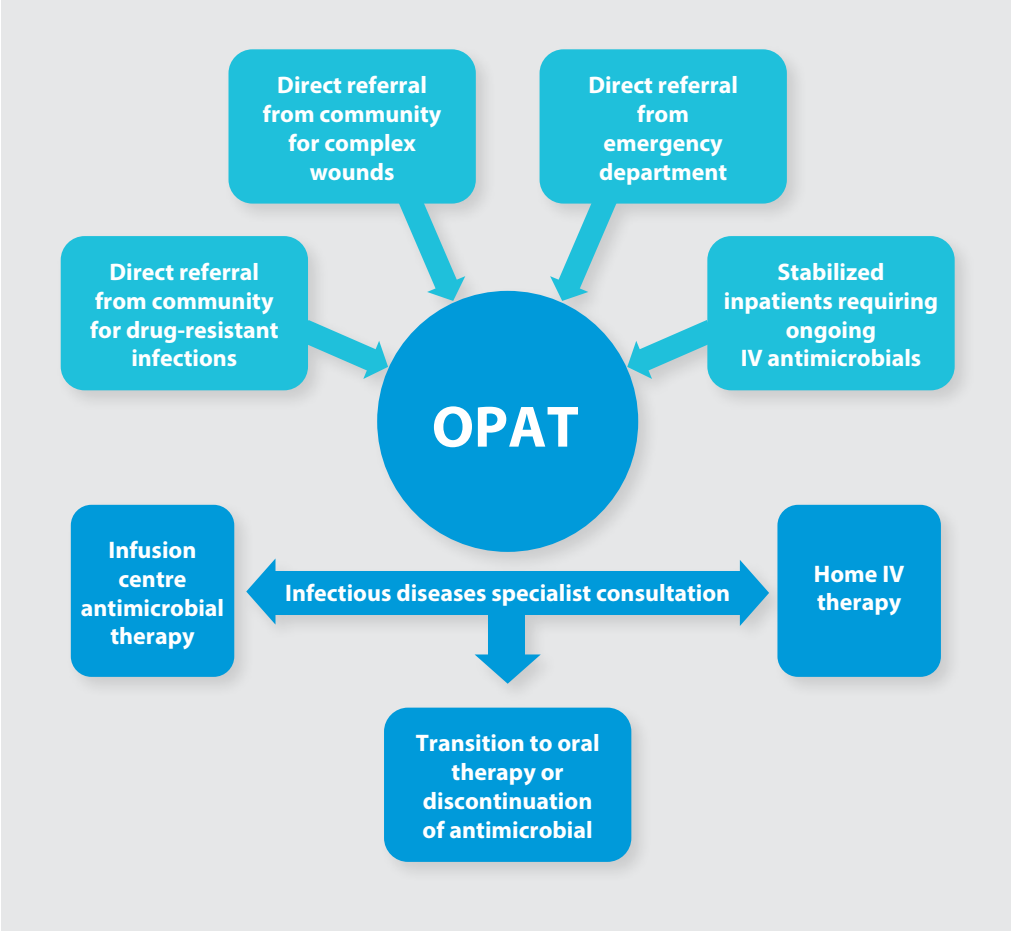

FIGURE 2. Outpatient parenteral antimicrobial therapy (OPAT) benefit of care model.

safe and cost-effective for patients to receive treatment at home or at infusion centres, and minimize the risk of nosocomial infections.

Cost-saving methods

The cost analysis literature in outpatient settings is limited, but with continuous changes in drug delivery systems, there is potential for further cost reduction. There is increasing evidence that self-administration of IV antimicrobial therapy is safe and reduces costs.[28] The use of elastomeric pumps facilitates outpatient management and favors the use of first-line antimicrobial agents.[29] This delivery model reduces the cost associated with nursing and clinic visits, and gives patients more flexibility while being treated.[28] Future research on the cost-effectiveness of OPAT services using different drug delivery devices and the use of resources for facilitating at-home infusions will be essential in order to provide better decision making regarding outpatient treatments.

Summary

For nearly 50 years, OPAT has been proven to be a safe, effective, and cost-saving model of care for patients with severe infections **[Figure 2]**. Infectious diseases specialists play an increasing role in the management of complex infections in the outpatient setting. The increasing number of severe infections, immunocompromised patients, and multidrug-resistant organisms will shape the future of OPAT. The COVID-19 pandemic has placed a strain on acute care hospitals over the past 2 years, and the ability to provide safe and effective care in outpatient settings has never been more critical. Realizing the cost-saving benefits of OPAT requires increasing investments in resources for infusion centres to reduce congestion in the emergency department and for home IV services to allow patients to convalesce at home with their family. ■

Competing interests

None declared.

Future research on the cost-effectiveness of OPAT services using different drug delivery devices and the use of resources for facilitating at-home infusions will be essential in order to provide better decision making regarding outpatient treatments.

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S. Fakhredine, MD, T. Oravec, MD, S. Belga, MD, A. Wright, MD, A. Mah, MD

Management of common infections in solid organ transplant recipients in British Columbia

Because transplant recipients remain on lifelong immunosuppression, physicians must be aware of the common infections they may face, and consult with infectious diseases and transplant infectious diseases specialists to support the ongoing health of this unique patient population.

ABSTRACT: Solid organ transplantation is becoming increasingly common in British Columbia, and infectious complications in these immunosuppressed patients are being seen with increasing frequency by community providers. Some infections, such as *Pneumocystis* pneumonia and cytomegalovirus infection, commonly affect all transplant recipients, whereas some infections are more specific to certain transplant types, such as cholangitis in liver transplant recipients, urinary tract infections in renal transplant patients, and pulmonary mold infections in lung transplant recipients. Numerous protocols and procedures exist to identify and mitigate infectious risk in transplant patients, as do specific treatment strategies. This article provides an overview of the epidemiology, diagnosis, treatment, and prevention of common infections in transplant patients, with a focus on community practitioners caring for this ever-increasing population.

Dr Fakhredine is a transplant nephrology fellow in the Division of Nephrology, Department of Medicine, University of British Columbia. Dr Oravec is a fellow in the Division of Infectious Diseases, Department of Medicine, UBC. Dr Belga is a clinical assistant professor in the Division of Infectious Diseases, Department of Medicine, UBC. Dr Wright is a clinical associate professor in the Division of Infectious Diseases, Department of Medicine, UBC. Dr Mah is a clinical assistant professor in the Division of Infectious Diseases, Department of Medicine, UBC. Drs Fakhredine and Oravec are co–first authors of this article.

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The number of solid organ transplant recipients is steadily increasing in British Columbia. In 2020, 253 kidney transplants, 71 liver transplants, 32 heart transplants, and 51 double lung transplants were performed in BC.[1] These transplant recipients reside throughout the province; therefore, all health care providers should have a general understanding of common issues this population may face. Infections are a major complication of transplantation and are associated with significant morbidity and mortality.[2]

We review risk periods for infections and chemoprophylaxis, with particular attention to management of cytomegalovirus. Additionally, we focus on management of the most common community onset infections, including recurrent urinary tract infections in kidney transplant recipients, intra-abdominal infections in liver transplant recipients, and mold and respiratory virus infections in lung transplant recipients.

Infection risk and prophylaxis

In solid organ transplantation, in general, the post-transplant period is divided into three risk periods: early (first month), intermediate (1 to 6 months), and late post-transplant (beyond 6 months)[3,4] **[Table 1]**. All solid organ transplant recipients receive perioperative antibacterial prophylaxis to reduce the risk of surgical site infection. In addition, the 2019 American Society of Transplantation Infectious Diseases Community of Practice candidiasis guidelines recommend *Candida* prophylaxis for adult liver transplant recipients with one or more of the following risk factors: prolonged or repeat operation, retransplantation, renal failure requiring dialysis, high transfusion requirement, hepaticojejunostomy, and *Candida* colonization during the perioperative period.[5] For lung transplant recipients, ischemia at the bronchial anastomosis, receipt of a single-lung transplant, hypogammaglobulinemia, cytomegalovirus infection, and pre-/post-transplant colonization of the airways with *Aspergillus* spp. are considered high-risk situations for post-transplant mold infections.[6]

In all solid organ transplant recipients, trimethoprim-sulfamethoxazole prophylaxis against *Pneumocystis jirovecii* pneumonia is recommended for a minimum of 1 year post-transplant, and in BC, it is often continued for the duration of the recipient's life due to infrequent but severe cases of late *P. jirovecii* pneumonia, which have occurred in the British Columbia transplant program. **Table 2** summarizes the current recommendations in BC for antiviral prophylaxis against the most common viral pathogens encountered in solid organ transplant recipients.[7]

Cytomegalovirus

Cytomegalovirus is the most frequently occurring opportunistic viral infection following solid organ transplant. It affects all organ transplants and is a major infectious cause of morbidity and mortality in transplant recipients.[8] In addition to having direct effects of end organ disease, cytomegalovirus has a number of indirect effects, including increased risk of bacteremia and invasive fungal infections in solid organ transplant recipients. It has also been associated with an increased risk for Epstein-Barr virus-mediated post-transplant lymphoproliferative disease, increased risk of acute rejection, and chronic allograft dysfunction.[8]

The primary infection with cytomegalovirus may be asymptomatic or it may cause a self-limited febrile illness in immunocompetent individuals.[8] After primary infection, cytomegalovirus establishes a lifelong latent infection that can periodically reactivate and cause shedding of an infectious virus.[9]

Cytomegalovirus infection is the presence of cytomegalovirus replication in tissue, blood, or other bodily fluids, regardless of symptoms. Conversely, cytomegalovirus disease is cytomegalovirus infection with clinical symptoms. The latter is subdivided into cytomegalovirus viral syndrome, with fever, malaise, lymphocytosis, leukopenia, or thrombocytopenia, or cytomegalovirus end-organ disease, including retinitis, pneumonitis, hepatitis, enteritis, nephritis, and others.[8]

Cytomegalovirus serologic status of donor and recipient are the key predictors of cytomegalovirus disease after transplantation. Thus, all donors and recipients should

TABLE 1. Timeline of infection after solid organ transplant (adapted from Fishman[3]).

Early (< 1 month)	Intermediate (1–6 months)	Late (> 6 months)
Perioperative infections: aspiration pneumonia, ventilator-associated pneumonia/hospital-acquired pneumonia, catheter-associated urinary tract infections, central line–associated bloodstream infections, surgical site infection *Clostridioides difficile,* methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant enterococci, *Candida* spp. **Donor-derived infections:** HIV, rabies, West Nile virus Bacterial infections; e.g., bacteremia	**With *Pneumocystis* and antiviral (cytomegalovirus/herpes simplex virus, hepatitis B virus) prophylaxis:** BK virus nephropathy, respiratory viral infection, *Cryptococcus, Mycobacterium tuberculosis,* aspergillosis **Without prophylaxis:** *Pneumocystis jirovecii* pneumonia, herpes viruses (cytomegalovirus, varicella zoster virus, herpes simplex virus, Epstein-Barr virus), hepatitis B virus, *Nocardia,* toxoplasmosis, strongyloidiasis	Community-acquired pneumonia Urinary tract infection Late cytomegalovirus infection, late *Pneumocystis jirovecii* pneumonia Aspergillosis

TABLE 2. Antiviral prophylaxis for solid organ transplant recipients (adapted from BC Transplant medication guidelines[7]).

Virus	Donor	Recipient	Risk	Management
Cytomegalovirus	–	–	Low	No prophylaxis for kidney/kidney-pancreas/liver or lung
Cytomegalovirus	±	+	Intermediate	Valganciclovir if recipient is to receive lymphocyte-depleting agent; 3 months for kidney/kidney-pancreas/liver/heart; 6 months for lung
Cytomegalovirus	+	–	High	Valganciclovir for 6 months for kidney/kidney-pancreas; 3 months for liver and heart; 1 year for lung
Herpes simplex virus/varicella zoster virus	n/a	+	n/a	Prophylaxis with valacyclovir 500 mg orally twice daily × 1 month for patients receiving lymphocyte-depleting agent and not receiving cytomegalovirus prophylaxis
Hepatitis B virus in liver transplant recipient	HBc Ab+	HBc Ab+ or –	High	Lamivudine for life
	HBc Ab–	HBc Ab+	Intermediate	Monitor for hepatitis B virus reactivation* No prophylaxis
	Any hepatitis B virus status	HBs Ag+	High	Hepatitis B virus immunoglobulin for 1 year and hepatitis B virus antivirals (e.g., entecavir, tenofovir) for life
Hepatitis B virus in nonliver transplant recipient	HBc Ab+ and hepatitis B DNA detectable	Any hepatitis B virus status	High	Start lamivudine and refer to hepatologist
	HBc Ab+ and hepatitis B DNA undetectable	HBc Ab– regardless of HBs Ab status	Intermediate	Monitor for hepatitis B virus reactivation* No prophylaxis
	HBc Ab–	HBc Ab+	Intermediate	Monitor for hepatitis B virus reactivation* No prophylaxis

*Monitor for hepatitis B virus reactivation every 3 months for 1 year, then every 6 months thereafter. Tests to be done: hepatitis B surface antigen, hepatitis B core antibody, hepatitis B surface antibody, and hepatitis B DNA.

be screened for Cytomegalovirus-IgG before transplantation. Populations at higher risk are Cytomegalovirus-seronegative organ recipients of seropositive donors (Cytomegalovirus D+/R– aka Cytomegalovirus mismatch), and Cytomegalovirus-seropositive recipients who receive lymphocyte-depleting therapy, such as antithymocyte globulin.[10] If Cytomegalovirus-IgG is indeterminate, providers should assume the highest-risk scenario (e.g., the cytomegalovirus-indeterminant donor is assumed to be positive).[8]

Post-transplant, molecular tests that detect cytomegalovirus DNA in blood are the preferred methods for cytomegalovirus monitoring and for diagnosing cytomegalovirus infection. The diagnosis of tissue-invasive disease depends on the presence of positive findings by histopathology. Importantly, the degree of cytomegalovirus viremia may not necessarily correlate with the severity of tissue-invasive disease. This is most commonly seen in cytomegalovirus enteritis.[8,10]

There are two main approaches to cytomegalovirus management post-transplant: cytomegalovirus prophylaxis and cytomegalovirus monitoring with pre-emptive therapy.[10] These approaches are generally managed by transplant teams during the first year post-transplant when recipients are at greatest risk of cytomegalovirus viremia and disease. Late cytomegalovirus disease can occur beyond 1 year post-transplant, and if clinical concern exists for this entity, community providers can send blood for cytomegalovirus polymerase chain reaction (PCR) testing. In BC, all cytomegalovirus PCR testing is sent to and performed at St. Paul's Hospital's virology laboratory. Importantly, ordering providers must specify that cytomegalovirus PCR or viral load is what is desired because the default lab test for cytomegalovirus in blood is serologic testing, which is of no utility in the diagnosis being sought.

For cytomegalovirus prophylaxis, valganciclovir 900 mg orally once daily is currently used for the highest-risk groups **[Table 2]**. The main side effect of valganciclovir is cytopenias. If this occurs, valganciclovir should be discontinued and pre-emptive monitoring instituted. The dose of valganciclovir should not be lowered to manage cytopenias because it increases the risk of resistance. Letermovir is a novel agent against cytomegalovirus that does not cause significant cytopenias. There is an ongoing randomized controlled trial of letermovir versus valganciclovir for prophylaxis of cytomegalovirus in high-risk D+/R– kidney transplant recipients (ClinicalTrials.gov identifier: NCT03443869).

Pre-emptive therapy is the administration of an antiviral only to those who develop evidence of rising cytomegalovirus DNA that surpasses a given threshold on PCR monitoring. Treatment is with valganciclovir 900 mg orally twice daily, and cytomegalovirus PCRs should be monitored weekly. Therapy is discontinued and weekly monitoring is continued after two sequential negative cytomegalovirus PCRs spaced 1 week apart.

Cytomegalovirus disease is treated with IV ganciclovir 5 mg/kg every 12 hours or oral valganciclovir 900 mg twice daily, adjusted based on renal function. Both are equally effective for mild to moderate disease. IV ganciclovir is the drug of choice in severe or life-threatening cytomegalovirus disease. Second-line agents may include foscarnet or cidofovir, but their use is limited by renal toxicity and IV-only formulations. The duration of treatment of cytomegalovirus disease depends on the resolution of clinical symptoms and two sequential negative cytomegalovirus DNA levels. Patients with cytomegalovirus disease who fail to respond to therapy after more than 2 weeks of full-dose antiviral therapy should be assessed for the possibility of drug-resistant cytomegalovirus in consultation with specialists in infectious diseases or transplant infectious diseases.

Management of common community onset infections by organ group

Intra-abdominal infections in liver transplant recipients

Risk of intra-abdominal infection following liver transplantation is relatively high[11] due primarily to the technically complicated nature of liver transplantation, particularly regarding biliary anastomoses.[12] Most liver transplantation is performed using one of two techniques: choledococholedocostomy (duct-to-duct anastomosis) or Roux-en-Y hepaticojejunostomy.[13] The duct-to-duct approach is preferred because it results in a more natural anatomy with preservation of the sphincter of Oddi, which is important in reducing reflux of intestinal contents into the transplanted organ. However, duct-to-duct procedures are not always feasible. Roux-en-Y procedures involve direct juxtaposition of the small intestine with the biliary system and significantly increase the risk of reflux. Vascular complications, including hepatic artery and portal vein thrombosis, also predispose transplant recipients to intra-abdominal infection due to hepatic necrosis and bile duct ischemia.[12] Prompt recognition of intra-abdominal infection following organ transplantation is important, and the early initiation of empiric antimicrobial therapy coupled with source control, potentially requiring surgical intervention, is necessary to optimize outcomes.[12] An additional factor that complicates intra-abdominal infection in solid organ transplant recipients is increased rates of colonization by multidrug-resistant organisms, which affects the choice of empiric antimicrobial coverage **[Table 3]**.[14-16]

Infections of surgical incisions should be suspected in patients presenting with pain, erythema, discharge, or dehiscence of wounds, typically within the first 30 days following transplantation.[17] Patients presenting with incisional infections should receive imaging to evaluate for the presence of deeper infection requiring more aggressive surgical debridement. These patients should undergo bedside or operative inspection of their wound to facilitate diagnosis of additional complications, collection of microbiologic specimens for culture, and thorough washout and debridement if applicable. Ultimately, choice and duration of antimicrobial therapy will be dictated by careful consideration of microbiologic testing and clinical response.[12,17]

Abdominal solid organ transplant recipients presenting with clinical signs of peritonitis should receive evaluation by medical and surgical teams, as this may signify perforation or anastomotic leak.[18] Given the immunosuppression used in solid organ transplant, patients with leaks or perforation may not manifest the usual signs and often present with fever alone; a high degree of clinical suspicion should be maintained, particularly in the first 3 months

following transplantation.[12] Blood and surgical site culture collection, initiation of empiric antimicrobial therapy **[Table 3]**, acquisition of abdominal imaging, and prompt surgical exploration when indicated are important for optimizing outcomes.

Definitive management will be dependent on radiographic and/or operative findings. Antimicrobials should be tailored based on microbiologic results and should be continued until source control has been obtained.[12] Following definitive source control, the duration of antimicrobial therapy is not clearly established. The STOP-IT trial demonstrated equivalent outcomes in patients who received short courses (~4 days) of antimicrobials following source control versus those who received longer courses (~8 days); however, the trial did not include solid organ transplant recipients.[19] Optimal duration in this population is unknown. In general, 1 to 2 weeks of antibiotics are given following source control; longer durations are used if residual collections remain.

Liver transplant patients are predisposed to developing intrahepatic infections.[12] Biliary strictures, whether anastomotic or nonanastomotic, contribute to patients developing recurrent cholangitis, while biliary leaks contribute to the formation of bilomas and hepatic abscesses. These infections do not occur in isolation: biliary ischemia can result in both strictures (predisposing to cholangitis) and duct perforation (resulting in biloma formation). Bilomas may become infected and result in hepatic abscess formation. Both bilomas and abscesses may compromise blood flow and result in further bile duct ischemia and additional stricturing or leaks.

TABLE 3. Empiric antimicrobial recommendations for intra-abdominal infections in solid organ transplant recipients based on multidrug-resistant colonization status (adapted from Haider and colleagues[12]).

Colonizing organism	Recommended antimicrobial	Alternatives and additional considerations
No known multidrug-resistant organisms	Piperacillin-tazobactam or ceftriaxone + metronidazole	Vancomycin may be added for enterococcal coverage when using cephalosporin-based regimens if high clinical concern For patients with severe ß-lactam allergies, ciprofloxacin and metronidazole ± vancomycin can be used
Extended-spectrum ß-lactamase	Meropenem or imipenem	Ertapenem is not active against *Pseudomonas* or *Enterococcus*
Carbapenemase-producing organism	Consult infectious diseases/ transplant infectious diseases specialists High-dose, extended-infusion meropenem plus colistin, tigecycline, or fosfomycin (choose two additional drugs, guided by susceptibilities) ± aminoglycoside or fluoroquinolone if susceptible	Ceftazidime-avibactam or meropenem-vaborbactam Requires Health Canada Special Access Program approval—consult infectious diseases specialist
Multidrug-resistant *Pseudomonas*	Consult infectious diseases/ transplant infectious diseases specialists Ceftolozane-tazobactam or high-dose, extended infusion Meropenem ± aminoglycoside/ ciprofloxacin	Empiric choice will depend on patient-specific resistance patterns
Methicillin-resistant *Staphylococcus aureus*	Vancomycin (in addition to gram-negative coverage as above)	Daptomycin, linezolid, ceftobiprole
Vancomycin-resistant *Enterococcus*	Daptomycin or linezolid (in addition to gram-negative coverage as above)	Liver transplant patients with vancomycin-resistant *Enterococcus* colonization are at highest risk
Antifungal coverage	Fluconazole or micafungin	May be added in the case of suspected bowel perforation or anastomotic leak or severe sepsis from intra-abdominal infection

Urinary tract infections in kidney transplant recipients

Urinary tract infection is the most common infectious complication among kidney transplant recipients.[20] These infections most commonly occur in the first year after transplantation but may occur at any time.[21] Urinary tract infections have been shown to be associated with increased mortality and renal allograft loss.[22] Even a single urinary tract infection after transplantation is enough to increase the risk of impaired allograft function.[23] Urinary tract infections also increase the risk of acute cellular rejection.[24] Almost one-third of patients who develop a urinary tract infection after kidney transplantation will experience recurrent infection.[21]

In most studies, kidney transplant recipients shared the same classic risk factors for recurrent urinary tract infection as the general population: female gender and prior recurrent urinary tract infection or urological abnormalities.[25] Prolonged use of Foley catheter, presence of a ureteral stent, increased age of recipient, and delayed graft function are risk factors for early urinary tract infection.[24] Ureteric reflux disease and cadaveric donors also represent a higher risk.[26] Kidney transplant recipients also have unique risk factors, including anatomical and functional abnormalities, as well as immunosuppression.[27] The placement of the renal allograft into the pelvis alters the distance and angle of the ureter in relation to the bladder and kidney, which contributes to increased risk of renal allograft infection **[Figure]**.

Most urinary tract infections after transplantation are caused by *Escherichia coli*. Other common uropathogens include other members of the Enterobacterales, as well as *Enterococcus* spp., *Pseudomonas aeruginosa*, and *Staphylococcus saprophyticus*. Unusual uropathogens include *Candida* spp. Emerging drug resistance due to extended-spectrum ß-lactamase carbapenemase-producing organisms and other multidrug-resistant organisms are of particular significance because they have been shown to increase the risk of recurrent urinary tract infection in kidney transplant recipients and often require treatment with IV antibiotics and treatments that have greater side effects.[27]

In order to diagnose and treat urinary tract infection, it is critical to differentiate asymptomatic bacteriuria from symptomatic urinary tract infection. Urinary symptoms with or without systemic symptoms such as fever, chills, malaise, hemodynamic instability, leukocytosis, flank/allograft pain, or bacteremia are key for diagnosis of a urinary tract infection. If the urinary tract infection is symptomatic, the best next step is to collect a midstream urine sample or use straight catheterization to assess pyuria, followed by culture and sensitivity testing. For patients who have had indwelling catheters for more than 2 weeks, the Infectious Diseases Society of America recommends removing the catheter and collecting urine by either a midstream void or a newly placed urinary catheter.[27]

The management of recurrent urinary tract infections in kidney transplant patients requires a proper diagnosis of the underlying mechanism.[28] Management of recurrent urinary tract infections is summarized in **Table 4**.

Mold infections in lung transplant recipients

Invasive fungal infections are a serious cause of morbidity and mortality in lung transplant patients, and both diagnosis and therapy can be challenging. Numerous factors predispose lung transplant recipients to invasive fungal infections, including constant exposure to environmental spores and hyphal elements, lack of normal ciliary action, lack of innervation and cough reflex, and airway ischemia, particularly at the anastomosis. While yeasts (*Candida* spp.) are the most common cause of invasive fungal

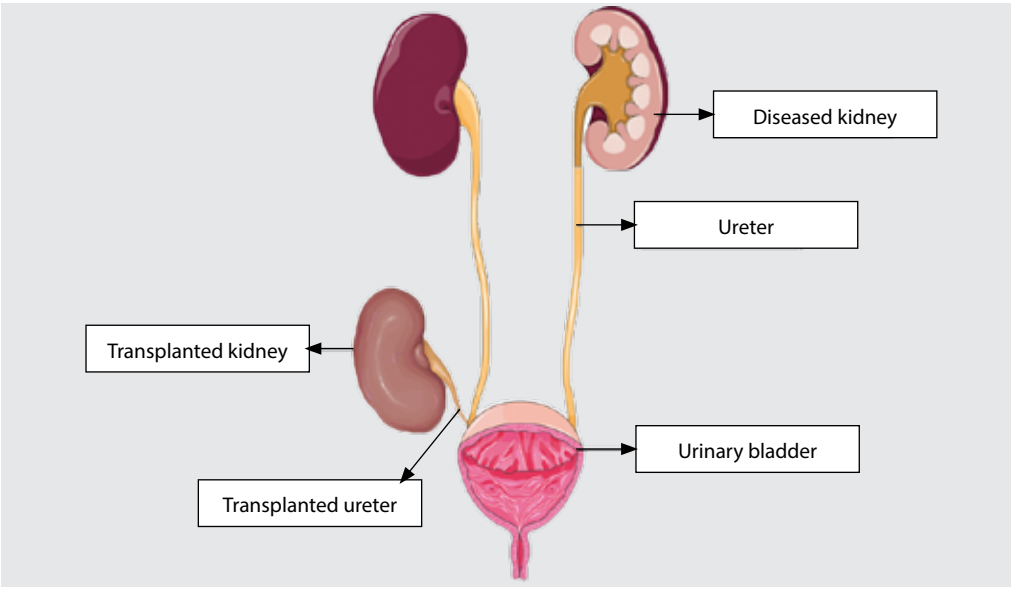

FIGURE. Anatomy of the genitourinary tract after kidney transplantation. The placement of the renal transplant in the recipient pelvis as opposed to the site of the native kidneys, termed heterotopic, causes increased risk of infection due to unique anatomic considerations (image created using Servier Medical Art).

TABLE 4. Management of recurrent urinary tract infections in kidney transplant recipients.

Medical management	Anatomical/functional assessment	Lifestyle modification
Adequate diabetes control Intravaginal estrogen **Antibiotic regimens:** Pill-in-pocket approach • Patients are provided with an antibiotic course to have on hand based on previous cultures susceptibilities • When symptoms of urinary tract infection develop, patient can collect urine culture and self-initiate antibiotics Postcoital antibiotics • Single postcoital dose of an antibiotic • The choice of antibiotic should be based on the susceptibility patterns of the strains causing the patient's previous urinary tract infection, the patient's history of drug allergies, and potential for interactions with other medications Prophylactic antibiotics • Daily administration of antibiotics to prevent the development of urinary tract infections • Generally avoided due to the risk of resistance, particularly in the transplant population **Adjunctive therapies:** Methenamine • Converts to formaldehyde in urine, making bladder inhospitable to uropathogens • Not available in BC; consult infectious diseases specialist Cranberry supplements • Limited evidence; proposed to prevent binding of *E. coli* to bladder epithelium D-mannose • Limited evidence; proposed to impair uropathogen binding to bladder epithelium	Assessment of postvoid residual Imaging by ultrasound or CT scan, cystourethrography, cystoscopy, or urodynamic studies if postvoid unrevealing Surgical intervention for benign prostatic hyperplasia/stricture Ureteric stents should be removed as early as possible to remove infection nidus	Wiping front to back Hydration Frequent timed voiding Postcoital voiding

infections among all solid organ transplant recipients (causing 49% to 85% of cases), lung transplant patients have higher rates of infection due to *Aspergillus* (44%) and other filamentous fungi (27%) than to *Candida* (23%).[29]

Risk factors for invasive aspergillosis that are unique to lung transplant patients include airway ischemia, single-lung transplant, pre- or post-transplant airway colonization with *Aspergillus* spp., cytomegalovirus infection, hypogammaglobulinemia, and episodes of rejection or augmented immunosuppression within the previous 3 months.[6,30,31]

Diagnosis of invasive aspergillosis is often challenging and is based on clinical, radiographic, and microbiologic characteristics. Diagnostic criteria for pulmonary invasive fungal infections are summarized in **Table 5**.[32] CT findings consistent with invasive aspergillosis include ground-glass opacities, peribronchial consolidation, nodules, or dense consolidation; the classical halo sign (dense consolidation surrounded by ground-glass opacification) occurs less commonly in solid organ transplant than in hematologic malignancies.[6] Tracheobronchial aspergillosis, occurring mainly at the anastomosis, accounts for approximately half of *Aspergillus* infections in lung transplant recipients and is both immediately dangerous and a precursor to invasive aspergillosis.[33] Direct inspection through bronchoscopy is needed because early tracheobronchial aspergillosis may be radiographically silent; microbiologic samples should also be collected, including cultures and galactomannan.

Therapeutic options recommended for the treatment of invasive aspergillosis are listed in **Table 6**. Therapy is typically continued for at least 3 months and until there is resolution of clinical, radiologic, and microbiologic signs of disease.[6] Azoles are CYP3A4 inhibitors and increase levels of common immunosuppressants used in solid organ transplant, including calcineurin inhibitors (e.g., tacrolimus) and mTOR inhibitors (e.g., sirolimus). Careful monitoring of tacrolimus levels is indicated while patients are receiving azoles and sirolimus is contraindicated. When an azole is discontinued, it results in reduced immunosuppressant levels and may precipitate rejection unless anticipated and proactively managed.

TABLE 5. Diagnostic criteria for invasive pulmonary aspergillosis (adapted from Donnelly and colleagues[32]).

Proven invasive pulmonary aspergillosis (IPA)	Histopathologic evidence of fungal invasion of tissue or Culture of organism from sterile site		
	Host factors	**Clinical features (CT)**	**Mycological evidence**
Probable IPA (host factor + clinical feature + mycological evidence) **Possible IPA** (host factor + clinical feature)	• Recent neutropenia • Hematologic malignancy • Solid organ transplant or hematopoietic stem cell transplantation recipient • Prolonged corticosteroids (> 0.3 mg/kg for > 3 weeks) • Treatment with T- or B-cell immunosuppressants • Severe inherited immunodeficiency • Acute graft versus host disease	• Dense, well-defined consolidation ± halo sign • Air-crescent sign • Cavity • Wedge-shaped and segmental, or lobar consolidation	Any of the following positive tests on samples obtained from nonsterile sites: • Fungal culture • Fungal elements observed • Galactomannan

TABLE 6. Antifungal agents recommended in the treatment of invasive pulmonary aspergillosis in solid organ transplant recipients (adapted from Husain and Camargo[6]).

Medication	Dose	Comments
First-line therapy		
Voriconazole	Loading dose: • 6 mg/kg orally/IV every 12 hours × 2 Maintenance dose: • 4 mg/kg orally/IV every 12 hours	• Trough level on day 7 (target 1.5–5 mcg/L) • Monitor liver enzymes, calcineurin inhibitor levels • Possible visual disturbances and hallucinations, transient following doses, attenuate over time
Second-line therapies		
Isavuconazole (dosage of prodrug isavuconazonium sulfate)	Loading dose: • 200 mg (372 mg) orally/IV every 8 hours × 6 Maintenance dose: • 200 mg (372 mg) orally/IV every 24 hours	• Monitor liver function and calcineurin inhibitor levels
Posaconazole (oral dosing based on delayed release oral tablet; liquid suspension also available but not recommended due to frequent dosing and poor absorption)	Loading dose: • 300 mg orally/IV every 12 hours × 2 Maintenance dose: • 300 mg orally daily	• Target trough > 1 mcg/L • Monitor liver function and calcineurin inhibitor levels
Liposomal amphotericin B	• 3–5 mg/kg IV daily	• Risk of renal toxicity; monitor electrolytes, renal function
Additional therapies		
Nebulized amphotericin B	• 25 mg inhaled twice daily	• For tracheobronchial aspergillosis, adjunctive therapy or prophylaxis
Echinocandins (micafungin, caspofungin)	• Micafungin: 100 mg IV every 24 hours • Caspofungin: 70 mg IV × 1, then 50 mg IV every 24 hours	• Used as combination therapy • Use as monotherapy should be considered only in consultation with transplant infectious diseases specialist

Solid organ transplant recipients should minimize exposure to soil and decaying organic material by avoiding gardening, landscaping, raking leaves, and construction or excavation sites. If avoidance is not possible, wearing gloves and a mask (N95 if on construction sites) is recommended.

Viral respiratory tract infections in lung transplant recipients

In solid organ transplant recipients, particularly lung transplant patients, viral respiratory tract infections can lead to serious morbidity and precipitate organ rejection.[34] Common pathogens include influenza, parainfluenza, respiratory syncytial virus, human metapneumovirus, rhinovirus/enterovirus, and coronaviruses, including SARS-CoV-2. Immunocompetent patients infected with these viruses typically have only upper respiratory tract involvement (with the exception of influenza and SARS-CoV-2). In lung transplant recipients, these viruses can cause a wide array of symptoms, ranging from mild symptoms, such as nasal congestion and rhinorrhea, to severe disease, including tracheobronchitis, bronchiolitis, and pneumonia. Seasonal patterns in these viruses exist.[34]

There are no clinical features that are useful for distinguishing disease caused by different viruses, but molecular diagnostics using PCR have played an increasingly important role. Establishing a diagnosis is particularly important because medical therapies are available for a few, but not all, of these viruses, and infection can both mimic and potentially precipitate rejection.[35,36] Many viruses are also associated with secondary bacterial or fungal pneumonias.[34,37] Nasopharyngeal swabs are most commonly used to collect samples for testing. Lower tract sampling may be indicated if clinical suspicion is high and upper tract samples are negative. Given the transmissibility of these pathogens, transplant wards must take care to appropriately isolate patients with confirmed or suspected infection to prevent spread to other vulnerable patients.

Influenza and, more recently, SARS-CoV-2 are the only viruses in this group for which vaccines and targeted therapy are available. Solid organ transplant recipients who contract influenza are at higher risk of complications relative to the general population, including pneumonia (22% to 49%) and ICU admission (11% to 16%).[34,38] Receipt of annual vaccination in solid organ transplant patients has been associated not only with reduced incidence (from 25.0% to 1.3% in a single study on lung transplant patients) but also with a decrease in disease severity in patients who develop influenza despite being immunized.[39,40] Risk factors for the development of severe influenza in solid organ transplant recipients include diabetes, bacterial or fungal pneumonia, use of antilymphocyte globulins, and acquisition of infection in the first 3 months following transplantation.[39]

Annual vaccination with inactivated influenza vaccine is strongly recommended (live-attenuated vaccines are contraindicated in solid organ transplant recipients); for patients who are unable to be vaccinated, prophylactic oseltamivir 75 mg orally daily for 10 days can be considered following high-risk exposures.

Transplant patients who develop influenza should be treated with oseltamivir 75 mg orally twice daily, regardless of symptom duration, and treatment should be continued for a minimum of 5 days and possibly extended up to 10 days in patients with severe disease or persistent symptoms. Importantly, oseltamivir does not have any significant drug–drug interactions with antirejection medications used in solid organ transplant, although it does require renal dose adjustment.[34]

Early data indicate that solid organ transplant recipients are infected with SARS-CoV-2, the virus causing COVID-19, at twice the rate of the general population, though it is unclear whether this is due to immunosuppression, increased comorbidities, or increased exposure.[41] Independent risk factors for mortality among solid organ transplant patients with COVID-19 have been reported to be lung transplantation, older age, and nosocomial acquisition.[41,42] The increased mortality in lung transplant recipients is likely due to similar factors that predispose them to other severe viral respiratory infections; the type of baseline immunosuppression does not seem to affect mortality. There are currently insufficient data to provide strong, evidence-based recommendations on the treatment of COVID-19 in solid organ transplant recipients. However, there is no indication that treatment should differ from that for the general population; consideration should be made for drug–drug interactions, and management should involve transplant physicians, particularly when alteration of immunosuppression is being considered.[43] Transplantation should be deferred if either the donor or recipient is SARS-CoV-2 positive;[43,44] potential transplant recipients who test positive may be considered on a case-by-case basis, depending on the urgency of transplantation, in consultation with an infectious diseases or transplant infectious diseases physician.

Both Canadian and BC guidelines recommend vaccination against SARS-CoV-2 in solid organ transplant recipients.[45,46] Major caveats in the transplant population include a recommendation to complete vaccination 2 weeks before transplant (though not to delay necessary transplant while awaiting vaccination), and to delay vaccination by at least 1 month following transplantation or following treatment of acute rejection, and by 3 months following rituximab therapy. The purpose of delaying vaccination in these scenarios is to ensure vaccine efficacy in the setting of increased immunosuppression, rather than due to concerns about safety. The efficacy of vaccination in this population is unknown, and strict adherence to public health measures must be maintained regardless of vaccination status.

Summary

Due to the success of solid organ transplant programs in BC, more transplant recipients are living in the community. These recipients remain on lifelong immunosuppression and are at ongoing risk for infectious complications. It is important for physicians working in communities throughout BC to have an awareness of some of the common infections these patients may face and to consult with colleagues in infectious diseases and transplant infectious diseases as required to support the ongoing health of this unique patient population. ■

Competing interests

Dr Mah is on the advisory board and/or has received research support from Avir, Merck, and Verity. Dr Belga has received fees for speaking from Merck and grants from Vancouver Coastal Health

Research Institute, Transplant Research Foundation of BC, and the COVID-19 Immunity Task Force. Dr Wright received fees for attending a one-time advisory board meeting for letermovir (mentioned in the article as it is the only agent of the two approved by Health Canada and available in BC).

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Rahel Zewude, MD, Gregory D. Deans, MD, MHSc, FRCPC, Natasha Press, MD, FRCPC

Sexually transmitted infections in British Columbia: An update

Though the rate of HIV diagnosis in BC has been declining, physicians should be aware of rising rates of gonorrhea, chlamydia, and syphilis to ensure their patients receive adequate screening, treatment, and follow-up.

ABSTRACT: Sexually transmitted infections remain a public health concern in BC. Rates of gonorrhea and chlamydia have been increasing over the past decade. Similarly, the incidence of syphilis in BC has been increasing, particularly in men who have sex with men, but also in women aged 15 to 49 years. This rise has prompted new recommendations to repeat syphilis testing in pregnancy around the time of delivery, in addition to routine syphilis screening in the first trimester. In contrast, the rate of HIV diagnosis in BC has been declining. This has occurred as more individuals at high risk for HIV acquisition have been enrolled in the pre-exposure prophylaxis program and more HIV-infected patients maintain undetectable viral loads, which reduces transmission. Despite the lack of incidence data on human papillomavirus infection as a nonreportable sexually transmitted infection, the rate of human papillomavirus-associated complications, namely anogenital warts and cervical intraepithelial neoplasia, has been declining in BC since the introduction of human papillomavirus vaccination programs.

Dr Zewude is an internal medicine resident in the Department of Medicine, University of British Columbia. Dr Deans is a clinical assistant professor in the Division of Infectious Diseases, UBC, and an infectious diseases physician at Surrey Memorial Hospital. Dr Press is a clinical associate professor in the Division of Infectious Diseases, UBC, and an infectious diseases physician at St. Paul's Hospital in Vancouver.

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Sexually transmitted infections (STIs) in British Columbia are a public health concern, particularly the increasing rates of chlamydia and syphilis. In the spring of 2020, during the initial phase of the COVID-19 pandemic, STI screening rates declined, probably due to both changes in sexual behavior and reduced access to sexual health services.[1] However, in 2021, screening rates began to normalize.[2] STI clinics have resumed services and continue to provide online STI testing to help overcome barriers in accessing clinic-based assessment.[3]

In this review, we discuss the current epidemiology, testing, management, and prevention of STIs in BC. We focus on those pathogens tested in routine screening, including gonorrhea, chlamydia, syphilis, and HIV. In addition to screening, routine vaccinations are available to prevent sexual transmission of hepatitis B and human papillomavirus (HPV). Hepatitis B vaccination has been part of the immunization schedule in BC since 1992, whereas HPV vaccination was introduced in 2008 for girls and was expanded to include boys in 2017.[4] We review BC's HPV vaccination and screening programs and their impact on prevalence.

Gonorrhea

Twice as many new gonorrhea cases are diagnosed in men as in women, and rates have been increasing over the past decade. A large proportion of females with gonorrhea infection can be asymptomatic; in those who are symptomatic, particularly with lower genital tract infection, the clinical manifestations are often limited to mild irritation and vaginal discharge, which may be interpreted as regular vaginal discharge.[5] Males, however, are more likely than females to have symptoms that may drive them to get tested. In addition to sexual behaviors, reasons for increased rates may include frequency of testing, improved sensitivity and specificity of testing methods, or changes in gonorrhea strains.[6,7]

Testing for gonorrhea and chlamydia is indicated for patients who have symptoms of urethritis/cervicitis or reported contact with a sexual partner who has either infection, and anyone who has tested positive or is being screened for another STI.[7] Symptoms of gonorrhea and chlamydia are quite similar and may include purulent urethral discharge, painful or difficult urination, new mucopurulent vaginal discharge, lower abdominal pain, dyspareunia, testicular swelling or pain, sore throat, or rectal pain or discharge.[7] Sites for screening should be based on symptoms and on type of recent sexual activity according to the patient's sexual health history. Active urethral, cervical, or abnormal vaginal discharge should be swabbed for both

gonorrhea culture and susceptibility, as well as for a nucleic acid amplification test (NAAT) for gonorrhea and chlamydia **[Table 1]**. The swab recommended for gonorrhea and chlamydia NAAT is shown in the **Figure**. Similarly, patients with throat and/or rectal symptoms should have swabs of the symptomatic site(s) collected for both gonorrhea culture and susceptibility, as well as gonorrhea and chlamydia NAAT. Screening of asymptomatic patients should consist of gonorrhea and chlamydia NAAT on first-catch urine, ideally without having voided in the preceding 1 to 2 hours, as well as on swabs of the cervix, vagina, throat, and/or rectum **[Table 1]**.

Unless chlamydia has been ruled out, patients with confirmed or suspected gonorrhea are treated for both infections. In BC, the recommended treatment for gonorrhea is a single dose of either cefixime 800 mg orally or ceftriaxone 250 mg intramuscularly, along with a single dose of oral azithromycin 1000 mg to cover chlamydia **[Table 2]**. With rising antibiotic resistance in gonorrhea strains, however, other national agencies such as the United States Centers for Disease Control are currently recommending a 500 mg dose of ceftriaxone intramuscularly. This increased dose of ceftriaxone has not yet been incorporated into Canadian guidelines.[8,9] However, the BC STI treatment guidelines are currently under review, and based on local antimicrobial susceptibility patterns and epidemiology, the gonorrhea treatment recommendations will be reassessed, including the ceftriaxone dose, the need for concurrent azithromycin, and whether cefixime will still be a first-line option. Patients should be counseled to abstain from condomless intercourse until 7 days posttreatment.[7] Repeat screening is recommended 6 months after successful treatment due to the high risk of reinfection.

Chlamydia

Chlamydia is the most common STI in BC, and its rate of infection continues to increase.[6,10] Females have approximately 1.5 times the diagnosis rate compared with males, who remain asymptomatic in half the cases of chlamydia infection.[11] Rates of chlamydia, as well as gonorrhea and syphilis, have also increased in seniors, which highlights the importance of extending preventive and screening measures for STIs to include older adults.[12] The reason for increased rates of chlamydia is likely multifactorial. Contributing factors may include increased screening in asymptomatic young adults, the use of NAAT on urine samples, which are less invasive for patients, and possibly, changes in sexual practices.[10,13]

The recommended treatment of chlamydia is doxycycline 100 mg orally twice daily for 7 days, or azithromycin 1000 mg orally in a single dose **[Table 2]**. Test of cure is recommended 3 to 4 weeks after initial treatment for pregnant and breastfeeding patients or if symptoms persist following treatment; retesting less than 3 weeks after treatment may be associated with

TABLE 1. Diagnostic work-up for gonorrhea, chlamydia, and syphilis.[7,13]

Site	Asymptomatic (screening)	Symptomatic
Cervix	GC/CT NAAT* on vaginal swab (preferred), cervical swab, or urine† (If hysterectomy or vaginoplasty, collect urine† for GC/CT NAAT)	1. GC C&S* from cervical swab (preferred) or vaginal swab 2. GC/CT NAAT for GC/CT on vaginal swab (preferred), cervical swab, or urine†
Penile; urethra	Urine† for GC/CT NAAT	1. GC C&S of visible discharge at meatus (insertion not required) 2. Urine† for GC/CT NAAT
Throat	Throat swab for GC/CT NAAT if receptive oral sex on a penis	Throat swab for: 1. GC C&S 2. GC/CT NAAT
Rectum	Rectal swab for GC/CT NAAT if receptive anal sex	Rectal swab for: 1. GC C&S 2. GC/CT NAAT
Genital or oral ulcers	Venipuncture for syphilis enzyme immunoassay serology	1. Syphilis polymerase chain reaction‡ 2. Venipuncture for syphilis enzyme immunoassay serology

* GC = gonorrhea; CT = chlamydia; NAAT = nucleic acid amplification test; C&S = culture and susceptibility testing

† patient should not have voided in the previous 1–2 hours; send first-void urine (first 10–20 mL)

‡ If a NAAT swab (similar to GC/CT collection) is used for syphilis polymerase chain reaction (PCR) and is not accessioned via the BC Centre for Disease Control Public Health Laboratory (BCCDC PHL), write on the laboratory requisition, "Lesion swabbed for syphilis PCR testing. Send to BCCDC PHL, attn: Dr Morshed."

FIGURE. Swab for gonorrhea and chlamydia nucleic acid amplification test. PHOTO: BONNE SYDORA, RN

a false-positive NAAT.[13] Repeat testing is recommended 6 months after treatment.

Syphilis

The number of new syphilis infections in BC has been increasing. Although most diagnoses are in men who have sex with men (MSM), infections are also increasing among women. From 2017 to 2018, there was a nearly 40% increase in infectious syphilis among women aged 15 to 49 years.[6,10] Because of the increase recorded in women, a change has been made to syphilis screening during pregnancy. Routinely, pregnant women are screened for syphilis in the first trimester.[14] It is now recommended to repeat syphilis testing around the time of delivery. The goal of testing twice during pregnancy is to prevent infection being passed from mother to baby. In 2019, two cases of congenital syphilis were identified in BC, after no cases had been identified in previous years.[14]

Testing for syphilis is indicated for patients who have symptoms of syphilis, such as a painless chancre at the site of inoculation, diffuse rash, or new visual symptoms; people with reported contact to syphilis; or pregnant patients in the first trimester and at the time of delivery. Patients with genital lesions suspicious for syphilis should be swabbed for a syphilis NAAT, which has replaced the previous method of dark field microscopy. All patients should be assessed with syphilis serology, which involves both treponemal and nontreponemal tests, which in BC are performed according to a validated algorithm.

Treatment of syphilis depends on the stage of the infection, which is determined based on symptomatology, timing of potential sexual exposure, serology results, and the results and timing of any previous testing. In BC, if there is ambiguity in interpreting syphilis test results or determining the stage of infection, support is available from the physicians and nurses at BC Centre for Disease Control sexually transmitted infections clinics.[15] Early syphilis, which includes primary, secondary, and latent infections within 1 year of infection, is treated with 2.4 million units of penicillin G benzathine (Bicillin L-A) given as two simultaneous intramuscular injections **[Table 2]**. Late syphilis, which is usually in the late latent stage, is treated with 2.4 million units of intramuscular penicillin G benzathine (Bicillin L-A) weekly for a total of three sets of injections. Patients with a true allergy to penicillin are treated with doxycycline 100 mg orally twice daily for 14 days in early syphilis and 28 days in late syphilis. Following treatment, all patients should have repeat syphilis serology; patients with early syphilis should generally be monitored with serology every 3 months to assess for the expected decline in titer of the rapid plasma reagin. The BC Centre for Disease Control provincial sexually transmitted infections clinics syphilis team can advise on this monitoring for different patient populations.[15]

In the spring of 2020, during the initial phase of the COVID-19 pandemic, STI screening rates declined, probably due to both changes in sexual behavior and reduced access to sexual health services. However, in 2021, screening rates began to normalize.

HIV

The rate of new HIV diagnoses in BC has been declining over the past decade, even with an increase in testing. This is due in part to treatment as prevention, with more HIV-infected individuals maintaining undetectable viral loads.[16] During the initial phase of the COVID-19 pandemic, rates of both testing and new HIV

TABLE 2. Treatment for gonorrhea, chlamydia, and syphilis.[7,11]

Infection	First-line	Second-line	Additional	Follow-up
Gonorrhea	Cefixime 800 mg orally in a single dose and azithromycin 1000 mg orally in a single dose; or ceftriaxone 250 mg intramuscularly in a single dose and azithromycin 1000 mg orally in a single dose	Cefixime 800 mg orally in a single dose and doxycycline 100 mg orally twice a day for 7 days; or ceftriaxone 250 mg intramuscularly in a single dose and doxycycline 100 mg orally twice a day for 7 days	Abstain from sexual activity for 7 days from the start of treatment. Test and treat last sexual contact AND any sexual contacts within the last 60 days.	Repeat testing at 6 months
Chlamydia	Doxycycline 100 mg orally twice a day for 7 days; or azithromycin 1000 mg orally in a single dose	—	Abstain from sexual activity for 7 days from the start of treatment. Test and treat last sexual contact AND any sexual contacts within the last 60 days.	Repeat testing at 6 months
Early syphilis	2.4 million units of penicillin G benzathine (Bicillin L-A) given as two simultaneous intramuscular injections	If penicillin allergic: doxycycline 100 mg orally twice a day for 14 days	Abstain from sexual activity for 14 days from the start of treatment. Test and treat sexual contacts within the past 3 months.	Repeat syphilis serology every 6 months until satisfactory drop in rapid plasma reagin titer

diagnoses declined. The greatest number of new HIV diagnoses is in MSM, which the pre-exposure prophylaxis (PrEP) program aims to address.[6,17]

HIV PrEP addresses HIV prevention in HIV-negative individuals at high risk of acquiring HIV infection. Those individuals are offered an antiretroviral combination pill (emtricitabine/tenofovir disoproxil fumarate) to prevent infection with HIV. There are two approaches to administering PrEP: daily and on demand. In on-demand PrEP, patients take one emtricitabine/tenofovir disoproxil fumarate combination pill 2 hours prior to sexual intercourse, a second pill 24 hours later, and a third pill 48 hours after the first dose. PrEP has been shown to be highly effective in preventing HIV transmission.[18] In BC, the PrEP program is publicly funded and open to any HIV-negative individual who meets the criteria for being at high risk of HIV acquisition.[19] Currently, approximately 4000 individuals are actively enrolled in the PrEP program, most of whom identify as MSM. Transgender women and MSM who are newly diagnosed with syphilis or a rectal bacterial STI, and who report having condomless anal sex, should be informed of the PrEP program. Further information regarding enrolment can be found at the BC Centre for Excellence in HIV/AIDS website.[19]

Human papillomavirus

Screening

Human papillomavirus (HPV) infection causes anogenital warts, as well as multiple genital tract malignancies, including cervical, vaginal, vulvar, and anal cancers. Consequently, HPV screening is based on screening for genital tract cancer, primarily cervical cancer.

The current BC guidelines for HPV screening recommend cervical cytology obtained through the conventional Papanicolaou smear test (Pap test) as the only screening method in asymptomatic females.[20] However, implementation of HPV DNA testing has been identified as a priority by the Canadian Partnership Against Cancer, and provincial health systems are moving toward this goal.[21]

The BC Cancer Agency recommends screening for cervical cancer with a Pap test in 25- to 69-year-old female and transgender patients who have a cervix. The recommendations explicitly state that Pap test screening should be continued in patients who have been through menopause, who have ever been sexually active at any point in their lifetime, who have received the HPV vaccine, and who are in a same-sex relationship.[22] Patients who do not require Pap test screening include those who have had their cervix removed for any reason, including total hysterectomy and gender-affirming surgery, and have no history of precancerous lesions or previous cervical cancer, and those who have never had any sexual contact (including penetrative, digital, or oral sexual contact).[20,22]

In BC, the PrEP program is publicly funded and open to any HIV-negative individual who meets the criteria for being at high risk of HIV acquisition.

Regarding anal cancer screening, the 2012 BC Cancer Agency guidelines recommend digital rectal exam to be included on annual physical exams at primary care.[23] Patients who are identified to be in a higher-risk group for anal cancer, particularly HIV-positive MSM, could be considered for anal cytology and high-resolution anoscopy at the St. Paul's Hospital Anal Dysplasia Clinic.[23]

Vaccination

HPV vaccination is now part of the school-based program for all children. In grade 6, two doses of the 9-valent HPV vaccine (HPV9) are given 6 months apart. Individuals who start the vaccine series at 15 years or older receive three doses at months 0, 2, and 6.[20]

For those who missed the school-based program, the current BC guideline for HPV vaccination recommends HPV9 (Gardasil 9), which provides protection against cervical, vulvar, vaginal, and anal cancers, as well as anogenital warts.[24] Compared with the previously used quadrivalent HPV vaccine (HPV4), HPV9 provides similar protection against anogenital warts but may also provide up to 15% additional protection against anogenital cancers.[24] It is available through the publicly funded program for individuals who start the vaccine series before their 19th birthday and those between 9 and 26 years who are transgender, HIV positive, MSM, or males who are street-involved or in the care of the Ministry of Children and Family Development.[24,25] Individuals who do not qualify for publicly funded HPV vaccination include MSM older than 27 years, women aged 19 to 45 years, and males aged 9 to 26 years.[25] For those individuals, HPV vaccination is recommended and is available by prescription. The cost is approximately $500 for the three-dose vaccine series and may be covered by third-party insurance plans.[20]

Individuals who have completed an HPV vaccination series with one of the older vaccines (HPV2 or HPV4) may choose to purchase an HPV9 vaccine series in order to ensure protection against the additional HPV strains. A minimum interval of 6 months between completion of an HPV2 or HPV4 series and initiation of an HPV9 series is recommended.[24]

Prevalence

HPV is not a reportable disease in BC, nor is it part of routine STI screening; therefore, the annual incidence and prevalence of HPV in the province is not well documented. A 2016 trial reported 8.2% HPV positivity at baseline screening of more than 15 000 women.[26] Furthermore, given that HPV infection with strains 6 and 11 is associated with 90% of anogenital warts, the prevalence rate of anogenital warts in the province can provide valuable information on the prevalence of HPV infection. In a study that examined the impact of BC's quadrivalent HPV immunization program on rates of anogenital warts, clinical exam diagnosis of anogenital warts in BC clinic visits from 2000 to 2017 were analyzed: 8.15% of the 85 158 individuals screened were diagnosed with anogenital warts.[27]

The incidence of HPV infection appears to be influenced primarily by HPV immunization. The above-mentioned study analyzed anogenital wart rates across different birth cohorts to assess the impact of BC's HPV immunization programs. The study reported a

56% overall decline in rates of anogenital warts in the younger birth cohort that is eligible for public HPV4 immunization when compared with older birth cohorts.[27] Additionally, a more than 50% decline in the rates of cervical intraepithelial neoplasia has been reported in the province since the introduction of the publicly funded HPV vaccination program.[28,29]

Summary

Physicians should be aware of rising rates of STIs in BC to ensure adequate screening, treatment, and follow-up of their patients. HPV vaccination has significantly reduced the rates of anogenital warts and precancerous genital lesions, and should be encouraged in eligible groups. ■

Competing interests

None declared.

Physicians should be aware of rising rates of STIs in BC to ensure adequate screening, treatment, and follow-up of their patients.

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Delivering respectful, safe health care to Indigenous people in BC

"The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition."

—World Health Organization

The Joint Collaborative Committees (JCCs) acknowledge that they must be learners and active participants in decolonizing BC's health care system, returning the right to access quality health care that is safe and free of racism and discrimination to Indigenous peoples (First Nations, Métis, and Inuit).

Further to the release of the 2020 *In Plain Sight* report, the JCCs have prioritized partnering with Indigenous communities and health care organizations to respond to the needs of Indigenous patients and be inclusive of Indigenous perspectives of health and wellness.

The JCCs are advancing cultural safety by positioning health care professionals as humble and respectful partners in care with patients[1] in Indigenous cultural experiences, feelings, and beliefs. As a start, the JCCs, with divisions of family practice and facility-based medical staff associations, are:

- Enhancing physicians' knowledge of cultural safety and humility through learning series and training.
- Advancing Indigenous people's representation on its committees.
- Providing funding to recognize the time invested and contributions made by Indigenous people at JCC-initiated meetings and events.
- Supporting partnerships and quality improvement initiatives with Indigenous communities and the integration of cultural advisors, traditional wellness healers, and Elders through primary care networks.
- Developing linkages to local Indigenous communities and people and ensuring good relationships between physicians and Indigenous leadership.

Across facilities and communities in BC, doctors are also leading initiatives and projects through the JCCs that embed culturally safe care into practice. Here are a few examples.

Cultural and community connections

In Tofino, an emergency room and family medicine doctor saw how traditional practices helped a group of patients who were struggling with trauma and experiencing substance use that required frequent treatment in hospital. Wanting to learn more and understand better, the physician collaborated with a Tla-o-qui-aht First Nation healer and a cultural worker to introduce a group of local health care professionals to traditional healing practices.

They arranged a cultural ceremony that included Tla-o-qui-aht First Nation members, physicians, nurses, X-ray and laboratory technicians, and a firefighter. It incorporated a talking circle, breathing exercises, drumming and singing, and cold-water cleansing pools. Together they explored how these practices and stronger cultural connections might blend with medical care to support people who experience trauma and pain, as well as the benefits of making traditional, nonmedical interventions more available to health professionals. Read more at https://facilityengagement.ca/cultural-connections-collaboration.

Holistic healing

Gathering as a community and learning from Elders are important means for community engagement for Indigenous people. Through a JCC initiative, a traditional gathering in Williams Lake brought together Secwépemc Elders to talk about medication use in their community, where a holistic approach to health and wellness was once the norm.

Understanding that storytelling is the traditional way for Indigenous communities to share knowledge, wisdom, and humor, a story titled *Coyote's Food Medicines* was developed to connect with communities about medications. The award-nominated book was created in partnership between the JCCs, the First Nations Health Authority (FNHA), and the Interior Health Authority, with guidance from Elders, illustrations by Georgia Lesley, and design and production by Drawing Wisdom. Through a beautifully stitched narrative, the story opens a safe space for Indigenous people to discuss the importance of maintaining good health when taking multiple prescribed medications, while encouraging meaningful conversations with

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This article is the opinion of the Joint Collaborative Committees (JCCs) and has not been peer reviewed by the BCMJ *Editorial Board.*

BC youth are in a mental health crisis—we must invest in prevention

The US Surgeon General recently issued an advisory on the youth mental health crisis, which was worsened by COVID-19, calling for swift, coordinated actions.[1] The situation in BC is similar. It is time for BC and Canada to create comprehensive strategies for child and youth mental health and substance use (CYMHSU), emphasizing prevention.

In 2018, one in six BC youth seriously considered suicide in the prior year, one in five self-reported anxiety disorders, one in eight engaged in purging, and one in seven were depressed. All rates increased more than 50% since 2013, with the worst rates among female and LGBTQ+ youth.[2] Even pre-COVID-19, BC was not on track to meet its mental health and substance use targets. The situation is similar across Canada, which ranked 31st of 38 high-income countries in children and youth well-being and mental health.[3] Unlike in Canada, many countries are showing improvement, highlighting the systemic failure and that something can be done.

The pandemic exacerbated the situation further. An Ontario study found that approximately 70% of children and adolescents experienced deterioration in at least one mental health domain (anxiety, irritability, hyperactivity, attention, depression, or obsessions/compulsions).[4] The BC COVID SPEAK survey confirmed a disproportionate impact on families living with children.[5] In 2021, opioid overdoses were the third-leading cause of death for BC children under age 19, with a record 29 deaths.

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The majority of CYMHSU disorders begin before the age of 15.[3] They are a leading cause of disability and are underfunded compared with other causes of disease burden.[3,6] Beyond disease burden, CYMHSU problems early in life lead to impairment across family, social, and academic domains, creating socioeconomic inequities.[3] BC's investments in early childhood education, social and emotional learning, poverty reduction, and mental health services are commendable but insufficient, as noted by Jennifer Charlesworth, BC's representative for children and youth.[7] Furthermore, both BC and Canada lack funding for evidence-based CYMHSU prevention.

Canada . . . ranked 31st of 38 high-income countries in children and youth well-being and mental health.

Much more can be done, from better prevention of intergenerational trauma to systematically delivering a suite of effective preventive interventions **[Table]**, including parenting programs, school-based programs, and cognitive-behavioral-therapy-based interventions, both universal and targeted. CYMHSU preventive interventions are highly cost-effective, with societal savings of $6000 to $14 000 per participant.[8] Preventing a single case of conduct disorder is estimated to yield lifetime savings of $5 million per child.[8] However, evidence-based preventive interventions are far from being implemented systematically in BC or Canada, with little reporting on the impact of current strategies. Therefore, an immediate scale-up of evidence-based measures is needed.

During the pandemic, we have seen that public health, the health care system, and the government can collaboratively monitor, act, and adjust to address a population-level health threat. We must do the same for the CYMHSU crisis. Physicians can play a role by raising awareness of the crisis, demanding action, or joining the CYMHSU Community of Practice voices. Physicians can also identify and refer children, youth, and families using resources available from https://openmindbc.ca.

To solve the crisis, it is crucial for the provincial and federal governments to establish a comprehensive strategy that includes prevention, with increased publicly reported surveillance and evaluation. The future well-being of our province and country rests on how we support and invest in the next generation's mental health. ■

—Veronic Clair, MD, PhD, CCFP, FRCPC
Chair, Council on Health Promotion

—Steve Mathias, MD, FRCPC
Guest Author

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TABLE. Prevalence of child and youth mental illnesses, including substance use disorders and associated preventive interventions, adapted from Schwartz and colleagues.[8]

Disorders and prevalence* in BC	Effective prevention interventions and supporting evidence
Anxiety disorder 5.2% or 38 800 children (4–18 years)	Four interventions using cognitive-behavioral therapy (CBT) (five randomized controls trials [RCTs]). • Effective in a variety of formats, such as teaching parents, delivering CBT to groups of children, and self-delivery. • Effective for children 4–17 years old. • Large effect size; e.g., odds of anxiety disorder diagnosis 8 times lower.
Depression 1.3% or 9700 children (4–18 years)	Four targeted CBT interventions (six RCTs). • Two provided to children, one to families, and one to youth reading a book.
PTSD 0.1% or 700 children (4–18 years)	Four targeted CBT interventions (five RCTs) in children who had been maltreated. • Three programs included parents. • Two delivered in groups, two to individual families.
Substance use disorders 2.3% or 8200 children (12–18 years)	Six universal and three targeted programs (10 RCTs). • Multicomponent interventions included child education, CBT, motivational interviewing, parent training, communication skills, resistance skills, and/or social skills training.
ADHD 3.7% or 27 600 children (4–18 years)	Three targeted parent-training interventions (four RCTs). • All programs applied to families with young children. • Usually teaching parents to encourage their child's positive behaviors through providing attention and praise while ignoring minor misbehaviors.
Oppositional defiant disorder 3.3% or 24 600 children (4–18 years) **Conduct disorder** 1.3% or 9700 children (4–18 years)	Parent training (10 RCTs) (parent teaching similar to above). Multicomponent interventions (five RCTs). • Including combinations of behavior therapy, enriched school curricula, parent-school collaborations, parent training, and/or social skills training.
Eating disorders 0.2% or 700 children (12–18 years)	Four multicomponent interventions (five RCTs). • One universal and three targeted, including combinations of discouraging unhealthy weight control practices, encouraging positive body image and healthy lifestyle planning, and/or media literacy training.

*Estimated numbers are for children 4–18 years old, except for eating disorders and substance use disorders, which are for children 12–18 years old.

Continued from page 179

health care providers. Read the full story at www.coyotestory.ca.

Access to quality care closer to home

Indigenous populations in rural BC communities face significant barriers to accessing quality care, including having to travel long distances to and from appointments, a lack of providers and services in rural communities, and a lack of access to culturally safe care. These hurdles were further emphasized with the start of the COVID-19 pandemic. In April 2020, the First Nations Virtual Doctor of the Day program was launched by the FNHA and the Rural Coordination Centre of BC (RCCbc), which is funded by the JCCs. The program is one of three Real-Time Virtual Support pathways offered by the RCCbc to enhance health equity in BC rural, remote, and Indigenous communities.

Operating 7 days a week, the program enables Indigenous people who have limited or no access to a doctor to receive culturally safe primary care virtually; it also supports community-based nurses and other health professionals to deliver primary care. In the program's first year, there were more than 6000 encounters between doctors and hundreds of patients who accessed the service. All physicians have training or experience in cultural safety and humility, and many of the doctors have Indigenous ancestry. Access the service and learn more at www.fnha.ca/what-we-do/ehealth/virtual-doctor-of-the-day.

The JCCs commit to keeping the conversation going with and between Indigenous communities and BC doctors, as well as collaborating with health care partners to develop solutions that address systemic health equity issues. Learn more about the JCCs at www.collaborateonhealthbc.ca. ■

—Ahmer A. Karimuddin, MD, FRCSC
Co-chair, Specialist Services Committee

—Jiwei Li, MD
Co-chair, Shared Care Committee

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The other pandemic: COVID-19 as a catalyst for hate against Asian health care workers

A call to action to address anti-Asian discrimination in the health care system.

Brooke Cheng, Joshua Ma

ABSTRACT: The COVID-19 pandemic reignited the long-standing issue of global racism against Asian populations. Specifically, Asian health care workers face discrimination due to a unique combination of their racial background and their roles interacting with COVID-19-exposed patients. Sources of violence and prejudice may arise from within and outside the health care system. If left unaddressed, the emotional stress of racial discrimination faced by health care workers can accelerate staff burnout, perpetuate feelings of isolation, and compromise patient care. In this article, we review factors involved in experiences of anti-Asian racism during the COVID-19 pandemic. Proposed areas of action to mitigate incidence of discrimination in the health care system may include policies addressing country-based nomenclature for global issues, funding for Asian community-based medical resources, and early anti-Asian racism education for health care students.

As she stood in the lobby of a business at the end of her 12-hour shift, a Chinese-Canadian nurse couldn't help but notice that her food was being prepared by unmasked workers. What should have been a simple reminder to mask up instead turned into a barrage of racist drivel against her: "I never thought it would be death caused by China!" and "You people are always causing problems!"[1] This story highlights the quintessential experience faced by Asian health care workers in Canada as they juggle hearing the empty praise of being called a "health care hero" with facing day-to-day overt racism and microaggressions at work and in public settings.[2,3]

While this story may surprise some, it is just one of thousands of anecdotes that continue to underpin deeper issues. The Asian population is no stranger to racial discrimination, having been scrutinized for their appearance, culture, and identity.[4,5] Though efforts have been made to educate the public on cultural sensitivity and to celebrate racial diversity, the SARS outbreak in 2003 demonstrated the speed at which we can revert to unconscious biases of racist tendencies in the face of fear and uncertainty.[5] In a similar vein, the COVID-19 pandemic has reignited racism against Asians, exacerbated by initial public framing of the situation as being caused by the "Chinese virus."[2,6,7] This phenomenon transcends borders, occurring even in Canada where we pride ourselves for our multiculturalism. The propensity to scapegoat this ethnic group during periods of crisis has contributed to the unfair social exclusion of the Asian population and laid the groundwork for tragedies such as the targeted mass shooting in Atlanta in March 2021.[5,8] Six Asian women were among the victims.

Unfortunately, racially driven prejudice has not been the only form of discrimination to increase during the COVID-19 pandemic. Health care workers have become a target of public fear, seen as a danger due to their higher risk for contact with environments and individuals exposed to COVID-19.[2,7] The manifestations of this fear have been numerous and widespread, with reports of violence against health care workers in countless countries around the globe.[9-12]

Taken together, Asian health care workers are at a unique intersection of increased risk for prejudice and discrimination in both their personal and professional lives.[2,7] A survey conducted by the Canadian Union of Public Employees reported an increase of COVID-19-related racism targeting health care workers in Manitoba.[13] Most significantly, while only 1% of health care workers who did not identify as Asian reported experiences of racism during the surveyed 1-month period, a staggering 20% of Asian health care workers reported racism during the same time frame.[13] This is supported by a series of interviews conducted with Asian health care workers highlighting experiences ranging from verbal microaggressions to outright violence.[2]

It is well established that the experience of racism and prejudice can have tremendous impacts on mental health among those inside and outside the medical field.[14-16] However, when paired with the busy and stressful environments of health care settings, discrimination is an unwarranted factor compounding the likelihood of burnout among health care workers. This sentiment is worsened by a shared frustration of a lack of acknowledgement from institutional and public authorities, as well as constantly feeling the need to prioritize patient trust over one's integrity.[2] The resulting burden is an invisible

Ms Cheng and Mr Ma are second-year medical students in the Faculty of Medicine at the University of British Columbia.

This article has been peer reviewed.

yet significant cost to the health care system, potentially manifesting as presenteeism among workers (the lost productivity to the work environment when employees cannot fully function due to illness or other conditions).[17,18] Perhaps the most important implication is that workers experiencing anxiety and stress from racially driven prejudice could have decreased capacity to properly care for patients.[19] In this sense, the effects of discrimination are carried downstream to the home and the workplace. If racism is beginning to affect an outcome as critical as patient safety and care, then this issue must be treated as one of utmost importance.

It is also important to recognize that this issue does not differentiate based on age or experience.[2,20,21] Asian health care workers at all stages of their careers may face the negative effects of racist exclusion, not only those who are currently practising professionals.[3] Notably, Asian students studying in the medical profession have also been affected, and we suspect that the same applies for students of other health care occupations. A Polish study demonstrated through an online survey that Asian medical students have experienced increased xenophobia since the COVID-19 outbreak, receiving reactions such as individuals pointing fingers or spitting at them, and patients asking in terror whether they are infected with COVID-19.[20] This may have hindered their career development and worsened feelings of isolation, given that many of these students were studying abroad. Interestingly, the prejudice tended to more greatly affect Asian mask-wearing students, with anecdotes of lecturers requesting that these individuals remove their masks, even amid student concerns for safety.[20] We are reminded of a similar experience in Vancouver, where mask wearers were targets of prejudice until masks were mandated by the government. Asian individuals were overwhelmingly represented in this group.[22]

Nevertheless, it would be naive to believe that health care workers are solely the victims of prejudice during the COVID-19 pandemic. Cases of health care workers facing stigma from fellow colleagues during the pandemic period have also been reported. For an action as simple as opting to take a COVID-19 test, a female health care worker required psychotherapy and benzodiazepines to manage her psychological distress due to the stigma received from coworkers.[23] Another health care worker employed in a COVID-19 ward reported feelings of humiliation and worthlessness due to derogatory tones and comments made by colleagues after her exposure to COVID-19 patients.[23] Even experienced health care workers may lash out inappropriately as a result of overwhelming stress or fear. It is important to look both internally and externally to identify possible areas in the health care system for targeted interventions to address this issue.

Workers experiencing anxiety and stress from racially driven prejudice could have decreased capacity to properly care for patients.

Overall, in light of recent events surrounding the COVID-19 pandemic, the increasing rate of anti-Asian racism has positioned this issue at the forefront of our minds. Public attention for the Asian population, one so often overlooked as a quiet "model minority," has reached an all-time high.[1] It is now up to the health care system to capitalize on this momentum and prevent the hardships experienced by Asian health care workers from being in vain.

To do this, we propose the following solutions:

- Establishment of policy to prevent public framing of future global situations as being associated with a certain ethnicity or country (e.g., supporting neutral language in standardized nomenclature for viral variants).[24]
- Increased government funding for Asian community-based care programs and medical resources provided in different languages (e.g., telehealth).[25]
- Implementation of education on Asian history, racism, and psychosocial resilience targeted for health care students, beginning early during preclinical training years.[26]

As Asian medical students, we believe that an evolution at the political, community, and education levels is imperative to establish a sustainable environment where Asian health care workers feel safe and valued for their work.

This is in no way intended to downplay the experiences of other groups, or to suggest that Asians are the only victims of racism. It has been clearly established that members of minority groups such as Indigenous, Black, and Hispanic populations are also victims of racism in the health care system, each with their own devastating and unfair experiences of bias.[27-29] However, we believe that joining the fight against Asian hate is also joining the fight for all people of color. The Asian population should not be thought of as the centre of attention, but rather a facet of a larger issue that must be addressed congruently. We would be honored to have members of all ethnic backgrounds become allies in our journey for racial equality in our health care system. Likewise, this is a call to action for all Asian health care workers to stand up for our fellow peers and colleagues who may be suffering their own battles.

Although the worst of the COVID-19 pandemic will likely reach an end, the social aftermath of the situation may persist far beyond. Furthermore, should new worldwide health crises arise in the future, they will test our ability to grow from past experiences and to respond with empathy. It is critical that this issue is addressed in the health care system, lessons from the COVID-19 experience are used, and an action plan is created to ensure a safe and inclusive environment for all health care workers. ■

Competing interests
None declared.

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COVID-19 therapies for mild to moderately ill patients

Recently, two novel agents have become available in BC for the treatment of COVID-19 in mild to moderately ill patients: a direct-acting oral antiviral, nirmatrelvir/ritonavir, and an IV antiviral, remdesivir. A monoclonal antibody, sotrovimab, was also in widespread use until recently; however, its utility has been limited due to loss of activity against the BA.2 variant of Omicron. On 23 March 2022, due to increased drug supply and operational capacity, eligibility criteria were expanded to include all symptomatic COVID-19 individuals in BC who are at increased risk of severe illness and hospitalization. Nirmatrelvir/ritonavir and remdesivir were each evaluated in a randomized controlled trial conducted during the Delta wave in unvaccinated adults with a risk factor for severe COVID-19, such as being over 55 years of age or having a comorbidity.[1,2] Adults were offered treatment if they had mild to moderate COVID-19 and were within 5 (nirmatrelvir/ritonavir) or 7 days (remdesivir) of symptom onset. Both treatments demonstrated a significant reduction in progression to hospitalization over placebo (6.3% versus 0.8% for nirmatrelvir/ritonavir and 5.3% versus 0.7% for remdesivir).[1,2] As Omicron causes less-severe disease than Delta and nearly 90% of BC adults have received a COVID-19 vaccine, patients who would derive a clinically meaningful benefit need to be carefully selected rather than applying trial inclusion criteria when choosing to offer treatment.

This article is the opinion of the BC Centre for Disease Control and the BC COVID-19 Therapeutics Committee and has not been peer reviewed by the BCMJ *Editorial Board.*

Who is at risk for hospitalization from COVID-19 in BC during the Omicron wave?

In BC, the average risk of hospitalization in the Omicron wave decreased to 1.2% from the 6.3% observed during the Delta wave in patients who were tested by polymerase chain reaction (PCR).[3] In addition, an analysis conducted by the BCCDC of hospitalized patients from 3 January 2022 to 9 February 2022 demonstrated that approximately 60% of hospitalizations after testing positive were incidentally diagnosed rather than being caused by severe COVID-19.[4] The COVID-19 Therapeutics Committee has developed a set of BC-specific eligibility criteria to identify individuals who would be expected to benefit from these treatments based on local epidemiological data.[3,4]

Who is eligible to receive COVID-19 treatments?

Adjusting for hospitalization rates, vaccination status, and symptomatic versus incidental COVID-19 diagnosis, individuals who are at increased risk include those who are severely immunocompromised or have a combination of risk factors such as advanced age, lack of or incomplete immunization, and chronic conditions/comorbidities. Individuals who demonstrated at least a 3% risk of hospitalization in this analysis are currently eligible to receive treatment. Patients eligible for therapy have also been prioritized for PCR testing; however, a positive rapid antigen test is acceptable for diagnostic purposes **[Table].**

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TABLE. Eligibility for COVID-19 treatment by age, vaccine status, and number and type of risk factors.

Age	Number of vaccine doses and/or previous infection		
	0, and no previous infection	1 to 2, or previous infection alone	3, or previous infection and any vaccination
Any adult ≥ 18	Those clinically extremely vulnerable defined as CEV 1, CEV 2, and CEV 3		
18–49	If ≥ 3 risk factors or Indigenous	Not at increased risk	Not at increased risk
50–69	At increased risk	If ≥ 3 risk factors or Indigenous	Not at increased risk
70+	At increased risk	If ≥ 1 risk factor or Indigenous	If ≥ 3 risk factors or Indigenous

Legend

At increased risk: Treatment is recommended/suggested

Not at increased risk: Treatment is not recommended

CEV 1: e.g., solid organ transplant, bone marrow or stem cell transplant, treatment for hematological malignancy, anti-CD20 or B-cell-depleting therapies

CEV 2: e.g., receiving immunosuppressive agents, moderate–severe primary immunodeficiency, cancer treatment for solid tumors, advanced HIV

CEV 3: e.g., cystic fibrosis, severe asthma or COPD, diabetes requiring insulin, intellectual and developmental disabilities, rare blood disorders, dialysis

Indigenous individuals may be at risk for disease progression due to disparate rates of comorbidity, including undiagnosed risk factors, and social determinants of health.

Source: Framework for COVID-19 Therapeutics for Mild-Moderately Ill Patients, BC COVID-19 Therapeutics Committee.

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What are practical considerations with offering treatment?

Any prescriber in BC can now prescribe nirmatrelvir/ritonavir. Patients need to be within 5 days of symptom onset to qualify, which can be extended to 7 days for those who would otherwise be referred for IV treatment solely on the basis of the treatment window. Those who are unable to see their family physician in time can be referred to the centralized COVID-19 Assessment and Treatment e-team (CATe) at 1 888 COVID-19.

Ritonavir and, to a lesser extent, nirmatrelvir are potent CYP3A4 inhibitors and interact with many medications that are metabolized through this pathway or are enzyme inducers. Common drug-drug interactions that either contraindicate the use of nirmatrelvir/ritonavir or require modification include those with amiodarone, anticoagulants rivaroxaban and apixaban, immunosuppressants tacrolimus and cyclosporine, statins, certain antipsychotics and antiepileptics, calcium channel blockers, and fentanyl.[5] A medication review is necessary for most patients, and a pharmacy consultation is recommended if significant interactions are present. A recent Canadian study demonstrated that 68% of older adults eligible for treatment with nirmatrelvir/ritonavir had a drug-drug interaction and 21% were taking at least one inappropriate medication.[6] Since patients who are at risk of hospitalization from COVID-19 are elderly with chronic conditions on multiple therapies, probability of drug-drug interactions with nirmatrelvir/ritonavir is high, highlighting the importance of a comprehensive assessment of drug-drug interaction and proactive deprescribing prior to prescribing nirmatrelvir/ritonavir to ensure patient safety.

Remdesivir is the only available alternative for those with significant drug-drug interactions, and unlike sotrovimab, which is variant specific and prone to resistance with emerging variants of concern, remdesivir is a nucleoside analogue, which is stable against SARS-CoV-2 mutations. Additionally, the intravenous administration requires a referral to a health care facility at a local health authority for three daily 30-minute infusions. During the assessment of the first 200 patients who contacted Service BC for nirmatrelvir/ritonavir, approximately 30% of patients who were eligible for therapy were referred for an alternative IV treatment due to drug-drug interactions.[7]

What resources are available to clinicians?

Clinicians can access a wide range of resources to assist with patient assessment and prescribing of COVID-19 therapies. Evidence changes rapidly and resources are updated accordingly.

Nirmatrelvir/ritonavir is prescribed using a specific prescription form, available at www2.gov.bc.ca/assets/gov/health/forms/2368fil.pdf. Pharmacies that stock nirmatrelvir/ritonavir kits are listed at www.bcpharmacy.ca/paxlovid.

The COVID-19 Therapeutics Committee maintains the following resources on the BCCDC website (www.bccdc.ca/health-professionals/clinical-resources/covid-19-care/treatments):

- COVID-19 Clinical Practice Guide. A comprehensive guide that includes recommendations and supporting evidence, including local epidemiological data.
- Practice Tool #1: Step-by-Step Assessment. Practical guidance on patient selection, testing, clinical assessment, therapy management, and contact information for referrals and consultations.
- Practice Tool #2: Definitions of Clinically Extremely Vulnerable. Information for immunocompromised and other at-risk groups.
- Practice Tool #3: Drug-Drug Interactions. A color-coded table of common interactions and management tips.
- Practice Tool #4: Pharmacist Counselling Checklist. A quick-reference guide for pharmacists.

Prescribers can also access a summary of the guidance in a two-page format, as well as a provider Q&A document, both available on the BCCDC website.

The COVID-19 Antiviral Support Line for Clinicians is also available Monday to Friday, 8:30 a.m. to 4:30 p.m., at 1 866 604-5924.

Prescribers can also request a personalized education session on nirmatrelvir/ritonavir provided by the Provincial Academic Detailing service. For more information, visit www2.gov.bc.ca/gov/content/health/practitioner-professional-resources/pad-service/intro-paxlovid-nirmatrelvir-ritonavir. ■

—BC COVID-19 Therapeutics Committee

—David Patrick, MD

BCCDC

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CME calendar

Rates: $75 for up to 1000 characters (maximum) plus GST per month; there is no partial rate. If the course or event is over before an issue of the *BCMJ* comes out, there is no discount. **Deadlines:** ONLINE: Every Thursday (listings are posted every Friday). PRINT: The first of the month 1 month prior to the issue in which you want your notice to appear; e.g., 1 February for the March issue. The *BCMJ* is distributed by second-class mail in the second week of each month except January and August. **Planning your CME listing:** Advertising your CME event several months in advance can help improve attendance; we suggest that your ad be posted 2 to 4 months prior to the event. **Ordering:** Place your ad at www.bcmj.org/cme-advertising. You will be invoiced upon publication. Payment is accepted by Visa or Mastercard on our secure online payment site.

PSYCHOLOGICAL PPE, PEER SUPPORT BEYOND COVID-19

Online (every 2nd and 4th Wednesday)

In response to physician feedback, the Physician Health Program's drop-in online peer-support sessions, established in April 2020, are permanently scheduled for every second and fourth Wednesday at noon. The weekly sessions are cofacilitated by psychiatrist Dr Jennifer Russel and manager of clinical services Roxanne Joyce, and are drop-in with no commitment required. The focus is peer support, not psychiatric care. All participants have the option to join anonymously. To learn more about the sessions and the program, visit www.physicianhealth.com/how-we-can-help/peer-support. Email peer support@physicianhealth.com for the link to join by phone or video.

ANATOMY-BASED BOTULINUM TOXIN TRAINING

Online and Vancouver UBC campus (now–30 Dec 2022)

Expand your practice with injectables. Learn both the therapeutic (migraines/headaches) and aesthetic (fine facial lines and wrinkles) applications. PTIFA offers anatomy-based training (20+ hours) and training recognized by the highest standard of practice in Canada. Receive the most clinically based training, including the opportunity to inject eight-plus patients. Courses held monthly on UBC Campus in Vancouver. Start today with the online Level 1 – Advanced Anatomy course (20 CME). Save $500. Use code "BCMJonline" before 31 May 2022. Register now at PTIFA.com.

CME ON THE RUN! INTERNAL MEDICINE SESSION

Online (3 June 2022)

The CME on the Run! sessions are offered online. Registrants will receive an email about how to get to the online virtual portal before the session. This session runs on 3 June 2022 (Friday afternoon from 1–5 p.m.) and includes great speakers and learning materials. Topics include: Too Many Letters to Remember: Diabetes Treatment Options, An ACE Up One's Sleeve: Hypertension in 2022, Management of Heart Failure, Vascular Traffic Jam: Update on Peripheral Vascular Disease, Not Just Pins and Needles: Peripheral Neuropathy, Daily Vibrations: Management of Essential Tremors, Graves' Disease: Hyperthyroidism Management, and Adrenal Fatigue: Fact or Fiction? Learn more and register at https://bit.ly/cotr2021-2022 or email cpd.info@ubc.ca.

BC INFECTIOUS DISEASES SYMPOSIUM

Online (17–18 June 2022)

Join us for this popular annual conference, hosted online over 2 half-days by the Divisions of Infectious Diseases at VGH and SMH. Day 1 will cover a variety of infectious disease topics, such as: Lessons Learned during the COVID-19 Pandemic, Intra-Abdominal Infections, Human Microbiome and Its Role in Recurrent *Clostridium Difficile* Infection, Antimicrobial Resistance in Canada, Oral vs Intravenous Antibiotics, mRNA Vaccines and the Future of Vaccinology in Primary Practice, plus more! Day 2 will focus on in-depth case discussions built upon the previous day's lectures. All live sessions will be recorded and available for participants to watch on demand after the symposium. Accredited for up to 8.25 Mainpro+ / MOC Section 1 credits. Learn more and register at https://bit.ly/BCID22 or email cpd.info@ubc.ca.

GP IN ONCOLOGY EDUCATION

Online (12–23 Sept and 3–17 Oct 2022)

BC Cancer's Family Practice Oncology Network offers an 8-week General Practitioner in Oncology education program beginning with a 4-week virtual introductory session every spring and fall at BC Cancer–Vancouver. This program provides an opportunity for rural family physicians, with the support of their community, to strengthen their oncology skills so that they can provide enhanced care for local cancer patients and their families. Following the introductory session, participants complete a further 30 days of clinic experience at the cancer centre where their patients are referred. These are scheduled flexibly over 6 months. Participants who complete the program are eligible for credits from the College of Family Physicians of Canada. Those who are REAP-eligible receive a stipend and expense coverage through UBC's Enhanced Skills Program. For more information or to apply, visit www.fpon.ca or contact Dilraj Mahil at dilraj.mahil@bccancer.bc.ca.

Classifieds

Advertisements are limited to 700 characters. 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 November for December publication. Visit www.bcmj.org/classified-advertising for more information. **Ordering:** Place your classified ad online at www.bcmj.org/classified-advertising. Payment is required at the time that you place the ad.

PRACTICES AVAILABLE

COQUITLAM—NEW TURNKEY SPACIOUS MEDICAL CENTRE FOR SALE

This 2200 sq. ft., fully furnished, eight exam room medical clinic is for sale. The recently renovated primary care clinic is ready for a practice immediately. The clinic is turnkey and all equipment on site comes with the sale of the business. This includes $200 000 of furnishings and equipment. Email syuan@elicare.ca.

KAMLOOPS—SOLO PRACTICE AVAILABLE FOR FAMILY PHYSICIAN

Family physician with solo practice in Kamloops is looking to turn over a fully equipped practice to a physician able to provide longitudinal care for his patients. The clinic is centrally located and is set up with a well-managed and organized EMR (Telus Med Access). Available December 2022. For further information contact Santie at 778 220-0848.

VICTORIA—FP WALK-IN

Fee-for-service practice near downtown Victoria for 30 years with new and long-term patients of varied demographics. Looking to transfer ownership for retirement but will continue regular shifts for smooth transition. Oscar EMR, two exam rooms, equipped for minor procedures. Contact Dr Michael Greenwood at 250 388-9934 or jbcentre@telus.net.

EMPLOYMENT

ABBOTSFORD—FP FOR MULTIDISCIPLINARY MATERNITY OFFICE

Seeking family physician to join the Fraser Birth Collaborative in beautiful Abbotsford, BC. We are a team of physicians, midwives, counselors, nurses, physiotherapists, RMTs, etc., that provide full care for mothers and babies until 2 months after birth. We would like a physician to join us and provide family practice care inside the clinic to follow these babies after discharge from our care. Abbotsford is a community of 160 000 people, with a newer regional hospital, 1 hour from Vancouver. Contact inbox@fraserbirth.ca.

ACROSS CANADA—PHYSICIANS FOR YOU – MATCHING DOCTORS WITH CLINICS

Are you a physician looking for work or a medical facility requiring physicians? Our team works with independently licensed Canadian physicians, CFPC/RCPSC-eligible international medical graduates, and clinics across Canada. Check out our reviews and current job postings, and call Canada's trusted recruitment firm today! Visit www.physiciansforyou.com.

BC—CANABO MEDICAL SERVICES, PART-TIME, CHOOSE YOUR HOURS

Canabo Medical Clinic has a long-term mandate as being a leader in medical cannabis research. Physicians will enjoy the service of our professional team that takes care of all administrative, management, and billing needs to allow for complete focus on patients. Most patients come into our clinics with a diagnosis from their family physicians, making our physicians' jobs quite easy. We offer a very competitive split, part- or full-time schedules, and paid training with one of our leading expert physicians. We are fully compliant with CMPA and College of Physicians and Surgeons standards of practices as well as Health Canada guidelines. Please contact Natalie Davis at ndavis@cmclinic.ca.

BURNABY METROTOWN—FULLY FURNISHED, READY TO WORK, MEDICAL OFFICE SPACE FOR LEASE

Updated COVID-19-compliant, fully furnished, five-room medical clinic (970 sq. ft.). Street-level location and ample walk-by traffic. Free parking and within walking distance of Metrotown SkyTrain. Perfect for family practice, a walk-in clinic, and/or cosmetic medical. Incentives and attractive lease rates offered. If interested, please contact drniou@gmail.com.

LANTZVILLE—FAMILY PRACTICE

The Sow's Ear Medical Clinic is looking for a physician to join our family practice. This is a great opportunity to join an established clinic with a built-in patient panel. The clinic is located in Lantzville, just outside Nanaimo. This prime location means you can enjoy an ocean-front village feel with the comforts of big-city amenities only minutes away. We are a busy multiphysician clinic with an on-site lab and an adjoining pharmacy. Contact Vicky Smith at sowsear-docs@shaw.ca for more information. Visit our website at www.sowsearmedical.com.

NANAIMO—GP

The Caledonian Clinic has availability for a general practitioner (locum or permanent position). We are a well-established, very busy clinic with 23 general practitioners, one first-year resident, one second-year resident, a podiatrist, a geriatrician/internist, and an orthopaedic surgeon. Our EMR is Profile by Intrahealth. We are located in a modern new clinic in the Nanaimo North Town Centre. Lab and pharmacy services are on site within the centre. Contact Lisa Wall at 250 716-5360 or email lisa.wall@caledonianclinic.ca. Visit our website at www.caledonianclinic.ca.

NISGA'A VALLEY—FAMILY MEDICINE LOCUMS AND FTES
Family physicians needed to provide primary and urgent care for a population of 3500 in four communities across the traditional Nisga'a Territory, easily accessed by flights into Terrace. A supportive team of three to four physicians work together to provide full-scope services (excluding obstetrics). The health centres are staffed with full-time RNs who take the first call after hours. Soaring mountains, dramatic lava beds, natural hot springs, mountain-biking trails, and thriving salmon-filled rivers offer outstanding recreation year-round. Excellent remuneration, average > $11 000 per week. Contact Dr Jeremy Penner at md@nisgaahealth.bc.ca.

NORTH VAN—FP LOCUM
Flexible hours and vacation time with no call. In-office and/or telehealth options available with great MOA support staff and a new competitive split; 100% to doctors for optional hospital visits, nursing home visits, medical-legal letters, etc., or sessional work. For further information contact Kim at 604 987-0918 or kimgraffi@hotmail.com.

POWELL RIVER—LOCUM
The Medical Clinic Associates is looking for short- and long-term locums. The medical community offers excellent specialist backup and has a well-equipped 33-bed hospital. This beautiful community offers outstanding outdoor recreation. For more information contact Laurie Fuller. Phone: 604 485-3927, email: clinic@tmca-pr.ca, website: powellrivermedicalclinic.ca.

SOUTH SURREY/WHITE ROCK—FP
Busy family/walk-in practice in South Surrey requires GP to build family practice. The community is growing rapidly and there is great need for family physicians. Close to beaches and recreational areas of Metro Vancouver. Oscar EMR, nurses/MOAs on all shifts. CDM support available. Competitive split. Please contact Carol at peninsulamedical@live.com or 604 916-2050.

SURREY (BEAR CREEK AND NEWTON)—FAMILY PRACTICE
We are looking for part-time/full-time physicians for walk-ins/family practice to work on flexible shifts between 9 a.m. and 6 p.m.; option to work 7 or 5 days per week. Clinic with eight exam rooms, two physio rooms, and pharmacy on site. Competitive split. For more information, please contact Anand at wecaremedicalclinic2021@gmail.com or 778 888-7588.

SURREY/DELTA/ABBOTSFORD—GPS/SPECIALISTS
Considering a change of practice style or location? Or selling your practice? Group of seven locations has opportunities for family, walk-in, or specialists. Full-time, part-time, or locum doctors guaranteed to be busy. We provide administrative support. Paul Foster, 604 572-4558 or pfoster@denninghealth.ca.

SURREY (SCOTT ROAD)—FT/PT GPS FOR SUPPORTIVE, ESTABLISHED, PHYSICIAN-OWNED CLINIC
Arista Medical Centre is seeking FT/PT GPs for a busy family practice. Flexible schedule. Brand-new, modern, multidisciplinary, multiphysician clinic with a very collegial atmosphere and physician-focused MOA support with seven exam rooms. Free parking. Highly competitive split. Please contact Manni at info@aristamedical.ca or 604 572-1000.

VANCOUVER—FP/GYNECOLOGIST/PEDIATRICIAN/SPECIALIST, AND RMT
Cross Roads Clinics: Opportunity to join our large multidisciplinary clinic with excellent support focusing on family health, preventive health, and the care of women and children. Virtual care, extended flexible hours/scheduling, and vacation friendly. Modern 9000 sq. ft. facility with 34 patient rooms and gymnasium. Physiotherapy, massage therapy, naturopathic medicine, acupuncture, dermatology, minor surgery, pediatrics, women's health, infertility, contraception, menopause, and incontinence clinic on site. No need to build your practice as we have patients immediately available to you. Potential service contract for family medicine. Great opportunity to focus on patient care, whether new to practice or semi-retiring; allow us to manage the rest. Please contact admin@crossroadsclinics.com.

VANCOUVER/RICHMOND—FP/SPECIALIST
We welcome all physicians, from new graduates to semi-retired, part-time or full-time. Walk-in or full-service family medicine and all specialties. Excellent splits at the busy South Vancouver and Richmond Superstore medical clinics. Efficient and customizable Oscar EMR. Well-organized clinics. Please contact Winnie at medicalclinicbc@gmail.com.

MEDICAL OFFICE SPACE

SURREY—SELF-CONTAINED SPACE ACROSS FROM SURREY MEMORIAL HOSPITAL
Medical office space at City Centre 2. Two physician offices, 990 sq. ft. waiting area, four exam rooms. Space for two MOAs. One private bathroom. Parking space available for rental at additional cost. Utilities included. Available starting February 2022. Email: Carla at frasergeneralsurgerygroup@gmail.com. Phone: 604 416-0084. Turnkey options also available.

VACATION PROPERTIES

DUNCAN—EXECUTIVE SUITE AVAILABLE IN COWICHAN VALLEY
Spacious executive suite available near Duncan on Vancouver Island. A five-star Airbnb vacation property prior to the pandemic, it is now being offered as a short- to long-term rental unit: 1000 sq. ft., 3 bedrooms, 1.5 bathrooms on 3 wooded acres, furnished to make your stay as convenient as possible. Info at www.hollyberrysretreat.com.

MISCELLANEOUS

CANADA-WIDE—MED TRANSCRIPTION
Medical transcription specialists since 2002, Canada-wide. Excellent quality and turnaround. All specialties, family practice, and IME reports. Telephone or digital recorder. Fully confidential, PIPEDA compliant. Dictation tips at www.2ascribe.com/tips. Contact us at www.2ascribe.com, info@2ascribe.com, or toll-free at 1 866 503-4003.

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VANCOUVER—TAX & ACCOUNTING SERVICES

Rod McNeil, CPA, CGA: Tax, accounting, and business solutions for medical and health professionals (corporate and personal). Specializing in health professionals for the past 11 years, and the tax and financial issues facing them at various career and professional stages. The tax area is complex, and practitioners are often not aware of solutions available to them or which avenues to take. My goal is to help you navigate and keep more of what you earn by minimizing overall tax burdens where possible, while at the same time providing you with personalized service.
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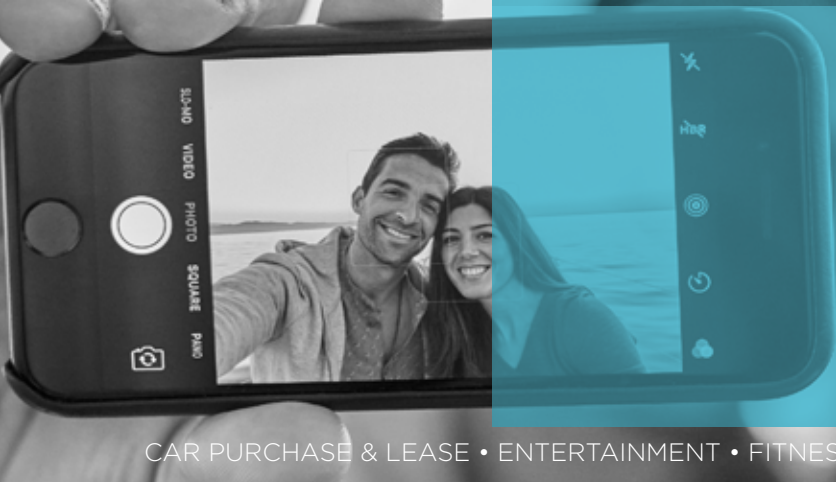

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