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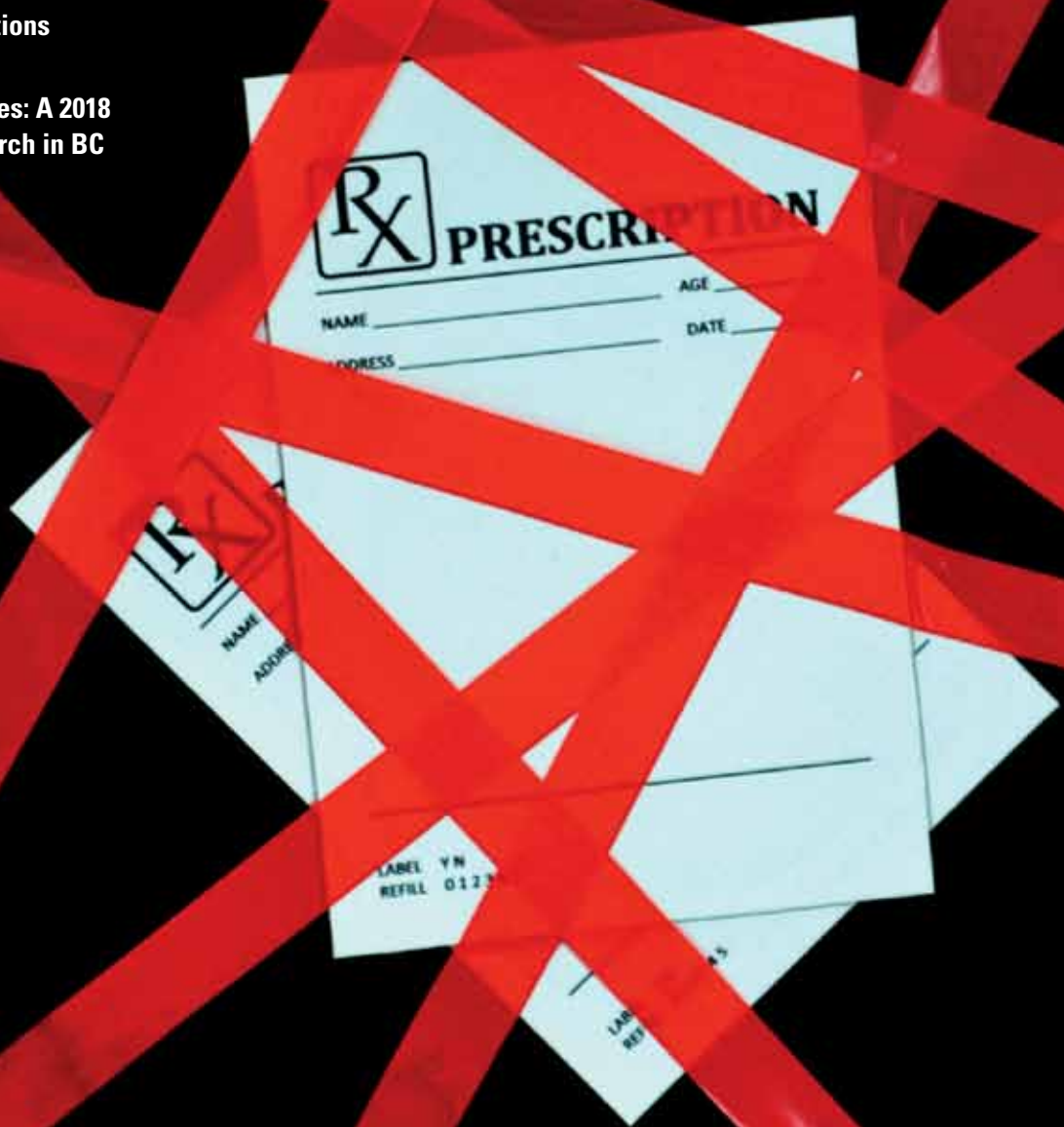
**BCM J**  
*BC Medical Journal*

## Diabetes in British Columbia: Starvation in the midst of plenty

**Challenges to managing  
type 2 diabetes in BC:  
Discordant guidelines and  
limited treatment options**

**Diabetes care in First Nations  
populations in BC**

**From beta cells to bedsides: A 2018  
update on diabetes research in BC**



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## ON THE COVER

**British Columbia has Canada's most restrictive formulary when it comes to diabetes treatment. Our theme issue highlights both the highs and the lows of caring for people with diabetes in BC. Articles begin on page 436.**

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

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## Rhinos, take 2

**T**his year, as another flu season begins, I'm going to try a different approach with my patients to conserve all the energy I expend trying to educate them (see my editorial in the Jan/Feb 2017 issue, "Of rhinos and flu").

"Hey Doc, do you think I should get the flu shot?"

"Nope."

"Why not?"

"Haven't you heard? That shot gives you the flu!"

"What?"

"Well, it contains parts of the flu virus, which are injected into you."

"That doesn't sound good."

"I know. It's horrible. Your body's immune system responds and you might even feel unwell for a few hours. Can you imagine? Way better to fight it off bedridden for a week or 2."

"Really?"

"Oh yeah, always better to get the disease. What would I do if no one got sick?"

"Aren't there serious complications from getting the flu?"

"Sure, but they are rare. Where's your sense of adventure?"

"I'm feeling a little uncomfortable."

**I'm sure that,  
like all of you, I will  
soldier on instead and  
present logical  
scientific arguments  
until I am once again  
blue in the face.**

"But wait, that's not all."

"There's more?"

"The flu shot takes time to produce so scientists have to decide months ahead of time which strains to include, and the last few years they haven't been very accurate. Of course, there is some cross-protection to other strains, but whatever."

"Isn't protection a good thing?"

"My advice is to hang out with people who get the flu shot and stay away from the sickies. That's what I do."

"But you're a physician."

"Yeah, but not a very good one—just ask my wife. She tells everyone. I'm just in it for the fame and fortune."

"But you don't have a car and you aren't famous."

"Regardless, that flu shot causes all sorts of problems. Lots of my patients get colds after receiving the vaccine and last year one of my patients got into a car accident after receiving the shot."

"Isn't that a coincidence?"

"That's what they would like you to think."

"Who are *they*?"

"Everybody knows who *they* are, but I can't talk about it here in case *they* have my office bugged again."

"Are you sure you're not one of those impaired physicians?"

"Define impaired."

So, okay, maybe not, but it's still fun to think about going to the dark side. However, I'm sure that, like all of you, I will soldier on instead and present logical scientific arguments until I am once again blue in the face.

—DRR

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## Knock knock, it's the doc

“**K**nock knock.”  
 “Who’s there?”  
 “Your doc.”  
 “Your doc who?”  
 “Your family doctor.”  
 “What?! No way!”

The door swings open and there she stands, Mrs S., with a genuine smile on her beautifully wrinkled face. Her smile widens even more when she sees that I have my 3-year-old daughter in tow. She opens her arms for a hug and welcomes us into her home. It is a very tidy and organized space full of knickknacks and pictures of her loved ones.

We walk through the living room, which looks untouched, and then to the kitchen, which has nothing on the counters. It is immaculate. Then we enter the family room, where we see Mr S. He is lying on a hospital bed

tucked in with lots of blankets and facing an amazing view. He is pale and unresponsive and remains that way throughout the visit.

Mrs and Mr S. are both my patients. His health declined rapidly over the past few years to a point where his Parkinson disease and dementia made it difficult for Mrs S. to

**A house call is an eye-opener. It usually takes about 30 minutes and it is not structured.**

bring him into the office. She hired a private caregiver to help her as she didn’t want a different home care worker looking after her husband every day. He was a very private person, and she wanted him to maintain his dignity. For the past few years I have been visiting him at home to ease the burden on Mrs S.

Mrs S. offers us a fruity drink and I see that her fridge is well stocked with food. During the visit, my daughter has to use the bathroom and I see that the raised toilet seat and bath bars are in place and there are no dangers of tripping on any risky rugs.

A house call is an eye-opener. It usually takes about 30 minutes and it is not structured. We talk about everything and anything, not just medicine. Usually it ends up being more about assessing the health of the caregiver, and it lets me see and understand so much more than I ever would if the patients came to the clinic.

MSP pays a family physician \$114.29 per house call between 8 a.m. and 11 p.m. and \$71.06 between 11 p.m. and 8 a.m. It usually takes me an hour to do one house call, including drive time. Many doctors don’t do house calls because the financial incentive is poor. They will rely on home care nursing or caregiver history to make medical decisions regard-

ing a patient’s health over the phone.

Telehealth and virtual house calls are becoming the new fad. Telemedicine limits the doctor’s ability to actually see the patient and to assess the patient’s real environment. We also forget that many patients do not have the technological savvy or the appropriate device required to conduct a virtual house call.

There have been a few survey studies done to assess physicians’ thoughts about house calls. A study cited in the *Canadian Family Physician*, January 2013, had a 29.2% survey return (unacceptable by Dr Richardson’s standards) and concluded that physicians lacked time and remuneration for doing house calls.

Toronto has a house-calls program in which four physicians each see eight patients per day. The program provides an at-home care service for seniors in Toronto who are unable to get a doctor. Financial constraints limit this program.

Uber for doctor house calls is becoming popular in the US. The patient downloads an app on their smartphone and enters their symptoms, address, and other personal information and, poof, there is a bona fide doctor at the patient’s front door in 20 to 60 minutes. Amazing, right?! What’s the catch? It costs money—privately \$50 to \$200 per visit, depending on the company used and the reason for the visit.

Despite all this new technology, I still think that a hands-on approach should apply to most patient care. When and if possible, see your patient in the flesh. Listen to their concerns while looking them in the eye. I realize that this is not always possible with the current lack of family physicians and the growing patient population. But for those patients who can’t make it into our offices—like our seniors and those who are physically or mentally challenged—the house call is priceless.

—JC

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## Come together, right now: Why diversity matters



We don't have an aging health care system as much as we have an outdated collection of silos where excellent work is done, but rarely

connected or scaled.

In my previous President's Comment [*BCMJ* 2018;60:389], I reviewed the challenges we face in improving health care. We need solutions that are innovative, fair, and inclusive. That is why we need diversity—now.

Aside from the intrinsic benefits derived from including others, there is evidence that diversity is our best chance of achieving needed health care reform. Studies have shown that diverse teams are more creative,<sup>1-4</sup> achieve better results,<sup>5-7</sup> act more ethically,<sup>8</sup> and promote more social responsibility.<sup>9-10</sup>

Slowly, through medical school admissions and licensing processes, we as a profession are better reflecting society. Working toward diversity intentionally ensures that our leadership will as well. This is about more than gender, ethnicity, demographics, abilities, health, family situation, and sexual orientation—this is about experiences and attitudes. This is about respecting those who think differently because they have lived through different times, places, and experiences. This is about trying to move barriers so that we include everyone who wants to participate.

Like health care itself, diversity is complex and evolving. Learning from the initiatives of other organizations, Doctors of BC will soon embark on consultation to support greater diversity in our governance structures,

including committees, the Representative Assembly, and the Board.

How do we make this happen? We can't find solutions unless we understand the problems. Our consultation will focus on understanding the barriers that are keeping us from being diverse and inclusive within our leadership structures.

**We have many challenges ahead and to meet them we need every voice, every idea, and every person.**

Improving diversity will only be successful if everyone feels a sense of belonging and is part of the process. Watch for information about these consultations in newsletters, on the Doctors of BC website, and through social media.

This will be neither easy nor comfortable, but it is worthy. We must look at ourselves and each other without judgment, united in our common vision of a medical association where all members feel safe to be themselves, choose to participate how they want, and know they belong.

We have many challenges ahead and to meet them we need every voice, every idea, and every person. If "diversity is an action, inclusivity is a culture, and belonging is a feeling,"<sup>11</sup> then Doctors of BC is committed to model our motto and show that we are Better. Together.

—Eric Cadesky, MDCM, CCFP, FCFP  
Doctors of BC President

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## Photo radar, and stories from those close to people killed by a fast-moving vehicle

In the September issue of the *BCM<sup>J</sup>*, Ms Fahra Rajabali and colleagues wrote that the gross cost for the leading causes of injury (including transport incidents) in 2013 ranged from \$547 to \$922 million.<sup>1</sup> Dr Richardson's editorial in the same issue asked for good studies,<sup>2</sup> and Dr Cadesky asked us to use science and stories to appeal to people.<sup>3</sup>

Here is some science: kinetic energy equals one half mass times velocity squared. In real-life terms, a motor vehicle causes more damage if it is moving fast. In a fact sheet on road safety,<sup>4</sup> the World Health Organization states the following:

- "An increase in average speed of 1 km/h typically results in a 3% higher risk of a crash involving injury, with a 4–5% increase for crashes that result in fatalities."
- "For car occupants in a crash with an impact speed of 80 km/h, the likelihood of death is 20 times what it would have been at an impact speed of 30 km/h."
- "Pedestrians have been shown to have a 90% chance of survival when struck by a car travelling at 30 km/h or below, but . . . almost no chance of surviving an impact at 80 km/h."
- "Speed cameras are a highly cost-effective means of reducing road crashes."

In the years 2008 through 2017, 3268 people died in motor vehicle incidents in British Columbia. Among the 298 people killed in motor vehicle incidents in BC in 2017, 163 were younger than age 50.<sup>5</sup> BC used to have speed enforcement by photo radar. Gordon Campbell promised to discontinue photo radar in the election campaign of 2001. He won the election, and scrapped photo radar.<sup>6</sup>

Some people might argue that it is ghoulish for doctors to engage with the family and friends of people who have died because of a speeding vehicle. It is not. If the family consents to sharing their story about a loved one killed by a fast-moving vehicle, the doctor and the family could ask a writer to draft a story for publication. Speed kills. Photo radar reduces speeding. I suggest that Doctors of BC recommend that the BC government bring back photo radar.

—Robert Shepherd, MD  
Victoria

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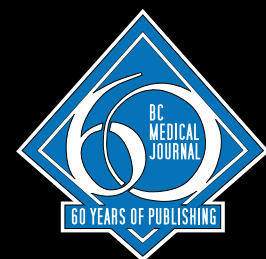
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*Doctors of BC declined to comment because it does not have a policy or organizational position on photo radar.*

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## Engaging with research at WorkSafeBC

**W**orkSafeBC's Research Services department supports the development of high-quality scientific evidence in occupational health and safety. Focusing on emerging issues and applied research, Research Services provides funding for academic scientific study and practical, innovative projects aimed at finding solutions for pressing workplace safety needs.

For physicians, this research may be relevant to the treatment and care of those who are injured or become ill on the job. Medical experts and practitioners are encouraged to connect with Research Services by exploring the active and completed research projects detailed on [www.worksafebc.com](http://www.worksafebc.com), and to participate in research by submitting funding proposals or partnering with other researchers.

### Funding opportunities

Through rigorous peer-reviewed competitions, WorkSafeBC provides funding for research through the following four specialized streams:

- **Innovation at work.** Open to Canadian residents, this stream has been designed to support nimble, small-scale projects that promote collaboration between workplace parties and researchers. Recent topics include health-promotion programs for long-haul truck drivers, barriers for psychiatric workers seeking help for PTSD, eye exposures to radiation among veterinary clinicians, and new tools for detecting pathogens in emergency-services environments. The next request for proposals will be announced this fall.

---

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

- **Research training awards.** Each spring, Research Services invites applications from master's and doctoral students pursuing training in occupational health and safety and workers' compensation research in BC.

### Research Services funds independent, scientifically valid research.

- **Systematic reviews.** These studies ask researchers to find and analyze the best evidence addressing critical issues in policy and practice. Open to researchers worldwide, these competitions are held as needed and help WorkSafeBC stakeholders better understand the state of knowledge on priority issues, provide critical assessment of current science, and identify gaps in areas of relevance to workers' compensation policy and practice.
- **Specific priorities research.** This stream was launched in 2014 to answer occupational health and safety questions that have immediate relevance to WorkSafeBC with findings that have clear application in policy and practice. Current areas of focus include the relationship between sex and gender and occupational health and safety, the impact of emerging technologies and artificial intelligence, return to work following mild traumatic brain injury, and key indicators for evaluation of violence prevention in health care.

### Partnerships

The Partnership for Work, Health, and Safety was established in 2005 between WorkSafeBC and researchers at the University of British Columbia.

The partnership works with routinely collected data from multiple sources, pulled together through Population Data BC, allowing researchers to develop a unique and comprehensive picture of the health and well-being of workers in our province. The partnership team is made up of a diverse group of faculty members, students, and staff working at UBC. Advisors from WorkSafeBC meet regularly with researchers to identify new topics and receive updates on ongoing projects.

Additionally, Research Services fosters and maintains partnerships with workers' compensation organizations and government groups across Canada to support research that benefits all Canadian workers. These collaborations enable WorkSafeBC to reach a wider sphere of researchers and encourage interprovincial initiatives.

### About Research Services

Research Services funds independent, scientifically valid research that can provide insight into real issues faced by workplaces and workers' compensation organizations. The central objectives are improving health and safety in BC workplaces, fostering successful rehabilitation and return-to-work of injured workers, and ensuring fair compensation for people suffering injury or illness on the job.

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PORSCHE



## New GPSC incentive supports family doctors to implement panel management

**P**anel management is a process of proactively managing a defined population of patients using EMR data to identify and respond to the patients' chronic and preventive care needs. Better patient data lead to better patient care, which is why the GPSC has developed a new incentive and supports to encourage doctors to implement panel management.

### A new phased approach to panel management

In addition to enabling planned proactive care for patients, accurate and optimized patient data are foundational to the transition to the patient medical home—particularly in supporting work between groups of family doctors and multidisciplinary teams. To help doctors ensure they have the best possible patient data, the Practice Support Program (PSP) is implementing a newly developed phased approach to panel management. This approach is based on what's been learned from a PSP pilot project and the experiences of other jurisdictions (e.g., Alberta). It guides physicians and their teams toward data-informed, proactive care.

The three phases of panel management are:

1. Empanelment: Develop an accurate list of active patients by confirming the patient-provider relationship and most responsible provider.
2. Panel cleanup: Develop accurate, up-to-date clinical registries for three to five chosen disease indicators.
3. Panel optimization: Develop accurate, up-to-date clinical registries for 10 to 15 disease indicators to

provide planned, proactive care.

Completing the phases will enable better care for individual patients and help GPs understand their patient population as a whole. This deeper

**The Panel Development Incentive (made available in September 2018) compensates eligible family physicians for committing to and completing the three phases of panel management—empanelment, panel cleanup, and panel optimization.**

understanding of their patient population empowers physicians to advocate for community resources, make the most of their time with patients, improve preventive and proactive care, and organize team members to best serve patients.

### Compensation: The Panel Development Incentive

The Panel Development Incentive<sup>1</sup> (made available in September 2018) compensates eligible family physicians for committing to and completing the three phases of panel management—empanelment, panel cleanup, and panel optimization.

To be eligible for the incentive, family doctors must be using an EMR system to manage patient information and have completed the GPSC PMH Assessment in the 12 months before applying for the incentive.

Valued at \$6000, the Panel Development Incentive consists of three payments:

- Payment 1 (\$2000) may be claimed after eligible family doctors commit to completing the three phases of panel management within 12 months after claiming the incentive.
- Payment 2 (\$1000) may be claimed after eligible family doctors indicate that they have completed phases one and two of panel management by submitting a copy of their GPSC Panel Management Manual and Workbook.
- Payment 3 (\$3000) may be claimed after eligible family doctors indicate that they have completed phase three of panel management

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

### Self-learning Mainpro+ credits

Use EMR data to inform and plan proactive patient care.

GPs can earn three credits per hour (up to 75 credits) for updating and managing their patient panels as guided by the GPSC Panel Management Manual and Workbook.

For details, contact [psp@doctorsofbc.ca](mailto:psp@doctorsofbc.ca).

by submitting a copy of their GPSC Panel Management Manual and Workbook.

Doctors may claim the Panel Development Incentive only once. Doctors who have completed some or all of the phases with PSP support are eligible to receive the incentive, less any sessional payments already claimed for this work through the PSP and provided that the incentive requirements have been met.

**Other resources and supports**

- The Panel Management Manual and Workbook guides GPs and practice teams through the phases of panel management step-by-step.<sup>1</sup>
- EMR-based Panel Management Tools help update patient information and develop disease registries.<sup>1</sup>
- In-practice coaching provides assistance directly in practices by PSP Regional Support Teams. Contact

the PSP Regional Support Teams to learn more ([www.gpsc.bc.ca/what-we-do/professional-development/psp/rst-contacts](http://www.gpsc.bc.ca/what-we-do/professional-development/psp/rst-contacts)).

For more information about panel management and supports, contact [psp@doctorsofbc.ca](mailto:psp@doctorsofbc.ca).

— **Brenda Hefford, MD**  
**Executive Director,**  
**Community Practice,**  
**Quality and Integration**  
**Department, Doctors of BC**

— **Alana Godin**  
**Director,**  
**Community Practice and Quality,**  
**Community Practice,**  
**Quality and Integration**  
**Department, Doctors of BC**

**Reference**

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**Specialist Symposium**  
**18 January 2019**

On 18 January 2019 the Specialist Services Committee (SSC) in partnership with Specialists of BC will host a symposium designed to actively engage and gather input from front-line specialist physicians and champions across BC in collaboration with BC health authorities and the Ministry of Health. This input will help define the future direction of health care planning for all stakeholders, including SSC's next strategic plan (2020 to 2023).

Interested to join? Check out our webpage for more details: [ssc.bc.ca/specialist-symposium-shaping-future-specialist-care-bc](http://ssc.bc.ca/specialist-symposium-shaping-future-specialist-care-bc)

Questions? Email Joanna Pannekoek at [jpannekoek@doctorsofbc.ca](mailto:jpannekoek@doctorsofbc.ca)



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**Eric Zhao receives Canadian Medical Hall of Fame award**



Photo: UBC

Mr Eric Zhao has received the 2018 Canadian Medical Hall of Fame award, which recognizes second-year medical stu-

dents with an established track record of community leadership, superior communication skills, and demonstrated interest in advancing knowledge.

Mr Zhao is a data scientist and health innovator committed to empowering patients and personalizing medicine. As an MD/PhD student at the University of British Columbia, he coauthored over 15 original research articles, reviews, and book chapters, and has delivered presentations at leading conferences, including Advances in Genome Biology and Technology and the American Society of Clinical Oncology. He recently defended his PhD, developing computational methods to personalize cancer therapy using whole-genome DNA stability analysis. For his accomplishments he received the Lloyd Skarsgard Research Excellence Award and the Vanier Canada Scholarship. Mr Zhao served as vice chair of the UBC Vancouver Senate and president of the UBC Medical Undergraduate Society (MUS). In this latter role, he oversaw passage of a position paper on national Pharmacare, revamped student representation on Faculty of Medicine committees, overhauled member communication, and supported the launch of the inaugural MUS strategic plan. He now co-leads a Faculty of Medicine working group on disruptive innovation in medical education. In 2015, he co-founded a start-up tailoring evidence-based

medication care plans for patients with complex health needs. Nationally, he advises on the CIHR Strategic Working Group on Health Research Training and served as VP Internal of the Clinician-Investigator Trainee Association of Canada.

**Screening tool to identify deceptive online ads**

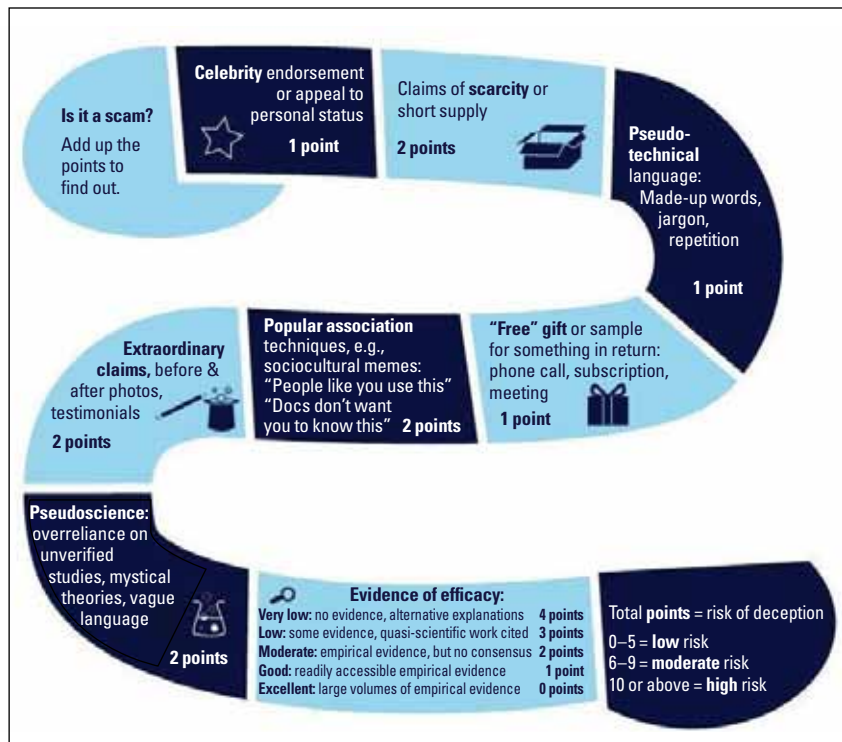
Researchers at the University of British Columbia have devised a simple screening tool ( **Figure** ) to evaluate if a health product that appears on the Internet is likely to be a scam. The Risk of Deception Tool (<https://news.ubc.ca/wp-content/uploads/2018/09/2018-Health-Scams-Assessment-Tool.jpg>) assigns points based on the type and number of persuasion techniques used in an ad. If the ad includes a celebrity endorsement, it gets one point; if it uses pseudo-technical language,

it gets another point. More points are added if the ad uses mystical language or claims that the product is very rare or in short supply. The higher the overall score, the greater the probability that the ad is a scam.

The system was devised by a team of two nurses, two doctors, two physiotherapists, a pharmacist, and a social worker, all from UBC.

Researchers analyzed advertisements targeting 112 different health concerns. They found that the most common deceptive ads were those promoting bodybuilding and weight loss, followed by medicinal products, which claim to treat pain, asthma, or other conditions, and lifestyle products, which include antiaging or sexual enhancement remedies.

The developers also found a high number of advertisements from alternative health practitioners that



**Figure. Screening tool to evaluate the risk of deception of Internet health ads.**

Image source: UBC Internet Health Scams Study, 2018.

made claims that were well outside what their therapies could reasonably achieve. Most of the scams identified originated in the United States. Misleading health ads on the Internet are concerning because consumers may end up self-medicating, say researchers.

The study, “Internet health scams—developing a taxonomy and risk-of-deception assessment tool,” was published in *Health and Social Care in the Community*. The lead researcher is Bernie Garrett, an associate professor in the UBC School of Nursing.

### **New device for post-prostatectomy urinary incontinence**

Vancouver-based Pacey MedTech has created a urethral control device that is a reliable solution to urinary incontinence in men—specifically those who have undergone prostate cancer treatment. Urinary incontinence is one of the greatest challenges for men post-prostatectomy. Traditionally, men with incontinence depend on adult diapers/pads, external catheters, leg bags, medication, and penile clamps. These options may be costly, leak, have odor, and produce extreme discomfort. Artificial sphincter surgery is also an option; however, additional surgery is not always possible or wanted by patients with urinary incontinence.

Prostate cancer is the most common cancer in Canadian men, with one in seven facing a diagnosis during his lifetime. The problem of leakage post-radical prostatectomy is widespread. The Prostate Cancer Foundation reports that about 24% of men experience frequent leakage or no bladder control at 6 months after prostatectomy.

The Pacey Cuff stops urinary leakage and reduces the dependency on absorption pads by up to 100%. They are more comfortable than traditional penile clamps as they maintain

consistent and effective blood flow to the penis. The device is designed for compression of the urethra to minimize leakage and also to protect the blood circulation in the topside of the penis, eliminating possible blood supply restriction pain. The cuff was created to be light, soft, and comfortable to ensure men can discretely wear it all day, continue to live a normal life, and engage in regular activities.

The device was created by BC vascular and general surgeon Dr Jack Pacey. More information is available at [www.paceycuff.com](http://www.paceycuff.com).

### **The ultrasound scanner of the future?**

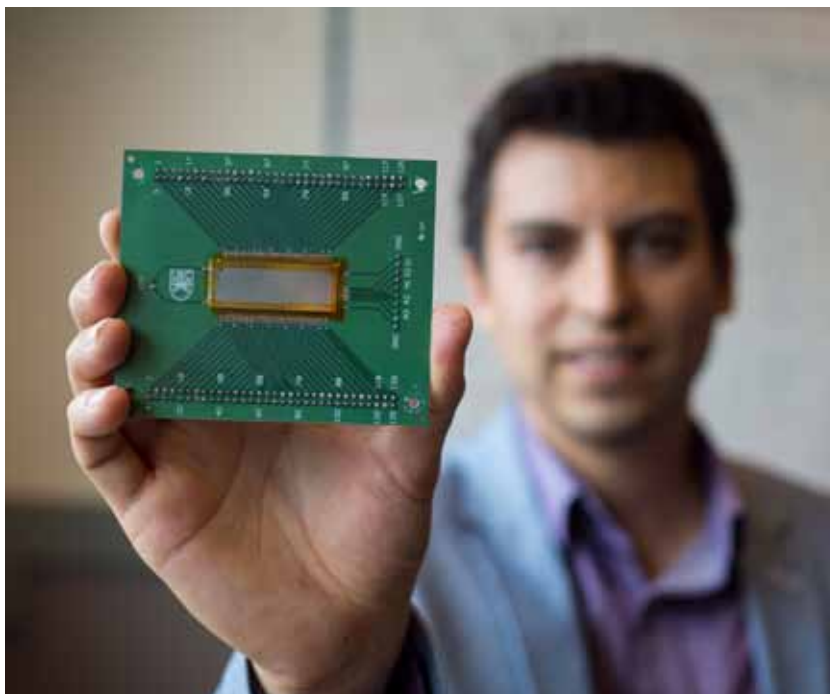
Engineers at the University of British Columbia have developed an ultrasound transducer that could dramatically lower the cost of ultrasound scanners to as little as \$100. The patent-pending innovation is portable, wearable, and can be powered by a smartphone (it needs just 10 volts to operate). The transducer also has the potential to be built into a flexible ma-

terial that can be wrapped around the body for easier scanning and more detailed views.

Conventional ultrasound scanners use piezoelectric crystals to create images of the inside of the body and send them to a computer to create sonograms. UBC researchers replaced the piezoelectric crystals with tiny vibrating drums made of polymer resin, called polyCMUTs (polymer capacitive micro-machined ultrasound transducers), which are cheaper to manufacture. Sonograms produced by the UBC device were as sharp as or even more detailed than traditional sonograms.

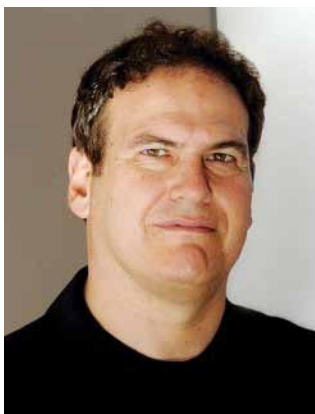
Researchers will next be developing prototypes and eventually testing the device in clinical applications. The study’s lead author is Carlos Gerardo, a PhD candidate in electrical and computer engineering at UBC. The research, “Fabrication and testing of polymer-based capacitive micro-machined ultrasound transducers for medical imaging,” was published in

*Continued on page 464*



*Study lead author Carlos Gerardo holding the new ultrasound transducer that could revolutionize ultrasounds.*

## Diabetes in British Columbia: Starvation in the midst of plenty



Ehud Ur, MBBS

**B**ritish Columbia is one of Canada's wealthiest provinces. So why do people with diabetes fare so poorly here?

A stark picture was painted recently by Diabetes Canada (DC), formerly known as the Canadian Diabetes Association, in a report estimating that 29% of British Columbians (1.4 million people) are living with diabetes or prediabetes.<sup>1</sup> Moreover, another DC report describes an “estimated increase of diabetes prevalent cases from 2016 to 2026” of 46%.<sup>2</sup> This is a profoundly worrying prospect for a disease that shortens lifespan by 5 to 15 years; contributes to 30% of strokes, 40% of heart attacks, 50% of renal failures requiring dialysis, 70% of nontraumatic limb amputations; and is a leading cause of vision loss.<sup>3-5</sup> BC's highly diverse population includes many at-risk ethnic groups, including South Asian, Chinese, and Indigenous peoples.<sup>1,6</sup> In addition, almost 15% of British Columbians are smokers, and almost 40% percent of the population is not physically active enough, with 50% of adults and almost 20% of youth being overweight or obese.<sup>1</sup> DC estimates that the cost to the BC health care system of diabetes-related hospitalizations, physician visits, and inpatient medications alone is \$418 million per year.<sup>1</sup> So what is the province doing about the present danger and anticipated tsunami of health care costs?

The Diabetes Charter for Canada<sup>7</sup> has established agreed-upon rights and

self-care responsibilities for people living with diabetes, health care providers, and governments. The charter states that governments have the responsibility to:

- Form comprehensive policies and plans for the prevention, diagnosis, and treatment of diabetes and its complications.
- Collect data on diabetes burden such as costs and complications, and to regularly evaluate whether progress is being made.
- Guarantee fair access to diabetes care, education, prescribed medications, devices, and supplies to all Canadians, no matter what their income or where they live.
- Address the unique needs and disparities in care and outcomes of vulnerable populations that experience higher rates of diabetes and complications and significant barriers to diabetes care and support.
- Implement policies and regulations to support schools and workplaces in providing reasonable accommodation to people with diabetes in their self-management.

While other provinces (notably Nova Scotia,<sup>8</sup> New Brunswick,<sup>9</sup> and Ontario<sup>10</sup>) have long recognized the need for a guiding and cohesive strategy to achieve these goals, BC has not.

Although BC has taken some positive steps in the past number of years,<sup>2</sup> the initiatives resulting from these steps exist in isolation and are not part of an integrated approach.

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*This article has been peer reviewed.*



For example:

- In 2013 the province's public health plan<sup>11</sup> set a target to reduce the annual incidence rate for diabetes from 6.3 (2009/10 baseline) to 6.0 per 1000 by 2023. However, no explicit plan was proposed for achieving this, and the prevalence of diabetes is now expected to increase from 8.3% in 2013 to 10.3% in 2020.<sup>12</sup>
- In 2018, the provincial insulin pump program, first introduced in 2008 for children and youth age 18 and younger, was expanded to insure patients of all ages.<sup>13</sup>

Other examples of initiatives that operate in isolation include the following:

- The Food Skills for Families program, which is funded by the provincial government and delivered by DC.
- The Primary Health Care Charter, which identifies diabetes management as a priority medical condition and establishes outcome measures.
- Medical Services Plan fee codes for family physicians providing care for chronic illnesses, including diabetes, and fee codes for diabetes remote consults and remote glucose monitoring.

Despite the lack of a coordinated provincial approach to diabetes care, BC has a very strong diabetes research and clinical community that is engaged in many initiatives. For example:

- Scientists at the University of British Columbia are undertaking fundamental research into islet cell biology.
- Participants are being monitored at Vancouver General Hospital in the first in-human cellular implant trial to treat type 1 diabetes.
- First Nations populations are the focus of diabetes care and cultural outreach programs.
- The Islet Transplant Program at

the Ike Barber lab is comparing the progression of microvascular complications in patients with islet transplantation and those receiving current medical therapy.

- The Diabetes Delivery Education Research program is translating evidence-based interventions in high-risk and medically underserved communities, evaluating

And every day these dedicated professionals are faced with the reality of being unable to provide optimal, evidence-based care to many of their patients. Why? Because we live in British Columbia.

This theme issue was born out of the concern and frustration produced by practising in a province with Canada's most restrictive drug formulary

**BC is a have province, yet patients who do not have private insurance coverage are forced to use outdated, higher-risk, and less-effective therapies, while patients with private insurance have access to the best evidence-based therapies available.**

peer support models for long-term self-management, and designing culturally innovative approaches to lifestyle change in ethnic minority communities.

- The Diabetes Clinical Trial Unit at Vancouver General Hospital is being supported by an electronic medical record system for 22 000 patients, the largest and most comprehensive longitudinal diabetes database of its kind.
- The Endocrine Research Society at St. Paul's Hospital is conducting groundbreaking research into novel diabetes technologies, including insulin pumps, continuous glucose sensors, and Internet-based care delivery and blood glucose reporting systems.

Every day in British Columbia, primary care physicians, allied health professionals such as dietitians and social workers, endocrinologists, and other medical and surgical specialists are caring for people with diabetes.

and where successive governments have been reluctant to show leadership in attempting to address the epidemic of diabetes. BC is a have province, yet patients who do not have private insurance coverage are forced to use outdated, higher-risk, and less-effective therapies, while patients with private insurance have access to the best evidence-based therapies available. And to complicate matters, the government funds the Therapeutics Initiative (TI), which provides physicians with its own unique interpretation of the diabetes literature through bimonthly Therapeutics Letters that often cast doubt on the findings of robust trials and guideline recommendations issued by highly respected international organizations.

The first article in this theme issue reports on findings from a working group of primary care physicians and specialists from across BC formed to identify both the negatives and positives of diabetes care in BC. This

article by Dr Maureen Clement and colleagues considers the conflicting recommendations for diabetes management and notes that Therapeutics Initiative messages disseminated to BC physicians differ significantly from recommendations provided by national and international bodies that follow rigorous guideline development processes. The authors also describe the way restrictive drug coverage policies in BC limit options for diabetes management.

The second article is by Dr Keith Dawson, who describes the prevalence of diabetes in Indigenous populations. He reviews innovative programs that are addressing the epidemic of diabetes affecting Indigenous British Columbians, but also expresses concern about the lack of coverage for guideline-recommended therapies under Pharmacare Plan W.

The third and final theme issue article is by Dr C. Bruce Verchere, who summarizes the extraordinary research initiatives underway in our province. These include projects at the UBC Point Grey Campus, Vancouver General Hospital, BC Children's Hospital, and sites outside Vancouver.

It is time for the BC government to take the lead in diabetes care and develop an overarching approach in partnership with health care experts. A good start would be to implement a provincial taskforce. Strategies considered must include:

- Defining achievable prevention and treatment goals.
- Identifying standards for care and barriers to their implementation.
- Collecting and analyzing population-level data (e.g., outcomes, hospital admissions) through a provincial registry.
- Establishing a holistic diabetes research institute within a provincial diabetes program to better coordi-

nate research opportunities, align with population needs, and ensure the implementation of best practices.

This theme issue is particularly timely with the recent release of the Diabetes Canada 2018 clinical practice guidelines, which provide the most up-to-date evidence-based recommendations for preventing and managing diabetes.<sup>14</sup> We hope that these new guidelines and the articles in this issue will generate discussion among BC health care professionals that lead to changing the status quo. British Columbians deserve better.

—Ehud Ur, MBBS, FRCPC  
**Professor, Division of  
 Endocrinology  
 University of British Columbia**

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# Challenges to managing type 2 diabetes in British Columbia: Discordant guidelines and limited treatment options

Contradictory recommendations and formulary restrictions make it difficult for BC physicians to manage their patients with diabetes using the most robust and up-to-date evidence.

**ABSTRACT:** Type 2 diabetes is a common metabolic condition that requires a multifaceted approach to reduce associated complications. Management is challenging because of the progressive nature of the condition and the growing availability of different classes of antihyperglycemic agents. Unfortunately, general practitioners and specialists looking for guidance in the complex pharmacological management of type 2 diabetes in BC can find themselves frustrated by contradictory recommendations from these three bodies: Diabetes Canada, the British Columbia Guidelines and Protocols Advisory Committee, and the Therapeutics Initiative. These

three bodies differ in composition and the methodology that they use to prepare recommendations. Diabetes Canada is a national organization supporting a large number of volunteers from many health professions as they develop clinical practice guidelines. The Guidelines and Protocols Advisory Committee consists of representatives from the Ministry of Health and Doctors of BC who oversee working groups that develop BC-specific guidelines on important clinical topics, including diabetes care. The Therapeutics Initiative is an organization funded by the Ministry of Health and the University of British Columbia that completes assessments of drug therapy

and publishes the findings in bulletin form. Receiving conflicting information is difficult for physicians and can result in a wide variability in quality of care, as well as clinical inertia, such as failure to implement or intensify a beneficial therapy. Furthermore, despite growing evidence of significant clinical benefits for many diabetes drugs, most require special authority approval or, in the case of newer agents, are not covered at all by BC Pharmacare, which makes it difficult for physicians to manage their patients with diabetes using the most up-to-date and robust evidence.

Dr Clement is a family physician in the Interior of British Columbia with a consulting practice in diabetes. She has been actively involved with Diabetes Canada and was a member of the expert committee, steering committee, and executive committee during development of the 2003, 2008, 2013, and 2018 Diabetes Canada clinical practice guidelines. Dr Paty is an endocrinologist and UBC clinical associate professor who specializes in diabetes and post-transplant

endocrinology. Dr Mancini is professor of medicine in the UBC Division of Cardiology, director of the CardioRisk Clinic at Vancouver Hospital, staff physician in the Healthy Heart Program Prevention Clinic at St. Paul's Hospital, and a member of the writing group for the 2018 Diabetes Canada clinical practice guidelines. Dr Miller is an endocrinologist in Victoria and a clinical associate professor, UBC and UVic. He was actively involved with the Diabetes Canada guidelines (2003–2018) and with the BC guidelines (2003–2018). Dr Mudaliar is a

Vancouver family physician. Dr Shu is an endocrinologist at Royal Columbian Hospital, currently serving as the regional head of endocrinology for the Fraser Health Authority. Dr Thompson is medical director of the VGH Diabetes Centre and principal investigator for the cell implant trial. Dr White is an endocrinologist and UBC clinical assistant professor with a practice in Vancouver. Dr Ur is a professor in the Division of Endocrinology at UBC.

*This article has been peer reviewed.*

**D**iabetes is a chronic metabolic disease that is becoming more common in British Columbia, with predicted prevalence rates rising from 8.3% in 2013 to 10.3% in 2020.<sup>1</sup> The complications of diabetes contribute significantly to morbidity and mortality, and increase the cost burden to patients, our medical system, and society as a whole.<sup>2,3</sup> Primary care physicians manage the majority of people living with diabetes, and more than 20% of a typical physician's caseload will likely involve caring for people with either diabetes or prediabetes.<sup>4</sup> Not only is the prevalence of diabetes increasing,<sup>5</sup> but the management of patients with diabetes is becoming more complicated as patients live longer and require additional care for frailty and comorbid conditions. There are now nine classes of antihyperglycemic agents, which often need to be used in combination owing to the progressive nature of diabetes,<sup>6,7</sup> a situation that increases the complexity of therapeutic decision making.

Diabetes requires a multifaceted approach to reduce both microvascular and macrovascular complications.<sup>8</sup> Glycemic control is an important risk factor for microvascular disease, including retinopathy, nephropathy, and peripheral neuropathy.<sup>9-13</sup> Early improved glucose control slows progression to these endpoints.<sup>9,14-17</sup> An association between macrovascular disease and aggressive glycemic control is less clear.<sup>16,18,19</sup> Cardiovascular (CV) benefit, most likely from better glucose control, has been seen in long-term (10- to 20-year) observational studies such as EDIC,<sup>20</sup> long-term follow-up of the UKPDS,<sup>21</sup> and a subset of VADT (although no overall survival benefit was seen in this group with established cardiovascular disease),<sup>22</sup> suggesting that good glycemic control achieved with less hypoglycemia, if initiated early in the

course of the disease, reduces long-term CV risk.

Worldwide, clinical practice guidelines based on the best available evidence support the use of antihyperglycemic agents to reduce the risk of long-term complications of diabetes.<sup>2,23-25</sup> In large, randomized controlled CV safety studies, agents such as empagliflozin,<sup>26</sup> liraglutide,<sup>27</sup> semaglutide,<sup>28</sup> and canagliflozin<sup>29</sup> have

### **Recommendations issued by the TI are notable for not aligning with those of other bodies.**

demonstrated CV benefits. Conflicting information regarding appropriate use of these and other antihyperglycemic agents can confuse physicians and may result in widely variable quality of care as well as clinical inertia, which can mean physicians fail to implement or intensify a beneficial therapy.

### **Sources of recommendations**

British Columbia physicians' management of diabetes is guided by recommendations from three principle sources:

- Diabetes Canada (DC), formerly known as the Canadian Diabetes Association, which publishes clinical practice guidelines for the prevention and management of diabetes in Canada<sup>2,3</sup> and updates these as necessary.<sup>23</sup>

- The Guidelines and Protocols Advisory Committee (GPAC), which publishes clinical practice guidelines for use in BC on many topics, including diabetes care.<sup>30</sup>
- The Therapeutics Initiative (TI), which publishes recommendations regarding drug therapy for managing diabetes in their regular Therapeutics Letters.<sup>31</sup>

**Table 1** summarizes the composition and methodology of the bodies and shows how they vary in their guideline development and publishing processes. The recommendations produced by all three are widely disseminated.

### **Diabetes Canada**

In 1998 the Canadian Diabetes Association published one of the first evidence-based guidelines for the management of diabetes in Canada.<sup>32</sup> In this and subsequent publications an independent expert committee developed and graded recommendations based on the quality of evidence from key studies. Updates were published in 2003, 2008, 2013, and 2018.<sup>3</sup> These guidelines are ranked among the best in the world with respect to quality, rigor, and process<sup>33</sup> as assessed using the AGREE II instrument (Appraisal of Guidelines for Research and Evaluation).<sup>34</sup> Each recommendation addresses a clinically important question related to the management of diabetes and its sequelae. Health benefits of interventions as well as risks and side effects are considered in formulating the recommendations. Patient preferences and values are considered by consulting people with diabetes and reviewing the literature. Each recommendation is justified using the strongest clinically relevant, empirical evidence that can be identified. Sources of evidence are cited and the strength of this evidence is indicated based on criteria from the epidemiological

## Challenges to managing type 2 diabetes in British Columbia: Discordant guidelines and limited treatment options

	Diabetes Canada (DC)	Guidelines and Protocols Advisory Committee (GPAC)	Therapeutics Initiative (TI)
<b>Composition of body</b>	<ul style="list-style-type: none"> <li>The 2013 clinical practice guidelines were developed with the active participation of 120 volunteers.</li> <li>Authors and reviewers of DC guidelines include health professionals from family medicine, endocrinology, internal medicine, and other specialties, nursing, dietetics, pharmacy, and exercise physiology, as well as people with diabetes.</li> </ul>	<ul style="list-style-type: none"> <li>The 2015 diabetes care guideline was developed by a working group led by a physician chair and supported by a Ministry of Health research officer.</li> <li>GPAC working groups include general practitioners, specialists, and other subject matter experts, as well as a government-employed pharmacist.</li> </ul>	<ul style="list-style-type: none"> <li>Since 1994 Therapeutics Letters have been published regularly to identify “problematic” issues and provide “brief, simple, practical messages.”<sup>31</sup></li> <li>Working groups have authored these letters under the guidance of the TI executive, which includes five physicians and five nonphysicians, including academics specializing in pharmacology.</li> </ul>
<b>Scope of recommendations</b>	<ul style="list-style-type: none"> <li>Prevention and management of type 1 diabetes, type 2 diabetes, gestational diabetes mellitus.</li> <li>Macrovascular and microvascular complications.</li> <li>Organization of care and self-management education.</li> <li>Diabetes in special populations.</li> </ul>	<ul style="list-style-type: none"> <li>Epidemiology and prevention.</li> <li>Management of type 1 and type 2 diabetes in adults, including complications.</li> <li>BC-specific topics (e.g., Pharmacare coverage, Pharmacare special authority process).</li> </ul>	<ul style="list-style-type: none"> <li>Prescription drug therapies.</li> <li>Laboratory testing considered on occasion.</li> </ul>
<b>Authors identified</b>	<ul style="list-style-type: none"> <li>Yes.</li> </ul>	<ul style="list-style-type: none"> <li>No.</li> <li>In future, “lists of contributors may be published on the website.”<sup>36</sup></li> </ul>	<ul style="list-style-type: none"> <li>No.</li> </ul>
<b>Disclosures published</b>	<ul style="list-style-type: none"> <li>Yes.</li> </ul>	<ul style="list-style-type: none"> <li>Conflict of interest must be disclosed, but is not published.</li> <li>In future, disclosures will be published (personal conversation between Dr Clement and Ministry of Health).</li> </ul>	<ul style="list-style-type: none"> <li>Yes for TI members in general.</li> <li>No for authors of Therapeutics Letters.</li> </ul>
<b>Committee members remunerated</b>	<ul style="list-style-type: none"> <li>No, except for the hourly stipend paid to members of the Independent Methods Review Committee, who are physicians with expertise in appraising evidence and have no conflicts of interest.</li> </ul>	<ul style="list-style-type: none"> <li>Committee and working group members receive payment through the Ministry of Health and Doctors of BC for the hours they spend performing GPAC business.</li> </ul>	<ul style="list-style-type: none"> <li>Employed TI members receive a salary from the University of British Columbia supported by a Ministry of Health grant.</li> </ul>
<b>Literature review conducted</b>	<ul style="list-style-type: none"> <li>Yes.</li> <li>Full systematic literature review conducted based on clinically relevant questions.</li> </ul>	<ul style="list-style-type: none"> <li>No.</li> <li>Although a full systematic literature review is not conducted, guideline authors quote extensively from DC recommendations, which are based on a literature review.</li> </ul>	<ul style="list-style-type: none"> <li>Yes.</li> <li>The TI publication process “involves a literature review,”<sup>31</sup> but no details are provided.</li> <li>Previous Therapeutics Letters and review articles are often cited.</li> </ul>
<b>Recommendations graded</b>	<ul style="list-style-type: none"> <li>Yes.</li> <li>Each recommendation is assigned a grade based on the available evidence, its methodological strength, and its applicability to the Canadian population.</li> <li>Each recommendation is approved by the Steering Committee and Executive Committee, with 100% consensus required.</li> </ul>	<ul style="list-style-type: none"> <li>No statement is provided about levels of evidence or grading of recommendations.</li> <li>References are provided.</li> </ul>	<ul style="list-style-type: none"> <li>No process for assessing evidence and grading recommendations is identified or declared.</li> <li>References are provided for some statements.</li> </ul>
<b>Frequency of publication and methodology for updates</b>	<ul style="list-style-type: none"> <li>A major rewrite is scheduled every 5 years.</li> <li>Interim updates with independent medical review are completed when important new trial evidence is published.</li> </ul>	<ul style="list-style-type: none"> <li>Each guideline is reviewed every 3 to 5 years.</li> </ul>	<ul style="list-style-type: none"> <li>Therapeutics Letters tend to be published in response to a topic of discussion or controversy and when there is a potential for cost to the medical system.</li> <li>No schedule of topics is published.</li> </ul>
<b>Independent methodological review conducted</b>	<ul style="list-style-type: none"> <li>Yes.</li> </ul>	<ul style="list-style-type: none"> <li>No.</li> </ul>	<ul style="list-style-type: none"> <li>No.</li> </ul>
<b>Peer review conducted</b>	<ul style="list-style-type: none"> <li>Clinical practice guidelines are sent to national and international reviewers by the publisher, Elsevier, as part of a standard peer-review process.</li> </ul>	<ul style="list-style-type: none"> <li>Guidelines are sent for review, but not as part of a true peer-review process.</li> </ul>	<ul style="list-style-type: none"> <li>Therapeutics Letters are sent for review, but not as part of a true peer-review process since the authors are the editor and the reviewers do not have the ability to request rewrites.</li> </ul>

**Table 1. Comparison of three bodies issuing diabetes management recommendations.**

literature and other guidelines processes. Recommendations based on biological or mechanistic reasoning, expert opinion, or consensus are explicitly identified and graded as such. Finally, harmonization is sought with guidelines issued by other bodies, including the Canadian Cardiovascular Society, the Canadian Hypertension Education Program, the Canadian Cardiovascular Harmonization of National Guidelines Endeavour, and the Society of Obstetricians and Gynecologists of Canada.

### **Guidelines and Protocols Advisory Committee**

The Guidelines and Protocols Advisory Committee consists of representatives from the BC Ministry of Health and Doctors of BC. The committee advises the Medical Services Commission regarding both the effective utilization of medical services and high-quality, appropriate patient care,<sup>35,36</sup> and oversees a number of working groups responsible for developing guidelines and protocols on almost 100 topics (see [www.bcguidelines.ca](http://www.bcguidelines.ca)). The diabetes care guideline does not include an independent literature review but instead relies heavily on existing documents, including the Diabetes Canada clinical practice guidelines. The diabetes care guideline also addresses circumstances in BC and includes BC-specific information such as Medical Service Plan billing rules and incentive fees, lab test availability, Pharmacare coverage, referral pathways, and local resources. A handbook outlining the process for guideline development indicates that “For guidelines published after 2014, lists of contributors may be published on the website.”<sup>36</sup>

### **Therapeutics Initiative**

The Therapeutics Initiative was established in 1994 by the Department

of Pharmacology and Therapeutics in cooperation with the Department of Family Practice at the University of British Columbia “to provide physicians, pharmacists, allied health professionals and the public with up-to-date, evidence-based, practical information on prescription drug therapy.”<sup>31</sup> Funding is provided by the BC Ministry of Health through a grant to UBC. Four TI working groups are engaged in the development of recommendations that are published bimonthly in Therapeutics Letters and distributed as unsolicited mail to physicians and pharmacists in BC. Each letter commonly focuses on adverse outcomes found in trials as opposed to the primary or secondary objectives of the trials reviewed. Authors of the letters are not named and there is no stated methodology for literature selection or review or grading of recommendations, nor a predefined schedule for discussion of specific therapeutic areas. Since 2010, 18 drugs or classes of drugs have been reviewed in detail in 27 Therapeutics Letters and only one drug has been given a full recommendation (intravenous iron in appropriately selected people with chronic severe iron deficiency).<sup>37</sup>

### **Recommendations compared**

Both Diabetes Canada and the Guidelines and Protocols Advisory Committee identify a process, structure, and timeline for their work in advance. The recommendations produced by both are more comprehensive in scope than those of the Therapeutics Initiative, which focuses mainly on drug therapies and aims to “improve prescription habits.”

The composition of DC guidelines committees is broad-based and inter-professional, including people with diabetes as well as experts in various

specialties from across Canada. The GPAC working groups responsible for developing guidelines are smaller than the DC committees, but also include medical experts and a Pharmacare pharmacist. The members of TI working groups include salaried employees and other health care professionals and academics who are identified on the organization’s website. While the authors of DC guidelines are named, authors of GPAC guidelines and Therapeutics Letters are not.

Recommendations issued by the TI are notable for not aligning with those of other bodies, while recommendations issued by DC and GPAC align closely with American and European guidelines for diabetes management<sup>24,25</sup> and those of the United Kingdom’s National Institute for Health and Care Excellence (NICE), which produces the only guidelines to receive a higher rating than the DC diabetes guidelines<sup>33</sup> and is cited in one Therapeutics Letter as a source of “independent information.”<sup>38</sup>

DC, GPAC, and these international bodies recommend monitoring patients with diabetes using a glycated hemoglobin (HbA1c) level, and that the target A1c should be individualized, with a reasonable level for most adults being less than 7.0% and a target for those who are younger being 6.5% so they may benefit from more years of excellent glycemic control to avoid microvascular complications. Algorithms in DC, GPAC, and other international guidelines provide diabetes care teams with direction for management. No such direction is provided by the TI other than a preference for lifestyle intervention: “While we await the trial evidence, it is rational to emphasize lifestyle measures in these patients: weight loss, low carbohydrate diets and exercise.”<sup>39</sup> This recommendation is made despite the statement in another

Therapeutics Letter that “weight loss is difficult to maintain”<sup>40</sup> and a lack of any references to support emphasizing “low carbohydrate diets,” which a literature review by Diabetes Canada found no evidence to support.<sup>3</sup> In the comments section of the TI website, a request for clarification regarding exactly what kind of carbohydrates such a diet would include is answered as follows: “We [the TI] are not experts on evidence about diet” (reply to Dr Virendra Sharma by Thomas L.

Perry, MD, FRCPC, Chair, TI Education Working Group, 21 March 2017, 9:05 p.m.).

### BC Pharmacare coverage

The most recent Diabetes Canada clinical practice guidelines recommend that antihyperglycemic agents should be chosen based on both patient and agent characteristics.<sup>2,3</sup> While all agents named by DC have been evaluated and approved for use in Canada, in BC only a few (generally

older and less-expensive agents such as glyburide, metformin, and human insulins) are fully covered under the provincial formulary.<sup>41</sup> This makes it much more difficult for physicians to use up-to-date evidence when managing their patients with diabetes.

**Table 2** and **Table 3** illustrate the extent to which BC restricts Pharmacare coverage compared with three other provinces: Alberta and Ontario (each historically considered a have province) and Nova Scotia (considered

Clinical priority	Therapy recommended by Diabetes Canada	British Columbia	Alberta	Ontario	Nova Scotia
<b>At diagnosis</b>					
A1c < 8.5%	Lifestyle intervention	n/a	n/a	n/a	n/a
<b>First-line agents to consider based on clinical priority and patient characteristics</b>					
A1c ≥ 8.5%	Metformin (Glucophage, Glumetza)	L	L	L	L
A1c ≥ 8.5%	Metformin + another agent	See second-line options below			
Symptomatic hyperglycemia with metabolic decompensation	Insulin ± metformin	See listings for insulin in Table 3			
<b>Second-line options to consider based on clinical priority and patient characteristics when glycemic target is not reached after 2–3 months</b>					
Clinical cardiovascular disease	Empagliflozin (Jardiance)	NL	R	L	R
	Liraglutide (Victoza)	NL	NL	NL	NL
Hypoglycemia risk	<b>DPP-4 inhibitors</b>				
	Alogliptin (Nesina)	NL	NL	NL	NL
	Linagliptin (Trajenta)	R	R	L	R
	Sitagliptin (Januvia)	DL	R	L	R
	Saxagliptin (Onglyza)	R	R	L	R
	<b>GLP-1 receptor agonists</b>				
	Albiglutide (Eperzan)	NL	NL	NL	NL
	Exenatide (Byetta)	NL	NL	NL	NL
	Liraglutide (Victoza)	NL	NL	NL	NL
	Dulaglutide (Trulicity)	NL	NL	NL	NL
	Semaglutide (Ozempic)	NL	NL	NL	NL
	<b>SGLT2 inhibitors</b>				
	Canagliflozin (Invokana)	NL	R	L	R
	Dapagliflozin (Forxiga)	NL	R	L	R
	Empagliflozin (Jardiance)	NL	R	L	R
	<b>TZDs</b>				
	Pioglitazone (Actos)	R	R	L	R
	Rosiglitazone (Avandia)	DL	R	NL	NL

**Table 2. Formulary listings in BC and selected provinces for therapy recommended by Diabetes Canada.** (Table continued on next page.)

See next page for legend.

## Challenges to managing type 2 diabetes in British Columbia: Discordant guidelines and limited treatment options

(Table continued from previous page.)

Clinical priority	Therapy recommended by Diabetes Canada	British Columbia	Alberta	Ontario	Nova Scotia
<b>Second-line options to consider based on clinical priority and patient characteristics when glycemic target is not reached after 2–3 months (Continued)</b>					
Weight gain risk	<b>GLP-1 receptor agonists</b>				
	Albiglutide (Eperzan)	NL	NL	NL	NL
	Exenatide (Byetta)	NL	NL	NL	NL
	Liraglutide (Victoza)	NL	NL	NL	NL
	Semaglutide (Ozempic)	NL	NL	NL	NL
	<b>SGLT2 inhibitors</b>				
	Canagliflozin (Invokana)	NL	R	L	R
	Dapagliflozin (Forxiga)	NL	R	L	R
	Empagliflozin (Jardiance)	NL	R	L	R
	<b>Alpha-glucosidase inhibitor</b>				
Acarbose (Glucobay)	DL	L	R	L	
Relative A1c lowering	<b>DPP-4 inhibitors</b>				
	Alogliptin (Nesina)	NL	NL	NL	NL
	Linagliptin (Trajenta)	R	R	L	R
	Sitagliptin (Januvia)	DL	R	L	R
	Saxagliptin (Onglyza)	R	R	L	R
	<b>GLP-1 receptor agonists</b>				
	Albiglutide (Eperzan)	NL	NL	NL	NL
	Exenatide (Byetta)	NL	NL	NL	NL
	Liraglutide (Victoza)	NL	NL	NL	NL
	Dulaglutide (Trulicity)	NL	NL	NL	NL
	Semaglutide (Ozempic)	NL	NL	NL	NL
	<b>Insulin (see Table 3)</b>				
	<b>Insulin secretagogues</b>				
	Gliclazide (Diamicon, Diamicon MR)	R	L	L	L
	Glimperide (Amaryl)	NL	NL	L	NL
	Glyburide (Diabeta, Euglucon)	L	L	L	L
	Repaglinide (GlucoNorm)	NL	L	L	NL
	<b>SGLT2 inhibitors</b>				
	Canagliflozin (Invokana)	NL	R	L	R
	Dapagliflozin (Forxiga)	NL	R	L	R
	Empagliflozin (Jardiance)	NL	R	L	R
	<b>TZDs</b>				
	Pioglitazone (Actos)	R	R	L	R
Rosiglitazone (Avandia)	DL	R	NL	NL	

**Table 2 (Continued). Formulary listings in BC and selected provinces for therapy recommended by Diabetes Canada.**

Adapted from Diabetes Canada. Formulary listings for diabetes medications in Canada. April 2018<sup>41</sup>

L = listed. Can be prescribed by any doctor. Cost will be fully or partially covered according to the terms of the public drug plan.

R = restricted. Only available to those who meet eligibility criteria and received prior approval from the drug benefit plan. Cost will be fully or partially covered according to the terms of the public drug plan.

NL = not listed. Not available through the public drug plan.

DL = delisted. Product has been removed from the formulary and is no longer available.



## Challenges to managing type 2 diabetes in British Columbia: Discordant guidelines and limited treatment options

Insulin (Brand name)	British Columbia	Alberta	Ontario	Nova Scotia
<b>Bolus (prandial) insulins</b>				
Aspart (NovoRapid/Novolog)	L*	L	R	L
Glulisine (Apidra)	L*	L	L	L
Lispro (Humalog)	L*	L	L	R†
<b>Short-acting insulins</b>				
Regular (Humulin-R, Novolin ge Toronto)	L	L	L	L
Pork regular insulin (Hyperpurin Regular)	R	NL	NL	NL
<b>Basal insulins: Intermediate-acting regular</b>				
NPH (Humulin-N, Novolin ge NPH)	L	L	L	L
<b>Basal insulins: Long-acting analogues</b>				
Detemir (Levemir)	R	L	L	R
Glargine (Lantus)	R‡	L	L	R
Glargine 300 (Toujeo)	NL	NL	NL	NL
Glargine SEB (Basaglar)	R‡	L	L	L
Degludec (Tresiba)	NL	NL	NL	NL
Pork isophane insulin (Hypurin NPH)	R	NL	NL	NL
<b>Premixed insulins</b>				
Premixed regular-NPH (Humulin 30/70, Novolin 30/70, 40/60, 50/50)	L	L	L	L
Biphasic insulin aspart (NovoMix 30)	L*	NL	L	NL
Insulin lispro/lispro protamine suspension (Humalog Mix25, Mix 50)	L*	L	L	NL

**Table 3. Formulary listings in BC and selected provinces for insulin.**

Adapted from Diabetes Canada. Formulary listings for diabetes medications in Canada. April 2018.<sup>41</sup>

L = listed. Can be prescribed by any doctor. Cost will be fully or partially covered according to the terms of the public drug plan.  
 R = restricted. Only available to those who meet eligibility criteria and received prior approval from the drug benefit plan. Cost will be fully or partially covered according to the terms of the public drug plan.  
 NL = not listed. Not available through the public drug plan.  
 SEB = subsequent-entry biologic.

\*Partial reimbursement provided for rapid-acting insulins; patients must pay the difference.

†Full benefit provided for children 18 years and younger.

‡As of 21 August 2018, Pharmacare offers restricted coverage for Basaglar brand of insulin glargine only. Patients starting insulin glargine will no longer be provided coverage for Lantus ([www2.gov.bc.ca/assets/gov/health/health-drug-coverage/pharmacare/newsletters/news18-011.pdf](http://www2.gov.bc.ca/assets/gov/health/health-drug-coverage/pharmacare/newsletters/news18-011.pdf)).

a have-not province). Although drug evaluation is now performed nationally by the Common Drug Review and the Canadian Agency for Drugs and Technologies in Health (CADTH), it appears that recommendations from the TI rather than those from the much more robust DC guidelines are determining BC Pharmacare policy. BC is the only province to require special authority for gliclazide (for use after hypo-

glycemia with glyburide),<sup>41,42</sup> and is the only province to not list empagliflozin. The rejection of empagliflozin appears to be influenced largely by cost and supported by the TI's criticisms of the EMPA-REG OUTCOME trial.<sup>43</sup> These criticisms, however, do not accord with most interpretations of the trial and other recent CV safety trials<sup>26-29</sup> such as the LEADER trial of liraglutide,<sup>27</sup> which demonstrated benefit for people with

type 2 diabetes and clinical cardiovascular disease.

As a result of TI conclusions, BC residents with diabetes are at a disadvantage when compared with Canadians in other jurisdictions. Essentially, BC has become a have-not province for people with diabetes, a problem likely to worsen as the rates of diabetes in BC continue to rise.<sup>44</sup>

**Key recommendations considered**

Clear, high-quality, evidence-based recommendations are the cornerstone of medical training and subsequent decision making for health care providers. Physicians and patients expect and deserve the best care possible based on transparent processes and unbiased sources.

In BC, comparing key recommendations on important clinical issues such as A1c targets and pharmacological therapy<sup>45-55</sup> reveals significant discord. The TI is at odds with DC and GPAC on a number of topics, as shown in **Table 4**. In an example

regarding cardiovascular outcomes and the use of empagliflozin, the Therapeutics Letter of July/August 2017 disputes the conclusions of the EMPA-REG OUTCOME trial.<sup>43</sup> The TI authors question the design of the trial, which is one mandated by the FDA, and the “aggressive” use of insulin, sulfonylureas, and DPP4s in the control group, which are the very medications BC Pharmacare covers. The TI authors also focus on genital infections experienced by some study subjects, and emphasize these harms in a table. Despite these concerns, the Therapeutics Letter of September/October 2017 names canagliflozin and

dapagliflozin as “drugs to avoid”<sup>55</sup> but does not name empagliflozin.

Contradictory recommendations serve to confuse medical care providers, and restrictive Pharmacare coverage only adds to this confusion and promotes clinical inertia. A recent evidence-based review of formulary coverage for diabetes and cardiovascular disease concluded that glucose-lowering agents that reduce mortality in patients at very high cardiovascular risk are now available, and that empagliflozin has been shown to be highly cost-effective. The authors urge all provincial formularies to “re-examine their access requirements

	Diabetes Canada (DC)	Guidelines and Protocols Advisory Committee (GPAC)	Therapeutics Initiative (TI)
<b>A1c targets</b>	<ul style="list-style-type: none"> <li>• Target levels for A1c should be individualized.</li> <li>• A1c ≤ 7.0% recommended for most individuals.</li> <li>• A1c ≤ 6.5 in some patients with type 2 diabetes may further lower the risk of nephropathy<sup>16</sup> (Grade A, Level 1 recommendation) and retinopathy<sup>17</sup> (Grade A, Level 1), but this must be balanced against the risk of hypoglycemia<sup>16</sup> (Grade A, Level 1).</li> <li>• Less-stringent A1c targets of 7.1%–8.5% may be appropriate in patients with limited life expectancy; high level of functional dependency; extensive coronary artery disease at high risk of ischemic events; multiple comorbidities; history of recurrent severe hypoglycemia; hypoglycemia unawareness; longstanding diabetes for whom it is difficult to achieve an A1c ≤ 7.0% despite effective doses of multiple antihyperglycemic agents, including intensified basal-bolus insulin therapy (Grade D, Consensus for all).</li> </ul>	<ul style="list-style-type: none"> <li>• Recommendations for A1c align with DC.</li> </ul>	<ul style="list-style-type: none"> <li>• No upper or suggested A1c level for treatment recommended: “The optimal glycemic target in patients with type 2 diabetes is unknown.”<sup>49</sup></li> <li>• “A glycemic target of &lt; 6.0% compared to a target of 7.0% to 7.9% caused increased mortality in type 2 diabetics who were at high risk of cardiovascular events.”<sup>49</sup></li> <li>• “Most commonly used surrogate markers have not been proven to be consistently predictive of morbidity or mortality risk thus their use in risk calculators is questionable.”<sup>50</sup></li> <li>• “Relying on surrogate markers to assess effectiveness of drug therapy has not been proven to yield clinically meaningful benefits and there are important examples where that strategy was harmful.”<sup>50</sup></li> <li>• “Additional RCTs that test specific glycemic targets are needed for the full spectrum of patients with type 2 diabetes.”<sup>49</sup></li> <li>• “The current regulatory framework for glucose lowering drugs that bases benefit on lowering HbA1c and bases harms on not increasing specific cardiovascular outcomes requires rethinking.”<sup>54</sup></li> </ul>
<b>Lifestyle intervention</b>	<ul style="list-style-type: none"> <li>• Recommends starting lifestyle intervention at the time of diagnosis and continuing alongside pharmacological management.</li> <li>• Guidelines include 5 physical activity recommendations and 13 nutrition recommendations.</li> </ul>	<ul style="list-style-type: none"> <li>• Recommendations for lifestyle intervention align with DC.</li> </ul>	<ul style="list-style-type: none"> <li>• Recommends lifestyle intervention as opposed to pharmacological management: “Type 2 diabetes management should focus on weight management, appropriate nutrition, regular physical activity and blood pressure control, rather than intensive glucose lowering treatment.”<sup>51</sup></li> <li>• “Exercise and weight loss are effective in treating type 2 diabetes.”<sup>40</sup></li> </ul>

**Table 4.** Key recommendations issued by three bodies for the management of type 2 diabetes.

(Table continued on next page.)

## Challenges to managing type 2 diabetes in British Columbia: Discordant guidelines and limited treatment options

(Table continued from previous page.)

	Diabetes Canada (DC)	Guidelines and Protocols Advisory Committee (GPAC)	Therapeutics Initiative (TI)
<b>Pharmaceutical therapy</b>	<ul style="list-style-type: none"> <li>Treatment algorithm provided.</li> <li>Individualized therapy recommended.</li> <li>Recommends adding second- and third-line agents to metformin according to agent and patient characteristics and continuing until A1c target reached.<sup>23</sup></li> <li>Lists each class of medication with effect on A1c lowering, hypoglycemia, weight, cardiovascular outcome, and cost.</li> </ul> <p><b>Sulfonylureas</b></p> <ul style="list-style-type: none"> <li>Gliclazide reported to cause less hypoglycemia than glyburide, especially in the elderly. In general, initial doses of sulfonylureas in the elderly should be half of those used for younger people, and doses should be increased more slowly (Grade D, Consensus).</li> <li>Gliclazide<sup>45</sup> and gliclazide<sup>46</sup> MR (Grade B, Level 2) and glimepiride<sup>47</sup> (Grade C, Level 3) should be used instead of glyburide, as they are associated with a reduced frequency of hypoglycemic events.</li> <li>No specific preferred second-line agents are recommended except in cases of clinical cardiovascular disease, where the preferred second-line agent is empagliflozin or liraglutide.<sup>23</sup></li> </ul>	<ul style="list-style-type: none"> <li>Treatment algorithm provided.</li> <li>Recommendations for treatment align with DC 2013 guidelines published prior to the November 2016 update.<sup>23</sup></li> </ul> <p><b>Sulfonylureas</b></p> <ul style="list-style-type: none"> <li>Risk of hypoglycemia depends on agent (more risk with glyburide).</li> <li>“Controversies in Care” section mentions data linking sulfonylureas with cardiovascular harm, but concludes that “At present, there is a lack of evidence clearly demonstrating cardiovascular harm.”<sup>30</sup></li> </ul>	<ul style="list-style-type: none"> <li>No treatment algorithm provided.</li> <li>No recommendations regarding which medications to use, when to use them, and in which patient populations.</li> <li>Therapeutics Letter of March 2017 states that “gluco-centric” approach to type 2 diabetes “may be misguided” and quotes from a study questioning “the likelihood that an individual will benefit from treatment of DM2 over an expected life span”<sup>39</sup> and concluding that “there is a potential epidemic of overtreatment with antihyperglycemic therapies.”<sup>39</sup></li> </ul> <p><b>Sulfonylureas</b></p> <ul style="list-style-type: none"> <li>Despite citing study findings that the incidence of hypoglycemic reactions was significantly greater with glibenclamide than with gliclazide,<sup>45</sup> the TI states “There is insufficient evidence from double-blind randomized trials that gliclazide provides a therapeutic advantage over other sulfonylurea drugs.”<sup>53</sup></li> <li>“Sulfonylureas, metformin, and insulin are equally efficacious in improving glucose control in type 2 diabetes” and “are better than diet alone.”<sup>40</sup></li> </ul> <p><b>Intensive insulin</b></p> <ul style="list-style-type: none"> <li>“The effectiveness of intensive insulin treatment in delaying the onset of complications of diabetes has been established for type 1 and, to a lesser extent, for type 2 diabetes.”<sup>40</sup></li> </ul> <p><b>Acarbose</b></p> <ul style="list-style-type: none"> <li>“Acarbose can be used as an adjunct to diet and other oral agents to achieve glucose control in patients with NIDDM. Its main disadvantages are cost and the high incidence of gastrointestinal side effects.”<sup>52</sup></li> </ul> <p><b>Antihyperglycemics</b></p> <ul style="list-style-type: none"> <li>“Widely prescribed glucose lowering drugs for people with type 2 diabetes have been approved in Canada without evidence that they reduce mortality or major morbidity.”<sup>54</sup></li> </ul>
<b>Cardiovascular outcomes</b>	<ul style="list-style-type: none"> <li>Based on publications from the EMPA-REG OUTCOME<sup>26</sup> and LEADER<sup>27</sup> trials, the November 2016 DC update to the 2013 guidelines<sup>23</sup> recommends using an antihyperglycemic agent with demonstrated cardiovascular outcome benefit (empagliflozin,<sup>26</sup> liraglutide<sup>27</sup>) in patients with clinical cardiovascular disease not meeting glycemic targets after lifestyle intervention and metformin. Based on the CANVAS<sup>29</sup> program, the 2018 DC guidelines added canagliflozin to this recommendation.</li> </ul>	<ul style="list-style-type: none"> <li>Latest guideline was issued before publication of EMPA-REG OUTCOME and LEADER trials and DC update.</li> <li>Guideline links to Canadian Agency for Drugs and Technology in Health and Common Drug Review statement that empagliflozin “was superior to placebo for improving glycemic control, reducing body weight, and lowering systolic blood pressure,” supporting use in patients with type 2 diabetes at high risk for cardiovascular disease.<sup>48</sup></li> </ul>	<ul style="list-style-type: none"> <li>“Phase 4 trials have been published for saxagliptin, alogliptin, sitagliptin, empagliflozin, and liraglutide... These trials must be interpreted cautiously considering the current uncertainty regarding the effects of standard of care on cardiovascular outcomes.”<sup>54</sup></li> <li>Question design and benefit of EMPA-REG trial (see text).</li> </ul>

**Table 4 (Continued). Key recommendations issued by three bodies for the management of type 2 diabetes.**

for SGLT-2 inhibitors and to consider adding GLP-1 agonists to reflect current evidence and clinical guideline recommendations.”<sup>56</sup>

Patients in BC living with type 2 diabetes deserve care that meets nationally vetted standards and provincial support for the most up-to-date evidence-based approach to diabetes management.

### Summary

Type 2 diabetes is a common disease and its management is becoming increasingly complex. Management recommendations used in BC come primarily from Diabetes Canada, the Guidelines and Protocols Advisory Committee, and the Therapeutics Initiative.

The use of antihyperglycemic therapy has been shown to reduce complications and save lives. Physicians in BC are receiving contradictory information and facing formulary restrictions not seen in other provinces. Better alignment of evidence-based recommendations and appropriate drug coverage is needed to improve clinical outcomes and the lives of people in BC living with diabetes, and to make the management of diabetes less challenging for physicians and patients alike. **BCMJ**

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# Diabetes care in First Nations populations in British Columbia

More, not less, should be done to mitigate the negative impact of diabetes on Indigenous people, especially when it comes to Pharmacare coverage for guideline-recommended therapies.

**ABSTRACT: Indigenous populations are disproportionately affected by diabetes, as seen in predictions that one in two Indigenous people in their 20s will develop diabetes at some point in life. The health care services that Indigenous people receive will vary greatly and will depend on whether they live on or off reserve. In 2013 the First Nations Health Authority assumed the programs, services, and responsibilities formerly handled for Indigenous people in British Columbia by Health Canada. Two innovative programs that have been successful in addressing the epidemic of diabetes in First Nations populations in BC are the Diabetes and My Nation program and the mobile diabetes telemedicine clinic program. A significant challenge to care delivery has arisen since October 2017, when the First Nations Health Authority joined BC Pharmacare and the new Plan W formulary was introduced. Plan W severely limits or denies access to diabetes medications that were previously covered, including gliclazide, repaglinide, some DPP-4s, all SGLT2s, insulin glargine, insulin detemir, and rapid insulins. This means Indigenous British Columbians do not have ready access to many guideline-recommended therapies that can mitigate the negative impact of diabetes.**

*This article has been peer reviewed.*

**T**he estimated global prevalence rate of type 2 diabetes is 8.8%,<sup>1</sup> with Indigenous people being disproportionately affected.<sup>2</sup> In Canada, the prevalence rate in Indigenous adults younger than age 35 is over 50.0%, and the lifetime risk of diabetes at age 20 is estimated at 75.6% in men and 87.3% in women.<sup>3</sup> It is predicted that one in two Indigenous people in their 20s will develop diabetes at some point in life.<sup>3</sup>

The social determinants of health play a major role in the development of chronic diseases such as diabetes. Colonization is recognized worldwide as the most significant social determinant of health.<sup>3,4</sup> Other social determinants affecting diabetes in First Nations include poverty, isolation, poor access to care, food insecurity, obesity, and lack of health education. Risk is compounded by lifestyle habits such as smoking, low levels of physical activity, and unhealthy eating habits that contribute to high rates of obesity.<sup>5-7</sup> Further, urbanization means that food is no longer obtained by traditional hunting and gathering methods but is bought from a local commissary stocked with high-carbohydrate, energy-dense prepared foods promoted by ubiquitous advertising.

## Indigenous health care in BC

First Nations populations in BC may receive different health care services based on whether they live on or off reserve. Both on-reserve and off-reserve health care may be supported by clinics, but there are major differences in the services provided depending on the particular clinic and on the size and location of the community (urban, semi-urban, or remote). Larger clinics may have physicians in attendance, while smaller clinics tend to be staffed by nurses or community health care workers. There is high physician turnover in clinics serving First Nations communities and a lack of Indigenous caregivers with whom community members can identify and from whom they will accept advice. It is uncommon to find Indigenous physicians or nurses staffing most of these clinics, and Indigenous patients are often seen by non-Indigenous physicians in nearby non-First Nations communities. This is of consequence, since many Indigenous people have had adverse experiences with authorities who are less able to provide culturally appropriate assistance.

In 2013 the First Nations Health Authority (FNHA) assumed the programs, services, and responsibilities

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formerly handled for Indigenous British Columbians by Health Canada's First Nation and Inuit Health Branch (FNIHB) and the Non-Insured Health Benefits (NIHB) program. Since then, FNHA has administered programs for all status Indigenous people in the province to ensure they have access to the health and wellness programs provided for other citizens. An Indigenous person residing either on or off reserve has access to care providers throughout the province, as well as access to a different list of medications and services than non-Indigenous people.

In October 2017 FNHA joined BC Pharmacare and the new plan Plan W formulary was introduced.<sup>8</sup> While FNHA has promoted this transition to a 100% paid plan for Indigenous people as a positive step, Plan W in fact severely limits or denies access to diabetes medications that were covered previously,<sup>9</sup> including gliclazide, repaglinide, some DPP-4s, all SGLT2s, insulin glargine, insulin detemir, and rapid insulins. This is unfortunate, as Indigenous people have a significant problem with obesity and prediabetes as well as diabetes, and GLP-1s (which are not listed by either BC Pharmacare or NIHB) and SGLT2s are the only medications that assist in weight reduction as well as glycemic control while providing proven cardiovascular protection.<sup>10-13</sup> Moreover, combination therapies that enhance adherence and often provide reduced costs also have restricted coverage.

### Initiatives in diabetes care delivery

Support for diabetes care delivery to First Nations populations in BC has come from various programs, including the Aboriginal Diabetes Initiative (ADI), introduced by Health Canada and now administered by FNHA. This program provides funding to 196 of 203 on-reserve communities.

Two other successful initiatives in BC are the Diabetes and My Nation program and the mobile diabetes telemedicine clinic program.

#### Diabetes and My Nation

The Diabetes and My Nation program ([www.diabetesandmynation.com](http://www.diabetesandmynation.com)) addresses the complex problem of diabetes through education in local community schools, physical activity programs proposed by local community members, "circles of diabetes care" that emphasize the importance of glucose monitoring to take ownership of the disease, and long-term follow-up. When the effectiveness of this program was compared with the effectiveness of diabetes care in a non-Indigenous local community provided by the same family physicians, the outcomes in the First Nations community were superior.<sup>14</sup>

#### Mobile diabetes telemedicine clinic

The mobile diabetes telemedicine clinic program has provided consultative care in the past 5 years to over 4000 First Nations patients, many living in remote locations. Established in 2003 and expanded in 2009 to cover almost all First Nations communities in northern and southern BC, this program is delivered by a team consisting of one or two nurses who are certified diabetes educators, a clerk, and a vision technician. Currently two teams provide these mobile diabetes telemedicine clinics: Carrier Sekani Family Services and Seabird Island Band. The team visits requesting communities to see those people known to have diabetes who wish to receive an in-depth health status evaluation, which includes a full history, physical examination, and medication review using the Virtual Diabetes Program EMR, which is oriented specifically to First Nations clients.<sup>15</sup>

The patient's ability to take charge of his or her own diabetes self-care is assessed and a full laboratory evaluation is performed by point-of-care tests that include fasting or random blood glucose, hemoglobin A1c, a full lipid profile, and urinary microalbumin/creatinine ratio, liver function tests, and full visual field retinal photographs. All laboratory tests are rigidly quality controlled (supported by CEQAL Inc. laboratories). Reports, including recommendations, are generated by the nurses and vision technician and are then uploaded to a secure Internet site<sup>15</sup> and accessed by endocrinology and ophthalmology consultants. A complete report containing recommendations for improved care is generated and transmitted to family physicians and community health units. Wherever possible, follow-up contact is made with the patients themselves, as well as their family physicians and other consultants. Efforts are made to see the same patients a second time within the subsequent 6 months to 2 years, depending on resources, and episodically thereafter. The most significant aspect of these assessments is that they include extensive patient education in healthy eating, the importance of physical activity, glycemic targets, and advice regarding the risks of complications and methods of avoiding such complications. Aspects of self-care are emphasized, and a website<sup>16</sup> provides educational support for both patients and community health care workers.

These annual assessments indicate that while obesity is a major baseline problem, many other indicators improve over subsequent clinic visits, including blood pressure levels, A1c levels, lipid levels, and use of antihypertensive ACE inhibitors or ARBs and statins. The patient education aspect is particularly appreciated



and it is clear that this improves patient participation in care.

The success of the mobile clinic program may be seen by comparing diabetes care results in BC with those found in the rest of Canada. For example, in the Diabetes Mellitus Status survey,<sup>17</sup> 49.6% of diabetes patients in Canada had an A1c level lower than 7.0% compared with 54.0% of First Nations diabetes patients in northern BC and 54.9% in southern BC.<sup>18</sup> According to this metric, Indigenous people served by the clinic program in multiple BC communities with many challenges had glycemic outcomes superior to those in the rest of Canada.

The BC mobile telemedicine clinic approach has proven to be effective and appreciated in rural and urban settings, and could be equally effective in non-First Nations communities, particularly as it is an efficient use of resources.

### **Challenge to diabetes care delivery**

A significant challenge to diabetes care delivery in BC is the limitations on access to medications. After lifestyle changes are introduced to patients newly diagnosed with type 2 diabetes, optimal first-line therapy with metformin begins. This is then followed by or combined with additional oral agents that promote glycemic control, weight loss, and reduction of adverse outcomes. Three different classes of these second-line agents provide this and are recommended by clinical practice guidelines: DPP-4s, SGLT2s, and GLP-1s.<sup>19,20</sup> BC has one of the most limited formularies in Canada, offering only restricted coverage for two DPP-4 agents, and no coverage for GLP-1s. BC is also the only province in Canada to provide no coverage for any SGLT2 agents. In addition, BC's restriction on insulin choice causes those who need basal insulin

to take two less-reliable insulin injections per day, and to use less-reliable short (rapid-acting) insulins before meals. FNHA's decision to restrict drug coverage means that First Nations people will lose access to many guideline-recommended therapies. While lifestyle changes are clearly

betes in First Nations populations in BC are the Diabetes and My Nation program and the mobile diabetes telemedicine clinic program. Unfortunately, the adoption of Pharmacare Plan W by FNHA in 2017 now severely limits or denies access to diabetes medications that were previ-

## **Indigenous people are disproportionately affected by diabetes, and the care they receive will depend on whether they live on or off reserve.**

important, we need to help people adhere to recommended care, and placing any obstacles in their way will have deleterious consequences.

Diabetes places an enormous burden on First Nations in BC by decreasing quality of life and productivity, and increasing morbidity, premature mortality, and health care costs. In a wealthy province such as BC more, not less, should be done to mitigate the negative impact of this disease on Indigenous people.

### **Summary**

Indigenous people are disproportionately affected by diabetes, and the care they receive will depend on whether they live on or off reserve. In BC the First Nations Health Authority is responsible for programs and services formerly handled by Health Canada. Two innovative initiatives that have helped address the epidemic of dia-

ously covered, which means Indigenous British Columbians do not have access to many guideline-recommended therapies. **BCMJ**

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### **Competing interests**

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# From beta cells to bedsides: A 2018 update on diabetes research in British Columbia

Laboratory and clinical investigators in BC are making notable discoveries as they collaborate to reach a better understanding of diabetes, especially regarding pancreatic beta cell biology, obesity, and autoimmunity.

**ABSTRACT: With more than 1.4 million British Columbians impacted by prediabetes or diabetes, the need has never been greater for research into the causes of the disease and new approaches to predict, prevent, and reverse this devastating condition. Fortunately, BC has a rich history of diabetes research dating back to the 1960s and has become a world leader in the area, with research projects underway at three Vancouver sites and more research capacity developing outside Vancouver. Current research strengths lie in pancreatic beta cell biology and replacement, obesity, autoimmunity, and community health. Notable discoveries and plans for future research have resulted from progress made by wet laboratory scientists and diabetologist clinicians based at Vancouver General Hospital, the University of British Columbia, and BC Children's Hospital. The future is bright for the province's strong and collegial community of researchers, especially with the establishment of the BC Diabetes Research Network.**

**W**orldwide prevalence of both type 1 and type 2 diabetes is on the rise, yet we remain without a cure for this metabolic disease and have limited therapeutic options. With 1.4 million people impacted by prediabetes or diabetes in British Columbia alone,<sup>1</sup> the need has never been greater for research into the causes of the disease and new approaches to predict, prevent, and reverse this devastating condition.

BC has a rich history of diabetes research, discovery, and training that dates back to the 1960s, when experimental studies led to the discovery of the first incretin hormone, gastric inhibitory polypeptide—also called glucose-dependent insulinotropic polypeptide (GIP)—by Drs John Brown and Raymond Pederson in the Department of Physiology at the University of British Columbia (UBC).<sup>2</sup> Subsequent work by this group, including Dr Chris McIntosh, using preclinical models of type 2 diabetes, played a key role in the eventual therapeutic application of dipeptidyl peptidase-4 (DPP-4) inhibitors,<sup>3</sup> today a widely used class of type 2 diabetes drugs that prolong the biological activity of the incretin hormones GIP and glucagon-like peptide-1 (GLP-1).

This group of investigators also played a significant part in training many current diabetes researchers in BC and around the world.

## Research sites

Diabetes research in BC today takes place primarily at three sites: Vancouver General Hospital (VGH), the UBC Point Grey Campus, and BC Children's Hospital (BCCH). As well, research efforts are underway elsewhere in BC. Close collaboration among the Vancouver research groups is facilitated by complementary expertise, sharing of core infrastructure, and outstanding trainees. In recent years, increasing collaboration among wet laboratory scientists and diabetologist clinicians has benefited the diabetes research community as a whole and enabled innovative clinical trials and translational research that

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has provided cells and blood samples from patients for study at the laboratory bench.

### **Vancouver General Hospital**

At VGH, the world-leading Ike Barber Human Islet Transplant Laboratory was initiated by a donation from Dr Irving K. Barber that enabled the recruitment of Dr Garth Warnock, a pioneer in human islet transplantation in type 1 diabetes. Since 2003, the clinical program at the lab has transplanted islets into 54 individuals with type 1 diabetes. Follow-up of these patients shows that islet transplantation and the resulting improvement in glucose regulation has slowed progression of microvascular complications.<sup>4</sup> Clinical studies of islet transplant recipients in Vancouver have also identified beta cell prohormones as biomarkers of islet graft function that may have value in predicting islet transplant failure.<sup>5</sup>

Importantly, the availability of human islets for research has stimulated collaborative research projects in human islet biology among many BC-based diabetes researchers. For example, using human islets from the Ike Barber lab, local researchers reported that immune-suppressive drugs such as tacrolimus, typically used in islet transplant recipients to prevent allograft rejection, have deleterious effects on human beta cell function and thus may contribute to graft failure.<sup>6</sup> This widely cited finding has led to greater consideration of the impact immunosuppressive protocols have on transplanted islets. Other human islet studies have provided new insight into why toxic islet amyloid plaques form in type 2 diabetes and how they induce inflammation and beta cell loss.<sup>7</sup> Related studies have suggested that the beta cell death and dysfunction in islet transplants resembles the beta cell failure seen in

type 2 diabetes,<sup>8</sup> including the part played by amyloid formation.<sup>9</sup>

VGH is also the site of multiple trials in type 2 diabetes and clinical research into the regulation of glucose metabolism in older adults with type 2 diabetes. Given the risk of hypoglycemia in this understudied population, such research has significant implications for clinical practice.<sup>10</sup>

In the area of translational research in diabetes prevention and control, Dr Tricia Tang is leading a program that focuses on high-risk and medically underserved patient populations.<sup>11,12</sup> She is conducting community-based trials investigating the impact of low-cost, sustainable behavioral interventions on glycemic control, diabetes distress, and other health-related outcomes in South Asian Canadians and members of other ethnic communities.

### **UBC Point Grey campus**

In the regulatory peptide group of the UBC Department of Cellular and Physiological Sciences (formerly the Department of Physiology) the retirement of investigators once threatened to leave a void in diabetes research in BC. Fortunately, this was avoided with the recruitment of Dr Tim Kieffer in 2002 and Dr Jim Johnson in 2004. These capable investigators have now developed large and diverse diabetes research programs with strengths in islet biology, and have made significant contributions to our understanding of incretin, leptin, and stem cell biology, as well as hyperinsulinemia and obesity.

Dr Johnson has used novel mouse models of altered insulin production to gain insight into the biology and actions of insulin, pointing to unappreciated roles for hyperinsulinemia in obesity and lifespan. He has shown that genetically decreasing insulin production in mice confers protection

from diet-induced obesity<sup>13</sup> and prolongs lifespan.<sup>14</sup>

Dr Kieffer's pioneering work in stem cell derivation of insulin-producing cells<sup>15</sup> has moved us closer to having a source of unlimited, functional beta cells for transplantation in patients with type 1 diabetes. Beta cell replacement—currently by transplantation of pancreatic islets isolated from cadaveric organ donors—has the potential to be a functional cure for persons with type 1 diabetes, but is limited by tissue supply and graft failure. Dr Kieffer's group has also developed protocols for generating human insulin-producing cells from embryonic stem cells completely in the laboratory dish.<sup>15,16</sup> Insulin-producing cells derived from stem cells are now entering clinical trials, including one in Vancouver. This exciting area of research has led to a number of collaborative studies with UBC and BCCH researchers aiming to further improve these protocols and to engineer better beta cells that can evade immune attack, last longer, and function better following transplantation.

Other laboratories in the UBC Life Sciences Institute are studying the genetics of obesity, insulin action, and lipid metabolism, as well as viral pathogenesis of type 1 diabetes. Long-standing research activity at UBC is continuing in the areas of insulin action and diabetes complications, pharmacological modulation of insulin sensitivity, and changes in cardiac metabolism that occur in diabetes. One example is Dr Brian Rodrigues's work, which has led to a better understanding of the metabolic machinery that drives energy metabolism in the cardiomyocyte and endothelial cell and its breakdown in the diabetic state.<sup>17</sup> This information is now being used to devise novel therapeutic strategies to prevent or delay diabetes-related heart disease.

### BC Children's Hospital

Laboratory-based diabetes research at BCCH and its associated research institute began in the early 1990s under the leadership of Dr Aubrey Tingle, who partnered with UBC departments to recruit new clinician scientists and wet laboratory investigators to build childhood diabetes research capacity and programs focused on autoimmunity in type 1 diabetes, viral pathology, antigen presentation, and causes of beta cell death and dysfunction in diabetes. In the 2000s, childhood diabetes research in BC received a boost with investments from multiple partners, including the BCCH Foundation, Diabetes Canada (formerly known as the Canadian Diabetes Association), UBC, and the Canucks for Kids Fund (CFKF). With the help of these partners, infrastructure funding from the Canada Foundation for Innovation and BC Knowledge Development Fund, and the construction of the Translational Research Building at BCCH, I was fortunate to be able to recruit four laboratory-based diabetes investigators. These individuals established strong research programs in beta cell development and biology funded by the Canadian Institutes of Health Research.<sup>18-20</sup> Our growing diabetes research group was soon joined by other experienced BCCH investigators looking at the genetics of metabolic disease, the epigenetics of diabetes complications,<sup>21</sup> and the role of nutrition.<sup>22</sup>

Diabetes and transplant immunology research was greatly strengthened by the move from VGH to BCCH of Dr Megan Levings, who has established a leading research program in human T regulatory cell biology.<sup>23,24</sup> Recent studies in diabetes autoimmunity at BCCH by Levings and colleagues have generated a better understanding of the mechanisms that lead to T cell activation and beta cell

loss in type 1 diabetes. These studies have also shown the tremendous power of the chimeric antigen receptor (CAR) to generate CAR T regulatory cells with the potential to attenuate allograft responses to islet transplants and enhance graft survival.

The BCCH diabetes research group in the CFKF Childhood Diabetes Laboratories has made a number of impactful discoveries. Pediatric endocrinologists at BCCH teamed with laboratory investigators to demonstrate that children with recent-onset type 1 diabetes have higher circulating levels of a T cell subtype (Th17) that secretes a pro-inflammatory cytokine (IL-17).<sup>25</sup> This work provided the rationale for testing ustekinumab (a drug used in the treatment of psoriasis) in patients with type 1 diabetes in a clinical trial now underway in Vancouver (clinicaltrials.gov: NCT02117765).

Other translational studies at BCCH have led to the recent discovery of circulating biomarkers of potential value in predicting progression to diabetes and prognosis, including a unique gene signature expressed in T regulatory cells in patients with type 1 diabetes<sup>23</sup> and peptides derived from beta cell prohormones.<sup>5</sup> Wet laboratory studies have provided new insight into genes involved in the regulation of pancreatic beta cell development and function,<sup>18-20</sup> and elucidated how beta cell dysfunction occurs in type 2 diabetes, pointing to roles for cholesterol accumulation<sup>26</sup> and islet macrophages.<sup>27</sup>

BCCH also has strengths in clinical pediatric diabetes research. In addition to participating in type 1 diabetes clinical trials through TrialNet, BCCH has strong community-based clinical and population health research programs. Clinical studies have investigated diabetes risk in vulnerable populations, including

Indigenous people and youth with mental illness. These studies have shown that youth prescribed certain antipsychotic medications have a twofold to threefold increased risk of being overweight or developing prediabetes,<sup>28</sup> a discovery that has led to changes in clinical practice guidelines regarding the use of such medications in these youth. Other studies have sought a better understanding of cardiovascular complications in obese youth.<sup>29</sup> BCCH is also home to studies aimed at reducing the prevalence of obesity in youth through lifestyle modification approaches such as SCOPE, a program for preventing childhood obesity through community engagement.<sup>30</sup> Finally, BCCH clinicians have played a key role in enabling childhood diabetes translational research to occur, spearheading multiple collaborative clinical studies with laboratory-based investigators.

### Research sites outside Vancouver

Outside Vancouver, diabetes research is gaining in strength. At UBC Okanagan, discoveries have been made in the areas of nutrition and exercise. Links have been uncovered between intake of polyunsaturated fats and the risk of developing diabetes,<sup>31</sup> and clinical studies have shown how exercise, in particular high-intensity interval training (HIIT), impacts inflammation and metabolism in humans, providing evidence that HIIT may reduce cardiovascular complications in type 2 diabetes.<sup>32</sup>

At the University of Northern BC, research has been aimed at developing medications to manipulate metabolic signalling pathways in adipose tissue.<sup>33</sup>

Finally, at Simon Fraser University, Dr Scott Lear is investigating obesity and diabetes, and the role of environment, ethnicity, and lifestyle

in chronic disease. This builds on an important international study led by Dr Lear that showed physical activity of any kind can reduce the risk of diabetes and heart disease.<sup>34</sup>

### The future

The future is bright for diabetes research in BC. A strong and collegial environment is fostering collaborative studies across the various diabetes research sites in BC, and wet laboratory researchers are increasingly working closely with diabetes clinicians to move research from bench to bedside and back again. Current and future clinical trials show promise in applying laboratory-based discoveries to improving the lives of people with diabetes.

Islet biology is clearly a recognized strength of BC's diabetes researchers, with local investigators making discoveries in how healthy insulin-producing beta cells develop and function, what goes wrong with beta cells in diabetes, and how to create insulin-producing cells in culture and how to regenerate and replace beta cells. Tremendous opportunities exist for training in diabetes research across multiple disciplines, from genetics to cell biology to physiology, allowing BC to attract outstanding diabetes research talent to train here. Fantastic new technologies are available as well. For example, we now have mouse models of disease, and tools that enable deep interrogation of single cells from subjects with diabetes.

The newly formed UBC-funded BC Diabetes Research Network (<https://diabetesbc.ca>) promises to bring researchers together from different disciplines at regular meetings, including the annual Vancouver Diabetes Research Day held each fall, and UBC Okanagan Diabetes Research Day. These meetings can be expected

to create new opportunities through the sharing of data and ideas and the spawning of new partnerships and collaborations. Given the prevalence and burden of diabetes in our province, country, and world, it is timely and exciting that BC is now home to this network and is increasingly taking a leadership role in diabetes research on the international stage.

### Summary

The need has never been greater for research into diabetes and new approaches to predict, prevent, and reverse this devastating condition. Fortunately, the rich history of diabetes research in BC that began in the 1960s continues today at Vancouver General Hospital, the UBC Point Grey campus, BC Children's Hospital, and other sites in the province, including UBC Okanagan, the University of Northern British Columbia, and Simon Fraser University. Many notable discoveries have been made by investigators and islet biology has proven to be a particular research strength. With the establishment of the BC Diabetes Research Network, more discoveries and more collaboration can be expected. **BCMJ**

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### Competing interests

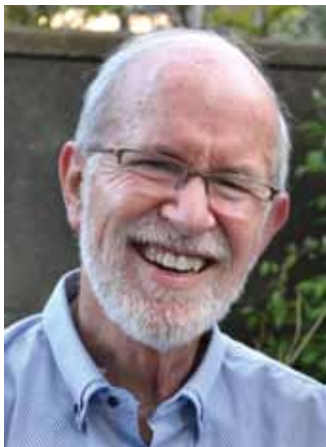
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## Dr Richard Wadge 1946–2018



Dr Richard (Rick) Wadge (UBC class of 1970) practised family medicine in the Surrey/Delta region for 37 years. During his lengthy tenure as a family doctor, Rick was devoted to his patients, providing care in nursing homes, making house calls, and delivering over 1000 babies. His compassion, sense of humor, and ability to focus on an individual gave him a personal touch that endeared him as an exemplary doctor to his many patients. Rick clearly enjoyed his career, which saw him help thousands of people, and often spoke about how fortunate it was to be a physician.

After retiring from office practice, Rick, a clinical associate professor, increased his involvement with the UBC School of Medicine, accepting a teaching position with the university where he taught students how to communicate and how to properly conduct physical and sensitive examinations. Rick enjoyed teaching as much as he loved practising medicine, and many of the qualities that made him such a great doctor made him an equally exceptional teacher. Rick loved working with the patient simulation actors and always spoke of them with the highest praise. He was also the chief examiner for the LMCC.

Rick was happily married to his wife Mavourneen for 50 years and together they were blessed with four children: Jeff (Sara), Patrick (Zan), Joy (Remo), and Chantal (Avassa). His eight grandchildren loved him dearly and he was an amazing “Bompa” to them all.

Rick faced his ALS diagnosis with unflinching courage, and when the time came he exercised his right to die on his own terms, in his own home, with his wife by his side and surrounded by his family.

—Alex Wadge  
Sechelt, BC

## Dr John Daniel Garry 1936–2018



Dr John Daniel Garry had an exciting and rewarding life and career that spanned the world. Dad was born in Kildysart, County Clare, Ireland, on 7 June 1936. He was influenced by the many physicians in his family to study medicine, and he completed his medical studies in 1961 in Dublin at the Royal College of Surgeons in Ireland.

Not being afraid of challenges, he joined the British Army at the height of the Cold War as a physician. He was initially posted to Australia and the Maralinga Nuclear Testing Facility in South Australia. He met his wife, Julie, in Sydney and they were

married at Westminster Cathedral, London, UK, in 1964. He was then posted to the divided city of Berlin, deep inside East Germany. In Berlin, Dad welcomed the birth of a baby girl and boy. The experience of living in Berlin for those years initiated Dad’s love of Germany, its history, people, and culture.

In 1968, John and his family came to Canada, where he would serve as a public health physician starting in Prince George, next in Vancouver, where he obtained his FRCPC at UBC, and then to Kamloops. Harvard University and the United States then beckoned, and he completed a graduate degree in epidemiology at the Harvard School of Public Health.

John’s public health career continued in Vancouver and Richmond. He had a strong sense of public duty and continued his military interest as a physician in the Canadian Army Reserve Force, becoming the commanding officer of the 12th Vancouver Medical Company.

John’s life was very blessed and he enjoyed many adventures and pursuits. He was an avid golfer his entire life. He and Julie traveled often to Germany, elsewhere in Europe, and to Australia to visit family and friends.

Dad declined over the last year of his life. However, he welcomed his granddaughter, Elise, in January 2017. Elise and Dad formed a unique bond and enjoyed each other’s company immensely.

Our adventures with Dad have ended; however, this is just temporary. Mom, Alice, and I can’t wait to continue the journey with him and join him in the future in everlasting life together.

—Benedict M. Garry, MD, CCFP  
Vancouver





**Dr Fred Ceresney  
1927–2018**

Dr Fred Ceresney was born during the Roaring Twenties, graduated from the University of Toronto, and served in the Canadian armed forces as a medical officer before setting up family practice in Langley.

He was attracted to the area by his military compatriot Dr George Neilson, who was the founder of the original Fort Langley practice, where I now work. Fred served his patients in this same area for over 50 years. He saw Langley grow from a small rural agricultural community to the bustling suburban community it is today.

Medical practice in those days was varied, interesting, and fulfilling—the very definition of a patient-centred service. Fred and his colleagues perfected this model years ago, providing availability and services around the clock to their patients.

“Full service” doesn’t begin to describe it. According to Ina, Fred’s wife of 61 years—who answered the phone 24/7 in addition to caring for 10 children—the average day would end with 10 to 15 house calls. This was often followed by an overnight on-call for the hospital. More often than not she would wake to find the space beside her in the bed empty and cold—Fred would be up at emergency, or in the OR, or in the maternity ward. This

was the nature of practice in those days. Fred relished in it, working late into his life, always on top of things, on time, and enthusiastic.

Fred was also a patient of mine, and of our group practice in Fort Langley, for many years. Providing care to a fellow physician is a great privilege, but can also be a great challenge as they may prefer to direct their own care. They may bristle at the reversal of roles. They may be demanding. Or noncompliant. But Fred was none of these things—in fact, it was a remarkable and mutually shared journey. Yes, Fred was the patient (technically), and I was the physician (technically). But, somehow, together, in a spirit of cooperation and teamwork, we navigated the treacherous waters of his declining health in late middle life, and the rapids of his failing health in old age. And, as the list of ailments and diagnoses grew, as was inevitable, so did Fred’s equanimity

and acceptance. He was indefatigably cheerful, always polite, always considerate.

Every encounter ended with the gentle incantation: “Thank you, and God bless.” His demeanor reminded me of the saying, “The true measure of a man is not to be found when the going is easy. Real character emerges when adversity strikes.”

Fred Ceresney was such a man—honorable in his personal life, compassionate and humane in his dealings with people from all walks of life, ethical in his profession, and finally, courageous and graceful in the face of terminal failure and death. His life, and his living of it, is an inspiration to us all, as physicians and as human beings.

—Alister F. Frayne, MD  
Fort Langley

*Adapted from remarks given at the Langley Division of Family Practice AGM, 26 September 2018.*

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## Raccoon latrines and risk of *Baylisascaris* transmission

**L**ike it or not, raccoons are part of our urban landscapes. They can be found eating, sleeping, and defecating in parks, backyards, and other areas where British Columbians live, work, and play. While some may find them cute and others may find them a nuisance, what is certain is that raccoons commonly carry a serious zoonotic pathogen, *Baylisascaris procyonis* or raccoon roundworm. A large percentage (60% to 80%) of BC raccoons harbor this parasite.<sup>1</sup> Although human *Baylisascaris* infections are extremely rare, the clinical repercussions of this larva migrans infection can be very severe or even fatal. This disease is not reportable in BC and the BCCDC is aware of only two cases: one in a 17-month-old boy and another in an elderly woman with Alzheimer disease who was asymptomatic.<sup>2</sup>

Infection with *Baylisascaris* occurs when humans ingest infectious eggs from raccoon feces or from food, water, objects, or soil contaminated with raccoon feces that contain infectious eggs. Globally, cases are most commonly reported in children as they are more likely to have contact with infected raccoon feces, particularly in children with pica or geophagia. Generalized clinical signs and symptoms, which often appear 1 to 4 weeks after infection, can include fatigue, nausea, and fever. Other clinical presentations can take months to years to develop and depend on the migratory pathway of the larva, categorized as neural, ocular, or visceral larva migrans (**Table**).

The prognosis of *Baylisascaris* infection is often not favorable,

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

**Table. Clinical presentations of *Baylisascaris* larval migrans.**

Neural	Ocular	Visceral
<ul style="list-style-type: none"> <li>• Loss of coordination and muscle control</li> <li>• Lethargy</li> <li>• Seizures</li> <li>• Coma</li> </ul>	<ul style="list-style-type: none"> <li>• Visual impairment or blindness (often one-sided)</li> <li>• Photophobia</li> </ul>	<ul style="list-style-type: none"> <li>• Macular rash</li> <li>• Abdominal pain</li> <li>• Hepatomegaly</li> <li>• Pneumonitis</li> </ul>

especially in cases of neural larval migrans. The clinical effects of *Baylisascaris* are more severe than with other parasites that cause larval migrans (e.g., *Toxocara* spp.) because the larva continues to grow in the intermediate host, causing extensive tissue damage and reaction.<sup>3</sup>

Diagnosis of *Baylisascaris* is difficult; consultation with medical microbiology and infectious disease specialists is recommended. Diagnostic results from hematology (e.g., eosinophilia), serology (*Baylisascaris* antibodies), ocular examination, and imaging contribute to a final diagnosis of *Baylisascaris* infection. In addition, microscopy of suspect soil or raccoon feces can be examined for infectious eggs. Early treatment with albendazole has been shown to be effective if given within 3 days of ingestion of the contaminated substance (e.g., raccoon feces, infected soil). Once clinical signs develop, treatment entails a combination of albendazole, corticosteroids, and other supportive therapies depending on the organs that are affected.<sup>3</sup>

Raccoons habitually defecate in the same location as other raccoons residing in the vicinity. Often these latrines, which can be shared by one to six raccoons, are near areas of human activity, such as in backyard woodpiles, around trees or shrubs, or in open structures such as garages, decks, or attics. With the high prevalence of *Baylisascaris procyonis* in raccoons and the millions of eggs that

they can shed in their feces, raccoon latrines represent a health risk to people and their pets. *Baylisascaris* eggs take from 2 to 4 weeks to become infectious and can remain viable in the environment for years.<sup>3</sup>

Prevention strategies include promptly removing latrines from affected properties and deterring raccoons from revisiting, keeping children away from raccoon sites and deterring them from putting their hands in their mouths when playing outside, keeping pets dewormed, and practising effective hand and household hygiene when latrines and raccoons are present.<sup>4</sup>

—Erin Fraser, DVM, MSc  
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## Climate change and infectious disease in Canada and BC

**C**limate change in BC is predicted to bring warmer, rainier winters; drier summers; and more extreme weather events.<sup>1</sup> As a result, interactions between people, the environment, and pathogens will change. Here we review changes to infectious diseases that clinicians may see as a result of climate change.

### Vector-borne diseases

Climate is a key factor in vector distribution and to a lesser extent the occurrence of vector-borne diseases. The incidence of Lyme disease is increasing in Eastern Canada as *Ixodes scapularis*, the tick vector of this disease, expands its range northward into populated regions.<sup>2</sup> In BC, the tick *I. pacificus* is the main carrier of Lyme disease. It is already present in populated regions and is likely to expand into less-populated regions.<sup>3</sup>

Incidence of West Nile virus, the most common mosquito-borne disease in Canada, also may increase in BC with climate change. Levels of mosquitos from the genus *Culex*, which transmit the virus to humans, have been linked to warm winters and warm, wet springs that promote mosquito breeding and feeding.<sup>4</sup> Though incidence of West Nile virus has been low in BC, more frequent weather extremes on the back of a warmer climate may contribute to future outbreaks.<sup>5</sup>

Clinicians are also likely to encounter greater numbers of vector-borne diseases such as Chikungunya,

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

dengue, and Zika in travelers. Though these diseases may not expand their range to BC, they will increase their range into areas that Canadian travelers visit, including the Caribbean, Latin America, and Asia.<sup>2</sup>

**In Canada, outbreaks of *E. coli*, *Campylobacter*, and *Cryptosporidium* have been linked to summer weather, and outbreaks may become more frequent in the future.**

### Enteric diseases

Many enteric diseases are more common in summer, partially due to precipitation. Heavy rainfall, particularly after a drought, can flush a pulse of contaminated material into water supplies. This can be exacerbated by precipitation-related turbidity, which may reduce the effectiveness of water treatment.<sup>6</sup> This may be relevant in BC with climate change predicted to bring heavier fall precipitation following hotter and drier summers. Activities associated with warm weather (e.g., swimming, boating, and communal outdoor eating) also contribute to this seasonal pattern of waterborne illness. In Canada, outbreaks of *E. coli*, *Campylobacter*, and *Cryptosporidium* have been linked to summer weather, and outbreaks may become more frequent in the future.

Enteric pathogens may also grow more widely and rapidly in warmer weather. For example, outbreaks of *Vibrio parahaemolyticus* in BC have been associated with above-average ocean temperatures, which promote growth and proliferation of this pathogen.<sup>7</sup> More frequent outbreaks

of *V. parahaemolyticus* are expected in coming decades.

### Other diseases

Other diseases, such as *Legionellosis*, also peak in warmer months. A warming climate may increase the incidence of *Legionella*-related diseases.

### Recommendations for clinicians

Clinicians should be vigilant for changing patterns of infectious diseases that may be related to extreme weather and climate change. In particular, extreme weather events such as heavy rainfall have been associated with an increased risk of outbreaks of waterborne disease, and other diseases such as *Legionellosis* peak during warm months and may increase as the climate warms. Warmer waters may also increase the risk of infectious diseases from locally harvested shellfish.

Clinicians should be aware of reportable infectious diseases in BC and notify their local medical health officer of any outbreaks or unusual occurrences of disease. Surveillance will be key to understanding the interaction between climate change and infectious diseases.

—David McVea, MD  
 —Ray Copes, MD  
 —Eleni Galanis, MD

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*Microsystems & Nanoengineering.*

**Revamped mental health and substance use website for young people**

The BC Children’s Kelty Mental Health Resource Centre has launched a new website so families and health professionals can more easily find mental health and substance use information and resources to support children and youth.

The website, [keltymentalhealth.ca](http://keltymentalhealth.ca), contains information, tools, and services, including evidence-based supports, created by trusted health experts at BC Children’s Hospital. Kelty also launched a new Instagram account (@keltycentre) to comple-

ment information already provided through Facebook ([www.facebook.com/keltymentalhealth](http://www.facebook.com/keltymentalhealth)) and Twitter (<https://twitter.com/KeltyCentre>), connecting followers to the latest resources and information on mental health and substance use via social media.

In addition to the website, the Kelty Centre offers a variety of services so that children, youth, and families can find the help they need, when they need it, as close to their home communities as possible. This includes peer support services from trained young adults and parents with experience in child and youth mental health, through a collaboration with FamilySmart.



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## GP IN ONCOLOGY CASE STUDY DAY & FP ONCOLOGY CME DAY

**Vancouver, 23–24 Nov (Fri–Sat)**

BC Cancer's Family Practice Oncology Network is presenting two practice-ready CME events for family physicians at BC Cancer's 80th Anniversary Summit, at the Sheraton Vancouver Wall Centre—November 23: GPO (General Practitioner in Oncology) Case Study Day, and November 24: Family Practice Oncology CME Day. GPO Case Study Day provides in-depth exploration of prevalent and emerging challenges in cancer care through case-based discussion, while Family Practice Oncology CME Day provides insight into new developments and practice changing

guidelines in cancer care. Both offer opportunity to build helpful cancer care connections, and are accredited by the College of Family Physicians of Canada for up to 5.75 Mainpro+ credits each. Register today at [bccancersummit.ca](http://bccancersummit.ca). Full details at [fpon.ca](http://fpon.ca) or via [jennifer.wolfe@bccancer.bc.ca](mailto:jennifer.wolfe@bccancer.bc.ca)

## MINDFULNESS IN MEDICINE

**Brentwood Bay, 23–26 Nov (Fri–Mon)**

This foundations experiential workshop introduces the theory and practice of mindfulness and meditation for physicians, nurses, and other allied health professionals. Bringing mindfulness into our lives allows us to build resilience and to find joy and meaning in the work that we do. During this 4-day workshop we will explore the unique challenges of health care; review the clinical and neuroscientific basis of mindfulness; learn formal and informal skills of stress management, self-care, and meditation; and find ways to bring these into our personal and professional lives. This popular 16-hour workshop will take place over 4 half days in Brentwood Bay, leaving lots of opportunity to explore the beauty and recreation of the area. Each workshop is accredited for 16 Mainpro+ group learning credits and has a 30-person limit, so register today! For more information, contact us at [hello@livingthismoment.ca](mailto:hello@livingthismoment.ca), or check out <https://livingthismoment.ca/event/mindfulness-in-health-care-foundations-of-theory-and-practice>.

## CME ON THE RUN

**VGH and various videoconference locations, 30 Nov–10 May (Fri)**

CME on the Run sessions are held at the Paetzold Lecture Theatre, Vancouver General Hospital, and there are opportunities to participate via videoconference from various hospital sites. Each program runs on Friday afternoons from 1 p.m. to 5 p.m. and

includes great speakers and learning materials. Topics and dates: 30 Nov (diagnostics and radiology). Topics include: Cardiac imaging: When and what to order; Imaging modalities in hip pain; Cardiovascular risk screening: What's new; Office assessment of dementia: A practical approach; Interpreting a DEXA scan: What's in the numbers; PSA screening: A debate; Interpreting sex hormone lab values; Choosing wisely: Primary care's most overused lab tests. The next sessions are: 25 Jan (therapeutics); 1 Mar (geriatrics); 12 Apr (gynecology and urology); 10 May (internal medicine). To register and for more information, visit [ubccpd.ca](http://ubccpd.ca), call 604 675-3777; or email [cpd.info@ubc.ca](mailto:cpd.info@ubc.ca).

## GP IN ONCOLOGY TRAINING

**Vancouver, 4–15 Feb 2019 (Mon–Fri)**

The BC Cancer Agency's Family Practice Oncology Network offers an 8-week General Practitioner in Oncology training program beginning with a 2-week introductory session every spring and fall at the Vancouver Centre. This program provides an opportunity for rural family physicians, with the support of their community, to strengthen their oncology skills so that they may provide enhanced care for local cancer patients and their families. Following the introductory session, participants complete a further 30 days of customized clinic experience at the cancer centre where their patients are referred. These can be scheduled flexibly over 6 months. Participants who complete the program are eligible for credits from the College of Family Physicians of Canada. Those who are REAP-eligible receive a stipend and expense coverage through UBC's Enhanced Skills Program. For more information or to apply, visit [www.fpon.ca](http://www.fpon.ca), or contact Jennifer Wolfe at 604 219-9579.

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The College Library provides College registrants access to DynaMed, a point-of-care information tool available online and as a mobile app. DynaMed has clinically organized summaries for more than 3200 topics, including more than 1000 drug summaries from AHFS Drug Information, a source of comparative, unbiased, and evaluative drug information. Drug topics can be searched by generic or brand names. DynaMed's content is updated daily and presented in an easy-to-read bullet format.

Navigating DynaMed for a spe-

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cific disease, condition, or drug topic is easy. On the main page enter a search term into the search box or select from the A-to-Z browse option to

**DynaMed has clinically organized summaries for more than 3200 topics, including more than 1000 drug summaries from AHFS Drug Information**

display topics. The browse option displays a list of subject specialties (e.g., allergic disorders, geriatrics) with related topics subsumed under the specialty heading. The recent-updates tab displays the daily updates made to DynaMed.

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## Online cannabis-related resources for physicians

With the legalization of cannabis use, Doctors of BC has assembled a list of relevant online resources for physicians ([www.doctorsofbc.ca/resource-centre/cannabis-resources-physicians](http://www.doctorsofbc.ca/resource-centre/cannabis-resources-physicians)). The list will be updated as additional items are gathered. If you have suggestions for articles or clinical studies to add to this list, please email them to [communications@doctorsofbc.ca](mailto:communications@doctorsofbc.ca).

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1. Gilsanz V, Gibbons DT, Roe TF, et al. Vertebral bone density in children: Effect of puberty. *Radiology* 2007;166:847-850.  
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2. Mollison PL. *Blood Transfusion in Clinical Medicine*. Oxford, UK: Blackwell Scientific Publications; 2004:178-180.
3. O'Reilly RA. Vitamin K antagonists. In: Colman RW, Hirsh J, Marder VJ, et al. (eds). *Hemostasis and Thrombosis*. Philadelphia, PA: JB Lippincott Co; 2005:1367-1372.
4. Health Canada. *Canadian STD Guidelines*, 2007. [www.hc-sc.gc.ca/hpb/lcdc/publicat/std98/index.html](http://www.hc-sc.gc.ca/hpb/lcdc/publicat/std98/index.html) (accessed 15 July 2018).  
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2. Kim-Sing C, Kutynec C, Harris S, et al. Breast cancer and risk reduction: Diet, physical activity, and chemoprevention. *CMAJ*. In press.

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### back page

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The BCMA was very supportive of our efforts, arranging meetings and mail-outs to encourage growth of the Opt-Out Movement as well as helping physicians who had taken the plunge by paying for their disability insurance, CMPA fees, and CME funding.

The number of opted-out physicians was never large; it involved about 50 doctors in Nanaimo and another 50 across the province out of 8000 province wide. We may have been small in number, but we prevailed in the end because our cause was just. An agreement was reached in August 1993, essentially restoring the original contracts, and was approved by the BCMA membership.

We were proud that the doctors of Nanaimo were at the forefront of a difficult struggle against a government that seemingly had all the weapons but didn't have a principled defence! I remember the united feeling we had about leading the physicians of BC, and I continue to thank my colleagues here for their enthusiasm and support. I won't attempt to mention them all, but will salute my fellow internists and members of the "Nanaimo Seven," namely Drs Kam Bandali, Kevin Lai, Bennett Horner, Marc Trajan, Lawrence Winkler, and Herb Welch. **BCMA**

## Opting out (Nanaimo 1992)

How a small group of Nanaimo doctors were able to exert an outsized influence on the provincial stage.

Paul Mitenko, MD

Physicians in Nanaimo have recently completed a prolonged struggle with a difficult bureaucracy about a poorly designed hospital computer system. Our persistent and perceptive leaders have persuaded the government to remove the most dangerous aspects of this system, those which created real hazards for hospitalized patients. While we worked toward solving this problem, I was reminded of a previous fight against bureaucracy in Nanaimo, and offer this brief history.

The NDP, under Mr Mike Harcourt, was elected to provincial government in late 1991, and initially was welcomed by the BC medical profession because of the new approaches that they seemed to offer to medical care. That enthusiasm was replaced by alarm within the next few months with the introduction of legislation that canceled legal agreements with the medical profession, “extinguished” binding contracts (specifically the previous year’s agreement

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Dr Mitenko is a retired internist, and after having had a satisfying career, he spends his time visiting with friends and family, reading books, experimenting in the kitchen, and catching up on family and personal history.

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*For more Doctors of BC history, see The BCMA, Then and Now: A selected history from 1965 to Doctors of BC by Dr Brad Fritz, available at [www.doctorsofbc.ca/who-we-are/our-history](http://www.doctorsofbc.ca/who-we-are/our-history).*

that established government contributions to retirement savings plans for physicians), seized control of funding arrangements (establishing reimbursement caps and underfunding the health care system), and refused mediation and binding arbitration. The legislation was passed in July 1992 despite concerns and protests by the profession and the then BCMA.

### **The amount of publicity and coverage by the media made opening day a trial.**

Any trust or understanding from the profession was destroyed by the breaking of those legal contracts. Meetings and rallies were held, and in Nanaimo the result was the Opt-Out Movement. With a letter to the provincial government, individual physicians could withdraw from the Medical Services Plan. Since the government had proven to be so intransigent, it was proposed that physicians opt out, bill their patients directly, and ask patients to collect billed fees from MSP. After all, the government was not our master in our practices, but was actually the insurance company for our patients, and responsible to them for compensation via MSP.

Plans were developed, and the first opted-out doctors appeared in

Nanaimo on 11 September 1992. Various dire predictions were made by the then Minister of Health, Ms Elizabeth Cull, and other officials and bureaucrats, but the arrangements we had made in our offices held up well, specifically those that made sure no patient was denied care in the office or at the hospital, and certainly that patients would not be turned down on the basis of their ability to pay.

These plans were put together by physicians and their devoted office staff, and worked incredibly well for the duration of the dispute. Still, the amount of publicity and coverage by the media made opening day a trial, even to the clerk in my office (my wife, Donna) asking a bright young TV reporter, “Will that be cash or Chargex?”

Thus began our great adventure. Our patients proved to be very understanding, and on being acquainted with the fee schedule (we did not charge more than what was listed in the MSP schedule) were amazed at how little their services cost. We became closer to our patients even though we made less money.

Opting out certainly created confusion for the bureaucracy at MSP. I recall one patient who traveled to Victoria to collect on a disputed charge and refused to leave the wicket until she got paid the full amount. Physicians suffered forever with disputed billings, but she got paid that afternoon.

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