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Lyme carditis: A can't miss diagnosis

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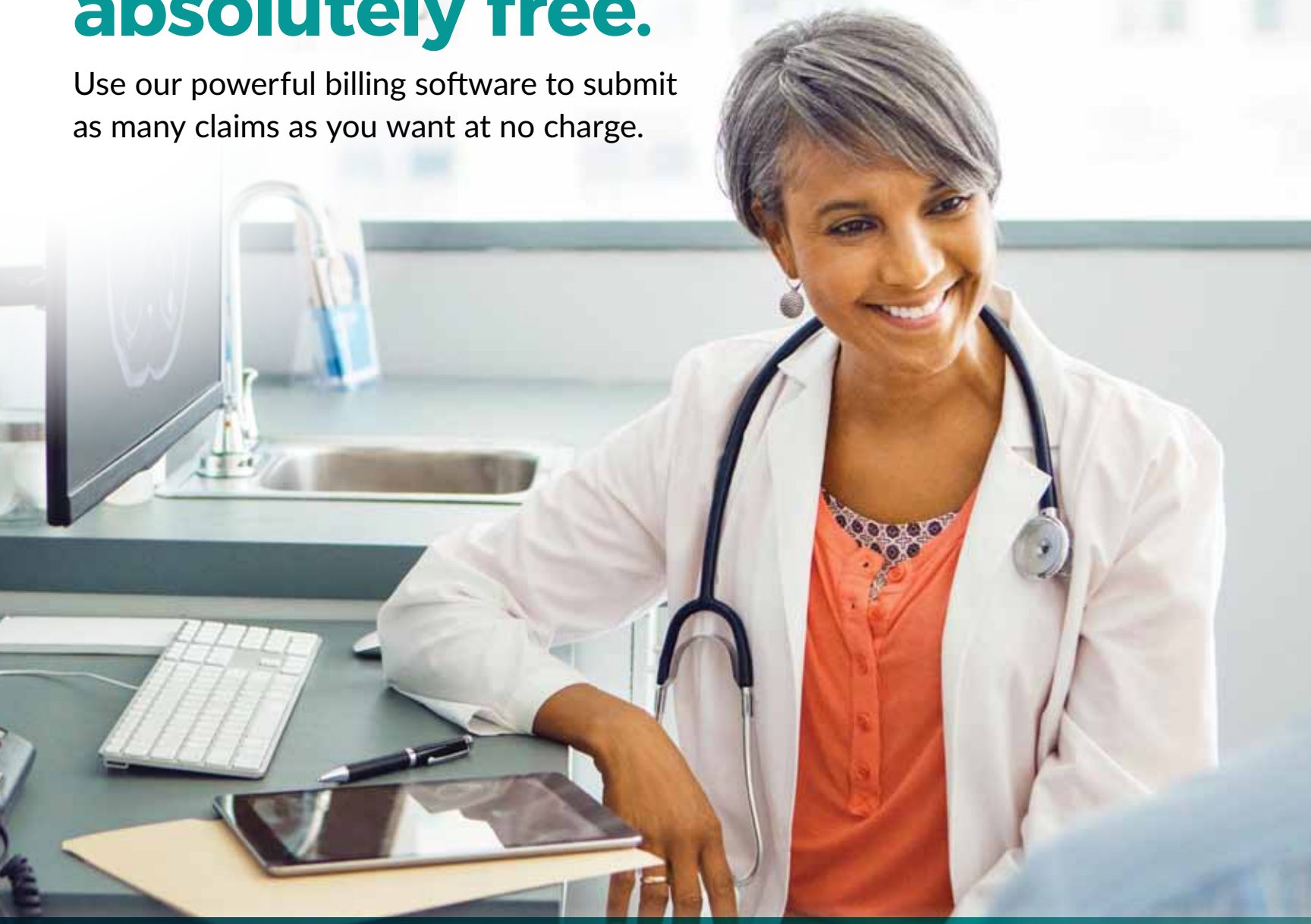

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Drs Fuchsia Howard and Greg Haljan are commencing research related to COVID-19 patients who have been released from the ICU and are now in need of long-term support—aftercare solutions that are currently lacking in Canada's health care system. News article begins on page 364.

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Environmental impact
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ON THE COVER
Lyme carditis: A can't miss diagnosis
Consider a diagnosis of Lyme carditis, an early manifestation of Lyme disease, if nonspecific cardiac symptoms have been preceded by flu-like symptoms and erythema migrans. Article begins on page 368.

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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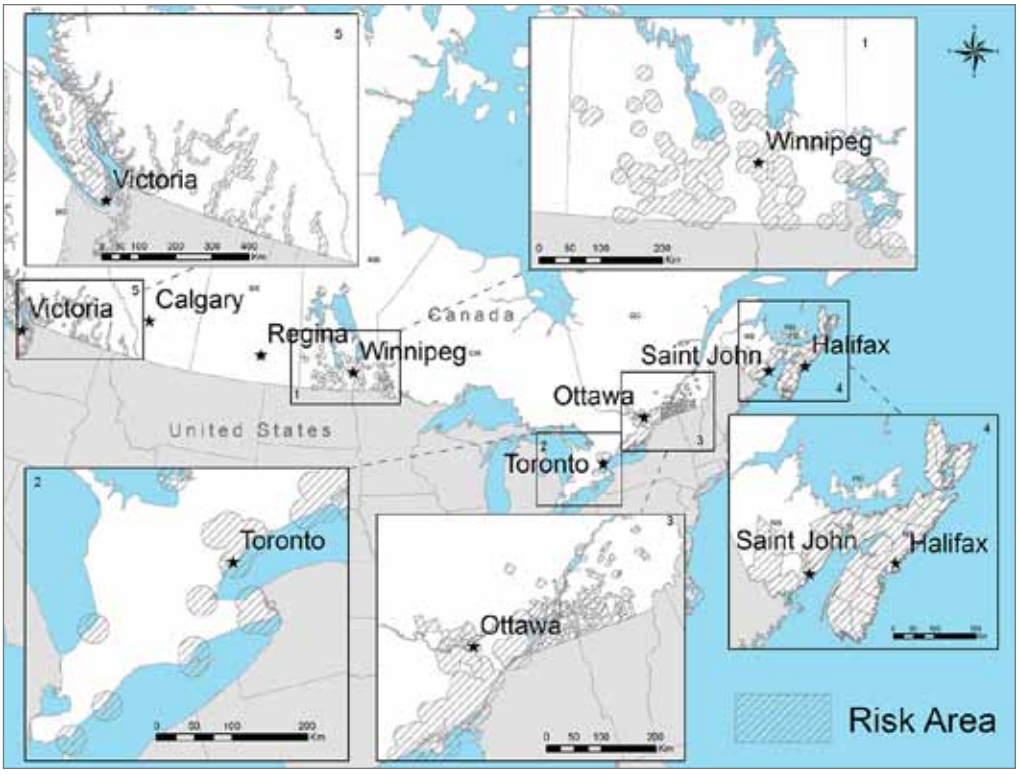


Endemic areas for Lyme disease throughout Canada. The article "Lyme carditis: A can't miss diagnosis" begins on page 368. Picture source: Government of Canada (www.canada.ca/en/public-health/services/diseases/lyme-disease/risk-lyme-disease.html#map)

Contents continued from page 359

Gloom season and social isolation

As I write this, it is almost palpable—the grey gloom of a West Coast November. Some love to be out during the dark rainy days of this season, but for most of us it is a challenging time. One primary care tip is to never stop mood disorder medications in the late fall as this commonly leads to clinical deterioration. The number of patients seen with mood disorders, particularly depression, seems to peak during this period of a constant wet twilight.

Personally, I struggle with lower energy and reduced motivation as the leaves fall and the winter season approaches. Leaving for and returning from work in the sprinkling darkness drains my joie de vivre. This is one major reason why I try to book a yearly winter escape to a sunny destination to recharge my batteries for the months ahead.

Due to the pandemic, this will not be happening this year. I realize that not being able to go on a Mexican vacation is a first-world problem, but I can already feel the darkness creeping in, so I am allowing myself to grieve a little. I am trying to remember that just because other people have bigger problems does not mean I cannot mourn my little one.

I do feel a little guilty focusing so much on myself, and in looking for ways to deflect these negative thoughts I choose to look to others. COVID-19 has increased feelings of isolation for so many vulnerable individuals in our society, particularly the elderly and those with disabilities. For these individuals, socializing prepandemic was not always easy either, due to mobility, transportation, and other issues. The knock-on effects of this pandemic—mask wearing, physical distancing, and limiting human interaction—all further increase isolation. At least during the summer (thanks to better weather) some outside contact was possible. I fear that, with the onset of harsher weather conditions, social isolation will deepen, leading to significant deterioration in well-being and mental health.

I struggle with lower energy and reduced motivation as the leaves fall and the winter season approaches.

All of us are aware of at least a few at-risk individuals through our family, friends, and patient contacts. Perhaps reaching out to them will be a benefit to all. I can think of a few distant relatives, social contacts, and patients in my practice who are particularly at risk of a mental health crisis secondary to social isolation. Awareness is the first step, but is not likely to result in any positive change. Therefore, I am going to strive to contact these individuals over the winter months. A spontaneous phone call does not cost much other than time, and it could make a positive difference in someone's struggle. I am even toying with the idea of creating a network for these people so they can talk with each other through this difficult time.

Thinking about reaching out to others already makes me feel a little better about the upcoming dark months. Maintaining a positive mental attitude can be challenging at times, so let's keep connected and remember that we are all in this together. ■

—David R. Richardson, MD

Private health care will never disappear—it is hardwired into human nature

Natura abhorret vacuum (nature abhors a vacuum), a physics concept attributed to Aristotle, generalizes to biology and is strikingly manifest by the tendency of life forms to colonize and inhabit hostile environments, including deep-sea thermal vents and probably also the waters of Antarctica's subglacial Lake Vostok—believed to have been isolated for 15 million years.

While evolutionary biology offers a simple explanation—passive natural selection—for colonization of the most forbidding ecosystems, human societal evolution is driven by a much more rapid and active mechanism, the tendency of our species to invent new needs when basic biological needs have been met, and our complementary ability to problem solve to meet those needs.

Cooperative problem solving to meet needs and wants is best illustrated by the human propensity to turn to the marketplace, a historic arena where ideas, goods, and services are traded. Our tendency to look to the market to meet needs and wants is so ingrained that black markets have never been eradicated by those in authority. For example, contraband items (e.g., drugs and weapons) and protection networks are well-known features of prison life. Where there is a will there is a way.

Universal health care systems that aim to provide essential care to all citizens regardless of their economic status necessarily impose queues and constraints that restrict choice and serve as barriers to care. While sacrificing choice and rationing care is undoubtedly essential to the greater good, patients who encounter these barriers face a dilemma. Should they passively accept state-imposed wait lists and other barriers or turn to the private market?

Whether driven by free choice or desperation, many turn to the market for private services, even in the face of condemnation from those in authority. Commercial surrogacy and the sale of transplant organs both thrive because individuals perceive that their needs cannot be met by state-controlled health systems.

Recently, a decision in the case of *Cambie Surgeries Corporation v. British Columbia* was rendered in BC Supreme Court following 11 years of litigation. The victory for the defendant was lauded by proponents of the single-payer system determined to ensure that medically necessary health care remains untainted by market forces. A sentiment also championing publicly funded non–user pay health care was recently expressed in the *Globe and Mail* (5 October 2020) by Dr Danyaal Raza, chair of Canadian Doctors for Medicare. In response to the revelation that Ontario patients were being charged $50 to $250 for a COVID-19 test, Dr Raza said, "This is absolutely jumping the queue in a time of crisis . . . it's unconscionable." A representative of the Ontario Ministry of Health agreed: "It has been brought to our attention that some providers are asking patients to pay in order to receive a COVID-19 test . . . this is not permitted."

Notwithstanding such condemnation, there appears to be no shortage of vendors willing to meet the needs of patients willing to pay privately for COVID testing; market forces tend to overwhelm imposed controls.

Such forces are clearly in evidence when one examines perhaps the most obvious health care crisis of our time—lack of access to primary care physicians. While the Cambie Surgery case (launched in 2009) focused on wait times for specialized surgical services, the *Vancouver Sun* reported on 15 September 2020 that 17% of BC residents (780 000) do not have a family physician, notwithstanding increasing numbers of family physicians being licensed. Why is this?

Simply put, more vendors (family physicians) are leaving the primary care market than entering it. While our provincial government recently announced $78.5 million to fund 22 primary health care networks in 13 health regions, this announcement lags well behind the market response (i.e., telemedicine and private clinics where members pay an annual fee to access bundled services including primary care). The provincial government's decision to publicly fund telehealth visits starting in April of this year in the face of COVID-19, a policy change widely expected to outlast the pandemic, likely reflects an acknowledgment by Ministry of Health officials that the market has already paved the way forward.

In any case, a sea change in primary care is afoot. For decades Canadian family physicians in urban and rural settings alike provided longitudinal and hospital care to patients through a simple but functional cottage industry model. Young physicians willingly relocated to locations where a market for their services existed. It is self-evident that few are now choosing this path; instead, they are choosing medical work more suited to their individual and family needs.

One can only wonder what the prevailing mode of primary care delivery will look like in a generation. Will health economists and officials succeed in rolling out continuing care models that are embraced by a majority of providers, including physicians, nurse practitioners, and others? Or will the "best-laid plans of mice and men often go awry," resulting in physicians and patients crafting their own solutions to the crisis in primary care? In my view, Robbie Burns, Scotland's beloved bard (quoted above), will be proven correct. I suspect that the market will lead, while health care planners scramble to keep up. ■

—David Esler, MD

Greetings from my family to yours

In my first words to you as president, I want to reflect on some of the things I am grateful for, acknowledge the challenges of the past year, and cast our eyes forward to 2021, where anything is possible.

First off, gratitude. I am grateful to live in this beautiful province we call BC, and I am grateful to the Indigenous peoples, for it is upon their ancient and unceded lands we all live, work, and play. I am grateful to live in Canada, a democratic country in which elections are largely a subdued affair, the timing of which may be contested, but not the results.

I am grateful for our colleagues in public health, especially Dr Bonnie Henry, her deputies and advisors, public servants, medical health officers, deputy medical health officers, and all others involved in making crucial decisions about our pandemic response. To adapt the famous words spoken by Winston Churchill during a dark hour in World War II, never in a global crisis has so much been owed by so many to so few. I am grateful to our political leaders for their willingness to share the stage with scientific experts, which stands in great and tragic contrast to other jurisdictions in the world. I am grateful for all essential workers, including delivery drivers, grocery workers, hydro crews, and sanitation workers who help us maintain one of the highest standards of living in the world despite some of the chaos around us. And I am grateful to all of you, my colleagues, who demonstrate every day what it is to be brave, to be innovative, to be compassionate, to be doctors in the time of COVID-19.

This pandemic began with frightening images from Wuhan, China; northern Italy; and New York. Field hospitals, morgues, and testing stations were quickly assembled to cope with the anticipated surge of ill people. Surgeries were canceled. Offices were closed. We moved to virtual care seemingly overnight. Everything changed.

And while the surge may not have materialized to the extent we anticipated, we still had to deal with the fallout. We rationed gloves and masks as supplies dwindled. We rapidly adapted our offices to see patients safely in person. We ramped up surgical and diagnostic capacity as much as we could while donning and doffing bulky personal protective equipment and working in facilities designed for throughput, not physical distancing. We innovated to deliver critical preventive care such as influenza vaccinations. We girded ourselves to deal with increased mental health and substance use concerns as we also looked after our own well-being.

I am grateful to our political leaders for their willingness to share the stage with scientific experts.

And lastly, while 2020 has been difficult, I know that you have been giving it your all for months without reprieve. I know that many of you are likely feeling exhausted if not teetering on burnout. But I also know that despite this, on any given day, at any given moment, you are out there crushing it 100%.

As we cross into 2021, COVID-19 will still be with us, but I remain optimistic for many reasons. Our understanding of this virus has evolved quickly, more quickly than for any human pathogen that has come before it. Massive global efforts are underway to develop new tests, treatments, and vaccines. Canadian industry has responded to the urgent call to produce critical supplies such as personal protective equipment and ventilators. We have made more advances in virtual care over the past 9 months than in the previous 9 years.

There is one more reason for my optimism. I know that this virus, no matter how many people it impacts, no matter what new obstacles it presents, cannot overcome all of us at once. There is always someone we can lean on, who can listen to our sorrow and who can build us back up. When you are feeling good, be that person to someone who is struggling. When you are feeling down, let that energized person into your life. We will all play these roles for one another in the coming months.

We face a choice as 2021 quickly approaches. Do we allow this virus to define us, or to divide us? Will we allow it to destroy our bonds with our fellow human beings? Or do we take stock of what is important, remember what we have rather than the little that we don't, reach out to someone who is struggling, and go bravely forward with renewed focus?

I choose to concentrate on the latter—to focus on the positives that have emerged throughout this year, as hard as they may be to see at times—and to take advantage of the opportunities that have resulted from these challenging times. We are living history, but indeed we live. And we find ways to thrive.

I wish the best of the season to each of you. May you find time to unwind, recoup, and re-energize. ■

—Matthew C. Chow, MD
Doctors of BC President

News

We welcome news items of less than 300 words; we may edit them for clarity and length. News items should be emailed to journal@doctorsofbc.ca and must include your mailing address, telephone number, and email address. All writers should disclose any competing interests.

BC's top family physician of 2020

Dr Tahmeena Ali

The College of Family Physicians of Canada (CFPC) and the Foundation for Advancing Family Medicine (FAFM) have selected the 2020 Family Physicians of the Year (recipients of the Reg L. Perkin Awards). Each year a recipient is nominated from each province by their peers, colleagues, and the CFPC's provincial chapters for their leadership, contributions to patient care, and commitment to family medicine teaching and research.

The 2020 Family Physician of the Year from British Columbia is Dr Tahmeena Ali, MD, CCFP, FCFP, from Surrey. Dr Ali obtained her medical degree from the University of Manitoba in her hometown of Winnipeg, completed her residency at the University of Alberta in Edmonton, and has been practising family medicine for 18 years. Dr Ali works as a full-service family physician in her practice in South Surrey, and at the Vine Youth Clinic in the Fraser Health Authority. Prior to this she spent 10 years working as a family physician in the emergency department of a hospital in a rural area of northern Alberta. Today, she continues to bring health care to underserved or vulnerable populations by working as a locum twice a year in remote communities on Cortes Island in BC.

In addition to her clinical practice, Dr Ali is also a professor of family medicine at the University of British Columbia, the privacy officer of HealthVue South Surrey Medical Clinic, and a medical inspector for the Ministry of Health's Billing Integrity Program.

Dr Ali is particularly passionate about mitigating the trauma that illness inflicts on her patients and those around them. From asthma to acquired brain injuries, maternity care to mental health, and rural to suburban settings, the multiplicity of opportunities to learn, grow, and heal is one of the things that Dr Ali enjoys most about being a family physician.

For the complete list of 2020 recipients and each recipient's biography, visit https://fafm.cfpc.ca/fpoy-2020.

Centralized PPE distribution system for doctors

The BC Ministry of Health plans to launch a centralized PPE distribution system for doctors at the end of November, to be followed with an incremental rollout around the province. This will enable doctors to order PPE at no cost for the duration of the pandemic.

Doctors who need additional masks to comply with the new mask policy are to connect with health authority contacts to place their orders. Health authorities have been directed to fill requests for masks, to meet the increased demand resulting from the new policy, at no cost to doctors. The new policy states that patients in doctors' offices are to be provided with medical masks.

Information about implementation of the PPE centralized system, interim requests for additional masks, and health authority contacts can be found in a memorandum on the Doctors of BC website at www.doctorsofbc.ca/sites/default/files/memo_ppe_distribution_november_13_2020_9_a.m._final.pdf.

Corrections to contact information included in the memorandum

To order masks if you work within Vancouver Coastal or Providence Health:

- Vancouver Coastal: Use online ordering portal. New users, email VCHCovid-19CentralSupply@vch.ca and an account will be set up for you.
- Providence Health: Doctors practising at PHC sites should contact Don Wills at dwills@providencehealthbc.ca.

New temporary fees for providing flu shots to adults

A temporary fee change has been approved that increases compensation to physicians for delivering respiratory immunizations to adults. The increased compensation will help offset the additional expenses incurred for providing flu shots during the pandemic. Two new temporary fees are available from 1 October 2020 to 30 April 2021. Detailed information is available at www.doctorsofbc.ca/news/temporary-billing-changes-providing-flu-shots-adults-during-covid-19.

Urgent need for long-term aftercare of post-ICU COVID-19 patients

Many COVID-19 patients released from the ICU reportedly suffer severe long-term effects including residual lung scarring, nightmarish hallucinations, hair loss, and neurocognitive deficits. There are also debilitating emotional ramifications related to the stigma of having had the virus, which can further impact a patient's ability to seek help or support after they've been ill. Dr Fuchsia Howard and Dr Greg Haljan will commence ongoing research related to COVID-19 patients who have been released from the ICU and are now in need of long-term support—aftercare solutions that are currently lacking in Canada's health care system. The work is part of a larger study that explores

how intensive care unit rehospitalizations can be prevented, for which both Dr Howard and Dr Haljan have received supporting grants from the Canadian Institutes of Health Research, and Dr Howard has received the Michael Smith Foundation for Health Research Scholar Award to investigate Critical Illness Survivorship.

Dr Howard and Dr Haljan's previous research in examining the aftercare of cancer patients revealed a large gap in post-ICU care, with 40% of ICU survivors readmitted to hospital within a year of discharge. They observed that 20% to 50% of patients released from the ICU later suffer from a wide variety of physical and emotional issues, termed post–intensive care syndrome (PICS).

This has been greatly exacerbated by COVID-19. The pandemic has highlighted the urgency for a broad long-term follow-up program that looks toward understanding the nuances of post-ICU survival. Comprehensive, holistic, and psychosocial support is crucial. PICS can compromise a patient's quality of life and a life lived on their own terms. It also puts stress on families who are tasked with the role of caregiver, leading to physical and financial burdens, especially for those with social inequities.

While over 80% of ICU patients survive, without seamless access to post-ICU aftercare, there is a remarkable cost that comes with it. COVID-19 presents an opportunity for provincial health care to prioritize ICU survivors and invest in patient-focused solutions.

Dr Howard, PhD, RN, is an assistant professor at UBC's School of Nursing. Dr Haljan, MD, FRCPC, is a clinical associate professor at the UBC Faculty of Medicine, local department head of critical care at Surrey Memorial Hospital, and the regional medical director of the Department of Evaluation and Research Services for the Fraser Health Authority. Dr Howard and Dr Haljan discuss their research on surviving the ICU in a video available at https://youtu.be/taRU1dXm4CQ.

New Hospital at Home fees

The BC government is implementing its Hospital at Home program across BC over the next few months to provide acute care services to patients in their own homes. The program allows eligible patients requiring hospital care to be "admitted" to hospital, but to receive that care at home from an interdisciplinary team led by a most responsible practitioner with hospital admitting privileges.

Hospital at Home is intended to provide care that is equivalent to the care provided in a hospital. It will allow a subset of acutely ill patients to choose an alternative to traditional inpatient treatment when appropriate and desired by both the patient and physician.

Effective 1 November 2020, two new fees are available to bill for Hospital at Home

Social isolation puts women at higher risk of hypertension

Researchers at the University of British Columbia are discovering that social isolation affects the health of men and women in different ways—including placing women at higher risk of high blood pressure. In a study published in the *Journal of Hypertension*, researchers discovered that middle-aged and older women who lacked social ties were much more likely than men to suffer from hypertension—a known risk factor for heart disease, which is the leading cause of death among women—and stroke.

Using data from the Canadian Longitudinal Study on Aging, researchers analyzed the social ties of 28 238 adults aged 45 to 85, and found that women who were nonpartnered, engaged in fewer than three social activities a month, or had a small social network (fewer than 85 contacts) had higher odds of hypertension. Average systolic blood pressure was highest among widowed, lone-living, and socially inactive women, and the largest difference in blood pressure was between widowed and married women. Widowed women were found to have the strongest likelihood of hypertension across all categories.

Among men, those who were single, shared a home with others, and had the largest social networks had the highest blood pressure, while those who had smaller networks and lived alone had lower blood pressure.

Researchers found that combinations of different social ties also mattered. Regular social participation appeared to have a protective effect among nonpartnered women, suggesting that health care providers may want to screen for the number of monthly social activities, and include these alongside healthy diet and exercise when treating nonpartnered older women.

Previous research by Dr Annalijn Conklin using the same data set found that women who were single, widowed, divorced, or separated had higher odds of abdominal and general obesity, while men were less likely to be obese if they lived alone and had a smaller social network.

Authors say more studies are needed on how exactly social connections impact cardiovascular risk factors. Prospective and intervention studies can help researchers understand this as well as why the associations are different for women compared to men.

Dr Conklin, assistant professor in the Faculty of Pharmaceutical Sciences at UBC and researcher with the Centre for Health Evaluation and Outcome Sciences is the principal investigator of the study. Dr Zeinab Hosseini, the lead author, contributed to the work as a former postdoctoral fellow at UBC. The study, "Social connections and hypertension in women and men," was co-authored by UBC sociology professor Dr Gerry Veenstra and UBC medicine professor Dr Nadia Khan, and funded by the Canadian Institutes of Health Research. Read the study online at https://tinyurl.com/y49qcks5 (subscription required).

services: a Hospital at Home visit fee and a Hospital at Home FP Conference with Allied Care Provider and/or Physician. Detailed information is available at www.doctorsofbc.ca/news/update-new-hospital-home-fees.

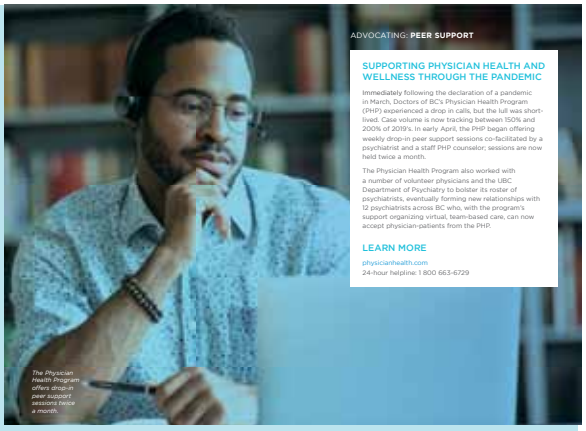
Virtual care technology to help patients prep for surgery

A new initiative, Stronger Together, has shown that virtual care can be used to assist patients with their pre- and postsurgery needs. The project helped a patient group in the Okanagan prepare for joint replacement surgery through week-by-week evidence-based virtual care. It is designed to improve patient health literacy, confidence, and outcomes through a combination of digital peer-to-peer social support, secure at-home remote monitoring of key vitals, and virtual one-on-one coaching from nurses and experts.

Dr Michelle Scheepers is an anesthesiologist with Interior Health and one of the pilot project's clinical leads. Dr Scheepers also serves as a quality improvement advisor with Interior Health. With the successful arthroplasty project completed, Stronger Together will be expanding offerings to support diverse patient populations across Canada, including in the areas of cardiovascular, stroke, mental health, COVID-19 support, and more.

The initiative is spearheaded by Curatio, a Vancouver-based digital health technology provider, along with CloudDX, a Canadian digital health company, and in partnership with Penticton Regional Hospital (Interior Health) and is supported by experts from the University of British Columbia and Simon Fraser University.

Released: Doctors of BC's new *Report to Members*



The *Doctors of BC Report to Members 2019–20* was released in late November and is available online now. Due to the COVID-19 pandemic, the association's annual general meeting and Board elections were rescheduled to early December 2020, resulting in a longer than usual reporting period. The theme of the report, "Advocating for our members," illustrates some of the ways the association has been working to support its members through the pandemic.

The report contains:

- Submissions from the association's CEO, president, chair of the Board, and speaker of the Representative Assembly reviewing the activities of the last year that have provided value to our members.
- Full audited financial report.
- Reports from committees, councils, sections, societies, and affiliated organizations.

The report is available now at www.doctorsofbc.ca/about-us/report-members.

Data migration support for Wolf EMR retirement

In preparation for the retirement of the Wolf EMR by 31 December 2023, the Doctors Technology Office and the Practice Support Program are available to family doctors as they migrate their EMR data to a new platform. Physicians can benefit from tailored advisory sessions and at-the-elbow coaching supports to help explain the transition process and to prepare panels for smoother data transfer. Physicians are encouraged to reach out for support well in advance of the termination date to allow for ample time to complete the process. For more information, contact dtoinfo@doctorsofbc.ca or call 604 638-5841.

RCCbc online rural innovations inventory to foster collaboration

The Rural Coordination Centre of BC's Rural Site Visits project is compiling details about local innovations through a new online rural innovations inventory (https://ruralinnovations.ca) to foster collaboration between communities wishing to address similar health care challenges. More than 100 projects are featured on the site so far. Consider submitting details of your idea, project, or initiative for inclusion in the inventory. To learn more or to discuss your project before submission, contact Innovations Concierge, Tracey DeLeeuw, at tdeleeuw@rccbc.ca.

Impacts of food security on nutrition

The 2020 Nobel Peace Prize was awarded to the World Food Programme (WFP) on 9 October 2020, thrusting the global plight of food insecurity and hunger back into the international spotlight.[1] After 2 decades of improvements, the rate of global hunger began increasing again in 2015. Last year, it was estimated that almost 690 million people worldwide struggled with chronic hunger.[2] Devastatingly, 2020 will see even more people struggle to access healthy nutrition as the social and economic impacts of the COVID-19 pandemic compound the global hunger crisis.[2]

Nearly 9% of the world's population has insufficient nutrition, but it is not only the lack of food that can lead to poor health in a population. Poor diet can lead to overweight and obesity as well to undernutrition.[2] The daily cost of a healthy diet has been estimated to be at least 5 times more expensive than one that is made up primarily of starches.[2] Additionally, adults with household food insecurity also have higher rates of health care utilization and costs.[3] The State of Food Security and Nutrition in the World report highlights the global need to ensure our interconnected food systems are transformed to yield affordable, accessible, and nutritious diets.[2]

As a family physician with a practice focused on obesity medicine, I have heard many patients relate their struggles to achieve a healthy diet. They report cost as a barrier when selecting fresh proteins, fruits, and vegetables at the store. They recognize the additional time cost when provided with well-meaning advice to prioritize home-cooked meals. Others report spending money on untested diet treatments or quick fixes, leaving little in the budget for the grocery store. Ultraprocessed foods can be cheaper, highly marketed, more addictive, and more accessible than their unprocessed counterparts, making them hard to resist and quickly adding additional costs to a household grocery budget.

Household food insecurity affects 12% of Canadians and millions of people around the globe.

Transforming food systems can feel mountainous, but there is much we can do as clinicians on an individual basis. Ask about the stability in your patients' lives with regard to food and financial security. Who does the shopping? Who does the cooking? These simple queries can be brief and yield good information when it comes to troubleshooting barriers to healthy nutrition.

Common strategies for helping patients achieve a healthy diet at lower cost[4] include:

- Batch cooking meals at home and freezing portions.
- Choosing frozen vegetables over more expensive fresh ones.
- Using coupons and planning ahead when shopping.
- Using new apps, such as Flashfood, to identify fresh products, nearing their best-before dates, at bargain prices at local supermarkets.

Having patients do a simple calculation of the money they've spent over 1 week on take-out, coffees, fast food, and grocery store junk food can be eye opening and help them find more room in their budget for more nutritious, whole foods. Local supports such as food banks (www.foodbanks.ca) can also help in a time of need, as can provincial and federal nutrition benefits programs that may provide additional nutritional and diet supports for some patients.[5] HealthLink BC also offers telephone and email support with registered dietitians (www.healthlinkbc.ca/dietitian-services) through the 8-1-1 service.

Household food insecurity affects 12% of Canadians and millions of people around the globe.[3] We can help our patients navigate healthy eating on a budget individually and advocate globally for transformative change to the food systems that nurture the world. ■

—Kelsey D.M. Kozoriz, MSc, MD, CCFP
American Board of Obesity Medicine Diplomate

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This article is the opinion of the Nutrition Committee, a subcommittee of Doctors of BC's Council on Health Promotion, and is not necessarily the opinion of Doctors of BC. This article has not been peer reviewed by the BCMJ *Editorial Board.*

Sympascho Young, MD, Omair Arshad, Yasemin Arikan, MD, Yazdan Mirzanejad, MD

Lyme carditis: A can't miss diagnosis

Clinicians should consider a diagnosis of Lyme carditis, an early manifestation of Lyme disease, if nonspecific cardiac symptoms have been preceded by flu-like symptoms and erythema migrans, especially if the patient is young, has no history of cardiac disease, and has recently traveled to an endemic area for Lyme disease.

ABSTRACT: Lyme disease, caused by the tick-borne spirochete bacterium *Borrelia* spp., is becoming increasingly prevalent in Canada. Lyme carditis is a rare but important early disseminated manifestation of the disease, which can present with high-degree atrioventricular block in otherwise healthy young adults. Timely treatment of Lyme carditis with appropriate antibiotics can lead to complete resolution. However, patients with Lyme carditis often have missed or late diagnoses, which can result in unnecessary pacemaker implantations, complications, and even fatalities. Considering Lyme carditis in the differential diagnosis of young patients presenting with new atrioventricular blocks is critical to ensuring timely diagnosis and treatment.

Dr Young graduated from the University of British Columbia medical school in 2020 and is now a resident physician in radiation oncology at the University of Western Ontario in London, Ontario. Mr Arshad is a medical student at the University of British Columbia (class of 2021). Dr Young and Mr Arshad are co–first authors of this article. Dr Arikan is a clinical assistant professor in the Department of Medicine at the University of British Columbia and is a staff infectious diseases physician at the Royal Columbian Hospital in New Westminster. Dr Mirzanejad is a clinical associate professor in the Department of Medicine at the University of British Columbia and is a staff infectious diseases physician at Surrey Memorial Hospital.

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Lyme disease is the most prevalent vector-borne disease in North America and Europe. It is caused by the gram-negative spirochete bacteria *Borrelia* spp., which are transmitted by the *Ixodes* spp. tick.[1] In Canada, the number of reported cases of Lyme disease dramatically increased from 144 in 2009 to 1487 in 2018.[2] Most of this increase occurred in Eastern Canada: 88% of reported cases in 2018 were from Ontario, Quebec, and Nova Scotia.[2] In BC, the trend is reversed: the number of reported cases declined from a peak of 40 (0.8 per 100 000) in 2016 to 9 (0.2 per 100 000) in 2018.[3] Nonetheless, risk modeling suggests that the overall incidence of Lyme disease in Canada may continue to increase as migratory patterns of birds that carry *Ixodes scapularis* are affected by climate change, which could result in further dispersion of *I. scapularis* into southeastern Canada. Given that the incidence of Lyme disease has generally increased in Canada and the disease and its complications can be difficult to diagnose, it is important for clinicians to be aware of the clinical manifestations of the disease.

Lyme disease progression

The progression of Lyme disease occurs in three stages:

Stage 1: Following the tick bite, there is a 3- to 32-day incubation period. Then, in 40% to 80% of cases, a localized skin infection, known as erythema migrans (EM), manifests at the site of the bite.[1] EM typically appears as a red annular skin lesion with a central clearing, and can be accompanied by a nonspecific infectious syndrome of fever, malaise, lymphadenopathy, myalgia, and headache.[1]

Stage 2: Early disseminated infection occurs a few weeks after the onset of Lyme disease and can include Lyme carditis, Lyme arthritis, and Lyme neuroborreliosis involvement.

Stage 3: Persistent infection lasts for at least 6 months and can include chronic Lyme arthritis and neuroborreliosis.[1]

This article focuses on Lyme carditis because it is often initially misdiagnosed and many patients report seeking medical attention several times before it is suspected. Misdiagnosis can lead to unnecessary implantation of permanent pacemakers in otherwise young and healthy people, which in turn can lead to a lifetime of pulse generator changes and risks of complications such as infection and lead dislodgement.[4]

Lyme carditis pathophysiology

Lyme carditis is believed to occur as a result of direct myocardial invasion by *Borrelia* spp. followed by an exaggerated macrophagic and lymphocytic inflammatory response within the cardiac tissues.[4] *Borrelia* spp. appear to have a tropism for cardiac tissues, which often involves the atrioventricular (AV) node, as evidenced

by autopsy findings.[5] The severity of conduction abnormalities is correlated with both the number of spirochetes present in the cardiac tissues and the degree of myocardial inflammation.[6] However, typically a small number of spirochetes are present within the cardiac tissue, but there is extensive lymphocytic infiltration, which suggests that the inflammatory response in Lyme carditis is exaggerated and likely plays a significant role in the pathophysiology of Lyme carditis.[7] Furthermore, evidence suggests there is cross-reactivity between anti-*Borrelia* antibodies and cardiac tissues; therefore, autoimmunity may be a contributor to this exaggerated inflammatory response.[8]

Lyme carditis manifestation

Compared to the cutaneous, arthritic, and neurological manifestations of Lyme disease, Lyme carditis is a relatively rare manifestation, with reported prevalence of 1.5% to 10.0% in the United States and 0.3% to 4.0% in Europe among adult patients with untreated Lyme disease.[9] Lyme carditis can be difficult to diagnose due to its rarity and nonspecific presentation. The signs of Lyme carditis are nonspecific cardiac symptoms, including syncope, presyncope, dyspnea, palpitations, and chest pain.[10] The most common electrocardiographic (ECG) manifestation of Lyme carditis is fluctuating atrioventricular block (AVB), which occurs in 90% of Lyme carditis cases, with 67% of those cases being third-degree **[Figure 1A]** or second-degree AVB **[Figure 1B, 1C]**.[4] The AVB can rapidly fluctuate from first-degree AVB **[Figure 1D]** to second- and third-degree AVB over minutes, hours, or days. Third-degree AVB can be fatal if untreated. Therefore, all Lyme carditis patients require strict cardiac monitoring.[4,9]

Lyme carditis can be difficult to diagnose due to its rarity and nonspecific presentation.

Lyme carditis manifests in early disseminated Lyme disease (stage 2), usually within 1 to 2 months after the onset of Lyme disease symptoms.[4] The presence of nonspecific flu-like symptoms and EM 1 to 2 months prior to the onset of nonspecific cardiac symptoms should prompt clinicians to consider Lyme carditis in their differential diagnosis. This is especially true if the patient is young, has no history of cardiovascular disease, and has recently traveled to an endemic area. Endemic areas in BC include Vancouver Island, the mainland coast across from Vancouver Island, the southern mainland, and the river valleys in southern BC.[11] Endemic areas throughout North America and Europe are shown in **Figures 2 to 4**. Similarly, history of a tick bite, especially from an endemic area for Lyme disease, that occurred 1 to 2 months prior to the onset of cardiac symptoms can be the proverbial "smoking gun" that strongly suggests the diagnosis of Lyme carditis. However, many patients do not remember being bitten, so the absence of a tick bite on history does not rule out Lyme carditis.[1]

Lyme carditis can also present with other conduction abnormalities, such as sinus bradycardia, sinus node disease, intra-atrial block, atrial fibrillation, supraventricular tachycardia, bundle branch block, ventricular tachycardia, ventricular fibrillation, and asystole.[4,10] Additionally, Lyme carditis can present as myopericarditis, myocarditis, pericarditis, and rarely, endocarditis or pancarditis.[10] Acute Lyme myopericarditis occurs in 10% of Lyme carditis cases.[10] This can lead to reduced left ventricular function, cardiomegaly, and clinical signs of congestive heart failure, though they are all reversible with appropriate treatment.[10] Lyme myopericarditis can mimic acute coronary syndrome, with ST depression or elevation,

Figure 1. Serial ECGs of a 27-year-old male with Lyme carditis, presenting with new onset progressive dyspnea and palpitations. Treatment with IV ceftriaxone was initiated on day 5.
(A) Third-degree atrioventricular block (AVB) with junctional escape rhythm, 41 bpm (day 1)
(B) Second-degree AVB with 2:1 conduction, 36 bpm (day 2)
(C) Second-degree AVB Mobitz I (Wenckebach), 46 bpm (day 5)
(D) First-degree AVB with PR interval of 308 ms, 37 bpm (day 8)

T wave inversion, and cardiac enzyme elevations.[4] Transthoracic echocardiogram can help distinguish between Lyme myopericarditis and acute coronary syndrome, as Lyme myopericarditis may show diffuse myocardial hypokinesis, while acute coronary syndrome would show regional wall motion abnormalities.[4] Cardiac magnetic resonance imaging or gallium-67 scintigraphy can be used for noninvasive diagnosis and monitoring of myocarditis.[10] Lyme pericarditis, which is more common in Europe (23% of Lyme carditis cases) than in the United States (2% to 5% of Lyme carditis cases), presents with signs and symptoms of pericarditis and can include complications of pericarditis such as pericardial effusion and cardiac tamponade.[10] Both Lyme endocarditis and pancarditis are very rare,[10] so they are not reviewed in this article.

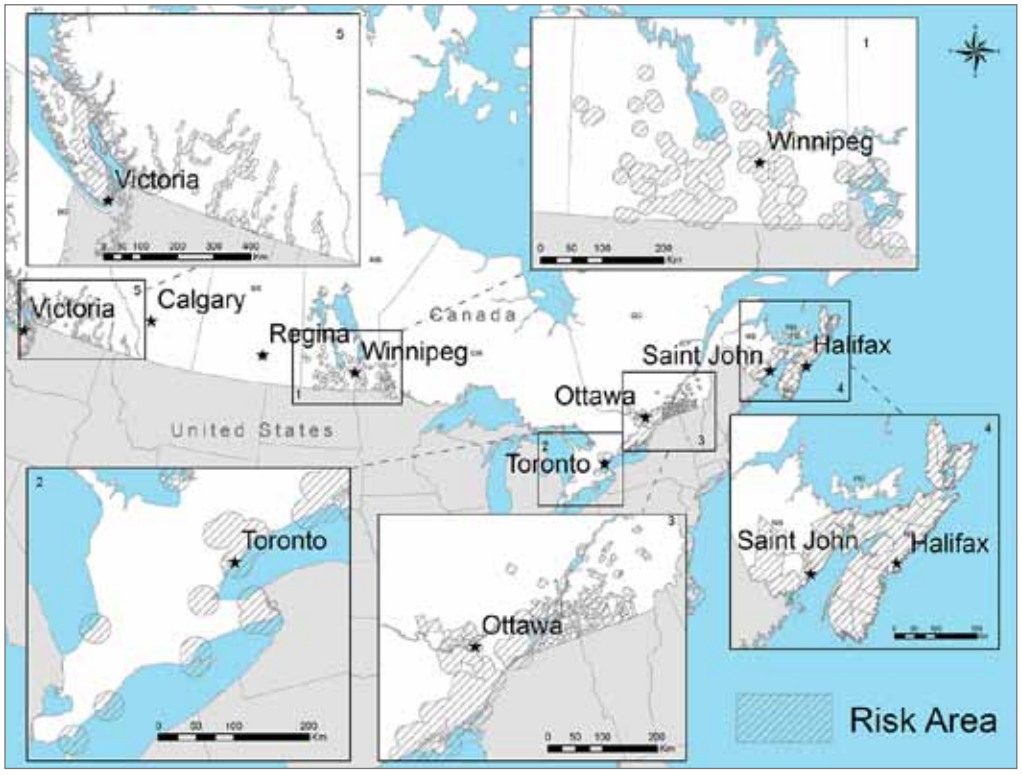

Figure 2. Endemic areas for Lyme disease throughout Canada. Source: Government of Canada (www.canada.ca/en/public-health/services/diseases/lyme-disease/risk-lyme-disease.html#map)

Lyme carditis and erythema migrans

Lyme disease and Lyme carditis are often misdiagnosed due to their rarity and variable presentation. Patients report seeking medical attention numerous times before the correct diagnosis is made.[4] For localized Lyme disease (stage 1), only 40% to 80% of patients develop EM.[1,10] It is important to note that EM typically appears within 7 to 14 days after the tick bite, and should be differentiated from the initial erythematous or blistering allergic skin reaction at the site of the bite. For example, EM will continue to enlarge in the first few days after its appearance, whereas an insect bite reaction will decrease in size. Furthermore, the EM lesion does not always manifest as the typical annular lesion with a central clearing. It can also manifest as an erythematous lesion without a central clearing, or with multiple rings around it, or with a central violaceous area.[1] Indeed, in an observational cohort study of 118 cases, central clearing was seen in only 9% of cases; homogeneous lesions and central erythema were observed in 59% and 32% of patients, respectively.[12] This can make recognition of EM, and by extension, diagnosis of

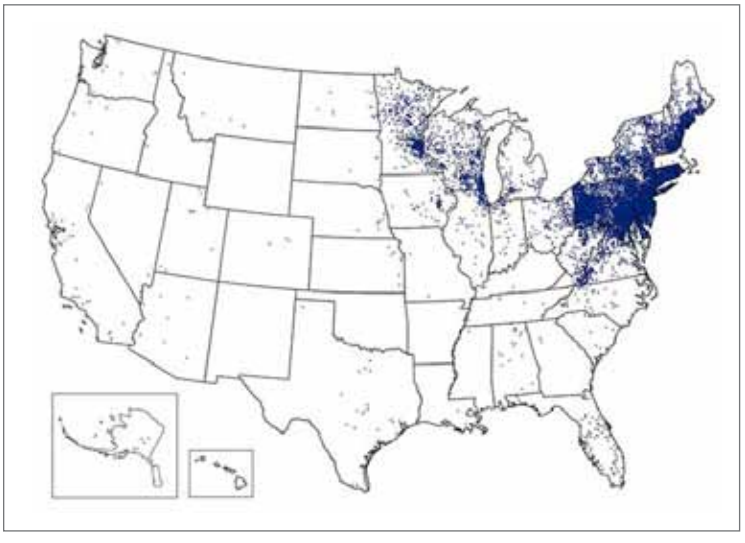

Figure 3. Endemic areas for Lyme disease throughout the United States. Source: US Centers for Disease Control and Prevention (www.cdc.gov/lyme/stats/maps.html)

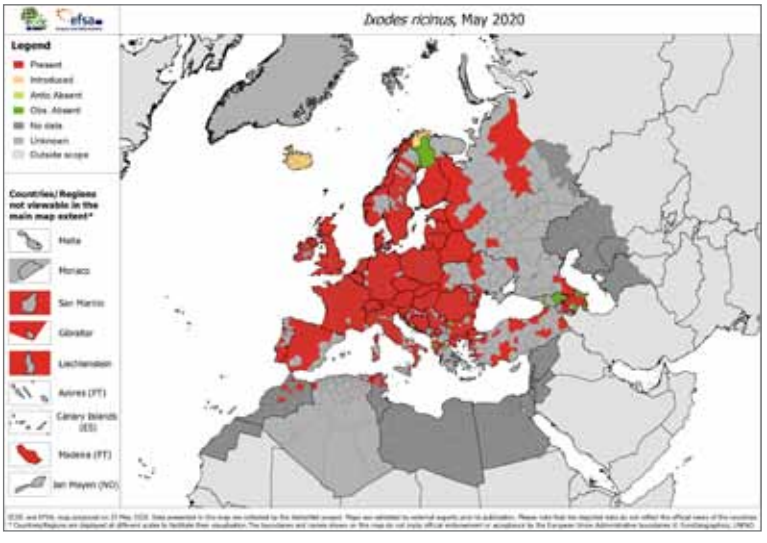

Figure 4. Endemic areas for Lyme disease throughout Europe. Source: European Centre for Disease Prevention and Control (www.ecdc.europa.eu/en/disease-vectors/surveillance-and-disease-data/tick-maps)

Lyme disease, difficult. As such, the cutaneous manifestations of Lyme disease are sometimes misdiagnosed as more common dermatologic diseases.[13]

Lyme carditis can also be difficult to diagnose because the preceding history of flu-like symptoms, EM, and travel usually occur 1 to 2 months prior to the cardiac presentation; therefore, clinicians may not ask about the preceding illness, and patients may not volunteer this information because it may seem irrelevant. Furthermore, the EM lesion may go unnoticed or may have resolved by the time cardiac symptoms appear. In one review of Lyme carditis patients with third-degree AVB, 40% of patients presented without EM and had syncope as the only presenting symptom.[6] Therefore, although the presence of EM is a very useful diagnostic indicator to suggest Lyme carditis, the absence of EM does not rule out Lyme carditis.

Diagnosis of Lyme carditis

Lyme carditis diagnosis is confirmed via Lyme serology **[Figure 5]**.[4] To aid in the clinical diagnosis and empiric treatment of Lyme carditis, Besant and colleagues[14] developed and validated a highly sensitive (93%) risk stratification score called the suspicious index in Lyme carditis (SILC) score **[Table 1]**, which evaluates the pretest probability that a patient's new onset AVB is caused by Lyme carditis. The variables of the SILC score can be associated with the mnemonic CO-STAR: constitutional symptoms, outdoor activity/endemic area, sex = male, tick bite, age < 50 years, and rash (EM).[14] Patients with a high-degree AVB and a SILC score > 2 have an intermediate or high pretest probability of Lyme carditis; therefore, they should be tested for Lyme serology and begin empiric antibiotic treatment for Lyme carditis while serology results are pending.[4] Patients with a high-degree AVB and a SILC score ≤ 2 have a low pretest probability of Lyme carditis; therefore, they should undergo standard treatment for high-degree AVB and should not receive empiric antibiotic treatment.[4] These patients generally do not require Lyme serology testing, but because each clinical situation is unique, the decision to test ultimately rests with the clinical judgment of the health care team.

Lyme serology is a two-tiered test: (1) enzyme-linked immunoassay (EIA), which, if positive, is followed by (2) Western blot for confirmation **[Figure 5]**.[15] However, it is important for clinicians to note that whole cell EIA can be falsely negative in early Lyme carditis; therefore, a negative serology result does not rule out Lyme carditis.[9] If Lyme serology is negative but there is high clinical suspicion of Lyme carditis, such as a SILC score > 2, the patient should be empirically treated for Lyme carditis. In this case, a C6 peptide EIA test may be appropriate because it is a more sensitive test for early Lyme carditis than the standard

TABLE 1. Suspicious index in Lyme carditis (SILC) score. (Source: Besant and colleagues[14])

Variable	Points*
Constitutional symptoms†	2
Outdoor activity or endemic area	1
Male sex	1
Tick bite	3
Age < 50 years	1
Erythema migrans	4

* 0–2: Low pretest probability of Lyme carditis
3–6: Intermediate pretest probability of Lyme carditis
7–12: High pretest probability of Lyme carditis
† Fever, malaise, arthralgia, dyspnea

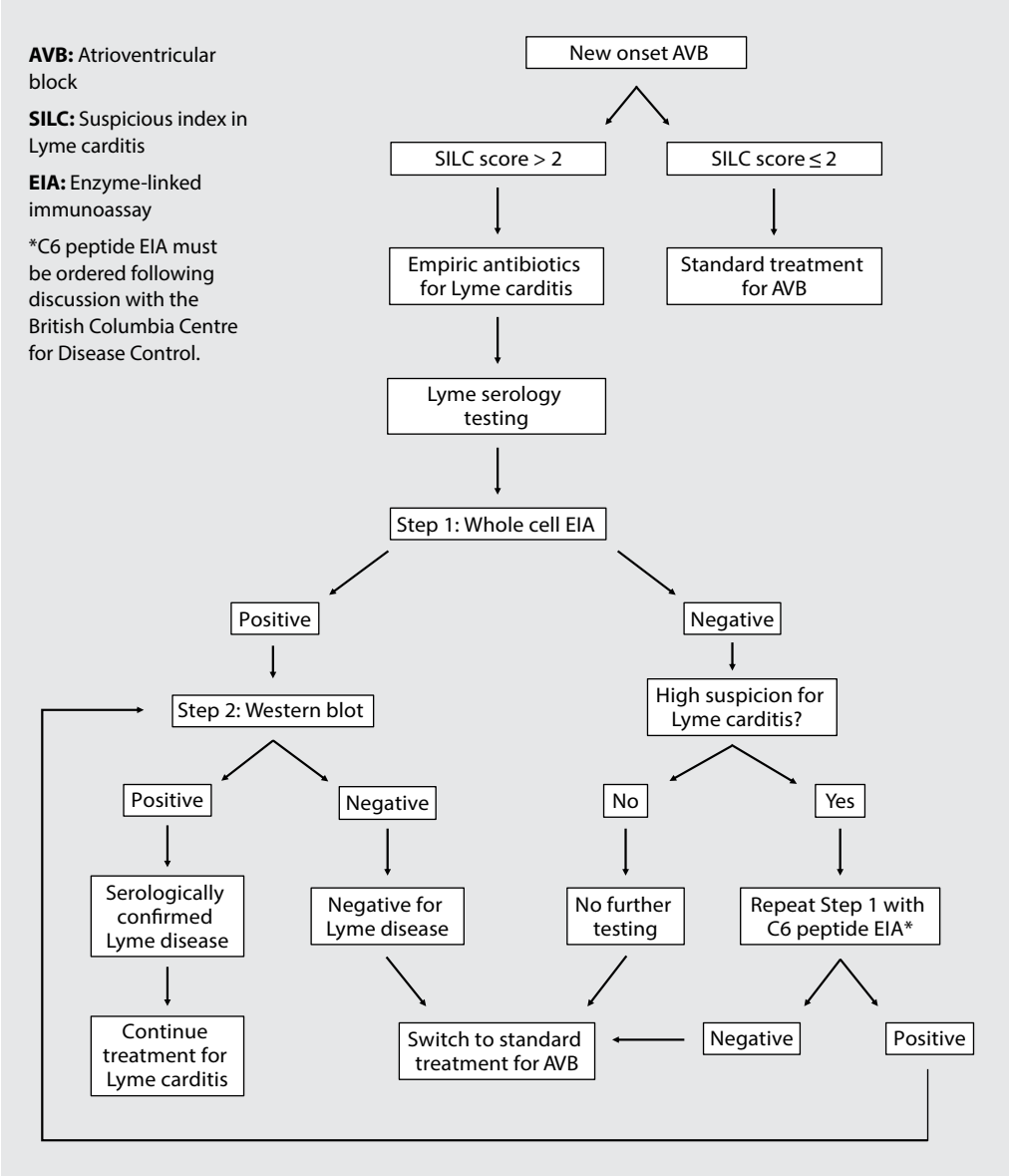

FIGURE 5. Proposed diagnostic and treatment algorithm for Lyme carditis.

methodology of whole cell EIA.[16] In BC, most clinicians cannot independently order the C6 peptide EIA test; it must be ordered following discussion with the BC Centre for Disease Control. A positive C6 peptide EIA still needs to be followed by a Western blot for confirmation. Further details on Lyme serology testing can be found in Scheffold and colleagues[9] and Marques.[15]

Treatment of Lyme carditis

Lyme carditis is fully reversible with timely and appropriate antibiotic therapy: most cases of AVB resolve within the first 10 days of antibiotic administration.[4,9] The choice of antibiotic treatment varies based on the severity of the presentation **[Table 2]**. Treatment should be started immediately after Lyme carditis has been clinically diagnosed. It is especially important not to wait for serology results before initiating antibiotic treatment because increased morbidity and mortality can occur, as seen in a recent case of Lyme carditis in New England.[17]

Because the AVB is fully reversible with appropriate antibiotic therapy, permanent pacemaker placement is usually not indicated for Lyme carditis, though a temporary transvenous pacemaker is required in 33% of cases.[4] The indications for temporary pacing are symptomatic bradycardia, hemodynamic instability, or high-risk features on ECG, such as alternating bundle branch block.[4] With appropriate antibiotic treatment, AV conduction is restored in a stepwise fashion from-third degree AVB **[Figure 1A]**, to second-degree AVB **[Figure 1B, 1C]**, then first-degree AVB **[Figure 1D]**, then back to normal.[4]

Yeung and Baranchuk[4] outlined an excellent pre- and post-discharge cardiac testing protocol for Lyme carditis patients. Once 1:1 AV conduction is restored, the temporary pacemaker can be removed. A predischarge stress test is recommended to assess the stability of the AV conduction and the need for a permanent pacemaker. All Lyme carditis patients should also have an outpatient ECG at 4 to 6 weeks postdischarge to assess for rhythm or conduction abnormalities.

Summary

Clinicians should consider Lyme carditis in the differential diagnosis of new onset AVB. Clinical clues for diagnosing Lyme carditis include the following: a young patient without a history of cardiovascular disease, presence of flu-like symptoms, history of tick bite and/or travel to an endemic area for Lyme disease 1 to 2 months prior to the onset of AVB, and the presence of EM. Early detection and treatment of Lyme carditis will reduce the incidences of morbidity and mortality from this rare but important manifestation of Lyme disease. ■

Competing interests

None declared.

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TABLE 2. Antibiotic treatment for Lyme carditis.[1,4]

Presentation	Line of treatment	Antibiotic	Duration of therapy
1st degree AVB*	1st	Doxycycline 100 mg PO BID	14–21 days
	2nd	Amoxicillin 500 mg PO TID	
	3rd	Cefuroxime 500 mg PO TID	
	4th	Erythromycin 250 mg PO QID	
2nd or 3rd degree AVB	1st	Ceftriaxone 2 g IV q24h	10–14 days,† followed by oral antibiotics‡
	2nd	Cefotaxime 2 g IV q8h	
	3rd	Penicillin G 5 million U IV q6h	

*AVB: atrioventricular block
†Until 1:1 atrioventricular conduction is restored
‡Combined total course of IV and oral antibiotics should be 14–21 days

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From diagnostics to theranostics, and why better cancer care will always be costly

A report on this promising technology, and a warning that it will come with a significant price tag.

H.M.K. McGillivray, BSc, C.F. Uribe, PhD, A. Rahmim, PhD, M.M. Muermann, BSc, R.J. Wassersug, PhD

ABSTRACT: The history of radiological scanners and why we can expect diagnosing cancer to continue to get better, but not necessarily cheaper. This is due in part to a continued desire to capture images faster and with higher resolution. Better instruments, at the same time, reveal more incidentalomas, which drive up the cost of medical care.

Theranostics (i.e., *thera*peutics plus diag*nostics*) using radiopharmaceuticals promises to improve cancer diagnoses and therapeutics. However, some of the most promising theranostic agents depend on rare isotopes that are difficult to acquire and expensive to convert to drugs that can localize and/or kill cancer cells. While better cancer care is likely in the near future, it will come with an unavoidably high price tag.

Ms McGillivray is a medical student at the Edinburgh Medical School, University of Edinburgh in Scotland. Dr Uribe is a medical imaging physicist at the BC Cancer Agency in Vancouver. Dr Rahmim is a senior scientist at the BC Cancer Agency and an associate professor of radiology and physics in the Department of Radiology at the University of British Columbia. Mr Muermann is a medical student at the University of British Columbia. Dr Wassersug is an honorary professor in the Department of Cellular and Physiological Sciences at the University of British Columbia.

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Introduction

The rising cost of cancer care is a major challenge to the medical system worldwide. Media coverage typically focuses on drug costs, hospital stays, and medical procedures, while less scrutiny is given to the cost of diagnostics. Here we focus on diagnostic technologies of computed tomography (CT), positron emission tomography (PET), and single photon emission computed tomography (SPECT), and how they are beginning to blend with therapeutics in a way that foreshadows much better but, unavoidably, more expensive cancer care.

One factor that has contributed to rising health care costs for decades is that diseases, most notably cancers, are being diagnosed more frequently than ever. Cancer risk increases with age, and higher rates of diagnosis can be attributed in part to us simply living longer.[1] However, the increased use of diagnostic technology is also a factor. We now have screening tests for three of the major cancers: prostate, breast, and colorectal.[2] Screening makes it possible to detect and treat cancers early, increasing the chances of a good prognosis.[2] However, screening invariably leads to more cancer diagnoses, as it uncovers tumors that would have never become clinically significant during the patient's lifetime. Health economists have struggled to develop heuristics that best assess the costs versus the benefits. When trying to save lives with finite funds, it is not clear how one should weigh the size of the population at risk and the clinical impact of new technologies, versus the related financial burden.[3-5] This is a moving target as each effort to contain diagnostic costs is met with evidence that diagnostic technology improves patient survival.

Admittedly, there has been progress in cancer care that cannot be accounted for by increased screening and early detection. This shows up in data (e.g., on the 5-year survival rate), which has climbed for nearly all cancers over the last decade. This is true even for cancers that have no dedicated screening tests and disheartening outcomes, such as pancreatic cancer, for which the 5-year survival rate has almost tripled since 1975.[6]

Screening accounts for at most 50% of increased survival of patients with cancer.[7] The decline in deaths from lung cancer can be directly credited to fewer people smoking[8] and advances in treatment.[7] Although we certainly have not won "the war on cancer" that President Nixon declared nearly half a century ago, we are inching in the trenches in the right direction.

But what of the financial burden? Expenditures for cancer diagnoses and treatment in Canada rose from $2.9 billion in 2005 to $7.5 billion in 2012.[9] Additional insights into how much cancer care costs beyond drug costs can be made from a retrospective look at changes in cancer diagnostics and treatment in previous decades as well as projecting cancer incidence.[10]

We argue that among the factors raising the cost of oncological care are diagnostics. Progress in this area depends on early and accurate detection. Our ability to effectively treat cancer often relies on how precisely we can localize tumors. It is only through imaging that surgical intervention and targeted radiotherapies are possible. Even with systemic treatments like

chemotherapy, monitoring tumors can be critical to assessing a patient's response to therapy.

However, precision diagnostics are not cheap, and their cost is likely to rise in the coming decade due to a growing elderly population and technological advancements. One such recent change involves merging therapeutics with diagnostics, potentially improving cancer care dramatically.

Some history

Seven decades after W.C. Röntgen discovered X-rays, Sir Godfrey Hounsfield built a system that could irradiate the body with them at different angles. Applying similar mathematics as originally developed by Johann Radon in 1917 and later by Allen Cormack in the 1960s, Hounsfield was able to generate 3D images of internal structures. This led to the first computed tomography (CT) machine, the EMI Scanner.[11]

Pixels on the original CT images measured 3 x 3 mm.[12] Newer scanners have reduced this to the submillimetre range.[13] Improved spatial resolution has provided radiologists with enhanced clarity that allows them to locate tumors that are barely different from normal tissue. Some of these tumors are even difficult to identify with the naked eye when surgically removed.[14]

Scanning speed has also dramatically improved. In the 1970s when the first CT scanner was used to image the head, a single scan could take up to 20 minutes.[12] A single comparable CT scan now takes less than one-third of 1 second, meaning images can be produced 3000 times faster.[12]

PET scanners have also become increasingly popular due to their higher sensitivity compared to other imaging modalities. PET involves injecting radioactive tracers that emit pairs of photons that interact with a ring of detectors to generate images. PET images combined with the anatomical information obtained with CT or MRI can localize tumors as well as reveal other possible lesions.

As impressive as scanners are today, there is good reason to want them to be better. Making scanners faster can improve spatial resolution and increase their sensitivity. Faster scanners reduce wait times and increase diagnostic efficiency. Improved resolution allows for detection of smaller lesions that may have previously gone unnoticed. Better sensitivity increases the chance of early detection leading to a better prognosis.

The costs

The BC Ministry of Health will spend approximately $21 billion in the 2019/20 fiscal year, not counting additional costs due to the COVID-19 pandemic.[15] According to the *American Journal of Medicine*, diagnostic imaging is a major contributor to rising health care expenditures across North America.[16]

Improved imaging modalities are uncovering additional incidentalomas, which lead to often-unnecessary investigations and invasive treatments.

In 2004 American citizens were already spending US$100 billion per year on diagnostic imaging,[17] either out of pocket or through insurance programs, and that amount has increased annually.[18]

Admittedly, defensive medical decision making by physicians has contributed to some overuse of diagnostic imaging. Recognizing this problem, the American College of Radiology (ACR) developed clinical guidelines for physicians to help them decide when scans are warranted. The Choosing Wisely campaign, founded by the ACR in 2012 and adopted by the Canadian Medical Association in 2014, offers clinical recommendations for scanner use.[19,20] The consortium's goal is to reduce unnecessary imaging and save costs across the board.[16] The concern is justified as the demand for diagnostic imaging is increasing. In BC alone, funding for MRI scans was recently increased by 20% in 2018–2019 in order to conduct 37 000 additional tests per year.[21] However, only a fraction of that growth can be accounted for by clinical scanner overuse.

The growth in clinical scanner overuse can also be partially attributed to the medical devices market, which exploded in the 1970s but has since shrunk to a limited monopoly. EMI was the first company in this space and started marketing its CT scanner in 1972. Within 2 years, 10 companies were selling CT hardware.

Modern scanners are produced by a few large companies. While many smaller companies have contributed to advances in CT, MRI, PET, and SPECT technology, these start-ups have been continually acquired and absorbed by the bigger players. There is now a limited monopoly of international companies controlling the scanner markets; five companies account for approximately three-quarters of the global market in medical imaging.[22] Some critics believe the lack of competition contributes to the high cost of modern scanners, but modern medical imaging machinery is complex and unavoidably expensive to manufacture and maintain.

Scanner technology has improved in recent years and there is a desire for this to continue, and the drive for quality (i.e., fast machines, higher resolution, higher sensitivities) largely exceeds the concern for cost.

An epidemic of incidentalomas

With improved resolution, scanners increasingly find incidentalomas—incidental findings of benign tumors, cancerous lesions, or other abnormalities.[23] With improved scanning, more scans, and better technology, incidentalomas are among the fastest-rising medical findings.

According to a recent systematic review, incidentalomas appear in over a third of cardiac MRI, chest CT, and CT colonoscopy scans.[23] While incidentalomas are almost always benign, certain cancers prove exceptions to this trend (e.g., less than 5% of lung and brain incidentalomas are malignant; 25% of ovarian incidentalomas are malignant). The highest incidence of malignant incidentalomas is for the breast, at 42%.[23] In a review of CT lung cancer screening, incidental lung nodules were found in 51% of study participants; however, 95% of those incidental findings were benign.[24]

There are benefits and disadvantages to the incidentaloma epidemic. When an

incidentaloma is identified, patients can expect additional investigations.[23,25] While the majority of incidentalomas are benign, many patients experience great distress at the prospect that it may be malignant between the time of discovery and definitive diagnosis. Patients have undergone unnecessary procedures, even surgery, to eliminate suspicious lesions that were found postoperatively to be benign and harmless.[25] Benign incidentalomas are responsible for much patient anxiety and exposure to unnecessary surgeries with significant downstream costs. If a benign incidentaloma had not been picked up on diagnostic scanning, it would have made no difference to a patient's life.[23,25]

Incidentalomas have also contributed to the rise in diagnoses of true cancers. Prior to the 1980s, pancreatic cancer was almost always diagnosed too late. Imaging technology was not advanced enough to identify it in time for successful treatment. Although pancreatic cancer is still highly lethal, incidental findings on modern scans are resulting in a growing portion of patients being diagnosed earlier, treated earlier, and living longer.[26]

Advances in technology

Newer radiopharmaceuticals have also helped make the images captured by diagnostic hardware more specific. Most PET imaging relies on the fact that glucose metabolism is accelerated in cancer cells relative to healthy cells, which also consume glucose. The most commonly used PET radiopharmaceutical is a molecule similar to glucose (labelled with ^{18}F radioisotope of fluorine) to create fluorodeoxyglucose (FDG). Because of their higher metabolic rate, most cancer cells take up this radiopharmaceutical faster than normal cells, meaning they appear brighter on PET images.

A major recent advance in prostate cancer imaging makes uses of prostate-specific membrane antigen (PSMA). There are now pharmaceuticals that, when injected into patients, specifically bind to PSMA.[27] Radioisotopes (e.g., ^{18}F, ^{68}Ga) attached to those molecules allow us to detect prostate cancer cells wherever they may be in the body. A PET scan using the radiopharmaceuticals that target PSMA in combination with a CT scan can locate prostate cancer tumors that would be invisible with other imaging modalities.

Targeting PSMA isn't useful only for locating prostate cancer—it can also be used to treat the disease. This can be done by linking a PSMA-binding pharmaceutical with a radioisotope such as Lutetium-177 (^{177}Lu) or Actinium-225 (^{225}Ac), which are beta and alpha radiation emitters, respectively. The goal is no longer to simply locate the cancer cells; it is to use the radiation to kill them. Alpha and beta particles can irreparably cleave cellular DNA and kill the cells in situ.

Upgrading radioisotope functionality from purely diagnostic to therapeutic by binding PSMA is an example of the blossoming field of theranostics. Theranostics begins with diagnostic imaging assessing disease location and tumor burden. Based on the tumor load, several therapy cycles with alpha or beta emitters can treat the disease first identified and monitor it via diagnostic images.

In some cases, the same isotope can be used to both image and treat. This is the case with ^{177}Lu bound to PSMA, which has a radio-decay pattern that can be imaged using SPECT while its beta emissions simultaneously kill the cancer cells. This makes it possible to assess and optimize how much radiation is being delivered to tumors while minimizing toxicity to normal tissues.

What's the catch?

Whether for diagnostics or therapeutics, no pharmaceutical company can patent a radionuclide or the PSMA molecule itself, as both exist in nature. That said, there is great competition to develop molecules that bind to PSMA and can be labeled (i.e., chelated) with a radioisotope of interest either for diagnostics or therapy. The best molecule will bind to cancer cells while sparing healthy tissue. As one indication of the amount of industrial interest here, in 2018 Novartis (Novartis International AG, Switzerland) purchased biopharmaceutical manufacturer Endocyte Inc. for US$2.1 billion in order to acquire the rights to market PSMA-617, a PSMA ligand that can be labeled with ^{177}Lu, a beta-emitting radioisotope.[28] This isotope has been of special interest because it also emits gamma particles when it decays. These photons allow for the generation of diagnostic images using SPECT, at the same time as beta particles are used to treat the cancer.

A large multicentre phase III clinical trial of a ^{177}Lu-radionuclide PSMA target therapy recently closed to accrual.[29] It is anticipated to lead to FDA approval of this radionuclide therapy within a year.

One of the most promising radioisotopes for treating prostate cancer, also mentioned above, is ^{225}Ac coupled to a PSMA-targeting molecule. The alpha particles emitted in the decay of ^{225}Ac are more lethal to cancer cells because they deposit all the energy locally (generating DNA breaks that are harder to repair), compared to beta particles, which travel further in tissue. This reduces injury to normal tissue surrounding prostate cancer cells. Because ^{225}Ac is difficult to produce and concentrate in the lab, it is rare and costly to use in clinical practice. To safely produce and purify such radionuclides as well as label molecules for targeted molecular radiotherapy requires infrastructure such as cyclotrons and multidisciplinary staff such as physicists, radio chemists, and biologists. Right now, ^{225}Ac is so challenging to produce that it has been labeled "the rarest drug on earth."[30] The TRIUMF facility based in Vancouver is working diligently to become one of the few suppliers of ^{225}Ac.[31] Ironically, while the only two places in the world where ^{225}Ac can be produced are both in British Columbia, it is clear that our health care system cannot afford to use it at present.

Although targeted radionuclide therapies are likely to significantly extend the lives of patients with advanced cancer, additional variables can further affect the cost. The radionuclides with the greatest therapeutic potential are generally too rare to be acquired through mining. Instead, they need to be manufactured in nuclear reactors or cyclotrons. However, the main purpose of a nuclear reactor is to generate electricity, not radioisotopes. Extracting radioisotopes for medical use is an expensive secondary use and may require reactor retrofitting. On the other hand, cyclotrons dedicated to the commercial production of radiopharmaceutical agents exist but are expensive, with prices in the range of US$2 to $3 million. This is the basic hardware cost and does not account for specialized staff needed to run such facilities.

Newer radiopharmaceuticals continue to drive costs up beyond the cost of the drugs themselves. The more sensitive they are as diagnostic agents the more cancer they are likely to detect. But if their specificity is not exceptionally high, the more incidentalomas will be found.

Additional costs

An additional factor adding to the climbing cost of cancer diagnostics is multimodal imaging, which involves merging images from different scanners.[32] Hybrid imaging is not cheap; a PET/CT scanner costs approximately $2.7 to $4 million, while a PET/MRI costs upwards of $7 million.

The newest state-of-the-art PET/CT scanner is a total-body machine developed by the multi-institutional EXPLORER consortium. Its system has a sensitivity 40 times greater than what is presently available and can collect images in seconds as opposed to the current standard of 10 to 20 minutes.[33] Furthermore, total-body PET/CT scans expose the patient to 1/40th of the radiation of current state-of-the-art PET scanners.[33,34] Estimated costs for these machines are in the range of approximately US$10 million. However, such models can enable significantly higher throughput in the clinical setting, which may offset some costs over time.

Currently there are five PET/CT scanners in BC: four are at BC Cancer's sites (Vancouver, Victoria, and Kelowna), and one is in a private practice. It was recently announced that a new regional cancer treatment centre in Surrey will have two PET/CT scanners, including a cyclotron as well as a radiopharmacy facility, and it is expected to become an important centre for future radiopharmaceutical therapies.[35]

Theranostics and the future

Theranostics is more than just a clever moniker.[36] Theranostics lends itself to precision medicine and is built on the principle that visualization is key to treatment and monitoring. New targeted therapies within a theranostic framework allow oncologists to treat what they see and see what they treat.

Enthusiasm for this approach is evident in the increase of medical literature using the term *theranostics*. According to PubMed, the term did not appear in medical literature before 2000 yet has since been referenced in 4500 articles.

Given the sophistication of the hardware and rarity of the compounds used in treatment, the economic barriers to accessing the cutting edge in theranostic care are likely to be too high for most provincial health budgets. Greater government investment is needed to make the latest forms of oncological care accessible to the Canadian public.

Summary

We have witnessed momentous advances in diagnostic imaging over the years, which are increasingly being integrated with cancer treatments. Merging diagnostics with therapeutics will likely improve future cancer care. However, the rare isotopes yielding great promise in theranostics will not be cheap. Nor will the molecules that bind them to specific cancer cells. Improved imaging modalities are uncovering additional incidentalomas, which lead to often-unnecessary investigations and invasive treatments. The continued push for enhanced diagnostic imaging is justifiable, but it also implies that the cost is not likely to decrease in the near future.

All factors indicate that cancer care will continue to improve but will be pricey. State-of-the-art cancer care is already financially beyond the reach of many. If we are to have widespread access to the best treatments in the future, both the public and those in health policy should count on spending much more on oncological diagnostics and treatment. ■

Competing interests

None declared.

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The potential use of telemedicine to increase access to opioid agonist therapy in rural and remote communities

A province-wide, centralized virtual care program for patients in rural and remote areas to access buprenorphine/naloxone and methadone may be a reasonable interim strategy to combat the opioid overdose crisis.

Anita Weng, BSc

The opioid overdose crisis continues to affect people in all parts of Canada. Between January 2016 and September 2019, Canada reported more than 14 700 deaths due to opioid-related overdose.[1] In British Columbia, fentanyl or its analogues are detected in about 80% to 85% of illegal drug overdose deaths, and about a third of overdose deaths occur in small- to midsized communities.[2,3] The BC Coroners Service reports that the illegal drug overdose death rate (per 100 000 person-years) between 2018 to 2020 is highest in Hope.[4] The top five communities on the list include two other small communities (Lillooet and Terrace) along with Prince George and Vancouver.[4]

Federal and provincial governments have implemented numerous strategies to target overdose prevention and harm, including easier access to naloxone and increased availability of supervised consumption facilities,[5-7] but rural and remote communities do not have access to many of these services. Furthermore, accessibility of opioid agonist therapy (OAT) remains limited in these communities.[8] Buprenorphine/naloxone and methadone are the two most commonly prescribed evidence-based OAT treatments that greatly reduce illicit drug use.[9] The use of buprenorphine/naloxone or methadone is also associated with a reduction in mortality and harms related to illicit drug use.[10,11] Additionally, slow-release oral morphine is available as the third-line OAT option for patients who were not successful with or could not tolerate buprenorphine/naloxone and methadone.[9]

Obtaining these evidence-based medications for opioid use disorder is particularly challenging for patients in rural and remote communities. Despite availability of addiction medicine specialists via Rapid Access to Consultative Expertise (RACE), scarcity of local OAT prescribers continues to be one of the most significant barriers to access. As a result, to improve access to effective treatments, telemedicine has been proposed as a means to provide OAT to the medically underserved communities.[12-15]

Evidence for delivering OAT care through telemedicine

Telemedicine may greatly reduce the physical barriers to accessing OAT for patients in rural and remote communities; however, the effectiveness of OAT care delivered using telemedicine must also be considered. There is limited research in this area; however, the available evidence suggests that it has similar retention rates and treatment effectiveness compared to traditional, in-person appointments. A retrospective cohort comparison study in Canada with over 3500 patients on either methadone or buprenorphine found that those who primarily used telemedicine to connect with their OAT physicians had a higher retention rate than the group of patients who primarily attended in-person appointments at 1 year of the study (50% versus 39%).[16] The authors hypothesized that ease of access and flexibility were the reasons for the superior retention rate.[16] The efficacy of OAT treatment (determined by urine drug screen in the last 30 days of the study) was also comparable between the telemedicine and in-person groups.[16] Similarly, a prospective study published this year involving pregnant patients on buprenorphine/naloxone found no statistically significant differences between retention rates of the in-person and telemedicine groups.[17] There was also no difference between the rates of neonatal abstinence syndrome or positive urine drug screen at 6-weeks postpartum between the two groups.[17] Lastly, a retrospective study on patients in rural communities receiving buprenorphine care solely via telemedicine had a nearly 60% retention rate at 3 months, and 86% of the remaining participants had negative urine screens.[18] Although this study did not have a comparison

Ms Weng is a student at the University of British Columbia Medical School (class of 2021). She is interested in pursuing a career in family medicine with a special interest in addiction medicine.

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group, the authors reported similar retention rates with published results of office-based OAT.[18,19]

None of these studies reported adverse patient outcomes due to OAT care being delivered via telemedicine. The studies did have limitations: they were nonrandomized, and many of them had small sample sizes and shorter follow-up periods. Future studies should focus on rural areas, where telemedicine-delivered OAT would have the most impact.

Legality and practicality of OAT care via telemedicine: Before and during COVID-19

One of the biggest concerns with this modality is the safety of patients, and physicians are legally bound to the OAT standards of practice as outlined by provincial regulatory bodies. For example, the College of Physicians and Surgeons of BC states that comprehensive evaluation of the patient, including history, physical, and relevant investigations, must be completed before methadone OAT initiation.[20] On the other hand, while the standards of practice from the College of Physicians and Surgeons of Alberta do not explicitly outline the necessary evaluations, physicians are instructed to follow evidence-based guidelines.[21] And both the widely recognized BC Guideline for the Clinical Management of Opioid Use Disorder and the Centre for Addiction and Mental Health's Buprenorphine/Naloxone for Opioid Dependence Clinical Practice Guideline recommend that comprehensive assessments, including focused physical exams, be conducted before initiating patients on either methadone or buprenorphine/naloxone.[9,22] Physical assessments are crucial to identify signs of drug use, intoxication, or withdrawal symptoms, and medical conditions that would preclude the use of OAT. Similar recommendations exist for initiating a patient on slow-release oral morphine, a medication with higher overdose and diversion risks.[9]

As a result, use of telemedicine for OAT providers in BC was mainly limited to stable patients already maintained on OAT, but who could not attend a follow-up appointment in person. In Ontario, most OAT is delivered in person, with a number of physicians in urban areas providing OAT via the Ontario Telemedicine Network.[23]

The COVID-19 pandemic ushered in many changes to how OAT is prescribed and delivered. The pandemic introduced new layers of complexity to the opioid overdose crisis in the forms of limited and toxic drug supply, isolation, difficulty with daily witnessed dosing and accessing injection sites, etc. As a result, the BC College of Physicians updated the practice standard on telemedicine in March 2020 so physicians may continue to provide care using telemedicine for the appropriate clinical contexts.[24] The British Columbia Centre on Substance Use also recommends that OAT providers continue to support patients on OAT with telemedicine.[25] Moreover, the centre published interim clinical guidance on how to protect people who use drugs from COVID-19 by offering OAT initiation or providing pharmaceutical alternatives to illicit drugs (i.e., oral hydromorphone and/or sustained-release oral morphine).[12] Because of restrictions imposed by the pandemic, OAT prescribers have also started to initiate buprenorphine/naloxone or methadone over telemedicine for appropriate patients.

Providing buprenorphine/naloxone and methadone care via telemedicine is feasible and may have retention rates and effectiveness comparable with traditional in-person visits.

The virtual opioid dependency program in Alberta

Prior to COVID-19, it was not a common practice for physicians to initiate OAT via telemedicine, especially methadone, but Alberta's Virtual Opioid Dependency Program (VODP) has been prescribing OAT via telemedicine for the past 3 years.[26] The program, established by Alberta Health Services, is currently serving clients in over 100 communities, and patients may either self-refer by calling the helpline or be referred by their physicians or allied health care providers.[26] According to the program manager, Mr Kelly Smith, physicians in the program are permitted by the college to prescribe same-day buprenorphine/naloxone starts for patients using illegal opioids (written communication from K. Smith, manager, VODP, 8 May 2020). Methadone can also be offered through VODP after the patient completes an initial assessment by a physician via virtual care. One of the most significant challenges to accessing OAT in rural communities is the lack of local prescribers, and the VODP program overcomes this by providing treatment initiation and maintenance of buprenorphine/naloxone and methadone through virtual care. Patients are also able to access addiction counseling through VODP. The program expanded substantially in 2019, and it had approximately 1200 new admissions in the last fiscal year.

Conclusion

People in rural and remote communities continue to experience great difficulty accessing the care needed to treat opioid use disorder, and telemedicine has garnered much attention as a potential tool to increase access. Even with readily available OAT virtual prescribers, patients in rural and remote areas must still overcome other barriers such as access to a pharmacy for daily witnessed dosing, laboratory for urine drug tests, and counseling and other mental health or social support services. However, as is evident from Alberta's VODP program and the existing literature, providing buprenorphine/naloxone and methadone care via telemedicine is feasible and may have retention rates and effectiveness comparable with traditional in-person visits. Changes to OAT prescribing practices due to COVID-19 will also lead to more data on the safety, feasibility, effectiveness, and physician experience of OAT initiated over telemedicine. While more and more rural physicians are obtaining training on initiating and maintaining patients on OAT, establishing a province-wide, centralized virtual care program for patients in rural and remote

areas to access buprenorphine/naloxone and methadone may be a reasonable interim strategy to combat the opioid overdose crisis. ■

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Using the beneficence model as an ethical approach to surgical decision making: A case report

When faced with a request from a Jehovah's Witness for a bloodless surgery, the surgical team should approach the case with an ethical framework in mind.

Sofía Zhang-Jiang, BHSc, Stephen Tredwell, MD, MA, FRCSC

ABSTRACT: Ethics-guided decision making in medicine should be approached with a sound framework. To explore the efficacy of Pellegrino and Thomasma's beneficence model in surgery, we present the case of a 14-year-old Jehovah's Witness with scoliosis requesting a bloodless surgery in which the surgeon used the model to achieve a successful outcome. The beneficence model outlines four levels of good: the ultimate good, the good of the patient as a person capable of reasoned decision making, the patient's perception of the patient's best interests, and the medical good. The surgeon and the patient each ranked the levels of good to determine their respective overarching goods, and then discussed their perspectives to reach a decision that minimized conflict between their overarching goods. Physicians involved in decision making can apply the beneficence model to examine ethically complex cases from a different perspective, rather than approaching the complexity simply as a conflict between the medical good and the patient's autonomy.

Ms Zhang-Jiang is a medical student at the University of British Columbia (class of 2022). She holds a Bachelor of Health Sciences degree from McMaster University. Dr Tredwell is a professor emeritus in the Department of Orthopaedics at the University of British Columbia.

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Introduction

Medical ethics

Ethics describes a moral philosophy that guides a person's actions. Health care professionals practise ethical thinking when making decisions about patient management and are generally influenced by Aristotle's dictum of "first, do no harm." The four pillars that lay the foundation for modern ethics are beneficence, nonmaleficence, autonomy, and justice.[1] Current medical ethics borrows strongly from these concepts. The challenge with medical ethics lies in its clinical application, when multiple principles often appear to conflict, and none of the four principles can be ranked as primary in absolute terms. Furthermore, each clinical case can be examined through different lenses that vary in their definition of the right course of action.

While the rightness of a decision is not difficult to determine in retrospect, evaluating the right course of action prospectively is no easy task for a clinician.

Two major ethical philosophies that dominate medical ethics today emphasize a respect for persons and, flowing from that, individual autonomy (Kantian) or social utility—specifically social good over the rights of the individual (utilitarian).[2] The first theory concerns itself with rights, duties, and obligations; the second values social good and social accountability.[2]

While the rightness of a decision is not difficult to determine in retrospect, evaluating the right course of action prospectively is no easy task for a clinician. Some common ethical dilemmas in modern medicine include the abortion of a fetus and the interplay of end-of-life decisions and religious beliefs, both situations that prompt debates on the extinguishment of life and its associated spiritual consequences.

The ethical dilemma that we discuss here centres on a pediatric patient's refusal of blood products due to the Jehovah's Witness faith, in which at first glance the principle of autonomy seems to conflict with medical beneficence. We examine this clinical case through Pellegrino and Thomasma's[2] beneficence model, a medical adaptation of the third major ethical philosophy—the Aristotelian doctrine of "the good." Pellegrino and Thomasma's view features four components of the patient's good: (1) the ultimate good, which represents the ultimate standard for a person's life choices; (2) the good of the patient as a person capable of reasoned decision making (i.e., autonomy); (3) the patient's perception of their own good, or best interests, in their current life situation; and

(4) the medical good as achieved through medical intervention to treat or manage a disease.[2] The levels of good are listed in the descending order of importance suggested by Pellegrino and Thomasma. This view allows a stratification of autonomy, less conflict, and a more thorough discussion as part of clinical decision making. The physician should approach the case with the four components of the patient's good in mind and ascertain the patient's opinion on each of them **[Table]**. When one or more levels of good conflict, a hierarchy should be determined among them to identify the overarching good. If, following the discussion, the medical good is in direct conflict with a patient's overarching good, rethinking is needed.

TABLE. Examples of questions that health care professionals may consider themselves, or ask a patient, to clarify their levels of good.

Level of good	Sample questions
The ultimate good	"What holds the highest meaning for you and constitutes the ultimate standard for your life choices?" "What is the most important determinant to your happiness; is it living accordance with God's will, developing your potential, honor, wealth, social utility, or something else?"
The good of the patient as a person capable of reasoned decision making	"What is your choice as a human being capable of reasoning and with freedom to express?"
The perception of the patient's own good in their current life situation	"What course of action is in line with your best interests given your current circumstances? "What quality of life is worthwhile or consistent with your life goals, aims, and plans?"
The medical good	"What is medically indicated for this disease or illness?"

Jehovah's Witnesses' beliefs

The Jehovah Witness Christian movement was founded in the United States by Charles Russell in 1872 and has grown to over 6 million members worldwide.[3] Members of this religion hold a fundamental belief that "consumption" of blood is forbidden, as indicated by Biblical passages such as: "Only flesh with its soul—its blood—you must not eat" (Genesis 9:3-4); "[You must] pour its blood out and cover it with dust" (Leviticus 17:13-14); and "Abstain from . . . fornication and from what is strangled and from blood" (Acts 15:19-21).[4,5] Jehovah's Witnesses interpret these verses as indicating prohibition of the transfusion of whole blood or its primary components (including packed red blood cells, white blood cells, plasma, and platelet administration) under any circumstance. Some Witnesses may accept secondary components such as albumin, immunoglobulins, and hemophiliac preparations, as their use is not absolutely prohibited.[4-6] Furthermore, many Witnesses believe that blood that has been removed from the body should be disposed of; thus, techniques to remove and store the patient's own blood are often unacceptable.[3,4] These patients pose a unique challenge to anesthetic and surgical teams in cases in which a blood-free surgery is desired and the risk of significant blood loss is high.

Case report

The patient was diagnosed with juvenile onset idiopathic scoliosis at age 10 and was scheduled for corrective surgery at age 12. His case was complicated by an additional diagnosis of severe factor IX deficiency. As a result of factor IX desensitization protocol, his scoliosis surgery was delayed until age 14. Scoliosis surgery can be associated with significant intraoperative blood loss of up to 4.5 L, and higher Cobb angles (severity of the curvature) are associated with increased blood loss.[7,8] It has been reported that Cobb angles greater than 50 degrees increase the risk of massive blood loss 2.47 times.[8] This patient's Cobb angle had increased to 65 to 70 degrees by age 14. The medical aspects of this case have been described in more detail in a previous case report.[9]

Prior to surgery, the surgeon consulted with the patient's family and church elders together using Pellegrino and Thomasma's beneficence model as a framework. All parties agreed to minimize the conflict between the patient's and the surgeon's overarching goods (see Ethical challenges below). The family refused the use of blood products during surgery due to their religious beliefs. Strategies to maximize preoperative hemoglobin concentration and minimize perioperative blood loss were implemented, and the surgeon agreed to terminate the surgery should sufficient blood loss occur to require blood products. Blood transfusions would be considered only in the case of a life-threatening intraoperative hemorrhage, and the family was not required to sign a transfusion consent form. The agreement was recorded in the patient's chart and was discussed with the anesthesia team.

Preoperative and perioperative procedures implemented to maximize hemoglobin and minimize blood loss included erythropoietin, oral iron supplement, recombinant factor IX concentrate, and tranexamic acid. Surgical time for posterior fusion of spinal levels T2–L1 was 4 hours. The use of monopolar cautery, a local anesthetic solution of epinephrine, and an argon gas coagulator optimized surgical hemostasis. Total intravenous fluid administered was 2700 mL and intraoperative blood loss was estimated at 350 mL, with no blood products given. No adverse events were noted in the patient's postoperative care and the patient was discharged in stable condition on day 11.

Discussion

Surgical outcomes

The ethical concern regarding Jehovah's Witness patients' refusal of blood products is not an uncommon issue in surgery. Although some surgeons and anesthesiologists prefer to decline surgeries on Witnesses, viewing the inability to use blood products as tying their hands, there is an increasing number who are ready to take on such cases.[3,4] Advances in medical care have enabled more elective surgeries and trauma cases to be performed without blood transfusions, as requested by Witnesses, although often at an increased risk.[3]

Simple methods to decrease the rate of bleeding, such as tourniquets and positioning the patient with the surgical site elevated, may be used during surgery.[3] Surgeons may also employ a technology called intraoperative autotransfusion, since some Witnesses accept blood that remains in a closed circuit system.[6] Moreover, Witnesses do not object to colloid or crystalloid replacement fluids, electrocautery, hypotensive anesthesia, or hypothermia, as well as newer techniques such as large-dose intravenous iron dextran administration and the ultrasonic scalpel.[3-5]

Such are some of the options successfully employed by surgical teams to decrease blood loss and improve surgical outcomes, but each has associated risks and drawbacks that necessitate a detailed informed consent process.[3] For instance, acute normovolemic hemodilution, a technique that involves removing whole blood from the patient preoperatively and infusing crystalloid or colloid fluids to maintain intravascular volume, carries the risk of hypoxia due to excessive hemodilution or hypovolemia as well as risks specific to the resuscitation fluid used.[10-12] Intravenous iron dextran injections can cause life-threatening anaphylaxis.[13] The potential complications of hypotensive anesthesia include shock, stroke, myocardial infarction, hepatic failure, and renal insufficiency.[14,15]

In addition, preoperative steps should be taken to optimize the patient's hemoglobin levels and to normalize bleeding and clotting times.[3] Examples include administering recombinant erythropoietin and iron to correct anemia and promote erythropoiesis, and discontinuing drugs that affect the coagulation cascade.[3,9] Postoperative care includes noninvasive techniques, such as close surveillance for bleeding and restricted phlebotomy, and administration of pharmacological therapies, such as hemostatic agents to stop bleeding and erythropoietic agents to promote erythropoiesis.[3,9]

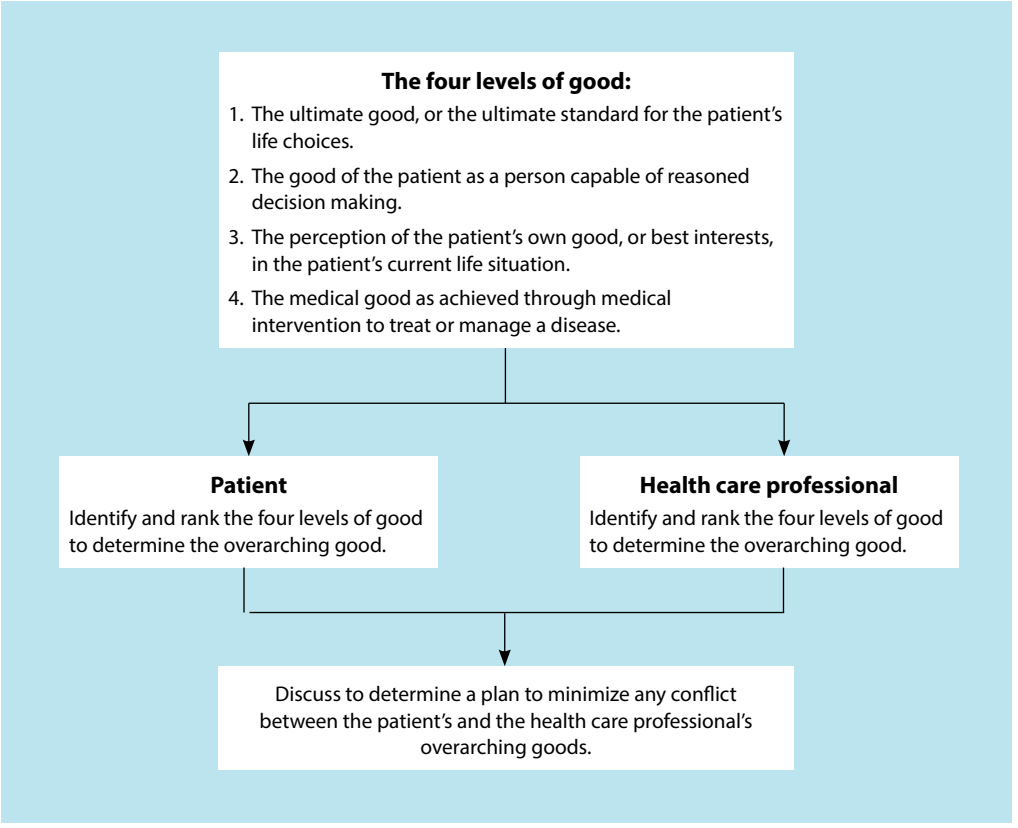

FIGURE. The beneficence model applied to clinical decision making.

Ethical challenges

The principle of patient autonomy provides patients the right to make their own decisions, which must be respected by the health care team. It is paramount for physicians to understand the decisions made by competent adults, even in cases of refusal of medically necessary care.[16] An important principle under patient autonomy is informed consent, which must be obtained voluntarily prior to any procedure after patients are fully informed of the risks and benefits of the treatment plan, including those of the strategies to reduce blood loss or those to reduce the medical need to replace blood.[5] In order to obtain informed consent, doctors must assess the competency of patients to ensure they are fully capable of making their own decisions, even if the decision of refusing care should lead to adverse outcomes such as death. For Jehovah's Witnesses, accepting blood transfusions is considered a sin so grave that it will result in the loss of any hope for eternal life—which could be viewed as worse than death itself.[3,5,17] With this reasoning in mind, Jehovah's Witnesses can be differentiated from suicidal patients who are incompetent due to mental illness.[5] It is common for Witnesses to refuse blood products despite a critical medical need, and the right to make this decision is widely accepted in medical literature and respected in clinical practice.[17]

When caring for Jehovah's Witnesses, ethical challenges arise when there is a conflict between the four levels of a person's good. There is a propensity for physicians to equate the medical good with the whole of the patient's good. Through the medical lens, doctors may view the refusal of blood products as not being in the best interest of a patient's health, as it may lead to hemorrhagic shock, severe anemia, or in the worst case, death by exsanguination.[18] This seemingly goes against the principle of beneficence and the fiduciary relationship between doctor and patient, which demands that doctors act in the best health-related interests of the patient, but according to the aforementioned beneficence model, it should account for only the medical component of beneficence rather than its whole.

The physician should help the patient understand the medical good, then encourage the patient to interpret the other levels of good and rank them to determine what the overarching good is **[Figure]**. In the case of Jehovah's Witnesses, patients may place the most value on the

ultimate good of living in accordance with their faith—this overarching good trumps the medical good; therefore, receiving a blood transfusion, which results in loss of eternal life, would not be a beneficent act for this patient even if it is medically indicated to prevent death. In our case, the surgical team determined through a discussion with the patient's family and church elders that the overarching good for the patient was the ultimate good of adhering to his Jehovah's Witness faith, which outweighed the medical good of accepting blood products. In the family's view, receiving blood products would equate to a grave sin worse than death.

There is, however, another variable that may need to be introduced into the conversation—the ultimate good as seen by the surgeon. All participants in the clinical decision have their own interpretations of the levels of good. Participants concerned with a patient's care include the patient, the patient's family, and the health care professionals, and these parties may have conflicting views. For instance, by operating, the surgeon may arrive at a juncture where their action creates a situation in which the patient may die if blood is not given, despite all the measures that have been taken to prevent this. From the perspective of the surgeon in our case, not administering blood products in the event of potentially life-threatening loss of blood went against his fundamental spiritual beliefs of nonmaleficence as a physician and as a member of his own religion. This is a conflict between two overarching goods. Acting in accordance with their own unwillingness to cause death, a surgeon may administer blood. The preoperative discussion should reveal this potential conflict and elucidate all possible strategies to avoid this clash of overarching goods, up to and including stopping the surgery and returning another day if possible under the circumstances. It is then necessary to evaluate the risk of this clash occurring.

In such a case, by examining the patient's and surgeon's differing overarching goods, conflict is altered from that of the medical good versus the patient's overarching good. If the risk of requiring a transfusion to prevent death is sufficiently remote, an understanding or agreement to respect the surgeon's unwillingness to cause death may allow the surgery to proceed. This discussion may necessitate agreement from the church elders that the two overarching beliefs need to be respected. Church elders are responsible for congregational governance in their jurisdiction, and they administer disciplinary action against members perceived to have committed serious sins. In a medical case, the patient's and family's anxiety can be reduced with reassurance that the decision is sanctioned by church elders.

By examining the patient's and surgeon's differing overarching goods, conflict is altered from that of the medical good versus the patient's overarching good.

The parties involved in this case, including church elders, agreed to minimize blood loss by optimizing preoperative hemoglobin levels and perioperative hemostasis through procedures such as monopolar cautery and argon gas coagulator. The surgical team respected the family's desire for a decreased risk of having to use blood products, and the family acknowledged the surgeon's beliefs of nonmaleficence and his decision to terminate the surgery should enough blood loss occur to necessitate blood products. In the unlikely event that imminent death became obvious, all parties agreed to respect the surgeon's ultimate good. This approach balanced the parties' conflicting overarching goods.

At our clinic, we have had only one incidence where this kind of agreement has not been reached. This illustrates the strength of the concept of beneficence-in-trust; the surgeon is trusted to expend all efforts available in a realistic attempt to adhere to the patient's wishes with a frank and honest expectation of success.

The ethical dilemma becomes more complex in pediatrics. A child's definition of their own levels of good may be distinct from those of the parents. Whether minors are competent to make the decision to refuse blood products, which may result in serious adverse outcomes, is less clear.[6,16,17] With evolving legal and ethical standards on autonomy and the rights of minors, there is uncertainty in the medical field about what is appropriate when caring for a minor in such cases. Jones and colleagues[16] argue that the parental responsibility is a moral obligation rather than a right and is, therefore, secondary to the responsibility of ensuring the physical safety of the minor. The focus should be on the child's health instead of the right of the parent to decide. There are many documented cases of court orders granting hospitals the ability to give blood that was absolutely necessary to save a minor's life.[16] However, exceptions have been made when the patient was an adolescent considered to be mature enough to make an informed decision.[6,16] Also worth noting is the potential consequence of a family casting out an adolescent who chooses to receive a blood transfusion at the loss of their eternal life.

It is important for health care professionals to document the decisions made throughout these conversations. Discussions often result in verbal agreements that are supplemented by clear documentation of the progress in the patient's medical chart.

It is recommended that health care professionals seek assistance when dealing with cases of conflict with patients and their families regarding treatment plans.[17] Most health care institutions have access to ethics services. The surgeon in this case consulted an ethicist who offered valuable feedback regarding the approach to the management decision. It is also valuable to involve church elders in the conversation on decisions of religious matters to reassure both the health care professional and the patient that the chosen pathway is philosophically acceptable. The goal is to reach a collaborative consensus that avoids or minimizes the clash between participants' overarching goods.

Summary

When faced with a request from a Jehovah's Witness for a bloodless surgery, the surgical team should approach the case with an ethical framework in mind. While, on the surface, the conflict appears to be one between the medical good and the patient's autonomy, Pellegrino and Thomasma's beneficence model is a different

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Implementing saline gargle sample collection for COVID-19 testing

British Columbia was one of the first jurisdictions in the world to implement a saline rinse-gargle ("saline gargle") collection method for COVID-19 testing. In September 2020, collection centres across BC started offering saline gargle as an alternative to nasopharyngeal (NP) swab for school-aged children and youth. By the time this article is published, saline gargle may be available to additional populations.

Why is an alternative to NP swabs needed?

As COVID-19 swept across the world in March and April, global supply chains faltered. During a pandemic, testing is critical, yet NP swabs had few suppliers and significant worldwide demand. This resulted in a global shortage of NP swabs, including in BC. The ability to test hinged on the ability to obtain NP swabs.

At the same time, tree planters from across Canada were heading to remote communities to start the planting season. This led to significant concerns regarding the spread of COVID-19 to these remote communities if symptomatic tree planters had to leave camp to seek health care services for COVID-19 testing. The ideal solution would be to allow planters to collect a specimen at their camp without a health care practitioner. NP swabs did not meet this collection criterion.

Why saline gargle?

Saliva was the most common swab-independent alternative at the time; however, some patients struggle to provide an adequate volume, and saliva is a difficult specimen type for laboratories to handle. Also, the mucoid nature of saliva was not ideal for the laboratory and required additional processing steps for the sample to be polymerase chain reaction (PCR) ready.

However, in available literature, there were limited and vague reports of using mouthwash samples for testing other viruses. Over extensive literature reviews, brainstorming, and discussions, saline gargle evolved to be a highly possible swab-independent option. Laboratory testing of PCR performance, stability, and appropriateness of the saline gargle was evaluated. Saline gargle performed well compared to the standard nasopharyngeal swab and viral transport media system.

Saline gargle performed well compared to the standard nasopharyngeal swab and viral transport media system.

Following the analytical validation of the sample type, a clinical validation was led by BC Children's Hospital, which required volunteers to provide matched NP swabs, saline gargle, and saliva specimens for parallel testing. The clinical validation demonstrated that interpretation of nucleic acid test results were equivalent for the NP swab and saline gargle, while saliva was shown to have lower clinical sensitivity, particularly for pediatric patients.

As part of the clinical validation findings, participants ranked saline gargle collection as the preferred collection method, adding to the rationale for selecting it as a testing option.

A collaborative province-wide cross-validation study involving all COVID-19 testing laboratories across the province confirmed that saline gargle specimens were compatible with all COVID-19 nucleic acid-based testing platforms present in BC.

Saline gargle implementation for back-to-school

Completion of the clinical validation coincided with back-to-school planning in August, which was timely because returning to in-person schooling meant an increased number of children would require COVID-19 tests. Testing by collecting an NP swab can be traumatic for children, parents, and health care workers, but using the less-invasive saline gargle helps to lessen barriers to testing.

Provincial Laboratory Medicine Services recommended the adoption of saline gargle for school-aged children and youth across BC, and provincial implementation started on 17 September, 1 week after children returned to the classroom.

A multidisciplinary group of health care professionals spearheaded the implementation. Representatives from laboratories, BC Children's Hospital, BCCDC, public health, COVID collection centres, and PHSA Supply Chain played critical roles in ensuring a successful launch. The group created written collection instructions and an accompanying collection video, updated guidance documents, trained front-line staff, and sourced supplies.

Testing tip

Prior to saline gargle testing, it's critical to practise how to gargle at home with a solution of salt and water. This is especially important for young children who, initially, often immediately spat out the saline solution because of its saltiness. This required either waiting 2 hours

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

before trying the saline gargle again or using an NP swab as the alternative.

Lessons learned

Testing continues to be key to addressing the COVID-19 pandemic, and saline gargle improves testing accessibility. This popular collection method, with high user acceptance, addresses an important aspect of the pandemic response as reluctance toward the NP swab is a barrier to testing.

The ability to increase testing among school-aged children and youth helped lessen the chance of a school-based outbreak in the first month after school started. While COVID-19 continues to circulate in the community and school-based outbreaks will occur, expanding saline gargle and increasing laboratory capacity will help BC manage the pandemic.

Multiple jurisdictions, in Canada and abroad, have taken the work performed in BC to facilitate the adoption of the saline gargle method in their region. ■

—Meghan McLennan, BSc, MLT
Project Manager, Provincial Laboratory Medicine Services

—David Goldfarb, MD, FRCPC
Medical Microbiologist and Pediatric Infectious Disease Physician, Associate Head, Department of Pathology and Laboratory Medicine, BC Children's & Women's Hospitals

—Michael Donoghue
Senior Project Manager, UBC Centre for Disease Control

—Linda Hoang, MD, DTM&H, FRCPC
Medical Microbiologist and Associate Director, BCCDC Public Health Laboratory

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lens through which to examine such cases. Through a careful discussion with the patient, the physician should ascertain the patient's views on each component of good in order to rank them and determine what the overarching good is for the patient. The physician should also reflect on their own definition of the overarching good and determine the extent to which they are willing to fulfill the patient's request. If the patient's interpretations of the overarching good conflict with the surgeon's, the parties should pursue options that minimize the clash of beliefs and determine a course that is acceptable to all. By approaching the decision-making process with empathy, clear communication, and meticulous planning, and using surgical techniques to decrease bleeding, it is possible to achieve a successful surgical outcome. ■

Competing interests
None declared.

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Obituaries

We welcome original tributes of less than 300 words; we may edit them for clarity and length. Obituaries may be emailed to journal@doctorsofbc.ca. Include birth and death dates, full name and name deceased was best known by, key hospital and professional affiliations, relevant biographical data, and a high-resolution head-and-shoulders photo.

Donald James Farquhar

1933–2020

Our dearly beloved spouse, father, grandfather, and great-grandfather passed away peacefully. Donald graduated from Vancouver College and then from medicine at UBC (1958) and thrived in his career in family medicine, practising in Kerrisdale and at the UBC Student Health Service, retiring as director in 1996. He served as an auxiliary medical officer for the Royal Canadian Air Force and as president of the Vancouver Medical Association, and was awarded the Dr David M. Bachop Gold Medal for Distinguished Medical Service by Doctors of BC in 2011. He was a member and president of the Probus Club of Vancouver, as well as an enthusiastic tennis player, bridge player, sailor, and world traveler. During a long and happy retirement, he and his wife, Rochelle, lived in Beach Grove and were members of the Delta Naturalists Society, the Boundary Bay Park Association, and the SFU Seniors Lifelong Learners Society.

Donald was predeceased by his first wife and the mother of his children, Doris, and by his daughter, Jacqueline; he is survived by his children, Brian (Karin), Ross (Lise, Alexander, Charles), and Stephanie (Tony, Ryder); step-sons, Richard (Fiona, Oliver, Annabelle, Thomas), and Raven (Olya); and devoted spouse, Rochelle, as well as his extended family, step-grandchildren, and special friends.

The family wishes to thank Dr Patricia Akangbou, Dr Philip Teal and the Residence at Clayton Heights for their compassionate care through the years of Donald's final illness.

Donations may be made in Donald's honor to the VGH and UBC Hospital Foundation or a charity of your choice.

"We loved him and he loved us."

—Rochelle Farquhar
Delta

Theodore (Ted) Tomas Thordarson

1931–2020

An iconic photograph of Dr Ted Thordarson and eight other doctors hangs in the lobby of Ridge Meadows Hospital in recognition of the campaign they led to extract government funding for the first community hospital in Haney. Fittingly, this pioneer family doctor passed away peacefully in the hospital he helped to found.

Ted was born and grew up in Selkirk, Manitoba. At the age of 17, Ted, the only licensed driver, drove his family to Vancouver to reestablish as salmon fishers on the Fraser River. He bought his first gillnetter at 18 and paid his way handily through university and medical school.

Ted graduated from UBC's third medical class in 1956 and interned at Royal Columbian Hospital. He moved to Haney and established a large and loyal practice. Ted held every medical staff position at the hospital. His Cuban cigar left smoldering on the hand rail outside a patient's room always signaled his whereabouts! This practice has since passed from favor.

In 1970 Ted and three partners established Dewdney Medical, which expanded to seven partners. It was a unique clinic in its time—a shared and cooperative full-service practice that allowed for generous time off for medical education and holiday. It was considered "a bit socialist" at the time, which was humorous as our founder was a vigorous entrepreneur and used his free time to start Christmas tree farms, blueberry farms, and an endless stream of real estate projects. Dewdney Medical was an early adopter of the concept of work/life balance, years before stress was discovered. It was the main reason many of us came to work there.

Keeping in the spirit of early adopting and foresight, Ted and his siblings, Dr Roy Thordarson, Lara, Frieda, and Helga, bought our summer property near Kelowna in the late 1950s. Toad Hall continues to be the mandatory annual migration point for huge summer gatherings of any with a drop of the Thordarson Icelandic blood and their continually expanding families.

Ted was a larger than life figure, the last of Ridge Meadows Hospital's founding physicians. He is survived by Maxine, his wife of 64 years; children, Ted Jr., Helga, and David; and a large family of Icelanders, genuine and honorary.

—Doug Botting, MD

Recently deceased physicians

If a BC physician you knew well is recently deceased, please consider submitting an obituary. Please limit your submission to a maximum of 500 words. Send the content and photo by e-mail to journal@doctorsofbc.ca.

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 (Wednesdays)

In response to physician feedback, the Physician Health Program's online drop-in peer support sessions, established 7 April, are now permanently scheduled for Wednesdays at 12 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.bcmj.org/news-covid-19/psychological-ppe-peer-support-beyond-covid-19. Email peersupport@physicianhealth.com for the link to join by phone or video.

CME ON THE RUN

Online, 2 October 2020–4 June 2021 (Fridays)

The CME on the Run sessions are offered online. Registrants will receive links to go online before each session. Each program runs on Friday afternoons from 1 p.m. to 5 p.m. and includes great speakers and learning materials. Topics and dates: 29 January 2021 (Therapeutics). Topics include Exercise as Medicine: Optimizing the Management of Chronic Diseases; Medical Abortion: Management of 1st Trimester Termination in the Office; What is New in the Management of Migraine?; Contraception 2020 Update; COVID Therapeutics—What Have We Learned?; Making Sense of Diets (Intermittent Fasting, Ketogenic, etc.); Facts and Myths About Drugs Your Patients Are Asking About; Emerging Cancer Therapies: What the FP Needs to Know. The next sessions are 5 March (Ophthalmology/ENT), 7 May (Geriatrics), and 4 June (Internal Medicine). To register and for more information visit https://ubccpd.ca/course/cme-on-the-run-2020-2021 or email cpd.info@ubc.ca.

GP IN ONCOLOGY EDUCATION

Vancouver, 1–12 February and 13–24 September 2021 (Mon–Fri)

BC Cancer's Family Practice Oncology Network offers an 8-week General Practitioner in Oncology education program beginning with a 2-week 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 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 Jennifer Wolfe at 604 219-9579.

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PRACTICES AVAILABLE

SURREY—FP ASSOCIATE/LOCUM

Well-established family physician looking for a part/full-time associate/locum for a very busy clinic in Fleetwood, Surrey. OSCAR EMR, telemedicine integrated, experienced staff, competitive split, flexible hours. Excellent location close to all the amenities. Can start ASAP. Punjabi speaking an asset. Email: drsohal@shaw.ca; Phone 604 585-9696.

VICTORIA—FP/WALK-IN

Well-established fee-for-service walk-in practice in the centre of James Bay, Victoria. Varied demographics and many long-term patients as we have been part of this community for 30 years. Looking to transfer ownership before retirement in December 2020; able to stay on longer for smooth transition. Office uses OSCAR EMR, has two exam rooms, and is equipped for minor procedures. Contact Dr Michael Greenwood at 250 388-9934 or email jbcentre@telus.net.

EMPLOYMENT

ABBOTSFORD—FT/PT/LOCUM FAMILY PRACTITIONERS, WALK-IN, GREAT LOCATION

A bright and modern medical clinic with seven exam rooms is looking for GPs. Join a team of two physicians and expert MOAs. Clinic is open 7 days a week; you choose your schedule, working days, and practice (family, walk-in and/or telemedicine options). OSCAR EMR. Busy practice. Competitive billing split. Contact Mo at 778 888-3747 or pharmasavegladwin@gmail.com.

BURNABY—FT OR PT FP OPPORTUNITY

An opportunity exists for a part-time or full-time family physician to join a turnkey practice/walk-in clinic in Burnaby. The group consists of three other family physicians in a shared office environment on OSCAR EMR, located on the second floor of a busy business plaza. Parking is free; please inquire with clinic coordinator Richard at rw@bcdrug.com.

BURNABY/METROTOWN—SPECIALISTS TO JOIN OUR RAPIDLY GROWING TEAM

Join our eight GPs and two internists at Imperial Medical Clinic. Flexible F/T or P/T schedules to suit your needs with in-person and/or virtual consults. Patient base of over 15 000 and growing. Young, progressive, collegial team. Brand new clinic. Great place to start practice without cost of opening your own office. All specialties considered. Call Dr Pav Kaliray at 778 822-1981.

CANADA—ARE YOU A PHYSICIAN LOOKING FOR A NEW ROLE?

Locum, long-term, city, or rural—we have it all. Whether you are a physician looking for work across Canada, or a medical facility requiring physicians, the team at Physicians for You can help. Your time is valuable. Let our 10 years of experience in Canada, extensive knowledge of the processes for licensure, and personalized, friendly service work for you. Our strong reputation is built on exceptional service and results. Check out our current job postings on our website and call the trusted recruitment team today. Visit us online at www.physiciansforyou.com, email info@physiciansforyou.com, or call 1 778 475-7995.

KELOWNA—LOOKING FOR A CHANGE?

Seeking a cosmetic physician. A well-established Kelowna clinic is looking to expand and add another physician at their brand new location. Cosmetic and medical work is available with excellent support staff and a variety of laser technologies at your disposal. The ideal candidate will already be familiar and have worked in the cosmetic field, including but not limited to injectables, laser treatments, minor skin surgery, body contouring treatments, and more. Please send your resume to craig@dermmedica.ca and a cover letter outlining your interest in this amazing opportunity for the right individual.

NANAIMO—GP

General practitioner required for locum or permanent positions. The Caledonian Clinic is located in Nanaimo on beautiful Vancouver Island. Well-established, very busy clinic with 26 general practitioners and two specialists. Two locations in Nanaimo; after-hours walk-in clinic in the evening and on weekends. Computerized medical records, lab, and pharmacy on site. Contact Lisa Wall at 250 390-5228 or email lisa.wall@caledonianclinic.ca. Visit our website at www.caledonianclinic.ca.

NISGA'A VALLEY—FAMILY MEDICINE

Family physicians needed to provide primary and urgent care for a population of 3500 in four communities across the traditional Nisga'a Territory. A team of three physicians works together to provide full-scope services (excluding obstetrics) in concert with other services such as home care, public health, and mental wellness and addictions. The health and wellness centres are staffed with full-time RNs who take first call after hours. Soaring mountains, picturesque fjords, dramatic lava beds, natural

hot springs, and thriving rivers offer outstanding recreation year round. Excellent remuneration. Contact Jeremy Penner at md@nisgaahealth.bc.ca.

NORTH VAN—FP LOCUM
Busy, established physicians with stellar support staff seek part-time or full-time associates. Doctors currently needed to fill very busy telemedicine and in-office shifts. OSCAR EMR with technical support. Part-time associates will be on a 70/30 split for weekend and evening shifts. Option of working from home. For further information contact Kim at 604 987-0918 or kimgraffi@hotmail.com.

PORT COQUITLAM—FULL-TIME FP, WALK-IN CLINIC SHIFTS
Opportunity for two family physicians/GPs to join a two-physician managed-overhead turnkey newly renovated medical clinic in the bustling Fremont Village area of Port Coquitlam. Join our team of seven physicians on PLEXIA/OSCAR EMR. Experienced staff, competitive overhead, telemedicine integration, and prime location. Contact Richard rw@bcdrug.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: 604 485-3927, email: clinic@tmca-pr.ca, website: powellrivermedical clinic.ca.

RICHMOND—PRACTICE OPPORTUNITY
Practice opportunity available at busy, well-established two-physician family practice office in Richmond, BC. Fluency in Cantonese and/or Mandarin is an asset. EMR, flexible scheduling, and negotiable terms. Please reply to allantsang999@gmail.com.

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/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.

VANCOUVER/RICHMOND—FP/SPECIALIST
We welcome all physicians—from new graduates to semi-retired, part-time, or full-time. Virtual, 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. Contact Winnie at medicalclinicbc@gmail.com.

VICTORIA—GP/WALK-IN
Shifts available at three beautiful, busy clinics: Burnside (www.burnsideclinic.ca), Tillicum (www.tillicummedicalclinic.ca), and Uptown (www.uptownmedicalclinic.ca). Regular and occasional walk-in shifts available. FT/PT GP post also available. Contact drianbridger@gmail.com.

MEDICAL OFFICE SPACE

ABBOTSFORD—OFFICE SPACE FOR SPECIALISTS
Beautiful office space approximately 2 minutes across from ARH. Three to four large rooms (10 x 12 sq. ft. each), south facing with large windows. Smart office enabled. Located in the modern Mahogany building, www.Mahoganymedical.ca. Contact neo4ever1976@gmail.com.

SOUTH SURREY—MEDICAL OFFICE SPACE FOR LEASE
Custom-built, exceptionally clean medical office with high-grade mill work, cork flooring, and decor in a modern professional building. Spacious reception desk with granite countertop. Waiting area has decorative rock wall and is furnished with high-end seating. Waiting room and exam rooms with high-definition televisions for patients. Private bathroom and kitchen. Size: 947 sq. ft. Building has a large parking lot (free parking for patients). Ideal for the discerning specialist. Full-time MOA available. Located in Croydon Business Centre, a professional building home to medical and dental offices. By Morgan Crossing Shopping Outlet, a European-style shopping outlet with many shopping and eating establishments. If interested, contact dmjones01@shaw.ca.

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VANCOUVER—DIGITAL STETHOSCOPE FOR SALE

ThinkLab One digital stethoscope for sale. Barely used. Great acoustics. $500. Contact 604 741-2857 for details.

VANCOUVER—TAX & ACCOUNTING SERVICES

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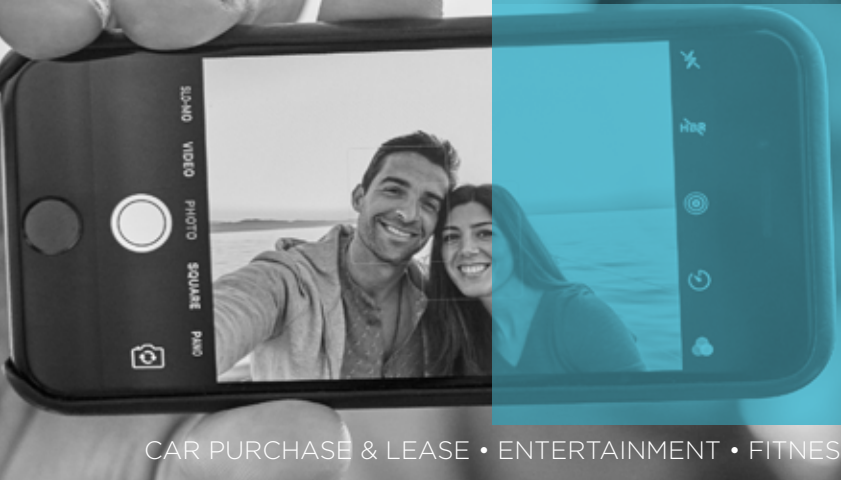

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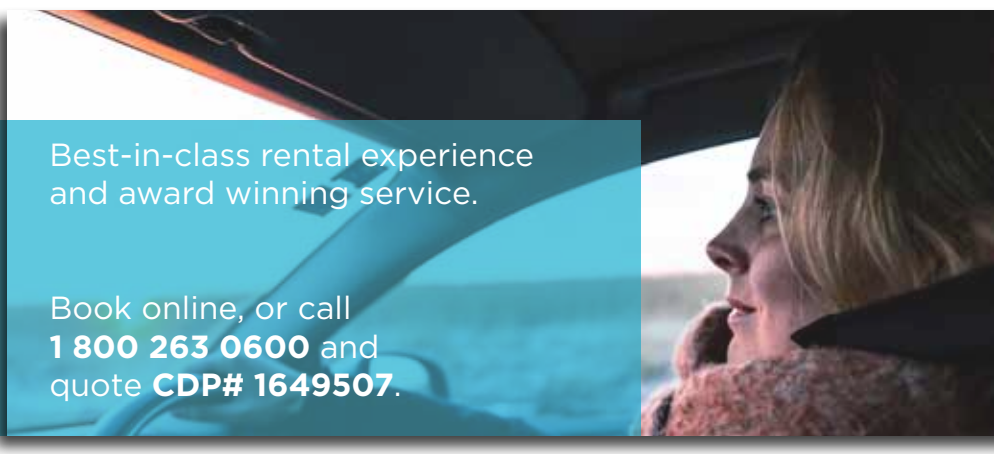

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