

Diagnosis and treatment of ectopic pregnancy

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BCM J

BC Medical Journal

April 2021

Volume 63 | No. 3

Pages 97–144

Demand for naloxone kits has risen in the past months as the number of overdoses has increased due to COVID-19. See the article “History of naloxone kits in BC: From inception to expansion” beginning on page 122.

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.

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

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

Subscribe to print: Email journal@doctorsofbc.ca.

Single issue: \$8.00

Canada per year: \$60.00

Foreign (surface mail): \$75.00

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ON THE COVER

Diagnosis and treatment of ectopic pregnancy

When an embryo is implanted outside the endometrium, it is a medical emergency, but associated maternal mortality has significantly declined over the decades due to earlier diagnosis and treatment.

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ISSN: 0007-0556
Established 1959

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

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History repeating

28 February 2021

As the world moves toward mass vaccination against SARS-CoV-2 in 2021, many unanswered questions remain. Will vaccine administration be mandatory? Will proof of vaccination be required to attend gatherings such as sporting or entertainment events? Will the unvaccinated be allowed to travel? Will life insurance be more costly if an individual refuses the COVID-19 vaccine? And so many more.

In my previous editorial I talked about my postvaccination DNA being altered and making friends with my injected microchip. This tongue-in-cheek discussion of some of the conspiracy theories regarding vaccination against the coronavirus downplays the real fear some individuals have about being immunized. Many think the vaccine was rushed into production and is not safe. Significant numbers of vaccine refusals are likely as people worry about potential adverse health outcomes. Conspiracy theorists have had a field day, and some are staunchly against vaccination as they falsely claim the vaccine was made from aborted fetal tissue. I have even heard of some groups fearing the vaccine will mark you with the sign of the beast (devil), which is based on a biblical chapter in Revelation. These fears, which seem ridiculous to most, are very real to some.

One night, while thinking about all of this, I was unconsciously rubbing my left deltoid when my fingers rubbed against my smallpox scar. Until 1970, babies were routinely immunized against smallpox, leaving us oldies with a mark either on the outside or inside of our upper arms. I wonder if some lessons about mass vaccination might be found in the history of this other terrible virus.

It is estimated that roughly 300 million people died from smallpox in the 20th century. Its case fatality rate was estimated at around 30%.

Contrast that to the COVID-19 mortality rate of around 2% with a current death toll of 2.5 million.

In 1796, British physician Edward Jenner noted that milkmaids who had contracted the milder bovine variant (cowpox) did not become ill with smallpox. He grabbed his gardener's 8-year-old son and scratched

Opposition to smallpox vaccination existed almost as soon as the vaccine was developed.

his upper arm with the contents of a cowpox blister from a milkmaid. A few months later he repeatedly scratched the boy's arm with contents from smallpox blisters and the boy never contracted the disease. As an aside, I do not think this study would receive ethics approval in 2021. Regardless, this groundbreaking work (which was initially rejected by the Royal Society of Physicians) led to the development of a vaccine.

Opposition to smallpox vaccination existed almost as soon as the vaccine was developed. Rationale for this criticism varied and included sanitary, religious, scientific, and political reasons. Some objectors and clergy thought the vaccine was un-Christian because it came from an animal. Some distrusted medicine in general and thought that smallpox was not an infection but that it came from decaying matter in the atmosphere. Some individuals were against vaccination because they thought it violated their personal liberty. Many governments started mandatory smallpox vaccination programs, which just added to the tension.

In Leicester, England, three individuals were jailed for refusing to be vaccinated and this same town had a demonstration march in 1885 with up to 100 000 individuals protesting mandatory vaccination.

Regardless, as the 20th century progressed, a general acceptance of vaccination against smallpox took hold. In North America, the smallpox immunization program was stopped around 1970 as the final recorded case on the continent occurred in 1949. The last known naturally acquired case of smallpox on the planet occurred in 1977 in Somalia. The last death from smallpox occurred in 1978, when a medical photographer working above a research lab in England contracted the disease. Currently, smallpox can be found only in the CDC lab in Atlanta and the State Research Lab in Russia.

I would like to believe that we have learned our historical lesson and that COVID-19 vaccination will go smoothly with general acceptance and wide public uptake, but sadly, history does tend to repeat itself. On that point, let us remember what happened to smallpox—it was eradicated largely due to widespread distribution and uptake of the vaccine. Is it too early to dream of the same outcome for SARS-CoV-2? ■

—David R. Richardson, MD

The gender pay gap in medicine

Gender pay gaps continue to exist in a multitude of professions, and medicine is not immune, as highlighted by a recent *CMAJ* article by Drs Cohen and Kiran.¹ As a female physician and a new mother, I am particularly interested and intrigued in this topic. How can I explain to women who enter medicine in the future that they may be paid less despite doing the same work as men, solely because of their gender? The complexity of this issue and the solutions to it cannot be thoroughly discussed in a few short paragraphs, but I hope to encourage increased awareness and conversations on this topic.

More women are entering medicine than ever before. The entering class of UBC Medicine in 2016 was 53.8% women.² Despite this, implicit gender-based biases still existed throughout my medical school and residency training. I can't count the number of times I have been mistaken for a nurse while the male colleague is assumed to be the doctor. Or how many times I have heard offhand comments about a female colleague who had to miss a day of work to take care of a sick child. Achieving a work-life balance is difficult, so it is not difficult to understand why female physicians may be drawn to certain specialties. Ultimately, we are all free to choose which specialty we pursue, but the gender pay gap is not explained only by the fact that female physicians may be more drawn to lower-paying specialties. The pay gap exists in higher-paying specialties as well.¹

Neither can the gender pay gap be explained by the fact that women work fewer hours than men. This has been backed by studies where, despite adjusting for confounders such as the number of hours worked, age, or years in practice, male physicians still consistently earned more than female physicians.^{3,4} A 2017 study in BC showed that female GPs made 36% less than male GPs, even though they worked

only 3.2 fewer hours per week compared to male GPs.⁵ Others have attributed the pay gap issue to female physicians spending more time with patients in general; therefore, in a fee-for-service model, they may be paid less than their male colleagues overall. But the pay

Despite adjusting for confounders such as the number of hours worked, age, or years in practice, male physicians still consistently earned more than female physicians.

gap exists in other payment models as well, such as in the UK where physicians are salaried.⁶

Current parental leave policies also make it difficult for women taking maternity leave to keep up with office expenses or career advancements, again contributing to the gender pay gap. Women may also spend more time caring for their children or doing household chores, leading to less time for clinical duties. Programs should be put in place to encourage male physicians to take paternity leave as well; the Doctors of BC Parental Leave Program is open to both male and female physicians, but more can still be done.

Solutions to close the gender pay gap are complex. It will require change at many levels. There are several suggestions by Drs Cohen and Kiran, at both the individual and system level, such as advocating for pay transparency, improving parental leave programs, and

encouraging women to take on leadership roles in medicine. I have had many mentors who have shown me that there is nothing too great to achieve, but it starts with listening and perseverance. As more doors open for women in medicine, we should all strive for true equality.

Ultimately, the question we should each be asking ourselves is not whether a gender pay gap exists in medicine, but what can I do to help close it? ■

—Yvonne Sin, MD

References

1. Cohen M, Kiran T. Closing the gender pay gap in Canadian medicine. *CMAJ* 2020;192:E1011-E1017.
2. UBC Faculty of Medicine, MD Undergraduate Program. Statistical data on application and admissions – 2018 (Med 2022). Accessed 1 February 2020. <https://mdprogram.med.ubc.ca/files/2018/10/MED-2022-Admissions-Statistics.pdf>.
3. Jaggi R, Griffith KA, Steward A, et al. Gender differences in the salaries of physician researchers. *JAMA* 2012;307:2410-2417.
4. Apaydin EA, Chen PG, Friedberg MW. Differences in physician income by gender in a multiregion survey. *J Gen Intern Med* 2018;33:1574-1581.
5. Hedden L, Barer ML, McGrail K, et al. In British Columbia, the supply of primary care physicians grew, but their rate of clinical activity declined. *Health Aff (Millwood)* 2017;36:1904-1911.
6. Rimmer A. The gender pay gap: Female doctors still earn a third less than male doctors. *BMJ* 2017;357:j1967.

Letters to the editor We welcome

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Correction to quote attribution

I read the BCMD2B article, “Using the beneficence model as an ethical approach to surgical decision making: A case report,” in the December issue of the *BCMj* [2020:62;380-383,385]. Very timely and useful indeed, but I would like to point out that the dictum “first, do no harm,” belongs to Hippocrates, not to Aristotle, as stated in the article.

—Miguel Lipka, MD, CCFP(EM)

The source of this famous dictum isn't at all clear. A remarkable amount of scholarship exists but none of it is yet conclusive. —ED

The lost art of physical examination

As we rush enthusiastically into the new age of virtual medicine, I am wondering what we are losing. I hear stories of patients receiving a telephoned prescription for penicillin, for a sore throat, unseen and unswabbed. Or for something that “sounds like” bronchitis. Another patient with right upper quadrant discomfort was treated with liver function tests and an ultrasound, but no examination. A tender breast lump? How about mammography plus or minus ultrasound?

I know I'm a dinosaur—a throwback to past generations of family medicine—but I foresee perils. It's not enough for the MOA at the end of the line to ask, “Do think you need an appointment?” Neither the patient nor the MOA should be held responsible to answer that question. I can only hope that most GP offices are finding better ways of dealing with this issue.

—Lorne Walton, MD
Maple Ridge

An updated look at the 16-week window between doses of vaccines in BC for COVID-19

In accordance with new recommendations from the National Advisory Committee on Immunization, British Columbia has extended the interval between first and second doses up to 16 weeks for all currently approved COVID-19 vaccines in Canada.¹ In light of this change—developed to maximize the number of individuals receiving their first doses of the COVID-19 vaccine—we have updated our review of the literature.

Real-world data have emerged from jurisdictions that extended their gap between the first and second doses.^{2,3} The United Kingdom approached vaccination with a planned 12-week dosing gap. In a UK preprint report (not yet peer reviewed), 60% to 70% protection was achieved in adults over the age of 70 after only one dose of either the Pfizer-BioNTech or Oxford-AstraZeneca vaccine.⁴ This protection was sustained up to the maximum follow-up period of 56 and 41 days respectively, albeit with limited numbers at the longer durations. Protection against symptomatic disease was further increased to 85% to 90% following the second dose of Pfizer-BioNTech vaccine.⁵ Among those who were symptomatic, the risk of hospitalization and death was reduced by 44% and 51% respectively, after a single dose of Pfizer-BioNTech, compared to an unvaccinated group.⁴ These data are encouraging when you consider that the UK variant (VOC 202012/01) was dominant during the study period.

A single vaccine dose clearly reduces COVID-19 infection, hospitalization, and death.

There are also multiple reports confirming what was seen in clinical trials: protection begins around 2 weeks after dose 1 and is sustained thereafter for the duration studied.^{5,6} Encouragingly, asymptomatic disease and viral loads also appear to be reduced after the first vaccination dose.⁵ However, given that less than 4 months have passed since the vaccine was approved in any jurisdiction, longer-term data are not yet available. While there is biologic plausibility to surmise that these novel vaccines might provide months of protection like other protein-antigen based vaccines (e.g., HPV),^{7,8} preprint data from Scotland show higher vaccine efficacy at day 28 to 34 compared to day 35 to 42 following a single dose of Pfizer-BioNTech or Oxford-AstraZeneca.⁹

The significance of this, or whether there is a further decline in immunity beyond day 42, is not yet known.

A single vaccine dose clearly reduces COVID-19 infection, hospitalization, and death. When supplied to a wide enough population, transmission is also curtailed.⁵ Although there is a lack of data to directly support a 16-week gap compared to shorter intervals, in the current setting of vaccine scarcity, it appears reasonable to accept the risk of an extended dosing interval in order to more rapidly provide protection to a greater proportion of the population. Vigilance will be key in determining whether this practice can continue safely while vaccine supply is limited; if the extended gap is found to put those waiting for dose 2 at excessive risk, then a shorter interval would need to be reconsidered.

—Tonia Tauh, MD, FRCPC

—Michelle Mozel, MSc

—Paula Meyler, MD, FRCPC

—Susan M. Lee, MAS, MD, FRCPC

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References

1. Government of Canada. NACI rapid response: Extended dose intervals for COVID-19 vaccines to optimize early vaccine rollout and population protection in Canada. Accessed 3 March 2021. www.canada.ca/en/public-health/services/immunization/national-advisory-committee-on-immunization-naci/rapid-response-extended-dose-intervals-covid-19-vaccines-early-rollout-population-protection.html.
2. BCCDC. Early findings show the first vaccine dose reduced the risk of COVID-19 by 80 per cent or more. Accessed Mar 3, 2021. www.bccdc.ca/about/news-stories/news-releases/2021/early-findings-show-the-first-vaccine-dose-reduced-the-risk-of-covid-19-by-80-per-cent-or-more.
3. Joint Committee on Vaccination and Immunisation (UK). Optimising the COVID-19 vaccination programme for maximum short-term impact. Accessed 3 March 2021. <https://app.box.com/s/uwwn2dv4o2d0ena726gf4403f3p2acnu>.
4. Bernal JL, Andrews N, Gower C, et al. Early effectiveness of COVID-19 vaccination with BNT162b2 mRNA vaccine and ChAdoX1 adenovirus vector vaccine on symptomatic disease, hospitalisations and mortality in older adults in England. medRxiv. Accessed 3 March 2021. www.medrxiv.org/content/10.1101/2021.03.01.21252652v1.
5. Weekes M, Jones NK, Rivett L, et al. Single-dose BNT162b2 vaccine protects against asymptomatic SARS-CoV-2 infection. Authorea. Accessed 3 March 2021. www.authorea.com/users/332778/articles/509881.
6. Dagan N, Barda N, Kepten E, et al. BCT162b2 mRNA Covid-19 vaccine in a nationwide mass vaccination setting. NEJM 2021. doi: 10.1056/NEJMoa2101765.
7. British Society for Immunology. British Society for Immunology statement on COVID-19 vaccine dosing schedules. Accessed 3 March 2021. www.immunology.org/policy-and-public-affairs/briefings-and-position-statements/covid-19-vaccine-dosing-schedules.
8. Kreimer AR, Sampson JN, Porras C, et al. Evaluation of durability of a single dose of the bivalent HPV vaccine: The CVT Trial. J Natl Cancer Inst 2020;112:1038-1046.
9. Vasileiou E, Simpson CR, Robertson C, et al. Effectiveness of first dose of COVID-19 vaccines against hospital admissions in Scotland: National prospective cohort study of 5.4 million people. Accessed 4 March 2021. www.ed.ac.uk/files/atoms/files/scotland_firstvaccine_data_preprint.pdf.

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On the nature of being a professional

Over the years, I've been given a lot of advice about what it means to look and act like a professional. From what I can gather, the ideal doctor is a stoic, dispassionate professional, dressed in business attire (or scrubs or a white lab coat), who demonstrates no particular social or cultural inclination. In a word, a professional doctor is neutral. There seems to be a list of dos and don'ts to get us here; however, the don'ts stand out most in my mind:

- Don't dress too casually.
- Don't let patients call you by your first name.
- Don't show too much emotion.
- Don't reveal anything about yourself.
- Don't be too funny, or too irreverent, or too opinionated.

But what I discovered is that the idea of neutral isn't so neutral at all. Rather, this ideal seems to be a very specific mode of dress, behaviors, and beliefs that may work for some but not all. If you're in doubt, ask an Indigenous person, an LGBTQ2S+ person, a person of color, a person who has lost their job during the pandemic, a person who is suffering from a substance use disorder, a person who has a hidden trauma that they need to share, or any number of other neighbors, friends, and colleagues.

In my clinical work with children, adolescents, and families (I see and talk to adults as much as I do kids!), I've challenged this neutral image in a number of ways:

- I show up to clinic in loud T-shirts and jeans.
- My patients call me by my first name all the time.
- I am visibly moved when someone tells me about something unjust that has happened to them.

- I openly share my personal history, my own experience of illness, and my hopes and fears. Worst of all, I tell jokes (even dad jokes), do unexpected things at surprising moments, and share my strong opinions about a lot of issues.

What's important is to be authentic, to be proud of your identity, and to demonstrate your humanity.

So, what have I found?

I am often one of the first people that an LGBTQ2S+ person comes out to. I am far too often the first person who learns that a teenager has been date-raped. People break down and tell me about old traumas. People tell me their stories of the racism, sexism, homophobia, and overall bigotry and injustice they experience every day. I know I am making a difference because my MOA swears that some of the angriest and most belligerent patients walk out of my office smiling.

Now, I don't follow this approach for all situations. What works in my clinical setting won't work in all settings, just as what works for one patient doesn't work for another. I also certainly take great care when considering how I come across in my role as president of Doctors of BC.

However, my point is that we all have different contexts within which we should examine what it means to be professional. There isn't a single meaning that fits every doctor—what's important is to be authentic, to be proud of your identity, and to demonstrate your humanity,

because in doing so we demonstrate to our patients that it's okay for them to do the same.

I began with a list of don'ts, and I will end with a list of dos:

- Do be willing to learn.
- Do be willing to ask people what they prefer from you, which may not be what you were taught.
- Do honor your culture, your history, and your customs, and do the same for your patients.
- Do show care for your patients, or indeed any other human being, in whatever way is most natural for you.
- Most importantly, do be human. ■

—Matthew C. Chow, MD
Doctors of BC President

Jennifer Laidlaw, MD, FRCPC, Leanne Lange, MPA, Erin Henthorne, MSW, RSW

Management of vulnerable adult patients seeking to leave hospital: Understanding and using relevant legislation

A clinical case of a patient suffering from medical illness, mental disorder, and self-neglect highlights which legislation doctors should follow when balancing the need to preserve patient autonomy and protect vulnerable patients by keeping them in hospital.

ABSTRACT: British Columbia has three pieces of legislation that are relevant to the protection and treatment of vulnerable adults who require hospitalization but decline to stay voluntarily: the Health Care (Consent) and Care Facility (Admission) Act (HCCCFAA), Mental Health Act (MHA), and Adult Guardianship Act (AGA). Patients may require hospitalization for multiple reasons, in which case more than one piece of legislation may be used simultaneously. However, physicians are often uncertain about when and how to exercise the appropriate legislation, what the legislation actually permits, and what documentation is required. To our knowledge, there currently are no publications regarding how these three acts intersect as related to the hospitalization of vulnerable individuals. Compounding this problem are gaps in the legislation that can predispose health care providers to inap-

propriately use the Mental Health Act, which is being increasingly scrutinized following a report by the BC Office of the Ombudsperson.

The HCCCFAA is applicable when hospitalization is required for treatment of medical illness. Adult patients who are capable of making a decision about receiving health care can either consent to or refuse treatment. Management of patients who are incapable of making a decision regarding their medical treatment may be treated in an emergency, including ongoing hospitalization, if a substitute decision-maker is not available to provide consent. In nonemergency settings, consent from a temporary substitute decision-maker must be obtained.

The MHA applies to cases where a person with mental illness would pose significant risks if their mental health disorders were left untreated. The MHA authorizes involuntary psychiatric treatment only. Currently, certified patients, even those who are capable of making their own treatment decisions, cannot refuse psychiatric treatment proposed by the treating physician.

The AGA applies to patients 19 years or older who appear to be experiencing abuse, neglect, or self-neglect and are suspected of not being able to seek support and assistance. The AGA allows for involuntary short-term hospitalization while an investigation and safety planning are being conducted. If risk of abuse, neglect, or

self-neglect as well as the inability to seek support and assistance is proven, a support and assistance plan can be put in place following discharge from hospital to help mitigate risk.

In the general hospital setting, patients often wish to leave hospital before doctors and other health care providers feel it is safe to discharge them. There can be multiple reasons for this, such as the patient requiring ongoing treatment of a medical illness or psychiatric treatment of a mental disorder, or they are at risk of abuse, neglect, or self-neglect due to their social circumstances. Balancing the often competing interests of protecting vulnerable patients and preserving patient autonomy can leave physicians unsure of the most appropriate course of action. To identify which piece of legislation is most relevant, it can be helpful to start with the question: *Why does the patient require ongoing hospitalization [see the Figure]?* Patients may require hospitalization for multiple reasons, in which case more than one piece of legislation may be used simultaneously.

A clinical case

Ms Safe* is a 55-year-old single female who lives alone and is a T6 paraplegic from a motor vehicle accident. She has chronic ischial wounds

Dr Laidlaw is a clinical assistant professor in the Faculty of Medicine, Department of Psychiatry, University of British Columbia and a consultation liaison psychiatrist at BC Cancer. Ms Lange is the Fraser Health clinical specialist for adult abuse and neglect. Ms Henthorne is the clinical practice leader for social work at Surrey Memorial Hospital.

This article has been peer reviewed.

**Ms Safe is a fictional composite patient.*

that have necessitated previous hospital admissions for 6 weeks of IV antibiotic treatment. She now requires daily wound care from home health nursing staff and regular offloading to avoid a recurrence of osteomyelitis. However, she is often not compliant with offloading, and she removes the wound dressings.

Ms Safe is brought to hospital by ambulance after her wound care nurse calls 911, saying that “the wound is down to the bone.” The ambulance report indicates that Ms Safe has refused to come to hospital for several weeks. An infectious disease specialist confirms she requires another 6 weeks of IV antibiotics for treatment of osteomyelitis. Ms Safe tells the hospitalist she wants to leave hospital, so the hospitalist asks a psychiatrist for a second opinion regarding her capacity.

Both the treating hospitalist and consulting psychiatrist find Ms Safe incapable of consenting to ongoing hospitalization and IV antibiotics because she says she will “be fine” without further medical treatment. Ms Safe is held in hospital and treated for her medical illness under the Health Care (Consent) and Care Facility (Admission) Act (HCCCFAA), given her incapacity, emergent nature of needing treatment, and lack of available temporary substitute decision-maker. Eventually, temporary substitute decision-maker consent is obtained from the Public Guardian and Trustee.

Several days later, Ms Safe complains that nurses are putting a chip under her skin that is being used to track her, which is why she removes her dressings. A chart review reveals that Ms Safe was trialed on risperidone during

her most recent hospitalization for osteomyelitis but that she did not take the antipsychotic following discharge. Ms Safe is currently refusing oral antipsychotics.

Ms Safe is certified under the Mental Health Act (MHA) and treated with oral risperidone for 1 month before she is switched to a depot intramuscular formulation of risperidone, given her history of noncompliance. She is released on extended leave to ensure compliance with psychiatric treatment in the community. Ms Safe’s psychosis remits with risperidone treatment, and she no longer removes her bandages. However, she is still noncompliant with offloading and has another recurrence of osteomyelitis that requires readmission to hospital 1 month after discharge. Readmission is again prompted by wound care nurses calling 911.

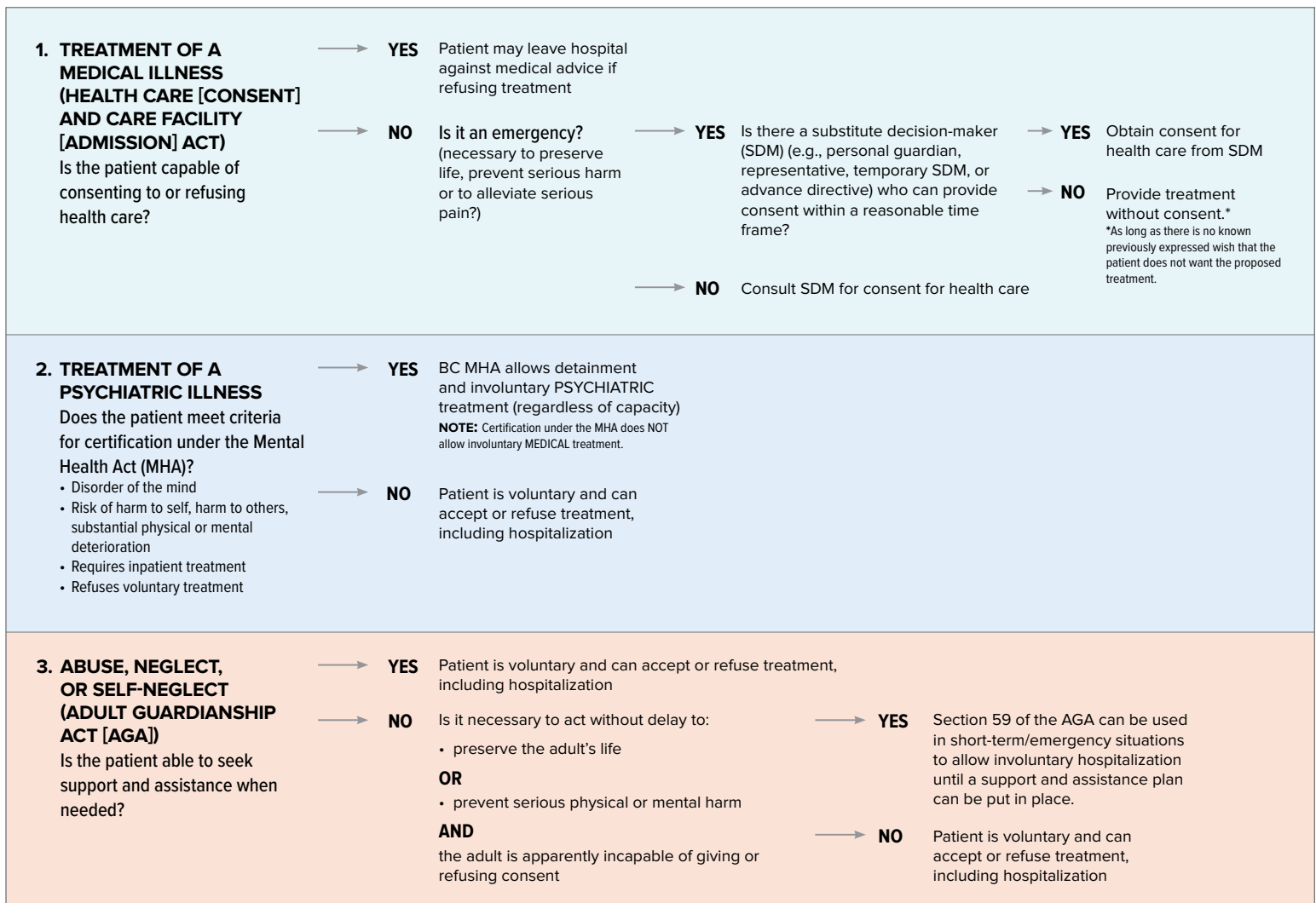


FIGURE. Reasons for hospitalization.

After further investigation by a social worker, it is determined that Ms Safe meets criteria for Section 59 of the Adult Guardianship Act (AGA) because of self-neglect, and she is held in hospital for 1 week after her IV antibiotic treatment has been completed to allow a support and assistance plan (SAP) to be put in place. The SAP includes home care nursing support four times a day to encourage offloading, regular wound care, and help with personal hygiene. Home health nursing staff and community social workers monitor Ms Safe's compliance with the SAP. Ms Safe has not presented to hospital for 6 months since the time of her last discharge, which is significantly longer than the interval between her last three visits to hospital.

Health Care (Consent) and Care Facility (Admission) Act

When does the HCCCFAA apply?

The HCCCFAA applies to all health care for adults 19 years and older. "Health care" is defined as "anything that is done for a therapeutic, preventative, palliative, diagnostic, cosmetic, or other purpose related to health."¹ Hospitalization for the purposes of providing health care is part of the health care treatment plan and can either be consented to or refused by patients who are capable of making this decision. In the case of Ms Safe, the HCCCFAA was the first applicable legislation because the initial indication for hospitalization was medical treatment.

All patients who are capable of providing consent for health care must do so before treatment can be delivered, unless it is an emergency.² Capacity to consent is specific to the treatment being proposed and must be assessed by the physician who is proposing treatment. However, as the Canadian Medical Protective Association advises, any physician who is uncertain whether a patient has the capacity necessary to provide consent in a nonemergency situation may wish to obtain a second opinion from a colleague.³ Often psychiatrists are called upon to provide a second opinion.

What does the HCCCFAA permit?

If a patient is capable of refusing treatment, including ongoing hospitalization, they may leave hospital against medical advice. However,

if the patient is incapable of refusing treatment, further management hinges on whether the treatment is considered an emergency. Emergencies are defined as anything that is "necessary to preserve life, prevent serious harm or to alleviate serious pain,"¹ and requires clinical judgment by the treating physician. In the event of an emergency where the patient has not previously expressed wishes declining consent for a related intervention, the physician may

Capacity to consent is specific to the treatment being proposed and must be assessed by the physician who is proposing treatment.

provide emergency health care treatment, including ongoing hospitalization, if a substitute decision-maker is not available to provide consent. In the case of Ms Safe, she was incapable of providing consent and wanted to leave the emergency room immediately. Given her risk of serious harm without treatment, she was kept in hospital under the emergency provisions of the HCCCFAA until a suitable and available substitute decision-maker could be located.

In the absence of an advance directive, substitute decision-makers are selected according to a hierarchy outlined in the HCCCFAA. The highest ranking substitute decision-maker is the personal guardian (committee of the person), who is appointed by a judge under the Patients Property Act. The next highest ranking substitute decision-maker is a representative, who is appointed under the Representation Agreement Act. Health care providers should ask to see the court order appointing the committee, or the representation agreement, before obtaining substitute consent, particularly because there are different scopes of a representative's authority.² However, in most cases, patients who are incapable of providing consent for nonemergency treatment require consent from a temporary

substitute decision-maker, as outlined in the hierarchy of the HCCCFAA.¹ The temporary substitute decision-maker is often not the same as the next of kin or contact person listed on the hospital chart. For individuals who do not have a suitable temporary substitute decision-maker, the office of the Public Guardian and Trustee can be reached during regular business hours to obtain substitute consent for nonemergency health care. Hospital social workers are often called upon to help identify a temporary substitute decision-maker because they are familiar with the selection hierarchy and the requirements of the decision-maker.

Patients should be verbally notified by the physician about the finding of incapacity to make a treatment decision, but currently there is no formal process for patients in BC to appeal that finding.

What does the HCCCFAA not include?

The HCCCFAA does not include involuntary psychiatric treatment for patients admitted to hospital under the MHA. It also does not address treatment or other control measures of reportable communicable diseases, regardless of patient capacity, in accordance with the Public Health Act: Health Act Communicable Disease Regulation.⁴

What is required for HCCCFAA documentation?

No specific form is required for use of the HCCCFAA. If a physician deems a patient incapable of making a medical treatment decision, they must document their opinion, along with brief reasons, in the patient's chart. In the case of Ms Safe, she was documented as incapable because she failed to appreciate the foreseeable consequences of declining treatment—she said she would "be fine," despite a substantial risk of worsening infection, sepsis, and death without treatment. Physicians must also document who has provided consent for treatment in nonemergency situations—either the patient, or a substitute decision-maker for incapable patients. While not required under the HCCCFAA, it is common practice to document this on a health authority consent form, especially for major health care treatment such as surgery, dialysis, or use of blood products.

Mental Health Act

When does the MHA apply?

The MHA, as outlined in Section 22, applies to patients who meet all four of the following criteria:⁵

- Is suffering from a disorder of the mind that seriously impairs the person's ability to react appropriately to their environment or to associate with others.
- Requires psychiatric treatment in or through a designated facility.
- Requires care, supervision, and control in or through a designated facility to prevent the person's substantial mental or physical deterioration or for the protection of self or others.
- Is unsuitable to be a voluntary patient.

The MHA is meant to allow involuntary psychiatric treatment of persons with mental illness who would pose significant risks if their mental health disorder was left untreated.⁶ In the case of Ms Safe, she met the criteria because she had a psychotic disorder, required treatment in a hospital, was at risk of physical deterioration because she was interfering with her wound care, and was not cooperative with voluntary psychiatric treatment.

What does the MHA permit?

The MHA allows for involuntary psychiatric treatment, defined as "safe and effective psychiatric treatment and includes any procedure necessarily related to the provision of psychiatric treatment."⁷ Examples of psychiatric treatment include use of antidepressants, antipsychotics, and mood stabilizers, while an example of an associated procedure is the monitoring of complete blood counts for patients receiving clozapine. Currently, certified patients, even those who are capable of making their own treatment decisions, cannot refuse psychiatric treatment proposed by the treating physician.

The MHA also allows for the extension of the terms of certification upon discharge under extended leave for patients who have poor insight or a history of treatment noncompliance. Extended leave stipulates that if patients do not comply with psychiatric treatment in the community, they can be recalled to hospital for further assessment and treatment. Extended leave enforcement is typically monitored by

a community psychiatrist, together with case managers.

Patients must be notified of their rights under the MHA, which include provision of a second opinion regarding treatment and assessment by a review panel regarding the appropriateness of ongoing involuntary hospitalization. Review panel meetings must occur within 14 days of the request for first certification, and the panel is composed of a lawyer, psychiatrist, and member of the general public.⁷

**The MHA authorizes
involuntary psychiatric
treatment only—
treatment of medical
illness is addressed
under the HCCCFAA.**

What does the MHA not include?

The MHA authorizes involuntary psychiatric treatment only—treatment of medical illness is addressed under the HCCCFAA. In the case of Ms Safe, certification under the MHA permits involuntary antipsychotic administration but does not address consent for her IV antibiotics, which is covered by the HCCCFAA. The importance of this distinction is highlighted in recommendation 5 of the BC Ombudsperson Special Report No. 42, *Committed to Change: Protecting the Rights of Involuntary Patients under the Mental Health Act*.⁸

What is required for MHA documentation?

Certification under the MHA requires completion of a Form 4: Medical Certificate (Involuntary Admission). The first Form 4 detains an individual for 48 hours; a second Form 4 extends the certification to 1 month. Each Form 4 must be completed by different physicians with an independent licence, but the forms do not need to be completed by a psychiatrist.⁷ Extensions of certification require completion of a Form 6: Medical Report on Examination of Involuntary Patient (Renewal Certificate),

which lasts 1 month, then 3 months, then 6 months for each subsequent renewal. A Form 5: Consent for Treatment (Involuntary Patient) must also be signed by the physician who proposes psychiatric treatment prior to treatment commencing. Several other forms require completion for involuntary admission of a patient, including Forms 13, 15, and 16, which are typically completed by psychiatric nurses on psychiatric inpatient units. Copies of all applicable MHA forms are provided in Appendix 16 of the *Guide to the Mental Health Act, 2005 edition*.⁷

Adult Guardianship Act

When does the AGA apply?

The AGA applies to all patients 19 years or older when a report is received or it appears that an adult is experiencing abuse, neglect, or self-neglect and is suspected of not being able to seek support and assistance or is determined as not being able to do so. The inability to seek support and assistance can be due to an illness, disease, injury, or other condition that affects the person's ability to make decisions about the abuse, neglect, or self-neglect.⁹ AGA assessments and investigations are conducted by designated responders. It should be clarified who fulfills the role of designated responder in your local setting, but it is most commonly hospital social workers. Physicians play a key role in communicating with designated responders regarding these concerns so that AGA investigations can occur.

Section 59 of the AGA, which authorizes the provision of emergency assistance, is much like the MHA equivalent of certification. For patients who are apparently unable to seek support and assistance when needed, to invoke Section 59 all three criteria must be satisfied:

- The adult is apparently abused, neglected, or self-neglected.
- There is risk to life, or physical/mental harm, or property damage or loss.
- The adult is apparently incapable of providing or refusing consent.

Ms Safe was not seeking support and assistance when needed, since the wound care nurses had to call 911 in order for her to go to hospital for appropriate care. Ms Safe met all three criteria because she appeared to be

self-neglecting, as evidenced by the fact that she was not complying with offloading, which led to repeated recurrences of osteomyelitis. She was also at risk of serious physical harm and was incapable of providing consent for treatment.

What does the AGA permit?

Designated responders investigate allegations of abuse, neglect, or self-neglect. If criteria for Section 59 are met, this allows:

- Involuntary hospitalization on a short-term basis while investigation and safety planning are underway.
- If risk of abuse, neglect, or self-neglect as well as the inability to seek support and assistance are proven, a support and assistance plan can be developed and put in place following discharge from hospital to help mitigate the applicable risks.

A support and assistance plan specifies any services required by the patient, including “health care, accommodation, social, legal, or financial services.”⁹ Vulnerable adults are not compelled to accept the plan unless a court order is obtained, which is costly and thus obtained infrequently.⁶ However, in clinical practice, collaboration with the adult and other associated parties can often result in implementation of a support and assistance plan.

Designated responders must advise patients of their right to obtain legal counsel, but there is no formal review panel similar to the MHA review panel process. Patients can go to court to challenge their involuntary status under Section 59 of the AGA.

For Ms Safe, her hospital stay was extended briefly under Section 59 of the AGA before she was released with a support and assistance plan. A court order was not obtained to compel her to accept the terms, but she was largely cooperative. In future, if Ms Safe does not comply with the terms of the support and assistance plan and is self-neglecting again, she could be brought back to hospital under Section 59 of the AGA, ideally before her condition has deteriorated so significantly that she requires another 6-week course of antibiotics.

What does the AGA not include?

Perhaps in contrast to the MHA, the AGA requires that the least intrusive, most effective

measures be taken to mitigate risk. This typically requires some attempts at managing patients in the community with maximal supports before placing them in long-term care facilities. Section 59.2 states that the designated agency (i.e., health authority) may “provide the adult with emergency health care;” however, in our clinical practice, the HCCCFAA is still used for this purpose.

Section 59 of the AGA, which authorizes the provision of emergency assistance, is much like the MHA equivalent of certification.

What is required for AGA documentation?

Documentation of a Section 59 or an AGA investigation is completed by the designated responder; therefore, the exact format may differ by health authority. When a patient is being held in hospital under Section 59 of the AGA, a form called Adult Guardianship Act Certificate of Emergency Assistance is used by most designated agencies and, like the Form 4 for the MHA, should be located centrally in the patient’s chart.

Recently, a Supreme Court of British Columbia case investigated the protracted involuntary detention of a vulnerable adult in hospital under Section 59(2)(e) of the AGA.¹⁰ This case highlighted that Section 59 is meant to be used as an “emergency measure” and that any detained patients should be notified of their reasons for detainment and have the ability to contact a lawyer. In most health authorities in BC, it is considered best practice to ensure the vulnerable adult is reassessed every 5 days to determine that they still meet criteria for detainment under Section 59.

Discussion

Challenges to appropriate use of existing legislation

While legislation is clear that the HCCCFAA should be used for incapable adults who require hospitalization for medical treatment,

inappropriate use of the MHA for this purpose does occur and is likely multifactorial. Our experience in educating health care providers on this topic has indicated that there is a general lack of knowledge and comfort among physicians regarding use of the emergency provisions under the HCCCFAA for treatment of incapable patients requiring medical treatment. Also, the HCCCFAA does not have a universally recognized equivalent of the MHA Form 4 that documents a patient’s incapacity and that either a substitute decision-maker has consented or emergency conditions are satisfied. The absence of a universally recognized form can create anxiety and uncertainty about whether detainment and treatment of an incapable patient is lawful, especially among non-physician health care providers. However, health authorities may have appropriate forms that can be used for this purpose. We propose that having a universally recognized form in BC to document incapacity and appoint a substitute decision-maker may also be beneficial.

Another barrier to using the HCCCFAA appropriately is uncertainty regarding levels of observation of incapable patients who pose a flight risk from open units. Should these patients be treated the same as those certified under the MHA? Strictly speaking, police do not have jurisdiction under the HCCCFAA to bring eloped patients back to hospital, as they do under Section 28 of the MHA. Hospital staff have also expressed concern that security will not assist in the detainment of patients who are not certified under the MHA. At our institution, security staff are instructed to follow clinical direction from health care providers and are not to rely on certification status alone to determine which patients should be detained. Suggestions for improvement include developing institutional policies for managing incapable patients who require medical treatment, including guidance on levels of observation and ensuring that patient capacity to consent to treatment is reassessed regularly given that patient capacity can fluctuate.¹¹

Challenges to using the AGA in practice include physicians’ lack of awareness of the legislation. Since AGA investigations are completed by designated responders who are typically not physicians, clear and collaborative

communication between physicians and designated responders is required to ensure all relevant information regarding risk is adequately communicated. In our experience, communication is best conducted directly in face-to-face meetings or by phone to ensure important details or nuances are not missed. Additionally, there is limited ability to apply for a court order to force compliance with support and assistance plans by uncooperative individuals or in cases of extreme risk that require quite intrusive measures to prevent imminent harm. With the results of a recent Supreme Court challenge,¹⁰ there is increased scrutiny regarding the appropriate use of Section 59, which may make some designated responders less inclined to invoke emergency measures. Finally, police are largely unfamiliar with the AGA and may be reluctant to bring eloped AGA patients back to hospital, despite legislation stating that designated responders are authorized to use any reasonable force to return patients to a safe place.

Despite the challenges discussed above, having increased knowledge of applicable legislation [see the Figure] can help physicians and health care providers ask pertinent questions to determine if the HCCCFAA, MHA, or AGA can be enacted to keep vulnerable patients in hospital. The HCCCFAA should be used when patients require hospitalization for medical treatment and the MHA when involuntary psychiatric treatment is required, and patients meet criteria for certification. While enactment of the AGA is outside the scope of

most physicians, knowing that it exists, when it is applicable, and the importance of collaborating with designated responders can ensure risks with regard to abuse, neglect, or self-neglect

There is a general lack of knowledge and comfort among physicians regarding use of the emergency provisions under the HCCCFAA for treatment of incapable patients requiring medical treatment.

are best mitigated by Section 59, either during hospitalization or with a support and assistance plan following discharge. ■

Competing interests

None declared.

References

1. Province of British Columbia. Health Care (Consent) and Care Facility (Admission) Act. Victoria, BC: Queen's Printers; 2020. Accessed 25 August 2020. www.bclaws.ca/civix/document/id/complete/statreg/96181_01.
2. BC Ministry of Health. Health care providers' guide to consent to health care. Victoria, BC; 2011. Accessed 25 August 2020. www.health.gov.bc.ca/library/publications/year/2011/health-care-providers%27-guide-to-consent-to-health-care.pdf.

3. Canadian Medical Protective Association. Is this patient capable of consenting? Ottawa, ON; 2016. Accessed 25 August 2020. www.cmpa-acpm.ca/en/advice-publications/browse-articles/2011/is-this-patient-capable-of-consenting.
4. Province of British Columbia. Public Health Act: Health Act Communicable Disease Regulation. Victoria, BC; 2013. Accessed 25 August 2020. www.bclaws.gov.bc.ca/civix/document/id/loo102/loo102/12_4_83.
5. Province of British Columbia. Mental Health Act. Victoria, BC; 2020. Accessed 25 August 2020. www.bclaws.ca/civix/document/id/complete/statreg/96288_01#section1.
6. Marshall J, Cotterell D, Chan P, et al. Protection of the vulnerable older adult: A review of the legislation, relevant case law, and common clinical practice. *BCM J* 2017;59:356-361.
7. BC Ministry of Health. Guide to the Mental Health Act, 2005 edition. Victoria, BC; 2005. Accessed 25 August 2020. www.health.gov.bc.ca/library/publications/year/2005/MentalHealthGuide.pdf.
8. Province of British Columbia. Office of the Ombudsman. Committed to change: Protecting the rights of involuntary patients under the Mental Health Act. Special Report No. 42. Victoria, BC; 2019. Accessed 25 August 2020. <https://bcombudsperson.ca/assets/media/OMB-Committed-to-Change-FINAL-web.pdf>.
9. Province of British Columbia. Adult Guardianship Act. Victoria, BC; 2020. Accessed 25 August 2020. www.bclaws.ca/civix/document/id/complete/statreg/96006_01.
10. Supreme Court of British Columbia. A.H. v. Fraser Health Authority, 2019 BCSC 227. Accessed 25 August 2020. www.bccourts.ca/jdb-txt/sc/19/02/2019BCSC0227cor1.htm.
11. Heldt J, Zito M, Seroussi A, et al. A medical incapacity hold policy reduces inappropriate use of involuntary psychiatric holds while protecting patients from harm. *Psychosomatics* 2019;60:37-46.

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Diagnosis and treatment of ectopic pregnancy


Early diagnosis of ectopic pregnancy is critical to reducing maternal mortality and improving treatment success rates, especially since many women have no identifiable risk factors.

ABSTRACT: Ectopic pregnancy refers to implantation of an embryo outside the endometrium. It is a medical emergency, but associated maternal mortality has significantly declined over the decades due to earlier diagnosis and treatment. Timely detection of ectopic pregnancy is contingent on having a high index of suspicion in all women of reproductive age, identifying patient risk factors, and then performing appropriate laboratory testing and imaging. Expectant management is less commonly used than medical management, which is preferred for asymptomatic, vitally stable women who wish to avoid surgery. Minimally invasive surgery is the gold standard for management of unstable or ruptured ectopic pregnancy. Recent data favor salpingectomy for women with a healthy contralateral tube because it has higher treatment success and does not appear to reduce future fertility compared to salpingotomy. However, salpingotomy is suggested for women with a dysfunctional or absent contralateral tube, or those who elect to preserve both tubes and accept the increased risk of treatment failure. Knowledge of the risks and benefits of each treatment option is critical for delivering patient-centred care.

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This article has been peer reviewed.

DIAGNOSIS + TREATMENT OF ECTOPIC PREGNANCY




Ectopic pregnancy refers to implantation of an embryo outside the endometrium. It is a medical emergency for which the associated mortality has significantly reduced over the decades due to earlier diagnosis and treatment.


TIMELY DETECTION IS CONTINGENT ON:

1. 

Having a high index of suspicion in all women of reproductive age

2. 

Identifying patient risk factors


3. 

Performing appropriate laboratory testing + imaging

Minimally invasive surgery is the gold standard for management of unstable or ruptured ectopic pregnancy.

Recent data favors salpingectomy for women with a healthy contralateral tube, as it has higher treatment success and does not appear to reduce future fertility compared to salpingotomy.

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BCMJ 2021; 63:3 112–116



Ectopic pregnancy occurs when a developing embryo implants at a site other than the endometrium of the uterine cavity, most commonly within the fallopian tube. Although the incidence of ectopic pregnancy is estimated to be approximately 2% of all pregnancies, it is one of the most common gynecologic emergencies encountered by community physicians.¹ Ruptured ectopic pregnancy can lead to severe hemorrhage and is a significant cause of pregnancy-related maternal mortality in the first trimester.² Thus, timely diagnosis of ectopic pregnancy is essential to prevent maternal mortality and improve treatment outcomes.

Maternal mortality related to ectopic pregnancy has plummeted over the last two decades due to the availability of quantitative beta-human chorionic gonadotropin (b-hCG) testing, transvaginal ultrasound, and laparoscopy, which allow for early diagnosis and intervention.¹ Despite this, ectopic pregnancy and its treatments remain a prevalent cause of morbidity among women and can affect long-term reproductive success. With a comprehensive understanding of ectopic pregnancy, community physicians can help women make informed decisions and thus provide personalized health care. This review outlines the current practices, recent advances, and unresolved topics related

to diagnosis, management, and prognosis of ectopic pregnancy.

Risk factors

Only half of the women who are diagnosed with ectopic pregnancy have identifiable risk factors.² Thus, it is critical to maintain a high index of suspicion in all women of reproductive age who present with amenorrhea, abdominal pain, irregular vaginal bleeding, or a history of ectopic pregnancy.³ The pretest probability of ectopic pregnancy is increased if multiple risk factors are elicited when taking a history, which can aid in making a prompt diagnosis.

The most well-documented risk factor for an ectopic pregnancy is a previous ectopic pregnancy.^{4,5} Women with a prior ectopic pregnancy have a 10-times higher risk of recurrence than the general population.⁶ After one ectopic pregnancy, there is a 10% to 15% chance of recurrence, which increases to 25% in women who have had two or more ectopic pregnancies.⁶ Recurrence can be attributed to congenital tubal dysfunction, acquired tubal damage from pelvic inflammatory disease, or previous tubal surgery—all of which may impede embryonic passage through the fallopian tube.^{4,7} Women with perihepatic adhesions (commonly known as Fitz-Hugh-Curtis syndrome), a complication of pelvic inflammatory disease, carry twice the risk of ectopic pregnancy recurrence compared to unaffected women.⁷

Smoking, even “light” consumption of one to nine cigarettes per day, increases the risk of ectopic pregnancy by up to twofold.⁸ Some other well-recognized risk factors for ectopic pregnancy are age over 35 years, history of infertility, prior tubal surgery, and laboratory/laparoscopy confirmed pelvic inflammatory disease.² Additionally, genital surgery, endometriosis, and dysmenorrhea have been recognized as significant risk factors.⁴ Jacob and colleagues also described a 1.8-fold (95% CI 1.54-2.09) increase in the risk of ectopic pregnancy in women with a diagnosis of mental health disorders, including depression, anxiety, adjustment disorder, and somatoform disorder.⁴ This finding might be limited to an association, confounded by increased rates of psychiatric disorders in women with a history of infertility, chronic pelvic pain, endometriosis, recurrent miscarriages, and so on.

It is also possible that the medications used for treating such disorders disrupt embryo transport through the fallopian tube.⁴ More studies are needed to understand the association between mental health and ectopic pregnancy before drawing definitive conclusions.

Older data associated intrauterine contraceptive devices (IUDs) with ectopic pregnancy.⁹ And while it remains true that if pregnancy occurs with an IUD in situ the risk of ectopic pregnancy is high, all forms of contraception reduce the risk of pregnancy and ectopic pregnancy.⁶ In vitro fertilization (IVF) was previously thought to be associated with increased risk of ectopic pregnancy due to possible underlying fallopian tube dysfunction in the infertile population and procedure-related factors.² The latter may not be relevant today because the IVF practices associated with increased rates of ectopic pregnancy, such as transfer of multiple embryos and day-3 embryo transfer, are less common in modern clinical practice. As a result, the incidence of ectopic pregnancy after IVF has decreased significantly, and many physicians now suggest that IVF pregnancies may be at little or no increased risk of ectopic pregnancy compared to natural conceptions.⁶

Diagnosis

History and presentation

Ectopic pregnancies almost always occur in the fallopian tube (> 95%), particularly in the ampulla (distal portion) (70%).⁷ Fewer tubal pregnancies occur in the isthmus (middle portion) (12%) and fimbria (11%).¹⁰ Rarely, pregnancies may grow in the cervix (< 1%) or abdomen (1%), or on the ovary (3%).^{10,11} It is important to obtain a full history, including menstrual and obstetrical history, to determine gestational age and evaluate for risk factors in all women of reproductive age. Women with an ectopic pregnancy most commonly present with abdominal pain, vaginal bleeding, or both.² However, these are also symptoms of miscarriage, which is, by far, the most common cause of failing pregnancy and/or abnormally rising b-hCG levels. An ectopic pregnancy may be intact or ruptured at presentation; the latter might present with hemodynamic instability and an acute abdomen that requires urgent surgical management to address ongoing hemorrhage.¹⁰

Initial workup includes confirmation of pregnancy (through urine or serum b-hCG testing) and a transvaginal ultrasound to determine the location of the pregnancy.²

Laboratory investigations

Serial quantitative serum b-hCG testing can be helpful in determining if the current pregnancy is likely to be in an ectopic location. In a normal pregnancy, the b-hCG level rises steeply for the first 4 weeks, followed by a slower rise until 10 weeks gestational age, with an eventual plateauing.¹² In most normal intrauterine pregnancies, the b-hCG level will rise 65% to 100% every 48 hours, although even a short plateau in b-hCG can be normal in rare cases.² When performing serial b-hCG measurements, it is recommended that the same laboratory be used to minimize the risk of interassay variability, which can be 5% to 10%.¹⁰

Decreasing b-hCG levels strongly suggest a failing pregnancy, but they do not indicate its location. If no intrauterine pregnancy has been confirmed, the woman should be closely monitored because it is possible for an ectopic pregnancy to rupture, even with very low b-hCG levels. The use of discriminatory b-hCG levels to determine when an intrauterine pregnancy should be visible on ultrasound is discouraged. Evidence from the 1980s suggested that b-hCG of 1000 to 2000 IU/L without a visible pregnancy could be assumed to be ectopic.¹³ It is now widely acknowledged that b-hCG can be nonspecific, as many ectopic pregnancies will never reach a level of 2000 IU/L or might rupture before that threshold. Conversely, women who have had multiple gestations have higher b-hCG levels than women who have had a single gestation, and using 2000 IU/L as a discriminatory value might not be accurate for such pregnancies.² Historical use of a “threshold” has resulted in the treatment of intrauterine pregnancies with methotrexate, a chemotherapeutic agent; hence, newer studies have urged caution and patience when evaluating early pregnancies of uncertain viability.¹³

Imaging

Transvaginal ultrasound is the optimal method for imaging pregnancies in the early first trimester. In a normal pregnancy, a gestational

sac is visualized at 5 weeks gestation (3 weeks after conception), when it is 2 to 5 mm in diameter.¹³ Following that, the yolk sac is the earliest structure to develop inside the gestational sac and is normally seen by 5 weeks and 5 days of pregnancy.¹⁰ Presence of an intrauterine pregnancy (gestational sac plus a yolk sac or embryo) on transvaginal ultrasound effectively eliminates the diagnosis of an ectopic pregnancy other than the rare scenario of a heterotopic pregnancy (one embryo within the uterus and another extra-uterine).¹⁰ However, even with modern high-resolution ultrasound, it is rare that ultrasound alone is sufficient to be definitive. Without a yolk sac, an intrauterine pregnancy cannot be confirmed, and clinicians should be wary because it might represent a pseudosac—a fluid collection in the endometrial cavity caused by sloughing of the decidua.¹⁰ To differentiate between a pseudosac and an early gestational sac, a follow-up ultrasound in 7 to 14 days should be arranged.

Transvaginal ultrasound can definitively diagnose an ectopic pregnancy if an extra-uterine gestational sac with yolk sac/embryo is visible² [Figure]. However, most ectopic pregnancies lack these definitive features on imaging and are often described as an inhomogeneous adnexal mass separate from the ovaries.¹⁰ An adnexal mass might also represent a cyst, corpus luteum, or bowel.² The presence of hemoperitoneum

(echogenic intraperitoneal fluid) and placental blood flow within the periphery of this mass (“ring of fire”) on color doppler can aid in diagnosis.¹⁰

Expectant management

Expectant management of ectopic pregnancy involves allowing the pregnancy to take its natural course with close physician follow-up until there is clinical resolution of symptoms, a negative urine pregnancy test, or negative serum b-hCG.¹⁴ There is evidence that expectant management of ectopic pregnancy can be a safe option in a select population of women who are hemodynamically stable, asymptomatic, have a b-hCG value less than 1000 IU/L, with decreasing levels, and can reliably access regular physician follow-up.¹⁵ These women can avoid the use of methotrexate and its possible side effects. It is worth noting, however, that a 5-year follow-up cohort study of 217 women who underwent expectant, medical, or surgical management of a first ectopic pregnancy suggested there was a 2.68 times higher risk of recurrent ectopic pregnancy in women who were managed expectantly.⁵ A randomized study called ACTorNOT (ClinicalTrials.gov NCT02152696) has completed recruitment to compare expectant management versus uterine evacuation plus methotrexate versus methotrexate alone in women with ectopic pregnancy.

Medical treatment

Methotrexate, the most common option for treating ectopic pregnancy, was first used for this purpose in 1982.¹⁶ It is a folate antagonist that prevents DNA replication and affects rapidly proliferating cells like that of a developing embryo.¹⁷ A single dose of methotrexate is administered intramuscularly based on body surface area (50 mg/m²). Its effectiveness is assessed by serial b-hCG measurements on days 4 and 7 post-treatment, then weekly until resolution.² A reduction of less than 15% in b-hCG level between days 4 and 7 posttreatment may indicate that treatment is inadequate; therefore, a second dose of methotrexate might be required.² Close observation is required to ensure patient stability, declining b-hCG levels, and normal liver function tests because methotrexate can affect liver function.^{2,17}

The b-hCG level at presentation is strongly associated with treatment success of a single dose methotrexate injection. A systematic review that analyzed five observational studies determined that women with a baseline b-hCG level of more than 5000 IU/L were 4 times more likely to have treatment failure with single-dose methotrexate than those with a presenting baseline between 2000 and 4999 IU/L.¹⁸ Thus, most guidelines suggest using methotrexate to treat ectopic pregnancy in women with a presenting b-hCG level less than 5000 IU/L. Other factors such as ectopic mass > 3.5 cm and presence of fetal heartbeat on transvaginal ultrasound are considered relative contraindications to the use of medical therapy because they might indicate a more developed embryo, which implies increased risk of ectopic rupture.^{2,10} However, few data are available to support these recommendations.¹⁰

One in three women may experience mild, self-limited side effects of methotrexate, including nausea, diarrhea, stomatitis, and conjunctivitis.² Serious complications, including anaphylaxis, pulmonary damage, and myelosuppression, have also been reported.¹⁰ Since methotrexate can cause temporary hepatic dysfunction, it is important to obtain a CBC and baseline liver and renal function laboratory results, and to monitor liver function if indicated. Patients should also be advised to stop their folate-containing supplements because they



FIGURE. Right ectopic pregnancy. A live embryo with a fetal heartbeat is visible in the right adnexa.

inhibit methotrexate function.¹⁰ Nonsteroidal anti-inflammatory medications should also be avoided because they may reduce renal clearance of the drug by reducing renal blood flow.¹⁰ Alcohol should be avoided during methotrexate treatment to prevent the combined effect of hepatotoxic drugs. Methotrexate should not be administered to patients with liver or renal dysfunction, lung disease, hematologic dysfunction, immunodeficiency, or peptic ulcer disease, or to those who are breastfeeding. Given that this is an outpatient treatment, and an ectopic pregnancy may rupture during therapy, it is important to alert patients to the symptoms of a ruptured ectopic pregnancy and to seek immediate medical attention if they occur.

Advances in medical treatment of ectopic pregnancy may be on the horizon. Researchers from the University of British Columbia have demonstrated that gonadotropin-releasing hormone (GnRH) and its receptor are expressed in trophoblast cells and fallopian tube epithelium at ectopic pregnancy implantation sites.¹⁹ This presents the potential to use a targeted and less toxic agent for conservative treatment of ectopic pregnancies. A randomized controlled trial comparing GnRH agonist versus methotrexate was registered in March 2020.²⁰ The trial is also planning to investigate the use of letrozole, an aromatase inhibitor that blocks the final step in estrogen synthesis, versus methotrexate to treat ectopic pregnancy, and is stated to conclude in 2022.

Surgical management

With improved laparoscopic instruments and techniques, minimally invasive surgery has become the gold standard for treating ectopic pregnancy and has mostly replaced laparotomy. Laparoscopic surgery offers a safer, faster, cheaper, and more esthetic option.^{10,21} With improved operator experience, even stable but symptomatic ectopic pregnancies can be managed with laparoscopy, which can result in quicker hemostasis and better patient outcomes.²¹ However, laparotomy is sometimes used for hemodynamically unstable cases because it might offer better field visualization when managing a large bleed.¹⁰

Two laparoscopic techniques are available for treating tubal pregnancies: salpingectomy,

where the fallopian tube containing the ectopic pregnancy is removed, and salpingotomy, where after removal of the ectopic mass, the affected fallopian tube is preserved. There is ongoing debate about treatment success, future fertility, and risk of repeat ectopic pregnancy after treatment with salpingotomy versus salpingectomy.

Salpingectomy versus salpingotomy Treatment success and future fertility

Given that salpingotomy requires the surgeon to meticulously extract a small trophoblastic mass while preserving the fallopian tube, the method might be prone to trophoblastic tissue retention, which can necessitate a salpingectomy. Multiple retrospective studies report trophoblast persistence rates between 9.0% and 12.0% for salpingotomy and 1.8% for salpingectomy.²² In an open-label, randomized control trial named European Surgery in Ectopic Pregnancy, women with ultrasound-confirmed ectopic pregnancy who were eligible for surgical management were randomly assigned to either salpingotomy or salpingectomy. The trial reported significantly higher postsurgical trophoblast persistence in the salpingotomy group ($n = 215$) than in the salpingectomy group ($n = 231$) (RR 15.0, $p = 0.01$).²³ The trial also found no significant difference in rates of naturally conceived pregnancies 36 months postsurgery (fecundity ratio 1.06, $p = 0.687$).²³ Thus, for women with tubal pregnancy and a healthy contralateral tube, salpingectomy is a reasonable treatment option because it minimizes risk of ectopic mass persistence and does not seem to reduce future fertility. However, for women with contralateral tubal pathology or no contralateral tube, conservative treatment with salpingotomy should be considered if they wish to maintain the potential for natural conception.

Risk of recurrent ectopic pregnancy

Multiple studies have evaluated the risk of ectopic recurrence following salpingotomy versus salpingectomy, but no consensus has been reached. A 12-year retrospective study found a recurrent ectopic pregnancy rate of 13% in the ipsilateral tube following salpingotomy, while in the salpingectomy group, there were no recorded recurrences.²² These data might be confounded by the fact that women who

Ectopic pregnancy—clinical pearls

- In most normal pregnancies, the b-hCG level rises 65% to 100% every 48 hours for the first 4 weeks.
- The yolk sac is the earliest structure to develop inside the gestational sac and is normally seen by 5 weeks and 5 days of pregnancy.
- An intrauterine gestational sac without a yolk sac or embryo is not sufficient to rule out ectopic pregnancy and might represent a pseudosac.
- Hemodynamically stable, asymptomatic women with a decreasing presenting b-hCG level < 1000 IU/L might be eligible for expectant management of ectopic pregnancy.
- Methotrexate is administered intramuscularly at a dose of 50 mg/m² of body surface area.
- A reduction of < 15% in the b-hCG level between day 4 and 7 post-methotrexate may indicate that treatment is inadequate, and a second dose of methotrexate might be required.

choose to undergo salpingotomy are more likely intending to conceive and have higher pregnancy rates compared to those who choose to undergo salpingectomy. Multiple retrospective studies that have included only women who are actively wanting to conceive post-salpingotomy or post-salpingectomy have reported no difference in rates of ectopic pregnancy recurrence between the two groups.^{24,25} Thus, data on the rates of ectopic pregnancy recurrence after different surgical procedures are still conflicting.

Discussion

Medical versus surgical management

Patients who are asymptomatic and hemodynamically stable can be managed with either intramuscular methotrexate or laparoscopic surgery. The decision should be guided by patient characteristics, laboratory and radiological findings, and patient preference after discussion

of the risks and benefits. When a patient has any contraindications to methotrexate use, surgical management is often necessary. Surgical management of a stable, asymptomatic patient might also be prudent if the patient wishes to concurrently undergo tubal sterilization or requests removal of a tube with recurrent ectopics.

It is important to clarify that no long-term effects on future fertility have been identified after methotrexate use or surgical treatment. It is common to suggest a 3-month waiting period post-methotrexate treatment before attempting to conceive again. This time frame appears to be somewhat arbitrary because studies have suggested that conception before the 3-month mark is no more likely to result in birth defects.²⁶ Among women intending to conceive, no significant difference in spontaneous intrauterine pregnancy rates have been found when comparing women previously treated with single dose methotrexate versus those who underwent surgical treatment for ectopic pregnancy.¹⁷ One study reviewed 594 patients who achieved pregnancy using IVF after one or more ectopic pregnancies. Comparing women who were managed with unilateral salpingectomy to those managed with methotrexate indicated that the rates of ectopic pregnancy were equivalent (3.6% versus 2.8%; adjusted OR 1.4, 95% CI 0.5-3.8).²⁷ The rate of recurrence was most strongly associated with the number of previous ectopic pregnancies rather than the treatment modality used during those pregnancies.²⁷ Thus, risk of recurrence of ectopic pregnancies should not play a major role in decisions about treatment when comparing medical versus surgical options in eligible women.

Summary

Clinicians should be aware of the possibility of ectopic pregnancy for all women of reproductive age because early diagnosis is critical to reducing maternal mortality and improving treatment success rates. An understanding of the treatments, eligibility criteria, necessary follow-up, and pros and cons of each treatment option can help clinicians ensure patient safety and autonomy. Medical or expectant management is a safe and effective option for a carefully selected population of stable, asymptomatic women. Laparoscopy is the gold standard for

surgical management of ectopic pregnancy, with salpingectomy having higher success rates than salpingotomy and comparable future fertility rates. Clinical presentation, ectopic size, b-hCG level, and patient preference are all important to consider when recommending treatment options for ectopic pregnancy because these factors may influence treatment success, risk of recurrent ectopic pregnancy, and short-term fertility. ■

Acknowledgments

The authors would like to acknowledge the College of Physicians and Surgeons' librarians and library technicians for their assistance in conducting the literature search, which was critical to the production of this article.

Competing interests

Dr Dunne is a member of the *BCMJ* Editorial Board but did not participate in the review or decision making regarding this article. No competing interests declared.

References

1. Creanga AA, Shapiro-Mendoza CK, Bish CL, et al. Trends in ectopic pregnancy mortality in the United States: 1980-2007. *Obstet Gynecol* 2011;117:837-843.
2. Barnhart KT, Franasiak J. ACOG Practice Bulletin No. 193: Tubal ectopic pregnancy. *Obstet Gynecol* 2018;131:e91-e103.
3. Ramakrishnan K, Scheid DC. Ectopic pregnancy: Forget the "classical presentation" if you want to catch it sooner. *J Fam Pract* 2006;55:388-395.
4. Jacob L, Kalder M, Kostev K. Risk factors for ectopic pregnancy in Germany: A retrospective study of 100,197 patients. *Ger Med Sci* 2017;15:Doc19.
5. Ellaithy M, Asiri M, Rateb A, et al. Prediction of recurrent ectopic pregnancy: A five-year follow-up cohort study. *Eur J Obstet Gynecol Reprod Biol* 2018;225:70-78.
6. Ectopic pregnancy. In: Taylor HS, Pal L, Seli E. *Speroff's clinical gynecologic endocrinology and infertility*. 9th ed. Philadelphia, PA: Wolters Kluwer; 2020. p.1260-1288.
7. Mullins E, Agarwal N, Oliver R, Odejinmi JF. Implications of perihepatic adhesions in women undergoing laparoscopic surgery for ectopic pregnancy. *Int J Gynecol Obstet* 2015;130:247-249.
8. Saraiya M, Berg CJ, Kendrick JS, et al. Cigarette smoking as a risk factor for ectopic pregnancy. *Am J Obstet Gynecol* 1998;178:493-498.
9. Franks AL, Beral V, Cates Jr W, Hogue CJ. Contraception and ectopic pregnancy risk. *Am J Obstet Gynecol* 1990;163(4 Pt 1):1120-1123.
10. Ectopic pregnancy. In: Hoffman BL, Schorge JO, Bradshaw KD, et al., editors. *Williams gynecology*. 3rd ed. New York: McGraw-Hill; 2016.
11. Dunne C, Havelock JC. Ovarian ectopic pregnancy after in vitro fertilization. *J Obstet Gynaecol Can* 2012;34:409.
12. Morin L, Cargill YM, Glanc P. Ultrasound evaluation of

first trimester complications of pregnancy. *J Obstet Gynaecol Can* 2016;38:982-988.

13. Doubilet PM, Benson CB. Further evidence against the reliability of the human chorionic gonadotropin discriminatory level. *J Ultrasound Med* 2011;30:1637-1642.
14. Jurkovic D, Memtsa M, Sawyer E, et al. Single-dose systemic methotrexate vs expectant management for treatment of tubal ectopic pregnancy: A placebo-controlled randomized trial. *Ultrasound Obstet Gynecol* 2017;49:171-176.
15. Odejinmi F, Huff KO, Oliver R. Individualisation of intervention for tubal ectopic pregnancy: Historical perspectives and the modern evidence based management of ectopic pregnancy. *Eur J Obstet Gynecol Reprod Biol* 2017;210:69-75.
16. Tanaka T, Hayashi H, Kutsuzawa T, et al. Treatment of interstitial ectopic pregnancy with methotrexate: Report of a successful case. *Fertil Steril* 1982;37:851-852.
17. Olofsson JI, Poromaa IS, Ottander U, et al. Clinical and pregnancy outcome following ectopic pregnancy; a prospective study comparing expectancy, surgery and systemic methotrexate treatment. *Acta Obstet Gynecol Scand* 2001;80:744-749.
18. Menon S, Collins J, Barnhart KT. Establishing a human chorionic gonadotropin cutoff to guide methotrexate treatment of ectopic pregnancy: A systematic review. *Fertil Steril* 2007;87:481-484.
19. Peng B, Klausen C, Campbell L, Leung PCK. Gonadotropin-releasing hormone and gonadotropin-releasing hormone receptor are expressed at tubal ectopic pregnancy implantation sites. *Fertil Steril* 2016;105:1620-1627.e3.
20. Ali SA. The aromatase inhibitor and GnRH antagonist versus methotrexate for management of undisturbed ectopic pregnancy. NIH: U.S. National Library of Medicine 2020. Accessed 23 June 2020. <https://clinicaltrials.gov/ct2/show/NCT04308343>.
21. Cohen A, Almog B, Satel A, et al. Laparoscopy versus laparotomy in the management of ectopic pregnancy with massive hemoperitoneum. *Int J Gynecol Obstet* 2013;123:139-141.
22. Lagana AS, Vitale SG, De Dominicis R, et al. Fertility outcome after laparoscopic salpingostomy or salpingectomy for tubal ectopic pregnancy: A 12-years retrospective cohort study. *Ann Ital Chir* 2016;87:461-465.
23. Mol F, van Mello NM, Strandell A, et al. Salpingotomy versus salpingectomy in women with tubal pregnancy (ESEP study): An open-label, multicentre, randomised controlled trial. *Lancet* 2014;383(9927):1483-1489.
24. Bangsgaard N, Lund CO, Ottesen B, Nilas L. Improved fertility following conservative surgical treatment of ectopic pregnancy. *BJOG* 2003;110:765-770.
25. Chen L, Zhu D, Wu Q, Yu Y. Fertility outcomes after laparoscopic salpingectomy or salpingotomy for tubal ectopic pregnancy: A retrospective cohort study of 95 patients. *Int J Surg* 2017;48:59-63.
26. Hackmon R, Sakaguchi S, Koren G. Effect of methotrexate treatment of ectopic pregnancy on subsequent pregnancy. *Can Fam Physician* 2011;57:37-39.
27. Irani M, Robles A, Gunnala V, Spandorfer SD. Unilateral salpingectomy and methotrexate are associated with a similar recurrence rate of ectopic pregnancy in patients undergoing in vitro fertilization. *J Minim Invasive Gynecol* 2017;24:777-782.

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Atypical severe presentations of the oculocardiac reflex: Two case reports

Physicians who treat patients with facial trauma need to know how to prevent or manage the occurrence of the oculocardiac reflex because it can cause severe hypotensive or bradycardic/asystolic events and cardiac arrest.

ABSTRACT: The oculocardiac reflex is a rare but potential cause of severe hypotensive or bradycardic/asystolic events in patients suffering from facial trauma. Though the most common side effect of the oculocardiac reflex is bradycardia, clinicians should be concerned about a further decline to potentially fatal arrhythmias, asystole, and even cardiac arrest. This article presents two severe cases of the oculocardiac reflex in the setting of facial trauma. The first case involves cardiac arrest at the time of midface fracture reduction. The second case involves severe hypotension requiring vasopressor support secondary to severe intraorbital pressure.

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This article has been peer reviewed.

Vagal reflexes are well known to cause a change in blood pressure or heart rate. This is seen often in medicine and is termed a “vagal response.” The most common example of vagal reflex stimulation used clinically involves slowing the heart rate with external carotid massage to correct supraventricular tachycardia. However, other maneuvers, such as rubbing the eyes or temples, can also cause a reduction in blood pressure or heart rate. The oculocardiac reflex is a reflex arc created by the trigeminal and vagus nerves.¹⁻³ It is defined as a slowing of the heart rate by more than 20% from baseline following globe manipulation or traction of the extraocular muscles.

As with any reflex, there is an afferent and efferent limb.¹ The trigeminal nerve serves as the sensory or afferent limb, while the vagus nerve serves as the motor or efferent limb of the reflex arc. Therefore, the reflex is initiated by activation of stretch receptors in the periorbital and ocular soft tissue, either through direct traction or increased pressure.⁴ This leads to stimulation of the vagal motor response, which causes impulses to the sinoatrial node and triggers a slowing of the heart rate.

The most common signs of oculocardiac reflex are bradycardia and hypotension. In severe cases, arrhythmia, asystole, and cardiac arrest can occur.^{5,6} This reflex is encountered primarily with pathology causing acutely entrapped muscles, such as orbital floor fractures.⁴ There are reported cases of asystole with activation

of this reflex due to direct surgical manipulation of the temporalis muscle,⁷ but we were not able to find any cases of asystole secondary to indirect manipulation of the orbit or periorbital musculature. We also were not able to find many cases of severe hypotension due to orbital pressure alone.

Case data

Patient 1

A 59-year-old male suffered a fracture to the left zygoma due to a direct punch to the cheek. He was diagnosed with a depressed left zygoma fracture with comminution of the orbital floor. His medical history was positive only for high blood pressure (treated with ramipril and furosemide) and high cholesterol (treated with atorvastatin). His surgery was performed 16 days after the injury to allow time to come off ASA. No preoperative muscle entrapment was present.

Once the patient was successfully under general anesthesia with an oral endotracheal tube, his upper buccal sulcus and lower lid were infiltrated with 0.25% bupivacaine with 1:100 000 epinephrine. An intraoral incision was made, and dissection was taken down to the periosteum, which allowed a retractor to be placed under his zygomatic arch. As soon as the zygoma was reduced, the patient went into asystole.

The ECG tracing demonstrated persistent and unresolving asystole. It was recognized

immediately when the anesthetic machine monitor alarm sounded. The anesthesiologist instructed the surgical team to cease operating immediately and take pressure off the operative site. Further treatment included intravenous injection of 0.6 mg atropine and 15.0 mg ephedrine. As asystole persisted, CPR was initiated. A wide complex agonal rhythm was noted as CPR commenced. Approximately 50 seconds of CPR was performed, during which time narrow QRS complexes became evident on the ECG. When CPR was stopped, a sinus rhythm was present, along with a perfusing blood pressure. The approximate elapsed time from when the event was recognized and spontaneous rhythm returned was between 60 and 90 seconds. Epinephrine was not required because an acceptable blood pressure was detected shortly after resumption of spontaneous sinus rhythm. Due to these events and clinically acceptable reduction of the midface fracture, the incision was closed, and no plate fixation was performed. A forced duction test showed no orbital muscular entrapment.

The patient had an uneventful emergence and extubation. He was transferred to the post-anesthetic care unit in stable condition, alert and cooperative. Following hospital discharge, he underwent outpatient cardiology review, including a stress test and 24-hour Holter monitor test. No cardiac disease was detected.

Patient 2

While driving, an 82-year-old male, who was otherwise healthy and living independently, was struck from the side in a motor vehicle collision, which resulted in multiple injuries, including complex midface and depressed skull fractures. The patient was admitted to the ICU and assessed immediately by a plastic surgeon for management of his periorbital fractures. The trauma and ICU team was concerned about ongoing hemorrhage from concomitant pelvic and long bone fractures. The patient was hypotensive and required vasopressor support of 7 mcg/kg/min norepinephrine bitartrate. He was bradycardic at 45 to 55 beats per minute. The Glasgow Coma Scale was 3T owing to sedation needs. Clinical evaluation demonstrated significant proptosis. A diagnosis of orbital compartment syndrome secondary to

his displaced orbit and skull base fractures was tested. Intraocular pressures were measured to be 28 mm Hg in the involved globe (OD) and 15 mm in the contralateral globe (OS).

An emergent lateral canthotomy and cantholysis procedure was performed at the bedside under local anesthesia (1% lidocaine with 1:100 000 epinephrine) to reduce the patient's ocular pressures. Immediately after release and with serial evaluations, OD ocular pressures decreased to 9 to 11 mm Hg, which were equal to the contralateral side at that time. Shortly after orbital decompression, the patient's blood pressure and heart rate stabilized, and he no longer required vasopressor support. An ophthalmologist was consulted and did not identify any evidence of intraocular trauma or globe rupture. The patient underwent urgent operative reduction and internal fixation of his facial and depressed skull fractures within 24 hours of decompression.

Discussion

Various stimuli can cause activation of the oculocardiac reflex. Anesthesiologists, ophthalmologists, maxillofacial and plastic surgeons, trauma teams, intensivists, and emergency physicians who deal with patients who have trauma to the structures of the orbit or face need to be aware of this reflex, its potential consequences, and how to manage or prevent its occurrence.

Though the most common side effect of the oculocardiac reflex is bradycardia, clinicians should be concerned about a further decline to potentially fatal arrhythmias, asystole, and even cardiac arrest. Because the oculocardiac reflex is a vagal reflex, it should also be considered in patients with unexplained hypotension. The only definitive treatment is the immediate cessation of the triggering stimulus.

In our first case, it is possible that the oral approach to the zygomatic arch caused mild irritation to the insertion of the temporalis muscle, though Bhattacharjee's report⁷ suggested that the muscle's involvement in the reflex arc suggested that it was direct pressure on the muscle that caused the reaction. It is more likely that the delayed nature of the treatment caused the asystole. By 16 days posttrauma, the bones would have started to knit together, and elevation of the zygoma would have caused

direct movement of the orbital bones and a sudden change in orbital pressure. Due to the patient being on ASA, the risk of postoperative periorbital hemorrhage necessitated the surgical delay.

In our second case, the displacement of the bony structures into the orbit, along with post-traumatic swelling, caused compression of the globe and orbital musculature. Despite proptosis, the orbit is a closed compartment, and this quickly caused a compartment syndrome to develop. While an awake patient would complain of pain and visual changes, an intubated individual will have no signs or symptoms early in the disease progression. The significant effect of orbital compartment syndrome and the ensuing oculocardiac reflex on the blood pressure and heart rate was seen by the rapid removal of vaso-supportive medications after correction of the orbital pressure.

Summary

The oculocardiac reflex is a rare but potential cause of severe hypotensive or bradycardic/asystolic events in patients suffering from facial trauma and should be considered quickly in the clinical setting. ■

References

1. Dunville LM, Sood G, Kramer J. Oculocardiac reflex. StatPearls Publishing LLC. Last updated 28 June 2020. Accessed 12 September 2020. www.ncbi.nlm.nih.gov/books/NBK499832.
2. Barnard NA, Bainton R. Bradycardia and the trigeminal nerve. *J Craniomaxillofac Surg* 1990;18:359-360.
3. Bhargava D, Thomas S, Chakravorty N, Dutt A. Trigemino-cardiac reflex: A reappraisal with relevance to maxillofacial surgery. *J Maxillofac Oral Surg* 2014;13:373-377.
4. Pham CM, Couch SM. Oculocardiac reflex elicited by orbital floor fracture and inferior globe displacement. *Am J Ophthalmol Case Rep* 2017;6:4-6.
5. Bainton R, Lizi E. Cardiac asystole complicating zygomatic arch fracture. *Oral Surg Oral Med Oral Pathol* 1987;64:24-25.
6. Shearer ES, Wenstone R. Bradycardia during elevation of zygomatic fractures. A variation of the oculocardiac reflex. *Anaesthesia* 1987;42:1207-1208.
7. Bhattacharjee A, Rajaram P, Khatua A, et al. Two episodes of trigeminocardiac reflex during a pan facial fracture surgery, a rare phenomenon—Case report and review of literature. *J Clin Diagn Res* 2017;11:ZD01-ZD03.

PQI project makes appetizing discoveries for long-term care residents

Institutional food consistently receives negative feedback, whether the person rejecting it is a hospital patient or a vulnerable senior living in long-term care. As medical coordinator at Providence Healthcare's Holy Family Hospital long-term care in Vancouver, I noticed that during the annual team-family conferences with interdisciplinary staff, long-term care residents, and their families, food frequently came up as a topic of concern.

I seized the opportunity to apply for a physician quality improvement (PQI) project through Vancouver Coastal Health/Providence Health Authority. I wanted to study this patient-based issue through a quality-improvement lens, with value-based health care in mind, and with the goal of decreasing residents' food complaints by 20%.

Beginning in March 2018, I started measuring how much food was being wasted at Holy Family long-term care, and learning from the residents about their concept of the food experience and how it could be improved. Keeping in mind that 82% of the residents have cognitive impairment and some have language barriers, we enlisted volunteers to help attain direct input from the seniors about the food experience.

The quality improvement team then came together to collaborate with care aides, dietitians, nurses, and the volunteer coordinator. We took a Plan-Do-Study-Act (PDSA) approach, assessing the problem through three measures: a chart audit to see how many dietitian referrals pertained to food preferences or complaints, a food waste audit, and a patient food-experience survey.

For the food waste audit, residential care aides—who had already observed that lunch was the most wasted meal of the day—suggested using food slips to record food consumed. At lunch, 38% of the entrées went uneaten. The aides felt this might be a matter of timing; lunch

With social isolation more extreme due to COVID-19 restrictions, the experience of eating is increasingly important to frail seniors' quality of life.

was served so close to breakfast that residents seemed to have little appetite for it.

Vancouver Coastal Health PQI project advisors Amy Chang and Enrique Fernandez-Rui led a root-cause analysis (a fish-bone diagram) to settle on two potential interventions.

The first was using lipped plates, which help residents (many of whom are cognitively impaired) scoop food into their mouths to prevent so much of their food landing on the tray beneath the dish.

We also switched the portion sizes of lunch and dinner, maintaining the same number of daily calories. When we assessed the amount of wastage from the main entrées from both cognitively impaired and cognitively intact residents, the rate did not change much, with an average 32% of wastage in December 2018 and 27% in September 2019.

For cognitively intact residents, however, the switch of entrée portion sizes decreased wastage from 48% in December 2018 to 24% in September 2019.

The number of times residents were referred to dietitians because they'd expressed food preferences or made food-related complaints actually increased over the course of our project, probably indicating more awareness of how to give feedback and advocate for change. We learned that for long-term care residents, food quality, including taste, temperature, texture, and the option to eat communally are more important than the dishware, cutlery, or environment that others may deem important.

With social isolation more extreme due to COVID-19 restrictions, the experience of eating is increasingly important to frail seniors' quality of life. I hope that our results will inspire other BC physician leaders and health care providers to discuss and investigate this crucial patient need.

PQI is a flagship initiative of the Specialist Services Committee, one of four Joint Collaborative Committees funded by Doctors of BC and the BC government. PQI has supported this initiative and many others that are making a real difference to promote innovation in our health care system. For more information, go to <https://ssc.bc.ca/physician-engagement/regional-quality-improvement-initiative>. Family doctors participating in PQI are supported by sessional funding from the General Practice Services Committee. ■

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This article was submitted by the Specialist Services Committee and has not been peer reviewed by the BCMJ Editorial Board.

Is it safe for patients with cardiac implantable electronic devices to charge electric vehicles?

A look at the potential consequences.

Caleb A.N. Roda, MD

ABSTRACT: Patients with cardiac implantable electronic devices (CIEDs) are susceptible to electromagnetic interference and its potential harmful consequences from a variety of sources. Recent widespread consumer adoption of electric vehicles poses a new source of electromagnetic interference in the daily environment for patients with CIEDs. Current research shows no interference for CIED patients charging electric vehicles at low power; however, the effects of high-powered electric vehicle charging have yet to be experientially tested. Understanding the potential consequences of this powerful technology for patients with CIEDs is necessary to keep them safe while progressing toward a more sustainable future.

Introduction

Cardiac implantable electronic devices (CIEDs), including pacemakers, implantable cardiac defibrillators, and cardiac resynchronization, have become well established standards of care for a variety of tachyarrhythmias, bradyarrhythmias, and in more recent years, heart failure.¹⁻³ Cardiac implantations have been increasing globally due to improvements in technology, growing medical indications, and an aging population.^{4,5}

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This article has been peer reviewed.

More than 1 million cardiac implants in 61 countries occurred during 2009, a substantial increase over the previous world pacing survey conducted in 2005.⁴ CIEDs are known to be susceptible to electromagnetic interference (EMI) from environmental, industrial, and hospital sources.⁶⁻⁹ The electric current flowing through these sources generates a magnetic field (valid proxy for EMI) that can induce electrical fields in CIED circuitry, leading to pacing inhibition, device reprogramming, and inappropriate shock delivery.⁹ Electric vehicles (EVs) have become ubiquitous in the global vehicle market and pose a new potential environmental source of EMI for CIED patients, especially as it pertains to their high-powered charging.¹⁰

Effects of electromagnetic interference on cardiac devices

During EV charging, the current flow in the charging cable creates a magnetic field that can potentially induce EMI in nearby devices. It has been experimentally shown that current flowing through an electronic arc welder cable during operation generated a magnetic field strength of 100–130 micro Tesla (μT), and induced inappropriate atrial sensing in a participant with a unipolar sensing pacemaker.¹¹ Current CIEDs almost exclusively use bipolar leads and have a higher magnetic field threshold of about 300mT before EMI is apparent.^{12,13} Ventricular oversensing is clinically the most relevant problem caused by EMI, which may lead to asystole in the case of pacing inhibition in pacemaker-dependent patients. Device

manufacturers have taken many steps to limit EMI on modern CIEDs through shielding, filters, bipolar leads, and components with less ferromagnetic material.⁹ Despite these efforts, there remain reports of EMI in the general environment at an incidence of 0.27% per patient per year.¹⁴ As EV charging continues to become more powerful with higher current flow, it is important to test whether charging an EV can generate a magnetic field strong enough to cause EMI in patients with CIEDs.

Safety of electronic transportation systems

Current research assessing the safety of electrically powered transportation systems for patients with CIEDs shows no measurable interference. Magnetically levitated linear motor cars, trains, trams, and hybrid vehicles have proven to be safe for patients with CIEDs to ride in and or operate.¹⁵⁻¹⁷ More recently, the magnetic fields generated during regular-powered charging of the consumer EVs Volkswagen e-up!, BMW i3, Nissan Leaf, Tesla model 85S, and Tesla model S P90D have been examined on patients with CIEDs.^{18,19} The highest magnetic field recorded was 116.5 mT by the Tesla model 85S around the charging cable. In both experiments there were no episodes of over- or undersensing, inappropriate pacing, pacing inhibition, or device reprogramming. Furthermore, Lennerz and colleagues recently published the complete methodological details of their 2018 study, highlighting the wide selection of cardiac devices tested and thus the

generalizability of their safety results.²⁰ Both experiments had a small sample size and were underpowered to detect rare events; nonetheless, CIED patients should feel reassured operating and charging EVs under similar circumstances.

High-powered electric vehicle charging

Currently, EV manufacturers such as Tesla have established a public global network of high-powered charging stations for their vehicles. The “supercharging” offered by Tesla is able to charge their EVs faster using higher current flow. It was shown experimentally that magnetic field strength around the charging cable during Tesla EV charging increased almost proportionally with current flow.¹⁹ Tesla V2 direct current superchargers generate a current flow twelvefold higher than the charging that has been experimentally tested on participants with CIEDs. This creates the potential for generating magnetic fields around the charging cable that exceed the 300 mT shown to cause EMI in unipolar and bipolar CIEDs in vivo.^{12,13} Caution is warranted given the gap in knowledge surrounding the effects of high-powered EV charging on CIED function.

Conclusion

Manufacturers of CIEDs are regularly improving their safety and effectiveness; however, these devices are not without risks and will likely continue being susceptible to EMI from a variety of sources. Currently, EV manufacturers offer the capability to charge at much higher powers than previously shown to be safe. More research is needed to elucidate the effects of high-powered EV charging on patients with CIEDs and allow for the continued adoption of more efficient and powerful EVs without sacrificing safety. ■

Competing interests

None declared.

References

- Al-Khatib SM, Stevenson WG, Ackerman MJ, et al. 2017 AHA/ACC/HRS guideline for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death: A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol* 2018;72:e91-e220.
- Brignole M, Auricchio A, Baron-Esquivias G, et al. 2013 ESC guidelines on cardiac pacing and cardiac resynchronization therapy: The Task Force on cardiac pacing and resynchronization therapy of the European Society of Cardiology (ESC). Developed in collaboration with the European Heart Rhythm Association (EHRA). *Eur Heart J* 2013;34:2281-2329.
- Moss AJ, Hall WJ, Cannom DS, et al. Cardiac-resynchronization therapy for the prevention of heart-failure events. *N Engl J Med* 2009;361:1329-1338.
- Mond HG, Proclemer A. The 11th world survey of cardiac pacing and implantable cardioverter-defibrillators: Calendar year 2009—a World Society of Arrhythmia's project. *Pacing Clin Electrophysiol* 2011;34:1013-1027.
- Greenspon AJ, Patel JD, Lau E, et al. 16-year trends in the infection burden for pacemakers and implantable cardioverter-defibrillators in the United States 1993 to 2008. *J Am Coll Cardiol* 2011;58:1001-1006.
- Misiri J, Kusumoto F, Goldschlager N. Electromagnetic interference and implanted cardiac devices: The nonmedical environment (part I). *Clin Cardiol* 2012;35:276-280.
- Misiri J, Kusumoto F, Goldschlager N. Electromagnetic interference and implanted cardiac devices: The medical environment (part II). *Clin Cardiol* 2012;35:321-328.
- Yerra L, Reddy PC. Effects of electromagnetic interference on implanted cardiac devices and their management. *Cardiol Rev* 2007;15:304-309.
- Beinart R, Nazarian S. Effects of external electrical and magnetic fields on pacemakers and defibrillators: From engineering principles to clinical practice. *Circulation* 2013;128:2799-2809.
- Zhou Y, Wang M, Hao H, et al. Plug-in electric vehicle market penetration and incentives: A global review. *Mitigation Adapt Strat Global Change* 2015;20:777-795.
- Tiikkaja M, Aro AL, Alanko T, et al. Electromagnetic interference with cardiac pacemakers and implantable cardioverter-defibrillators from low-frequency electromagnetic fields in vivo. *Europace* 2013;15:388-394.
- Napp A, Joosten S, Stunder D, et al. Electromagnetic interference with implantable cardioverter-defibrillators at power frequency: An in vivo study. *Circulation* 2014;129:441-450.
- Stunder D, Seckler T, Joosten S, et al. In vivo study of electromagnetic interference with pacemakers caused by everyday electric and magnetic fields. *Circulation* 2017;135:907-909.
- von Olshausen G, Rondak IC, Lennerz C, et al. Electromagnetic interference in implantable cardioverter defibrillators: Present but rare. *Clin Res Cardiol* 2016; 105:657-665.
- Fukuta M, Mizutani N, Waseda K. Influence of electromagnetic interference on implanted cardiac arrhythmia devices in and around a magnetically levitated linear motor car. *J Artif Organs* 2005;8:154-160.
- Halgamuge MN, Abeyrathne CD, Mendis P. Measurement and analysis of electromagnetic fields from trams, trains and hybrid cars. *Radiat Prot Dosimetry* 2010; 141:255-268.
- Tondato F, Bazzell J, Schwartz L, et al. Safety and interaction of patients with implantable cardiac defibrillators driving a hybrid vehicle. *Int J Cardiol* 2017;227:318-324.
- Aung TT, Oo S, Market R, Wase A. Are you safe to ride a TESLA with an ICD? An in-vivo Study. *Circulation* 2017; 136(suppl_1):A14078.
- Lennerz C, O'Connor M, Horlbeck L, et al. Electric cars and electromagnetic interference with cardiac implantable electronic devices: A cross-sectional evaluation. *Ann Intern Med* 2018;169:350-352.
- Lennerz C, Horlbeck L, Weigand S, et al. Patients with pacemakers or defibrillators do not need to worry about e-Cars: An observational study. *Technol Health Care* 2020;28:1-12.

Ventricular oversensing is clinically the most relevant problem caused by EMI, which may lead to asystole in the case of pacing inhibition in pacemaker dependent patients.

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History of naloxone kits in BC: From inception to expansion

The Take Home Naloxone program's history, how far we've come since its inception, and the work yet to be done.

Vivian W.L. Tsang, MGC, Jane A. Buxton, MBBS, MHSc, FRCPC

The spike in overdose deaths in BC due to COVID-19 serves as a reminder that the lack of access to harm-reduction services has significant implications for people who use drugs (PWUD). One of the cornerstones of harm-reduction services in BC is the Take Home Naloxone (THN) program created in 2012. We hope that by providing insight into the program, medical providers will discuss and offer the lifesaving THN kits in clinics and hospital settings when appropriate.

Ms Tsang is a fourth-year medical student in the Vancouver Fraser Medical Program in the UBC Faculty of Medicine. Dr Buxton is physician epidemiologist and medical lead for harm reduction at the British Columbia Centre for Disease Control.

This article has been peer reviewed.

Increasing numbers of heroin-related deaths in 2011 due to a toxic drug supply was a precursor to the overdose crisis in British Columbia. At that time, naloxone was not widely available in Canada despite its 40-year approval history for use in opioid respiratory depression reversal. Naloxone has greater affinity for μ -opioid receptors in the brain than opioids and thus naloxone acts as a competitive antagonist.¹ This allows for effective reversal of the symptoms of opioid toxicity, including respiratory depression for up to 60 minutes while emergency services are called.² While Europe, Australia, and the United States had developed THN programs in some jurisdictions for PWUD, BC, a front-runner on the harm-reduction scene, had not yet responded.³

Peers with lived experience in the community were witnessing friends and family die with no means of intervention. Their voices fueled the determination to make changes to

the existing availability of naloxone to reduce morbidity and mortality among PWUD. The BC Centre for Disease Control (BCCDC) harm-reduction team received approval to implement a pilot THN program in 2012. The team visited a program that had been initiated in 2005 in Edmonton and, with input and generous support from colleagues in the US, began developing training and data collection materials and source supplies.

The pilot was a grassroots effort, with the first THN kits designed from sunglasses cases bought in bulk in Vancouver's Chinatown. They were assembled in the BCCDC pharmacy, but during times of high demand, staff volunteers from across the centre would put them together during their lunch breaks. The naloxone ampoules were added by the pharmacy, where lot numbers and expiry dates were recorded in the kits. This made it possible to achieve central distribution despite limited resources.

Still under Schedule I regulations at the time (prescription-only medication), naloxone had to be prescribed by a physician, which led to the development of stock stickers that would be filled out in advance with information including naloxone batch number, prescriber details, and patient identification. The stickers were placed on pill bottles containing two ampoules of naloxone. The early program also kept a record of every patient who had been prescribed naloxone and received a THN kit.

The major policy issues of the THN program were increasing access to naloxone, tackling public and professional pushback through promotion and education, and identifying physician champions, who in the early days, were critically important to the program's expansion. The rollout of the program was slow and resistance emerged. The first community training session at the Vancouver Area Network of Drug Users (VANDU) was put on hold until concerns stemming from a lack of understanding of the action and scheduling of naloxone were allayed. Emergency departments in Vancouver

were approached, and although supportive in principle, they declined to participate initially as they felt unable to manage the burden of training in a busy clinical environment.

Three components needed for site enrollment were identified: an educator, a prescriber, and a dispenser, and approval from the regional health authority was obtained.⁴ Champions in the Royal Inland Hospital Emergency Department initiated the first THN program in any emergency department in Canada in 2014.⁵ By the end of that year, the program had been implemented at 61 sites, and 1198 THN kits had been distributed to clients in the community [Figure].⁶ The SAVE ME procedure (stimulate, airway, ventilate, evaluate, muscular injection with 1 mL of naloxone 0.4 mg, and evaluate) was used for training and displayed on posters distributed at

sites where THN kits were available. Providers were educated on the distribution and use of naloxone, as well as how to challenge common misperceptions about naloxone as an enabler to opioid use.⁷ Fiscal and time constraints, coupled with work to retain prescribers, were identified as barriers for expansion at that time.⁴

Over the next few years, a number of factors came into play. First, the emergence of fentanyl and its analogs in the toxic street-drug supply led to an unpredictable potency of illicit opioids and an exponential trend in overdose deaths.⁸ A series of

regulatory changes in 2016 and 2017 reduced barriers to naloxone access. In 2016, the federal Minister of Health removed naloxone from the Prescription Drug List, and in September 2016 naloxone was made unscheduled by the College of Pharmacists of BC, allowing it to be

Champions in the Royal Inland Hospital Emergency Department initiated the first THN program in any emergency department in Canada in 2014.

	2012	2013	2014	2015	2016	2017	2018	2019	2020 ^a
Active THN Sites (includes pharmacies) Newly joined in year (Cumulative total in year)	6	27 (33)	28 (61)	45 (106)	349 (455)	527 (982)	467 (1,449)	246 (1,695)	100 (1,795)
Kits Shipped to Sites Shipped in year (Cumulative total in year)	350	1,252 (1,602)	1,973 (3,575)	5,886 (9,461)	52,262 (61,723)	140,748 (202,471)	195,696 (398,167)	232,312 (630,479)	245,953 (876,432)
Kits Reported Distributed to Clients Distributed in year (Cumulative total in year)	106	617 (723)	1,198 (1,921)	3,152 (5,073)	21,519 (26,592)	63,297 (89,889)	60,463 (150,352)	51,498 (201,850)	27,301 (229,151)
Overdose Reversals Reported using THN Kits^b Reported in year (Cumulative total in year)	5	36 (41)	127 (168)	397 (565)	3,941 (4,506)	15,521 (20,027)	21,247 (41,274)	20,575 (61,849)	14,039 (75,888)

a. THN site (excluding inactive sites) and order counts are complete until November 30, 2020; distribution data is reasonably complete to June 30, 2020, due to lag in kit distribution record return to Harm Reduction Services, but includes all records to November 30, 2020.

b. Based on client kits refilled due to naloxone use on self/others to reverse an overdose (distribution data).

FIGURE. Number of THN sites, kits shipped and reported distributed, and overdose reversals 2012 to 30 November 2020.^{6,15-17} [source: BCCDC]

distributed in the community without a physician prescription.⁹ Following the declaration of a public health emergency in BC on 14 April 2016, the program expanded quickly, with increased public awareness and acceptance. Two months later, naloxone became available at all emergency departments through a ministerial directive.¹⁰ In October 2016, the kit production (without naloxone) was outsourced to an external company. Evidence shows that naloxone successfully reduced overdose deaths, improving overall overdose morbidity and mortality.^{11,12}

The Facility Overdose Response Box program was launched in late 2016 to support community site staff and non-health care service providers on site to have ongoing access to naloxone and other resources, and ensured training, protocols, and policies were in place to support overdose events.¹³ Increased overdose deaths and delays in federal approval of supervised consumption site applications led the BC Minister of Health to enact a ministerial order to establish overdose prevention services, which enable clients to use drugs in an observed setting.¹⁴ In 2016, additional THN distribution sites were added to satisfy the twentyfold increase in demand for naloxone [Figure].¹⁵⁻¹⁷ A massive scale-up of the program occurred during the initial peak of the overdose crisis, with distribution increasing from 4688 kits per month in November 2016 to 11 000 kits per month in January 2017.¹⁵

Development of multiple educational resources also increased in 2017 for both providers and the public. It was noted that youth in particular experienced an improvement in their internal locus of control and a sense of safety with THN training.¹⁸ Pharmacists were trained to dispense naloxone kits at community pharmacies, and this laid the foundation for THN kits to eventually be free of charge from pharmacies in BC.¹⁹ High-quality, low-barrier training is available to anyone before or when attending a community pharmacy to obtain a kit (<http://naloxonetraining.com>). It includes an assessment of understanding and a certificate of completion to ensure standardized training occurs.

By 31 December 2020, more than 900 000 kits had been shipped to 1819 active THN distribution locations across BC. Over 80 000

naloxone kits have been reported as used to reverse an overdose, but this is a considerable underestimate.²⁰

Ongoing administrative data collection and research have allowed various aspects of the program to be evaluated.²¹ Research was conducted to investigate correlates of THN possession in BC, which was found to be positively associated with male recipients in 2017 and

Demand for THN kits has risen in the past months as the number of overdoses has increased due to COVID-19.

2018, primarily those aged 31 to 60.²⁰ More than two-thirds of those who received a kit reported being at risk of overdose.²⁰ A recent cross-sectional analysis revealed lower rates of THN kit possession among people who use drugs by non-injection routes.²² However, smoking is the preferred mode of opioid use in BC, and Coroners Service data also revealed the highest proportion of deaths for PWUD are among those who smoked drugs.²³ This disparity reveals the need for increased education on the overdose risk associated with smoking drugs and the importance of having a THN kit to keep friends and community members safe regardless of the mode of drug use.

Demand for THN kits has risen in the past months as the number of overdoses has increased due to COVID-19. With reduced attendance at supervised consumption sites and overdose prevention sites, people with lived experience are acting as first responders, using THN kits to assist members of their community.²¹ October 2020 saw the highest number of THN orders with more than 33 800 THN kits shipped to community sites, pharmacies, correction centres, clinics, and nontraditional

sites across BC.^{1,24} In line with increasing access to naloxone, continuing education on overdose response and naloxone administration, supporting site coordinators to report, and collecting data will allow for a sustainable program and future research.

BC's actions with THN are leading the way for many other provinces. Training, harm reduction, and naloxone administration materials are used across Canada from Alberta to New Brunswick.²⁵ Understanding the history and barriers to THN program initiation and expansion will help organizations planning to start or expand similar programs. Physicians and medical providers play a huge role in reducing the stigma around drug use. Offering THN kits is an easy way to create safe spaces for clients to discuss drug consumption practices. Medical students, physicians, and other providers should be encouraged to provide training, carry a THN kit, and act as champions to reduce drug-related deaths in their communities.

All individuals who fit the eligibility criteria and are seeking training and a personal THN kit can go to www.towardtheheart.com/site-finder to locate their nearest community site or pharmacy for access. Physicians can also share a list of THN distribution sites with their patients. THN kits are provided at no cost to individuals at risk of experiencing or witnessing overdose, such as family or friends of PWUD.²⁶ BC physicians can purchase naloxone and supplies required for use in their clinics at their local pharmacy.²⁶

Physicians interested in further advocacy and support of this program can contact their regional harm reduction coordinator and/or the BCCDC naloxone program. ■

Acknowledgments

The authors would like to thank Sierra Williams, Dylan Collins, Sympascho Young, and Amina Moustaqim-Barrette for their insights on the history of the THN program for this article.

References

1. Moustaqim-Barrette A, Papamihali K, Mamdani Z, et al. Accessing take-home naloxone in British Columbia and the role of community pharmacies: Results from the analysis of administrative data. *PLoS One* 2020;15:e0238618.
2. McDonald R, Strang J. Are take-home naloxone programmes effective? Systematic review utilizing

- application of the Bradford Hill criteria. *Addiction* 2016; 111:1177-1187.
3. Buxton JA, Pursell R, Gibson E, Tzemiz D. Increasing access to naloxone in BC to reduce opioid overdose deaths. *BCM J* 2012;54:231-232.
 4. Banjo O, Tzemiz D, Al-Qutub D, et al. A quantitative and qualitative evaluation of the British Columbia Take Home Naloxone program. *CMAJ Open* 2014;2: E153-E161.
 5. The take home naloxone program saves lives. *Hospital News*. 2014. Accessed 22 February 2021. <https://hospitalnews.com/take-home-naloxone-program-saves-lives>.
 6. BCCDC. BC Take Home Naloxone Program In: THN sites, 2020, editor. Vancouver, BC, Canada: British Columbia Centre for Disease Control; 2020.
 7. Buxton J, Tsang E, Amlani A, Ferris C. BC take home naloxone program. *This Changed My Practice (UBC CPD)*. 2015. Accessed 22 February 2021. <https://thischangedmypractice.com/bc-take-home-naloxone-program>.
 8. Jafari S, Buxton JA, Joe R. Rising fentanyl-related overdose deaths in British Columbia. *Can J Addiction* 2015; 6:4-6.
 9. National Association of Pharmacy Regulatory Authorities. National drug schedules: Final recommendation on naloxone hydrochloride. 2016. Accessed 4 March 2021. <https://napra.ca/national-drug-schedules>.
 10. BCCDC Harm Reduction Services. Timeline of community naloxone in British Columbia, background. 2019. Accessed 22 February 2021. <https://towardtheheart.com/resource/thn-program-timeline/open>.
 11. Irvine MA, Buxton JA, Otterstatter M, et al. Distribution of take-home opioid antagonist kits during a synthetic opioid epidemic in British Columbia, Canada: A modelling study. *Lancet Public Health* 2018;3(5):e218-e225.
 12. Irvine MA, Kuo M, Buxton JA, et al. Modelling the combined impact of interventions in averting deaths during a synthetic-opioid overdose epidemic. *Addiction* 2019;114:1602-1613.
 13. Williams S, Lewis-King T, Buxton JA. Evaluation report: Evaluation of British Columbia's Facility Overdose Response Box (FORB) program. Vancouver, BC. BC Centre for Disease Control. 2019. Accessed 21 February 2021. <https://towardtheheart.com/resource/forb-program-evaluation-report/open>.
 14. BC Gov News. Ministerial order supports urgent overdose response action. 2016. Accessed 21 February 2021. <https://news.gov.bc.ca/releases/2016HLTH0094-002737>.
 15. Young S, Williams S, Otterstatter M, et al. Lessons learned from ramping up a Canadian Take Home Naloxone programme during a public health emergency: A mixed-methods study. *BMJ open* 2019;9:e030046.
 16. Ambrose G, Ishiguro S, Amlani A, Buxton JA. Overdose recognition and response: The BC Take Home Naloxone program evaluation. Review of data from Sept 2012–Mar 2015. Accessed 21 February 2021. www.bccdc.ca/resource-gallery/Documents/Educational%20Materials/Epid/Other/Naloxone%20Program%20Research%20Summary%20FINAL.pdf.
 17. Klassen D, Buxton J. Overdose recognition and response in the BC Take Home Naloxone program. Review of data up to July 2016. Accessed 15 March 2021. <https://towardtheheart.com/resource/evaluation-july-2016/open>.
 18. Mitchell K, Durante SE, Pellatt K, et al. Naloxone and the Inner City Youth Experience (NICYE): A community-based participatory research study examining young people's perceptions of the BC take home naloxone program. *Harm Reduct J* 2017. doi: 10.1186/s12954-017-0160-3.
 19. Mamdani Z, Buxton JA. Evaluation of British Columbia's take home naloxone program in community pharmacies. Vancouver: BC Centre for Disease Control. (2019). Accessed 15 March 2021. <https://towardtheheart.com/assets/uploads/1571953664uujs4Wj82uoRg5EBNAHxsi87cDYPgkMRp2TyV9t.pdf>.
 20. Moustaqim-Barrette A, Papamihali K, Buxton JA. Take home naloxone program report; review of data to December 2018 Vancouver, BC. BC Centre for Disease Control. 2019. Accessed 15 March 2021. <https://towardtheheart.com/resource/thn-evaluation-report-2019/open>.
 21. BCCDC. Harm reduction studies. Accessed 21 February 2021. www.bccdc.ca/our-research/projects/harm-reduction-studies.
 22. Moustaqim-Barrette A, Papamihali K, Crabtree A, et al. Correlates of take-home naloxone kit possession among people who use drugs in British Columbia: A cross-sectional analysis. *Drug Alcohol Dependence* 2019;205:107609.
 23. BCCDC. Overdose response reports. Accessed 21 February 2021. www.bccdc.ca/health-professionals/data-reports/overdose-response-reports.
 24. Pearce LA, Mathany L, Rothon D, et al. An evaluation of Take Home Naloxone program implementation in British Columbian corrections facilities. *Int J Prison Health*. 2019;15:46-57.
 25. Moustaqim-Barrette A, Elton-Marshall T, Leece P, et al. Environmental scan: Naloxone access and distribution in Canada. Canadian Research Initiative in Substance Misuse (June 2019) and Timeline of naloxone distribution in Canada. Vancouver, BC, Canada: British Columbia Centre for Disease Control 2019. Accessed 15 March 2021. https://crism.ca/wp-content/uploads/2019/06/CRISM_Enviro-Scan_Final-Draft_June18.pdf.
 26. Buxton J, Gilbert M, Kuo M, et al. Patient and physician resources for naloxone use in BC. *BCM J* 2018;60:84-85.

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We owe almost all of our knowledge not to those who have agreed but to those that have differed.

—Charles Colton, 1825

Following a substantive review by the Doctors of BC's Governance Committee, and a report and decision by the Doctors of BC Board, it was announced in January that the subcommittees of the Council on Health Promotion (COHP), including the Emergency and Public Safety Committee (EPSC), will be discontinued in late 2021. The present initiatives and responsibilities of these subcommittees will be refocused into special project groups under COHP. The structure and operational functioning of these groups remains to be determined. We would like to look back on the many initiatives that have been brought forward by the EPSC, previously known as the Emergency Medical Services Committee (EMSC), over its more than 40 years.

From personal recollection, we believe the EMSC has been in existence since at least the 1970s. In the mid-1980s it became a subcommittee of COHP. It has acted as a voice for BC's physicians on matters of vehicle safety (including alcohol and drug impairment and medical fitness to drive), disaster preparedness, prehospital and trauma care, and opioid overdose prevention services, as well as other special subject areas it has been tasked to address. Over previous decades the subcommittee has established an excellent and constructive working relationship with RoadSafetyBC (previously

the Office of the Superintendent of Motor Vehicles), to the benefit of all.

However, the road traveled was not always smooth. There were bumps along the way with various opposing advocacy groups, municipal and provincial governments, and within the association itself. Many programs that originated from the EPSC/EMSC are now taken for granted and proudly referenced. Examples are the introduction of mandatory seatbelts in vehicles, bicycle helmet requirements, excessive-speeding restrictions, impaired driving standards, banning of cellphone-distracted driving, and disaster preparedness at all levels.

That there was vocal opposition to some of this, including from BCMA members and Board appointees, should not be surprising. We observe that nearly all positive public health advances, since the 1854 destruction of Broad Street's cholera-producing pump, have been initially unpopular with the public, the media of the day, and frequently, the medical profession itself. A candid review of the BCMA/Doctors of BC history would confirm this.

Health advocacy can be controversial and polarizing. Nevertheless, without these healthy internal organizational frictions between zealous physician advocates and eager groups armed with sound scientific evidence to challenge established norms and opinions, little physician-driven health advocacy and social change would have occurred. We believe it is safe to say that the province's physicians would not presently enjoy their high level of public

trust without these lively internal debates and the decisions to move forward.

The authors are both old enough to recall when an education meeting was held the day before each June BCMA AGM. Afternoon presentations from COHP offered an opportunity for members to make health promotion resolutions from the floor. That is how the initiative for bicycle helmets began in 1986. Board member attendance at this portion of the meeting was regrettably low. COHP subcommittees were invited to submit resolutions to be considered

by the BC caucus for presentation at each August CMA General Council. There were robust discussions in a special caucus meeting in the month ahead. Caucus members were assigned mover and seconder roles, expected to research and present the motion succinctly (preferably with a bilingual component), and everyone took part in setting priorities.

The CMA disbanded its Health Promotion Committee 6 years ago. After 2017, the BC caucus became much smaller and no longer invited COHP resolutions to convey to the CMA, as the CMA changed its process of receiving policy submissions. Many past CMA policy resolutions originated from the BCMA. Some of these were endorsed and formed national policy, such as the restricted use of hands-free cellular phones, random breath testing, and calls for improvements in hospital disaster preparedness. Other COHP subcommittees and chairs have successfully lobbied for policies to

**Voices calling
for change will
always originate as
dissenting voices.**

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This article is the opinion of the Emergency and Public Safety 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.

Enhancing care for patients with a history of trauma

A list of books and articles about trauma-informed care, available through the College Library, is provided online at www.cpsbc.ca/files/pdf/Library-Trauma-Informed-Care-Resources.pdf. The books and articles were selected with particular focus on those providing practical recommendations to optimize care for patients who have experienced a traumatic event.

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

People who have experienced traumatic events may find the health care environment particularly challenging, but they are also at greater risk of having health problems.¹ These resources can assist with the multiple challenges of initiating communication, building trust, and addressing individual needs.^{2,3}

Electronic resources are listed first. Physical books are available for loan and are delivered via Canada Post with free return postage included.

If you would like a list of articles on a specific aspect of trauma-informed care, such as its implementation in a particular setting, or specific to a particular type of trauma, request

a literature search via this online form: www.cpsbc.ca/literature-search-requests. ■

—Niki Baumann
Librarian

References

1. Porcerelli JH, Jones JR, Klamo R, Heeney R. Childhood abuse in adults in primary care: Empirical findings and clinical implications. *Int J Psychiatry Med* 2017; 52:265-276.
2. Gerber M, ed. Trauma-informed healthcare approaches: A guide for primary care. Cham (CH): Springer, 2019.
3. Raja S, Hasnain M, Hoersch M, et al. Trauma informed care in medicine: Current knowledge and future research directions. *Fam Community Health* 2015;38: 216-226.

COHP

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restrict tobacco advertising (Bill C-51), pursued improved nutrition standards, promoted improved health through physical activity, and addressed the issues of healthy aging and preventing frailty.

Voices calling for change will always originate as dissenting voices. Constructive avenues for transformation must remain open in any organization or it risks having change forced upon it. We trust that any new health advocacy configuration, and the projects that evolve from COHP, will ensure sufficient member and subject-expert participation, and that the kinds of successful initiatives of the COHP's previous subcommittees will lead to further advancements and healthy societal change. ■

—Chris Rumball, MD

—Ian Gillespie, MD

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Resources to support transgender patients

Trans Care BC has created resources to help family physicians provide care to transgender and gender-diverse patients. Online education, medical forms, clinical resources, and patient materials are available at www.phsa.ca/transcarebc/health-professionals. The Trans Care BC care coordination team (for patients and providers) is accessible at 1 866 999-1514 or transcareteam@phsa.ca.

2020 Joule Innovation Grant winners from BC

Joule (a subsidiary of the CMA) selected 12 recipients for its 2020 Innovation Grants. The recipients are CMA members from across Canada and will share \$500 000 in funding to develop or expand their projects. For more information on the grant program and all of this year's recipients, visit <https://joulecm.ca/innovate/grants>.



Dr Melissa Lem is a Vancouver family physician and a clinical assistant professor in the University of British Columbia's Faculty of Medicine. She is also director of the BC Parks Foundation's Parks Prescriptions (PaRx) program, Canada's first national, evidence-based nature prescription program. The program is driven

Income replacement benefits due to COVID-19



Doctors of BC members have been heavily impacted by the global pandemic caused by the COVID-19 outbreak, working on the front line to help the public while dealing with the prospect of getting sick themselves. There are several options available to physicians (and MOAs) who are seeking an income replacement benefit during a period of illness resulting from COVID-19.

Physicians enrolled in the government-funded physicians' disability insurance (PDI) can access sickness benefits under regular disability certificate provisions, but can also access income benefits if quarantining due to an exposure, whether exposed to the virus inside or outside their occupation. There is a maximum of 14 days

available under quarantine claims for PDI (nontaxable). For physicians with Disability INCOMEprotect or Professional Expense Insurance, benefits are available after completing the elimination period (continuous period of sickness required) for those with a positive or presumptive positive test for COVID-19. If these options do not apply and physicians are quarantining due to an occupational exposure, the negotiated quarantine income replacement (QIR) benefit is available. The QIR will pay for a maximum of 2 weeks in the amount of \$3050 (taxable). This benefit is available multiple times if a physician faces new exposures and has to quarantine.

MOAs may have some disability insurance if enrolled in the Doctors of BC Health Benefits Trust Fund Plan, which can pay benefits after 17 weeks of continuous illness following a positive COVID-19 test. MOAs may also qualify for the Canada Recovery Sickness Benefit for periods of self-isolation or employment insurance sickness benefits for up to 15 weeks at 55% of earnings up to a maximum of \$573 a week following a positive test or forced quarantine following an exposure.

Physicians are encouraged to review their coverage options every 3 to 5 years or upon a life event to ensure they are equipped with the right insurance for their needs. For more information on available benefits or to speak with a licensed insurance advisor about options, contact the Insurance Department at insurance@doctorsofbc.ca or 604 638-2904.

—**Sam Morris, Insurance Administration Manager, Members' Products and Services, Doctors of BC**

by health care professionals who want to improve their patients' health by connecting them to nature.

Dr Lem has been awarded a \$50 000 grant, in the Sustainable Health Care category, which will allow her to scale PaRx across Canada, build the web application, develop and implement a climate points system for a related app, and create a CME-accredited online module to train prescribers to effectively prescribe nature. A key feature of the program is an app that will incentivize and track time spent in nature, and pair patients with nature experiences with the aim of reducing their stress, anxiety, and depression, and engage them in preventing and mitigating the effects of climate change. Health care providers who register with PaRx will be able to prescribe nature-based activities like planting trees, growing food, or taking part in watershed restoration projects with the aim of improving their patients' mental health.

Dr Lem is also president-elect of the Canadian Association of Physicians for the Environment, a widely published writer, and an experienced media personality. She has been researching, writing, and speaking about the connection between nature and health for more than a decade.

For more information about PaRx, visit www.parkprescriptions.ca.



Dr Abhi Cherukupalli is a family medicine resident at the University of British Columbia who is passionate about global health and medical innovation. He started the medical device

company Tractus Medical, and designed a device for the treatment of wrist fractures. The device offers consistent fixed traction throughout the treatment and casting process, and can improve the speed and accuracy of the treatment and increase the flow of patients in the emergency department. It can be operated by a single physician when a patient presents with a broken wrist, rather than multiple physicians having to work simultaneously to pull on the wrist and put the broken bones back into place.

It can also offer a more effective treatment that does not require surgery, decreasing a patient's involvement with the health care system.

Dr Cherukupalli was awarded a \$10 000 grant in the Emerging Physician Innovators category. The funds will help him and his team incorporate Tractus Medical, fund prototype development and manufacturing costs of the device, apply for a provisional patent, and apply for Health Canada approval to start clinical trials.

For more information about Tractus Medical, visit <https://ca.linkedin.com/company/tractus-medical>.



Dr Gregory Schmidt completed his general internal medicine fellowship at the University of British Columbia. He spent 2 years designing health care systems with Indiana University and AMPATH (Academic Model Providing Access to Healthcare) in rural Kenya. There he helped lead the redesign of Open MRS, the largest open-source electronic health record system used in low- and middle-income countries.

Dr Schmidt won a \$50 000 grant for his work with Bodo Health, a software startup and a virtual clinic that offers in-home speech, language, and voice services. In 8 months, Bodo Health moved from concept and research to a fully functional beta-clinic operating on its own telehealth and electronic medical record, and it is now expanding its services to four provinces.

Every year, more than 60 000 Canadians have a stroke, and stroke patients require a dedicated set of telehealth technologies for their assessment and rehabilitation. The grant, awarded in the Access to Care category, will allow Bodo Health to build tools for virtual post-stroke and neuro-rehab speech services. It will also allow Dr Schmidt and his multidisciplinary team to research, design, prototype, test, and build an integrated online stroke speech-language system; design digital tools and resources to help with face-to-face teletherapy appointments;

and hire a senior researcher to study Bodo's care model for its effectiveness, cost, and safety.

For more information about Bodo Health, visit www.bodohealth.com.

Are you receiving your Business Cost Premium payments?

Doctors of BC is encouraging eligible community-based doctors to confirm they are receiving the Business Cost Premium (BCP). Effective April 2020, the BCP provides a percentage premium on MSP fees for in-person consultation, visit, counseling, and complete examination services to help cover the rising rent, lease, or ownership costs of a community-based office.

Register now

Eligible BC doctors who have not yet registered for the BCP are encouraged to do so. Doctors who meet the following criteria are eligible:

- You are responsible for some or all of the rent, lease, or ownership costs of a community-based office, either directly or indirectly.
- Your community-based office is in an eligible geographical location (e.g., Metro Vancouver, Greater Victoria). Rural Retention Program (RRP) communities are not eligible; however, the Joint Standing Committee on Rural Issues is working on how it may direct funds to address this issue in rural areas.
- You are entitled to receive and retain payment for the eligible fees directly from MSP (i.e., payments assigned to health authorities are not eligible for the premium).

One month after its launch, the BCP was expanded to include telehealth (phone and video) fee items for consultation, visit, counseling, and complete examination services. This temporary measure ensures that eligible physicians can continue to access the premium during the pandemic, given these services would have normally been provided in person in physicians' offices.

You may register at any time. Visit www.doctorsofbc.ca/business-cost-premium for information and the application for registration.

If you are registered but not receiving payment

BC doctors who have registered for the BCP but are unsure if they are receiving payment are asked to double check their remittance statement. For doctors who have registered for the BCP, the payment will be listed in the adjustment area of the remittance statement [see Figure].

The most common reason for not receiving payment after registration is missing information on the billing claim: specifically, the BCP facility number assigned to the physician's community-based office. It is essential that the BCP facility number be included on each submitted billing claim for the Teleplan system to apply the correct percentage premium for each location. Please note that inclusion of

PERSONAL HEALTH BU REP	DATA SEQUENCE CENTER NUMBER	PLAN REF BU	REC CD	DTE OF SERV YEAR MN DD TO	NO BC FEE SYS ITEM	PAID AMOUNT	EXP CD 1 2 3 4	PRACT REF P	ENS IN CLR CD	AD1 AMOUNT CD	AD2 AMOUNT CD	AD3 AMOUNT CD
PRACITITIONER NAME		PRACT NUM		BILLED SERVICES 115		PAID AMOUNT \$15,367.58						
				AMOUNT TO BE ADJUSTED THIS PAYMENT		ADJUSTMENT MADE THIS PAYMENT \$254.82				TOTAL ADJUSTMENT OUTSTANDING		TOTAL AMOUNT TO BE ADJUSTED
				ADJUSTMENT CODE -BP - BUSINESS COST PREMIUM								
				NET TOTAL BLD:		15,367.58 PD:				14,944.32		

FIGURE. Sample remittance statement; adjustment area is circled, showing the BCP payment.

the facility number on billing claims may not be automated with some billing software.

Doctors who still have concerns about their BCP payment are encouraged to phone Health Insurance BC (HIBC) for assistance. HIBC administers the BCP on behalf of the Medical Services Plan and offers dedicated phone

support: Vancouver: 604 456-6950; elsewhere in BC: 1 866 456-6950. Upon request, HIBC can also provide approval for doctors to resubmit eligible claims to receive retroactive BCP payment.

If you have questions about the information in this story, email economics@doctorsofbc.ca.



Vaccine toolkit for physicians

Doctors of BC has developed an information toolkit to support doctors and their teams in conversations with patients about COVID-19 vaccines. The toolkit includes:

- Scripts for voicemails and websites.
- Documents for patients on vaccine effectiveness and safety (available for downloading and printing).
- Office posters.
- Links to share with patients.

The toolkit is available at www.doctorsofbc.ca/covid-19-vaccine-office-toolkit. It will be updated regularly as new products become available. If you have suggestions for further developments, email covid19@doctorsofbc.ca.

For patients with concussions: MyGuide from Vancouver Coastal Health

The online resource MyGuide: Concussion is designed to help adults manage and recover from concussions. The guide was developed by a team of experienced clinicians and content experts, and includes content on:

- Concussion symptoms
- Concussion recovery basics
- Returning to activities
- Concussion self-management
- Navigating the health care system
- Participating in research

The MyGuide Concussion website helps users design a customized guide for their recovery and to track their progress. For more information, visit <https://concussion.vch.ca>.



New episode of DocTalks: Physician burnout during COVID-19

Reports of physician burnout are increasing as BC doctors work to meet the unprecedented demands generated by the COVID-19 pandemic. But what does burnout look like? How do you recognize the early warning signs so you can take steps to prevent it? And where do doctors go for help?

In the latest episode of DocTalks, psychiatrist Dr Jennifer Russel and family doctor Dr Lawrence Yang share their perspectives about how burnout affects doctors, how to recognize it, and what steps to take to minimize the impact. From deploying personal coping strategies to implementing leadership and QI methodology and advocating for system-wide enhancements, they share the methods they've adopted—in their personal and professional lives—to stay well, and discuss what supports are available for doctors. DocTalks is available for download on all podcast platforms, and on the Doctors of BC website at www.doctorsofbc.ca/tags/doctalks.




NEW EPISODE

**Burnout and COVID-19:
Warning signs and when to act**

with guests
Dr Jennifer Russel and Dr Lawrence Yang





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Obituaries

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

Dr Leanne Dahlgren 1972–2020



It is with both great honor and deep sadness that we remember the life of Dr Leanne Dahlgren, who passed away unexpectedly on 21 December 2020. She was a devoted mother and wife, compassionate and skilled physician, scholar, valued mentor, and a dear friend and treasured colleague at BC Women's Hospital.

Leanne was born in August 1972 and grew up in Sturgis, Saskatchewan, a typical agricultural prairie town of 600. She always stayed true to her humble, friendly, and honest prairie roots, and her small-town sense of community.

From an early age, Leanne wanted to be a doctor, which, coming from a small town, seemed a far goal to reach. But reach it she did, going from undergraduate sciences to medical school and an obstetrics and gynecology residency at the University of Saskatchewan. There she met the love of her life, Paul Scott, whom she would marry and have a family with.

In 2001, Leanne began her maternal fetal medicine fellowship at BC Women's Hospital and a Master of Health Sciences in Epidemiology at UBC, completing them in 2004. She won several awards for her research work, including the 2005 S. Stewart Murray prize for best final paper of graduates from MHSc, and a Strategic Training Initiative in Research in the Reproductive Health Sciences CIHR/Health

Canada scholarship, among many others. Her first CIHR grant as a principal investigator soon followed.

From this foundation she was inspired to a career in medicine that provided both the art and science of our profession at the highest levels. Her passion and dedication for delivering the art of medicine (caring, compassionate, empathic, and women-centric care) was matched only by her rigorous adherence to the science of evidence-based medicine, as seen by her work with the Canadian Pre-term Birth and Canadian Neonatal Networks, among others.

Equally important to Leanne was teaching and mentorship—she was known for her enthusiasm and excellence in teaching, particularly at the resident and fellowship levels. In recognition of her dedication and excellence, she was awarded a Council on Resident Education in Obstetrics and Gynecology award in 2011. She also taught across the entire spectrum of health care providers, and her enormous influence on those whom she taught is demonstrated by the large number of emails and cards we received from places like the Middle East, UK, Israel, and across Canada.

Helping others by modeling and mentoring was important to Leanne; she felt firsthand the challenges of balancing work in an academic tertiary care centre with her roles of wife, mother, friend, colleague, clinician, and scholar. However, it was clear to all that Leanne's family was her first priority. Her son, Ronan, was born in 2006 after a pregnancy where she experienced the full gamut of emotions from stress and anxiety to awe and wonderment. Her daughter, Elin, followed in 2011. Those experiences inspired and motivated Leanne to improve the pregnancy experience for all women, evidenced by her involvement on committees promoting a safe and natural birth.

The third member of her brood was a Bouvier des Flandres dog, Jasper. All three were a source of great delight for Leanne and Paul, generating endless tales of laughter and joy, which she shared with all. Wherever she was, whatever she was doing, Leanne's family was never far from her thoughts. We know that Leanne would be proud of them at this difficult time, and be comforted by the knowledge that she and Paul raised their children well with their love, support, and guiding hands.

Dr Leanne Dahlgren shall be truly missed. She was the best of evidence-based medicine combined with compassion, kindness, gentleness, and a warm smile.

—Nancy Kent, MD
Vancouver

—Sayrin Lalji, MD
West Vancouver

—Kenneth Lim, MD
Vancouver

Dr James Wilson Grahame 1939–2020



It is with much sadness that I report the peaceful passing of Dr James Wilson Grahame in Victoria, British Columbia, on 6 November 2020. Wilson was much loved by his family and colleagues. He was born on 13 February 1939 in Maghera, Northern Ireland, and is survived by his loving wife, Jane, and their blended family

of six children (Michael, Jennifer, Stephanie, Timothy, Penny, and Oliver) and six grandchildren (Raleigh, Storme, Skyler, Loughton, Caitlin, and Dylan).

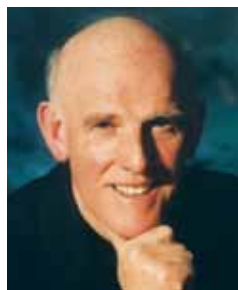
Wilson graduated from medicine at Queen's University in Belfast prior to immigrating to Winnipeg, in 1965, where he completed a residency in urology. He took a faculty position with the Department of Urology at the University of Manitoba. With his tremendous sense of humor and excellent teaching skills, he was a very popular instructor.

In 1976, Wilson relocated to Vancouver, practising at St. Vincent's, Mount Saint Joseph, Delta, and Richmond Hospitals. His skill and dedication as a clinician and his Irish humor were legendary. In 1993 Wilson developed a cardiac problem, forcing him to retire suddenly from his urology practice. Wilson and Jane relocated to Maple Bay on Vancouver Island and eventually to Oak Bay in Victoria.

Wilson embraced his passions with much enthusiasm, whether sailing, gardening, traveling, enjoying sports, or spending time with family and friends. With a twinkle in his eye and an abundance of Irish humor, he left an indelible impression on the innumerable lives he touched over the years. His legacy of joy and mischievous fun made the world a better place. Truly a class act.

—Russ Stogryn, MD
Langley

Dr George R. Gray
1932–2021



Hematology was in its infancy as a specialty in BC when George entered the field in 1962. As one of the first academic hematopathologists in Canada, George mentored close to 20 trainees, who either currently direct the hospital

and private labs in this province or have already retired. And there were many more foreign students, general pathologists, and clinical hematologists who benefited from his guidance. He championed the concepts of excellence in laboratory practice, with attention to administrative detail, the responsibility to teach, the value of research, and close collaboration with the technical staff. Following his early years in Montreal and Kingston, George graduated from Queen's Medical School in 1957 and came to BC to complete his pathology residency at Shaughnessy Hospital. He was a fellow student of Drs David Hardwick, Hugh Pontifex, Earl Shepherd, and Donald Rix, all of whom became distinguished leaders in academic pathology, and regional and private laboratories.

He joined Dr Wally Thomas at Vancouver General Hospital, determined to further develop the nascent field of hematopathology, and became the go-to guy in the province for difficult blood film and bone marrow interpretation. He later focussed his research interests describing rare local abnormal hemoglobins (i.e., Hbs Vancouver and Lulu Island).

Both he and Wally valued a close interaction between the lab diagnostic and the clinical applications of hematology, and early on welcomed Dr Shelly Naiman who expanded the diagnostic coagulation lab, and me, who came to lead the blood transfusion program and then Dr Ted Reeve, who helped develop the transplant immunology program. Among the others recruited by George for the VGH lab were Drs Jorge Denegri, Paul Keown, Cedric Carter, Randy Gascoyne, Bakul Dalal, and Monika Hudoba. Later, more of his protégés, such as Drs Deborah Griswold, Robert Coup-land, and David Pi, returned to make contributions to this lab. George seemed to find great pleasure as the reliable straightman for Shelley Naiman's jibes, and annually we all eagerly awaited his appearance in a seersucker suit as the harbinger of summer.

George headed the division from 1981 to 1998. Following retirement at the hospital he served as a medical consultant at Canadian Blood Services and was appointed as clinical professor emeritus at UBC. As a committee man, he helped establish the Royal College Examination Board in Hematopathology and

the BC Association of Lab Physicians.

Traveling became an even more important part of his life after retirement as he continued teaching with colleagues in China, India, and South America, and as a result further honed his taste for very spicy food. George was predeceased by his wife, Sylvia, and is survived by his children, Ian and Katherine; their partners; his brothers; and those of us fortunate enough to remember this very good friend and valuable colleague.

—Jerry Grove, MD
Vancouver

(With assistance from Ian and Katherine Gray)

Dr Arnold George Lowden
1927–2020



Arnold was a prairie boy at heart. Born in Regina and raised in Yorkton, Saskatchewan, his mother, Lorene, was a homemaker and his father, Stan, an accountant. He played hockey for the University of Saskatchewan Huskies during his undergraduate studies, and completed his medical degree at the University of Toronto in 1951. Interning at St. Paul's Hospital in Vancouver, he met Charmaine Gruchy, a young nurse from West Vancouver. They married in 1952, with fellow intern Dr C.E. McDonnell and Dr Peter Marr at his side.

Arnold initially practised in Yorkton, where he coached the Junior B hockey team to the 1953 provincial championship. He and Charmaine later moved to Gull Lake, where Arnold worked alongside Dr John Matheson, who became a lifelong friend. In 1958, he obtained his diploma in public health in Toronto, returning to the Tisdale region as public health officer. Arnold resumed general practice in Moose Jaw in 1960. He always enjoyed the provincial medical curling bonspiels.

OBITUARIES

In 1966, Arnold joined the R.B. White Clinic in Penticton, BC. He became a school trustee, was team doctor and part owner of the Junior A Broncos, and president of the BC Junior Hockey League.

He became the medical health officer for the East Kootenays in 1975. He quickly initiated an alcohol and drug counseling service, which became the East Kootenay Addiction Services Society, and was named director emeritus for 30 years of outstanding service. Arnold served on many boards and committees, including the AIDS Network Kootenay Outreach and Support Society (ANKORS), and the EK Union Board of Health.

Arnold was deeply involved in the Cranbrook community. He served as chair of the school board (and on the provincial council), as Cranbrook Community Theatre board member (with several supporting theatrical roles!), and, alongside Charmaine, as an active member of First Baptist Church. He was a director with the Cranbrook Royals Hockey Club and a strong supporter of the Kootenay Ice. Arnold was an avid golfer and curler, and loved singing

with the Kootenay Harmony Chorus.

Arnold retired from public health in 1992, but assisted at surgeries for 5 more years. In retirement, he faithfully delivered school lunches for the Salvation Army, imparting many kind words along the way. He enjoyed time spent with friends and family, and remained active in the community. His decades of willing service and leadership improving the health of the community were recognized in 2008, when he was declared Citizen of the Year by the Chamber of Commerce.

The staff and residents of Kootenay Street Village became Arnold's new family when long-term care visits were not possible this year. He passed away peacefully with family members at his side—an honorable end to a life well lived. Arnold was predeceased by his parents and sister, Marjorie. He is survived by his wife, Charmaine, and their three children, seven grandchildren, and six great-grandchildren.

—Keith G. Lowden, MD
Cranbrook

—Launny R. Lowden, MD, FRCP
Cranbrook

Recently deceased physicians

If a BC physician you knew well is recently deceased, please consider submitting an obituary. Include the deceased's dates of birth and death, full name and the name the deceased was best known by, key hospital and professional affiliations, relevant biographical data, and a high-resolution photo. Please limit your submission to a maximum of 500 words. Send the content and photo by e-mail to journal@doctorsofbc.ca.

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New agreement between Doctors of BC and WorkSafeBC

Recent negotiations between WorkSafeBC and Doctors of BC have resulted in a new agreement, which recognizes the importance of the work and time put in by physicians to help injured workers. Here are some of the big changes to note from the new agreement, valid from 1 April 2019 to 31 March 2022.

In Year 1, there is a rate increase to specific WorkSafeBC fee codes. In Years 2 and 3, a 2.3% rate increase will be applied to all WorkSafeBC fee codes. There are also increases to the expedited surgery premium (ESP) for surgeries. Please refer to the new fee schedule for more information.

The family doctor of an injured worker will receive the Form 8 fee even if the injured worker previously saw a doctor at a walk-in clinic or hospital. The agreement recognizes that family physicians have a better understanding of their patient's health history and that they can provide insight that other physicians may not. To receive the Form 8 fee (fee code 19937), physicians must answer "yes" to the question, "Are you the injured worker's regular practitioner?" In addition, the Form 8 must be received within 10 business days of the date that the first Form 8 was received by WorkSafeBC.

To improve the process of starting a claim, WorkSafeBC has added a timeliness tier for sending Form 8. If you send a Form 8 within 1 business day of treating the injured worker,

you will receive a financial bonus. Offering a financial incentive should result in physicians sending their assessments sooner, which will in turn create a WorkSafeBC claim faster.

As part of this agreement, WorkSafeBC can no longer request unsevered medical records. When requesting a copy of an existing report, such as a consult report or an imaging report, clinics can bill fee code 19904. This is a flat

fee regardless of the number of pages sent. A new fee code has been created (19959) for use if WorkSafeBC requests a copy of a Form 11. This fee code has the same rate as fee code 19940 (the code for electronically sending Form 11). When you receive a request for severed medical records, you can continue to bill fee code 19953. If you receive the request but your clinic has

no files to send as a result, your clinic can still invoice the fee code for severed medical records.

Billing for WorkSafeBC-related telephone calls has been simplified. If there is a phone call or office consultation between a treating physician and either a WorkSafeBC officer, a medical advisor, a WorkSafeBC-sponsored treatment program physician, a community physician, and/or a community allied health provider, your clinic should bill fee code 19930. This new agreement has eliminated fee codes 19919 and 19508.

For surgeons, a new zero dollar fee code (19326) has been created to allow them to start the 40-day clock for ESP. A surgeon can bill this new fee code after receiving approval for submitting Form 83D6, Authorization Request for Surgery. If code 19326 is not billed, surgeons can still use fee codes 19911, 19912, and 19908 to start the 40-day clock for ESP.

The agreement recognizes that family physicians have a better understanding of their patient's health history and that they can provide insight that other physicians may not.

For more details on these changes and the new rates, please refer to the new Doctors of BC agreement with WorkSafeBC at www.worksafebc.com/en/resources/health-care-providers/guides/physicians-and-surgeons-worksafebc-services-agreement. Remember to invoice WorkSafeBC within 90 days of the date of treatment to prevent any delays in processing payments. Should you require assistance, please call WorkSafeBC Payment Services at 604 276-3085 or toll free at 1 888 422-2228. You can also arrange a learning opportunity through our accredited academic detailing program by calling 1 855 476-3049 or emailing MedicalServicesEvents@worksafebc.com. ■

—Ernest Salcedo

WorkSafeBC Health Care Services Client Representative



British Columbia Medical Journal
@BCMedicalJournal

#CollaborateOnHealthBC: Patient care toolbox expands with virtual care

Dr John Yap remembers the exact date he and his four colleagues knew the way they provide care was about to change dramatically: Friday, March 13.

Read the article: bit.ly/3aFnZib#page=3

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

Guidelines for authors

The *British Columbia Medical Journal* is a general medical journal that seeks to continue the education of physicians through review articles, scientific research, and updates on contemporary clinical practices while providing a forum for medical debate. Several times a year, the *BCM^J* presents a theme issue devoted to a particular discipline or disease entity.

We welcome letters, blog posts, articles, and scientific papers from physicians in British Columbia and elsewhere. Manuscripts should not have been submitted to any other publication. Articles are subject to copyediting and editorial revisions, but authors remain responsible for statements in the work, including editorial changes; for accuracy of references; and for obtaining permissions. The corresponding author of scientific articles will be asked to check page proofs for accuracy.

The *BCM^J* endorses the “Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals” by the International Committee of Medical Journal Editors (updated December 2016), and encourages authors to review the complete text of that document at www.icmje.org.

All materials must be submitted electronically, preferably in Word, to:

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Editorial process

Letters to the editor, articles, and scientific papers must be reviewed and accepted by the *BCM^J*'s eight-member Editorial Board prior to publication. The Board normally meets the last Friday of every month, at which time submissions are distributed for review the following month. We do not acknowledge receipt of submissions; the editor will contact authors of articles by email once the submission has been reviewed by the Board (usually within 8 to 10 weeks of submission). The general criteria for acceptance include accuracy, relevance to practising BC physicians, validity, originality, and clarity. The editor contacts authors to inform them whether the paper has been rejected, conditionally accepted (that is, accepted with revisions), or accepted as submitted. Authors of letters are contacted only if the letter is accepted and editorial staff need further information. Scientific papers and other articles typically take 5 to 10 months from the date of receipt to publication, depending on how quickly authors provide revisions

and on the backlog of papers scheduled for publication. Manuscripts are returned only on request. The *BCM^J* is posted for free access on our website.

For all submissions

- Avoid unnecessary formatting, as we strip all formatting from manuscripts.
- Double-space all parts of all submissions.
- Include your name, relevant degrees, email address, and phone number.
- Number all pages consecutively.

Opinions

BCMD2B (medical student page). An article on any medicine-related topic by a BC physician-in-training. Less than 2000 words. The *BCM^J* also welcomes student submissions of letters and scientific/clinical articles. BCMD2B and student-written clinical articles are eligible for an annual \$1000 medical student writing prize.

Blog. A short, timely piece for online publication on bcmj.org. Less than 500 words. Submissions on any health-related topic will be considered. Should be current, contain links to related and source content, and be written in a conversational tone.

The Good Doctor. A biographical feature of a living BC physician. Less than 2000 words.

Letters. All letters must be signed, and may be edited for brevity. Letters not addressed to the Editor of the *BCM^J* (that is, letters copied to us) will not be published. Letters commenting on an article or letter published in the *BCM^J* must reach us within 6 months of the article or letter's appearance. No more than three authors. Less than 300 words.

Point-Counterpoint. Essays presenting two opposing viewpoints; at least one is usually solicited by the *BCM^J*. Less than 2000 words each.

Premise. Essays on any medicine-related topic; may or may not be referenced. Less than 2000 words.

Proust for Physicians. A lighthearted questionnaire about you. Submit responses online at www.surveymonkey.com/s/proust-questionnaire, print a copy from the *BCM^J* website at www.bcmj.org/proust-questionnaire, or contact journal@doctorsofbc.ca or 604 638-2858.

Special Feature. Articles, stories, history, or any narrative that doesn't fit elsewhere in the *BCM^J*. Less than 2000 words.

Departments

Obituaries. Include birth and death dates, full name and name deceased was best known by, key hospital and professional affiliations, relevant biographical data, and photo. Less than 500 words.

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Clinical articles/case reports/survey studies

Manuscripts of scientific/clinical articles and case reports should be 2000 to 4000 words in length, including tables and references. The first page of the manuscript should carry the following:

- Title, and subtitle, if any.
- Preferred given name or initials and last name for each author, with relevant academic degrees.
- All authors' professional/institutional affiliations, sufficient to provide the basis for an author note such as: “Dr Smith is an associate professor in the Department of Obstetrics and Gynaecology at the University of British Columbia and a staff gynecologist at Vancouver Hospital.”
- A structured or unstructured abstract of no more than 150 words. If structured, the preferred headings are “Background,” “Methods,” “Results,” and “Conclusions.”
- Three key words or short phrases to assist in indexing.
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2. Mollison PL. *Blood Transfusion in Clinical Medicine*. Oxford, UK: Blackwell Scientific Publications; 2004. p. 78-80.
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. p. 1367-1372.
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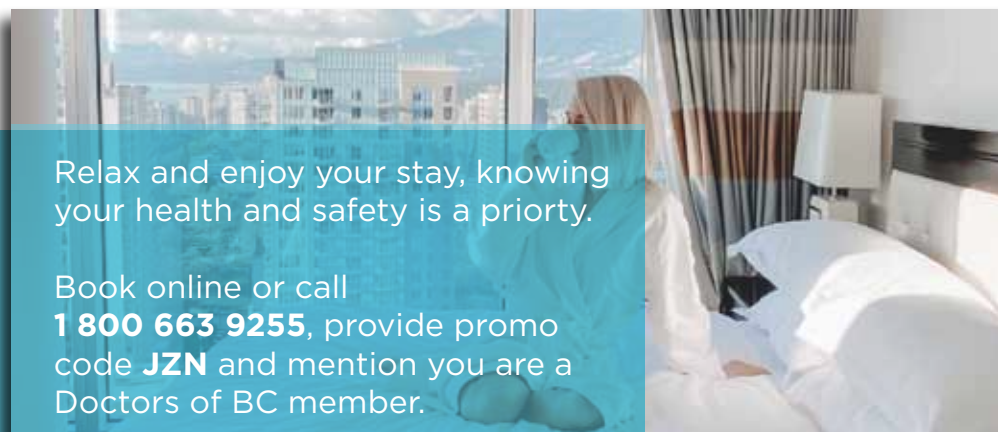
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The upper airway: Cross-disciplinary conversations

Thoughts on the upper airway gleaned from conversations with my colleagues across disciplines, considered from an evolutionary and public health point of view.

Mark Elliott, MD, FRCPC

Thinking about upper-airway problems, three themes emerge. First, many health care practitioners, including doctors, dentists, chiropractors, physiotherapists, and nutritionists, are involved in treating patients with upper-airway issues, but in very siloed ways. Second, humans have an inherent cognitive bias to treat rather than do nothing (called *action fallacy* in the psychology literature) once a disease is present. Third, surgery is becoming less invasive. That can mean not leaving patients with huge incisions on their bellies but rather four small laparoscopic holes sewn up with a stitch or two each. It can also mean not performing surgery at all, when the downsides of complications are fully written into the equation. The conservative approach that neurosurgeons now take toward doing a lumbar laminectomy is the poster child for this approach. The approach is to wait and see while using muscle strengthening of hip extensors and flexors to restore a more normal lumbar anatomical lordosis.

Anatomy of the upper airway

Anatomically the upper airway goes from a patient's glabella to the thyroid cartilage (top of nose to bottom of voice box). It is the basic oxygen delivery structure. In humans, the upper airway includes dozens of bones, muscles, nerves, arteries, and veins. All of this anatomy, from the erectile tissue in the turbinates of the

nose to the mitochondria in the cells of the arytenoid muscles, acts in an integrated way.

Nature versus nurture

The upper airway has to be thought of in evolutionary terms; however, nothing garners more emotion than an empiric study that says human trait A or B or C is 30% or 60% or 90% genetic. This is especially true for traits such as facial esthetics. The willpower versus biology arguments are generally a waste of time as nature and nurture are like the sides and ends of an ever-changing rectangle, too integrated to separate in any meaningful way. The phrase used in a recent evolutionary biology publication is "heredity interacting with experience filtered through the inherent randomness of development"; in other words, nurture acting on nature through time.¹

Nitric oxide

Nitric oxide (NO) is a biological signaling agent. A Nobel Prize was awarded in 1998 for the discovery of its cardiovascular dilating effect. Sildenafil uses these NO biochemical pathways for its effects. The initial enthusiasm about the nitric oxide pathway has fizzled somewhat. In my field of anesthesiology, it is only used in parts-per-million concentrations for open heart patients with bad pulmonary hypertension or right-ventricular dysfunction to alter ventilation perfusion (or V/Q) mismatch for better oxygenation (oral communication from Dr John Bowering, anesthesiology, Providence Health Care) or in the ICU to buy some time with severe sepsis (oral communication from Dr Demitrios Sirounis, anesthesiology,

Providence Health Care). It is expensive, polluting, and exogenous. Much recent interest in nitric oxide is the endogenously produced NO from the sinuses.

Anesthesiologists

Outside the operating room, when an anesthesiologist is consulted for an upper-airway situation in the hospital, it continues to be for some extremis situation. What has changed dramatically is the technology used to intubate. Decades ago, with an old-fashioned direct laryngoscope, it was not uncommon for the operator to not be able to visualize the larynx for intubation because they were basically trying to look around a corner with direct vision. This was especially so if the patient had a small mentohyoid distance (short chin); had decreased neck mobility, which meant inability to put the head in a sniffing position (flexion of the cervical spine and extension of the atlanto-occipital joint); or was obese, which increased the odds of not being able to bag mask ventilate optimally. There has been remarkable improvement in intubating equipment over the last few decades, which started with various bougies (thin bent tubes that are inserted somewhat blindly into the trachea and an endotracheal tube then threaded over them to achieve intubation), then moved on to fiberoptic endoscopes (introduced by our respirologist colleagues who did bronchoscopies), and now video laryngoscopes (laryngoscopes with small video cameras at the end so seeing around the corner is easy). This technological development, along with "improved communication and situational awareness" that the CMPA stresses, should lead to safer airway management.²

Dr Elliott is a staff anesthesiologist at Providence Health Care in Vancouver.

This article has been peer reviewed.

Otolaryngologists

Pediatric surgical practice has changed a lot since the Tonsil Hospital of the 1920s in New York City, which was built to do tonsillectomies on kids to prevent recurrent infections and the dreaded complication of rheumatic heart disease from strep throat.³ The famous Paradise Study of 1984 showed that while a tonsillectomy prevented recurrent bouts of tonsillitis, so did waiting.⁴ It is not uncommon for an ENT surgeon to be consulted about removing tonsils, especially if they are “kissing.” Surgery is reserved for the most severe cases with a well-established diagnosis of sleep apnea. Most kids do not have sleep apnea, and it doesn’t correlate well with tonsil size (oral communication from Dr Paul Moxham, otolaryngologist, BC Children’s Hospital).

Sinus surgery is becoming more and more of a subspecialty in otolaryngology. One reason for this is the remarkable development of sinus surgery endoscopic technology, as has also happened for the anesthesiologist. There is a growing recognition that sinus surgery has a downside, which has led to a much more conservative selection of patients for surgery (oral communication from Dr Andrew Thamboo, otolaryngologist, Providence Health Care). It is known that nitric oxide, which is produced in the paranasal sinuses, upregulates the ciliary action in the mucosa with effects on the microbiota of the upper airway.

Orthodontists

Traditional orthodontics says crooked teeth are inherited from parents and can be treated very well with braces. Orthodontics treatment gets excellent results if patients wear retainers for years after braces come off. Dr Mike Mew (the most-known orthodontist in the world as measured by YouTube subscribers⁵) questions this from an evolutionary point of view (braces treat the symptom of crowded teeth, resulting in a nice smile, but the causal factor is weaker muscles/a smaller jaw). He says that in the last few hundred years technology has created softer, higher-calorie foods that we essentially breastfeed/suckle versus having to chew using muscles of mastication. His treatment (called *orthotropics*) is basically to sit up straight and chew your food well (electronic communication

from Dr Robert Sapolsky, professor of biology/neurosurgery, Stanford) along with specific swallowing exercises (the pharyngeal constrictor and longitudinal muscles are involuntary skeletal muscles, not smooth [oral communication from Dr Arman Abdalkhani, otolaryngologist, UBC]), and taping the mouth shut while

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pulmonary medicine
usually say that if you
are not breathing well
when you are asleep
then you are not healthy.**

sleeping. Some heavy hitters from Stanford in academic biology have chimed in to support this, claiming that these concepts warrant a thorough scientific attempt to falsify.⁶

Oral surgeons

Oral surgeons in our health care system take out molar teeth. Also included in their practice are the LeFort mandibular and maxillary osteotomies for orthodontic reasons. After working for many years with a very skilled maxillofacial surgeon, I find myself questioning the risk-reward ratio of these procedures, especially considering that less than 100 years ago no one did these types of procedures and there is no historical record of a molar health care crisis.

Respirologists

The respirologist is consulted more and more for queries on obstructive sleep apnea.⁷ This malady is becoming a public health issue as its incidence goes up. The list of diseases associated with sleeping disorders is also getting longer. A large percentage of these patients are overweight, and it is up to the respirologist, who more often than not orders a sleep study, to figure out if the mechanism of the sleep apnea is obstructive or central. A CPAP device is usually recommended and very often helpful but compliance with the apparatus is not great. The people in pulmonary medicine usually say that if you are not breathing well when you are asleep then you are not healthy

(oral communication from Dr Pierce Wilcox and Dr Najib Ayas, respirologists, UBC).

Family practitioners

Breathing exercises are big these days.⁸ Techniques date back to ancient yogis (pranayama), are numerous, and are commonly tied to meditative practice. Family practitioners see a lot of this attached to stress management. The underlying evolutionary principle is that all animals (except humans and maybe dogs) breathe through the nose rather than the mouth, which has the advantages of filtering pollutants in the air, humidifying the air, and increased sinus nitric oxide production. Breathing/meditative techniques stress the diaphragmatic rather than chest wall muscles for gas exchange in the lungs. There is undoubtedly a modicum of truth to the idea that breathing less (just like eating less) will increase parasympathetic tone over the excessive sympathetic tone present in stressed patients.

The future

How will the shift to less-invasive treatment of the airway play out in 100 years? It’s possible to imagine that we will look back at today’s treatment of the upper airway like we now look back on bloodletting, the rack, or even leeches. ■

References

1. Linden D. Unique: The new science of human individuality. Basic Books; 2020.
2. CMPA. The unanticipated complicated airway: Are you ready? Accessed 28 January 2021. www.cmpa-acpm.ca/en/advice-publications/browse-articles/2018/the-unanticipated-complicated-airway-are-you-ready.
3. New York Times. A tonsil remedy is fitted for a new century. Accessed 28 January 2021. www.nytimes.com/2011/04/12/health/12klass.html.
4. Paradise JL, Bluestone CD, Bachman RZ, et al. Efficacy of tonsillectomy for recurrent throat infection in severely affected children—results of parallel randomized and nonrandomized clinical trials. *N Engl J Med* 1984;310:674-683.
5. New York Times Magazine. How two British orthodontists became celebrities to Incels. Accessed 28 January 2021. www.nytimes.com/2020/08/20/magazine/teeth-mewing-incels.html.
6. Kahn S, Ehrlich P. Jaws: The story of a hidden epidemic. Stanford University Press; 2018.
7. Osman A, Carter SG, Carberry JC, Eckert DJ. Obstructive sleep apnea: Current perspectives. *Nat Sci Sleep* 2018;10:21-34.
8. Nestor J. Breath: The new science of a lost art. Penguin Random House; 2020.

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