

Managing hyperkalemia in the outpatient setting



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1. As at February 28, 2025. 2. On average, as reported from Jan-Dec 2024, in BC, AB and ON. 3. On average, as reported from Oct-Dec 2024, in BC, AB and ON.

*Doctor consultations are available at no cost for AB, BC & ON residents who are covered under their respective provincial insurance plan. For ON, OHIP is currently providing access to telehealth, but this may be subject to change.



To mitigate the impact of novel communicable diseases on long-term care residents, we need to enhance vaccination coverage and monitor emerging viral strains. "COVID-19 fatalities among long-term care residents in the Vancouver Coastal Health region" begins on page 94.

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ORIGINAL RESEARCH

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ON THE COVER

The old approach to dietary potassium management recommended avoiding fresh fruit and vegetables, plant-based proteins, and whole grains, but the new recommendations mirror general advice for a healthy diet: whole, unprocessed, plant-based foods. "Managing hyperkalemia in the outpatient setting" begins on page 100.

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

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

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

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

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

Subscribe to print: Email journal@doctorsofbc.ca.

Single issue: \$8.00; Canada per year: \$60.00;

Foreign (surface mail): \$75.00.

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

Open access policy
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The Refugee Health Initiative's service-learning program deepens BC medical students' understanding of the refugee experience and provides practical support to refugee families experiencing displacement. "Medical students' service-learning in the Refugee Health Initiative: A mixed-methods program description and evaluation" begins on page 91.

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Infertility among physicians

Infertility affects 24% to 33% of physicians—which is significantly higher than the 12% rate in the general population.¹ A 2024 review on physician infertility highlighted that while many health care workers face challenges like delayed family planning, arduous schedules, and workplace exposures, infertility rates are uniquely high among physicians.¹ Key concerns include financial pressures and the conflict between career demands and family building. Duty hours and the length of medical training are major factors in childbearing decisions.^{1,2}

Many related studies have focused on surgeons, who have some of the longest residencies and most physically demanding jobs. A *JAMA Surgery* study found that female surgeons were nearly twice as likely as nonsurgeon partners of male surgeons (48% versus 27%) to experience pregnancy complications, even after controlling for age, work hours, in vitro fertilization use, and multiple gestation.³

In a survey of 4533 female physicians, 28% had undergone fertility treatment and 41% had experienced miscarriage. Female surgeons were older at first pregnancy and had fewer children and more preterm births than those in other medical specialties.⁴ The study called for culture change to make workplaces more supportive of pregnancy and outlined initiatives that can be taken at all levels of a physician's career to improve fertility and make pregnancy less risky. The infographic in the study may be useful if you're seeking pregnancy or supervising physicians of reproductive age.⁴

The faces of infertility are as varied as physicians themselves—including women, men, transgender physicians, those with a same-sex partner, and individuals having babies on their own. Despite persistent stigma, it's crucial to recognize that infertility is *not* just a women's problem.

The American Society for Reproductive Medicine has updated the definition

of *infertility* to reflect modern experiences. It now refers to the “inability to achieve a successful pregnancy based on a patient's medical, sexual, and reproductive history, age, physical findings, diagnostic testing, or any combination of those factors” and specifically includes the use of donor gametes and pregnancy as an individual or with a partner.⁵

Despite being a wide-reaching problem, women, or people with ovaries, may bear a disproportionate burden of infertility. Already at a higher risk of burnout and gender bias than their male colleagues, they also face the logistics of seeking fertility treatment. For example, scheduling early morning monitoring for in vitro fertilization can be difficult on operating room days, and pregnancy complications are unpredictable. Training programs and schedulers are not always accommodating, and even in supportive group practices, woman physicians may feel guilt about inconveniencing their colleagues.⁴

Canadian Fertility Awareness Week is 20–26 April 2025. Consider taking a moment to reflect on the impact of infertility in our profession and who around you might be struggling silently. I have previously written in the *BCMJ* on infertility topics, including infertility workup [2019;60:203–209], donor eggs [2020;62:328–332], egg freezing [2016;58:573–577], ectopic pregnancy [2021;63:112–116], and male infertility [2022;64:126–130]. There are many more resources available from the Canadian Fertility Andrology Society and the American Society for Reproductive Medicine. Starting a conversation or sharing resources can be a powerful step in breaking the stigma. ■

—Caitlin Dunne, MD, FRCSC

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Death by typographical error?

Our work as physicians has many challenges, and I'm sure we all have lists of pet peeves related to it. The administrative burden and long work hours would probably be near the top of the list, followed closely by poor work-life balance, difficult patient encounters, and difficult patients.

The administrative burden is something that requires system change, and I will not attempt to solve that on this page. I once used long work hours to avoid going home, but I don't need to do that anymore. I devoted a previous editorial to this topic [*BCM* 2023;65:278,287]. A healthy work-life balance is still a work in progress for me and probably will be for the foreseeable future.

Difficult patient encounters may be influenced by both patient and physician factors. I am guilty of often running behind schedule. Many patients understand that one or more patients ahead of them required more of my time than was budgeted for, but some patients, in their impatience, forget too quickly that they once benefited from my extra time, care, and attention. They will often express anger toward my staff but be very pleasant toward me. We have instituted a zero-tolerance policy for this type of behavior. When my staff bring this to my attention, I will offer the patient a chance to apologize to my staff or face being fired

from my practice. I would rather lose one patient than one member of our amazing office staff.

We all have difficult patients. They come in all shapes and sizes. Some may be manipulative, dependent, lonely, or too embarrassed or afraid to ask the question most important to them. All these challenges have been increasing over many years but seem considerably worse in the last few years.

Since the pandemic, patients seem to be more anxious about their health. There seems to be a higher level of somatization in general, with patients presenting with a long list of vague and unrelated symptoms. This leads to longer consultations, more ordering of tests, and more referrals to specialists. Although the public still has a high level of trust in physicians, according to the Canadian Medical Association 2025 health and media annual tracking survey, they are also very likely to be exposed to health misinformation.¹

Before a patient comes to see us, they have often researched their symptoms online, including on various social media sites. The veracity of their information seems

less important to them. Several factors are in play here. Many patients do not have a family physician, and those who do will often wait weeks to get in to see them. It is becoming more arduous, time-consuming, and frustrating to counteract their health misinformation. I love the saying "Please do not confuse your Google search with my medical degree." Unfortunately, many patients put more stock in their online search than their physician's knowledge and experience.

Between their online search and getting in to see their physician, patients will often have been influenced by misinformation. They have often made a diagnosis and started some form of treatment, which may not be in their best interest and may be opposite to the treatment they require. I am concerned that, sooner or later, someone will die because they mixed up medical terms in their online search. They may confuse hypertension with hypotension, hyperthyroid with hypothyroid, melasma with melanoma, colposcopy with colonoscopy, or exacerbation with exasperation. In completing their certification of death form, I may have to enter a cause of death of "Death by typographical error." ■

—David B. Chapman, MBChB



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Letters to the editor

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

From community to hospital: How Burnaby is tackling the substance use and mental health crisis in BC

In 2016, the BC provincial health officer declared a public health emergency due to an increase in drug-related overdoses and deaths. In response, several initiatives were created to minimize the risks associated with substance use.^{1,2} We outline three lessons learned during the development and implementation of two projects, one spearheaded by Burnaby Hospital and the other by the Burnaby Division of Family Practice in collaboration with the Shared Care Committee, a Joint Collaborative Committee of Doctors of BC and the BC government.

Lesson 1: There was a gap in knowledge about substance use care and resources among Burnaby Hospital staff, community providers, and the public

Burnaby Hospital's Addiction Medicine Consult Team initiated a series of quality improvement projects in 2022. The team surveyed 22 physicians and 36 allied health professionals and nurses about substance use care. Overall, 42% disagreed or strongly disagreed with the statement "I have proficient knowledge on addiction medicine resources relevant to the Fraser Health region."

The Burnaby Division of Family Practice and the Shared Care Committee surveyed the Burnaby public on substance use and mental health in 2022: 181 of 340 respondents (53.2%) agreed and 29 (8.5%) strongly agreed with the statement "I know where to get help for substance use

challenges that may affect me or someone else in Burnaby." Of 51 Burnaby clinicians who were also surveyed, 19 (37.3%) agreed and 4 (7.8%) strongly agreed with the statement "I am aware of substance use supports and resources that I can refer my patients/clients [to] within Burnaby."

Lesson 2: It's not a lack of resources; it's a lack of pathways to find them

Project teams suspected that knowledge accessibility was a primary factor in the knowledge disparity in the hospital and the community. In response, two tools were created to better direct evidence-based guidelines and patient information through health authorities and provide clinicians with tools to address knowledge gaps and reduce the impact of siloed resources:

- Burnaby Hospital's Addiction Medicine Consult Team created the Burnaby Resources on Substance Use website (www.brsu.ca), a central repository of addiction care resources, in 2022. The website was evaluated by 37 hospital staff between 2022 and 2023, and 30 providers (81%) reported learning about four or more resources after using the website for a minimum of 5 minutes.
- The Shared Care team developed the Burnaby Community Resource Directory (<https://burnabypcn.ca/social-supports/>) to allow Burnaby residents to navigate their local services with ease.

Lesson 3: Interdisciplinary collaboration is critical to improve substance use and mental health challenges

Creating community-minded solutions that meet the diverse needs of patients

with complex social and medical challenges requires perspectives from all levels of care. The success of the initiatives discussed here stems from collaborative efforts among quality improvement experts, diverse clinicians, and experienced community health care workers and highlights the value of collaborative care and input. Given the complexity of addiction care, creating connections across disciplines allows for a broader understanding of the health care community and the implementation of more holistic solutions for patients. Additionally, working collaboratively on unified goals allows for shared knowledge and the opportunity to create innovative solutions.

—Vanessa Kong, BA

Fourth-Year Medical Student, UBC

—Lingsa Jia, MD, FRCPC

Local Department Head of Addiction Medicine, Burnaby Hospital

Adult Psychiatrist, St. Paul's Hospital
Clinical Assistant Professor, UBC

Specialist Lead on this project for the Burnaby Division of Family Practice, supported by the Shared Care Committee

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The Invictus Games: Reflections from a medical volunteer

The Invictus Games Vancouver Whistler 2025 concluded on 16 February 2025. It is the seventh time the Invictus Games have been held and the first time they have included winter sports. The games are a multisport event for wounded, injured, or sick (WIS) military veterans from Canada and its allies, attracting over 500 competitors from 23 nations. The term *WIS* is used by the Invictus Games Foundation.

The event would not have been possible without volunteers, and, as with all major sporting events, there was a well-organized medical team with outstanding leadership and excellent pregame training. It was an honor for me to work with all the physicians, surgeons, physiotherapists, registered massage therapists, nurses, chiropractors, and pharmacists. The dedication of the medical volunteers was exceptional; some had traveled at their own expense from other provinces and from overseas. Their motivation was obvious: to show appreciation to those who knowingly placed themselves in harm's way to defend the democratic freedoms we benefit from and had suffered as a result. My motivation originated after a visit to Omaha Beach and Juno Beach, two sites of the D-Day landings in Normandy, France, on 6 June 1944.

As part of our uniforms, we were provided distinctive yellow coats that identified us as being with the games. When I was coming home on the SkyTrain late one night after a shift, a well-dressed, articulate young man attempted to engage me in debate. He stated that Canadians did not believe in war and should not support efforts to promote war. He was persistent, although I did not feel threatened and chose not to respond. The encounter made me sad more than anything else, as I suspect that soldiers despise the effects of war, just as health care providers hate disease. As health care workers, we treat the sick and injured; that is our mission. Similarly, military folks also have a mission, only carrying out *their* duties may result in their own disability or death.

With it being the 80th anniversary of the end of World War II this year, it is time

to be appreciative for the society we have the privilege to live in. Had the Axis powers won that war, the young man would not have been allowed to voice his opinions in public. To all our veterans, past and present, thank you for your service.

—Eric M. Yoshida, OBC, MD, FRCPC
Professor of Medicine, UBC

Re: Doctors need electronic health records to work for us, not the other way around

Kudos to Drs Tseng and Lee for their informative and important letter on health care system digitization using the Cerner electronic health record (EHR) system.¹ The points raised in the letter, including shifting administrative tasks to physicians, increasing physician workload, and EHR impacts on patients and physicians, are timely and important. We share the authors' frustrations, and others have reported similar experiences.²⁻⁴

Many of us with previous experience using other EHR systems have been disappointed with Cerner for some of the reasons raised in the letter, including complex workflows, incomplete data linkages, and increasing workload. We recognize that similar problems exist with other EHR systems. However, more testing and tailoring could potentially have been done before the implementation of Cerner to enhance its effectiveness. As Cerner is a program with some separate components, such as front-end speech recognition and data linkages to other provincial databases, it is likely possible to modify its components individually to make the program function more effectively. This could be tested against other EHR systems. Presumably, incorporating artificial intelligence tools (for example, voice commands and dictating notes) could simplify Cerner. Additionally, Cerner's confusing function-related icons add to the cognitive workload and frustration. It would be helpful for Cerner to study and improve the user experience. This likely has consequences for patient care and patient safety. Organizations implementing EHRs should construct a framework

for users to express frustrations and offer suggestions for improvement.

This topic is important to health care in British Columbia and requires much more extensive evaluation and attempts at modification for improvement. It is suitable for an article or an issue of the *BCMJ*, not just a Letter to the Editor

—Charles Krieger, MD, PhD, FRCPC
Vancouver

—Helen Monkman, PhD
Victoria

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Re: Rural privileging

I am writing in response to the article on privileging and credentialing through a rural lens [*BCMJ* 2024;66:334-339]. I am a retired rural physician, having worked in family practice in Quesnel for 40 years and then assisting in the operating room for another 17 years before retiring at age 85. After coming to Canada following 3 years doing house jobs in Brighton, UK, I was lucky to do a 1-year anesthesia residency in Vancouver before moving to Quesnel.

In 1965, there was no BC Ambulance Service. The local ambulance, a museum piece from the 1950s, was owned and operated by the local taxi driver. Doctors were sometimes asked to join when they were attending accidents. Additionally, there was no air ambulance, so it was either a military plane from Comox or a plane from West

Fraser, a local sawmill. It was with these constraints that we rural doctors needed to work. A selection of cases might cast insight on privileges.

One February morning in the 1970s, a young man was brought in by the BC Ambulance Service, having been found in a snowdrift, where he had spent the night on his way home from the bar. It had been -20°C overnight. He was unconscious, with a rectal temperature of 29°C . Such cases require careful warming with hot air so the cold periphery does not flood in, reducing the core temperature and causing cardiac arrest. Our best option was a hot bath and to watch for cardiac arrest. His hands were terrible—solid blocks of ice—leaving me with images of eventual amputation through the wrists. In my mind, regular stellate ganglion blocks might salvage some of the tissue. Several days of these were done on the then-conscious patient. I was rewarded with fingers enveloped by brown blisters—all of them. I did not see them after that, but I was told that pink fingers eventually emerged. How would that fit into the suggested version of privileges?

Another case was a 40-year-old woman with Guillain-Barré syndrome who needed 10 days of ventilation. We successfully managed without an ICU, and she is now in her 80s.

On another February morning in the 1970s, as mentioned in a book he wrote, my partner, Dr Alex Holley, asked me to accompany him to Vancouver with a patient we had been caring for with suspicion of a ruptured arch of the aorta following a car accident. Alex had phoned around for air transport. There was poor weather in Comox, but West Fraser brought its small plane from Williams Lake. We went with the patient to Vancouver, along with blood, intubation, and ventilation if needed, through a bumpy descent to the airport due to stormy weather. Two weeks later, the patient came in to the office to thank us and boast of his new aortic arch.

About that time, we had a man who had fallen and broken his neck at C1. Another of my partners happened to be with him at the time. He did resuscitation, and I later

put skull tongs on and ventilated him. I accompanied him to Vancouver in the Royal Canadian Air Force's Buffalo from Comox—but at no higher than 5000 feet as we came down the Fraser Canyon, because the plane was not pressurized. With ventilation and traction, the physical challenges could be interesting. Unfortunately, the patient died a few days later.

One more case. One quiet Saturday afternoon in the emergency department, a worried-looking older man with a clearly rustic lifestyle came in and said, "I wonder if you can help me. There's no vet in town and I have a dog with porcupine quills."

"Okay, things are quiet now," I replied. His dogs were cougar hunters! This was a 70-pound, shaggy, fierce-looking hound with a face, mouth, and head patched with barbed quills. Anesthesia would seem to be indicated, but my training had not covered dog anesthesia. I had heard that ventricular fibrillation could be a problem. After some thought, I bypassed the need for IV and inserted two pediatric pentobarbital suppositories. This was followed by some patience and a third insertion, after which sedation ensued, and the quill extraction began with pliers. With the face and head cleared, we turned our attention to the mouth, tongue, and inner cheeks, all the while wondering when the anesthesia would wear off. The treatment was concluded with the dog recovering. The owner was so happy that he said, "I have another one in the car." He was given some suppositories, declined the rubber glove that was offered to him, and left happy. Rural medicine!

—John Maile, MD
Quesnel

Artificial intelligence technology for cervical cancer screening

The article "Cervical screening in BC—Change inspired by First Nations and Métis communities" [*BCMJ* 2024;66:370-374] was very informative in demonstrating that by including care, compassion, and understanding in screening for cervical cancer in this population, the incidence of this

preventable disease may be reduced significantly. Hopefully, like in other populations, aided by high acceptance of the human papillomavirus vaccine, cervical cancer will be eradicated in the future.

Another approach can also be used to help individuals who live in remote areas. The use of artificial intelligence technology is being introduced into colposcopic imaging. NTL Healthcare, based in Korea, has developed CerviCARE AI, a handheld device used to diagnose cervical dysplasia with over 95% sensitivity and specificity.¹ For those not familiar with colposcopy statistics, that rate is higher than what a trained colposcopist could achieve. Notably, the device does not require Wi-Fi, as its reference data is within it.

I volunteer with Project HANDS Society, a Canadian registered charitable organization, and since 2013, we have screened over 10 000 women in Bolivia, Myanmar, and Myanmar refugee camps in Thailand using visual inspection with acetic acid. Last November, we used the CerviCARE AI device in the Mae La refugee camp in Thailand for the first time. Not only did we find it accurate by our own visual assessments, but it was also an excellent teaching tool for nurses, midwives, and doctors.

This device, and possibly others that may follow, would be an excellent addition for screening in remote areas. It could significantly reduce the number of patients who would require transportation to a larger centre for colposcopic assessment. Screenings could take place in patients' own communities. This device is already in use in South Asia and Southeast Asia, in countries such as Vietnam, Thailand, Malaysia, Bangladesh, and India.

And a disclaimer: I have no financial interest in this company or the device, and I was a colposcopist prior to retiring.

—Gary C. Jackson, MD
White Rock

Reference

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A culture of compassion

Health care leadership is not for the faint of heart. In a landscape of competing priorities and limited resources, leaders strive to navigate complex systems while driving meaningful improvements. Every decision they make impacts patient care, their colleagues, and the future of the health care system. Yet, too often, leaders at all levels of our profession encounter a troubling feedback culture that can be harsh and unsupportive, exacerbating moral distress and undermining trust. To create sustainable improvements in health care, we must cultivate a culture of constructive feedback.

Moral distress is a reality for many of us. It arises when we recognize the right course of action but are hindered by systemic barriers. This distress is compounded by external factors, such as financial constraints, staffing shortages, and bureaucratic roadblocks, as well as internal pressures from colleagues who are experiencing their own moral distress. Each physician operates within their own sphere of difficulty, and when these pressures collide, trust can erode, and leadership becomes an isolating endeavor. A culture of respectful, kind, and constructive feedback, acknowledging that physicians lead with good intentions, can pave the way for system improvements without causing isolation and burnout.

While patient well-being is a core mission in health care, we cannot overlook the health and safety of those providing patient care. Workplace violence in emergency departments, exhaustion from long shifts, and the mental toll of navigating life-or-death decisions are just a few of the

challenges physicians face. Leaders, too, experience feeling unsafe—not necessarily in a physical sense, but in the form of moral distress.

I submit that all leaders strive for transparency, accountability, and communication but often fall short of meeting the needs of all interest holders. The moral distress a

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leader feels when unsupported or unheard can result in withdrawal, hesitation in making bold decisions, or difficulty advocating effectively. If we are to foster trust, collaboration, and well-being in health care, psychological and physical safety must be at the forefront—for everyone.

Transforming health care requires courageous leadership, but to be courageous, we also need compassion. It is possible to challenge inefficiencies and shortcomings while also recognizing the dedication of those working to improve the system. Many leaders already bear the weight of moral distress, often in silence, as they strive to balance competing priorities. By fostering a feedback culture rooted in kindness, we create an environment where leaders are supported rather than broken down, where trust is reinforced rather than diminished,

and where systemic improvements emerge through collaboration rather than division.

We must champion psychological and physical safety at all levels of health care—from frontline providers to senior leadership. A system that values constructive feedback, genuine support, and tangible efforts to enhance safety will thrive now and in the future.

For meaningful progress, we must be tough on the problems but gentle on the people who are working tirelessly to solve them. Only then can we build a health care system that is effective, compassionate, and sustainable—for patients, providers, and the leaders striving to make a difference. ■

—Charlene Lui, MD
Doctors of BC President

Medical students' service-learning in the Refugee Health Initiative: A mixed-methods program description and evaluation

The Refugee Health Initiative's service-learning program deepens BC medical students' understanding of the refugee experience and provides practical support to refugee families experiencing displacement.

Catherine Binda, MD, Bader Al-Zeer, BSc (Hon), Videsh Kapoor, MD, CCFP, FCFP

Background

There have been persistent calls among medical educators and researchers to promote social accountability in medical training.¹⁻⁴ The field of refugee health offers an opportunity for service-learning, a pedagogical framework used to augment medical school curriculums to promote empathy,⁵ social accountability,⁶ and an understanding of the health advocate role.¹ Health advocates support “patients in navigating the health care system” and use their “knowledge of the determinants of health to positively influence the health of [those] they serve.”⁷ The Royal College of Physicians and Surgeons of Canada identified health advocate as one of the six key roles of a medical expert.⁷

Service-learning balances community needs with student learning objectives by creating reciprocal partnerships.⁸ While required volunteerism in medical school curriculums risks perpetuating inequalities by reinforcing an us–them dichotomy, students who critically engage with service-learning can build meaningful relationships with community members, reflect on systems of power, and become agents of change.⁹

Medical students across Canada have a demonstrated interest in refugee health,¹⁰ and most Canadian medical school curriculums introduce foundational learning objectives on the subject.¹¹ Modeled after the University of Ottawa Refugee Health Initiative, the University of British Columbia Refugee Health Initiative was created in response to refugee communities' calls to action in Greater Vancouver following an influx of Syrian refugees fleeing war in 2016.

Program description

The Refugee Health Initiative (RHI) is a service-learning program that creates partnerships between refugees who have recently settled in Greater Vancouver, interpreters with relevant lived experiences, refugee-serving community partners, and preclerkship medical students. RHI pairs refugee families with medical students and interpreters who can help the families

connect with relevant resources, educational opportunities, and services to help them settle in their new communities.

Language interpreters are recruited using the program members' social networks based on the demographic information received in refugee family referrals. Interpreters complete a criminal record check and privacy and confidentiality training.

With the family's consent, community partners refer refugee families to RHI and share the number of people in the family, along with their names, country of origin, primary language, and individualized support needs. RHI has supported families originating from Syria, Afghanistan, Pakistan, and Palestine. The majority of RHI families are Arabic speaking, though RHI also supports families using Farsi, Dari, and Punjabi interpretation.

All government-assisted refugees who have settled in Canada within the previous 12 months are eligible for referral. In their first year of resettlement, refugee families in Canada have extended health coverage under the Interim Federal Health Program,¹² which includes limited vision, dental, and medical supply coverage. Medical students can leverage their understanding of the health care system to help newly settled refugees maximize their use of the program.

To assess gaps in support, medical students and RHI families complete the

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This article has been peer reviewed.

Vulnerability Screening Tool Settlement Checklist during their first meeting.¹³ The checklist was designed by the Vancouver Association for Survivors of Torture to help professionals working with refugees screen for potential vulnerabilities and resiliency factors relevant to the mental health and settlement of refugees in British Columbia. RHI also aims to support refugee-serving community partners by providing context-relevant information.

Program results and evaluation

Between 2016 and 2024, RHI medical students, interpreters, and refugee community members dedicated 3552 hours to service-learning. Seventy-two medical students, 62 refugee families, and 110 interpreters formed 62 small groups, which met regularly. To engage in community outreach, students worked with five community partners to collaborate on presentations about 11 health and well-being topics and, with help from interpreters, facilitated 72 presentations for 700 refugee participants.

In a convenience sample of 12 medical student–refugee pairings, students reported their partner families were accessing a median of 4 out of 10 (range: 1 to 7) community resources highlighted by the Vulnerability Screening Tool Settlement Checklist.¹³

Students reported they helped families access medical appointments; housing resources; appointments with settlement or social workers; community programs and events; dental appointments; employment and volunteering opportunities; English language programs; nutrition resources, including food banks; résumé-writing services; school, college, and university services; mental health resources; immigration lawyers; and birth registries.

No families reported they were seeing a psychiatrist, psychologist, or clinical counselor prior to their involvement with RHI, and only 6 out of 12 families had a primary care provider.

In addition to learning about forced migration from the refugee families, students reported that their participation in

RHI improved their knowledge of local community resources. One student shared that RHI “[had] made [them] significantly more comfortable with using an interpreter in clinical situations [and] aware of some of the barriers that newcomers to Canada may face, and [they] try to . . . advocate for [their] patients by addressing communication barriers and connecting them to the appropriate community resources.” Medical students further their communication, advocacy, and cultural competencies by completing annual RHI training, completing postmeeting reflective templates, and participating in bimonthly meeting discussions.

Interpreters indicated they were motivated to volunteer with RHI because of their desire to positively impact their community, act as advocates, explore careers in health care, and help educate medical students. In an evaluation survey, multiple interpreters stated that RHI’s strength was its ability to build connections between medical students and refugees. Interpreters also reported that refugee families gained a “better and deeper awareness of how the medical system works” through connections made in the program and that there was “tangible change for families.”

While the scope and impact of other service-learning initiatives, including those at the University of Ottawa and Johns Hopkins University, have been previously described,^{10,14} RHI has demonstrated unparalleled sustainability and scale in terms of the longevity of the program and the number of refugees supported.

Program limitations

RHI and this program assessment have limitations. RHI is unable to provide each family with more than a few hours of volunteer support each month. Also, medical students are limited in the type of support they can provide. They can help arrange appointments with primary care providers but are unable to provide medical advice.

Given that refugee families must be connected to a community organization to be referred to RHI, it is possible that the supports provided are redundant at times

and that efforts could be of greater impact to families who are not engaged in other community supports. However, connecting with those families is a challenge. Additionally, because refugee families must be connected to a community resource like the Resettlement Assistance Program, the RHI program structure is not generalizable to all medical schools in Canada. Only 36 communities across Canada support the Resettlement Assistance Program,¹⁵ so medical students may not be adequately supported in the community to engage in a refugee health service-learning program.

In the past, RHI has chosen not to request feedback from refugee families on a regular basis so as not to burden them. RHI plans to seek feedback from refugee families in future program evaluations and to continue to support refugees in Greater Vancouver and engage medical students in health advocacy.

Call to action

Social support and community integration improve refugees’ well-being,¹⁶ and language barriers and trauma act as barriers to refugees accessing health care.¹⁷ Notably, the Provincial Health Services Authority provides translation services 24/7 in over 200 languages to patients and their families.¹⁸ We call on physicians and allied health providers in BC to address language barriers in their clinics and refer refugees to adjunctive resources in the community, particularly while they have extended coverage under the Interim Federal Health Program.¹² ■

Competing interests

None declared.

Acknowledgments

The majority of RHI team members and community partners live, work, and learn on the traditional, ancestral, and unceded territories of the x^wməθk^wəyəm (Musqueam), Skwxwú7mesh (Squamish), and səilwəta+ (Tsilil-Waututh) Nations. The authors thank the refugee families, community partners, interpreters, students, and faculty supervisors for their ongoing support.

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COVID-19 fatalities among long-term care residents in the Vancouver Coastal Health region

Continued efforts to enhance vaccination coverage and monitor emerging viral strains are essential to mitigate the impact of novel communicable diseases on long-term care residents.

ABSTRACT

Background: Advanced age and chronic comorbidities were established as important risk factors of severe illness early in the COVID-19 pandemic. We examined COVID case fatality rates among long-term care residents in the Vancouver Coastal Health region to reveal the scale and temporal patterns of fatalities during the initial waves of local disease transmission during the pandemic.

Methods: Data were obtained from Vancouver Coastal Health surveillance records and the British Columbia Vital Statistics Agency, spanning 12 January 2020 to 25 June 2022.

The fatality rate of long-term care residents within the Vancouver Coastal Health region who were COVID-positive was measured across six phases of the pandemic. “COVID-19-related” and “30-day all-cause” case fatality variables were used, and data were stratified by time period and age group.

Results: In total, 3418 COVID cases were included. The COVID-related fatality rate among long-term care residents declined from wave 1 (34.3%) to wave 6 (1.9%); the overall fatality rate was 9.9%. The overall 30-day all-cause case fatality rate also declined from wave 1 (32.9%) to wave 6 (6.0%), with an overall 30-day all-cause case fatality rate of 13.6%.

Conclusions: The significant reduction in COVID-related fatality rates among long-term care residents in the Vancouver Coastal Health region in association with vaccination uptake and effectiveness, hybrid immunity, and changing viral strains emphasizes the critical role of timely vaccinations in safeguarding vulnerable populations.

Background

Understanding of SARS-CoV-2 infection has evolved considerably since the virus was first identified in Wuhan, China, in December 2019. However, advanced age, in particular among those with chronic comorbidities, was established as an important risk factor for severe illness and mortality early in the COVID-19 pandemic.¹ Canadian data indicate that although individuals 70 years of age and older have accounted for only 14% of all reported COVID cases, they represent more than 80% of all COVID-related deaths.²

In British Columbia, long-term care facilities provide care to individuals with complex health needs, who often require 24-hour professional supervision and help with most or all daily activities.³ Seventy-five long-term care facilities provide care in the Vancouver Coastal Health region, which serves 1.25 million people. The facilities are located in the Howe Sound, North Shore, Sunshine Coast, and Central Coast regions, as well as the cities of Vancouver and Richmond.⁴ Thirty-five (47%) are operated by the health authority; 40 (53%) are operated by nongovernmental and other organizations, mostly not-for-profits.⁵

SARS-CoV-2 infection in residents of long-term care facilities was associated with the rapid spread of infection and devastating

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This article has been peer reviewed.

mortality. The first outbreak in a long-term care facility in Canada was reported in the Vancouver Coastal Health region. Thus, early in the pandemic, resource-intensive and intrusive interventions were implemented in long-term care facilities to prevent the importation of the virus and limit its spread. This included daily screening of staff and residents, cancellation of group recreation activities, limitation of in-person visitation by family and friends to exceptional situations only, and isolation of ill residents and exposed contacts (usually the rest of the unit) for prolonged periods.⁶ Despite these measures, a study by the Organisation for Economic Co-operation and Development (OECD) indicated that in 2020, Canada had the highest mortality of long-term care residents compared with community-dwelling older persons in 12 OECD member countries.⁷

Vaccines against SARS-CoV-2 were first approved by Health Canada on 9 December 2020, less than 1 year after the novel virus was first identified. An immunization campaign began in BC on 15 December 2020, with long-term care staff among the first group eligible to be immunized. Immunization of long-term care residents began 1 week later, corresponding with permission to move the vaccine from central holding points.⁸ This was followed by several cycles of immunization campaigns to complete the primary two-dose series in long-term care facilities by spring 2021, and booster campaigns were implemented biannually starting in fall 2021. The highly changeable nature of SARS-CoV-2 led to waves of illness activity in the community and in long-term care facilities. Though the illness experience among long-term care residents evolved in 2021, the most dramatic shift was noted with the arrival of the Omicron wave in December 2021.⁹

We examined COVID case and case fatality data among long-term care residents in the Vancouver Coastal Health region from the beginning of the COVID pandemic to June 2022 to reveal the scale of COVID case fatality among those residents and examine temporal patterns of fatalities across each wave of local disease transmission.

Methods

Study design

Case and mortality data were obtained from Vancouver Coastal Health Public Health surveillance records spanning 12 January 2020 to 25 June 2022. For the purpose of sensitivity analysis, mortality data were also obtained through linkage with the BC Centre for Disease Control's Public Health Reporting Data Warehouse (PHRDW), which includes several data sources, such as BC Vital Statistics.¹⁰ The PHRDW collates information from data sources across BC and provides it to public health partners for real-time surveillance activities,¹⁰ though there is some delay in complete capture of all deaths. Data for this study were accessed on 5 July 2023, and we had access to identifiable information on residents during and after data collection.

We performed a retrospective analysis of all cases of laboratory-confirmed COVID-19 among long-term care residents within the Vancouver Coastal Health region by measuring crude fatality rate across six phases of the pandemic. Long-term care facilities reported all cases of COVID infection of residents to Vancouver Coastal Health Public Health daily. The reports were updated to include case outcomes, such as hospitalization and death, as they occurred. The reported mortality data were supplemented with a data linkage between case reports and all resident deaths reported administratively to Vancouver Coastal Health. During waves 1 and 2 of the pandemic, from 12 January 2020 to 6 February 2021, all deaths of COVID-positive patients in long-term care facilities were attributed to their COVID infection and thus were deemed COVID related. Beginning during wave 3 (7 February 2021 to 3 July 2021) and onward through wave 6 (13 March 2022 to 25 June 2022), Vancouver Coastal Health medical health officers reviewed any death of long-term care residents to determine the causal relationship with preceding infection. This produced a binary "COVID-19-related fatality" variable: "yes" indicated that the death was determined to be due to COVID;

"no" indicated the death was determined to have occurred following an active COVID infection but was deemed to not be due to the infection.

We also examined deaths due to any cause in COVID-infected individuals within 30 days of the collection of their positive specimen. Where the date of specimen collection was not known, symptom onset date was used, based on the more comprehensive PHRDW data linkage. The "30-day all-cause case fatality" variable was applied to all COVID cases in the study population: "yes" indicated the death had occurred within 30 days of the specimen collection or onset date; "no" indicated otherwise.

Analysis

We performed two separate analyses to compare fatality rates using the COVID-19-related and 30-day all-cause fatality variables. Data were stratified by age group and time period. Age groups were divided into residents who were 50 to 89 years of age and those who were 90 years of age or older. To ensure confidentiality, residents who were younger than 50 years of age were excluded from the analysis due to the small sample size. Time periods were based on the dominant viral strain that was circulating among the local population [Table 1].¹¹ Date ranges of each pandemic phase, or

TABLE 1. Dates of local COVID-19 waves and dominant strains.¹¹

Wave	Dominant strain(s)	Date range
1	Non-VOC*	12 January 2020–4 July 2020
2	Non-VOC	5 July 2020–6 February 2021
3	Alpha/Gamma	7 February 2021–3 July 2021
4	Delta	4 July 2021–4 December 2021
5	Omicron BA.1	5 December 2021–12 March 2022
6	Omicron BA.2	13 March 2022–25 June 2022

* VOC = variant of concern.

wave, were informed by the epidemic curve of COVID cases known among the BC population, as well as local circulation within the Vancouver Coastal Health region.¹¹ Genomic sequencing data from the BC Centre for Disease Control’s Public Health Laboratory were used to determine the dominant viral strains that were most prevalent during each wave. The Mann-Kendall trend test was used to determine trends across the waves of the pandemic. All analyses were conducted using R, version 4.3.1.¹² Study-specific ethics approval was waived by the University of British Columbia’s Research Ethics Board, because public health surveillance is within the mandate of the local medical health officer under the provisions of BC’s Public Health Act.

Results

In total, 3545 cases of COVID-19 infection in Vancouver Coastal Health long-term care facilities were identified by laboratory testing between 12 January 2020 and 25 June 2022. During this period, 127 cases (3.6%) were excluded from the analysis because the individuals were under 50 years

of age at diagnosis. Individuals between 50 and 89 years of age represented 64.0% (*n* = 2189) and those 90 years of age and older represented 35.2% (*n* = 1202) of the total 3418 cases included in the analysis [Table 2]. The highest overall caseload in long-term care occurred during wave 5, between 5 December 2021 and 12 March 2022 (*n* = 1675, 49.0%). However, the highest overall number of deaths in long-term care residents occurred during wave 2, between 5 July 2020 and 6 February 2021 (*n* = 181, 53.6%).

The COVID-19-related case fatality rate across waves 1 to 6 was 9.9% (*n* = 338) [Table 2]. Even though the rate during wave 4 increased by 4.0 percentage points over that of wave 3, there was a statistically significant decrease from 34.3% during wave 1 to 1.9% during wave 6 (*P* < .001). Vaccines were first introduced in long-term care facilities in December 2020, near the end of wave 2 [Figure]. Second doses were given to long-term care residents with a minimum interval of 28 days from the first dose. By the end of the spring 2021 immunization campaign, 97% of long-term care residents

had received at least one dose of the vaccine, and 92% had received two doses.

The overall 30-day all-cause case fatality rate across waves 1 to 6 was 13.6% (*n* = 464) [Table 3]. The rate during wave 4 increased by 7.5 percentage points over that of wave 3, but overall, there was a statistically significant decrease from 32.9% during wave 1 to 6.0% during wave 6 (*P* < .001).

Discussion

Between 12 January 2020 and 25 June 2022, the overall case fatality rate in residents of long-term care facilities in the Vancouver Coastal Health region was 13.6% based on the 30-day all-cause fatality variable and 9.9% based on the COVID-19-related case fatality variable. Based on all data available from the beginning of the COVID pandemic to September 2023, the Public Health Agency of Canada reported a case fatality rate of 1.5% across all age groups in BC, 1.5% for individuals between 50 and 89 years of age, and 8.5% for persons 90 years of age and older.² Though caution should be used in making comparisons with these results due to different variable definitions

TABLE 2. COVID-19 cases and related case fatality rate in residents of long-term care facilities, by age group and time period.

Time period (dominant strain)	Age group (years)						Total			P*
	50–89			90+			Cases	COVID-19-related deaths	Case fatality rate (per 100)	
	Cases	COVID-19-related deaths	Case fatality rate (per 100)	Cases	COVID-19-related deaths	Case fatality rate (per 100)				
Wave 1: 12 January 2020–4 July 2020 (non-VOC [†])	128	40	31.3	85	33	38.8	213	73	34.3	—
Wave 2: 5 July 2020–6 February 2021 (non-VOC)	401	100	24.9	211	81	38.4	612	181	29.6	—
Wave 3: 7 February 2021–3 July 2021 (Alpha/Gamma) [‡]	—	—	—	—	—	—	27	3	11.1	—
Wave 4: 4 July 2021–4 December 2021 (Delta)	57	5	8.8	29	8	27.6	86	13	15.1	—
Wave 5: 5 December 2021–12 March 2022 (Omicron BA.1)	1096	31	2.8	579	22	3.8	1675	53	3.2	—
Wave 6: 13 March 2022–25 June 2022 (Omicron BA.2)	507	7	1.4	298	8	2.7	805	15	1.9	—
Waves 1–6	2189	183	8.4	1202	152	12.6	3418	338	9.9	< .001

* P for variable trend using the Mann-Kendall trend test; [†]VOC = variant of concern; [‡] Data for wave 3 could not be grouped by age due to low numbers and risk of re-identification.

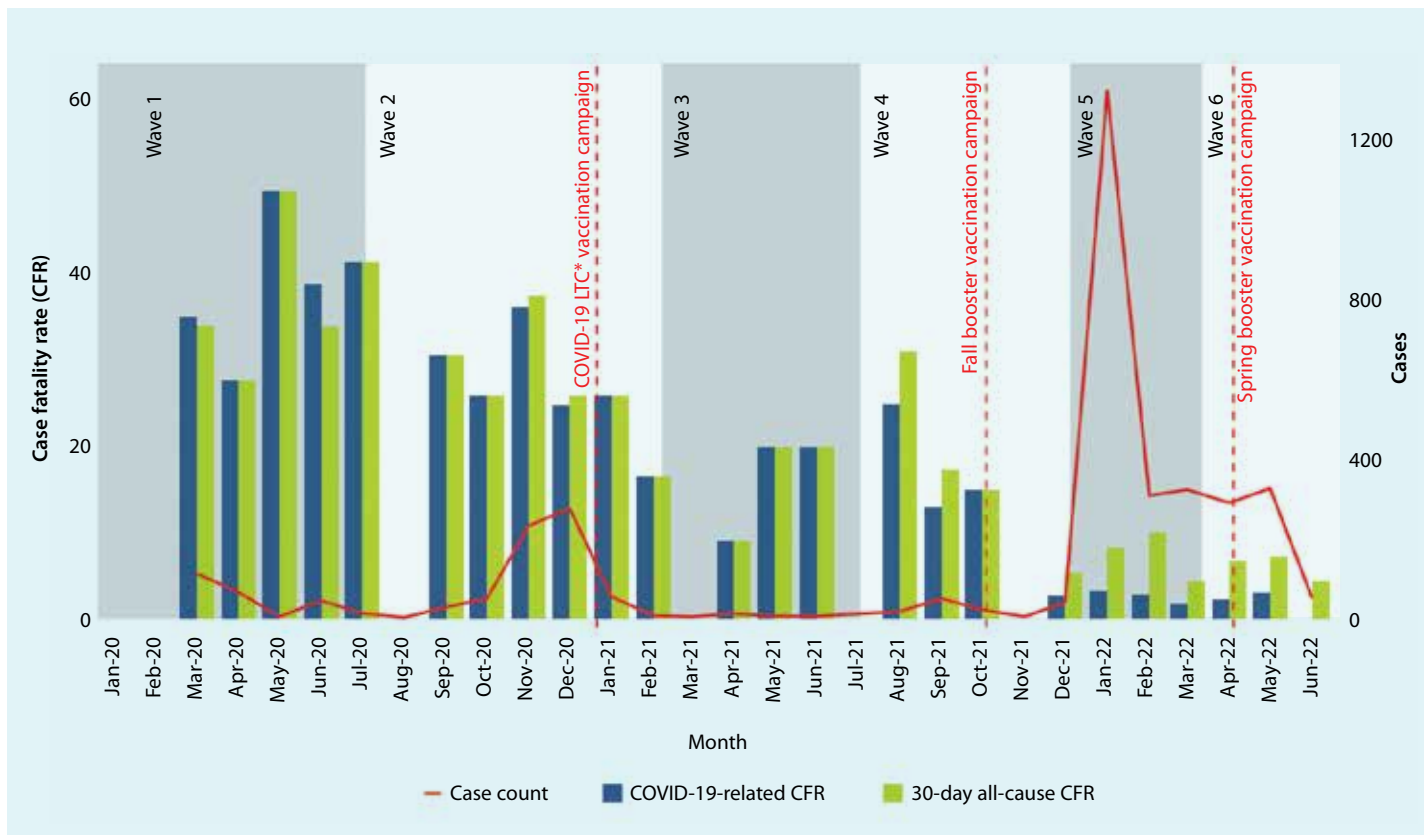


FIGURE. 30-day all-cause case fatality rate and COVID-19-related case fatality rate (CFR) between January 2020 and June 2022.

* LTC = long-term care.

TABLE 3. COVID-19 cases and 30-day all-cause case fatality rate in residents of long-term care facilities, by age group and time period.

Time period (dominant strain)	Age group (years)						Total			P*
	50–89			90+			Cases	30-day all cause deaths	30-day all-cause case fatality rate (per 100)	
	Cases	30-day all-cause deaths	30-day all-cause case fatality rate (per 100)	Cases	30-day all cause deaths	30-day all-cause case fatality rate (per 100)				
Wave 1: 12 January 2020–4 July 2020 (non-VOC) [†]	128	37	28.9	85	33	38.8	213	70	32.9	—
Wave 2: 5 July 2020–6 February 2021 (non-VOC)	401	105	26.2	211	82	38.9	612	187	30.6	—
Wave 3: 7 February 2021–3 July 2021 (Alpha/Gamma) [‡]	—	—	—	—	—	—	27	3	11.1	—
Wave 4: 4 July 2021–4 December 2021 (Delta)	57	7	12.3	29	9	31.0	86	16	18.6	—
Wave 5: 5 December 2021–12 March 2022 (Omicron BA.1)	1096	65	5.9	579	75	13.0	1675	140	8.4	—
Wave 6: 13 March 2022–25 June 2022 (Omicron BA.2)	507	22	4.3	298	26	8.7	805	48	6.0	—
Waves 1–6	2189	236	10.8	1202	225	18.7	3418	464	13.6	<.001

* P for variable trend using the Mann-Kendall trend test; [†]VOC = variant of concern; [‡]Data for wave 3 could not be grouped by age due to low numbers and risk of re-identification.

and time periods used, our data indicate a disproportionate impact of COVID on residents of long-term care facilities in the Vancouver Coastal Health region.

The evaluation of COVID-19-related case fatality rates in long-term care facilities in our study indicated that the original virus, or non-variant of concern strain of SARS-CoV-2, was associated with a 30% to 34% case fatality rate among residents. The rate declined to 11% during the Alpha/Gamma wave (wave 3), which was likely a result of both the protective effect of the primary series of COVID vaccines and changes in the virulence of the circulating strain. The protective effect of the COVID vaccines on hospitalization and mortality rates is well documented.^{7,13-16} In addition, several biannual booster campaigns have been implemented since the original primary series was offered, all of which have included long-term care residents. The Delta variant (wave 4) was associated with increased transmissibility compared with previous variants and significant mortality of community-dwelling adults in jurisdictions that did not have access to vaccines;¹⁷ in our local context, the COVID-19-related case fatality rate among long-term care residents increased to 15.1%, and the 30-day all-cause case fatality rate increased to 18.6%.

The arrival of the Omicron variant (wave 5) was notable, because it was characterized by high transmissibility and vaccine immune evasion. Infection-acquired seroprevalence among Canadians rose rapidly to 76% in the latter half of 2022 in association with the introduction of the Omicron BA.1 and BA.2 variants.¹⁸ However, there was a significant reduction in the severity of illness following infection with the Omicron variant compared with the Delta variant.^{19,20} Though the seroprevalence of infection-induced antibodies remained lowest among individuals 60 years of age and older in the general population (less than 60%) in March 2023,¹⁸ and though it was likely higher among long-term care residents given their congregated living arrangement, our results support the attenuated severity of the Omicron variant,

given that the lowest case fatality rate in long-term care residents occurred in waves 5 and 6. The 30-day all-cause case fatality rate was 8.4% and 6.0%, respectively, while the COVID-19-related case fatality rate was 3.2% and 1.9%, respectively.

Overall, our results underscore the importance of timely vaccination efforts to protect long-term care residents, especially given their heightened vulnerability to severe outcomes due to both age and comorbidities. Our data also suggest that public health monitoring of viral strains and their associated transmissibility and severity will remain important for determining nuanced public health interventions that are proportionate to time, geography, and population-specific risk. Long-term care facilities faced highly restrictive policies during the COVID-19 pandemic, which had a number of documented negative effects, including physical health consequences, reduced nutrition, increased physical pain, loneliness, depressive symptoms, agitation, aggression, and reduced cognitive ability.^{21,22} Because long-term care facilities are homes for frail individuals, creating a balance between managing the risks posed by an emerging virus and the unintended harms of pandemic control restrictions on quality of life for residents is recommended. This is a crucial assessment that should be built into pandemic plans and should consider emerging information and advances in prevention and control, including the availability of vaccines and treatment. Studies from BC and Canada provide suggestions for future mitigation of risk within long-term care facilities.^{23,24}

Study limitations

Our study may have been limited by an incomplete case ascertainment and underreporting of deaths among long-term care residents. Given that the systematic review of COVID-19 case fatality in long-term care facilities was implemented only at the beginning of the third wave of the pandemic, it is possible that COVID-related fatality was overreported during the first two waves. Nevertheless, due to early implementation

of twice-a-day symptom-based surveillance, low-threshold testing of symptomatic individuals, close care coordination between Vancouver Coastal Health Public Health and facilities regarding case management, and heightened vigilance within long-term care facilities, it is unlikely that incomplete case ascertainment or underreporting/overreporting was a significant factor during the first 2 years of the pandemic. Given the rapid increase in infections following the arrival of the Omicron variant, it is possible that individuals with mild infection may not have been tested or reported. Seroprevalence studies identified a large prevalence of asymptomatic infections, though clinical relevance of those infections beyond provision of infection-acquired immunity is unclear.

The probability that deaths were not reported is low, though this remains a source of concern when interpreting trends in fatality rates. We compensated for this by calculating both the COVID-19-related case fatality rate and the 30-day all-cause case fatality rate, the latter of which provided the upper bounds of severity of COVID-related illness in facilities. Long-term care residents are frail individuals with complex underlying health conditions. The 30-day all-cause case fatality rate during waves 5 and 6 approximated a return to baseline fatality from other natural causes and at worst was an outer estimate for case fatality rate due to COVID. In total, 168 deaths during waves 5 and 6 that were not reported in real time by long-term care facilities were detected using the retrospective 30-day analysis. Given the close and frequent collaboration between the Office of the Chief Medical Health Officer and the long-term care sector, including daily to weekly contact with facilities that were experiencing illness, we are reasonably confident that if those deaths had been attributed to COVID, they would have been reported to the Office of the Chief Medical Health Officer for further review. Additionally, the trend in our reported COVID-19-related case fatality rate was consistent with the trend observed by the neighboring Fraser Health

Authority through its surveillance (personal communication, Dr Jing Hu, 26 October 2023). An internal review of long-term care licensing data across the Vancouver Coastal Health region indicated that the yearly mortality rate in long-term care facilities in 2022 was 18.7%, lower than the 2019 prepandemic rate of 22.6%, which further indicates a return to baseline fatality from all causes within long-term care facilities by the time pandemic precautions had been lifted. Finally, the relatively small sample size in our study precluded further sub-analyses involving other covariates related to COVID-19 case fatality, though they have been examined in the literature.²⁵⁻²⁷

Conclusions

The introduction of vaccines and the changing viral landscape significantly influenced case fatality rates in long-term care facilities in the Vancouver Coastal Health region, which emphasizes the critical role of vaccinations in safeguarding vulnerable populations. Continued efforts to enhance vaccination coverage and monitor emerging viral strains are essential to mitigating the impact of novel communicable diseases on long-term care residents. Such strategies are crucial to ensure the well-being and safety of this population during ongoing and future public health challenges. ■

Competing interests

Dr Schwandt is a member of the *BCMJ* Editorial Board but did not participate in the review or decision-making process.

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Managing hyperkalemia in the outpatient setting

Outpatient management of hyperkalemia involves assessing the patient's intercurrent health, reviewing their medications, addressing comorbidities, and initiating additional medications if necessary. Patients should avoid processed foods and salts with highly bioavailable potassium.

ABSTRACT: Hyperkalemia, a common electrolyte (potassium) abnormality, is often encountered in the outpatient setting, but the lack of standardized guidelines for hyperkalemia management creates challenges for both patients and health care providers. We reviewed the causes of hyperkalemia based on common case presentations, highlighting potassium physiology, contributing medications and comorbidities, and laboratory and sampling factors. Outpatient management of hyperkalemia involves assessing the patient's intercurrent health, reviewing their medications to identify potential culprits, addressing

comorbidities, and, if necessary, initiating the use of additional medications (e.g., diuretics, sodium-glucose cotransporter-2 inhibitors) to manage underlying conditions. It is important to exhaust all options before discontinuing or reducing doses of guideline-directed medications such as renin-angiotensin-aldosterone system inhibitors and mineralocorticoid receptor antagonists. Updated recommendations for dietary management of potassium emphasize reducing the intake of highly bioavailable potassium in processed foods and salts rather than restricting fresh fruits and vegetables, plant-based proteins, and whole grains.

setting, where the severity of concomitant illnesses in hospitalized patients may lead to recommendations for outpatients to be referred to the emergency department for monitoring.⁵ These broad-stroke recommendations create further stress and anxiety for the patient, physician, and health care system. Given the association of hyperkalemia with higher health care resource utilization and costs, clear protocols are needed.^{7,8} We present clinical cases that highlight common scenarios in which a clinician may encounter hyperkalemia in the outpatient setting. We review risk factors, potential causes, and suggested approaches to outpatient management.

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This article has been peer reviewed.

Hyperkalemia is a common electrolyte abnormality among patients with cardio-kidney-metabolic syndrome and has potentially life-threatening consequences.¹⁻³ Hyperkalemia is more commonly seen in patients with chronic kidney disease, heart failure, and diabetes, given the underlying pathophysiology and exposure to guideline-based medications such as renin-angiotensin-aldosterone system inhibitors (RAASis) and mineralocorticoid receptor antagonists (MRAs).^{4,5} However, despite well-established recommendations for managing acute hyperkalemia in inpatient settings, guidelines for outpatient management remain limited.⁶ Available data and recommendations are often extrapolated from the inpatient

Case 1

Mr Sharma is a 65-year-old man with type 2 diabetes mellitus and hypertension. His most recent blood work indicated his potassium level was 5.2 mmol/L, estimated glomerular filtration rate (eGFR) was 80 ml/min/1.73 m², urine albumin:creatinine ratio was 40 mg/mmol, and A1c was 8.1%. He takes telmisartan, amlodipine, atorvastatin, empagliflozin, metformin, and insulin. He also takes glucosamine daily and ibuprofen as needed for management of osteoarthritis. His blood pressure is 140/85 mmHg. Two weeks after increasing his telmisartan dose to 80 mg daily, his serum potassium was 5.9 mmol/L. What are his risk factors for hyperkalemia?

Factors affecting potassium levels

Potassium physiology

Approximately 98% of total body potassium is stored intracellularly, while 2% is in serum.⁹ In normal kidney function, the kidney is responsible for approximately 90% of potassium excretion, while colonic excretion accounts for approximately 10%.¹⁰ This intra- and extracellular difference in potassium levels is maintained by several complex mechanisms, including sodium–potassium pumps and hormonal regulation. Cellular uptake of potassium is influenced by insulin and beta2 adrenergic receptor stimulation, while renal excretion of potassium is modulated by aldosterone. In people with reduced eGFR, adaptations occur to maintain potassium homeostasis: the kidney adaptively increases potassium secretion in the remaining functioning nephrons, and gastrointestinal potassium excretion increases to up to 25% to 30% of total excretion in the case of G5 chronic kidney disease.^{9,11}

Serum potassium follows a circadian rhythm whereby potassium levels peak in the early afternoon and reach a nadir at 9 p.m.¹² The diurnal variability of serum potassium is much greater in the setting of chronic kidney disease (the difference between minimum and maximum potassium levels in an individual is 0.72 ± 0.45 mmol/L) compared with normal kidney function.¹² Patients with chronic kidney disease commonly exhibit postprandial hyperkalemia with serum potassium transiently rising following a meal—this is referred to as “impaired potassium tolerance.”¹³

Medications and comorbidities

Hyperkalemia has multifactorial causes [Figure 1].¹³ Patients with chronic kidney disease, heart failure, or diabetes are commonly prescribed medications that further reduce renal potassium excretion (e.g., RAASi, MRAs) or block intracellular uptake (e.g., beta blockers). Over-the-counter medications such as NSAIDs and supplements such as glucosamine also raise serum potassium, either by reducing potassium clearance (e.g., NSAIDs)

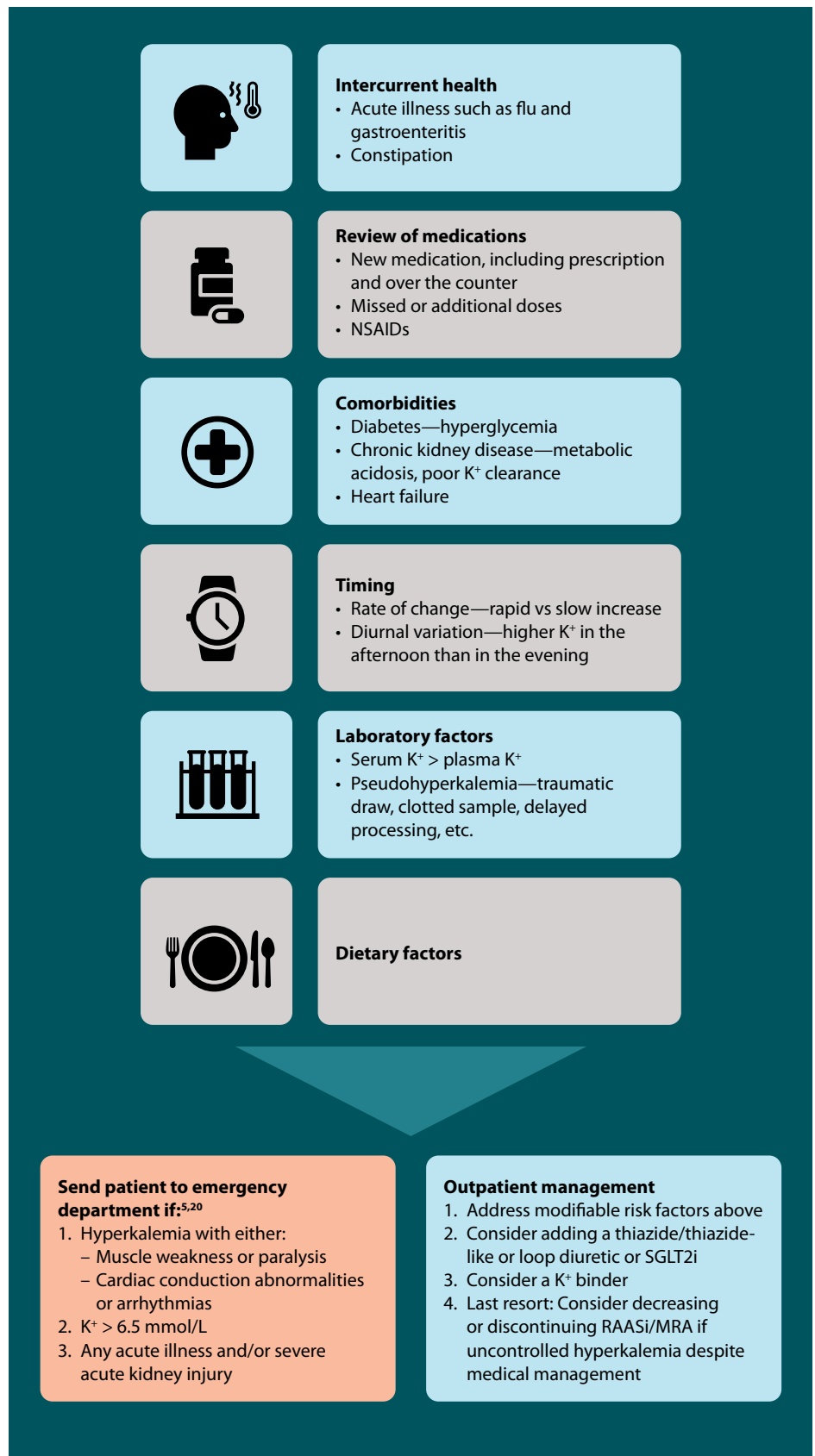


FIGURE 1. Causes of hyperkalemia and suggested management.

K⁺ = potassium; SGLT2i = sodium-glucose cotransporter-2 inhibitor; RAASi = renin-angiotensin-aldosterone system inhibitor; MRA = mineralocorticoid receptor antagonist.

or, more commonly, by containing potassium additives.¹⁴

Constipation, which occurs in up to 90% of patients on dialysis, is a common contributor to hyperkalemia because of the increased reliance on gastrointestinal potassium excretion in chronic kidney disease.¹⁵ Diabetes mellitus is another risk factor for hyperkalemia, as hyporeninemic hypoaldosteronism is commonly seen in these patients, and intracellular shift of potassium is reduced in the setting of hyperglycemia and low insulin states.¹³ Cellular uptake of potassium is also reduced with metabolic acidosis, a complication of advanced chronic kidney disease. Renal hypoperfusion in the setting of volume depletion and heart failure also increases the risk of hyperkalemia. Finally, concurrent illnesses associated with increased catabolism or tissue breakdown can cause increased release of potassium into the extracellular space. Despite common understanding to the contrary, dietary potassium intake has a weak correlation with blood potassium.

Laboratory and sampling factors

Collection methods and sample handling may contribute to variability in serum potassium. Levels in serum samples are often higher than those in plasma (by a mean of 0.38 ± 0.18 mmol/L) because serum analysis requires the blood to clot, which releases potassium, whereas plasma samples do not.¹⁶ Similarly, pseudohyperkalemia may occur due to clotted samples, traumatic venipuncture, fist clenching, suboptimal temperature of sample storage, high levels of platelets, and delayed sample processing.¹⁷

Case 1 revisited

Mr Sharma has several risk factors for hyperkalemia. He has diabetes, and suboptimal glycemic control can result in a shift of potassium to the extracellular space. His over-the-counter medications, ibuprofen and glucosamine, are also likely contributors to hyperkalemia.

Given his albuminuria, the goal would be to achieve the maximum tolerated dose

of his angiotensin receptor blocker (i.e., maintain his current telmisartan dose). He should be counseled to avoid NSAIDs and glucosamine. A thiazide/thiazide-like diuretic could be added, given that he has suboptimal blood pressure control, and this medication can increase potassium excretion. To improve his glycemic control and enhance potassium shift into cells, his insulin dose can be increased, and/or a glucagon-like peptide-1 agonist, which also has kidney and cardiovascular benefits, can be considered.¹⁸

Case 2

Ms Lee is a 68-year-old woman who was recently discharged from hospital with myocardial infarction requiring three stents, subsequent heart failure with an ejection fraction of 35%, and chronic kidney disease with a baseline eGFR of 23 mL/min/1.73 m². Her medications include aspirin, bisoprolol, atorvastatin, sacubitril/valsartan, and dapagliflozin. She was recently seen in the clinic and was started on spironolactone. Her previous potassium levels were 5.3 mmol/L and 4.8 mmol/L. You receive a call from the outpatient lab in the evening because blood work from a sample drawn earlier in the day indicated a potassium level of 6.3 mmol/L.

Critical hyperkalemia: When should patients go to the emergency department?

There are several key factors in determining the severity of hyperkalemia: signs and symptoms, potassium level, and the rate of change in potassium levels. Irrespective of the potassium level, anyone with signs and symptoms such as muscle weakness or paralysis or cardiac conduction abnormalities or arrhythmias requires emergency treatment and cardiac monitoring.¹⁹⁻²² The most common electrocardiogram findings in hyperkalemia are peaked T waves followed by QRS widening; sustained hyperkalemia may further lead to conduction blocks, ventricular fibrillation, and asystole.²⁰ Guidelines and expert opinion agree that

anyone with a potassium level greater than 6.5 mmol/L should be urgently referred to the emergency department, but there are discrepancies regarding management of potassium levels between 6.0 and 6.5 mmol/L.^{5,20-22} This range requires clinical judgment and contextualization of potassium values due to the multifactorial nature of outpatient measurements [Figure 1]. Furthermore, the rate of change in potassium levels must be considered, because a rapid rise is more likely to cause cardiac abnormalities than a gradual increase over several months.²¹

Without clear guidelines and standardization, physicians must use their clinical judgment to decide when to send patients to the emergency department, which increases stress and anxiety for clinicians and patients and further strains the health care system. In British Columbia, LifeLabs alerts clinicians anytime potassium levels are greater than 6.2 mmol/L. In comparison, in Ontario, clinicians are alerted anytime potassium levels are greater than 6.6 mmol/L, but only between 8 a.m. and 8 p.m. when levels are 6.2 to 6.5 mmol/L.^{23,24} Lab results are often reported after hours, and patients exhibit no symptoms, which further adds to the management conundrum.

Outpatient management of hyperkalemia

Patient assessment and review of medications

Assessing the patient's intercurrent health is an essential first step to determining whether the hyperkalemia can be managed when the individual is an outpatient. Patients with severe intercurrent illness with concurrent metabolic derangements (e.g., pneumonia with dehydration leading to acute kidney injury and hyperkalemia) or symptoms of hyperkalemia require urgent medical care. Once the patient is deemed stable, the recommended approach is to first address modifiable factors and apply mitigating strategies [Figure 1]. A careful review of medications may identify a potential culprit. Discontinuing over-the-counter medications such as

NSAIDs and glucosamine supplements may resolve hyperkalemia. A repeat lab test outside the postprandial window and discontinuing culprit medications can often resolve hyperkalemia and clarify potential contributing laboratory factors.

Addressing comorbidities

In patients with diabetes, hyperkalemia may result from potassium shift due to elevated serum glucose.²⁵ Management of the hyperglycemia can improve serum potassium levels. Correction of metabolic acidosis in patients with chronic kidney disease by increasing fruit and vegetable intake or bicarbonate supplementation can improve hyperkalemia.^{26,27} However, sodium bicarbonate supplementation needs to be monitored in individuals with a history of heart failure, because it can lead to volume overload.²⁸ Addressing constipation with laxatives and increasing fibre intake can improve gastrointestinal potassium clearance.²⁰ The following resource highlights the management of constipation, including both nonpharmacologic and pharmacologic strategies, in patients with chronic kidney disease:

- www.bcrenal.ca/resource-gallery/Documents/Management%20of%20Constipation%20in%20Patients%20with%20Chronic%20Kidney%20Disease.pdf

Additional medications

The primary purpose of initiating additional medications (e.g., diuretics, sodium-glucose cotransporter-2 inhibitors) is to manage underlying conditions, such as hypertension or heart failure, with the secondary benefit of mitigating hyperkalemia through their mechanisms of action. If the addition of a medication is not sufficient to manage hyperkalemia, a potassium binder can be added. The Table provides examples of medications and possible doses; however, medication selection, initial dosing, and titration must be individualized for each patient in consideration of clinical indication, adverse effect profile, and tolerability.

TABLE. Medications for outpatient potassium management.

Medication	Initial and maximum dose	Common indications	Source
Diuretics			
Hydrochlorothiazide	12.5 mg daily, up to 50 mg daily (some sources: max 25 mg per day)	Hypertension	BC Guidelines: Hypertension – Diagnosis and Management ⁷⁰
Chlorthalidone			
Furosemide	20 to 200 mg per day (often twice-per-day dosing)	Edema, volume overload	BC Guidelines: Heart Failure – Diagnosis and Management ⁷¹
Sodium-glucose cotransporter-2 inhibitors			
Canagliflozin	100 mg daily, up to 300 mg daily	Chronic kidney disease, type 2 diabetes, heart failure	Kidney Disease: Improving Global Outcomes CKD Work Group guidelines; ²⁷ Canadian Cardiovascular Society and Canadian Heart Failure Society heart failure guidelines ³⁶
Dapagliflozin	10 mg daily		
Empagliflozin	10 mg daily, up to 25 mg daily		
Potassium binders			
Sodium polystyrene sulfonate	15 g one to four times daily	Hyperkalemia	Weinstein and colleagues ²⁸
Sodium zirconium cyclosilicate	10 g three times daily for up to 48 hours, then 5–10 g once per day		
Patiromer	8.4 g once per day (dose can be titrated at ≥ 1 week intervals in 8.4 g increments to a maximum of 25.2 g once per day)		

Diuretics

For patients with persistent hyperkalemia in the setting of chronic kidney disease and/or hypertension/volume overload, a thiazide/thiazide-like or loop diuretic can enhance kidney excretion of potassium.²⁰ However, their effectiveness diminishes and becomes less predictable in patients with low kidney function and chronic use; thus, dose titration is required.^{20,28}

Sodium-glucose cotransporter-2 inhibitors

Sodium-glucose cotransporter-2 inhibitors, which have been shown to reduce the risk of kidney disease progression and cardiovascular events, also reduce the risk of serious hyperkalemia.²⁹ They promote potassium excretion by increasing the delivery of sodium to the distal tubules in the kidneys.³⁰ However, the extent of sodium and potassium excretion is uncertain.³¹

Potassium binders

Potassium binders are potential management options for persistent hyperkalemia (potassium levels above 5.5 mmol/L) that is not responsive to other measures. In a recent study of BC patients with chronic kidney disease, only about 27% of patients with persistent hyperkalemia were prescribed sodium polystyrene sulfonate or calcium resonium.³² Gastrointestinal side effects and palatability may limit the long-term use of these potassium binders. However, newer agents such as sodium zirconium cyclosilicate and patiromer are available, but real-world studies are needed to assess whether tolerability is improved compared with the older potassium binders. Studies suggest that these newer potassium binders allow patients to remain on RAASis in the treatment of chronic kidney disease and heart failure.^{33,34}

Consequences of discontinuing guideline-directed medical therapies

RAASis and MRAs are both key disease-modifying agents for treating chronic kidney disease, cardiovascular disease, and diabetes mellitus.³⁵⁻³⁷ They lead to increases in potassium concentration due to their interference with aldosterone (indirect and direct blockade), thus impairing excretion by the kidney. They are often down-titrated or discontinued when patients experience hyperkalemia.³⁸ Observational studies, systematic reviews, and RCTs have demonstrated that discontinuing RAASis is associated with a higher risk of all-cause mortality and increased risk of kidney failure requiring dialysis.³⁹⁻⁴¹ Similar outcomes have been observed when discontinuing RAASis in patients with restored left ventricular heart failure after an acute myocardial infarction: stopping RAASis was associated with increased risk of all-cause mortality, spontaneous myocardial infarction, and heart failure rehospitalization (11.4% vs 5.4%; hazard ratio 2.20 [95% CI, 1.09-4.46]).⁴² Only as a last resort should dose reductions or discontinuation of RAASis or MRAs be considered if there is uncontrolled hyperkalemia despite addressing modifiable factors/medical treatment.^{26,43} If these medications are withheld, it is important to try to reintroduce them, with additional emphasis on addressing factors highlighted in **Figure 1**.

Case 2 revisited

Ms Lee tells you she has been feeling well, is taking her medications as prescribed, and has not started any new over-the-counter supplements. She has been eating and drinking well and having regular bowel movements. Both you and Ms Lee are keen on continuing her guideline-based medications. You review and provide her with the potassium management patient handout and discuss potentially starting her on a potassium binder. Follow-up blood work the next day indicates a potassium level of 6.0 mmol/L, and you prescribe sodium polystyrene sulfonate 15 g orally daily for

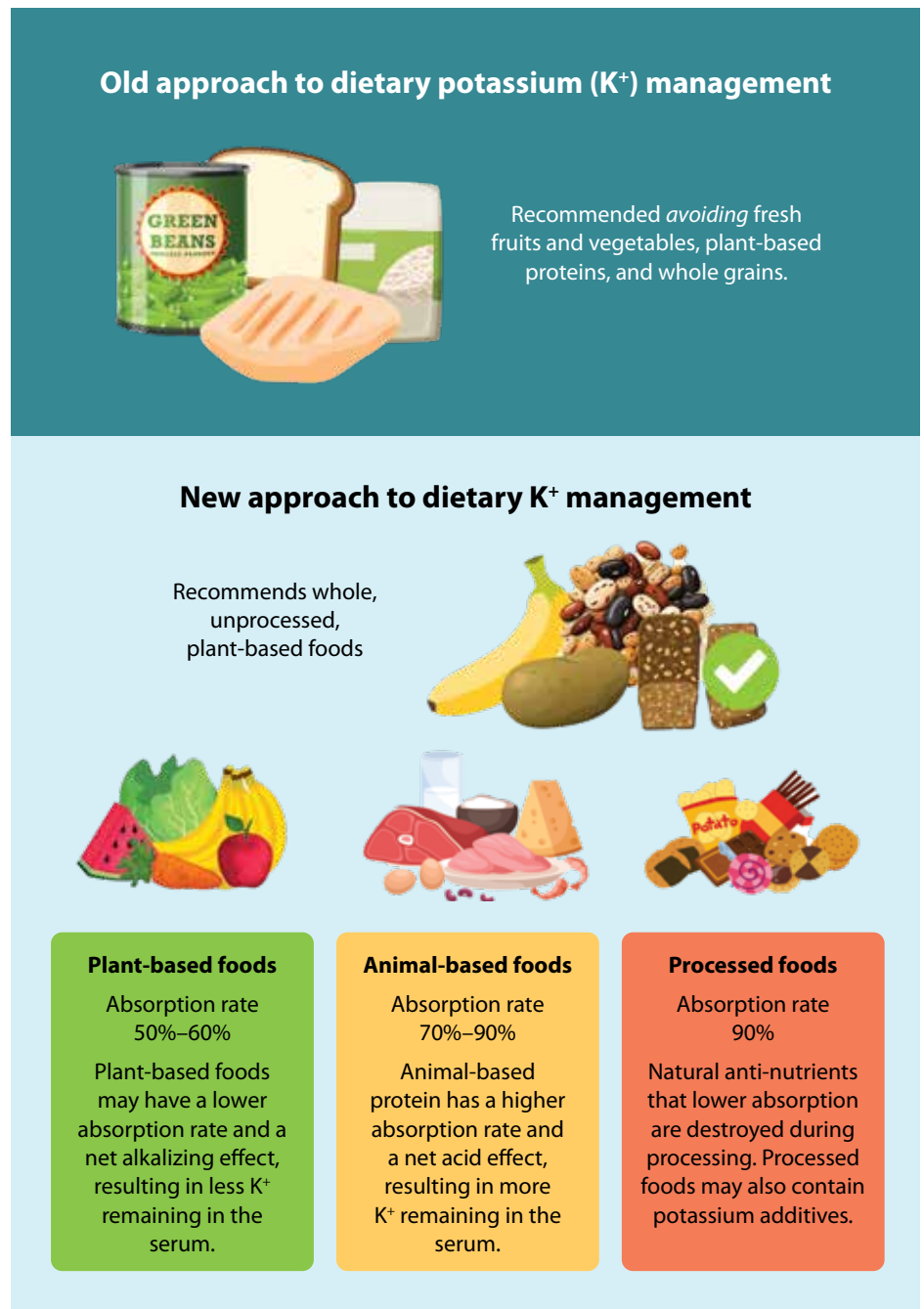


FIGURE 2. Old versus new approach to dietary potassium recommendations.^{27,44}

5 days, which reduces her potassium level to 5.5 mmol/L the following week. With dietary changes, Ms Lee could wean off the binder the following week and continue her guideline-directed medical therapies.

New perspectives on low-potassium diets

Traditionally, low-potassium diets have focused on restricting whole fruits and

vegetables (e.g., bananas, potatoes, oranges) [Figure 2].^{44,45} However, increasing evidence indicates that this approach fails to recognize factors such as potassium bioavailability, co-nutrient ingestion impacts on potassium metabolism, and North American dietary patterns.⁴⁶⁻⁴⁹

Different foods have different potassium bioavailability.⁴⁶ Several studies on potassium balance have reported that plant foods,

whose cell walls are left intact, have lower bioavailability than animal products.⁵⁰ This has led recent low-potassium diet recommendations to focus less on whole fruits and vegetables, because their intact cell walls likely reduce potassium bioavailability and limit their impact on circulating potassium.

Co-nutrient ingestion also alters intracellular potassium uptake. Alkaline foods, such as whole fruits and vegetables, encourage intracellular potassium uptake more than acidic foods, such as animal proteins.^{48,51-53} Additionally, potassium combined with carbohydrate loads enhances intracellular potassium uptake via insulin.⁴⁹ This has led to the recognition that whole fruits and vegetables that contain carbohydrates are less likely to be associated with hyperkalemia than animal-based foods.

Finally, the third factor related to changing recommendations also considers North American dietary patterns, particularly the consumption of ultra-processed foods. These foods may contain potassium additives, which have been reported to have significantly higher levels of potassium than foods without additives. These additives tend to be found in foods that have traditionally been considered to be low in potassium.⁵⁴⁻⁵⁶ Ultra-processed foods are more likely to have altered cell structures, which increases potassium bioavailability, even without additives. These foods also tend to be more acidic and lower in fibre, which may enhance absorption and reduce cellular potassium uptake.⁵⁷ An investigation of processed food consumption by adults living with kidney disease reported that more than 60% of calories consumed came from processed and ultra-processed foods.⁵⁸ Processed foods also reduce naturally beneficial “anti-nutrients”—compounds that inhibit nutrient absorption—thereby resulting in higher potassium uptake.⁵⁹

What to recommend instead?

New dietary potassium modification recommendations no longer restrict the intake of fresh fruits and vegetables but instead focus modification on highly bioavailable potassium in processed foods. Focusing

on nutrient-dense foods that are higher in plant fibre has shifted traditional recommendations away from total milligrams of potassium toward a diet that is higher in nutrient quality and lower in foods that contain potassium additives.⁶⁰ Modification of dietary potassium has also adopted a more comprehensive approach that recognizes the variety of factors, including glycemic levels and acid-base balance, that are known to impact serum potassium levels.⁶¹

New dietary potassium modification recommendations no longer restrict the intake of fresh fruits and vegetables but instead focus modification on highly bioavailable potassium in processed foods.

If the cause of hyperkalemia is related to acidosis, the primary dietary strategy is to recommend the intake of fruits and vegetables. These foods are base producing and have been shown to improve acidosis in chronic kidney disease.^{62,63} Whole, unprocessed fruits and vegetables are preferable to processed fruits and vegetables, such as juices, dried fruits, and canned products that are high in sugar or sodium. In general, a diet that is in line with the dietary approaches for hypertension or a Mediterranean diet, where unprocessed plant foods are favored over others, tends to work favorably for managing potassium levels, as well as overall cardiac health, diabetes, and kidney health.⁶⁴⁻⁶⁶ Such diets are favorable because of their higher fibre content, which reduces the bioavailability of potassium and improves digestive health.⁶⁷⁻⁶⁹

If the primary cause of hyperkalemia is related to glycemic levels, reducing the glycemic index of meals; using low-glycemic-index foods and higher-fibre foods; and consuming a better balance of

carbohydrates, proteins, and fats are recommended. If potassium levels remain elevated despite addressing modifiable risk factors and dietary advice is indicated, initial recommendations are to reduce the intake of items with highly concentrated forms of potassium, such as potassium-based salt substitutes, potassium-containing sports drinks, orange- or tomato-based juices, hot chocolate powders, and processed meats (e.g., hot dogs, lunch meat). Encouraging patients to read ingredient lists for potassium additives, including potassium chloride, potassium lactate, and potassium phosphates, is also recommended. Products that contain these additives are likely to contribute significant amounts of potassium to the diet. Finally, wet cooking methods (such as boiling and blanching) can help reduce the potassium content of all foods and are the preferred methods for cooking meats, legumes, grains, and vegetables compared with dry cooking methods (such as baking, roasting, and frying). Two important resources can help support this practice change:

- Potassium Management in Kidney Disease (BC Renal): www.bcrenal.ca/resource-gallery/Documents/Potassium_Management_in_Kidney_Disease.pdf
- Optimization of RAASi Therapy Toolkit: Addressing Challenges: Dietary approaches to hyperkalemia (International Society of Nephrology): www.theisn.org/initiatives/toolkits/raasi-toolkit/#1684867542809-330edb79-52b4

Summary

Outpatient hyperkalemia is a common abnormality identified in lab reports to clinicians. This review identifies multiple risk factors and management strategies for outpatient hyperkalemia and offers new perspectives on low-potassium diets. It also highlights the importance of exhausting all options before discontinuing or reducing doses of guideline-directed medications such as RAASis and MRAs. ■

Competing interests

None declared.

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Moving the dial on team-based care in British Columbia

We explore three overarching questions related to team-based primary care in BC: Why do we need teams, where do we go next, and how do we get there?

Goldis Mitra, MD, CCFP, Thuy-Nga (Tia) Pham, MD, CCFP, FCFP, MSc, M. Ruth Lavergne, PhD, MSc

Nearly a quarter of adults across Canada do not have a family doctor, and the problem is even worse in British Columbia, at 27%.¹ Despite the introduction of the Longitudinal Family Physician Payment Model in BC and significant investments in primary care by the government over the last 2 years, attachment and access to primary care are still concerns for a significant portion of the population. This has substantial health care system impacts, as patients rely on emergency

departments, walk-in clinics, and virtual care for access, and consultant specialists face the challenge of seeing patients without ongoing longitudinal follow-up.

The OurCare initiative is a national conversation about the future of primary care, focusing on the public's expectations, how the public defines good primary care, and the policy changes recommended to shape the system. Last year, OurCare published the results of a comprehensive initiative to understand the improvements Canadians want to see in our primary care system.² Over 16 months, from September 2022 to December 2023, the OurCare initiative engaged nearly 10 000 Canadian adults about their experiences with primary care and their values, ideas, and hopes for the future of family medicine. Through a national survey and subsequent

deep dialogues with hundreds of residents across five provinces, the project aimed to understand how people engage with primary care and what areas need improvement. Participants were randomly selected to represent the geography and demographics of their province, with overweighting of specific equity-deserving groups.

The resulting recommendations were distilled into the OurCare Standard, a set of six elements that represent people's aspirations about what high-quality primary care should look like [Box]. One key takeaway was the first element of the standard: "Everyone has a relationship with a primary care clinician who works with other health professionals in a publicly funded team." Participants resoundingly felt that an integral part of the solution to the attachment and access crisis was to expand

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This article has been peer reviewed.

BOX. The OurCare Standard.

1. Everyone has a relationship with a primary care clinician who works with other health professionals in a publicly funded team.
2. Everyone receives ongoing care from their primary care team and can access them in a timely way.
3. Everyone's primary care team is connected to community and social services that together support their physical, mental and social well-being.
4. Everyone can access their health record online and share it with their clinicians.
5. Everyone receives culturally safe care that meets their needs from clinicians that represent the diversity of the communities they serve.
6. Everyone receives care from a primary care system that is accountable to the communities it serves.

PREMISE

team-based primary care, both to increase capacity in the system and to address physician burnout. It is increasingly clear that robust teams in primary care are central to a high-functioning primary care system.²

Why do we need teams in primary care?

Declining capacity

We have a primary care capacity problem. Quite simply, we don't have enough family doctors to provide the increasingly complex care⁴ that Canadians need to address their immediate medical issues and disease prevention. These health human resource problems are a global issue: there are significant shortages of doctors, nurses, and key professionals in both high- and low-income countries around the world.⁵

It is not feasible to train or recruit doctors fast enough to address this crisis, and it might not be the most efficient way to meet patients' changing needs. A family physician's training equips them to work in multiple areas of the health care system, where many also provide care for pregnant persons, work as hospitalists and emergency medicine doctors, and more. Because of the many areas in which family physicians work, we don't have enough of them to meet system needs. No matter how much we rearrange the deck chairs—for example, by convincing hospital-based family doctors to work in traditional family medicine offices—we still need net new capacity in the system today.

Increasing complexity

Practice patterns among doctors are changing: even in traditional family doctors' offices, physicians are seeing fewer patients than their predecessors.⁶ This reflects the population aging and having more complex medical needs, but also the changing expectations of patients about care. It's not a matter of simply handing someone a prescription, telling them their diagnosis, and walking out of the room; shared decision making and ensuring a patient understands their diagnosis and treatment all take important face-to-face time.

At the same time, doctors are faced with a significant increase in the administrative complexity of care compared with 30 years ago—the tests and referrals that need to be ordered, the administrative avalanche of disability forms, Special Authority requests for medication coverage, and more.⁴ All these tasks prevent doctors from seeing more patients face-to-face. We need models of care that are equipped to manage this complexity of care and the associated administrative work.

The potential solution to the primary care capacity problem isn't simply to add more health care workers to the already immense workforce. Solutions must make primary care more efficient and do away with some of the hurdles that take time away from seeing patients. Artificial intelligence scribes are already helping care providers write clinical notes,^{7,8} and there is potential for much more capacity to be gained through improved use of technology.⁹ We also need to reduce needless administrative work through electronic referral systems and better-connected electronic medical records,¹⁰ and by doing away with mandatory sick notes.¹¹

However, because the heart of family medicine is people connecting with other people, we *do* need to increase the number of providers doing this work while *also* recognizing and supporting its increased complexity. Robust, well-functioning teams can retain physicians in longitudinal practice, bring nonphysicians into the work of primary care, and make the delivery of complex care more efficient.

Where do we go next?

Effective teams

To ensure that all patients can access primary care when needed, capacity increases need to come from thoughtfully designed teams that include family physicians working alongside other clinicians. A team is not just a group of clinicians thrown together in a clinic or a sprawling network of professionals connected via cumbersome referral mechanisms.

The most effective teams in primary care¹² are organized around the common goal of providing accessible and continuous care to a defined panel of patients, working with common values from a shared playbook. A team isn't defined by who is included; it is defined by how effectively the participants work together.

One way to recruit family physicians is to create systems of shared care where doctors, nurse practitioners, and nurses care for a larger defined panel of patients as practice partners, making it possible to juggle work in other settings and time off. In this way, small clusters of health care providers (sometimes called teamlets¹³) who are trained in primary care best practices can come together and provide both increased capacity to care for patients and improved quality of care.

As an example, one of our authors shares a panel of 1300 patients with another physician; together, they provide care for their patients during the week. Each day, one doctor is responsible for the administrative avalanche and urgent patient issues, and they are supported by a medical office assistant who works directly with their team and patients. Each physician has a portion of the shared patients on their panel and is responsible for periodic comprehensive care reviews to ensure patient care is appropriate, up to date, and coordinated. A nurse employed through the local primary care network works part-time to support patients both in person and over the phone. On the days the author is not working in the office, they can work in other settings, such as the hospital. Their local division of family practice¹⁴ has organized a community call group, so after 5 p.m. and on weekends, there is a local doctor that patients can call for urgent issues.

There are other models of team-based care to consider as well. Many doctors want to work in longitudinal family medicine but aren't ready to commit to a practice long-term. An all-hands-on-deck philosophy would support doctors who are interested in working in longitudinal family practice in whatever capacity they can. This

means clinic models are organized around providing a regular place of care for patients, such as a community health centre, even if the clinicians that patients see change over time. Many rural communities have advocated for this type of model, given their struggle to recruit and retain physicians. Importantly, skilled clinic-level leadership is required to provide this as a safe and viable option for physicians and patients.

If flexible options to work in longitudinal family medicine are not available, many physicians will opt to provide primary care services through virtual walk-in clinics. These clinics usually see a patient once online and then never again, which isn't the care most people want for themselves or their loved ones.

How do we get there from here?

Doctors sharing care, community call groups, and other systems that make longitudinal family medicine an attractive career don't occur by accident. They occur by design. In BC, our government, health system planners, and physician leaders are pivotal in helping shape the practice environment. This includes clearing the way for shared care of patients through remuneration that avoids disincentivizing shared care models, supporting mentorship of doctors who are considering shared practices, and coordinating community-based after-hours coverage.

A trained primary care workforce

Ninety percent of OurCare respondents said they would be comfortable receiving support from a team member their family physician recommended. Throughout BC, primary care nurses are successfully providing cancer screening, developmental screening for infants, cognitive testing for frail elders, and minor office procedures.¹⁴ Nurses are currently funded in multiple ways, including fee-for-service compensation that funds direct hiring into clinics, primary care networks, and the Nurse in Practice program.¹⁵

Other invaluable team members in primary care include pharmacists, mental

health clinicians, and social workers. In Victoria, family doctors can refer patients to community mental health clinicians and social workers directly through their electronic medical records system. In North Vancouver, when patients with depression or anxiety run into problems with their psychotropic medications, primary care network pharmacists provide in-depth consultations to help identify appropriate alternatives and manage medication side effects.

Doctors sharing care, community call groups, and other systems that make longitudinal family medicine an attractive career don't occur by accident. They occur by design.

A wide range of practitioners have the basic skills needed to be functional in any family practice, but they need specific training in primary care to help move the dial on our capacity problems. The training exists, but it is disconnected. Nationally, the College of Family Physicians of Canada's Team Primary Care initiative is working to standardize training for primary care nurses and implement a nationally accredited continuing education program. In BC, we need centrally developed and consistently delivered nurse training programs informed by physicians to ensure the training keeps up with the latest guidelines and evolving practices. We desperately need this work to move forward quickly.

Finally, we need investments in the workflow and technological changes required to improve efficiency so that offices can increase attachment and access. This expertise exists in BC, but it is inconsistently applied and is underfunded. Doctors of BC's business support program¹⁶ is working to reduce administrative burdens for front-office staff and do away with Special

Authority forms for family physicians and consultant specialists. The work needs to be better funded and supported to make it move quickly. The Family Practice Services Committee's Practice Support Program,¹⁷ which helps doctors optimize their practices and better engage with health technologies, needs a significant reimagining of its work and impact, along with renewed investment, to ensure it meets the needs of physicians and the health care system.

Leadership for team-based care

Addressing the capacity and complexity crisis in our primary care system requires thoughtful policy change and legislative action to support the expansion of team-based care, allow more efficient use of technology to support care, and reduce administrative burdens that detract from patient-facing care. We can create a more sustainable and high-quality health system by building robust primary care teams and shared care structures, investing in standardized training and support for all team members and their clinics, and clearing barriers to shared care and collaboration. By working together, we can move toward a system where everyone has access and attachment to primary care and we meet patients' increasingly complex needs. ■

Acknowledgments

The authors thank Dr Tara Kiran for her support and guidance during the development of the article and Dr Tahmeena Ali for her valuable feedback and suggestions on earlier drafts.

Competing interests

The authors were involved with the OurCare initiative in various capacities.

Funding

OurCare is an initiative spearheaded by Dr Tara Kiran. Engagements in 2022–2023 were supported by Health Canada, the Max Bell Foundation, and Staples Canada. For a full list of collaborators, please visit www.ourcare.ca/about.

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Public policy in the age of insecurity

As humans, we all experience a certain level of natural insecurity—an inherent worry that drives us to ensure that our basic health needs (food, shelter, and connection) are met. But modern economic, political, and social structures are generating new and unnatural threats, known as “manufactured insecurity,”¹ which can have harmful health effects. These range from emotional insecurity fueled by social media to increasingly prevalent income insecurity that contributes to energy, housing, and food insecurity.

In our current free-market economy, the basics for healthy survival—food, shelter, education, and health care—are becoming commodities available only to the wealthy. Without adequate regulations, companies are free to raise prices, evict tenants, and keep wages as low as possible to maximize profits. For many Canadians, the necessities of life are unaffordable. Despite living in one of the wealthiest countries in the world, in 2022, 11.6% of British Columbians were living in poverty.²

The negative health impacts of the toxic stress associated with chronic insecurity are well documented.³ People experiencing poverty face a greater risk of mental illness, chronic disease, reduced life expectancy, and lower educational achievement.⁴ Children are most impacted by poverty, experiencing developmental delays, chronic health problems, nutritional deficiencies, and adverse childhood experiences, which perpetuate the intergenerational cycle of poverty. The elderly, residents of rural areas, Indigenous

people, and those living with disabilities are also disproportionately affected.²

As a society, we have created the conditions that foster insecurity; we can also design structures to lessen insecurity. Although there are recognized strategies for frontline providers to apply, such as social

Despite living in one of the wealthiest countries in the world, in 2022, 11.6% of British Columbians were living in poverty.

prescribing, upstream problems require upstream solutions,³ and there is evidence that the implementation of system-level policies is effective. A recent University of British Columbia study found that providing a universal, guaranteed basic income to eliminate poverty would result in a net benefit to Canadians of \$541 billion annually. For every dollar invested, approximately \$4 to \$7 in economic impacts would be generated.⁵ The 2017 Ontario Basic Income Pilot demonstrated improved health outcomes, lower use of health services, and increased ability to access medications and other treatments.⁴ More recently, the Canada Emergency Response Benefit lifted millions of people out of poverty during the COVID-19 pandemic.⁴ Investing in supports for the early years is another high-impact intervention, with every dollar invested returning \$3 to \$9 on future health, criminal justice, and social assistance spending.⁶

In 1976, Canada formally recognized the right of every citizen to adequate food,

clothing, and housing and the highest attainable standard of physical and mental health.⁷ Once a world leader in social policy and programs, Canada now ranks 39th among 170 countries, but as the value of social investments becomes increasingly clear, progressive governments are again introducing more social programs like national pharmacare, dental care, and subsidized child care programs that will alleviate financial pressures on many low-income Canadians.⁸ Canada’s Old Age Security and Guaranteed Income Supplement are essential income for many older adults. British Columbia’s 2024 Poverty Reduction Strategy promotes increased investment in social housing, with rent controls, minimum wages keeping pace with living wages, and increased support for seniors and children.²

Insecurity in all its forms takes an enormous health and economic toll on individual Canadians and on society. Health professionals must continue to advocate for a strong, just, and equitable universal public health care system and social policies to protect all Canadians and allow them to flourish today and into the future. Although the upfront costs may seem daunting, the cost of doing nothing is greater. ■

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Dr Kenneth George Appleby
1926–2024

What a wonderful life! Dr Kenneth George Appleby was the original BC Lions doctor (1954–1994), retiring with three Grey Cup rings, from 1964, 1985, and 1994. He was inducted into the BC Lions Wall of Fame in 2003 and the BC Football Hall of Fame in 2012.

Dad’s final wishes were to outlive Mom, who had severe dementia and predeceased him by 6 weeks. Both were able to pass away peacefully at home with the help of their five sons and their families, who took care of them in their last few months.

Mom and Dad met at Lord Byng Secondary School; he went on to the University of British Columbia and then Queen’s University School of Medicine (class of 1954). They then settled in Burnaby, where Dad was one of the original Burnaby

Hospital physicians. They are survived by their five sons, Mike (Kelowna), Ken (Burnaby), Bill (St. Albert), Jamie (Prince George), and Robert (Vancouver); their sons’ spouses; 15 grandchildren; and eight great-grandchildren.

Retirement was full of travel, particularly throughout BC and Alberta, and they would never miss a grandchild’s Holy Communion, graduation, or wedding. Dad was so proud of all his grandchildren. Wherever he went, he never missed a thoroughbred racetrack, Santa Anita being a favorite. He particularly enjoyed the last few trips when some of his grandchildren came along. He was a true Lions fan, and after 40 years standing on the bench, he finally got to sit with Mom for 30 years, often with a grandchild or two. This photo is from his last game in 2023.

Dad was a great role model, always keeping up with current medical literature. When three of us kids were medical students simultaneously, we would try to stump him and quiz him about new things during Sunday dinners, and we were always surprised when he knew the answer. Even in retirement!

I am truly humbled by the number of former patients, their families, colleagues, and members of the BC Lions and Canadian Football League communities who have reached out to me after his passing. He made a great impression on them too.

Mom and Dad are now together forever. As he would always say, “Don’t worry about me,” just “Go, Lions, go!”

—Ken Appleby, MD
Burnaby

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