File No. CI 20-01-29284

THE QUEEN'S BENCH
Winnipeg Centre

BETWEEN:

GATEWAY BIBLE BAPTIST CHURCH, PEMBINA VALLEY BAPTIST CHURCH, REDEEMING GRACE BIBLE CHURCH, THOMAS REMPEL, GRACE COVENANT CHURCH, SLAVIC BAPTIST CHURCH, CHRISTIAN CHURCH OF MORDEN, BIBLE BAPTIST CHURCH, TOBIAS TISSEN, ~~DJ'S FAMILY RESTAURANT, LYLE NEUFELD, HELEN NEUFELD~~, ROSS MACKAY

Applicants,

- and -

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF MANITOBA, and DR. BRENT ROUSSIN in his capacity as CHIEF PUBLIC HEALTH OFFICER OF MANITOBA, and DR. JAZZ ATWAL in his capacity as ACTING DEPUTY CHIEF OFFICER OF HEALTH OF MANITOBA

Respondents.

Affidavit of BRENT ROUSSIN
Affirmed, March 8, 2021

Manitoba Justice, Legal Services Branch
Constitutional Law Section

Per: Michael Conner
Heather Leonoff
Denis Guénette

[redacted]

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Respondents.

AFFIDAVIT

1. I am the Chief Provincial Public Health Officer for the Province of Manitoba, appointed as such under section 10 of *The Public Health Act*.

2. I have personal knowledge of the facts and matters stated in this affidavit – except where they are based upon information and belief, in which case I believe them to be true.

A. My Experience, Education and Credentials

3. I am a member of the College of Physicians and Surgeons of Manitoba, and have been an active member since 2002. As a physician, I specialize in public health and preventive medicine.

4. I obtained my Doctorate of Medicine in 2000, from the Rady Faculty of Health Sciences, the University of Manitoba's Faculty of Medicine. I completed a residency in family medicine at the University of Manitoba from 2000 to 2002.

5. In 2009, I obtained a law degree from Robson Hall, the University of Manitoba's Faculty of Law.

6. In 2011, I obtained a Master's degree in Public Health, from the Department of Community Health Sciences, in the University of Manitoba's Faculty of Medicine. I completed a residency in public health at the University of Manitoba and the Royal College of Physicians and Surgeons of Canada from 2009 to 2012. One area that engages my interest is the social determinants of health, and the intersection of medicine and the law.

7. I was appointed as the Chief Provincial Public Health Officer for the Province of Manitoba on June 3, 2019, pursuant to Order in Council 200/2019.

8. Prior to becoming Manitoba's Chief Provincial Public Health Officer, I was employed as a Medical Officer of Health on a full time basis, in the province's Department of Health, starting September 4, 2012. (OICs 387/2012 and 258/2013). In that capacity I worked with the First Nations and Inuit Health Branch in the Government of Canada.

9. Attached and marked as **Exhibit 1**, is a copy of my curriculum vitae (my home address is redacted).

B. Department of Health and Seniors Care

10. The office of the Chief Provincial Public Health Officer for the Province of Manitoba is housed administratively within the Department of Health and Seniors Care, and reports directly to the Deputy Minister of Health and Seniors Care.

11. Working with me is the Deputy Chief Provincial Public Health Officer, Dr. Jazz Atwal. In addition, the department employs policy analysts and public health advisors, as well as numerous individuals appointed as Medical Officers of Health under *The Public Health Act*. We work closely with numerous specialists in a variety of public health disciplines including epidemiologists and data analysts within the Information Management and Analytics Branch, including the Epidemiology and Surveillance Unit, and the Cadham Provincial Laboratory at Shared Health Inc.

12. Ordinarily, the main functions of my office are to:

a. Promote and protect the health of Manitobans, including monitoring and reporting on their health status.

b. Provide co-ordinated and integrated health leadership, including supporting government departments and other partners to improve the overall health of Manitobans and reduce health disparities

c. Take appropriate action consistent with the powers and responsibilities described for the Chief Provincial Public Health Officer in *the Public Health Act*.

d. Advance public health knowledge and capacity.

13. However since early 2020, the vast majority of my office's time and resources have been dedicated to responding to the COVID-19 pandemic.

14. By reason of my office and statutory mandate, I have been required to learn a considerable amount about the SARS-CoV-2 virus and the disease that is COVID-19 – including the evolving state of knowledge about them.

15. While my office and the Department of Health and Seniors Care have played a central and leading role in the Province of Manitoba's strategy to respond to the COVID-19 pandemic, we have not been the sole participants in the effort – nor even the sole leaders. For example, the province has established an Incident Command structure, which is co-chaired by myself and Lanette Siragusa, Chief Nursing Officer from Shared Health Inc. This structure was initially established in February 2020 – even before the virus and disease had a presence in Manitoba.

16. The establishment of an Incident Command System is a recognized emergency response methodology to effectively manage emergency response efforts. For COVID-19 in Manitoba this has been implemented through a Unified Incident Management Structure. Attached as **Exhibit 2** is a high-level overview of the structure, current to February 18, 2021. The colour-coding relates to the broad categories that are standard features of an Incident Command System: The Centralized Committee is in Green,

Operations are represented in orange, Planning in blue, Logistics in yellow, and Finance in gray.

17. Apart from the Department of Health and Seniors Care, the pandemic has also impacted and engaged the attention of most every aspect of the remainder of government as well.

18. Some of the elements of the Government's COVID-19 response strategy that do not fall directly within the Department of Health and Seniors Care, include:

a. The Testing Task Force has been established to coordinate and oversee testing-related initiatives for both rapid testing and regular testing.

b. The Centralized COVID Cases and Contact Team has been established for contact tracing operations.

c. The Vaccine Task Force has been established to plan and conduct vaccine sites and processes for vaccine administration.

19. In addition to overseeing the public health response to the pandemic, my office has been involved in assisting many offices of government generally, to address impacts of the pandemic across sectors.

C. COVID-19 and SARS-CoV-2

20. COVID-19 is a disease caused by a virus named "SARS-CoV-2" – for Severe Acute Respiratory Syndrome Coronavirus 2. It is one of a group of viruses known as *coronaviruses*, of which seven are known to infect humans.

21. The first cases of what is now called COVID-19 emerged in December 2019, in Wuhan, China and the causal agent (SARS-CoV-2) was identified soon thereafter. Since then, the virus has spread all over the world. On January 30, 2020, following the recommendations of the Emergency Committee, the World Health Organization's Director General declared that the outbreak constitutes a Public Health Emergency of International Concern. According to the World Health Organization's website https://covid19.who.int/ as of March 2, 2021, there have been nearly 114 million confirmed cases globally of people infected with SARS-CoV-2, and more than 2.5 million COVID-related deaths.

22. The first known appearance of the virus in Manitoba was on March 12, 2020. This first case was travel related and other travel-related clusters of infections followed. However, community transmission of the virus, where the source of infection could not be identified, was later seen and it has subsequently spread to nearly all inhabited corners of the province.

23. SARS-CoV-2 is considered a *novel* coronavirus, as it was first isolated and identified within humans in January 2020.

24. SARS-CoV-2 can spread from an infected person to others through the creation of respiratory droplets and aerosols (smaller droplets). These respiratory droplets and aerosols can be created when an infected person breathes, coughs, sneezes, talks, sings or shouts. After the virus has been discharged by an infected person, the two primary methods by which an uninfected person becomes infected are:

a. The infectious droplets or aerosols are inhaled by another individual or come into direct contact with the mucous membranes of their nose, mouth or eyes.

b. The virus may also spread when a person touches another person (i.e. a handshake) or a surface or an object (also referred to as a fomite) that has the virus on it, and then touches their mouth, nose or eyes with unwashed hands.

25. An infected person will most commonly discharge the virus by exhaling. The virus can also be discharged by spread of saliva or other bodily fluids. Certain activities, such as coughing, talking loudly or singing, are more likely to spread the virus because they create more droplets and propel them further.

26. COVID-19 has proven to be highly communicable and contagious among people. As discussed in more detail in the affidavit of Jason Kindrachuk, peer reviewed studies have demonstrated that:

a. Asymptomatic and especially pre-symptomatic transmission of SARS-CoV-2 does occur. There is strong scientific evidence that virus transmission primarily occurs from a few days before symptom onset up to about five days after.

b. While children tend to experience less severe disease (unless they have an underlying condition), there is evidence that children can transmit the virus. Older children and teenagers may transmit the virus as efficiently as adults.

c. There is evidence that certain activities like singing and talking loudly can pose a greater risk of transmission. Thus, choirs in faith-based gatherings are of concern.

27. It has become understood that certain settings, including indoor crowded spaces with poor ventilation, have led to a higher risk of transmission. The Public Health Agency of Canada says as follows on its website, a print-out of which is attached as **Exhibit 3**:

https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/main-modes-transmission.html#_Settings_with_higher :

> **Settings with higher risk of transmission**
>
> Outbreak investigations and scientific studies are revealing more about COVID-19 and this new knowledge is being applied to reduce its spread. We know that the virus is most frequently transmitted when people are in close contact with others who are infected with the virus (either with or without symptoms). We also know that most transmission occurs indoors.
>
> Reports of outbreaks in settings with poor ventilation suggest that infectious aerosols were suspended in the air and that people inhaled the virus. These settings have included a choir practice, fitness classes, and restaurants. Transmission in these settings may have been facilitated by certain environmental conditions, such as re-circulated air.
>
> There is no evidence at this time that the virus is able to transmit over long distances through the air, for example, from room to room through air ducts. It is still unclear how easily the virus spreads through contact with surfaces or objects.

28. Like all viruses, SARS-CoV-2 evolves and changes as it replicates, which has led to the detection of many new variants. Most variants do not

engage any greater level of concern. But some variants do raise concerns because they have greater clinical or public health significance – such as increased transmissibility, increased severity, or impacts on the efficacy of vaccines or therapeutics. These are referred to as Variants of Concern. As of March 5, 2021 there are three Variants of Concern which have been identified globally. Of these, B.1.1.7 (first described in the United Kingdom) and B.1.351 (first described in South Africa) have already been identified in Manitoba.

29. On the issue of variants, the World Health Organization has said as follows, in a posting that it made on December 31, 2020 https://www.who.int/csr/don/31-december-2020-sars-cov2-variants/en/:

> All viruses, including SARS-CoV-2, change over time, most without a direct benefit to the virus in terms of increasing its infectiousness or transmissibility, and sometimes limiting propagation (see Q&A on COVID-19 and related health topics). The potential for virus mutation increases with the frequency of human and animal infections. Therefore, reducing transmission of SARS-CoV-2 by using established disease control methods as well as avoiding introductions to animal populations, are critical aspects to the global strategy to reduce the occurrence of mutations that have negative public health implications.

30. As the name of the virus implies – Severe Acute Respiratory Syndrome Coronavirus 2 – COVID-19 is a respiratory disease. It entails a range of clinical presentations and potential symptoms that vary in frequency and severity. Some of the most common symptoms include fever, cough, fatigue, shortness of breath, loss of appetite, and loss of smell and taste. Some individuals who are infected never develop any symptoms at all. This is referred to as being asymptomatic.

31. There is a spectrum of COVID-19 disease severity that is seen:

a. For many infected people, the symptoms they experience will be mild, of short duration, largely benign, and followed by a full recovery and complete return to normal health.

b. But for some people, the range of heath consequences is neither mild nor benign. For a certain segment of the population who become infected, COVID-19 engages very serious symptoms that can only be treated through hospitalization. Some individuals require admission to an Intensive Care Unit and ventilation.

c. COVID-19 can be fatal for the most severely affected segment of the population.

32. As such, COVID-19 is a disease that has both morbidity (illness) and mortality (death) implications – both of which can require hospitalization with a need for significant medical intervention. The risk of serious outcomes, including death, tends to increase with age and certain pre-existing conditions.

33. The Public Health Agency of Canada, in a publication dated December 12, 2020, and titled *People who are at risk of more severe disease or outcomes from COVID-19*, explains as follows:

https://www.canada.ca/en/public-health/services/publications/diseases-conditions/people-high-risk-for-severe-illness-covid-19.html

Who is at risk of more severe disease or outcomes?

- Older adults (increasing risk with each decade, especially over 60 years).
- People of any age with chronic medical conditions including:
  - lung disease
  - heart disease
  - hypertension (high blood pressure)
  - diabetes
  - kidney disease
  - liver disease
  - dementia
  - stroke
- People of any age who are immunocompromised, including those:
  - with an underlying medical condition (e.g., cancer)
  - taking medications that lower the immune system (e.g., chemotherapy)
- People living with obesity (BMI of 40 or higher).

34. Manitoba data current to February 8, 2021 shows that 8.1% of all COVID-19 cases have had a severe outcome resulting in hospitalization or death. Epidemiological reports provided to me by the Epidemiology and Surveillance Unit reveal that approximately 90% of deaths occur among persons over 60 years of age. However, approximately one third of hospitalizations and 44% of COVID-19 patients admitted into the Intensive Care Unit are under the age of 60. This is discussed in greater detail in the affidavit of Carla Loeppky.

35. There is evidence that First Nation persons, who make up 12% of the provincial population, are particularly vulnerable. According to the Manitoba First Nations COVID-19 Pandemic Response Coordination Team, as of February 19, 2021, 31% of cases in Manitoba have been First Nations persons. Of these, almost 55% are off reserve. The median age of

hospitalizations among First Nations persons is 51, while the median age for ICU admissions is 57. Attached as **Exhibit 4** is a copy of the Coordination Team's Weekly Bulletin (February 19, 2021). The data in the report is provided by the Epidemiology and Surveillance Unit. Also attached as **Exhibit 21** is a publication dated March 1, 2021, which has been posted on the Manitoba Health and Seniors Care website, entitled *COVID-19 Infections in Manitoba: Race, Ethnicity and Indigeneity*. It demonstrates how data from around the world has shown COVID-19 infections are not evenly distributed by population groups, as Black, Indigenous and People of Colour (BIPOC) are overrepresented in COVID-19 infections. The report includes data from May 1, 2020 to December 31, 2020, and provides data and context on how COVID-19 has affected BIPOC communities in Manitoba.

36. I am also aware of evidence that a certain segment of the population have experienced persistent long-term symptoms from COVID-19. Sometimes these lingering symptoms are serious, such as breathing difficulty, and this is not limited to an older age demographic. These have colloquially been referred to as "long haulers". In a September 23, 2020 article published in the Journal of the American Medical Association, a United Kingdom team estimated that overall approximately 10% of people who had COVID-19 experience prolonged symptoms. However, it remains too early to draw conclusions about the number, age distribution and severity of the long-term impacts of COVID-19. Attached as **Exhibit 5** is a copy of that article, titled *As Their Numbers Grow, COVID-19 "Long Haulers" Stump Experts*. Further study is required, and is being examined by the World Health Organization.

D. Evolving knowledge about the virus and the disease

37. Because the virus has only recently been introduced within the human species, the state of knowledge about it, including scientific and peer-reviewed knowledge, is evolving rapidly. Many uncertainties remain. For example, the extent of the lasting personal health consequences to those who did not experience a full recovery, or did not succumb to death, remains unknown. Studies continue to be done all over the world to answer many questions, such as how transmissible it is among children, the extent of asymptomatic or pre-symptomatic transmission, whether immunity is lasting after infection or vaccination, the impact of new variants of the virus, the impact of the virus on pregnant women and their fetuses, the impact on children related to an over-active immune response, the extent to which pre-existing conditions make people more vulnerable, and the efficacy of various non pharmaceutical interventions to limit the spread.

38. This also means that the state of the underlying scientific or peer-reviewed knowledge about the disease and its implications is different, depending on the period of time that is being discussed. Thus, what was reliably known in March and April 2020, was far more limited than what was reliably known in November and December 2020. And what is reliably known now, in February and March 2021, is more advanced than it was in November and December 2020. Still, it is fair to say that even now the overall understanding of this novel coronavirus continues to be relatively nascent – albeit evolving and growing.

39. At any given time during an unfolding pandemic, public health decisions need to be made by public health officials – but they can only be

based on the best available known information at that time. When these decisions are made, it is with the recognition that new knowledge will likely be forthcoming. In an article titled *Ranking the effectiveness of worldwide COVID-19 government interventions*, published in the December 2020 edition of the journal Nature Human Behaviour, at page 1303, the authors write on the first page that "Decisions had to be undertaken under rapidly changing epidemiological situations, despite (at least at the very beginning of the epidemic) a lack of scientific evidence on the individual and combined effectiveness of these measures, degree of compliance of the population and societal impact." Attached as **Exhibit 6** is a copy of that article.

40. The public health evidence base is created through scientific research findings, surveillance and epidemiology and community consultation. As new scientific evidence and peer-reviewed literature emerges from around the world in relation to COVID-19, it is being absorbed for analysis and consideration. Officials in Manitoba, across Canada and internationally have been working collaboratively to accumulate and share current knowledge, experience and best practices as things rapidly evolve, to respond to the pandemic.

41. Within Manitoba, a collective sharing of knowledge has been occurring as a result of discussion and dialogue among experts that include the following categories of officers, specialists and entities:

a. Public health experts and officers.

b. Epidemiologists.

c. Basic scientists (virologists, immunologists).

d. Cadham Provincial Laboratory.

e. Providers of health services, including acute care specialists (ER, ICU).

f. Regulated health professions, and representative organizations of members in health professions.

g. Officers within the Department of Health and Seniors Care, including policy analysts.

h. Senior policy advisors, and elected officials.

42. Across Canada, various officials throughout governments have been engaging in discussions with their counterparts – which has also been contributing to the growth of collective shared knowledge. In fact prior to the pandemic, in 2018, the Pan-Canadian Public Health Network (the "PCPHN") had published the Federal/Provincial/Territorial Public Health Response Plan for Biological Events – a 57-page document, the purpose which is explained as follows on page iii:

> ... designed to be an overarching governance framework to guide F/P/T public health responses to biological events. It was developed by an expert task group comprised of experts in public health and emergency management, as identified by members of the Public Health Infrastructure Steering Committee (PHI-SC) and the Communicable and Infectious Disease Steering Committee (CID-SC). It was approved by PHN on October 17, 2017.

43. Attached as **Exhibit 7** are some extracts from that publication which offer an understanding of the broader extent to which coordinated inter-

jurisdictional efforts are engaged for a pandemic. The entire document can be found at the webpage https://www.canada.ca/content/dam/phac-aspc/documents/services/emergency-preparedness/public-health-response-plan-biological-events/pub1-eng.pdf .

44. Using my own experience as an example in this regard, my office has been participating on the following inter-jurisdictional groups:

a. In January 2020, the PCPHN established a **Special Advisory Committee** ("SAC") to provide advice to the Federal-Provincial-Territorial ("FPT") Conference of Deputy Ministers of Health pertaining to the coordination, public health policy and technical content related to the COVID-19 outbreak. Membership on the SAC includes members of the Pan-Canadian Public Health Network Council and the Council of Chief Medical Officers of Health. The SAC is co-chaired by Dr. Theresa Tam, Canada's Chief Public Health Officer, and a provincial or territorial chief medical officer of health on a rotating basis. Experts, senior FPT public health officials and Indigenous organizations support the Committee. The Committee meets several times a week to discuss the coordination of the response to COVID-19 across Canada's health systems. Information about the SAC appears on the PCPHN's website, at http://www.phn-rsp.ca/sac-covid-ccs/index-eng.php, and a copy of that webpage is attached as **Exhibit 8**.

b. The **Technical Advisory Committee** (the "TAC"), which meets twice weekly, provides a forum for vetting/sharing of technical

information amongst task groups, and is responsible for the inclusion of a program policy analysis as needed. The TAC approves and endorses technical information and actions that will go to the SAC for approval or decision via the FPT SAC Secretariat. The SAC may choose to delegate the approval of purely technical products to the TAC. TAC is co-chaired by the FPT co-chairs of the Communicable Infectious Disease Steering Committee (the "CID-SC") or their designates. Members will include technical representatives from each P/T and federal jurisdiction stakeholders.

c. The **Council of Chief Medical Officers of Health** (the "CCMOH") is a forum for promoting excellence in population and public health practice through communication, and collaboration and exchange of ideas, knowledge, experience and best practices. CCMOH membership includes the Chief Medical Officer of Health from each provincial and territorial jurisdiction, Canada's Chief Public Health Officer, the most senior Public Health Physician of the First Nations and Inuit Health Branch of Indigenous Services Canada, the Chief Medical Officer from the First Nations Health Authority, and ex-officio members from other federal government departments. The CCMOH meets weekly.

45. It is my understanding that Dr. Theresa Tam, the Chief Public Health officer of Canada, is regularly in touch with many of her counterparts globally regarding evolving knowledge and best practices to fight the pandemic.

E. The Speciality of Public Health and Preventive Medicine

46. Public health is a specialty within the field of medicine. The Royal College of Physicians and Surgeons of Canada refers to it as the Speciality of Public Health and Preventive Medicine. Attached as **Exhibit 9** is a copy of a publication from the College, most recently revised in 2018, which discusses the discipline's objectives. Its opening paragraphs explain as follows:

> Public Health and Preventive Medicine is the medical specialty primarily concerned with the health of populations. The discipline's focus is disease and injury prevention and control, which is achieved through health protection and health promotion activities. A Public Health and Preventive Medicine specialist monitors and assesses the health needs of a population and develops, implements, and evaluates strategies for improving health and well-being through interdisciplinary and intersectoral partnerships.
>
> Building on foundational competencies in clinical medicine and the determinants of health, the Public Health and Preventive Medicine specialist demonstrates competencies in public health sciences, including but not limited to epidemiology, biostatistics, and surveillance, planning, implementation and evaluation of programs and policies, leadership, collaboration, advocacy, and communication. These competencies are applied to a broad range of acute and chronic health issues affecting a population, including those that may be related to environmental exposures.

47. The Canadian Public Health Association has also published its own explanation of the discipline in a document entitled *Public Health: A Conceptual Framework* (second edition, 2017), a copy of which is attached as **Exhibit 10**. On page 4, it defines public health practice as follows:

DEFINING PUBLIC HEALTH PRACTICE

> Public health practice can be viewed as an approach to maintaining and improving the health of populations that is based on the principles of social justice, attention to human rights and equity, evidence-informed policy and practice, and addressing the underlying determinants of health. Such an approach places health promotion, health protection, population health surveillance, and the prevention of death, disease, injury and disability as the central tenets of all related initiatives. It also means basing those initiatives on evidence of what works or shows promise of working. It is an organized, comprehensive, and multi-sectoral effort.
>
> This definition and the practice of public health have developed over time, and will continue to develop to meet the evolving health requirements of the population. As these demands grow, there will be debates concerning the role and purpose of public health practice and the scope of practitioners' activities. Underlying these debates and developments, however, are an amalgam of concepts and practices that are the foundation and building blocks of public health.
>
> https://www.cpha.ca/sites/default/files/uploads/policy/ph-framework/phcf_e.pdf

48. In Manitoba, public health has been made the subject of its own statute, *The Public Health Act*, and it essentially encapsulates those explanations and definitions. Section 2 establishes the overall purpose of that Act as being to enable the delivery of public health services to promote and protect the health and well-being of the people of Manitoba. The term "public health services" is defined as including "health surveillance, population health assessment, health promotion, health protection, disease prevention and control, and injury prevention."

49. In its 2003 report entitled *The Future of Public Health in the 21st Century*, the Institute of Medicine defined public health as follows: "Public

health is what we, as a society, do collectively to assure the conditions for people are healthy." Regarding that phrase, Bailey et al. write as follows in their text *Public Health Law and Policy in Canada* (2019, 4th edition), at page vi:

> The IOM's definition can be appreciated both by observing its emphasis on co-operative and mutually-shared obligation ("we, as a society"), and by focusing on the collective responsibility for healthy populations (e.g. governments and communities). The definition also makes clear that even the most organized and socially conscious society cannot guarantee complete physical and mental well-being. The role of public health, therefore, is to "assure the conditions for people to be healthy". These conditions include a variety of educational, economic, social and environmental factors that are necessary for good health.

50. While medicine is traditionally focused on the treatment of the individual, public health as a discipline focuses on populations. As Bailey et al. explain at page vi:

> The physician diagnoses disease and offers medical treatment to ease symptoms and, where possible, to cure disease. Public health, on the other hand, seeks to understand the conditions and causes of ill-health (and good health) in the populace as a whole. It seeks to assure a favourable environment in which people can maintain their health.

51. Bailey at al. explain the overriding purposes of public health as follows, at page vi:

a. To monitor and evaluate the health status of populations.

b. To devise strategies and interventions designed to ease the burden of injury, disease and disability.

c. To promote the public's health and safety.

52. Mattersthat are within the scope of public health include more traditional death and illness threats like chronic disease, tobacco consumption, and unhealthy diets. It also engages population-based policy considerations, such as development of strategies to address identifiable problems. And it can include working with at-risk populations to address higher-than-normal occurrences of these threats to health. [p. v]

53. Public health intervention seeks to reduce mortality and morbidity, and places emphasis on disease prevention and health promotion for a community. [p. vi]

54. When it comes to decision-making in the realm of public health, the authors of Chapter 2 in the text by Bailey at al., explain the main principles that underlie the ethics of public health that guide sound decision-making: effectiveness, proportionality, necessity, least infringement, and public justification. They also explain on page 55 that in 2002, R.E.G. Upshur proposed four principles to guide in the justification of public health intervention: the harm principle (i.e. preventing harm to others), the principle of least restrictive or coercive means, the reciprocity principle (i.e. public reciprocation for the individuals who comply with their duties), and the transparency principle (i.e. engaging affected stakeholders in decision-making). All four of these principles, as elaborated by Upshur, are briefly explained on pages 4 and 5 of the attached publication *Ethics in Practice for Registered Nurses*, from February 2006 – a copy of which is attached as **Exhibit 11.**

55. Certain aspects of these principles – most notably the principle of least restrictive or coercive means – are generally codified in Manitoba's *Public Health Act*, at section 3, which reads as follows:

> **Limit on restricting rights and freedoms**
> **3** If the exercise of a power under this Act restricts rights or freedoms, the restriction must be no greater than is reasonably necessary, in the circumstances, to respond to a health hazard, a communicable disease, a public health emergency or any other threat to public health.

56. Public health officials have an important role to implement measures to contain and limit the spread of communicable diseases, including pandemics. As the Canadian Public Health Association explains on page 5 of its publication, public health practice is based on the five main building blocks of evidence, risk assessment, policy, intervention and evaluation. These are supported by a foundation of health equity, social justice, and the social determinants of health.

57. Relatively recent viral outbreaks such the 2003 SARS outbreak, and the 2009-2010 H1N1 influenza pandemic, have generally heightened awareness of the need to enhance comprehensive pandemic response preparedness plans. Among other things, recent experience led to Manitoba's Legislature repealing the former Public Health Act and replacing it with an entirely new statute (S.M. 2006, c. 14) which was proclaimed into force on April 1, 2009.

F. Implementation of Public Health Measures in Response to COVID

58. Since March 2020, various measures have been implemented in Manitoba in response to the COVID-19 pandemic. They consist of a suite of measures, which are generally similar to measures seen across Canada and much of the rest of the world. The general public health consensus throughout the world is that limiting the number and duration of contacts, especially indoors, is necessary to prevent the spread of SARS-CoV-2. Where things vary is in the scope and extent of the measures that have been implemented.These are informed by the local epidemiology and key indicators including health care capacity.

59. In Canadian jurisdictions, the objective is to implement the least restrictive measures necessary to prevent or limit the spread of the pandemic and minimize the number of serious outcomes in terms of mortality and morbidity, while balancing the hardships that might result from public health restrictions and minimizing societal disruption.

60. No single measure is sufficient on its own. In Manitoba, the nature and extent of measures has been wide-ranging on several fronts. What follows is my attempt to illustrate some of the more important measures, without necessarily intending this to be taken as a comprehensive list.

i) Public Dissemination of Information

61. One important category of measures which has been implemented from the start of the pandemic, has been disseminating information and providing public health advice to Manitobans in different forms. Messages have been offered to the public at large about fundamental preventive

practices, such as staying home when sick, regular handwashing, minimizing one's own hand-to-face contact, wearing masks, and physical distancing.

62. Messaging is provided to the public by many means. Manitoba has pandemic-related webpages (https://manitoba.ca/covid19/index.html), provides regular briefings on the current state and evolution of the pandemic, uses social media to convey daily messages, and posts pandemic-related news releases daily (https://news.gov.mb.ca/news/index.html). In addition, Manitoba has led by example in developing signage in offices and on premises, and recommended to other non-government entities to do the same. Signage encourages preventive practices, such as asking individuals to self-screen for symptoms before entering a premises.

63. Despite these concerted efforts at providing informative messaging and public advice, the reality is that public advice alone is insufficient to combat a pandemic of the magnitude of COVID-19. Some individuals will take risks that become broader public health problems. There is also the unfortunate reality that some sources have been disseminating misinformation in a way that corrodes the effect of public messaging.

ii) Evidence Collection

64. Health surveillance and collection of evidence is one of the core functions of public health and a critical part of the evidence base. It is crucial for public health surveillance to be ongoing. There needs to be systematic collection, analysis, interpretation and dissemination of health data to help guide the decision-making and actions.

65. Sections 41 and 42 of *The Public Health Act* impose reporting requirements on certain classes of people – notably health professionals and those in charge of laboratories – related to communicable diseases (including COVID-19). These reports must be prepared and submitted to my office as specified in regulations.

66. Mandatory reporting is an important first step in responding to any communicable disease, and it has been a crucial way for awareness to be raised with my office about COVID-19 within Manitoba. Mandatory reporting overrides legal and ethical confidentiality interests of individual patients, but in a way that places safeguards for that information. In addition, Part 8 of the Act establishes a regime for health surveillance and information gathering and sharing.

67. Data provided to me through the Epidemiology & Surveillance Unit helps me to understand the magnitude of the problem, the rate of increase, who is affected, and the distribution and spread of cases. It also allows for a better understanding of the disease in terms of the clinical spectrum and range of severity. It assists in detecting clusters and outbreaks, evaluating prevention measures, monitoring for changes in the variants, and assisting with the planning of public health actions including the use of resources.

iii) Basic Core Strategies

68. In order to respond to COVID-19, a set of basic core strategies has been developed and implemented.

69. Testing has been a vital component of the public health response to COVID-19. Laboratory testing has been important to accurately identify

individuals who have been infected, and to respond accordingly to reduce transmission. Testing has also assisted in evidence collection, for monitoring of the number of cases of the virus, and the performance of contact tracing, understanding the overall burden of the disease, assessing the extent of community spread, and identifying probable locations of concern. This information has allowed for a more tailored response to the pandemic geographically and over time.

70. Contact tracing has also been a vital component of the public health response to COVID-19. It involves the identification of people who have been in contact with individuals known to have contracted the disease, and who are therefore at risk of having themselves contracted the disease. This might lead to an order to self-isolate for a period of time (discussed below). Because of the magnitude of the spread of the virus, contact tracing for COVID-19 has required a high volume of staffing resources. We have the capacity to trace the contacts of as many as 700 cases per day, with streams of work divided as follows:

a. COVID-19 Case Investigation.

b. Complex Cases Investigation.

c. Contact Notification.

d. Active Daily Monitoring.

71. These streams are supported with recruited entities in healthcare through the Provincial Recruitment and Redeployment Team (PPRT), in addition to partnerships with agencies such as the Canadian Red Cross, Statistics Canada, and others. Contact tracing operations are overseen by

the Contact Tracing and Virtual Call Centre Branch, in collaboration with the regional health authorities and with clinical oversite by the Department.

iv) Interventions (Non-Pharmaceutical)

72. Throughout the pandemic, a variety of "non-pharmaceutical interventions" have been engaged.

73. Travel restrictions and self-isolation have been one category of measures.

74. Throughout the pandemic, the self-isolation period has been for 14 days. While the scope of people who have been required to self-isolate for that period has varied somewhat, the requirement to self-isolate has largely been directed at people who have entered into Manitoba from beyond, and people who have contracted the virus or been exposed to someone who has contracted the virus (usually identified through contact tracing).

75. The first Self Isolation Order for Persons Entering Manitoba was made on April 16, 2020, and variations have periodically been made to it.

76. A distinct Self-isolation Order was made on August 27, 2020, and was later replaced by the Self-Isolation and Contact Tracing Orders, which added a requirement on infected persons to provide information about their contacts.

77. In addition, at times there have been restrictions on travel within the province – most notably orders prohibiting travel to northern Manitoba and remote communities.

78. And of course, since March 20, 2020, there has been a succession of COVID-19 Prevention Orders, which have focused on limiting the potential for spread of the virus. I will discuss these orders in greater detail further below.

79. In addition to binding orders, advice and guidance has been given throughout the pandemic to specific sectors for the implementation of sector-specific measures. For example, this has resulted in development of measures regarding child care centres, public education (K to 12 schools), post-secondary institutions, personal care homes and long term care facilities, correctional facilities and the justice system, and government offices and services, among others. In many instances, these measures are implemented by the particular sector and are not orders under *The Public Health Act*.

v) Vaccines and Other

80. Vaccines have also become an important measure in responding to COVID-19, since their availability in January 2021.

81. Vaccines can be critical to stopping the spread of a contagious disease like COVID-19. An effective vaccine lowers the chances of an individual getting COVID-19 if they are exposed to the virus. In addition to this, widespread vaccination will limit spread through communities. Vaccinations also limit the opportunity for a virus to mutate into more virulent or more transmissible variants of concern.

82. In addition to the above public health measures, the provincial response strategy to COVID-19 has required constant consideration of the

availability of limited health care resources – notably equipment, facilities and human resources. Often, health care resources must be shifted to accommodate growing demands of COVID-19.

G. Public Health Orders

83. Public Health Orders (PHOs) are one important category of measures we have implemented in Manitoba in response to the COVID-19 pandemic. The basic thrust of the PHOs has been to reduce the number of close contacts and gatherings to limit or prevent the opportunity for a highly communicable disease like COVID-19 to spread and cause serious outcomes. Jurisdictions throughout Canada and the world have implemented broadly similar, albeit not identical, measures.

84. Public Health Orders are made under section 67 of *The Public Health Act*, by the Chief Provincial Public Health Officer for the Province of Manitoba, upon approval by the Minister of Health and Seniors Care. Section 67 empowers the Chief Provincial Public Health Officer to make orders if they reasonably believe that a serious and immediate threat to public health exists because of an epidemic or threatened epidemic of a communicable disease, and the threat to public health cannot be prevented, reduced or eliminated without taking special measures.

85. COVID-19 poses a serious and immediate threat to public health. According to the World Health Organization, there have been over 2.5 million deaths globally since the pandemic began. In Manitoba, as of March 5, 2021, there have been over 30,000 cases of COVID-19, including almost 2,400 hospitalizations and over 900 deaths.

86. Determining special measures that are necessary to prevent, reduce or eliminate the threat to public health requires careful analysis of many different factors and indicators including epidemiological evidence, the capacity of Manitoba's health care system and other systemic factors. No single factor or indicator is determinative. The most important factors and indicators include:

a. The total number of cases, regional incidence, and the rate of growth (e.g. doubling time of cases, the effective reproduction number Rt).

b. The number of serious outcomes (hospitalizations, ICU admissions and deaths).

c. The location of the cases and the extent of community transmission.

d. Outbreaks and clusters in highly vulnerable settings.

e. Test positivity rate and trend.

f. Capacity for testing.

g. Capacity for contact tracing. If community transmission becomes rampant and numbers grow too quickly, it becomes nearly impossible to contain the virus through contact tracing.

h. Active versus recovered cases.

i. The characteristics of virus transmission, including the potential for asymptomatic or pre-symptomatic transmission.

j. Health care system capacity. This is a critical factor. If the number of cases overwhelms the health care system, some people may be deprived of adequate health care. Delays in treatment for both COVID care and non-COVID care can adversely affect quality of life and in severe cases can lead to death.

87. Public health officials also consider potential collateral effects of restrictions such as unintended adverse economic or mental health impacts. By their nature, pandemics are very hard on a population. In addition to the direct health impacts of the disease, pandemics may cause fear and anxiety among the public. Public Health Orders that restrict gatherings or temporarily close places can also adversely affect peoples' economic status and their mental health. This is why we seek to impose the least restrictive measures necessary. It is a difficult balance, which must be re-evaluated in a dynamic way as the pandemic progresses. Governments also attempt to alleviate these hardships by providing mental health supports and economic relief.

88. Public Health Orders in Manitoba are not made in isolation. In addition to knowledge regarding local epidemiology, they are also based on current scientific information and knowledge gathered from Canada and around the world. This includes:

a. Peer reviewed articles.

b. Recommendations from organizations like the World Health Organization, and the Pan-Canadian Public Health Network's Special Advisory Committee and Technical Advisory Committee.

c. Lessons learned from actual experiences observed in Manitoba and in other jurisdictions.

89. As noted, while the number of fatalities attributable to COVID-19 is an important consideration, it also very important to monitor closely any strain on our limited health care resources. Hospitalization is a particularly important factor because if the number of severe COVID-19 cases overwhelm our hospital and ICU capacity, we may be unable to provide critical care to those who need it. This could result in preventable deaths or adverse health outcomes for both COVID-19 and non-COVID-19 patients. I am in regular contact with Lanette Siragusa, Incident Command co-chair, who keeps me apprised of hospital and ICU capacity.

90. In this regard, it is important to comment on Dr. Bhattacharya's concerns about potential false positives from the RT-PCR test. The RT-PCR test very accurately determines laboratory confirmed cases of COVID-19. This provides me with an accurate picture of the overall burden of COVID-19 in the community. An individual who tests positive may be infectious. However, even if that individual is no longer infectious, it remains important to identify all RT-PCR positive cases for contact tracing purposes. This allows us to locate other persons who may have contracted the disease in order to prevent further spread. It also enables us to identify potential clusters of the virus that need to be addressed through focused measures.

91. However, the RT-PCR test is not the driving factor for public health decisions. Rather, as discussed, many indicators are taken into account to assess the severity of the pandemic and determine what measures are necessary. Hospital capacity is particularly critical. Indeed, any concern

about so-called "functional false positives" becomes wholly irrelevant when one considers actual numbers of hospitalizations, ICU admissions, and deaths resulting from COVID-19. It was primarily the fact that those numbers were skyrocketing in November 2020 and ICU capacity had to be expanded that demanded urgent action.

92. Since March of 2020, I have made nearly 70 Orders in response to the COVID-19 pandemic, some containing several specific orders, and six of which were in force as of March 2, 2021. Throughout the pandemic, these orders have been neither uniform nor static. Their content has continually been adjusted as required, to respond to the prevailing conditions of the pandemic at a particular time. Sometimes, different measures have applied to different regions within the province.

93. My office first became aware of the virus and the disease in December 2019 or January 2020. When the virus first appeared in Manitoba in March 2020, cases were initially traceable to a relatively limited number of persons who had travelled and their contacts. In those early days, much about the virus remained unknown. We were very concerned about widespread transmission overwhelming our health care system as we had seen in early hot spots in the world such as China, Italy and New York City.

94. Starting in March 2020, we began to issue a number of Pubic Health Orders to limit gatherings, and to reduce the risk of transmission. On March 20th, all indoor and outdoor gatherings, including at places of worship were limited to 50 people. At that time retail establishments could remain open subject to 1-metre physical distancing. Theatres and gyms were closed. Restaurants and hospitality premises were limited to the lesser of 50 people

or 50% capacity. On March 30th, the gathering limits were further reduced to a maximum of 10 people. Then starting April 1 businesses were closed, except they could continue to provide services remotely online or by phone and allow pick-up and delivery service, as long as physical distancing measures were in place. Businesses listed in a schedule could remain open for in-person attendance as long as they maintained physical distancing of 2 metres. Restaurants were also restricted to delivery and take-out only (with proper physical distancing). Notably, the Public Health Orders did not place any restrictions on physicians and nurses in the delivery of health care services.

95. During the first wave, these basic restrictions remained in place, however they were adjusted as the pandemic progressed to reflect growing knowledge and to respond to particular circumstances relating to different types of activities and establishments. In addition, travellers from outside the province were required to self-isolate for a fixed period upon arriving or returning to Manitoba to prevent the spread of virus. And within Manitoba, travel to northern Manitoba and remote communities was also restricted, in attempt to prevent the spread of SARS-CoV-2 to more vulnerable populations.

96. Starting on May 22, 2020, the gathering restrictions were relaxed to allow up to 25 people indoors and 50 people outdoors, including in places of worship. In part, this reflected our understanding that the risk of transmission was greater in indoor settings.

97. The fundamental goal and premise of all the public health orders is and has been to reduce the risk of transmission by limiting close contacts,

especially prolonged gatherings indoors, to prevent SARS-CoV-2 from spreading too rapidly and overwhelming Manitoba's health care system. The expression "flatten the curve" became part of our daily language.

98. As the first wave of the pandemic began to subside in the summer of 2020, public health restrictions were eased gradually and progressively. For example, beginning on June 21, 2020, maximum gathering sizes were increased to 50 people indoors or up to 100 people outdoors, subject to certain exceptions. Many businesses re-opened up to 75% capacity and subject to physical distancing requirements. By July 24, businesses could generally re-open with physical distancing, unless otherwise specifically addressed in the public health orders. Religious services were also permitted with up to 500 persons or 30% of the usual capacity (whichever was less), again with physical distancing. These restrictions continued more or less in this form until the fall.

99. COVID-19 is a fluid and evolving pandemic, requiring constant monitoring and vigilance. The level of restrictions initially imposed in March and April 2020 were no longer required in the summer. Likewise, the measures that were necessary to respond to the pandemic starting in November 2020 were different than what was necessary in the first wave. The first wave turned out to be relatively small in comparison. By the fall of 2020, Manitoba began to experience widespread and uncontrolled community transmission and the entire province was put under Level Red (critical).

H. November 2020 – The Circuit Break

100. By November 2020, the situation in the province significantly worsened. Community spread had started to occur rampantly. Public health and acute care capacity were being overwhelmed. Epidemiological modelling projected that we were on the verge of exceeding our hospital and ICU capacity. If we did not act decisively to stop the spread of SARS-CoV-2, the results for the health care system could have been catastrophic. This concern was in addition to deaths directly attributable to COVID-19. A "circuit break" was necessary to dramatically slow the transmission.

101. Manitoba implemented a response at Level Red (critical) on the Pandemic Response System. This indicates that community spread of COVID-19 is not contained or there are significant strains on our health care system – both of which were occurring.

102. Evidence presented on November 10, 2020 by the Epidemiology and Surveillance unit showed that Manitoba had the highest per capita rate of active COVID-19 cases in the country (376 per 100,000). Newly reported cases were doubling every 2 weeks, resulting in a large increase in cases with severe outcomes and increasing challenges for contact tracing. The test positivity rate had soared to over 10.5% provincially. The evidence suggested province-wide community transmission.

103. In addition, both COVID-19 related deaths and hospitalizations were rapidly escalating. Cases in young adults (age 20-39) and in seniors (age 60+) were increasing very quickly. The latter group is at the highest risk of severe outcomes. First Nations populations were seeing escalating positivity rates (over 12%) and disproportionate numbers of COVID-19 cases.

104. Modelling showed that Manitoba was tracking along the worst-case scenario simulated in terms of number of cases. Unless stringent measures were implemented, it was projected that Manitoba could reach maximum capacity of ICU by November 23, and total hospital capacity by mid-December. Once an ICU reaches a point where it is no longer able to receive or treat new patients, extremely difficult decisions need to be made about who gets adequate care. The circumstances can be fatal for the lack of adequate care. There are other places in the world where they did in fact reach that unfortunate point.

105. It was at that point that all of the available information led me to conclude that significant action was necessary to prevent, reduce or eliminate a very serious and immediate threat to public health posed by COVID-19. A "circuit break" that would significantly reduce the number of contacts was essential to reduce the spread of SARS-CoV-2.

106. This included further restrictions on gatherings, including at places of worship, for a limited period of time in order to regain control over the community spread of the virus.

I. Restrictions on Gatherings and Places of Worship

107. Since the start of the pandemic, Public Health Orders ("PHOs") have placed considerable emphasis on gatherings of people, because gatherings are a significant risk for the transmission of the virus.

i) March 20 to 30, 2020: Public gatherings of 50 people

108. The first COVID-related PHO was made under *The Public Health Act* on March 20, 2020, and was registered as a regulation (M.R. 20/2020). It

consisted of four Orders which applied province-wide. Order 1 in this PHO stated as follows:

> ORDER 1
> ,... all persons are prohibited from assembling in a public gathering of more than 50 persons at any indoor or outdoor place or premises. This includes places of worship, social gatherings and family events such as weddings and funerals.

109. As such, at that point:

a. The rules that applied to places of worship were the same as the more general rules that applied to public gatherings.

b. Public gatherings were limited to a maximum of 50 people.

110. Order 1 of that PHO contained an exception for retail premises that could reasonably maintain a one-metre separation of persons on premises. It also contained exceptions for providers of health care or social services, and for public transportation.

111. Order 2 was also written as a rule related to public gatherings, but was more specific to hospitality venues: restaurants, licensed premises, live performance venues and movie theatres. These were required to operate at no more than 50% capacity, to a maximum of 50 people, with a one-metre separation of persons on premises.

112. Order 3 closed bingos. Order 4 closed fitness facilities and public pools.

ii) March 30 to May 22, 2020: Public gatherings of 10 People

113. Effective March 30, 2020, and until May 22, 2020, a series of PHOs were made, and a variety of changes can be seen in different contexts. However, two things that remained constant throughout this period were that:

a. The rules that applied to places of worship continued to be the same as the more general rules that applied to public gatherings.

b. The limit on public gatherings was reduced to a maximum of 10 people (down from the prior 50).

114. Other notable developments that occurred within this time period were that:

a. As a result of Legislative amendment to *The Public Health Act* on April 15, 2020 (a rare one-day emergency session), the order-making powers at section 67 were revised. Further, with the addition of section 111.1, PHOs would no longer need to be published as regulations under *The Statutes and Regulations Act*.

b. Revisions were made throughout this period to the Orders that applied to businesses, including retail business. By April 1, 2020, a schedule was added to identify the limited categories of businesses that could remain open, so long as precautionary measures were in place – but clarifying also that all businesses, whether listed on the schedule or not, could remain open using remote means (e.g. telephone or online) with curbside pick-up or delivery. Then by May 1, a second schedule was added to allow for reopening of certain businesses, such as shopping malls and certain in-person services.

c. Restaurants were closed for dine-in purposes, but could remain open for pick-up or take-away.

d. A separate order was made, effective April 17, 2020, restricting travel to northern Manitoba and remote communities – a restriction that remained in place until June 18, 2020.

iii) May 22 to June 21: 2020: Public gatherings of 25 or 50 people

115. On May 22, 2020, PHO restrictions were eased.

a. Places of worship continued to be included in Order 1 on public gatherings.

b. The prior limits to 10 people were increased: indoor public gatherings were allowed with a maximum of 25 people, and outdoor public gatherings were allowed with a maximum of 50 people.

116. Effective June 1, Order 1 on public gatherings also allowed for public gatherings by motor vehicle – if everyone remained in their vehicles, or stayed beside their vehicle while maintaining a 2-metre separation.

117. Beginning with the PHO that took effect on May 22, 2020, the orders become more particularized for discrete categories – at that point, it was 12 discrete orders in all. Orders were added to address each of post-secondary institutions, child care, sporting and recreational activities, cultural activities, and community centres. In addition, a third schedule was added to this PHO, addressing various recreational activities such as movie theatres, gaming, amusement parks, and live indoor theatres – which were no longer required to remain closed.

118. Other changes were made through this period that applied to businesses. In addition, these orders contemplated restaurants reopening for on-premises outdoor dining, but with a limit of 50% of usual capacity, and a minimum 2-metre separation between tables.

iv) June 21 to July 25, 2020: Public gatherings of 50 or 100 people, or 30% capacity

119. A new PHO was made on June 18, 2020, which took effect on June 21, 2020. At this point, Order 1 on public gatherings increased the limits even further:

a. Order 1 continued to apply to religious services, weddings and funerals, and was expanded to mention events such as banquets, receptions and graduations.

b. Organized indoor public gatherings were generally limited to a maximum of 50 persons, but with some flexibility. A venue could exceed that number, so long it remained within 30% of its usual capacity, and if the venue was divided into separate areas that were each limited to 50 persons in a way that prevented comingling as among those separate areas. This was done to accommodate places of worship, as a result of public engagement with stakeholders.

c. Organized outdoor public gatherings were subject to the same formula as indoor public gatherings, except maximums were set at 100 persons in each separate area.

iv) July 25 to August 24, 2020: Discrete Order for Religious Services

120. The new PHO that took effect on July 25, 2020 represented the first time that religious services (alternatively, places of worship) were no longer included within the general Order 1 on public gatherings. This format has continued to be followed since – although there has always continued to be an interplay between the general order for public gatherings (usually Order 1 or Order 2), and the specific order for religious services or places of worship.

121. On July 25, 2020, Order 1 on public gatherings generally remained the same as it had been in the immediately preceding PHO. It had the dual aspect of maximum areas for indoor public gatherings (50 persons) and outdoor public gatherings (100 persons), with an ability for multiple separate areas each within those maximums, so long as the overall number or persons was no greater than 30% of usual capacity.

122. However, this PHO also established two new discrete orders for Religious Services (Order 19) and Indigenous Cultural Events (Order 20). Religious services could have multiple separate areas (as in Order 1), or they could hold services with a maximum of 500 persons or 30% of usual capacity (whichever is lower) with physical distancing. For certainty, Order 1 was modified so the general rule on public gatherings now applied "Except as permitted by this section or Orders 19 and 20".

123. And Order 19 itself read as follows:

Religious services

ORDER 19

19(1) Subject to subsection (2), churches, mosques, synagogues, temples and other places of worship may open to hold regular religious services if

(a) the number of persons attending a service does not exceed 30% of the usual capacity of the premises or 500 persons, whichever is lower, and measures are implemented to ensure that persons attending a service are reasonably able to maintain a separation of at least two metres from other persons at the service, other than a group of persons who are attending the service together; or

(b) the following requirements are met:

(i) the number of persons attending a service does not exceed 30% of the usual capacity of the premises,

(ii) the premises is physically divided into separate areas which contain no more than 50 persons each,

(iii) persons in each area are prevented from coming into close proximity with persons in another area during the service as well as when entering or leaving.

19(2) If a wedding, funeral or other event is held at a place of worship, it must be conducted in accordance with the applicable requirements of Order 1.

124. At that point, motor vehicle-based gatherings also continued to be allowed – an exception that continued within the general Order 1 on public gatherings.

v) August 24 to September 18, 2020: Two Regional PHOs

125. August 24, 2020, represented the first time that a more targeted territorial approach was implemented to account for different prevailing trends within distinct regions of the province.

126. During this period, the area of particular concern was the Prairie Mountain Health Region– generally the southwest area of the province – because community transmission and clusters were occurring throughout the region. This area was subject to a distinct PHO called the "Prairie Mountain Health Region COVID-19 Prevention Orders". All other regions outside it were subject to the "General COVID-19 Prevention Orders".

127. With respect to Public Gatherings (Order 1) and Religious Services (Order 19) – as well as the remainder of the orders – the General PHO essentially remained unchanged from the immediate predecessor PHO that had been applying province-wide.

128. But the Prairie Mountain Health Region PHO made some notable changes:

a. Order 1 on Public Gatherings reinstated the 10-person maximum for any public gathering, whether indoor or outdoor. (The motor vehicle exception remained.)

b. Order 19 on Religious Services was condensed, by eliminating the prior option 19(1)(b). This left only the prior option 19(1)(a) – meaning that the maximum was the lower of 500 people or 30% capacity with a 2-metre separation between everyone. There was

no option to go beyond the 500-person limit with multiple separate areas with 50 persons.

129. The Prairie Mountain Health Region PHO was also the first PHO in Manitoba to mandate the use of masks as a discrete order within a PHO. It read as follows:

Use of Masks

ORDER 23

23(1) A person who enters or remains in an indoor public place must wear a mask in a manner that covers their mouth, nose and chin without gapping.

23(2) The operator of an indoor public place must ensure that every person who is not wearing a mask while in the indoor public place is given a reminder to do so as soon as practicable.

23(3) Subsections (1) and (2) do not apply in respect of the following:

(a) a child who is under five years of age;

(b) a person with a medical condition that is unrelated to COVID-19, including breathing or cognitive difficulties, or a disability, that prevents them from safely wearing a mask;

(c) a person who is unable to put on or remove a mask without the assistance of another person;

(d) a person who needs to temporarily remove their mask while in the indoor public place for the purpose of

(i) receiving a service that requires the removal of their mask,

(ii) actively engaging in an athletic or fitness activity, including water-based activities or acting as a lifeguard,

(iii) consuming food or drink,

(iv) an emergency or medical purpose, or

(v) establishing their identity.

23(4) Subsections (1) and (2) do not apply to an employee or agent of the operator of the indoor public place while the employee or agent is

(a) in an area of the indoor public place to which members of the public do not normally have access; or

(b) located behind a non-permeable physical barrier, including a plexiglass barrier.

23(5) Subsection (1) and (2) do not apply to a person in an indoor public place if

(a) they are seated, and

(i) the seating is arranged in accordance with the applicable requirements set out in these Orders, or

(ii) at least two metres from other persons who are not sitting with that person, if the arrangement of seating in the place is not specifically addressed in these Orders; and

(b) they wear a mask at all times while moving to or from their seated position within the indoor public place.

ORDER 24

24(1) A person at an outdoor public gathering of four or more persons must wear a mask in a manner that covers their mouth, nose and chin without gapping.

> 24(2) Subsection (1) does not apply to a person described in subsection 23(3).

130. Although this was the first time that a PHO included a specific order mandating the use of masks, it was not the first time that mask-wearing had been required for other reasons. By this time, many operators of indoor public places – including retail premises – had already been requiring all people attending those premises to wear masks.

131. During this time, on September 4, 2020, travel restrictions to Northern Manitoba and remote communities were re-established.

vi) September 18 to October 1, 2020: Return to one province-wide PHO

132. On September 18, 2020, the two prior orders were replaced, once again, by a single PHO that applied province-wide. The narrower rules that had been applied only in Prairie Mountain Health Region were rescinded, in favour of the less restrictive approach that had prevailed in the General PHOs. More to the point:

a. Order 1 had the dual approach of maximum areas for indoor public gatherings (50 persons) and outdoor public gatherings (100 persons), with an ability for multiple separate areas each with those maximums, so long as the overall number or persons was no greater than 30% of usual capacity.

b. Order 19 (Religious Services) continued to have options (a) or (b), being a maximum of 500 persons with a minimum 2-metre separation between attending groups, or multiple separate areas of

50 people – both options subject to a maximum of 30% of usual capacity.

133. The requirement to wear masks in the prior Prairie Mountain Health Region PHO, was not carried forward into this PHO.

vii) October 1 to November 2, 2020: Return to Two Regional PHOs

134. On October 1, 2020, the province returned to having two distinct PHOs targeted at specific geographical regions to reflect the differing severity of virus transmission. This time, comparatively greater restrictions were applied to the Capital Region – essentially the City of Winnipeg and 18 surrounding municipalities. A General PHO applied to the rest of the province and was comparatively less restrictive.

135. The General PHO largely made no changes from the prior PHO – particularly in relation to Order 1 on public gatherings and Order 19 on religious services. Furthermore, there was no order mandating the use of masks.

136. By contrast, the Capital Region PHO re-instituted the 10-person limit for both indoor and outdoor public gatherings (Order 1) – but with some ability to exceed that limit using separate areas (each with 10-person limits) within 30% of usual capacity.

137. The exception for motor vehicle gatherings was continued in both of these PHOs.

138. Particularly notable for the Capital Region PHO, however, is that it introduced for the first time a restriction on gatherings in private residences.

At this point, the provision was placed within Order 1 on gatherings, and was written as follows in relation to the 10-person limit:

> 1(5) In the case of a gathering at a private residence, all persons who reside at that residence are not to be included when calculating the number of persons at the gathering.

139. In addition, the Capital Region PHO included a requirement to use masks in indoor public places, which had previously been included in the Prairie Mountain Health Region PHO. However, masks were not mandated for outdoor public gatherings.

140. Effective October 19, 2020, a further PHO was made for the Capital Region that reduced the 10-person limit on gatherings to 5 persons. Also, the exception for motor vehicle gatherings was removed.

viii) November 2 to 12, 2020: Lowered maximums on gatherings

141. On November 2, 2020, there continued to be two PHOs – a General PHO and another for the Capital Region.

142. In both PHOs, Order 1 limited gatherings to 5 people including private gatherings. Both PHOs also permitted gatherings in separate areas with no more than 5 people in each area, but the allowable cap on usual capacity was different:

a. For the General PHO, it continued to be 30% of usual capacity.

b. For the Capital Region PHO, it was 15% of usual capacity.

143. At this point, both PHOs no longer had the exception for motor vehicle gatherings.

144. For religious services (Order 19), neither PHO continued the option of holding services in multiple separate areas. Instead, the provisions were as follows:

a. The General PHO set a maximum capacity of 250 persons or 20% of usual capacity, whichever is lower, with distancing measures.

b. The Capital Region PHO set a maximum capacity of 100 persons or 15% of usual capacity, whichever is lower, with distancing measures.

145. Both PHOs also mandated the use of masks for indoor public places.

146. On November 9, 2020, the Capital Region PHO was expanded to also include the Southern Health Region – which incorporates the southcentral and southeastern area of the province. This reflected worsening circumstances in those regions.

ix) November 12 to January 22, 2021: The Circuit Break

147. November 12, 2020 was the first day for the implementation of a province-wide "Circuit Break" PHO for the reasons previously discussed.

148. At this point, one PHO applied the same set of orders throughout the province – though this period had two phases: November 12 to 20, 2020, and November 20, 2020 to January 22, 2021.

149. For the first phase – November 12 to 20, 2020:

a. Order 1 on gatherings continued to set a limit of 5 persons, but now with no alternative formula based on usual capacity. This applied to both public gatherings, and gatherings in private residences.

b. Religious services were required to be closed under Order 13 – although the premises could still be used to make services available to the public over the internet or through other remote means. Furthermore, special ceremonies such as funerals, weddings, baptisms, or other rites, could occur with a maximum of 5 persons.

c. Masks continued to be mandated for indoor public places, under Order 14.

150. Those same rules were continued in the second phase, from November 20, 2020 to January 22, 2021. But starting on November 20, 2020, the PHO introduced a new Order 1 that more clearly addressed the issue of gatherings in private residences. In this PHO, persons were not permitted to allow others to enter or remain in their residences, except for a limited list of exceptions. To alleviate loneliness, those who lived alone could allow one other person with whom they have regular contact to attend their residence, and could also attend at the private residence of one other person with whom they have regular contact.

151. It was during this period that Springs Church, in Winnipeg, had been issued tickets for its "Church in Our Cars" on-premises services, and initiated proceedings in the Court of Queen's Bench challenging the PHO, and did not succeed in obtaining an interim injunction in relation to it. Nevertheless, in the PHO that took effect on December 11, 2020, Order 2(2) was added to allow for motor vehicle gatherings, in a way that differed slightly from what

had been allowed in summer. All persons in the vehicle must be from the same residence or in a caregiver relationship, and the must stay in their vehicles and not interact with others outside their cars.

x) January 22, 2021: Easing

152. Starting on January 22, 2021, in light of the improving indicators coming out of the Circuit Break, restrictions in PHOs started to ease throughout the province, except in northern Manitoba and remote communities:

a. The general 5-person limit on public gatherings remained, but outdoor gatherings could occur at a private residence without counting the residents.

b. Up to 10 persons (in addition to the officiant) could attend a funeral with social distancing measures in place.

153. Starting on January 28, 2021 throughout the province, except in northern Manitoba and remote communities:

a. Up to two authorized persons could attend at someone's place of residence.

154. Starting February 12, 2021, one PHO was made to apply throughout the province, and:

a. The 10-person exception for funerals was expanded to weddings (with allowance for a photographer or videographer).

b. Places of worship could hold regular services, with no more than 50 persons or 10% of usual capacity (whichever is lower), with 2-metre separations between household groupings. Other occasions had to comply with the general rule for funerals or weddings.

xi) Risks with Places of Worship and Religious Services

155. Religious services at places of worship tend to have similar risks of transmission as other categories of large indoor gatherings that involve prolonged contact among persons. In this regard, the risk at places of worship can be compared to theatres, concert halls or indoor sporting venues where crowds gather in close proximity for prolonged periods of time. They are different than retail environments that typically involve only transient contact between people for shorter duration.

156. Moreover, by their nature, faith-based activities at places of worship are communal activities, which can entail additional risks of transmission. This could include hand shaking, hugging, choirs and singing. Communal activities will, of course, vary for each institution, and depend on the occasion, but ceremonial rituals can include direct contact and sharing or distributing items, including consumable items.

157. For all of these reasons, places of worship and faith-based gatherings have their own discrete potential for virus transmission and to seed further outbreaks. While distancing, hand hygiene and wearing masks can attenuate the risk, it is not fail-proof even assuming perfect compliance. And unfortunately, experience has demonstrated that outbreaks did occur in those settings before the "circuit-break". Given the circumstances of the

pandemic facing Manitoba in November 2020, it was determined that places of worship had to be temporarily closed.

158. There are known and documented experiences in Manitoba of outbreaks or clusters having occurred in relation to religious services or faith-based gatherings, or in some cases funerals.

159. Information provided by the Epidemiology and Surveillance Unit indicates that there has been as many as ten such clusters or outbreaks and that they have occurred through all regions, including within the Winnipeg Regional Health Authority, the Prairie Mountain Health Region, the Northern Health Region, the Southern Health Region, and the Interlake Eastern Regional Health Authority. The details are explained further in the affidavit of Carla Loeppky.

160. In addition, I am aware of documented clusters or outbreaks of COVID-19 related to faith-based settings and choir activities elsewhere in Canada (Saskatchewan, Alberta and Ontario) and in the United States. Attached as **Exhibits 12 and 13** are two studies published in the Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report discussing the transmission of COVID-19 related to attendance at church and choir practice, and which are posted on these websites:

https://www.cdc.gov/mmwr/volumes/69/wr/mm6920e2.htm?s_cid=mm6920e2_

https://www.cdc.gov/mmwr/volumes/69/wr/mm6919e6.htm

J. Focused Protection

161. I have read the report of Dr. Bhattacharya filed in this proceeding, which discusses the Great Barrington Declaration and the concept of focused protection.

162. In Manitoba, we have implemented "focused protection" insofar as public health orders are tailored so that any restrictions are no greater than reasonably necessary to respond to the specific circumstances of the pandemic. Restrictions have not been all or nothing. There has been a balanced approach informed by scientific evidence, local context, evolving knowledge of the pathogen and weighing the risks and benefits. For example, Manitoba's Pandemic Response System has been designed so the restrictions may be eased or strengthened depending on the severity of the situation in specific locations and geographic areas of the province. At times, different responses have applied to different regions of the province or particular facilities have been placed in Level Red (critical) to address outbreaks of the virus. In addition, orders have focused on particular activities and types of settings to reflect the varying risk of transmission. For example, prolonged indoor gatherings (e.g movie theaters, places of worship, sporting events) are treated differently than activities involving less close contact or transient contact of shorter duration (e.g. curb-side pick up at retail stores) or outdoor activities.

163. However, when there is community transmission of a virus like SARS-CoV-2 that can cause diseases with potentially serious outcomes (hospitalization or death) for vulnerable individuals across a wide spectrum of ages, it is not practical or feasible to prevent, reduce or eliminate the threat

to public health by focusing public health orders only on certain age groups (e.g. over 60) or particular vulnerable populations. I say this for several reasons.

164. First, even if severe outcomes were limited to elderly persons living in personal care home settings (which is not the case), there is a risk that younger persons working or visiting such facilities will transmit the disease. This risk would be greater if young people were allowed to circulate freely in the community.

165. In fact, we took special measures focused on protecting personal care homes and long-term care facilities. For example, since May 1, 2020, public health orders have restricted employees from working in more than one facility in order to minimize the risk of transmitting COVID-19 between them. Shared Health implemented rules limiting visitation in an attempt to prevent the virus from being introduced to these vulnerable facilities. Shared Health also implemented Infection Prevention and Control protocols and guidelines in these facilities, including guidance on testing, surveillance, cohorts of staff and residents, routine practices (PPE, masks, hygiene and physical distancing), screening, admissions, outbreak preparedness and management protocols, environmental cleaning, ventilation, hospital transfers, congregate meals, and visitor protocols, among other measures. Despite these efforts, SARS-CoV-2 is highly communicable and outbreaks of COVID-19 have occurred in personal care homes. Roughly half of our deaths are related to personal care homes. Attached as **Exhibits 14, 15 and 16** are publications intended for use at personal care homes and long term care facilities in Manitoba.

166. In any event, the vulnerable older population is not restricted to personal care homes. Adults aged 60 and older are integrated throughout society. It is not realistic to segregate or compartmentalize society as suggested by the Great Barrington Declaration. If the virus is allowed to circulate widely in the community, without intervention, it will inevitably be transmitted to vulnerable adults whether in the workplace, at home or other places.

167. Second, while most COVID-19 related deaths occur in people over 60, severe outcomes are not limited to that age group. People of all ages may be more susceptible to hospitalization or death due to COVID-19 if they have one of many chronic medical conditions such as lung disease, heart disease, hypertension (high blood pressure), diabetes, kidney disease, liver disease, dementia, or stroke, or if they are immunocompromised with an underlying medical condition such as cancer or are taking medications that lower the immune system like chemotherapy, or are living with obesity. As of February 25, 2020, about 40% of reported COVID-19 cases had underlying conditions. Further, about 33% of serious outcomes in Manitoba (deaths or hospitalizations) have occurred in persons younger than 60.

168. Our First Nation population in Manitoba is also more vulnerable to COVID-19 due a variety of socioeconomic factors and underlying comorbidities. There is evidence that First Nation persons have been disproportionately affected by COVID-19. First Nations persons represent about 12% of the population in Manitoba, but represent 31% of total COVID-19 cases. More than half (about 55%) of the 9,689 cases are off-reserve. The median age for hospitalizations among First Nations persons is 51 and the median ICU age is 57. While some public health orders have been

focused on preventing transmission in remote communities, it is not possible to address the vulnerability of First Nations people without minimizing community transmission as a whole.

169. Third, the Great Barrington Declaration relies heavily on the notion of "herd immunity". That is, by allowing the virus to circulate freely among the population, people infected will gain immunity and eventually enough people will become immune to prevent exponential growth of the virus in the community. The degree of protective immunity conferred by infection with SARS-CoV-2 is currently unknown. The possibility of reinfection is not well understood and is the subject of ongoing research. Re-infection has been known to occur with other common coronaviruses and there have been documented cases of re-infection of SARS-CoV-2. For example, see a recent article "Genomic evidence for reinfection with SARS-CoV-2: a case study" published January 1, 2021 in the Lancet, attached as **Exhibit 17** an article published in The BMJ reporting a case of reinfection in Hong Kong attached as **Exhibit 18**; and an article published by Dr. Deena Hinshaw, Alberta's Chief Medical Officer of Health attached as **Exhibit 19**. Further research in this area is required.

170. The affidavit of Jason Kindrachuk details a study of the situation in Manaus, Brazil where significant virus transmission continued even after it was thought the population had surpassed the threshold for herd immunity. In Manaus, it was estimated that up to 66% of the people had already been infected by July 2020 and that rate rose to 76% by October 2020. Nonetheless, there was a serious second surge of SARS-CoV-2 infections by mid January 2021. There is no clear evidence that lasting herd immunity can be achieved by allowing less vulnerable people to circulate freely. In

addition, permitting the virus to replicate more widely results in more variants. The introduction of new Variants of Concern raises additional questions about lasting herd immunity.

171. Fourth, even assuming that herd immunity might theoretically be achieved in this manner, adopting such a strategy would come at a much greater cost of more deaths and severe outcomes. Until herd immunity in society is acquired, the disease would be allowed to circulate broadly, inevitably infecting more vulnerable individuals and, as experience has shown, likely overwhelming our limited health care resources. This leads to greater morbidity and mortality for non-COVID-19 patients as well. In her article, Dr. Hinshaw also discussed the situation in Manaus, Brazil. Although just 6% of the population was over 60, the death toll was 2,500 to 3,400 people in a population of 1.8 million. She estimated that if Alberta had a similar per capita death rate as Manaus, allowing 66% of the population to be infected would result in 6,100 to 8,300 deaths. Even assuming that a 50% infection rate was sufficient to achieve herd immunity (contrary to many higher estimates), that would still cost about 1,000 lives under the age of 60 in Alberta.

172. I agree with Dr. Hinshaw's observation that even if we were willing to accept the direct cost in terms of additional lives lost, and even assuming we could somehow segregate individuals over age 60 from the rest of the population, hospitalizations and ICU admissions are more common than deaths in those under 60. This could potentially put a tremendous burden on our health care system.

173. I have also reviewed the peer-reviewed article published in the Lancet, commonly referred to as the John Snow Memorandum, which offers a critique of the Great Barrington Declaration. It is attached as **Exhibit 20.** I agree with the essential conclusions in that article.

174. The focus of our approach in Manitoba, and indeed across Canada and in many jurisdictions throughout the world, is to minimize serious illness and death from COVID-19 by maintaining the spread of the virus to manageable levels so it does not overwhelm our health care resources. This is achieved by sticking to fundamentals such as mask wearing, hand hygiene and physical distancing, minimizing the opportunity for large super spreading events, especially higher risk activities and gatherings, and quickly identifying cases for contact tracing and isolation.

175. It is certainly true that public health restrictions can have collateral consequences on people's mental health and economic circumstances. These potential risks are taken into account and balanced against the severity of the pandemic. However, there is no simple metric. Decisions must be made in real-time in response to prevailing and evolving circumstances and without the benefit of hindsight analysis. We have aimed to implement special measures that weigh the benefits with the risks of COVID-19 including the risks of the public health measures themselves. Public health officials are also aware that the provincial and federal governments have put in place many policies and programs, such as mental health and financial support, to respond to these unintended consequences. One example was to establish visitor pods at personal care homes to alleviate loneliness. This accords with the public health principle of

reciprocity: necessary restrictions to fight the pandemic for the public good are counterbalanced by other supports.

176. To date, Manitoba has never had a "lockdown" requiring people to shelter-in-place as in some jurisdictions, except on a few First Nation reserves and remote communities at the request of local leadership. Nor have we implemented curfews. Retail stores have largely remained open, either in-store for essential items or curb-side pick up. Restaurants have at times been limited to pick-up and take-out only, or at other times capacity has been limited when dining-in has been allowed. Apart from a period during the first wave in the spring of 2020, schools have remained open, maximizing in-person learning especially at the elementary level or using blended models of learning for older children. The size of gathering restrictions (both public and private) have ebbed and flowed depending on the extent of community spread. Likewise, restrictions on places of worship have changed with the circumstances of the pandemic. At those times when in-person religious services were not allowed, faith-based organizations continued to hold remote services, which were permitted.

177. As explained above, the most stringent measures to date were implemented starting on November 12, 2020 due to the severity of the pandemic. Community transmission had become widespread and was seriously threatening the capacity of our health care system to cope with the number of hospitalizations and ICU admissions. We were in real danger of exceeding maximum capacity of available health care resources. At that time, there was an urgent need to broadly curb transmission of the virus. Allowing the younger or less vulnerable population to continue to gather and circulate freely would increase transmission and very likely have resulted in

a far greater number of hospitalizations and deaths among more vulnerable groups of all ages, but especially older adults.

178. The evidence shows that the public health measures implemented starting in mid-November 2020 were successful at flattening the curve and regaining control over community transmission of the virus. As a result, beginning January 22, 2021, we have gradually started easing public health restrictions to reflect the improving circumstances, based on the epidemiological evidence, key indicators and consultation with the community. If the trend continues, restrictions will be further relaxed. However, we continue to carefully monitor the situation, including the potential for variants of concern.

179. Importantly, several vaccines for SARS-CoV-2 have now been approved and are being distributed in a manner that prioritizes the most vulnerable groups. As supply allows, the hope is that the vaccine will be administered as quickly and as widely as possible. If the vaccine proves effective in providing lasting immunity, it will allow us to eventually remove the public health restrictions.

180. I make this affidavit *bona fide*.

SWORN BEFORE ME at)
the City of Winnipeg, in)
the Province of Manitoba,) Brent Roussin
this 8th day of March, 2021)

A Barrister at Law in and for
The Province of Manitoba

THIS IS EXHIBIT "1" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

1

Brent C. Roussin, MD, JD, MPH, FRCPC

[redacted]
Email: [redacted]

Professional Training

- **Public Health and Preventive Medicine Residency:** University of Manitoba and Royal College of Physicians and Surgeons of Canada, June 2012
- **Family Medicine Residency (CCFP)**: University of Manitoba, 2000-2002
- **Academic Health Sciences Leadership Program**: University of Manitoba, George and Fay Yee Centre for Health Care Innovation, 2016

Certificate in Occupational and Environmental Health:
The Johns Hopkins University, Bloomberg School of Public Health, April 2012

Education

Master of Public Health: Department of Community Health Sciences
Faculty of Medicine, University of Manitoba
2011

Juris Doctor: Faculty of Law, University of Manitoba
2009

Doctor of Medicine: Faculty of Medicine, University of Manitoba
2000

Bachelor of Science: University of Manitoba
1996

Professional Experience

2019-Present: **Chief Provincial Public Health Officer**
Manitoba Health Seniors and Active Living

2014- 2019: **Northern/Rural Lead Medical Officer of Health**
Manitoba Health

2012- 2019: **Medical Officer of Health**
Manitoba Health for First Nations and Inuit Health Branch, Indigenous Services Canada

2012- 2019: **Program Director- Public Health and Preventive Medicine Residency**, University of Manitoba, Department of Community Health Sciences

2002-Present: **Primary Care Physician**- Winnipeg, Manitoba
St. James Street Medical Clinic: 2005-Present
Assiniboine Clinic: 2002-2005

2005-2007: **Medisys- Regional Consultant-Prairie-East Division:** Canada Post Project

2003-2006: **Workers Compensation Board of Manitoba**: General Medical Advisor

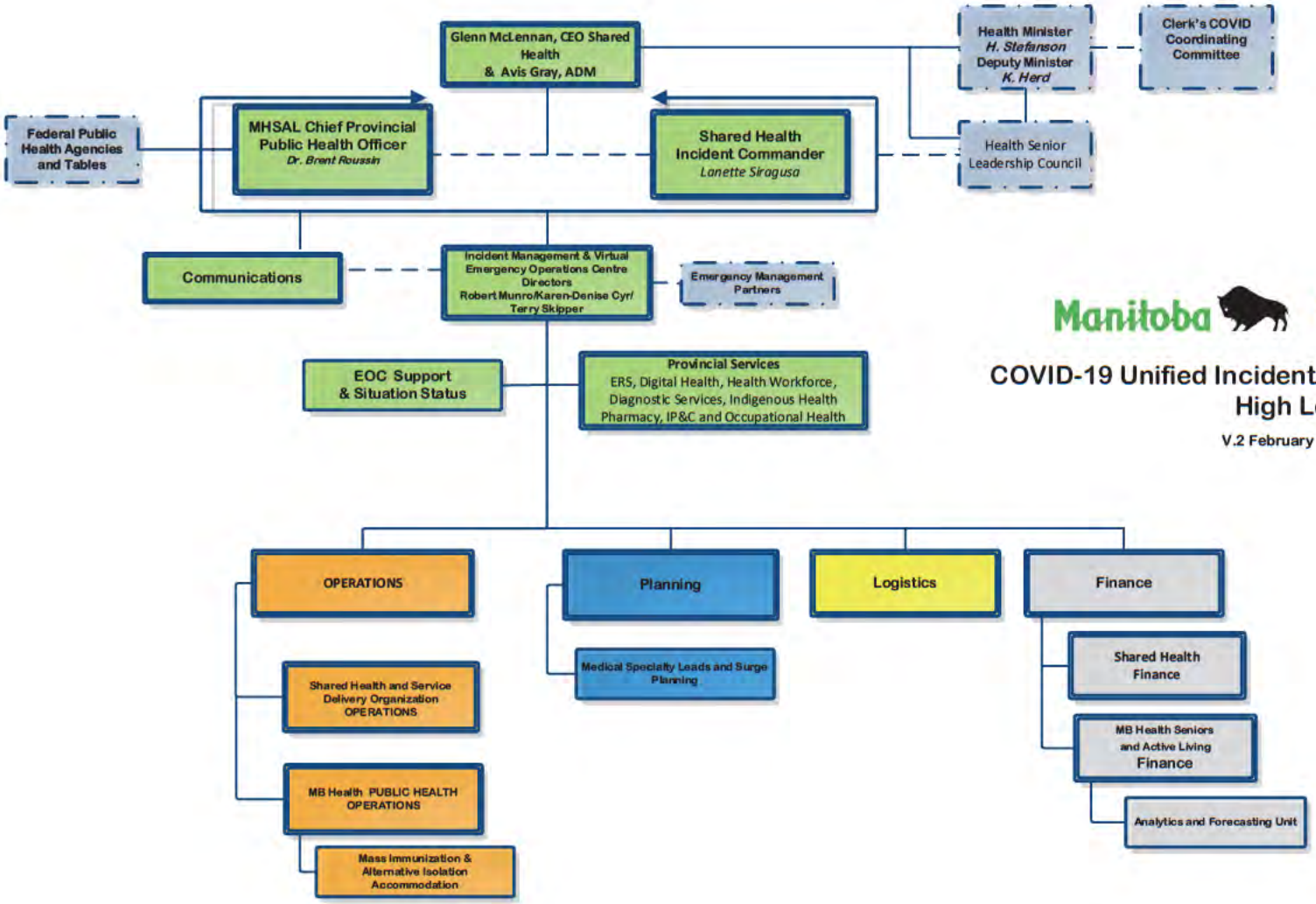
References

Available upon request.

THIS IS EXHIBIT "2" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

2



Manitoba

Shared health Soins communs Manitoba

COVID-19 Unified Incident Management Structure High Level

V.2 February 18, 2021

AB1924

THIS IS EXHIBIT "3" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

3

AB1926

Government of Canada Gouvernement du Canada

COVID-19: Main modes of transmission

On this page

How COVID-19 spreads

SARS-CoV-2, the virus that causes COVID-19, spreads from an infected person to others through respiratory droplets and aerosols created when an infected person coughs, sneezes, sings, shouts, or talks. The droplets vary in size from large droplets that fall to the ground rapidly (within seconds or minutes) near the infected person, to smaller droplets, sometimes called aerosols, which linger in the air under some circumstances.

The relative infectiousness of droplets of different sizes is not clear. Infectious droplets or aerosols may come into direct contact with the mucous membranes of another person's nose, mouth or eyes, or they may be inhaled into their nose, mouth, airways and lungs.

AB1927

The virus may also spread when a person touches another person (i.e., a handshake) or a surface or an object (also referred to as a fomite) that has the virus on it, and then touches their mouth, nose or eyes with unwashed hands.

Settings with higher risk of transmission

Outbreak investigations and scientific studies are revealing more about COVID-19 and this new knowledge is being applied to reduce its spread. We know that the virus is most frequently transmitted when people are in close contact with others who are infected with the virus (either with or without symptoms). We also know that most transmission occurs indoors.

Reports of outbreaks in settings with poor ventilation suggest that infectious aerosols were suspended in the air and that people inhaled the virus. These settings have included a choir practice, fitness classes, and restaurants. Transmission in these settings may have been facilitated by certain environmental conditions, such as re-circulated air.

There is no evidence at this time that the virus is able to transmit over long distances through the air, for example, from room to room through air ducts. It is still unclear how easily the virus spreads through contact with surfaces or objects.

Follow public health measures

AB1928

While we do not yet fully understand all modes of transmission and their relative importance, and it is likely that multiple modes of transmission occur, we do know that several actions can be taken to help prevent transmission:

- maintain a physical distance of 2 metres from people outside of your household
- wear a non-medical mask when:
  - you are in public and you might come in close contact with others
  - you are in any indoor space with people from outside your immediate household
  - advised by your local public health authority
- wash your hands often and do not touch your face with unwashed hands
- keep the number of people you have prolonged contact with as small as possible

Using all of these layers of protection will help to reduce the risk of transmission.

The following settings are particularly risky for transmission of the virus. Avoid or take additional measures and keep exposure very brief in:

- closed spaces
- crowded places
- close-contact settings and close-range conversations
- settings where there is singing, shouting or heavy breathing, for example, during exercise

AB1929

It is particularly important to avoid settings where these risks overlap, e.g., closed, crowded spaces where close-range conversations occur.

Ventilation

As winter approaches in Canada, it is more difficult to socialize outdoors. Maximize ventilation by ensuring that heating, ventilation and air conditioning (HVAC) systems are in good working order. Drawing as much fresh air as possible from outside will decrease the concentration of aerosols that may be suspended in the air, and reduce the chances of SARS-CoV-2 spread if those aerosols happen to contain the virus. If the weather permits, open a window. Reduce the noise level in public spaces, for example turn off the music, so people can speak as quietly as possible.

The public health measures we have been practicing continue to be effective in preventing the spread of the virus that causes COVID-19.

Date modified:
2020-11-05

THIS IS EXHIBIT "4" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

4

Assembly of Manitoba Chiefs | Manitoba Keewatinowi Okimakinak | First Nations Health and Social Secretariat of Manitoba | Keewatinohk Inniniw Minoayawin

Manitoba First Nations COVID-19 Pandemic Response Coordination Team Weekly Bulletin

Date: February 19, 2021

The Manitoba First Nations COVID-19 Pandemic Response Coordination Team advise that, since the February 12th bulletin, three hundred and ninety seven (397) new First Nations COVID-19 cases were identified as of 7:00 am Friday, February 19th. The total number of lab-confirmed positive and probable positive First Nations cases in Manitoba has increased by 397, taking the total to 9689 cases. Of the total cases, 5303 cases are off-reserve and 4386 cases are on-reserve. The total number of recovered cases are now 8755, there have been 146 deaths, and 788 cases are considered active.

	On Reserve	Off Reserve	Total
Active Cases	654	134	788 (67%)
Total Cases	4386	5303	9689 (31%)

% is of Provincial Totals

- New cases- 397
- FN Test positivity- 13%
- New tests- 2627
- Percentage of total tests in MB- 15%

Presumed Active Cases
- On Reserve- 322
- Off Reserve- 117
- Total FN- 439
- Percentage of total in MB- 59%

First Nations COVID-19 Hospitalizations

	Hospitalizations Totals (males/females)	Age Range	Median Range	ICU Patients (males/females)	ICU Age Range	ICU Median Age
Current	25 (11/14)	27-91	59	4 (2/2)	62-70	65
Total	744 (327/417)	0-93	51	170 (82/88)	18-83	57

- Deaths
  - Current- 2 (2 male, 0 female)
  - Total- 146 (69 male, 77 female)
- Age range of deaths-
  - Current- 73-80
  - Total- 9-96
- Deaths- Median Age
  - Current- 77
  - Total- 66

Details of the 9689 First Nations cases:

- 3061 people in Winnipeg Regional Health Authority (WRHA)
- 1339 people in the Interlake Eastern Regional Health Authority (IERHA)
- 513 people in the Southern Health-Santé Sud (SHSS)
- 485 people in the Prairie Mountain Regional Health Authority (PMH)
- 4291 people in the Northern Regional Health Authority (NRHA)
- 0 cases where the region of residence is pending
- The number of recovered cases is 8755
- The number of currently hospitalized cases is 25. This is 31% of all hospitalizations in the province currently.
- The number of First Nations people in the ICU due to COVID-19 is 4. This is 33% of all COVID-19 ICU admissions currently.
- The number of deaths among First Nations people due to COVID-19 is now 146, as 2 more deaths have been reported. The median age of deaths in First Nations is 66 (in comparison to 83 for the rest of MB).
- The cases have occurred in 4842 females and 4847 males
- The age range of cases is 1-96
- The most commonly reported age group of infected individuals is 20-29 (same as the rest of MB)
- Travel-acquired cases: 0% (in comparison to 2% for other Manitobans)
- Acquisition through contact with a known positive case: 73% (in comparison to 68% for other Manitobans)
- Average time from symptom onset until testing: 3 days (same as the rest of MB)
- 39% of cases reported the presence of an underlying illness (in comparison to 34% for the rest of MB)

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Manitoba First Nations COVID-19 Pandemic Response Coordination Team Weekly Bulletin

Date: February 19, 2021

First Nation Testing

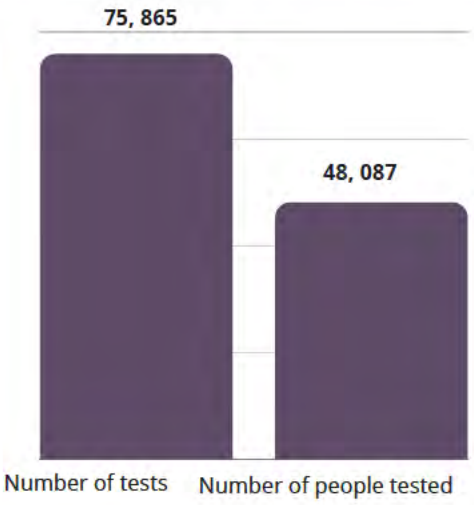
As of February 19th, 2021, the number of First Nations COVID-19 tests has risen by 2627, for a total of 75865 tests conducted for First Nations across Manitoba since the pandemic began. The 5-day COVID-19 test positivity rate in Manitoba First Nations is 13% which is higher than Manitoba's current 5-day test positivity rate of 5%.

The total number of tests in First Nations represents 11% of the overall tests done in Manitoba; testing numbers are highest in hospital, particularly in Winnipeg; the main sources of test samples excluding Winnipeg were from nursing stations.

- Except in the very young, testing rates are higher in women, 59% overall. This mirrors the provincial testing trends where there are also more women who are being tested at 56%.
- A total of 48087 First Nations people have been tested to date. Of those, 59% of tests were completed for First Nations who live on reserve and 41% of tests were completed for First Nations who live in urban or rural areas.

Unlike the majority of cases in Manitoba, First Nations people are most likely to be infected through close contact to a known case of COVID-19.

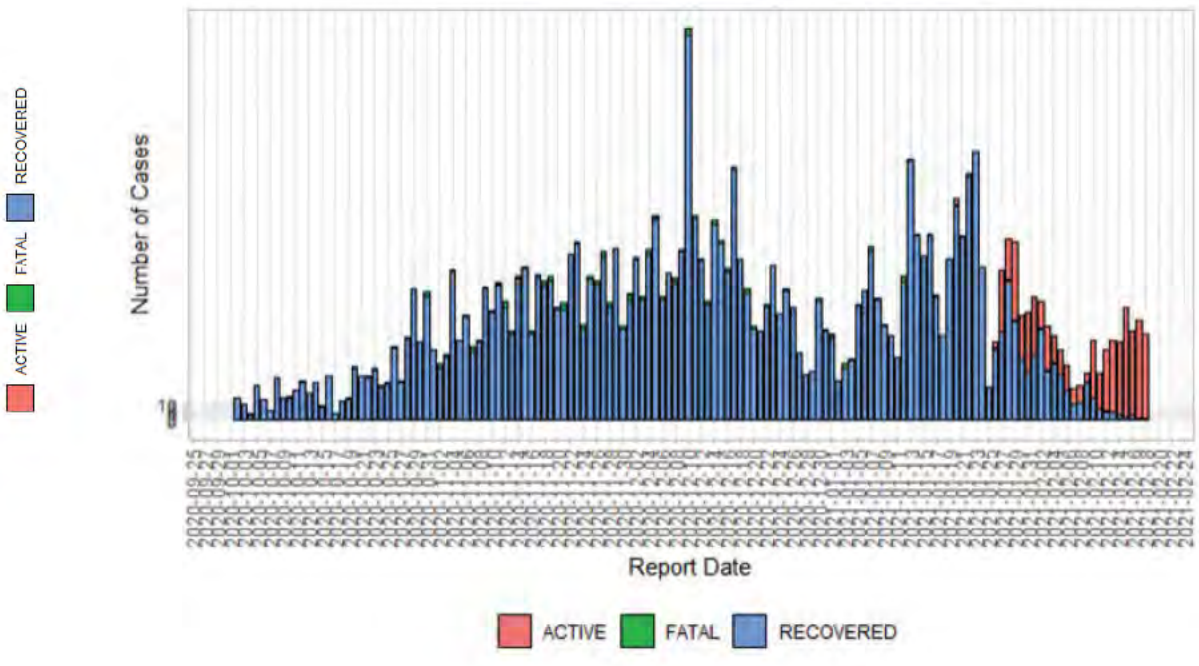
Number of tests performed, and number of people tested



73% of COVID-19 infections were a result of close contact to a positive cases

First Nations currently make up approximately 67% of active cases.

Epidemiological Curve- First Nations Cases



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Manitoba First Nations COVID-19 Pandemic Response Coordination Team Weekly Bulletin

Date: February 19, 2021

Discussion

Manitoba still remains in Red (critical) on the Pandemic Response System. Even though the restrictions might be loosening, it is important to continue to be vigilant and take precautions. First Nations people continue to make up a highly disproportionate amount of active cases in Manitoba (67% today).

The 5 day test positivity rate remains higher than the rest of the province (13%). While some communities are currently COVID free with no active cases, others continue to experience new cases or even outbreaks.

Please be aware of the most current change in restrictions to the public health orders that came in effect for the province at 12:00 am February 12, 2021 and last for three weeks.

The orders replace the General COVID-19 Prevention Orders made on Jan. 28 and the Northern Manitoba COVID-19 Prevention Orders made on Feb. 1, 2021.

The orders include the following changes, with further pandemic safety measures in place:

- Allowing restaurants and licensed premises to reopen at 25 per cent capacity with patron groups limited to members of the same household only;
- Allowing outdoor sports facilities to reopen for casual sports as well as organized practices and games, with multi-team tournaments not permitted;
- Allowing gyms, fitness centres and yoga studios to reopen at 25 per cent capacity;
- Allowing indoor sporting facilities such as rinks, gymnastic clubs and martial arts studios to reopen at 25 per cent capacity for individual instruction only;
- Allowing places of worship to hold regular religious services if a service does not exceed 10 per cent of usual capacity or 50 people, whichever is lower;
- Allowing self-help groups for persons dealing with addictions or other behaviours to hold meetings at 25 per cent capacity of the premise where meetings take place;
- Allowing museums, art galleries and libraries to operate at 25 per cent capacity;
- Allowing personal service businesses, such as those providing pedicures, electrolysis, cosmetic application, tanning, tattooing or massage services to reopen at 25 per cent capacity;
- Allowing up to 10 people to attend a wedding in addition to the officiant and a photographer or videographer;
- Allowing photographers and videographers to offer services to individual clients or those residing in the same household in addition to providing services at weddings, with the exception of visiting client homes; and
- Allowing the film industry to operate fully with physical distancing and other safety measures in place.

Further information about the orders can be found here: https://news.gov.mb.ca/news/?archive=&item=50678

In addition, travelers into Manitoba who do not qualify for an exemption must self-isolate for 14 days. Further information about these orders is available here: https://www.gov.mb.ca/asset_library/en/proactive/2020_2021/orders-soe-selfisolation-01282021.pdf

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Manitoba First Nations COVID-19 Pandemic Response Coordination Team Weekly Bulletin

Date: February 19, 2021

At this time, PRCT advises all First Nations people and communities to take the actions above. In addition, we remind people to:

- Limit close contacts outside of the household. This is very important for reducing transmission of COVID-19.
- If you have family who live in other communities/ areas from you, consider ways to connect that are lower risk for spreading COVID-19, such as connecting by phone, social media or other virtual platforms.
- Practice physical distancing measures and stay 2m/ 6ft away from people who are outside of your household.
- Frequently wash your hands with soap and water for 20 seconds or use hand sanitizer.
- Regularly clean commonly touched surfaces such as door handles and countertops.
- Wear non-medical masks.
- Stay home and self-isolate if you have any new symptoms that could be from COVID-19, no matter how mild the symptoms are.
- Present for testing if your symptoms last for more than 24 hours.

You can access testing by calling the health facility in your community, going to the RHA testing site closest to you, calling your health care provider, or use the Screening Tool to find out when/where you can be tested. https://sharedhealthmb.ca/covid19/screening-tool/

COVID-19 Resources and Links:

Manitoba First Nations COVID-19 Alert Levels
https://manitobachiefs.com/wp-content/uploads/PRCT-MB-First-Nations-COVID-Alert-Levels.pdf

School Division Reopening Plans
http://www.manitoba.ca/covid19/restoring/school-divisions.html

Restoring Safe Schools: August 13 - School Settings Practice Guidance and Protocols
https://www.gov.mb.ca/covid19/restoring/rss-practice-guidance.html

Applying Current Public Health Orders and Guidance to Community Events
https://manitobachiefs.com/wp-content/uploads/PRCT-GUIDE-Applying-Current-Public-Health-Orders-and-Guidance-to-Community-Events-29May2020-FINALasof459pm.pdf

Public Health Considerations During COVID-19 for Sundance Leaders
https://d5d8ad59-8391-4802-9f0a-f5f5d600d7e9.filesusr.com/ugd/38252a_de8caedd52c5409e9607394c383c7929.pdf?index=true

Manitoba Government COVID-19 information
https://www.gov.mb.ca/covid19/

Please visit any of the following websites for more information and resources on COVID-19:
www.manitobachiefs.com
www.mkonation.com
www.fnhssm.com

THIS IS EXHIBIT "5" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

5

Medical News & Perspectives

As Their Numbers Grow, COVID-19 "Long Haulers" Stump Experts

Rita Rubin, MA

For 32-year-old Hanna Lockman of Louisville, Kentucky, it all started March 12. She was at work when she suddenly felt a stabbing pain in her chest.

"It just got worse and worse and worse, to the point I was crying from the pain," she recalled in a recent interview. At 3 AM, the pain sent her to the emergency department. "I had developed a dry cough, maybe a mild fever. I don't remember."

Five months, 16 emergency department trips, and 3 short hospitalizations later, Lockman can't remember a lot of things. She places the blame squarely on coronavirus disease 2019 (COVID-19).

"I joke, 'Well, COVID has eaten my brain, because I can't remember how to remember words, keep track of medication,'" she said. "My brain just feels like there's a fog."

Lockman considers herself to be a "long hauler," someone who still hasn't fully recovered from COVID-19 weeks or even months after symptoms first arose. She serves as an administrator of 2 "Long Haul COVID Fighters" Facebook groups, whose members now number more than 8000.

The longer the pandemic drags on, the more obvious it becomes that for some patients, COVID-19 is like the unwelcome houseguest who won't pack up and leave.

"Anecdotally, there's no question that there are a considerable number of individuals who have a postviral syndrome that really, in many respects, can incapacitate them for weeks and weeks following so-called recovery and clearing of the virus," Anthony Fauci, MD, director of the National Institute of Allergy and Infectious Diseases, said in July during a COVID-19 webinar organized by the International AIDS Society.

That appeared to be the case with the first severe acute respiratory syndrome (SARS), which emerged in 2002 and was also caused by a coronavirus. Some people who were hospitalized with SARS still had impaired lung function 2 years after their symptoms began, according to a prospective study of 55 patients in Hong Kong. But only 8096 people were diagnosed with SARS worldwide—a fraction of the COVID-19 cases reported each day in the US alone.

In a recent *JAMA* research letter, 125 of 143 Italian patients ranging in age from 19 to 84 years still experienced physician-confirmed COVID-19–related symptoms an average of 2 months after their first symptom emerged. All had been hospitalized, with their stays averaging about 2 weeks; 80% hadn't received any form of ventilation.

Physicians at a Paris hospital recently reported that they saw an average of 30 long haulers every week between mid-May, when the COVID-19 lockdown ended in France, and late July. The patients' average age was around 40 years, and women outnumbered men 4 to 1.

As with SARS, many COVID-19 long haulers are health care workers who had massive exposure to the virus early in the pandemic, neuroimmunologist Avindra Nath, MD, of the National Institute of Neurological Disorders and Stroke (NINDS), noted in a recent editorial.

Overall, approximately 10% of people who've had COVID-19 experience prolonged symptoms, a UK team estimated in a recently published Practice Pointer on postacute COVID-19 management. And yet, the authors wrote, primary care physicians have little evidence to guide their care.

Puzzling Persistence

Adults with severe illness who spend weeks in intensive care, often intubated, can experience long-lasting symptoms, but that's not unique to patients with COVID-19. What's unusual about the long haulers is that many initially had mild to moderate symptoms that didn't require lengthy hospitalization—if any—let alone intensive care.

"Most of the patients that I see who are suffering from [post-COVID-19] syndrome were not hospitalized," Jessica Dine, MD, a pulmonary specialist at the University of Pennsylvania Perelman School of Medicine, said in an interview. "They were pretty sick, but still at home."

Why some previously healthy, often young, adults still haven't recovered from the disease has stymied physicians.

"We in the medical field are very accustomed to taking care of respiratory syncytial virus and other pneumoviruses in young adults," Wesley Self, MD, MPH, an emergency medicine physician at Vanderbilt University Medical Center, said in an interview. With those infections, "people feel pretty sick for 2 to 3 days, and then they feel markedly better."

But COVID-19 is another matter, Self and his coauthors found in a recent study of 292 individuals with the disease who did not require hospitalization. "One of the goals of this particular study was to understand those with mild symptoms," Self said. "This was an understudied group."

More than a third of them hadn't returned to their usual state of health 2 to 3 weeks after testing positive, the researchers wrote in the *Morbidity and Mortality Weekly Report*. The older the patients, the more likely they were to say they their pre–COVID-19 health hadn't come back. But even a quarter of the youngest, those aged 18 to 34 years, said they had not yet regained their health.

"That certainly was a surprise to us," Self's coauthor and Vanderbilt colleague William Stubblefield, MD, an emergency medicine specialist, said in an interview.

Self and others say they suspect that severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection triggers long-lasting changes in the immune system. In some organs, especially the lungs, those changes persist far past the point at which patients have stopped shedding the virus, Self said. "Frankly, we don't know how long that lasts." To help answer that question, Self and his coauthors are conducting a follow-up study to assess

outpatients' health 6 months after their COVID-19 diagnosis.

Sorting Through Symptoms

Just as acute COVID-19 has been found to affect every part of the body, so, apparently, do its persistent symptoms.

In the study of Italian patients, the most common symptoms reported at follow-up were fatigue, shortness of breath, joint pain, and chest pain, in that order. None of the patients had a fever or other sign or symptom of acute illness, but about 44% of them had a worsened quality of life. As the authors pointed out, though, patients with community-acquired pneumonia can also have persistent symptoms, so the findings might not be exclusive to COVID-19.

Less formal surveys have also turned up wide-ranging lingering effects. When the Body Politic COVID-19 Support Group conducted an online survey in the spring, about 91% of 640 respondents said they hadn't fully recovered and were on day 40 of symptoms, on average. Most reported ongoing fatigue, chills and sweats, body aches, headaches, brain fog, and gastrointestinal issues. Anecdotally, some people have reported feeling better for days or weeks before relapsing with old or new symptoms, according to the organization, which started as a small Instagram group chat and has grown to more than 14 000 members.

Francis Collins, MD, PhD, director of the National Institutes of Health (NIH), blogged about the survey in September. "Because COVID-19 is such a new disease, little is known about what causes the persistence of symptoms, what is impeding full recovery, or how to help the long-haulers," Collins wrote, noting that the Body Politic and its international Patient-Led Research for COVID-19 group are now conducting a second survey of long haulers.

A recent survey by the grassroots group COVID-19 "Survivor Corps" found that fatigue was the most common of the top 50 symptoms experienced by the more than 1500 long haulers who responded, followed by muscle or body aches, shortness of breath or difficulty breathing, and difficulty concentrating.

Cough is the most common persistent symptom seen at the new COVID-19 Recovery Clinic (CORE) at Montefiore Medical Center in New York, codirector Aluko Hope, MD, MSCE, said in an interview. Between Hope, a pulmonary and critical care specialist, and the clinic's other director, general internist Seth Congdon, MD, the clinic sees a wide range of patients, including some who were never hospitalized. What the CORE patients have in common is that they haven't yet returned to their pre–COVID-19 health. At least a few of them have been sick for 4 or 5 months, Hope said. Besides the persistent cough, which can also occur with other viruses, loss of taste and smell lingers for many long haulers.

Many of the clinic's patients are also still short of breath. This could be due to the deconditioning seen with any lengthy illness, Hope said, or to infection-specific conditions, such as postviral reactive airways disease, lung fibrosis, or viral myocarditis. Hope said that he's seen at least one patient with no history of heart disease who developed postviral heart failure.

Dine first noticed that some patients weren't getting better through Penn's COVID Watch outreach program, which texts those who are home sick with the disease twice a day until they've been symptom-free for a week to 10 days. She now sees so many people with persistent issues that she's developed a flowchart to try to narrow down the reasons for their ill health: Is this a new symptom unrelated to COVID-19? Is it a complication of the disease, like a blood clot? Or is it a side effect of treatment? If she rules those out, she said there are just 2 options left: Either the patient is still infected with SARS-CoV-2 or they have postviral syndrome.

When the Fog Doesn't Lift

Lockman and many other long haulers describe their most debilitating persistent symptom as impaired memory and concentration, often with extreme fatigue.

The effects are different from the cognitive impairment patients might experience after a critical illness, according to Hope. When it comes to COVID-19, "I do think there's a subset of patients [who] weren't even in the hospital who have a postviral brain fog," he said.

At the end of May, Lockman took a 6-week leave of absence from her job at a human resources management company. Since that ended, she has been working part-time—4 hours on a good day. She moved her home office to her living room so she can rest on the couch. After a recent trip to the emergency department, she was so exhausted that she slept all but 3 hours the next day.

An intriguing idea is taking shape. During the July webinar, Fauci noted that some long haulers' symptoms like brain fog and fatigue are "highly suggestive" of myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS).

New York–based psychiatrist Mady Hornig, MD, a member of Columbia University Medical Center's epidemiology faculty, has long studied the role of microbial, immune, and toxic factors in the development of brain conditions such as ME/CFS, whose etiology and pathogenesis are unknown. Now she's looking at these relationships not only as a physician and scientist but also as a long hauler.

Hornig wrote off a throat tickle and cough in March as allergies. And she assumed that walking around her home shoeless caused the chilblains that later developed on her toes. It wasn't until a 4 AM fever awoke her on April 24 that she suspected she had contracted COVID-19. Although she takes 650 mg of aspirin daily for another condition, the fever persisted for 12 days, a longer stretch than any she had experienced since she had her tonsils removed at age 14, nearly 50 years ago.

Despite all the indicators, Hornig's April 27 nasal swab test was negative for SARS-CoV-2. That's likely because it was performed either too soon or too late—depending on whether the late April fever or the earlier cough or "COVID toes" were the first sign.

Her doctors told her they didn't have a better explanation than COVID-19 for her symptoms, which have also included oxygen saturation levels as low as 88% and 8- to 10-minute tachycardia episodes that still send her heart rate to 115 to 135 beats per minute at least once a day and leave her breathless, even if she's sitting down. Before COVID-19, Hornig was used to working 12- to 14-hour days. For weeks after becoming ill, tachycardia would leave her so fatigued that "I felt like I could not do anything further—my brain was just empty," she said in an interview.

About 3 out of 4 people diagnosed with ME/CFS report that it began with what appeared to be an infection, often infectious mononucleosis caused by Epstein-Barr virus (EBV), Hornig noted. One ME/CFS *International Classification of Diseases* diagnosis code even calls the condition "post-viral fatigue syndrome." Although EBV is a herpesvirus, not a coronavirus, Hornig speculated

that SARS-CoV-2 infection might reactivate latent EBV, triggering the fatigue.

To explore the idea, she has designed prospective studies with the Solve ME/CFS Initiative. The nonprofit in July launched a registry and biobank, funded in part by the NIH, to collect data from COVID-19 long haulers, as well as people diagnosed with ME/CFS and healthy controls.

"Because of the large number of COVID-19 cases occurring simultaneously, we have a unique scientific window and a huge responsibility to investigate any long-term consequences and disabilities that COVID-19 survivors may face," Hornig said in a statement announcing the registry and biobank. "Doing so will provide clues and potential treatment candidates for the millions of Americans already diagnosed with ME/CFS."

Hornig and other scientists point to autonomic nervous system dysregulation as the possible explanation for long-haulers' tachycardia, extreme fatigue, and other persistent symptoms. The system controls involuntary physiologic processes such as heart rate, blood pressure, respiration, and digestion.

Stanford University neurologist Mitchell Miglis, MD, who specializes in autonomic nervous system disorders such as postural orthostatic tachycardia syndrome (POTS), recently coauthored a case report about a previously healthy, 26-year-old emergency department nurse who developed classic POTS symptoms—fatigue, tachycardia—that hadn't resolved 5.5 months after she was diagnosed with COVID-19 in March.

"One of the most common symptoms of POTS is brain fog," Miglis noted. "It's not clearly related to blood flow to the brain. It's something else."

With Lauren Stiles, JD, president of Dysautonomia International and research assistant professor of neurology at Stony Brook University School of Medicine, Miglis has developed an online survey that is being shared with COVID-19 survivor social media groups to gather more information about autonomic symptoms. He plans to resurvey respondents every 3 months for the next year to see how they progress. Miglis speculated that POTS, ME/CFS, and persistent COVID-19 may be different names for the same disorder, and patients' diagnoses depend on their physicians' subspecialty.

Nath, chief of the Section of Infections of the Nervous System at NINDS, is planning a prospective study of persistent ME/CFS-type symptoms among people who've had COVID-19. "I think we need to assure the public that we are aware of the syndrome," he said in an interview. "We're very keen to understand what it's about."

"Medical Gaslighting"

Many long haulers never had laboratory confirmation of COVID-19, which, they say, adds to some health care professionals' skepticism that their persistent symptoms have a physiological basis.

Only about a quarter of the Body Politic survey's respondents had tested positive for COVID-19, while nearly half were never tested—often because their request was denied. But everyone's answers were included in the analysis. The main difference between those who received a positive or negative result was how early in their illness they were tested. "We believe future research must consider the experiences of all people with COVID-19 symptoms, regardless of testing status, in order to better understand the virus and underscore the importance of early and widespread testing," the report's authors wrote.

Lockman was not one of the survey respondents, but she exemplifies the Body Politic's point. At her first trip to the emergency department, she was diagnosed with pneumonia and admitted to the hospital, where she received supplemental oxygen and intravenous antibiotics for 3 days. She suspected it was COVID-19 from the beginning. But she was told she wasn't sick enough or old enough to get one of the then-scarce tests for SARS-CoV-2.

Three weeks after her symptoms began, and after testing negative for influenza and respiratory syncytial virus, Lockman was finally given a SARS-CoV-2 nasal swab test. She tested negative, likely because she had low virus levels by then, she said. In June, she was hospitalized again, this time with pulmonary emboli. A physician who reviewed her chart said she had no doubt that COVID-19 explained her symptoms.

Body Politic has acknowledged that its survey sample wasn't representative of all people with COVID-19. But the organization expressed hope that the findings would inform public health professionals and future research. Toward that end, the founders of the Long Haul COVID Fighters recently launched a Medical and Scientific Collaboration group on Facebook, giving patients and researchers a place to exchange information.

One thing that's clear, Miglis said, is that "these mystery diagnoses are real, and they're not just in patients' heads."

Long haulers say they aren't always taken seriously, though, especially if they're women, harkening back to the era when "female troubles" were written off as hysteria.

"There is definitely gender bias," Dine said. Women with persistent symptoms are more likely than men to be viewed as "dramatic and anxious," she said. "One of the first steps is believing them and making them feel heard. That alone helps."

"We've experienced so much medical gaslighting, basically doctors telling us, 'That's not what you have. It's just anxiety,'" Lockman said. Despite her frustrations, she remains hopeful that her health will continue to improve, although she recognizes that there likely will be bumps along the way.

"I definitely feel better than I did a month ago," she said in early August. "But I still wake up not knowing what I'm going to deal with today." ■

Note: Source references are available through embedded hyperlinks in the article text online.

THIS IS EXHIBIT "6" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

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Check for updates

Ranking the effectiveness of worldwide COVID-19 government interventions

Nils Haug[1,2,7], Lukas Geyrhofer[2,7], Alessandro Londei[3], Elma Dervic[1,2], Amélie Desvars-Larrive[2,4], Vittorio Loreto[2,3,5], Beate Pinior[2,4], Stefan Thurner[1,2,6] and Peter Klimek[1,2]✉

Assessing the effectiveness of non-pharmaceutical interventions (NPIs) to mitigate the spread of SARS-CoV-2 is critical to inform future preparedness response plans. Here we quantify the impact of 6,068 hierarchically coded NPIs implemented in 79 territories on the effective reproduction number, R_t, of COVID-19. We propose a modelling approach that combines four computational techniques merging statistical, inference and artificial intelligence tools. We validate our findings with two external datasets recording 42,151 additional NPIs from 226 countries. Our results indicate that a suitable combination of NPIs is necessary to curb the spread of the virus. Less disruptive and costly NPIs can be as effective as more intrusive, drastic, ones (for example, a national lockdown). Using country-specific 'what-if' scenarios, we assess how the effectiveness of NPIs depends on the local context such as timing of their adoption, opening the way for forecasting the effectiveness of future interventions.

In the absence of vaccines and antiviral medication, non-pharmaceutical interventions (NPIs) implemented in response to (emerging) epidemic respiratory viruses are the only option available to delay and moderate the spread of the virus in a population[1].

Confronted with the worldwide COVID-19 epidemic, most governments have implemented bundles of highly restrictive, sometimes intrusive, NPIs. Decisions had to be taken under rapidly changing epidemiological situations, despite (at least at the very beginning of the epidemic) a lack of scientific evidence on the individual and combined effectiveness of these measures[2–4], degree of compliance of the population and societal impact.

Government interventions may cause substantial economic and social costs[5] while affecting individuals' behaviour, mental health and social security[6]. Therefore, knowledge of the most effective NPIs would allow stakeholders to judiciously and timely implement a specific sequence of key interventions to combat a resurgence of COVID-19 or any other future respiratory outbreak. Because many countries rolled out several NPIs simultaneously, the challenge arises of disentangling the impact of each individual intervention.

To date, studies of the country-specific progression of the COVID-19 pandemic[7] have mostly explored the independent effects of a single category of interventions. These categories include travel restrictions[2,8], social distancing[9–12] and personal protective measures[13]. Additionally, modelling studies typically focus on NPIs that directly influence contact probabilities (for example, social distancing measures[18], social distancing behaviours [12], self-isolation, school closures, bans on public events[20] and so on). Some studies focused on a single country or even a town[14–18] while other research combined data from multiple countries but pooled NPIs into rather broad categories[15,19–21], which eventually limits the assessment of specific, potentially critical, NPIs that may be less costly and more effective than others. Despite their widespread use, relative ease of implementation, broad choice of available tools and their importance in developing countries where other measures (for example, increases in healthcare capacity, social distancing or enhanced testing) are difficult to implement[22], little is currently known about the effectiveness of different risk-communication strategies. An accurate assessment of communication activities requires information on the targeted public, means of communication and content of the message.

Using a comprehensive, hierarchically coded dataset of 6,068 NPIs implemented in March–April 2020 (when most European countries and US states experienced their first infection waves) in 79 territories[23], here we analyse the impact of government interventions on R_t using harmonized results from a multi-method approach consisting of (1) a case-control analysis (CC), (2) a step function approach to LASSO time-series regression (LASSO), (3) random forests (RF) and (4) transformers (TF). We contend that the combination of four different methods, combining statistical, inference and artificial intelligence classes of tools, also allows assessment of the structural uncertainty of individual methods[24]. We also investigate country-specific control strategies as well as the impact of selected country-specific metrics.

All the above approaches (1–4) yield comparable rankings of the effectiveness of different categories of NPIs across their hierarchical levels. This remarkable agreement allows us to identify a consensus set of NPIs that lead to a significant reduction in R_t. We validate this consensus set using two external datasets covering 42,151 measures in 226 countries. Furthermore, we evaluate the heterogeneity of the effectiveness of individual NPIs in different territories. We find that the time of implementation, previously implemented measures, different governance indicators[25], as well as human and social development affect the effectiveness of NPIs in countries to varying degrees.

Results

Global approach. Our main results are based on the Complexity Science Hub COVID-19 Control Strategies List (CCCSL)[23]. This dataset provides a hierarchical taxonomy of 6,068 NPIs, coded on four levels, including eight broad themes (level 1, L1) divided into

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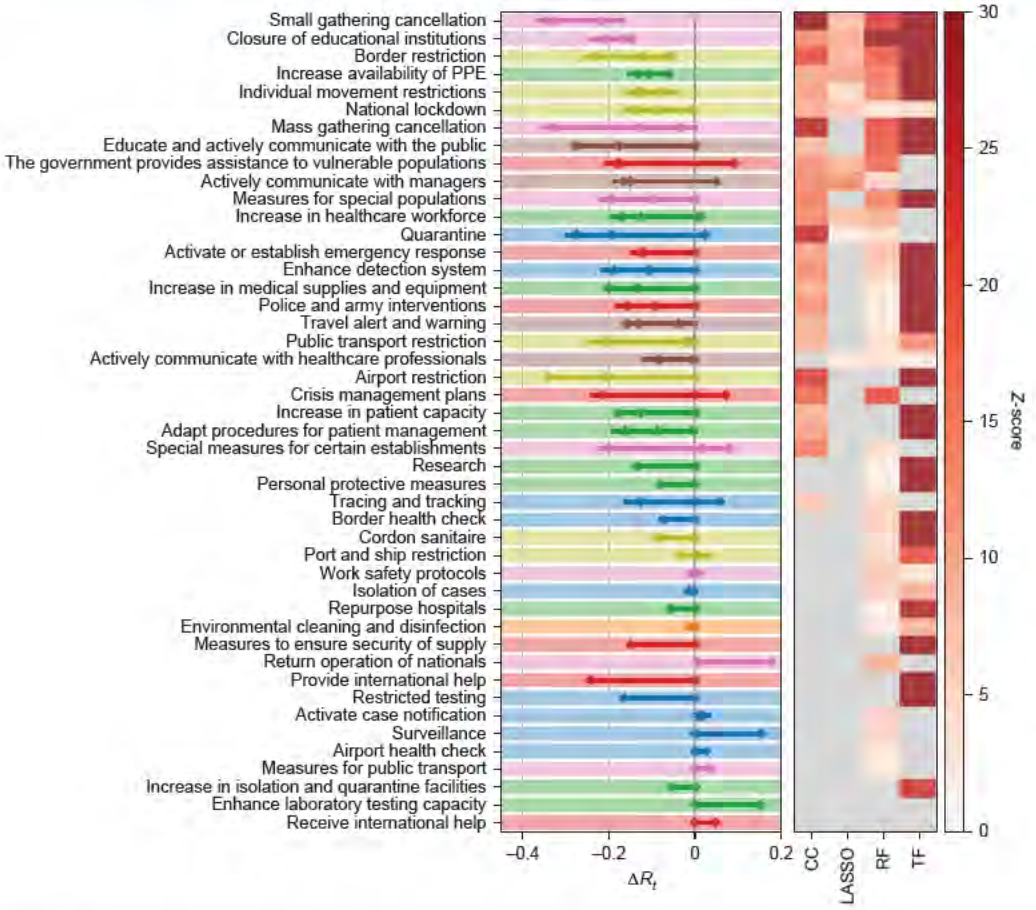

Fig. 1 | Change in R_t (ΔR_t) for 46 NPIs at L2, as quantified by CC analysis, LASSO and TF regression. The left-hand panel shows the combined 95% confidence intervals of ΔR_t for the most effective interventions across all included territories. The heatmap in the right-hand panel shows the corresponding *Z*-scores of measure effectiveness as determined by the four different methods. Grey indicates no significantly positive effect. NPIs are ranked according to the number of methods agreeing on their impacts, from top (significant in all methods) to bottom (ineffective in all analyses). L1 themes are colour-coded as in Supplementary Fig. 1.

63 categories of individual NPIs (level 2, L2) that include >500 subcategories (level 3, L3) and >2,000 codes (level 4, L4). We first compare the results for NPI effectiveness rankings for the four methods of our approach (1–4) on L1 (themes) (Supplementary Fig. 1). A clear picture emerges where the themes of social distancing and travel restrictions are top ranked in all methods, whereas environmental measures (for example, cleaning and disinfection of shared surfaces) are ranked least effective.

We next compare results obtained on L2 of the NPI dataset—that is, using the 46 NPI categories implemented more than five times. The methods largely agree on the list of interventions that have a significant effect on R_t (Fig. 1 and Table 1). The individual rankings are highly correlated with each other ($P = 0.0008$; Methods). Six NPI categories show significant impacts on R_t in all four methods. In Supplementary Table 1 we list the subcategories (L3) belonging to these consensus categories.

A normalized score for each NPI category is obtained by rescaling the result within each method to range between zero (least effective) and one (most effective) and then averaging this score. The maximal (minimal) NPI score is therefore 100% (0%), meaning that the measure is the most (least) effective measure in each method. We show the normalized scores for all measures in the CCCSL dataset in Extended Data Fig. 1, for the CoronaNet dataset in Extended Data Fig. 2 and for the WHO Global Dataset of Public Health and Social Measures (WHO-PHSM) in Extended Data Fig. 3. Among the six full-consensus NPI categories in the CCCSL, the largest impacts on R_t are shown by small gathering cancellations (83%, ΔR_t between −0.22 and −0.35), the closure of educational institutions (73%, and estimates for ΔR_t ranging from −0.15 to −0.21) and border restrictions (56%, ΔR_t between −0.057 and −0.23). The consensus measures also include NPIs aiming to increase healthcare and public health capacities (increased availability of personal protective equipment (PPE): 51%, ΔR_t −0.062 to −0.13), individual movement restrictions (42%, ΔR_t −0.08 to −0.13) and national lockdown (including stay-at-home order in US states) (25%, ΔR_t −0.008 to −0.14).

We find 14 additional NPI categories consensually in three of our methods. These include mass gathering cancellations (53%, ΔR_t between −0.13 and −0.33), risk-communication activities to inform and educate the public (48%, ΔR_t between −0.18 and −0.28) and government assistance to vulnerable populations (41%, ΔR_t between −0.17 and −0.18).

Among the least effective interventions we find: government actions to provide or receive international help, measures to enhance testing capacity or improve case detection strategy (which can be expected to lead to a short-term rise in cases), tracing and tracking measures as well as land border and airport health checks and environmental cleaning.

In Fig. 2 we show the findings on NPI effectiveness in a co-implementation network. Nodes correspond to categories (L2)

Table 1 | Comparison of effectiveness rankings on L2

L2 category	Score (%)	Consensus	ΔR_t^{CC}	ΔR_t^{LASSO}	Importance (RF)	ΔR_t^{TF}
Small gathering cancellation	83	4	−0.35 (2)	−0.22 (5)	0.020 (2)	−0.327 (3)
Closure of educational institutions	73	4	−0.16 (2)	−0.21 (4)	0.028 (2)	−0.146 (2)
Border restriction	56	4	−0.23 (2)	−0.12 (2)	0.017 (2)	−0.057 (2)
Increased availability of PPE	51	4	−0.11 (2)	−0.13 (2)	0.012 (1)	−0.062 (2)
Individual movement restrictions	42	4	−0.13 (2)	−0.08 (3)	0.017 (2)	−0.121 (2)
National lockdown	25	4	−0.14 (3)	−0.09 (2)	0.0020 (9)	−0.008 (3)
Mass gathering cancellation	53	3	−0.33 (2)	0	0.012 (1)	−0.127 (2)
Educate and actively communicate with the public	48	3	−0.18 (4)	0	0.018 (2)	−0.276 (2)
The government provides assistance to vulnerable populations	41	3	−0.17 (3)	−0.18 (4)	0.009 (1)	0.090 (3)
Actively communicate with managers	40	3	−0.15 (2)	−0.20 (4)	0.004 (2)	−0.050 (2)
Measures for special populations	37	3	−0.19 (2)	0	0.008 (1)	−0.100 (2)
Increase healthcare workforce	35	3	−0.17 (20)	−0.13 (3)	0.030 (8)	0.011 (2)
Quarantine	30	3	−0.28 (2)	−0.2 (1)	0.0023 (9)	0.023 (2)
Activate or establish emergency response	29	3	−0.13 (2)	0	0.0037 (9)	−0.121 (2)
Enhance detection system	25	3	−0.19 (3)	0	0.0032 (9)	−0.106 (2)
Increase in medical supplies and equipment	25	3	−0.13 (3)	−0.004 (3)	0.003 (2)	−0.200 (3)
Police and army interventions	23	3	−0.16 (2)	0	0.003 (2)	−0.091 (2)
Travel alert and warning	20	3	−0.13 (3)	0.0 (1)	0.002 (1)	−0.159 (3)
Public transport restriction	13	3	00.20 (4)	−0.01 (7)	0.004 (1)	−0.023 (3)
Actively communicate with healthcare professionals	11	3	0	−0.08 (4)	0.003 (1)	−0.003 (2)

Out of the 46 NPI categories, all four methods show significant results for six NPIs (consensus 4) while three methods agree on 14 further NPIs (consensus 3). We report the average normalized score, the observed reduction in R_t for the various methods and NPI importance for RF. Numbers in parentheses denote half of the amount by which the last digit of the corresponding number outside the parentheses fluctuates within the 95% confidence interval.

with size being proportional to their normalized score. Directed links from *i* to *j* indicate a tendency that countries implement NPI *j* after they have implemented *i*. The network therefore illustrates the typical NPI implementation sequence in the 56 countries and the steps within this sequence that contribute most to a reduction in R_t. For instance, there is a pattern where countries first cancel mass gatherings before moving on to cancellations of specific types of small gatherings, where the latter associates on average with more substantial reductions in R_t. Education and active communication with the public is one of the most effective 'early measures' (implemented around 15 days before 30 cases were reported and well before the majority of other measures comes). Most social distancing (that is, closure of educational institutions), travel restriction measures (that is, individual movement restrictions like curfew and national lockdown) and measures to increase the availability of PPE are typically implemented within the first 2 weeks after reaching 30 cases, with varying impacts on R_t; see also Fig. 1.

Within the CC approach, we can further explore these results on a finer hierarchical level. We show results for 18 NPIs (L3) of the risk-communication theme in Supplementary Information and Supplementary Table 2. The most effective communication strategies include warnings against travel to, and return from, high-risk areas ($\Delta R^{CC}_t = -0.14$ (1); the number in parenthesis denotes the standard error) and several measures to actively communicate with the public. These include to encourage, for example, staying at home ($\Delta R^{CC}_t = -0.14$ (1)), social distancing ($\Delta R^{CC}_t = -0.20$ (1)), workplace safety measures ($\Delta R^{CC}_t = -0.18$ (2)), self-initiated isolation of people with mild respiratory symptoms ($\Delta R^{CC}_t = -0.19$ (2)) and information campaigns ($\Delta R^{CC}_t = -0.13$ (1)) (through various channels including the press, flyers, social media or phone messages).

Validation with external datasets. We validate our findings with results from two external datasets (Methods). In the WHO-PHSM dataset[26] we find seven full-consensus measures (agreement on significance by all methods) and 17 further measures with three agreements (Extended Data Fig. 4). These consensus measures show a large overlap with those (three or four matches in our methods) identified using the CCCSL, and include top-ranked NPI measures aiming at strengthening the healthcare system and testing capacity (labelled as 'scaling up')—for example, increasing the healthcare workforce, purchase of medical equipment, testing, masks, financial support to hospitals, increasing patient capacity, increasing domestic production of PPE. Other consensus measures consist of social distancing measures ('cancelling, restricting or adapting private gatherings outside the home', adapting or closing 'offices, businesses, institutions and operations', 'cancelling, restricting or adapting mass gatherings'), measures for special populations ('protecting population in closed settings', encompassing long-term care facilities and prisons), school closures, travel restrictions (restricting entry and exit, travel advice and warning, 'closing international land borders', 'entry screening and isolation or quarantine') and individual movement restriction ('stay-at-home order', which is equivalent to confinement in the WHO-PHSM coding). 'Wearing a mask' exhibits a significant impact on R_t in three methods (ΔR_t between −0.018 and −0.12). The consensus measures also include financial packages and general public awareness campaigns (as part of 'communications and engagement' actions). The least effective measures include active case detection, contact tracing and environmental cleaning and disinfection.

The CCCSL results are also compatible with findings from the CoronaNet dataset[27] (Extended Data Figs. 5 and 6). Analyses show four full-consensus measures and 13 further NPIs with an

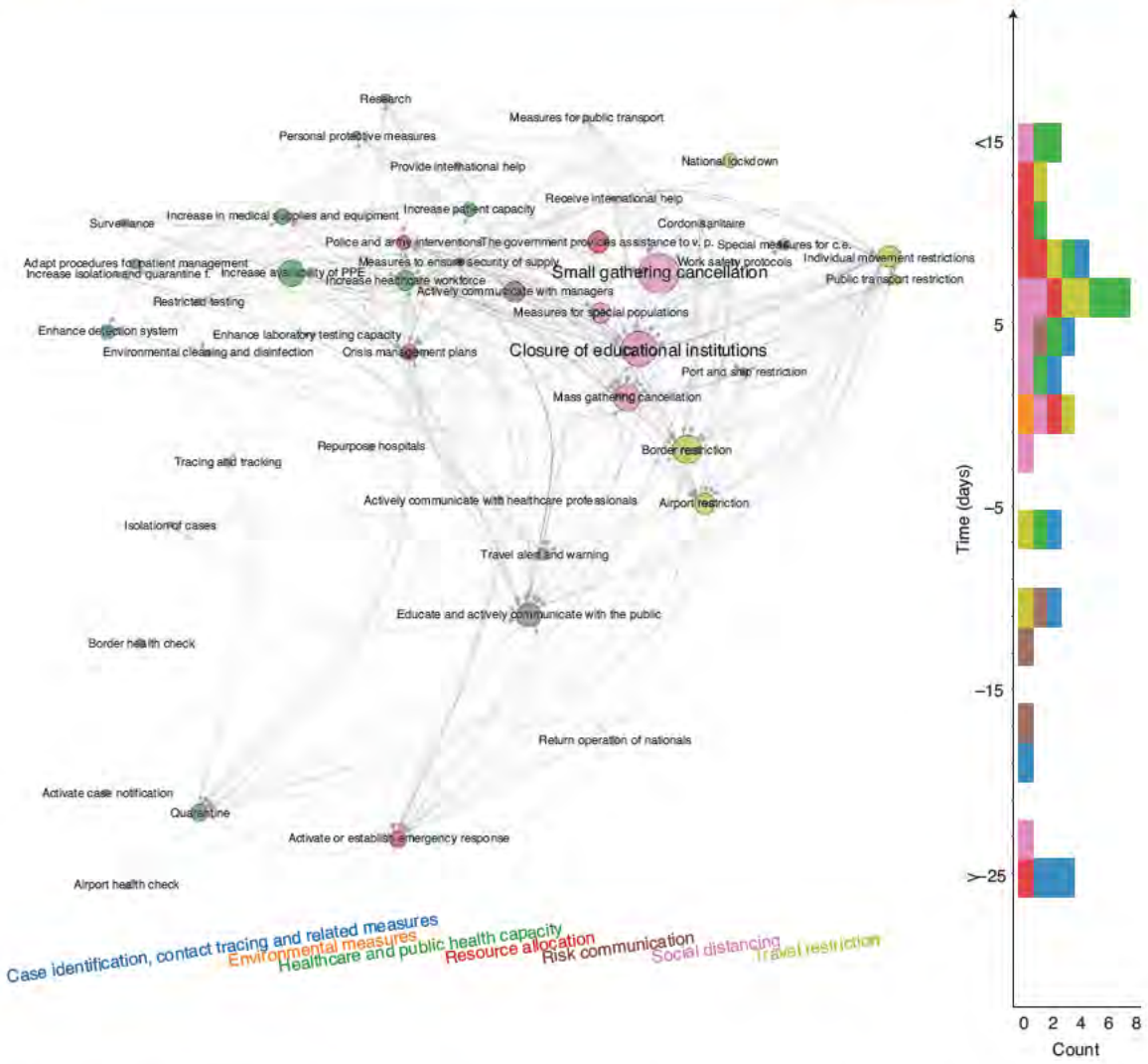

Fig. 2 | Time-ordered NPI co-implementation network across countries. Nodes are categories (L2), with colours indicating the theme (L1) and size being proportional to the average effectiveness of the intervention. Arrows from nodes *i* to *j* denote that those countries which have already implemented intervention *i* tend to implement intervention *j* later in time. Nodes are positioned vertically according to their average time of implementation (measured relative to the day where that country reached 30 confirmed cases), and horizontally according to their L1 theme. The stacked histogram on the right shows the number of implemented NPIs per time period (epidemic age) and theme (colour). v.p., vulnerable populations; c.e., certain establishments; quarantine f., quarantine facilities.

agreement of three methods. These consensus measures include heterogeneous social distancing measures (for example, restriction and regulation of non-essential businesses, restrictions of mass gatherings), closure and regulation of schools, travel restrictions (for example, internal and external border restrictions), individual movement restriction (curfew), measures aiming to increase the healthcare workforce (for example, 'nurses', 'unspecified health staff') and medical equipment (for example, PPE, 'ventilators', 'unspecified health materials'), quarantine (that is, voluntary or mandatory self-quarantine and quarantine at a government hotel or facility) and measures to increase public awareness ('disseminating information related to COVID-19 to the public that is reliable and factually accurate').

Twenty-three NPIs in the CoronaNet dataset do not show statistical significance in any method, including several restrictions and regulations of government services (for example, for tourist sites, parks, public museums, telecommunications), hygiene measures for public areas and other measures that target very specific populations (for example, certain age groups, visa extensions).

Country-level approach. A sensitivity check of our results with respect to the removal of individual continents from the analysis also indicates substantial variations between world geographical regions in terms of NPI effectiveness (Supplementary Information). To further quantify how much the effectiveness of an NPI depends on the particular territory (country or US state) where it has been introduced, we measure the heterogeneity of NPI rankings in different territories through an entropic approach in the TF method (Methods). Figure 3 shows the normalized entropy of each NPI category versus its rank. A value of entropy close to zero implies that the corresponding NPI has a similar rank relative to all other NPIs in all territories: in other words, the effectiveness of the NPI does not depend on the specific country or state. On the other hand, a high value of the normalized entropy signals that the performance of each NPI depends largely on the geographical region.

The values of the normalized entropies for many NPIs are far from one, and are also below the corresponding values obtained through temporal reshuffling of NPIs in each country. The effectiveness of many NPIs therefore is, first, significant and, second,

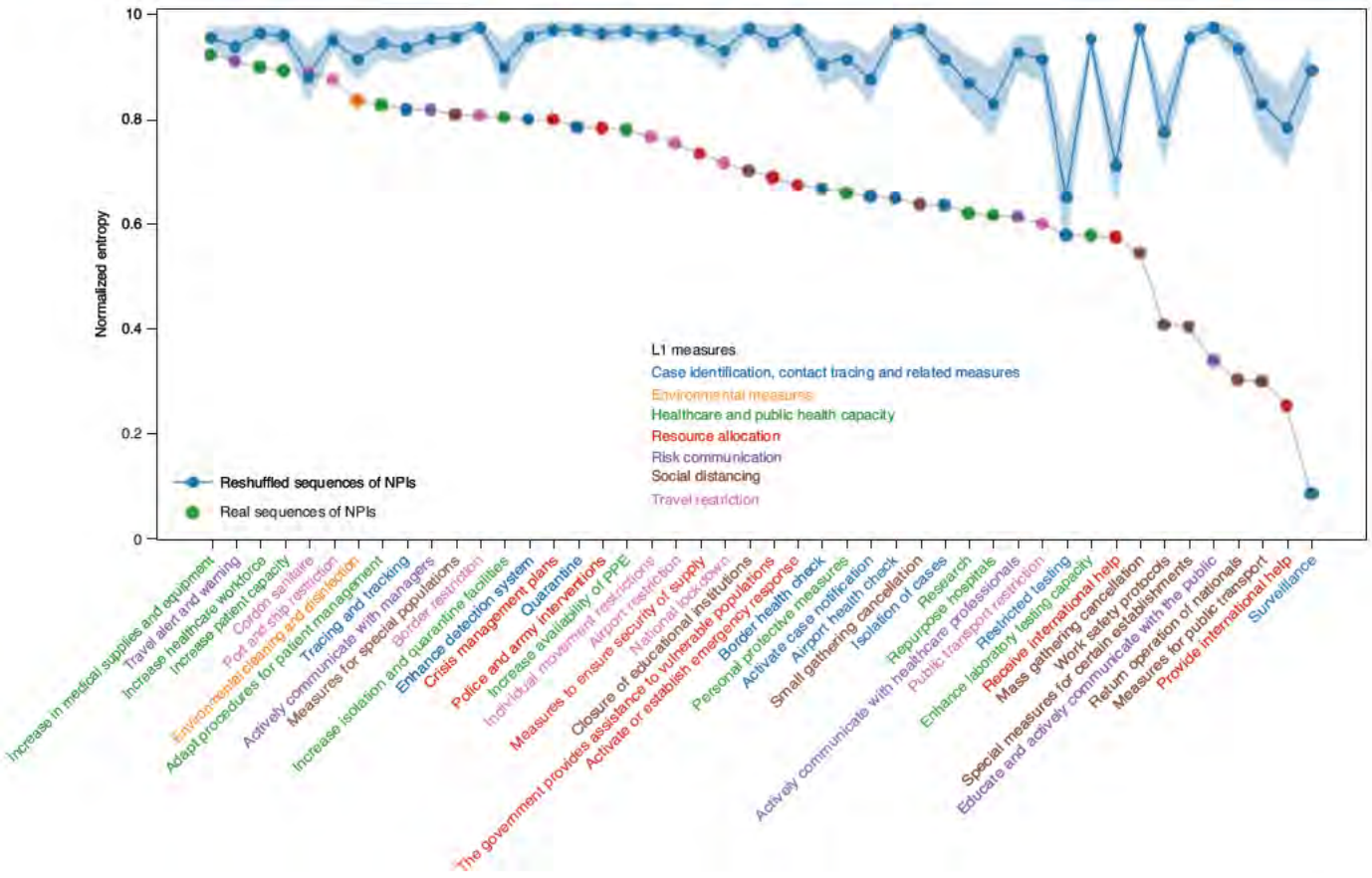

Fig. 3 | Normalized entropies versus rank for all NPIs at level L2. Each NPI is colour coded according to its theme of belonging (L1), as indicated in the legend. The blue curve represents the same information obtained from a reshuffled dataset of NPIs.

depends on the local context (combination of socio-economic features and NPIs already adopted) to varying degrees. In general, social distancing measures and travel restrictions show a high entropy (effectiveness varies considerably across countries) whereas case identification, contact tracing and healthcare measures show substantially less country dependence.

We further explore this interplay of NPIs with socio-economic factors by analysing the effects of demographic and socio-economic covariates, as well as indicators for governance and human and economic development in the CC method (Supplementary Information). While the effects of most indicators vary across different NPIs at rather moderate levels, we find a robust tendency that NPI effectiveness correlates negatively with indicator values for governance-related accountability and political stability (as quantified by World Governance Indicators provided by the World Bank).

Because the heterogeneity of the effectiveness of individual NPIs across countries points to a non-independence among different NPIs, the impact of a specific NPI cannot be evaluated in isolation. Since it is not possible in the real world to change the sequence of NPIs adopted, we resort to 'what-if' experiments to identify the most likely outcome of an artificial sequence of NPIs in each country. Within the TF approach, we selectively delete one NPI at a time from all sequences of interventions in all countries and compute the ensuing evolution of R_t compared to the actual case.

To quantify whether the effectiveness of a specific NPI depends on its epidemic age of implementation, we study artificial sequences of NPIs constructed by shifting the selected NPI to other days, keeping the other NPIs fixed. In this way, for each country and each NPI, we obtain a curve of the most likely change in R_t versus the adoption time of the specific NPI.

Figure 4 shows an example of the results for a selection of NPIs (see Supplementary Information for a more extensive report on other NPIs). Each curve shows the average change in R_t versus the adoption time of the NPI, averaged over the countries where that NPI has been adopted. Figure 4a refers to the national lockdown (including stay-at-home order implemented in US states). Our results show a moderate effect of this NPI (low change in R_t) as compared to other, less drastic, measures. Figure 4b shows NPIs with the pattern 'the earlier, the better'. For those measures ('closure of educational institutions', 'small gatherings cancellation', 'airport restrictions' and many more shown in Supplementary Information), early adoption is always more beneficial. In Fig. 4c, 'enhancing testing capacity' and 'surveillance' exhibit a negative impact (that is, an increase) on R_t, presumably related to the fact that more testing allows for more cases to be identified. Finally, Fig. 4d, showing 'tracing and tracking' and 'activate case notification', demonstrates an initially negative effect that turns positive (that is, toward a reduction in R_t). Refer to Supplementary Information for a more comprehensive analysis of all NPIs.

Discussion

Our study dissects the entangled packages of NPIs[23] and quantifies their effectiveness. We validate our findings using three different datasets and four independent methods. Our findings suggest that no NPI acts as a silver bullet on the spread of COVID-19. Instead, we identify several decisive interventions that significantly

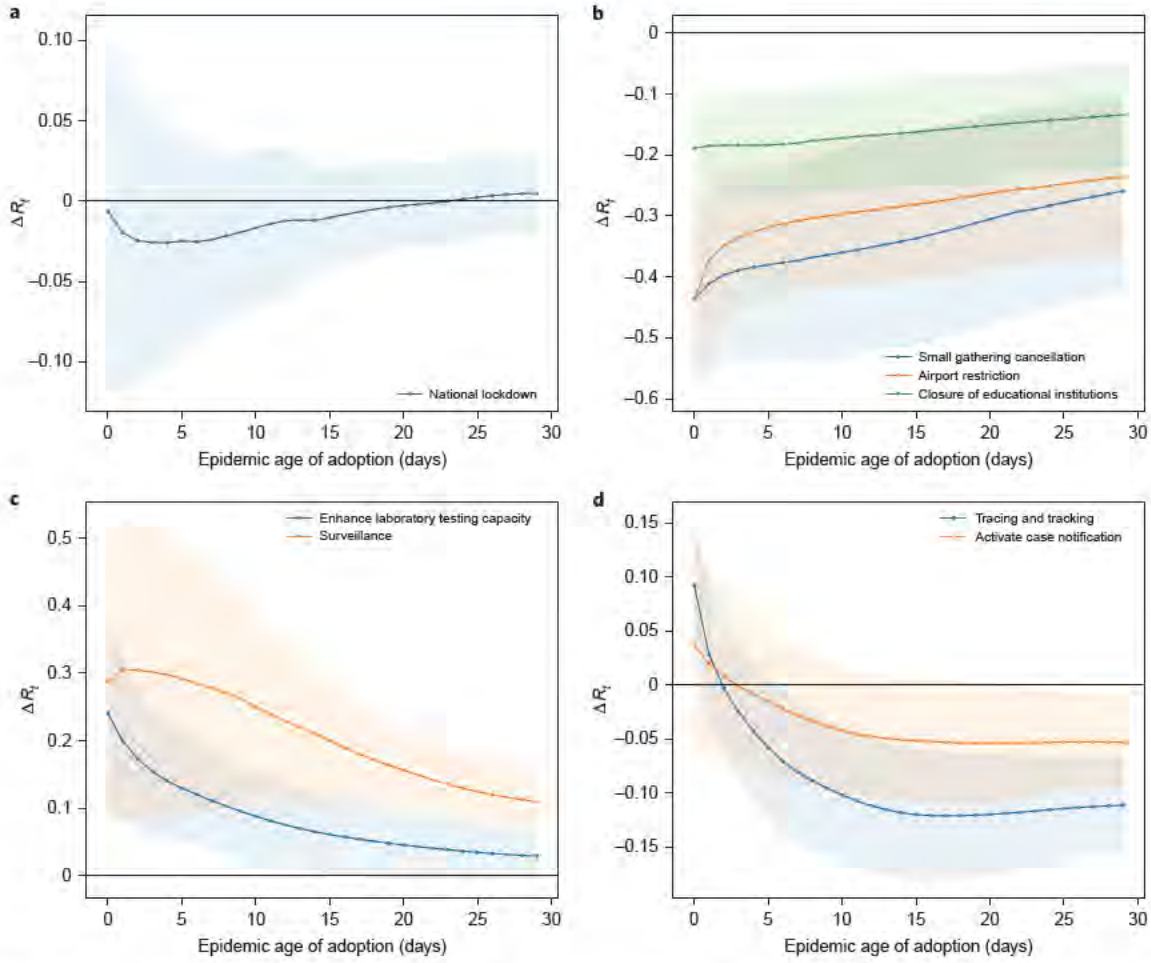

Fig. 4 | Change in R_t as a function of the adoption time of selected NPIs, averaged over countries where thosee NPIs had been adopted. a, National lockdown (including stay-at-home order in US states). **b**, A selection of three NPIs displaying 'the earlier the better' behaviour—that is, their impact is enhanced if implemented at earlier epidemic ages. **c**, Enhance laboratory testing capacity and Surveillance. **d**, Tracing and tracking and Activate case notification. Negative (positive) values indicate that the adoption of the NPI has reduced (increased) the value of R_t. Shaded areas denote s.d.

contribute to reducing R_t below one and that should therefore be considered as efficiently flattening the curve facing a potential second COVID-19 wave, or any similar future viral respiratory epidemics.

The most effective NPIs include curfews, lockdowns and closing and restricting places where people gather in smaller or large numbers for an extended period of time. This includes small gathering cancellations (closures of shops, restaurants, gatherings of 50 persons or fewer, mandatory home working and so on) and closure of educational institutions. While in previous studies, based on smaller numbers of countries, school closures had been attributed as having little effect on the spread of COVID-19 (refs. [19,20]), more recent evidence has been in favour of the importance of this NPI[28,29]; school closures in the United States have been found to reduce COVID-19 incidence and mortality by about 60% (ref. [28]). This result is also in line with a contact-tracing study from South Korea, which identified adolescents aged 10–19 years as more likely to spread the virus than adults and children in household settings[30]. Individual movement restrictions (including curfew, the prohibition of gatherings and movements for non-essential activities or measures segmenting the population) were also amongst the top-ranked measures.

However, such radical measures have adverse consequences. School closure interrupts learning and can lead to poor nutrition, stress and social isolation in children[31–33]. Home confinement has strongly increased the rate of domestic violence in many countries, with a huge impact on women and children[34,35], while it has also limited the access to long-term care such as chemotherapy, with substantial impacts on patients' health and survival chance[36,37]. Governments may have to look towards less stringent measures, encompassing maximum effective prevention but enabling an acceptable balance between benefits and drawbacks[38].

Previous statistical studies on the effectiveness of lockdowns came to mixed conclusions. Whereas a relative reduction in R_t of 5% was estimated using a Bayesian hierarchical model[19], a Bayesian mechanistic model estimated a reduction of 80% (ref. [20]), although some questions have been raised regarding the latter work because of biases that overemphasize the importance of the most recent measure that had been implemented[24]. The susceptibility of other modelling approaches to biases resulting from the temporal sequence of NPI implementations remains to be explored. Our work tries to avoid such biases by combining multiple modelling approaches and points to a mild impact of lockdowns due to an overlap with effects of other measures adopted earlier and included in what is referred to as 'national (or full) lockdown'. Indeed, the national lockdown encompasses multiple NPIs (for example, closure of land, sea and air borders, closure of schools, non-essential shops and prohibition of gatherings and visiting nursing homes) that countries may have already adopted in parts. From this perspective, the relatively

attenuated impact of the national lockdown is explained as the little delta after other concurrent NPIs have been adopted. This conclusion does not rule out the effectiveness of an early national lockdown, but suggests that a suitable combination (sequence and time of implementation) of a smaller package of such measures can substitute for a full lockdown in terms of effectiveness, while reducing adverse impacts on society, the economy, the humanitarian response system and the environment[6,39–41].

Taken together, the social distancing and movement-restriction measures discussed above can therefore be seen as the 'nuclear option' of NPIs: highly effective but causing substantial collateral damages to society, the economy, trade and human rights[4,39].

We find strong support for the effectiveness of border restrictions. The role of travelling in the global spread of respiratory diseases proved central during the first SARS epidemic (2002–2003)[42], but travelling restrictions show a large impact on trade, economy and the humanitarian response system globally[41,43]. The effectiveness of social distancing and travel restrictions is also in line with results from other studies that used different statistical approaches, epidemiological metrics, geographic coverage and NPI classification[2,8–11,13,19,20].

We also find a number of highly effective NPIs that can be considered less costly. For instance, we find that risk-communication strategies feature prominently amongst consensus NPIs. This includes government actions intended to educate and actively communicate with the public. The effective messages include encouraging people to stay at home, promoting social distancing and workplace safety measures, encouraging the self-initiated isolation of people with symptoms, travel warnings and information campaigns (mostly via social media). All these measures are non-binding government advice, contrasting with the mandatory border restriction and social distancing measures that are often enforced by police or army interventions and sanctions. Surprisingly, communicating on the importance of social distancing has been only marginally less effective than imposing distancing measures by law. The publication of guidelines and work safety protocols to managers and healthcare professionals was also associated with a reduction in R_t, suggesting that communication efforts also need to be tailored toward key stakeholders. Communication strategies aim at empowering communities with correct information about COVID-19. Such measures can be of crucial importance in targeting specific demographic strata found to play a dominant role in driving the spread of COVID-19 (for example, communication strategies to target individuals aged <40 years[44]).

Government food assistance programmes and other financial supports for vulnerable populations have also turned out to be highly effective. Such measures are, therefore, not only impacting the socio-economic sphere[45] but also have a positive effect on public health. For instance, facilitating people's access to tests or allowing them to self-isolate without fear of losing their job or part of their salary may help in reducing R_t.

Some measures are ineffective in (almost) all methods and datasets—for example, environmental measures to disinfect and clean surfaces and objects in public and semi-public places. This finding is at odds with current recommendations of the WHO (World Health Organization) for environmental cleaning in non-healthcare settings[46], and calls for a closer examination of the effectiveness of such measures. However, environmental measures (for example, cleaning of shared surfaces, waste management, approval of a new disinfectant, increased ventilation) are seldom reported by governments or the media and are therefore not collected by NPI trackers, which could lead to an underestimation of their impact. These results call for a closer examination of the effectiveness of such measures. We also find no evidence for the effectiveness of social distancing measures in regard to public transport. While infections on buses and trains have been reported[47], our results may suggest a limited contribution of such cases to the overall virus spread, as previously reported[48]. A heightened public risk awareness associated with commuting (for example, people being more likely to wear face masks) might contribute to this finding[49]. However, we should note that measures aiming at limiting engorgement or increasing distancing on public transport have been highly diverse (from complete cancellation of all public transport to increase in the frequency of traffic to reduce traveller density) and could therefore lead to widely varying effectiveness, also depending on the local context.

The effectiveness of individual NPIs is heavily influenced by governance (Supplementary Information) and local context, as evidenced by the results of the entropic approach. This local context includes the stage of the epidemic, socio-economic, cultural and political characteristics and other NPIs previously implemented. The fact that gross domestic product is overall positively correlated with NPI effectiveness whereas the governance indicator 'voice and accountability' is negatively correlated might be related to the successful mitigation of the initial phase of the epidemic of certain south-east Asian and Middle East countries showing authoritarian tendencies. Indeed, some south-east Asian government strategies heavily relied on the use of personal data and police sanctions whereas the Middle East countries included in our analysis reported low numbers of cases in March–April 2020.

By focusing on individual countries, the what-if experiments using artificial country-specific sequences of NPIs offer a way to quantify the importance of this local context with respect to measurement of effectiveness. Our main takeaway here is that the same NPI can have a drastically different impact if taken early or later, or in a different country.

It is interesting to comment on the impact that 'enhancing testing capacity' and 'tracing and tracking' would have had if adopted at different points in time. Enhancing testing capacity should display a short-term increase in R_t. Counter-intuitively, in countries testing close contacts, tracing and tracking, if they are effective, would have a similar effect on R_t because more cases will be found (although tracing and tracking would reduce R_t in countries that do not test contacts but rely on quarantine measures). For countries implementing these measures early, indeed, we find a short-term increase in R_t (when the number of cases was sufficiently small to enable tracing and testing of all contacts). However, countries implementing these NPIs later did not necessarily find more cases, as shown by the corresponding decrease in R_t. We focus on March and April 2020, a period in which many countries had a sudden surge in cases that overwhelmed their tracing and testing capacities, which rendered the corresponding NPIs ineffective.

Assessment of the effectiveness of NPIs is statistically challenging, because measures were typically implemented simultaneously and their impact might well depend on the particular implementation sequence. Some NPIs appear in almost all countries whereas in others only a few, meaning that we could miss some rare but effective measures due to a lack of statistical power. While some methods might be prone to overestimation of the effects from an NPI due to insufficient adjustments for confounding effects from other measures, other methods might underestimate the contribution of an NPI by assigning its impact to a highly correlated NPI. As a consequence, estimates of ΔR_t might vary substantially across different methods whereas agreement on the significance of individual NPIs is much more pronounced. The strength of our study, therefore, lies in the harmonization of these four independent methodological approaches combined with the usage of an extensive dataset on NPIs. This allows us to estimate the structural uncertainty of NPI effectiveness—that is, the uncertainty introduced by choosing a certain model structure likely to affect other modelling works that rely on a single method only. Moreover, whereas previous studies often subsumed a wide range of social distancing and travel restriction

measures under a single entity, our analysis contributes to a more fine-grained understanding of each NPI.

The CCCSL dataset features non-homogeneous data completeness across the different territories, and data collection could be biased by the data collector (native versus non-native) as well as by the information communicated by governments (see also ref. [23]). The WHO-PHSM and CoronaNet databases contain a broad geographic coverage whereas CCCSL focuses mostly on developed countries. Moreover, the coding system presents certain drawbacks, notably because some interventions could belong to more than one category but are recorded only once. Compliance with NPIs is crucial for their effectiveness, yet we assumed a comparable degree of compliance by each population. We tried to mitigate this issue by validating our findings on two external databases, even if these are subject to similar limitations. We did not perform a formal harmonization of all categories in the three NPI trackers, which limits our ability to perform full comparisons among the three datasets. Additionally, we neither took into account the stringency of NPI implementation nor the fact that not all methods were able to describe potential variations in NPI effectiveness over time, besides the dependency on the epidemic age of its adoption. The time window is limited to March–April 2020, where the structure of NPIs is highly correlated due to simultaneous implementation. Future research should consider expanding this window to include the period when many countries were easing policies, or maybe even strenghening them again after easing, as this would allow clearer differentiation of the correlated structure of NPIs because they tended to be released, and implemented again, one (or a few) at a time.

To compute R_t, we used time series of the number of confirmed COVID-19 cases[50]. This approach is likely to over-represent patients with severe symptoms and may be biased by variations in testing and reporting policies among countries. Although we assume a constant serial interval (average timespan between primary and secondary infection), this number shows considerable variation in the literature[51] and depends on measures such as social distancing and self-isolation.

In conclusion, here we present the outcome of an extensive analysis on the impact of 6,068 individual NPIs on the R_t of COVID-19 in 79 territories worldwide. Our analysis relies on the combination of three large and fine-grained datasets on NPIs and the use of four independent statistical modelling approaches.

The emerging picture reveals that no one-size-fits-all solution exists, and no single NPI can decrease R_t below one. Instead, in the absence of a vaccine or efficient antiviral medication, a resurgence of COVID-19 cases can be stopped only by a suitable combination of NPIs, each tailored to the specific country and its epidemic age. These measures must be enacted in the optimal combination and sequence to be maximally effective against the spread of SARS-CoV-2 and thereby enable more rapid reopening.

We showed that the most effective measures include closing and restricting most places where people gather in smaller or larger numbers for extended periods of time (businesses, bars, schools and so on). However, we also find several highly effective measures that are less intrusive. These include land border restrictions, governmental support to vulnerable populations and risk-communication strategies. We strongly recommend that governments and other stakeholders first consider the adoption of such NPIs, tailored to the local context, should infection numbers surge (or surge a second time), before choosing the most intrusive options. Less drastic measures may also foster better compliance from the population.

Notably, the simultaneous consideration of many distinct NPI categories allows us to move beyond the simple evaluation of individual classes of NPIs to assess, instead, the collective impact of specific sequences of interventions. The ensemble of these results calls for a strong effort to simulate what-if scenarios at the country level for planning the most probable effectiveness of future NPIs, and, thanks to the possibility of going down to the level of individual countries and country-specific circumstances, our approach is the first contribution toward this end.

Methods

Data. *NPI data.* We use the publicly available CCCSL dataset on NPIs[23], in which NPIs are categorized using a four-level hierarchical coding scheme. L1 defines the theme of the NPI: 'case identification, contact tracing and related measures', 'environmental measures', 'healthcare and public health capacity', 'resource allocation', 'returning to normal life', 'risk communication', 'social distancing' and 'travel restriction'. Each L1 (theme) is composed of several categories (L2 of the coding scheme) that contain subcategories (L3), which are further subdivided into group codes (L4). The dataset covers 56 countries; data for the United States are available at the state level (24 states), making a total of 79 territories. In this analysis, we use a static version of the CCCSL, retrieved on 17 August 2020, presenting 6,068 NPIs. A glossary of the codes, with a detailed description of each category and its subcategories, is provided on GitHub. For each country, we use the data until the day for which the measures have been reliably updated. NPIs that have been implemented in fewer than five territories are not considered, leading to a final total of 4,780 NPIs of 46 different L2 categories for use in the analyses.

Second, we use the CoronaNet COVID-19 Government Response Event Dataset (v.1.0)[27] that contains 31,532 interventions and covers 247 territories (countries and US states) (data extracted on 17 August 2020). For our analysis, we map their columns 'type' and 'type_sub_cat' onto L1 and L2, respectively. Definitions for the entire 116 L2 categories can be found on the GitHub page of the project.

Using the same criterion as for the CCCSL, we obtain a final total of 18,919 NPIs of 107 different categories.

Third, we use the WHO-PHSM dataset[26], which merges and harmonizes the following datasets: ACAPS[41], Oxford COVID-19 Government Response Tracker[52], the Global Public Health Intelligence Network (GPHIN) of Public Health Agency of Canada (Ottawa, Canada), the CCCSL[23], the United States Centers for Disease Control and Prevention and HIT-COVID[53]. The WHO-PHSM dataset contains 24,077 interventions and covers 264 territories (countries and US states; data extracted on 17 August 2020). Their encoding scheme has a heterogeneous coding depth and, for our analysis, we map 'who_category' onto L1 and either take 'who_subcategory' or a combination of 'who_subcategory' and 'who_measure' as L2. This results in 40 measure categories. A glossary is available at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/phsm.

The CoronaNet and WHO-PHSM datasets also provide information on the stringency of the implementation of a given NPI, which we did not use in the current study.

COVID-19 case data. To estimate R_t and growth rates of the number of COVID-19 cases, we use time series of the number of confirmed COVID-19 cases in the 79 territories considered[50]. To control for weekly fluctuations, we smooth the time series by computing the rolling average using a Gaussian window with a standard deviation of 2 days, truncated at a maximum window size of 15 days.

Regression techniques. We apply four different statistical approaches to quantify the impact of a NPI, M, on the reduction in R_t (Supplementary Information).

CC. Case-control analysis considers each single category (L2) or subcategory (L3) M separately and evaluates in a matched comparison the difference, ΔR_t, in R_t between all countries that implemented M (cases) and those that did not (controls) during the observation window. The matching is done on epidemic age and the time of implementation of any response. The comparison is made via a linear regression model adjusting for (1) epidemic age (days after the country has reached 30 confirmed cases), (2) the value of R_t before M takes effect, (3) total population, (4) population density, (5) the total number of NPIs implemented and (6) the number of NPIs implemented in the same category as M. With this design, we investigate the time delay of τ days between implemention of M and observation of ΔR_t, as well as additional country-based covariates that quantify other dimensions of governance and human and economic development. Estimates for R_t are averaged over delays between 1 and 28 days.

Step function Lasso regression. In this approach we assume that, without any intervention, the reproduction factor is constant and deviations from this constant result from a delayed onset by τ days of each NPI on L2 (categories) of the hierarchical dataset. We use a Lasso regularization approach combined with a meta parameter search to select a reduced set of NPIs that best describe the observed ΔR_t. Estimates for the changes in ΔR_t attributable to NPI M are obtained from country-wise cross-validation.

RF regression. We perform a RF regression, where the NPIs implemented in a country are used as predictors for R_t, time-shifted τ days into the future. Here, τ accounts for the time delay between implementation and onset of the effect of a given NPI. Similar to the Lasso regression, the assumption underlying the RF approach is that, without changes in interventions, the value of R_t in a territory

remains constant. However, contrary to the two methods described above, RF represents a nonlinear model, meaning that the effects of individual NPIs on R_t do not need to add up linearly. The importance of a NPI is defined as the decline in predictive performance of the RF on unseen data if the data concerning that NPI are replaced by noise, also called permutation importance.

Transformer modelling. Transformers[54] have been demonstrated as models suitable for dynamic discrete element processes such as textual sequences, due to their ability to recall past events. Here we extended the transformer architecture to approach the continuous case of epidemic data by removing the probabilistic output layer with a linear combination of transformer output, whose input is identical to that for RF regression, along with the values of R_t. The best-performing network (least mean-squared error in country-wise cross-validation) is identified as a transformer encoder with four hidden layers of 128 neurons, an embedding size of 128, eight heads, one output described by a linear output layer and 47 inputs (corresponding to each category and R_t). To quantify the impact of measure M on R_t, we use the trained transformer as a predictive model and compare simulations without any measure (reference) to those where one measure is presented at a time to assess ΔR_t. To reduce the effects of overfitting and multiplicity of local minima, we report results from an ensemble of transformers trained to similar precision levels.

Estimation of R_t. We use the R package EpiEstim[55] with a sliding time window of 7 days to estimate the time series of R_t for every country. We choose an uncertain serial interval following a probability distribution with a mean of 4.46 days and a standard deviation of 2.63 days[56].

Ranking of NPIs. For each of the methods (CC, Lasso regression and TF), we rank the NPI categories in descending order according to their impact—that is, the estimated degree to which they lower R_t or their feature importance (RF). To compare rankings, we count how many of the 46 NPIs considered are classified as belonging to the top x ranked measures in all methods, and test the null hypothesis that this overlap has been obtained from completely independent rankings. The P value is then given by the complementary cumulative distribution function for a binomial experiment with 46 trials and success probability $(x/46)^4$. We report the median P value obtained over all $x \leq 10$ to ensure that the results are not dependent on where we impose the cut-off for the classes.

Co-implementation network. If there is a statistical tendency that a country implementing NPI i also implements NPI j later in time, we draw a direct link from i to j. Nodes are placed on the y axis according to the average epidemic age at which the corresponding NPI is implemented; they are grouped on the x axis by their L1 theme. Node colours correspond to themes. The effectiveness scores for all NPIs are re-scaled between zero and one for each method; node size is proportional to the re-scaled scores, averaged over all methods.

Entropic country-level approach. Each territory can be characterized by its socio-economic conditions and the unique temporal sequence of NPIs adopted. To quantify the NPI effect, we measure the heterogeneity of the overall rank of a NPI amongst the countries that have taken that NPI. To compare countries that have implemented different numbers of NPIs, we consider the normalized rankings where the ranking position is divided by the number of elements in the ranking list (that is, the number of NPIs taken in a specific country). We then bin the interval [0, 1] of the normalized rankings into ten sub-intervals and compute for each NPI the entropy of the distribution of occurrences of that NPI in the different normalized rankings per country:

$$S(\mathrm{NPI}) = -\frac{1}{\log(10)} \sum_i \mathrm{P_i} \log(\mathrm{P_i}), \quad (1)$$

where P_i is the probability that the NPI considered appeared in the ith bin in the normalized rankings of all countries. To assess the confidence of these entropic values, results are compared with expectations from a temporal reshuffling of the data. For each country, we keep the same NPIs adopted but reshuffle the time stamps of their adoption.

Reporting Summary. Further information on research design is available in the Nature Research Reporting Summary linked to this article.

Data availability

The CCCSL dataset can be downloaded from http://covid19-interventions.com/. The CoronaNet data can be found at https://www.coronanet-project.org/. The WHO-PHSM dataset is available at https://www.who.int/emergencies/diseases/novel-coronavirus-2019/phsm. Snapshots of the datasets used in our study are available in the following github repository: https://github.com/complexity-science-hub/ranking_npis.

Code availability

Custom code for the analysis is available in the following github repository: https://github.com/complexity-science-hub/ranking_npis.

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Author contributions

N.H., L.G., A.L., V.L. and P.K. conceived and performed the analyses. V.L., S.T. and P.K. supervised the study. E.D. contributed additional tools. N.H., L.G., A.L., A.D.-L., B.P. and P.K. wrote the first draft of the paper. A.D.-L. supervised data collection on NPIs. All authors discussed the results and contributed to revision of the final manuscript.

Competing interests

The authors declare no competing interests.

Additional information

Extended data is available for this paper at https://doi.org/10.1038/s41562-020-01009-0.

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Correspondence and requests for materials should be addressed to P.K.

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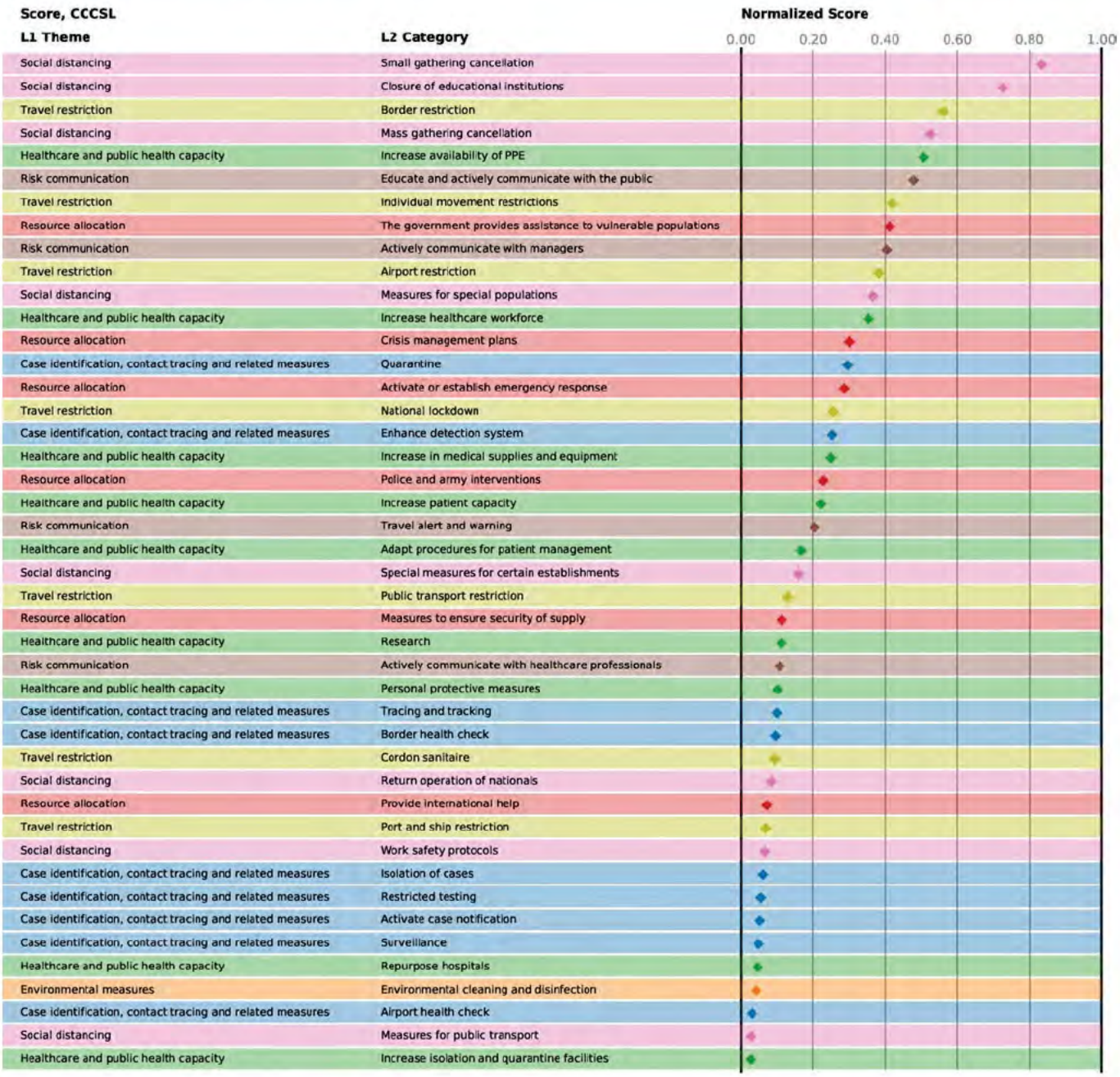
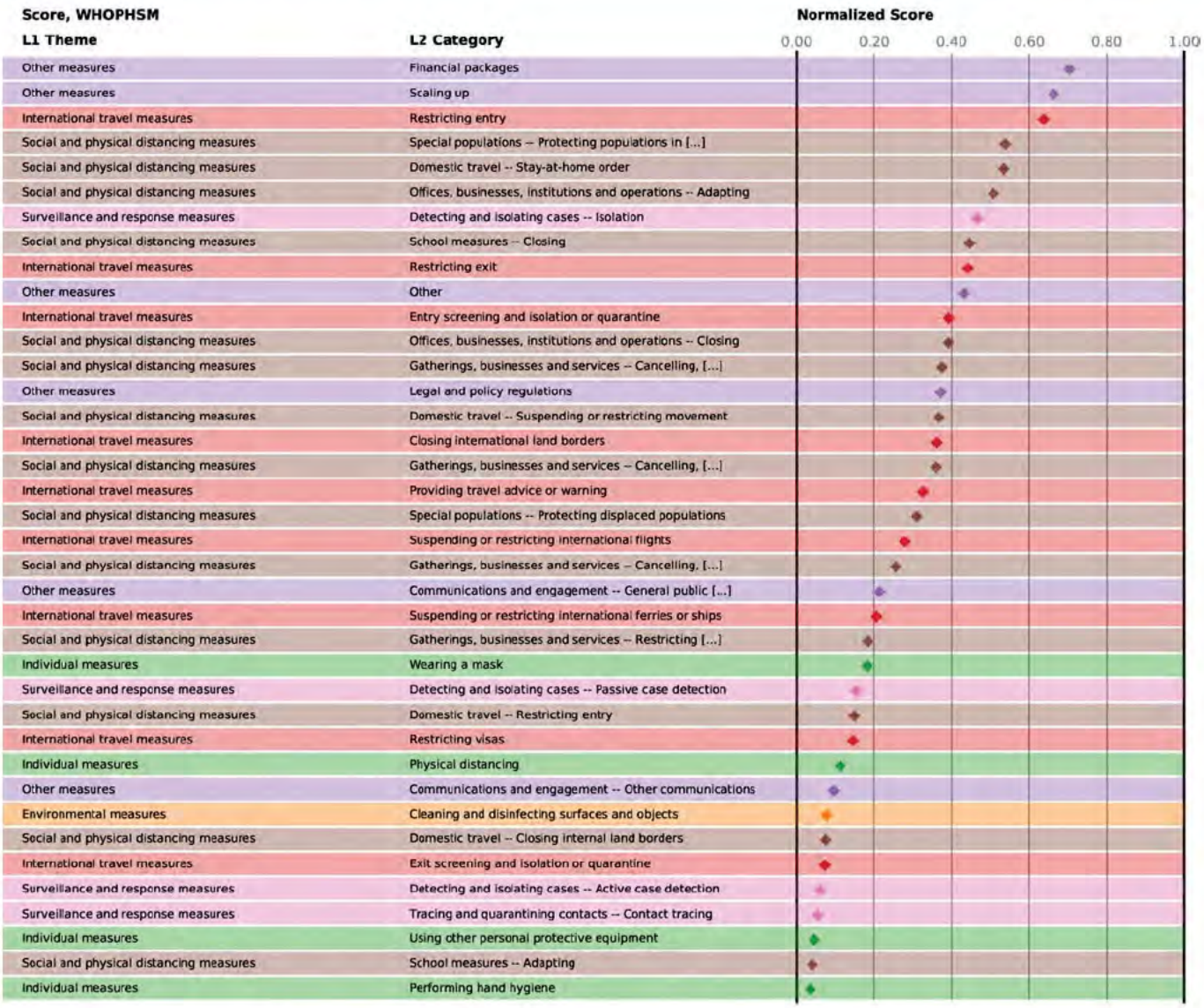
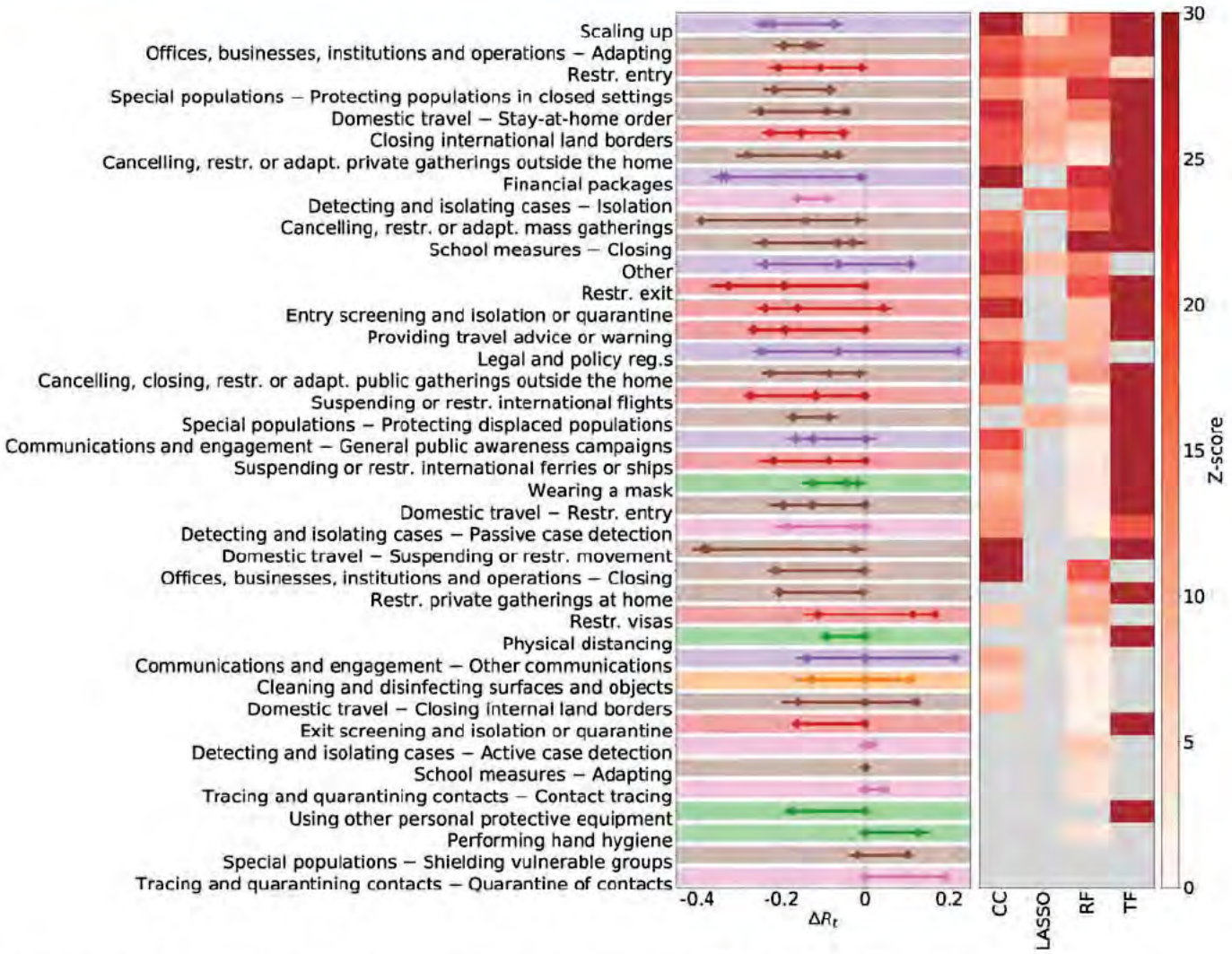


Extended Data Fig. 1 | Main results for the CCCSL dataset. Normalised scores (relative effect within a method) of the NPI categories in CCCSL, averaged over the four different approaches.

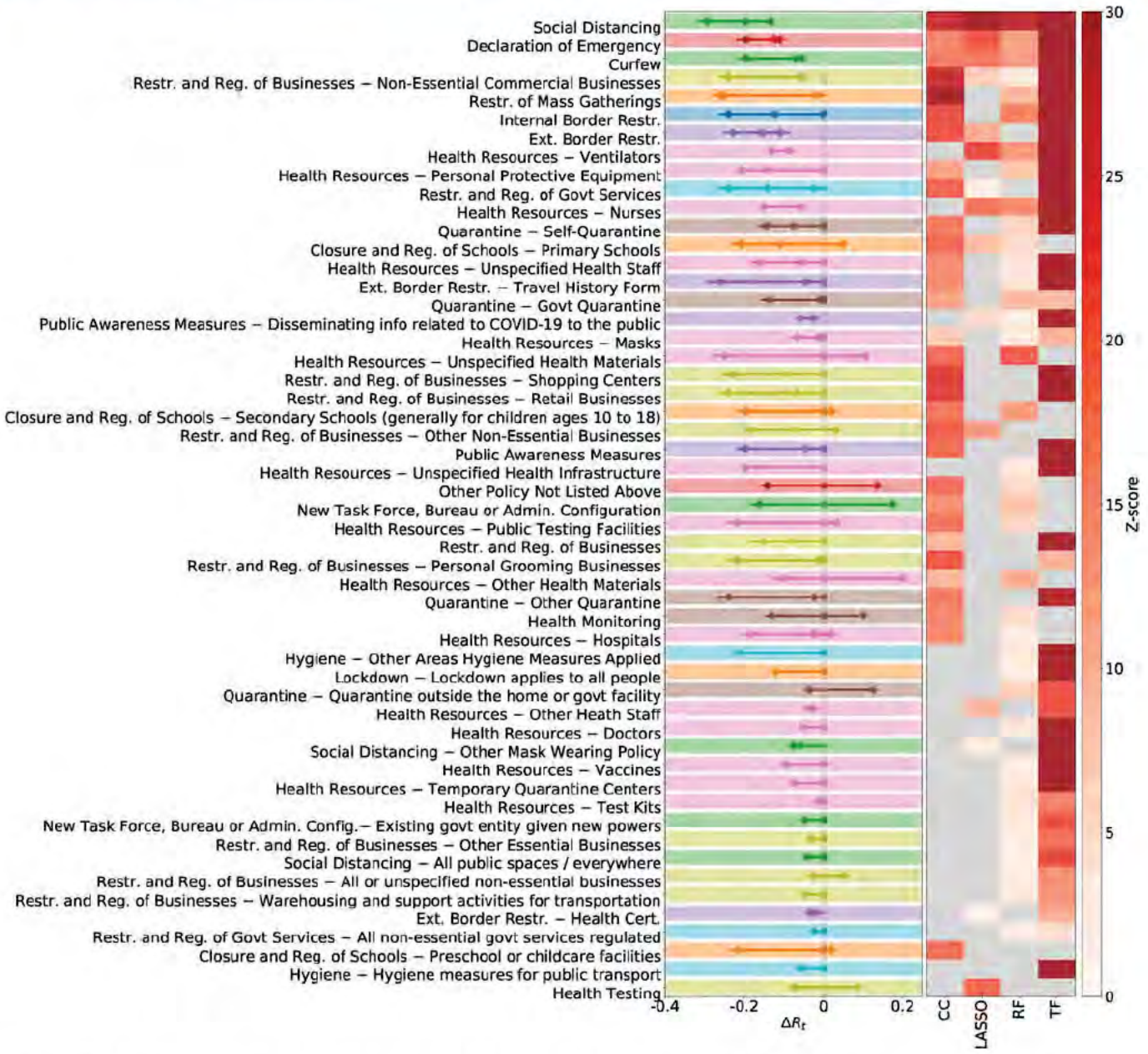
Extended Data Fig. 2 | Main results for the CoronaNet dataset. Normalised scores (relative effect within a method) of the NPI categories in CoronaNet, averaged over the four different approaches. Full names of the abbreviated L2 categories can be looked up in SI; Supplementary Table 3.



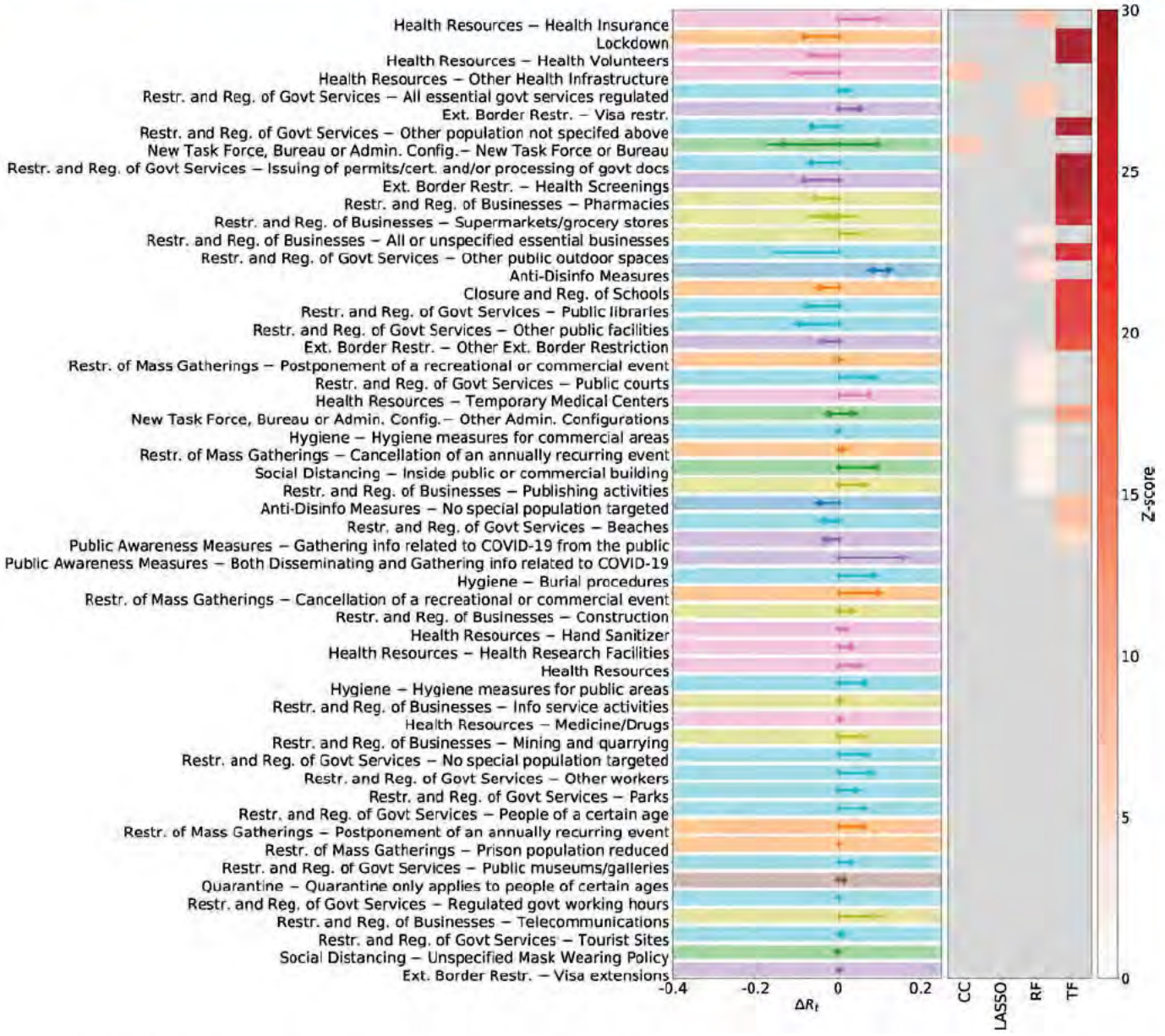
Extended Data Fig. 3 | Main results for the WHO-PHSM dataset. Normalised scores (relative effect within a method) of the NPI categories in WHO-PHSM, averaged over the four different approaches. Full names of the abbreviated L2 categories can be looked up in SI; Supplementary Table 4.



Extended Data Fig. 4 | Measure effectiveness in the WHO-PHSM dataset. Analogue to Fig. 1 of the main text if the analysis is done on the WHO-PHSM dataset. Full names of the abbreviated L2 categories can be looked up in SI; Supplementary Table 4.



Extended Data Fig. 5 | Measure effectiveness in the CoronaNet dataset(part 1). Analogue to Fig. 1 of the main text if the analysis is done on the CoronaNat dataset (continued in Extended Data Fig. 6). Full names of the abbreviated L2 categories can be looked up in SI; Supplementary Table 3.



Extended Data Fig. 6 | Measure effectiveness in the WHO-PHSM dataset (part 2). Analogue to Fig. 1 of the main text if the analysis is done on the CoronaNat dataset (continued from Extended Data Fig. 5). Full names of the abbreviated L2 categories can be looked up in SI; Supplementary Table 3.

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THIS IS EXHIBIT "7" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

7

Federal/Provincial/Territorial Public Health Response Plan for Biological Events

2018

Pan-Canadian Public Health Network
Partners in Public Health
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- PHAC's Centre for Emergency Preparedness and Response, including: John Topping, Jean-François Duperré, Robin McNeill, Jill Sciberras, Lynn Ménard
- Members of the Public Health Infrastructure Steering Committee, the Communicable and Infectious Disease Steering Committee and the Pan-Canadian Public Health Network Council

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TABLE OF CONTENTS

ADMINISTRATION AND AMENDMENTS

This document was prepared for the Federal/Provincial/Territorial (F/P/T) Public Health Network Council (PHNC) as an overarching governance framework to guide F/P/T public health responses to biological events. It was developed by an expert task group[1] comprised of experts in public health and emergency management, as identified by members of the Public Health Infrastructure Steering Committee (PHI-SC) and the Communicable and Infectious Disease Steering Committee (CID-SC). It was approved by PHN on October 17, 2017.

The Public Health Agency of Canada (PHAC), Centre for Emergency Preparedness and Response (CEPR) maintains the *Federal, Provincial, Territorial Public Health Response Plan for Biological Events* as an evergreen document on behalf of the PHNC.

The need to update the plan will be reviewed every three years at a minimum by PHI-SC and any changes will be tracked and noted as amendments in the plan. In addition, the need for revision will also be guided by after action reviews following the response to a real or simulated events requiring implementation of this plan, in whole or in part. The revision process will be coordinated on behalf of PHNC by the PHI-SC in consultation with CID-SC and led by CEPR. A time-limited joint task group may be established to conduct this work which may include recommendations for the development of new event-specific Annexes as required, to further support implementation of this plan.

Minor amendments will be approved by PHI-SC and CID-SC. Major revision, significantly altering the governance structure may require review and approval by PHNC.

Inquiries or comments on the *Federal, Provincial/Territorial Public Health Response Plan for Biological Events* should be directed to:

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Note to Readers

Henceforth, first occurrences in the text of terms that are listed in the Glossary are formatted in **bold.** Titles of plans, supporting documents and response levels are formatted in *italics*.

1 See Appendix M for task group membership

EXECUTIVE SUMMARY

This plan has been developed as a **response plan** for the Federal/Provincial/Territorial (F/P/T) health sector in order to facilitate formal coordination of F/P/T responses to **public health events that are biological** in nature and of a severity, scope or significance to require a high level **F/P/T response**. Informed by **lessons learned** from past F/P/T public health responses and best practices of current F/P/T structures (i.e., the Public Health Network structure and Special Advisory Committees), this plan focuses on the implementation of F/P/T responses led by senior-level public health decision-makers at the federal, provincial and territorial level in order to facilitate an efficient, timely, evidence-informed and consistent approach across jurisdictions to event-specific response activities. Improving effective engagement amongst **public health**, health care delivery and health emergency management authorities during a **coordinated F/P/T response** is a key objective of this plan. It is intended to serve as an F/P/T resource for F/P/T public health and **emergency management** authorities; specifically those who are involved in public health response preparedness and implementation. In order to further support coordination of public health events at a national level, this plan aims to build on the strengths of existing F/P/T tools and mechanisms while providing a single, overarching user-friendly response plan that is **scalable** and flexible enough to be utilized in full or in part for a range of F/P/T public health responses.

The concept of operations of the plan indicates how notification of public health events that potentially require a coordinated F/P/T response should be made to the Public Health Agency of Canada (PHAC), and how response needs are assessed to determine the appropriate level of F/P/T response coordination required. Four response levels that range from routine to **emergency** response are included to facilitate scaling of response activities as needed. The plan includes the details of a governance structure intended to be activated for those **events** in which a coordinated F/P/T response (i.e., led by senior-level decision makers) is deemed necessary and/or beneficial. The governance structure aims to: streamline response processes to a public health event; facilitate clarity on roles, responsibilities and approval processes; facilitate a high degree of situational awareness; and centralize risk management and task delegation. It incorporates three main streams: a Technical stream, a Logistics stream and a Communications stream. These streams are led by advisory committees/working groups and have been included in order to facilitate clarity regarding roles for issue management, response support, product development (e.g., recommendations, guidance, protocols), policy review and approval processes. "Cross stream" support and coordination will be essential to an efficient, informed and transparent response and therefore mechanisms for achieving this are also included.

Coordinated F/P/T responses will be conducted with each activated committee/group in the governance structure fulfilling the roles and responsibilities and decision-making processes as described in Section 4 of this plan and according to their respective terms of reference (included in corresponding appendices). Specifically, the Special Advisory Committee (SAC) will be the main approval/decision-making body for the duration of a coordinated F/P/T response under this plan, with governance structure products going to the Conference of Deputy Ministers of Health (CDMH) as required.

Public health emergencies involving multiple jurisdictions in Canada are relatively rare events. This plan is not exclusively an emergency response plan and therefore is expected to also be utilized for events not meeting the threshold of a public health emergency (i.e., for events requiring or that would benefit from enhanced F/P/T coordination); thus facilitating familiarity and opportunities to modify and improve this plan based on response experience.

This document is not intended to replace existing F/P/T health sector arrangements but rather is intended to complement and interact with the existing suite of plans and protocols currently in use by the health sector by providing an overarching governance framework with which the existing protocols will interact and/or align. Changes to those existing plans and protocols will be made following approval of this plan in order to clarify these linkages.

1 INTRODUCTION

Preface/Background

This document is a response plan for the Federal/Provincial/Territorial (F/P/T) health sector in order to facilitate formal coordination of F/P/T responses to public health events that are biological in nature. It is not intended to replace existing F/P/T health sector arrangements but rather is intended to complement and when applicable, be used in conjunction with the existing suite of plans and protocols currently in use by the health sector by providing an overarching governance framework that can be used to respond to a spectrum of public health events caused by **biological agents**. It is also expected that this plan will serve as the governance framework under which future and existing **hazard-specific** F/P/T health sector plans, protocols and guidance will be situated.

As required by legislation, all jurisdictions in Canada have plans that set out the steps to be taken in the event of an emergency or disaster. These plans identify linkages and channels of communication to other ministries, programs and agencies of the Government and contribute to a coordinated, system-wide approach to emergency management that can be applied if necessary in a **whole of government response**. In addition, the F/P/T health sector has in place well established hazard-specific tools that are routinely used to effectively plan for and manage public health events, including the *Canadian Pandemic Influenza Preparedness: Planning Guidance for the Health Sector* (CPIP) and *Food-borne Illness Outbreak Response Protocol* (FIORP) and others. In order to further support coordination of public health events at a national level, this plan aims to build on the strengths of these existing tools and mechanisms while providing a single, overarching user-friendly response plan and **F/P/T governance structure** that is scalable and flexible enough to be utilized in full or in part for a range of F/P/T public health responses to **biological** events. For a further description of the interface and relationship between this plan and other key plans at the F/P/T level, see *Appendix L: Relationship of the F/P/T Public Health Response Plan to other F/P/T Coordinating Instruments.*

Aim

The aim of this plan is to outline how F/P/T responses to public health events caused by biological agents will be conducted and coordinated. This response plan will provide clarity with respect to: considerations for F/P/T responses; response objectives and corresponding activities; governance mechanisms that support F/P/T response efforts and deliverables; and roles, responsibilities and accountabilities within those governance mechanisms.

This plan is intended to serve as a resource for F/P/T public health and emergency management authorities; specifically those that are involved in public health response preparedness and implementation. Those working in particular public health program areas can focus on hazard-specific preparedness activities (e.g., the CPIP) and response protocols (e.g., FIORP), knowing that if transition to a high level coordinated F/P/T response is needed this plan exists and would be used to provide that function.

Scope

The focus of this plan is on public health events that are biological in nature and require a public health response at both the P/T and federal levels. While the focus of this plan is public health, it should be emphasized that any public health event will be health system-wide and will require coordination between public health and health care delivery and other sectors. Details regarding response coordination with the respective health care systems of the provinces and territories are outside the scope of this plan.

Further, as a response plan, issues regarding **mitigation, preparedness** and **recovery** are also beyond the scope of this document. Activities relating to mitigation, preparedness are dealt with through the activities of existing committees and task groups within the Public Health Network that are actively engaged in health emergency management. However, should there be a need for enhanced F/P/T coordination in the recovery of a public health event (e.g., continued psychosocial response to a bioterrorism event or **pandemic**), consideration may be given to leveraging the governance components of this plan to support recovery activities.

Biological agents are the cause of biological events and include bacteria, viruses, fungi, other microorganisms and their associated toxins. They have the ability to adversely affect human health in a variety of ways, ranging from relatively mild, allergic reactions to serious medical conditions and death. These organisms are widespread in the natural environment; they are found in water, soil, plants, and animals.

Biological events can be naturally occurring disease outbreaks at national and international levels, accidental exposure to **pathogens** (disease causing agent) in the context of biomedical diagnostics and research, significant shortages of drugs and biologics or intentional use of pathogens or biotoxin (poisonous substance produced by a living organism) against humans, plants, or animals for harmful purposes. The scope of this plan is intended for the situations where the principle issue is human health and includes biological agents found in the environment, or diagnosed in animals, that have the potential for transmission to humans (zoonosis).

The following are examples of the range of scenarios where this plan may be applicable. It may be applied for a biological public health event in a single P/T with the potential for spread/involvement to another P/T, to multijurisdictional outbreaks that require coordination with federal and P/T partners (e.g., large and complex foodborne outbreak requiring significant coordination at a senior level beyond the scope of the FIORP), to shortages of **medical countermeasures** (e.g., **vaccine** shortage), to **public health emergencies** in Canada (e.g., H1N1 pandemic influenza). The management of large-scale public health events with international implications in which federal coordination is necessary (e.g., ebola, zika) are also within the scope of this plan. Biological events that are restricted to animal, plant, or food health or safety are outside the scope of this plan.

It is recognized that public health events that are intentional in nature (e.g., bioterrorism) will require a law enforcement/security response in addition to a public health response. While the elements of the public health response to an intentional event may not significantly differ from those described in this plan (and therefore this plan may be utilized for the public health **consequence management**), the linkages to the law enforcement/ security response are not within the scope of this plan. It is expected however, that the governance structure for a biological event where the intent is malicious, would be similar to that as described in this plan.

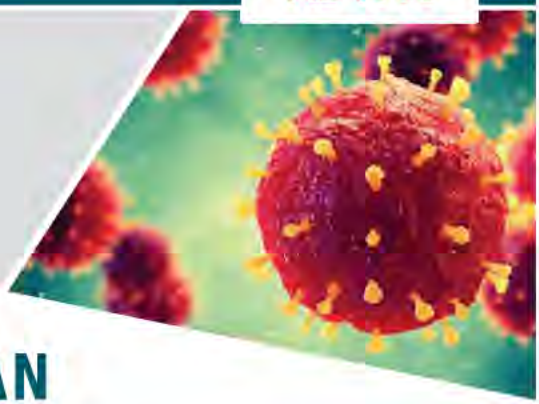
Following endorsement, training and use (i.e., proof of concept), this plan will become a model for development of an **all hazard** F/P/T governance for the health sector that can be applied if required for F/P/T coordinated responses to other events such as natural disasters or **Chemical, Biological, Radiological/Nuclear, Explosive (CBRNE) events.**

Objectives

The specific objectives of this plan include:

- defining a flexible F/P/T governance mechanism that can be used consistently for a coordinated response to all biological public health events that would benefit from high level F/P/T collaboration;
- identifying escalation considerations and response levels for a scalable response, and
- improving effective engagement amongst public health, health care delivery and health emergency management authorities during a coordinated F/P/T response.

Through the achievement of these objectives it is expected that, at the time of a response, notification processes and inter-jurisdictional information-sharing will be enhanced; public and professional communication expectations will be addressed; and advanced planning and decision-making between and amongst multiple jurisdictions will be facilitated.



2 CONTEXT FOR THE PLAN

Risk Environment

This plan has been developed at a time when **public health risks** have been relatively well defined and assessed, and risk mitigation activities are ongoing. However, it is recognized that many risk drivers are so broad and expansive that even coordinated public health interventions are unlikely to mitigate those risks. Some of the risk drivers associated with emerging infectious disease are: globalization of people and animals, climate change, changes in land use, movement/displacement of people, population density and urbanization, and changes in farming practices and antibiotic use. Many of these risks are manifesting outside of Canada but have a real or potential impact on the health of the public in Canada. It is in this risk environment that health authorities in Canada must be prepared to respond to biological **hazards.**

Previous and ongoing public health responses have addressed everything from **epidemics** of novel respiratory pathogens (e.g., Severe Acute Respiratory Syndrome—SARS) and pandemics (e.g., H1N1 influenza), to emerging infections (e.g., west nile virus, lyme disease) and international or travel-related public health threats (e.g., ebola, zika).

Throughout 2013-14, the Council of Chief Medical Officers of Health (CCMOH) was involved in the response to a number of significant public health events including infectious disease: (H7N9; MERS-CoV; H5N1; H1N1, seasonal influenza), food-borne illness: (E coli O157:J7 (XL Foods, Inc.), and vaccine supply issues: (2014 influenza vaccine shortage). The CCMOH subsequently identified inconsistencies in the management of these events and requested the development of a plan for response to public health events of national concern to ensure consistency, timeliness and scalability of F/P/T response activities.

It is within the context of experiences from past public health events that the guiding principles used for the development of this plan and anticipated response activities associated with this plan were derived. Specifically, lessons learned from an intensive review of the governance structure utilized during the F/P/T response to the H1N1 influenza pandemic in 2008-9 identified the need for a nimble, flexible governance that can be applied consistently, in whole or in part, to a range of public health scenarios and the need to clarify roles and responsibilities as well as decision-making and approval processes at various levels.[2]

2 Lessons Learned Review: *Public Health Agency of Canada and Health Canada Response to the 2009 H1N1 Pandemic:* www.phac-aspc.gc.ca/about_apropos/evaluation/reports-rapports/2010-2011/h1n1/pdf/h1n1-eng.pdf

Guiding Principles

The guiding principles used for the development of this plan and anticipated response activities were based on lessons learned or identified from previous public health responses and best practices. They include:

- Efficiency
- Timeliness
- Transparency
- Commitment
- Engagement
- Representativeness
- Health Equity
- Flexibility
- Effectiveness, and
- Ethical and Evidence-Informed Decision-Making.

More details regarding these principles are located in *Appendix B: Plan Development Guiding Principles*.

The contents of this plan and in particular the governance structure and concept of operations, aim to facilitate the following of these principles in order to appropriately operationalize best practices (such as the activation of the Special Advisory Committee) and other learnings from previous public health responses.

During a response there will be a need for a consistent, coordinated approach that is both scalable and flexible. Throughout the response it may be necessary to modify guidance, protocols, or recommendations in order to adapt the response to the evolving circumstances. Ideally, any significant changes will be made in conjunction with an articulated change in response objectives (e.g., preventing introduction into Canada vs. preventing spread of illness within Canada). It is recognized that at any one point during the response the objectives of the response may vary from jurisdiction to jurisdiction within Canada depending on the local impact of the public health event and **risk assessments**; however, F/P/T governments should aim to work collaboratively to facilitate a common set of F/P/T public health response objectives to every extent possible, recognizing roles and responsibilities differ, the impact of the event will likely be different in each jurisdiction and F/P/T health care systems function differently.

Public Health and Emergency Management Roles

Public Health authorities conduct and manage responses to public health events via:[3]

- monitoring and surveillance activities,
- risk assessment,
- **public health measures** (e.g., public education, case and contact management, trace-back/trace-forward, travel/border measures, vector control, mitigation of risk from animals, etc.),
- laboratory networks,
- connections with a clinical research network and other health care delivery partners,
- vaccine (and other medical countermeasures) programs,
- the provision of specific health services and evidence-informed recommendations,
- engagement with key stakeholders (e.g., occupational health authorities, health care institutions, law enforcement), and
- risk communications.

3 Not all examples are applicable in Québec or are the responsibility of public health authorities in in Québec where the concept of *public health* is distinguished from the *public health system*.

Emergency Management authorities facilitate and support coordination of responses to public health events by:

- using a platform and tools for planning and coordination of integrated response activities,
- addressing issues regarding mutual assistance/aid (e.g., via the *Operational Framework for Mutual Aid Surge Requests* [OFMAR]),
- providing logistical guidance and support, and
- expediting and facilitating the sharing of information and other resources across the health sector and with other relevant sectors domestically and internationally.

The response activities implemented and coordination required will vary depending on the type of public health event and response objectives (which may change over the course of the response). Therefore this plan includes references to potential response activities in conjunction with response objectives, a governance structure that is flexible and scalable, and a concept of operations that facilitates awareness of the entire response process.

F/P/T Authorities/Roles and Responsibilities

The main roles, responsibilities and authorities of the federal Health Portfolio and the provincial and territorial public health authorities during a public health response to a biological hazard are listed in *Appendix C: Main F/P/T Roles and Responsibilities*. A coordinated F/P/T response requires collaborative and inter-operable infrastructures, response capacities and harmonized activities. During a public health response, the role of the F/P/T governments will be to work collaboratively to establish an overall agreed upon strategy that articulates, why, what and how. The 'what' are interventions that can be implemented as needed across Canada and that correspond to response needs and objectives, recognizing that some or all jurisdictions may implement them dependant on the roles and responsibilities of the jurisdiction and circumstances of the event. These interventions may include: developing/modifying protocols for surveillance and laboratory testing, providing recommendations for public health measures and the use of medical countermeasures, identifying research needs and developing and implementing an F/P/T communication strategy that allows P/T governments to develop harmonized communication plans and stakeholder engagement strategies.[4]

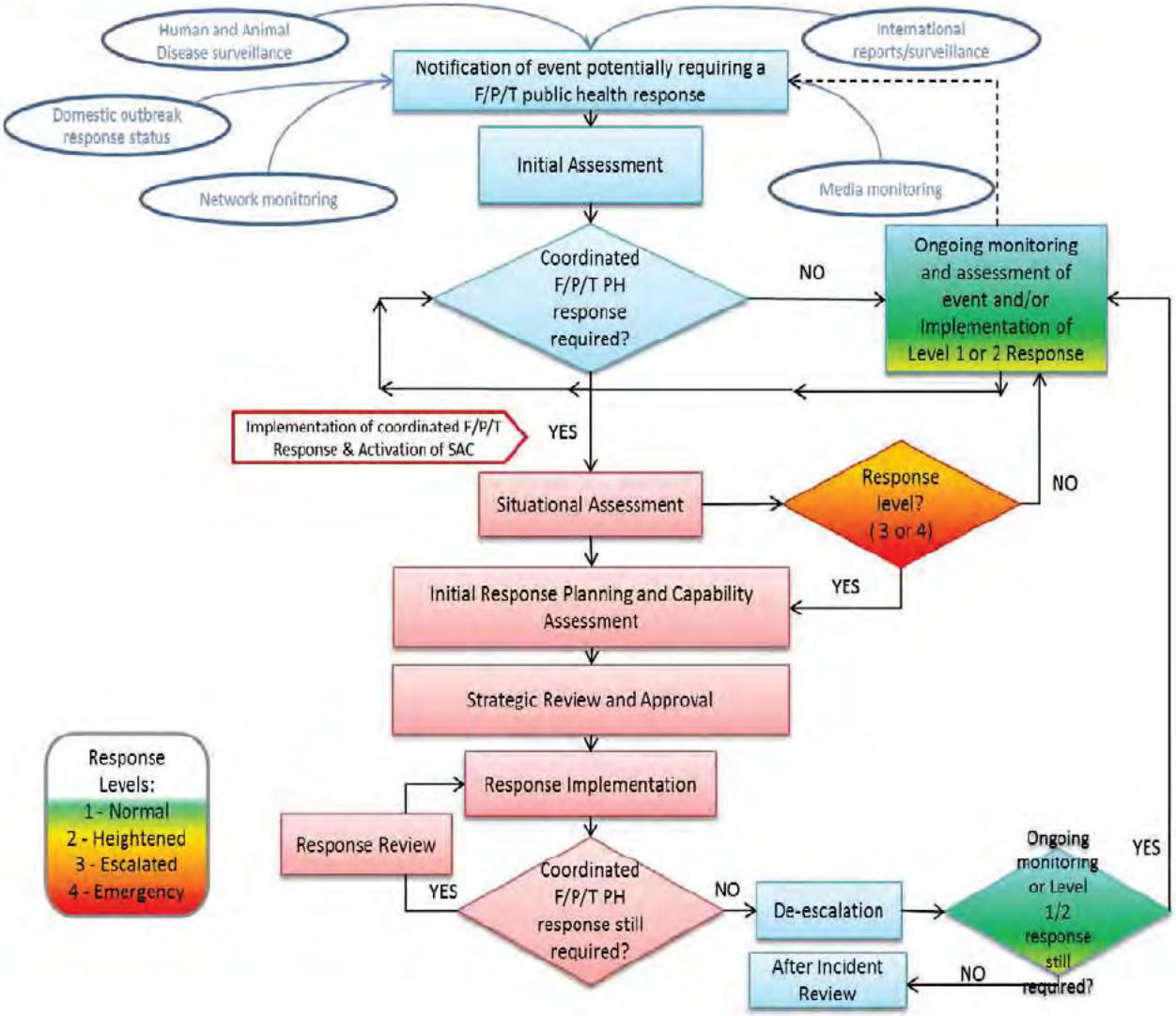
If a coordinated F/P/T response is implemented under this plan, the federal Health Portfolio will facilitate the coordination of the response through the Health Portfolio Operations Centre (HPOC) including participation on the F/PT governance structure committees/groups as described in this document and through its support of the F/P/T Special Advisory Committee Secretariat. See Section 4 *F/PT Governance* for more specific information on the HPOC's role.

4 In Québec, public health is responsible for medical countermeasures for immunization and prevention activities, not for treatment or medication.

3 CONCEPT OF OPERATIONS (CONOPS)

The following figure depicts the main steps in the concept of operations of this plan.

Figure 1: Concept of Operations



The governance structure for a coordinated F/P/T response (described in Section 4) contains three response streams that can be activated under this plan. They include a Technical Advisory Committee (TAC), a Logistics Advisory Committee (LAC), and a Communications group. These committees/groups report to the Special Advisory Committee (SAC), which in turn is supported by an F/P/T SAC Secretariat. The F/P/T SAC Secretariat facilitates and manages the intersection between the SAC and the three response streams in coordination with the HPOC. The governance structure for this plan is intended to be activated for a coordinated F/P/T response which for the purposes of this plan is considered a *Level 3—Escalated* or *Level 4—Emergency* response. Descriptions of the response levels are found in Figure 2.

3.1 NOTIFICATION

Consistent with the scope of this plan, an F/P/T coordinated response could be necessary due to the presence of unusual, unexpected or serious illness, or the identification of a risk of unusual, unexpected or serious illness, within or outside of Canada.

It is expected that these public health events will be detected through a variety of sources including: Canadian human and animal disease surveillance activities; monitoring networks (e.g., laboratory, health security); national and international reports/surveillance (e.g., International Health Regulations [IHR] notifications and the Global Public Health Intelligence Network [GPHIN]).

The PHAC should be notified of all public health events that potentially require a coordinated F/P/T response so that an assessment can be completed and an appropriate response level can be determined in a timely manner. All notifications that have the potential to be a **Public Health Emergency of International Concern** (PHEIC) should be made according to the timelines required under the IHR.[5]

Notification of these public health events **occurring within Canada** should be made by the affected jurisdiction/department to the federal HPOC Watch Office

by phone (1-800-545-7661 or 613-952-7940)

or

through the single window email: HPOC_COPS@phac-aspc.gc.ca.

Notification of public health events, identified by the PHAC, that are occurring outside of Canada will be assessed, managed and communicated according to existing operational protocols.

If an event is being monitored or a Level 1 or 2 response is ongoing (see Figure 2 for description of response levels), for example, a response to a food-borne illness outbreak using the FIORP, then the 'notification' may be that the circumstances (e.g., health impact, scope and/or risk) have changed enough to warrant consideration of escalating response efforts to include additional senior management coordination at an F/P/T level.

5 The IHR requires that all urgent events of international concern (i.e., events with serious public health impact and/or unusual or unexpected nature with high potential for spread) be assessed at the national level and reported to the World Health Organization (WHO) within 48 hours of notification. Annex 2 of the IHR provides a decision instrument designed to assist with the assessment and notification of events that may constitute a Public Health Emergency of International Concern.

3.2 INITIAL ASSESSMENT

The HPOC Watch Office will immediately refer all notifications of public health events that they receive to the appropriate PHAC program area for follow-up and assessment coordination. Outside of regular business hours the HPOC Watch Office will refer the notification to the PHAC Medical Officer On-Call for action as he/she deems necessary (including determining whether an initial assessment needs to occur on an urgent basis or whether it can be referred to the PHAC program area for follow-up on the next business day).

The initial assessment will include a rapid risk assessment and a situational analysis which will largely be dependent on the information available from the source of the notification. If the notification is coming from a province or territory, a representative with appropriate authority and expertise from that jurisdiction (and possibly other affected provinces and territories) will be engaged in the process. In the situation when a response is already occurring, for example under the FIORP, then the leads from that response (e.g., Outbreak Investigation Coordinating Committee [OICC] members) would be engaged in this initial assessment process. If the notification is coming from an international source, the PHAC program area will determine the participants to be engaged for the initial assessment process; this may include experts external to the PHAC. Sharing of **public health information** throughout the response is expected to occur as per the Multilateral Information Sharing Agreement (MLISA) or requirements under IHR obligations.

The purpose of the initial assessment is to determine what actions and/or resources are needed in order to respond to the public health event and specifically whether those actions would benefit from a coordinated F/P/T response in order to mitigate the health impact or risk to Canadians. Not all notifications will require this type of high-level coordination to respond and many will be managed through routine practices; an assessment of response needs will determine the next steps.

If there is not enough information at the time of the initial assessment to determine if a coordinated F/P/T response should be recommended this decision can be deferred until more information is available at which time a follow-up assessment can be completed. It is recognized that initial assessments could occur more than once for the same event in the form of a repeat or follow-up assessments.

A special meeting of the Council of Chief Medical Officers of Health (CCMOH) may be held for information sharing and to discuss ongoing monitoring of the situation if a coordinated F/P/T response is not deemed necessary at the time of the initial assessment and what will occur in the event the health impact or risk of the event changes significantly. Ongoing assessment is expected to occur as required until a potential event is concluded.

If one or more of the following needs are identified during the initial assessment, a ***coordinated F/P/T response*** may be recommended.

a. **Federal surge capacity or centralized planning** because multiple jurisdictions are affected or have been put at risk by the public health event (e.g., a vaccine supply issue, an event requiring rapid advanced planning/preparedness) and requirements for coordination exceed routine/existing capacities

b. **New or revised guidance documents, recommendations or activities** for the public health response (e.g., if an outbreak due to an unknown or new pathogen with high potential for human to human transmission occurs, and/ or a disease is new to Canada and no established program currently exists)

c. **Collated Canadian incidence data** on daily/urgent basis (e.g., for **IHR** reporting requirements)

d. **Analysis of epidemiological data from multiple jurisdictions** to inform the response

e. **Bulk purchasing** of medical countermeasures (MCM) or equipment

f. **Consistent use across multiple jurisdictions of limited resources** (e.g., MCM)

g. **Consistent approach to border screening, contact identification and follow-up, and/ or public and professional communications** (e.g., due to a Public Health Emergency of International Concern (PHEIC) occurring outside of Canada)

It is recognized that expectations or demands at a political level may necessitate activation of this plan's governance irrespective of the criteria above.

Implementation

The findings of the initial assessment may include a recommendation to implement a coordinated F/P/T response. If the public health event is occurring in Canada, the reporting and affected jurisdictions will be involved in making and endorsing the recommendation. The recommendation and rationale will be presented by the PHAC program area on behalf of the group completing the initial assessment, to the co-chairs of the PHNC, the chair of the Council of Chief Medical Officers of Health (CCMOH) and the Deputy Minister Liaison (or their respective designates) who together will make the decision to implement a coordinated F/P/T response. **If the decision is to implement a coordinated F/P/T response then a SAC and F/P/T SAC Secretariat will be established at this time.**

The HPOC and the F/P/T SAC Secretariat, as appropriate will communicate the decision, via email, to implement the coordinated F/P/T response and a SAC to all of the provinces and territories and implicated federal departments and to the Conference of Deputy Ministers of Health (CDMH) via the Deputy Minister Liaison. The F/P/T SAC Secretariat, with the support of the HPOC will also make the arrangements to convene a situational awareness teleconference with the new SAC and any additional key stakeholders and or external experts as soon as feasible with consideration given to the urgency of the situation.

If implementation of a coordinated F/P/T response is not deemed necessary then ongoing monitoring and assessment of the public health event and the response to the public health event will continue through routine processes/protocols and the rest of this concept of operations would not be implemented as described below.

3.3 SITUATIONAL ASSESSMENT

An initial situational awareness teleconference will be scheduled and organized with invitations being distributed by the HPOC. The Chief Public Health Officer (CPHO) or a designate, will chair the teleconference. Participants on the call will include the newly established SAC members, any additional P/T representatives (e.g., P/T program area managers, P/T Health Emergency Managers and P/T Emergency Operations Centre

[EOC] representatives), federal HP representatives (e.g., PHAC regional representatives, Health Canada [HC] representatives), and possibly external liaisons including representatives from Public Safety Canada/ Government Operations Centre (GOC), Royal Canadian Mounted Police (RCMP)/law enforcement, **federal populations** and potentially non-governmental organizations (NGOs). The P/T participants will be determined by the individual provinces and territories. The purpose of this first teleconference will be to:

1. debrief all participants on the details of the public health event and rapid risk assessment results,
2. to determine what F/P/T response level is appropriate to meet the immediate F/P/T response needs,
3. to ensure familiarity and accessibility of this plan,
4. to identify what parts of the governance structure to activate, and
5. to begin identification of individuals who will participate in committees under the governance structure.

During this teleconference a time and date will be set for the next teleconference during which the initial response planning, capability assessment and business cycle will be discussed.

F/P/T Response Level

In order to operationalize this scalable plan, F/P/T response levels are included to illustrate the considerations and potential scenarios corresponding to the different response levels; these are identified in Figure 2 F/P/T Response Levels. The need for a particular F/P/T response level (as indicated in the considerations for implementation) may be identified by a province or territory (e.g., CMOH), a group containing federal and P/T representatives and/or external experts (e.g., an OICC), the PHAC or HC. The information to illustrate this need will be collected during the notification and initial assessment and will be utilized during the situational assessment teleconference. The SAC will decide whether a *Level 3—Escalated* or *Level 4—Emergency* response level is required during the first situational assessment teleconference. Throughout the response the needs will be reassessed and the response level may change accordingly.

The majority of this concept of operations is intended to focus on the response to public health events in which a coordinated F/P/T response is needed or would be beneficial; specifically when the initial assessment indicates that a *Level 3—Escalated* or *Level 4—Emergency* response level is required.

The main difference between response levels is the level of activity required by HPOC and F/P/T SAC Secretariat to support the F/P/T governance structure as well as the components of the governance structure that are required to be activated. For example, a Level 3 response may be facilitated largely by coordination provided by the F/P/T SAC Secretariat, which would lead in issue triage, situational awareness, response planning, and task delegation in close consultation with the SAC co-chairs. The HPOC **Incident Management System** (IMS) structure may only be activated for minimal support. Level 4 responses may require full activation of the three response streams as well as the activation of additional task groups to carry out the required response functions and the full activation of the HPOC IMS.

A coordinated F/P/T response does not necessarily mean that each province or territory is engaged in the response to the same degree or that each province or territory is experiencing cases or equal risk of cases occurring. For example, during the response to the SARS outbreak the provinces with active disease transmission were responding at a pace and level of activity much greater than those that did not have cases. However there was a need for a coordinated F/P/T response during the SARS outbreak in order to:

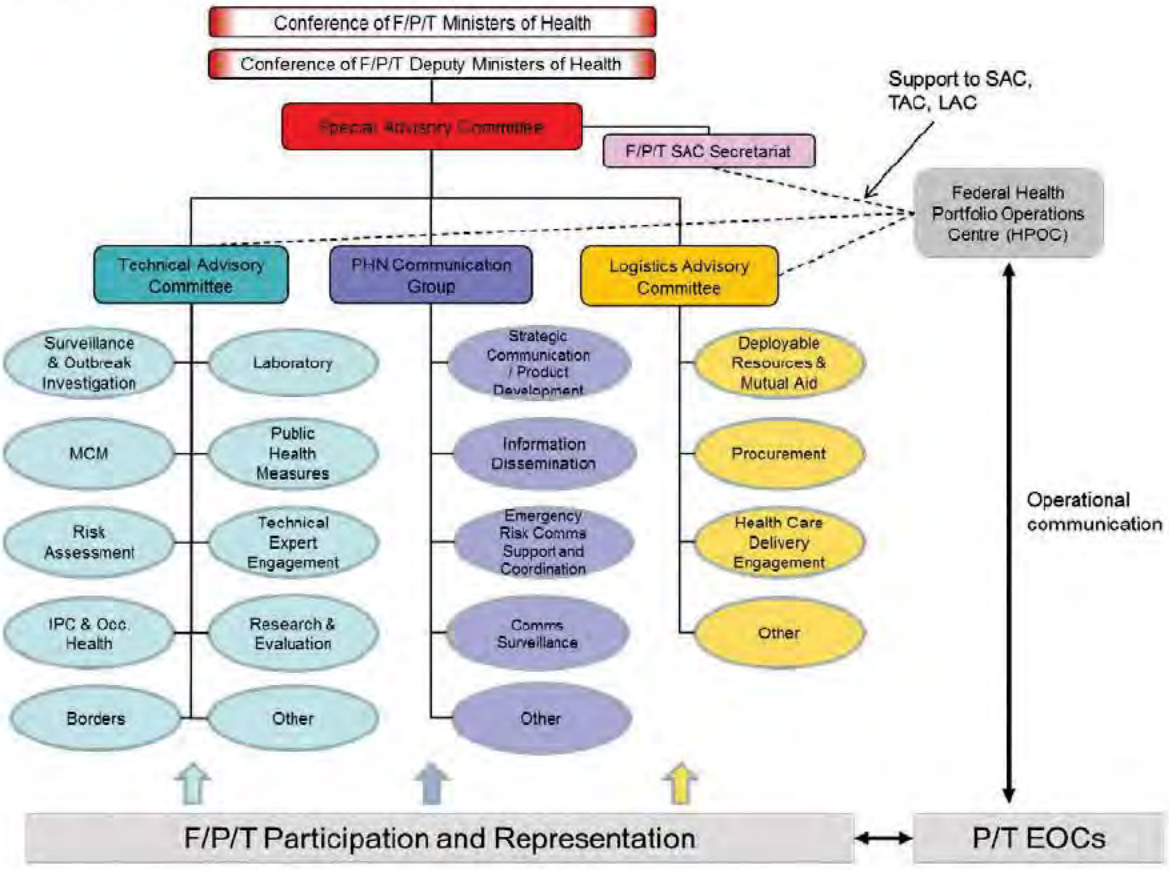
- support the heavily affected provinces;
- facilitate consistent surveillance;
- coordinate public health and infection control practices across the country;
- provide informed and consistent technical and public messaging.

4 F/P/T GOVERNANCE

4.1 STRUCTURE

The governance structure below in Figure 4 aims to: streamline response processes to a public health event; clarify roles, responsibilities and approval processes; facilitate a high degree of situational awareness; and centralize risk management and task delegation. It has been developed based on best practices and lessons learned from prior large-scale public health responses. The general response functions identified in the structure are being presented for illustrative purposes and represent an example of a fully activated structure. At the time of implementation this structure will be customized to suit the specific event and scale of the required response. See appendix A for list of acronyms used in this figure.

Figure 4: Governance Structure for a Coordinated F/P/T Response



Note: In Figure 4, reporting relationships are depicted by solid lines and support relationships are depicted by dashed lines.

4.2 GOVERNANCE STRUCTURE GROUPS—ROLES, RESPONSIBILITIES AND DECISION-MAKING

It is strongly recommended that the descriptions described below are read in conjunction with the corresponding terms of reference attached as appendices to this plan.

Special Advisory Committee

The Special Advisory Committee (SAC) has a mandate to provide advice to the F/P/T Conference of Deputy Ministers of Health (CDMH) pertaining to the coordination, public health policy and technical content on matters related to response to a significant public health event. If it is determined that a coordinated F/P/T response is required (following initial assessment of the situation as per the concept of operations described in Section 3 of this document), a SAC will be activated.

Products may be developed within the governance structure of this plan which may include, but are not limited to: recommendations, guidance documents, protocols, and communication products. SAC will be the main forum for F/P/T approval/endorsement of such products however, for purely technical products (e.g., surveillance case definitions, laboratory testing protocols), the SAC may choose to delegate approval to the Technical Advisory Committee (TAC). If necessary, the SAC will involve the CDMH or the Deputy Minister Liaison in decision-making either by an expression of interest by the CDMH or when the scale of the public health event and subsequent resource implications for the response activities indicate. With the support of the F/P/T SAC Secretariat, the SAC co-chairs will provide SAC endorsed products to the CMDH as required.

The SAC is chaired by the co-chairs of the Public Health Network Council (PHNC). For details regarding the SAC composition and activities related to this plan can be found in *Appendix D: Special Advisory Committee Roles and Responsibilities under the FPT Public Health Response Plan*.

F/P/T governments recognize that each jurisdiction will decide whether or not to implement the recommendations or products of the SAC, and will do so according to the needs of the jurisdiction and/or its legislative framework.

FPT Special Advisory Committee Secretariat (FPT SAC Secretariat)

The F/P/T SAC Secretariat will support the SAC by assuming multiple coordination functions any time when the SAC is activated. Under this plan, a SAC is activated for a coordinated F/P/T response which for the purposes of this plan is a *Level 4—Emergency* response and a *Level 3—Escalated* response. In this governance structure, the F/P/T SAC Secretariat manages the intersection between the SAC and the three response streams of the governance: the Technical Advisory Committee (TAC), the PHN Communications Group, and the Logistics Advisory Committee (LAC) and will provide cross-stream support through the planning and tracking of tasks.

Membership

The F/P/T SAC Secretariat will be composed of F/P/T senior level policy staff. Members may come from the current Public Health Network Secretariat. These individuals routinely provide policy support to PHNC members and have extensive experience in providing strong context, content and process knowledge of policy and program areas in public health. In addition, their day-to-day roles and responsibilities include policy analysis and options, linking with technical expertise, supporting communications, information sharing and knowledge exchange and product and tool development. Furthermore, they are often linked in with inter-governmental relations officials within the provinces and territories and at the federal level. Each jurisdiction will have the opportunity to identify an appropriate policy representative to serve on the F/P/T SAC secretariat.

Key responsibilities

The F/P/T SAC Secretariat, with the support of the HPOC Incident Management System (IMS) structure, will be responsible for rapid centralized analysis of issues and F/P/T response needs, prioritization and distribution of tasks, with the aim of improving efficiency, increasing situational awareness, and facilitating engagement of external resources. This will be achieved through liaison with the SAC co-chairs and through planning meetings convened with the HPOC Planning Group and co-chairs of the TAC, LAC and PHN Communications Group.

Specifically the F/P/T SAC Secretariat, with direction from SAC co-chairs, will identify what type of product/action is required, task this to the appropriate group(s) within the governance structure and monitor progress. The F/P/T SAC Secretariat will identify and prioritize response issues and F/P/T response needs in consultation with the SAC co-chairs and co-chairs of the TAC, LAC and PHN Communications Group and will provide a mechanism for P/Ts, other groups within the governance structure, and other stakeholders to bring their issues forward to the SAC.

It is expected that the F/P/T SAC Secretariat will routinely liaise with the co-chairs of the SAC, TAC, LAC and PHN Communications Group and with the HPOC Event Manager as required throughout the response. The F/P/T SAC Secretariat with the support of the HPOC, will convene situational awareness and planning meetings as described below.

Applying Strategic Policy Lens and Product Integration

Another key activity of the F/P/T SAC Secretariat is to apply a strategic policy[8] lens to all products (developed by groups within the governance structure) that are being brought forward to SAC for discussion, approval and/or endorsement. It is also responsible to integrate products developed by different streams within the governance structure as requested by SAC.

Product integration would include combining content developed by the multiple streams into one document in which case the F/P/T SAC Secretariat will be formatting the final combined product and adding any summaries or strategic policy analysis but will not make any fundamental changes to the previously approved/endorsed content. An example of when this would occur is if SAC requested a single product that includes technical recommendations, logistical issues and a communication response (or any combination of work from two streams)—such as a vaccine response strategy. This process is intended to help expedite and support evidence-informed decision-making by the SAC.

The F/P/T SAC Secretariat will be the contact point for P/Ts, other groups within the governance structure, and other stakeholders to bring their issues forward to the SAC (note: focus should be on F/P/T issues). The HPOC IMS Planning Group may support this process through maintenance of activity trackers or other tools. The mechanism for bringing issues to the F/P/T Secretariat will be via email[9] to the HPOC.

Where practical, the results of planning and situational awareness meetings will be captured in meeting minutes/record of decisions taken by HPOC IMS staff but also in situation reports and incident action plans developed by the HPOC IMS Planning Group.

Note: The F/P/T SAC Secretariat is not responsible for approving documents (aside from verifying the F/P/T incident action plan).

8 Strategic policy concerns broad issues of national and international importance. This could include border screening, explaining Canada's response posture to international partners and dealing with the trade implications of a public health event.

9 This process will be incorporated into the Business Cycle.

The F/P/T SAC Secretariat will:

- be the coordination point for receiving issues that may require an F/P/T response action and discussion with SAC;
- in consultation with SAC co-chairs and through planning meetings with HPOC, TAC, LAC and PHN Communications Group co-chairs, identify what type of product/action is required and which group within the governance structure will be the lead on developing the product or completing the action;
- track progress towards completion of product/action;
- convene situational awareness calls and hold planning meetings as needed or requested by SAC co-chairs;
- policy analysis and option development;
- product and strategic policy integration:
- directly supports federal and P/T SAC co-chairs and SAC members and Deputy Minister Liaison at SAC meetings teleconferences or CDMH meetings;
- Links the SAC with federal and P/T inter-governmental relations officials.

Convening Planning Meetings

The F/P/T SAC Secretariat, with coordination support from the HPOC IMS will convene planning meetings whose frequency will depend on the pace of the evolving public health event. HPOC IMS staff will be present for agenda support and coordination and minutes. These meetings will be conducted by teleconference and participants will include: co-chairs from the activated committees within the governance structure (TAC, PHN Communications Group and LAC) and HPOC IMS Planning Group representatives for incident action plan development. This limited participation (compared to situational awareness meetings) is expected to facilitate responsiveness and efficiency.

The purpose of these meetings will be to receive and anticipate F/P/T needs or issues which will then be triaged by the group and prioritized for action. The group as a whole will identify what products/actions are required and the F/P/T SAC Secretariat will delegate tasks to appropriate groups (i.e. the TAC, the LAC, Public Health Network Communications Group, or PHAC). This delegation of tasks will determine the required approval process for the products. The meeting participants will also set expected timelines for each product/action and these will be documented in the F/P/T incident action plan and reported on at the situational awareness meetings. The F/P/T incident action plan is developed by HPOC Planning Group and will be forwarded to the SAC via the F/P/T SAC Secretariat for approval. The incident action plan will document the objectives of the F/P/T response. Planning meetings will be used to review these objectives on an ongoing basis and to determine when to recommend to SAC changing them in order to direct response activities appropriately.

Convening Situational Awareness meetings

The F/P/T SAC Secretariat, with the coordination support of the HPOC will convene meetings for situational awareness as needed based on the pace of the evolving public health event or at the request of SAC co-chairs. These meetings will be conducted by teleconference and participants will include a broader audience than planning meetings: SAC co-chairs and members, co-chairs from the activated committees within the governance structure as well as activated task group leads, CCMOH members (i.e., those not already engaged), P/T EOC representatives, PHAC regional representatives, HPOC and HPOC Event Manager, NML IMS Operations and Planning Chiefs, federal population representatives and potentially NGOs (if involved/affected by the response). The P/T participants will be determined by the individual provinces and territories. The Director General, Centre for Emergency Preparedness and Response (CEPR) or the appointed HPOC Event Manager will chair the meetings.

The purpose of these meetings will be to receive epidemiological situation updates from the P/T representatives, international updates (as indicated) from the HPOC IMS, and to confirm the F/P/T response objectives and objectives of individual jurisdictions if they differ from the F/P/T response objectives. This meeting will also be an opportunity to receive update on F/P/T incident action plan progress (e.g. approvals made by SAC or by the CDMH). The meeting will also be the forum for the provision of updates on research findings and communication products and tactics.

Response Streams

The governance structure includes three main *streams:* a Technical stream, a Logistics stream and a Communications stream. These streams are led by advisory committees/groups and have been included in the governance structure in order to facilitate clarity regarding roles for issue management, response support, product development (e.g., recommendations, guidance, protocols), and approval/endorsement processes. "Cross stream" support and coordination will be essential to an efficient, informed and transparent response and will be delivered by the F/P/T SAC Secretariat in coordination with the HPOC.

It is anticipated that most of the response issues will be addressed by products that require technical, operational, logistical, communication and policy input (e.g., identification of priority groups for receipt of a medical countermeasure). In these instances the content developed by each stream will be reviewed from a program policy perspective prior to being approved by the respective advisory committee (i.e., Technical Advisory Committee or Logistics Advisory Committee) or endorsed by the Public Health Network Communications Group10. Products approved or endorsed at this level will then be sent to the F/P/T SAC Secretariat in order to prepare them for discussion at the SAC, this will be achieved through product integration and addition of a strategic policy analysis if required. Many of the products that might be needed as part of a coordinated F/P/T response can be identified in advance. *Appendix H: Anticipated Products and Pathways for a Coordinated F/P/T Response* includes a list of examples of potential products, along with development and approval pathways, in order to stimulate thinking regarding potential requirements and how the governance structure would function at the time of a response.

Technical Advisory Committee

The Technical stream will be led by an F/P/T committee, the Technical Advisory Committee (TAC) and as such will be expected to approve technical products prior to them going to the SAC. Any program policy implications associated with a technical product should be considered and addressed at the TAC level prior to it going to the SAC for approval. Inclusion of a senior level F/P/T program policy representative on the TAC is intended to facilitate this process through the provision of advice and support. The response functions depicted on the technical side of the governance structure will largely be focused on the characteristics of the public health event and *what* needs to be done from a technical perspective to achieve the response objectives. The TAC will be co-chaired by the F/P/T co-chairs of the Communicable Infectious Disease Steering Committee (CIDSC) or their designates. Further details regarding the TAC composition and activities are located in *Appendix F: Technical Advisory Committee Terms of Reference*.

Under the TAC, task groups will be established to address technical response functions (e.g., surveillance, laboratory, medical countermeasures) and to provide technical input into other governance structure products such as communication products. However, whenever possible pre-existing groups will be engaged prior to establishing a new task group. A generic terms of reference for these task groups can be found in *Appendix K: Task Groups Generic Terms of Reference*, and a list of existing groups that may be enlisted or leveraged to function as a technical task group during a response is in *Appendix I: Existing Committees, Working Groups and other Expert Resources.*

10 Communications products are endorsed not approved by the PHN CG.

Upon request these task groups would develop products such as epidemiological reports, guidance on public health measures, and recommendations on the type of MCM (e.g., medications or vaccines) to be used. The TAC would inform the task groups when their expected products are to include a policy perspective so that incorporation of this content could be included early in the development of the product. The TAC would also oversee the engagement of external experts and liaisons for example to address issues outside the scope of public health practice such as clinical care guidelines. The approval authority for purely technical products (that do not have significant resource implications) could be delegated by the SAC to the TAC. It is expected that relatively few products will fall into this category.

Public Health Network Communications Group

The Public Health Network Communication Group (PHN CG) is an existing group that is used to support consistent and coordinated public communications across jurisdictions during public health issues of national significance. The PHN CG can also be used to provide communications advice and support to the PHNC. During a response this group will support the SAC as required. The group is chaired by both a P/T and federal representative and is comprised of F/P/T communicators responsible for public health files in their respective jurisdictions. The PHN CG has developed a protocol[11] that aims to ensure early notification, coordinated and pro-active communications and real-time evaluation between and amongst affected jurisdictions with respect to emerging public health issues. It is expected that when the governance structure for a coordinated F/P/T response is activated as part of this plan, the communication related response functions will be coordinated through the PHN CG for the duration of the response to enable P/T governments can align their communication strategies.

Logistics Advisory Committee

The Logistics stream will be led by an F/P/T committee, the Logistics Advisory Committee (LAC), and as such will be expected to approve logistical products prior to them going to the SAC. Any policy implications associated with a logistical product should be considered and addressed at the LAC level prior to it going to the SAC for approval. Inclusion of a senior level F/P/T program policy representative on the LAC is intended to facilitate this process.

The LAC will be largely focused on *how* the response activities will be implemented in order to achieve the response objectives. The LAC will be co-chaired by the F/P/T co-chairs of the Public Health Infrastructure Steering Committee (PHI-SC) or their designates. Further details regarding the LAC composition and activities can be found in *Appendix G: Logistics Advisory Committee Terms of Reference*. Under the LAC, task groups will be established (or pre-existing groups may be engaged) to address the logistical response functions (e.g., policy support, mutual aid, deployable resources) and to provide logistical input into other governance structure products such as communication products. A generic terms of reference for these task groups can be found in *Appendix K: Task Groups Generic Terms of Reference*. A list of existing groups that may be enlisted or leveraged to function as an operational or logistical task group during a response can be found in *Appendix I: Existing Committees, Working Groups and other Expert Resources.* Upon request these task groups would develop products such as funding agreements, aid agreements and recommendations regarding resource acquisition and utilization. The LAC would inform the task groups when their expected products are to include a policy perspective so that incorporation of this content could be included early in the development of the product. The LAC would also oversee the engagement of health care delivery stakeholders as required for the response.

11 *Federal, Provincial, Territorial (FPT) Public Communications Protocol on Emerging Public Health Issues and Events, January 21, 2015.*

Health Portfolio Operations Centre (HPOC)

The HPOC serves as the Health Portfolio 'single window' for the coordination of response activities to significant public health events of national interest within the Health Portfolio's mandate, and acts as the point of contact for providing emergency management governance support and operational communications. HPOC supports and facilitates emergency operations by expediting and facilitating the sharing of information and supporting F/P/T response activities and communication in coordination with the operations centres of the PHAC regions, National Microbiology Laboratory (NML) and P/T ministries of health. The HP employs an emergency response structure modeled after the Incident Management System (IMS). For the purposes of this plan, the fully escalated HPOC IMS is not described here however the HPOC is included in Figure 4 to illustrate how it will support the governance structure.

Within this plan's governance structure, the HPOC:

- may provide support to both the Technical and Logistics streams by supplying a Technical Support Team and Logistics Support Team which will provide administrative and other coordination support to the TAC and LAC as required.
- is represented in the governance by the by the HPOC Operations Chief who is a member of the TAC and the HPOC Logistics Chief who is a member on the LAC.
- the HPOC Planning Chief, in coordination with the F/P/T SAC Secretariat, facilitates planning meetings which are used to receive and anticipate F/P/T needs or issues which will then be triaged and prioritized for action.
- the HPOC Planning Group is responsible for development of the F/P/T incident action plan.

Further, the federal members of the F/P/T SAC Secretariat are members of the Policy Group within the HPOC IMS and will provide situational awareness to the HPOC Event Manger and HPOC IMS regarding the activities of the governance streams. It is expected the HPOC Event Manager and other HPOC IMS representatives will be requested to participate in SAC meetings by the CPHO or other PHAC official.

Additional overall support functions of the HPOC including single window, business cycle, situation reports and liaison response functions, etc., will be carried out per the HPOC's normal response processes and as required to support the event and the HPOC IMS will be activated accordingly by PHAC senior management. For additional details on activities of the HPOC under this plan refer to *Section 3.4: Initial Response Planning and Capability Assessment.*

APPENDIX B—PLAN DEVELOPMENT: GUIDING PRINCIPLES

The guiding principles for the development of this plan and anticipated response activities associated with this plan were derived from a review of best practices and lessons learned documents; specifically an intensive review of the governance structure utilized during the F/P/T response to the H1N1 influenza pandemic in 2008–09. The latter, involved a structured survey of responders engaged at various levels within the H1N1 governance structure. A total of 38 individuals from the federal, provincial, territorial and regional levels provided responses which informed the following list of guiding principles.

Efficiency—the response should be as efficient as possible. This could be achieved by utilizing emergency management principles such as issue triage and management by objectives. For example, the response must include clear requests for appropriate deliverables, delegation of tasks and responsibilities, and strong adherence to meeting management principles, in order to ensure every responder's time is used efficiently. In addition, where there are expert groups or standing committees that regularly meet (i.e., when a response is not underway); these groups could be leveraged during a response. There also needs to be awareness of what other groups are doing, issues that "overlap", and expectations for products (including timelines, focus and target audience) in order for the response to proceed efficiently.

Timeliness—During a response it is important that deliverables are produced, approved and distributed in a timely manner in order to facilitate optimal use and maintain credibility and public confidence. It has been observed that health professionals and the public will seek and use information developed outside of Canada for other populations if Canadian response actions are not timely.

Transparency—Participants in the response need to be able to see how their deliverables (including but not limited to recommendations) are being received, assessed and possibly amended by decision-makers in order to have confidence in the value of their work. For example, if recommendations are not accepted or deliverables are amended, the rationale for these decisions should be provided as feedback to the originators of the work.

Commitment—There needs to be a commitment to functioning differently during an emergency response (i.e., not just doing the same thing faster), specifically by embracing emergency management principles. Commitments regarding surge capacity and/or mutual aid also need to be considered and respected.

Engagement—In addition to increasing awareness of the roles and responsibilities of various groups within the response governance structure, improving linkages/engagement between working groups, with external to government subject matter experts, and amongst public health, health care delivery and emergency management authorities, will serve to improve the overall goal and objectives of this response plan.

Representativeness—All provinces, territories and federal[13] authorities will be involved in the decision-making process for issues that have significant resource or policy implications for their jurisdiction/population-served. Similarly all provinces, territories and federal authorities will have the opportunity to participate in the approval process for deliverables (e.g., recommendations, protocols) that are expected to be followed/utilized in their respective jurisdictions/populations during the public health response.

Note: some deliverables (e.g., research summaries, guidance documents, treatment guidelines) may be developed by PHAC or external to government subject matter experts for use by the provinces and territories as they deem appropriate.

13 This reference is intended to refer to those federal authorities that are responsible for the delivery of health care services to specific populations (e.g., on-reserve First Nations communities, federal prison population).

Additional guiding principles derived from a review of best practices include the following:

Health Equity—Response activities should be implemented in a manner that facilitates health equity. Health equity means that all people can reach their full health potential and should not be disadvantaged from attaining it because of their race, ethnicity, religion, gender, age, social class, socioeconomic status or other socially determined circumstance. The World Health Organization (WHO) defines social determinants of health as the circumstances in which people are born, develop, live and age and the systems put in place to deal with illness.

Flexibility—During a response actions taken should be tailored to the situation and subject to change as new information becomes available. F/P/T governments are expected to work collaboratively to facilitate a consistent response to F/P/T public health response objectives; however it is recognized that at any one point during the response the objectives of the response may vary from jurisdiction to jurisdiction within Canada depending on the local impact of the public health event and risk assessments. Flexibility is required in order to adapt the response to the evolving public health event.

Effectiveness—The potential effectiveness of a response action needs to be considered prior to implementation. Effectiveness is considered to be the extent to which a specific intervention, procedure, regimen, or service, when deployed in the field, does what it is intended to do for a defined population.[14]

Ethical decision-making—ethical principles and societal values should be explicit and embedded in all decision-making, including the processes used to reach decisions. It is especially important to ensure that all actions respect ethical guidelines tailored to the concerns of public health, while respecting the rights of individuals as much as possible.[15]

Evidence-informed decision-making—Decisions should be based on the best available evidence to the extent possible. It is recognized that other factors also enter into decision-making, such as legal and institutional constraints, values, costs and availability of resources.

14 Source: Last, J.M. *A Dictionary of Epidemiology*, 2nd edition, 1988

15 Source: www.phac-aspc.gc.ca/cpip-pclcpi/assets/pdf/report-rapport-2015-eng.pdf

THIS IS EXHIBIT "8" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

8

AB1986

Pan-Canadian Public Health Network

Partners in Public Health

Special Advisory Committee on COVID-19

The Pan-Canadian Public Health Network (PHN) mobilizes coordinated action and response efforts in times of an urgent health event of national concern. A Special Advisory Committee (SAC) is established to lead a pan-Canadian response across federal, provincial and territorial (FPT) governments in the event of such a public health crisis.

In January 2020, the co-chairs of the PHN Council established a FPT Special Advisory Committee on COVID-19 to advise the Conference of FPT Deputy Ministers of Health on the coordination, public health policy, and technical content related to the COVID-19 outbreak.

The SAC has representatives from several Government of Canada departments, as well as members of the Public Health Network Council and the Council of Chief Medical Officers of Health. Dr. Theresa Tam, Chief Public Health Officer of Canada, and Dr. Saqib Shahab, Chief Medical Health Officer, Saskatchewan co-chair the committee.

Several expert groups bring together senior FPT public health officials, experts and Indigenous organizations that support the SAC on COVID-19, including a:

- Technical Advisory Committee
- Logistics Advisory Committee
- Public Health Network Communications Group
- Public Health Working Group on Remote and Isolated Communities.

The SAC currently meets several times a week to discuss the coordination of FPT preparedness and response across Canada's health systems.

SAC recommendations and guidance

- **Statement from the Council of Chief Medical Officers of Health: Implementing COVID-19 vaccination in Canada and vaccine dose interval**
- **Statement from the Council of Chief Medical Officers on working with Canadians on the ongoing management of COVID-19 in the months ahead**
- **Foundations for Living with COVID-19 in Canada: Lifting of Restrictive Public Health Measures**
- **Fact sheet: Mask wearing in community settings**
- **Council of Chief Medical Officers of Health Communication: Use of non-medical masks (or facial coverings) by the public**

Date modified: 2021-01-14

THIS IS EXHIBIT "9" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

9

ROYAL COLLEGE OF PHYSICIANS AND SURGEONS OF CANADA
COLLÈGE ROYAL DES MÉDECINS ET CHIRURGIENS DU CANADA

Objectives of Training in the Specialty of Public Health and Preventive Medicine

2014
EDITORIAL REVISION – MARCH 2018
VERSION 1.1

This document applies to those who begin training on or after July 1, 2014.

DEFINITION

Public Health and Preventive Medicine is the medical specialty primarily concerned with the health of populations. The discipline's focus is disease and injury prevention and control, which is achieved through health protection and health promotion activities. A Public Health and Preventive Medicine specialist monitors and assesses the health needs of a population and develops, implements, and evaluates strategies for improving health and well-being through interdisciplinary and intersectoral partnerships.

Building on foundational competencies in clinical medicine and the determinants of health, the Public Health and Preventive Medicine specialist demonstrates competencies in public health sciences, including but not limited to epidemiology, biostatistics, and surveillance, planning, implementation and evaluation of programs and policies, leadership, collaboration, advocacy, and communication. These competencies are applied to a broad range of acute and chronic health issues affecting a population, including those that may be related to environmental exposures.

The Public Health and Preventive Medicine specialist may pursue and engage in a number of different types of careers in a variety of settings including but not limited to:

- a municipal, regional, provincial, or federal government
- an international inter-governmental organization
- a non-profit or private sector health or social services organization
- a community-oriented clinical practice with an emphasis on health promotion, disease prevention, and primary health care
- in an academic environment as a researcher, scholar, or educator

Within these diverse settings, a Public Health and Preventive Medicine specialist may be a consultant, advisor, medical health officer, executive, manager, researcher, scholar, or educator.

GOALS

Public Health and Preventive Medicine residents must demonstrate a comprehensive knowledge of the science and art of Public Health and Preventive Medicine, and the skills to apply this knowledge to a broad range of population health issues in the socioeconomic, political, and environmental contexts in which they occur. Residents must demonstrate the knowledge, skills, and attitudes related to assessing the determinants of health, including but not limited to income, environment, gender, education, social support systems, health behaviours, and access to health care, of the populations with which they work. Further, residents must demonstrate competence in incorporating these determinants of health into research methodology, data presentation and analyses as well as in strategies that will improve the health of these populations.

Upon completion of training, a resident is expected to be a competent specialist in Public Health and Preventive Medicine capable of assuming a public health leadership and management role in a health-related organization, including as a consultant in the specialty. The resident must demonstrate a working knowledge of the theoretical basis of the specialty, including its foundations in the clinical sciences, public health sciences, and humanities.

Residents must demonstrate the requisite knowledge, skills, and attitudes to effectively provide community-focused care to diverse populations. In all aspects of specialist practice, the resident must be able to address issues relating to the determinants of health in a professional, ethical manner. In addition, residents are encouraged to have developed a higher level of expertise in one of the core fields, including but not limited to communicable disease, environmental health, chronic disease, and to acquire competency in an area of practice relevant to their own professional and personal development objectives, including but not limited to education; global health; leadership, management and administration; and occupational health.

PUBLIC HEALTH AND PREVENTIVE MEDICINE COMPETENCIES

At the completion of training, the resident will have acquired the following competencies and will function effectively as a:

Medical Expert

Definition:

As *Medical Experts*, Public Health and Preventive Medicine specialists integrate all of the CanMEDS Roles, applying medical knowledge, clinical and public health skills, and professional attitudes in their provision of care at the individual, family, group, organization, community, and population levels. *Medical Expert* is the central physician role in the CanMEDS framework.

Key and Enabling Competencies: Public Health and Preventive Medicine Specialists are able to…

1. **Function effectively as consultants, integrating all of the CanMEDS Roles to provide optimal, ethical care at the individual, family, group, organization, community and population levels**
    - 1.1. Perform a consultation effectively, including the presentation of well-documented assessments and recommendations in written and/or oral form, in response to a request from a variety of sources
        - 1.1.1. Clarify the nature of the request and establish, negotiating where required, the desired deliverables when called upon for advice
        - 1.1.2. Collect and interpret information efficiently and appropriate to the request
        - 1.1.3. Formulate clear and realistic recommendations
        - 1.1.4. Communicate the assessment and recommendations in a manner (oral, written or both) that is most suitable to the given circumstances
        - 1.1.5. Assess the implementation or impact of recommendations
    - 1.2. Demonstrate use of all CanMEDS competencies relevant to Public Health and Preventive Medicine
    - 1.3. Identify and appropriately respond to relevant ethical issues arising in the care of individuals, families, groups, organizations, communities and populations
    - 1.4. Demonstrate the ability to prioritize professional duties effectively and appropriately when faced with multiple issues and problems
    - 1.5. Demonstrate compassionate care at the individual, family, group, organization, community and population levels
    - 1.6. Recognize and respond to the ethical dimensions in public health and relevant clinical decision-making
    - 1.7. Demonstrate medical expertise in situations other than patient care, such as providing expert legal testimony and advising governments

2. **Establish and maintain medical knowledge, skills and behaviour appropriate to Public Health and Preventive Medicine**
    - 2.1. Apply knowledge of the fundamental biomedical, clinical, and public health sciences relevant to Public Health and Preventive Medicine practice
        - 2.1.1. Describe the natural history, epidemiology, risk factors and health burden of the major communicable and non-communicable diseases, including injury, of public health significance
        - 2.1.2. Apply knowledge of the principles of:
            - 2.1.2.1. Disease and injury prevention and control
            - 2.1.2.2. Health and disease surveillance
            - 2.1.2.3. Health protection

2.1.2.4. Health promotion

2.1.2.5. Population health assessment

2.1.3. Describe the principles of infection control and their application to effective and appropriate procedures and policies to reduce risk

2.1.4. Describe the general principles of emergency planning and incident management

2.1.5. Discuss knowledge translation and social marketing strategies as relevant to the promotion of health

2.1.6. Describe the analytic tests and methods used to explain differences in health and health related behaviours including but not limited to:

2.1.6.1. Analysis of variance (ANOVA)

2.1.6.2. Chi-square

2.1.6.3. Forecasting

2.1.6.4. Geospatial analysis

2.1.6.5. Kappa correlation

2.1.6.6. Life tables

2.1.6.7. Logistic regression

2.1.6.8. Modeling

2.1.6.9. Survival analysis

2.1.6.10. T-test

2.1.7. Describe the methods used to explore knowledge, attitudes, beliefs and behaviours and public health interventions including but not limited to:

2.1.7.1. Delphi process

2.1.7.2. Focus group

2.1.7.3. Key informant surveys

2.1.7.4. Nominal group

2.1.7.5. Participant observation

2.1.7.6. Social network analysis

2.2. Describe the CanMEDS framework of competencies relevant to Public Health and Preventive Medicine

2.3. Apply lifelong learning skills of the Scholar Role to implement a personal program to keep up-to-date, enhance areas of professional competence, and maintain specialty certification

2.4. Integrate the available best evidence and best practices to enhance the quality of care and patient and program safety in Public Health and Preventive Medicine

3. Perform a complete and appropriate assessment at the individual, family, group, organization, community, and population levels

3.1. Perform a health needs assessment for a defined population for a specific purpose using appropriate methods (qualitative, quantitative or both) that are relevant, concise and reflective of context and preferences, describe the results of such an assessment, and make recommendations for action

3.1.1. Analyze population level data in order to assess health status, health inequalities, determinants, and different needs to support prioritization of action

3.1.2. Use and interpret information from a range of sources, including but not limited to, mortality, hospital admission, census, primary care, communicable diseases, cancer registries, reproductive and sexual health data, and health surveys, to support public health activities in an evidence informed, resource-effective and ethical manner

3.1.3. Use a range of methods to assess morbidity and burden of disease within and between populations

3.2. Identify and explore health issues effectively, including context, preferences, and values

3.2.1. Define, develop, select and interpret relevant social, demographic, and health indicators from a variety of data sources including but not limited to vital statistics, administrative databases, registries, and surveys

3.2.1.1. Discuss and take into account the limitations in these data sets and their use

3.2.2. Identify and interpret the impact of health behaviours of individuals, groups and populations, particularly with respect to nutrition, physical activity, use of tobacco and other substances, sexuality, risk taking, immunization, and participation in recommended prevention and screening programs

3.3. Conduct an assessment that is relevant, concise and reflective of context and preferences for the purposes of Public Health and Preventive Medicine

3.3.1. Organize and analyze data, meta-data, information and knowledge using information technology as appropriate

3.3.2. Appraise the validity and relevance of data and data systems in order to assess their quality and appropriateness for purpose

3.3.3. Use data with consideration of the legal and ethical aspects of data collection, manipulation, retention, and release in order to balance societal benefit with individual privacy

3.3.4. Integrate different types of data, using complex data sets or data from a variety of sources, to draw appropriate conclusions

3.3.5. Discuss and apply guidelines for assessing causality, using Koch’s postulates and Bradford-Hill criteria

3.4. Select appropriate investigative methods which are evidence informed, resource-effective and ethical

3.4.1. Identify, select and interpret biological risk markers including but not limited to age, sex, race, genetic makeup

3.4.2. Select, discuss and demonstrate an understanding of the socio-economic, political, and environmental factors, relevant to investigate a given context, including but not limited to:

3.4.2.1. Distribution of wealth and power

3.4.2.2. Urbanization

3.4.2.3. Industrialization

3.4.2.4. Social attitudes and values

3.4.2.5. Immigration policies

3.4.3. Select, discuss and demonstrate an understanding of physical environmental factors, including but not limited to:

3.4.3.1. Hazardous emission and spills

3.4.3.2. Noise

3.4.3.3. Air and water pollutants

3.4.3.4. Natural disasters

3.4.3.5. Effects of climate change that are relevant to investigate a given health context (individual, local, regional, provincial, national, global)

3.4.4. Apply and interpret appropriate quantitative methods and analytic tests to explain differences in health and health related behaviours, including but not limited to:

3.4.4.1. Life tables

3.4.4.2. Survival analysis

3.4.4.3. T-test

3.4.4.4. ANOVA (Analysis of Variance)

3.4.4.5. Chi-square

3.4.4.6. Logistic regression

3.4.4.7. Kappa

3.4.4.8. Correlation

3.4.5. Interpret appropriate quantitative methods and analytic tests to explain differences in health and health related behaviours, including but not limited to:

3.4.5.1. Modelling

3.4.5.2. Forecasting

3.4.5.3. Geospatial analysis

3.4.6. Apply and interpret qualitative methods to explore knowledge, attitudes, beliefs and behaviours and public health interventions, including but not limited to:

3.4.6.1. Participant observation

3.4.6.2. Key informant surveys

3.4.6.3. Nominal group

3.4.6.4. Focus group

3.4.6.5. Delphi process

3.4.6.6. Social network analysis and applicable approaches

3.5. Demonstrate effective problem-solving and judgment in addressing health problems, including interpreting available data and integrating information to develop and implement management plans

3.5.1. Perform an assessment of the health impact of a policy or project for a defined population and make recommendations

3.5.2. Use evidence from health and non-health sources, including qualitative and quantitative studies, to answer a defined question, taking into account relative strengths and weaknesses of evidence used

3.5.3. Use an appropriate framework to critically appraise evidence, including but not limited to ecological, qualitative, etiological, interventional, and economic studies

3.5.4. Use an economic analysis including but not limited to cost-benefit, cost-effectiveness and cost-utility in the assessment of a health issue and proposed intervention options

3.5.5. Formulate a balanced, evidence-informed recommendation explaining key public health concepts using appropriate reasoning, judgement and analytic skills for a public health setting

3.5.6. Ascertain, in a timely fashion, key public health information from a range of documents, including but not limited to briefings, policies, and news reports, and use it appropriately and in relation to wider public health knowledge

3.5.7. Incorporate relevant legal and ethical frameworks into assessment of evidence

4. Design and effectively implement and evaluate primary, secondary, and tertiary interventions relevant to Public Health and Preventive Medicine

4.1. Plan and design an intervention management plan in collaboration with individuals, families, groups, organizations, communities, or populations

4.1.1. Debate the relative importance of individual and societal decisions for health

and ethical issues related to public health practice

4.1.2. Discuss the theories of community development

4.1.3. Discuss the strengths and weaknesses of health promotion interventions directed at populations including but not limited to social marketing, healthy public policy and harm reduction

4.1.4. Communicate the need for health promotion strategies in a defined community, presenting a case for action/inaction in response to the presenting health problem

4.1.5. Develop a plan to address a health need in a defined community making clear the theoretical base for a proposal and developing a business case for an activity with consideration to the strengths and weaknesses of health promotion interventions

4.1.6. Apply the theoretical models of behaviour change to the general population, high risk and hard to reach groups

4.1.6.1. Identify and demonstrate an understanding of factors that influence the potential for change in a given context and population

4.1.7. Apply knowledge translation and social marketing to encourage the application of best practices

4.2. Demonstrate effective, appropriate, and timely performance of interventions relevant to Public Health and Preventive Medicine

4.2.1. Advise on and co-ordinate public health action in the light of existing local, provincial, and national policies and guidelines

4.2.2. Describe the general principles of emergency planning and incident management

4.2.3. Contribute to the development and utilization of a community, provincial, or federal emergency preparedness plan, including but not limited to measures to prevent and manage exposure to biological and chemical agents, and radiation-emitting agents and devices

4.2.4. Lead or take a major role in the investigation and management of a significant incident, including but not limited to a communicable disease outbreak, non-infectious disease incident, or a look back

4.2.5. Contribute to the formulation of healthy public policy or legislation at local, provincial or federal level

4.2.6. Lead or make a significant contribution to a major public health campaign demonstrating an understanding of appropriate theory and applications of social marketing and mass communication

4.2.7. Implement and evaluate a health promotion intervention, including assessment of outcomes, methods, and costs; identifying strengths and limitations of intervention, communicating findings and making recommendations

4.2.8. Develop, implement and evaluate health protection programs applying

knowledge of common environmental hazards, including but not limited to water and sewage treatment and quality control of water, soil, air and food

4.3. Ensure appropriate informed consent is obtained for therapeutic and preventive interventions

5. Demonstrate proficient and appropriate use of procedural skills for diagnosis and intervention

5.1. Demonstrate effective, appropriate, and timely performance of diagnostic procedures relevant to Public Health and Preventive Medicine

5.1.1. Identify known or potential health effects associated with a particular hazard relevant to health protection in a population, drawing on expertise as appropriate

5.1.1.1. Characterize the hazard identified, both quantitatively and qualitatively

5.1.1.2. Assess the degree of risk associated with exposure to a hazard found in a population

5.1.2. Integrate hazard identification, characterization, and assessment into an estimate of the adverse events likely to occur in a population, based on a hazard found in that population

5.1.3. Design, implement and evaluate surveillance systems that inform public health programs

5.1.4. Apply the principles of infectious disease epidemiology to the investigation and management of communicable disease outbreaks in individuals, families, groups, organizations, communities and populations

5.2. Ensure appropriate informed consent is obtained for interventions consistent with the public health legal and regulatory framework

5.3. Document and disseminate information related to interventions performed and their outcomes

5.4. Ensure adequate followup and evaluation after interventions

6. Seek appropriate consultation from other health professionals, recognizing the limits of one's own expertise

6.1. Demonstrate insight into one's own limits of expertise

6.2. Demonstrate effective, appropriate, and timely consultation of another health professional as needed for optimal practice

6.3. Arrange appropriate followup care and services for individuals, families, groups, communities, or populations

7. **Actively contribute, as an individual and as a member of a team providing care, to the continuous improvement of health care/public health services quality and patient/population safety**
    - 7.1. Recognize and respond to harm from health care/public health service delivery, including patient/population safety incidents
    - 7.2. Adopt strategies that promote patient/population safety and address human and system factors

Communicator

Definition:

As *Communicators*, Public Health and Preventive Medicine specialists facilitate effective relationships with individuals, families, groups, organizations, communities, and populations.

Key and Enabling Competencies: Public Health and Preventive Medicine Specialists are able to…

1. **Develop rapport, trust, and ethical relationships with individuals, families, groups, organizations, communities, and populations**
    - 1.1. Recognize that being a good communicator is a core skill for physicians, and that effective communication can foster improved outcomes
    - 1.2. Establish constructive relationships with individuals, families, groups, organizations, communities, and populations that are characterized by understanding, trust, respect, honesty, and empathy
    - 1.3. Respect confidentiality, privacy, and autonomy
    - 1.4. Listen effectively
    - 1.5. Be aware of and responsive to nonverbal cues
    - 1.6. Facilitate all encounters effectively

2. **Elicit and synthesize accurately relevant information and perspectives of individuals, families, groups, organizations, communities, and populations, including colleagues and other professionals**
    - 2.1. Gather information about a health situation, including the beliefs, concerns, expectations, and experiences of all those involved
    - 2.2. Seek out and synthesize relevant information from other sources and stakeholders

3. **Convey relevant information and explanations accurately to individuals, families, groups, organizations, communities, and populations, including colleagues and other professionals**
    - 3.1. Deliver information in a humane manner and in such a way that it is understandable, and encourages discussion and participation in decision-making
    - 3.2. Disclose harmful patient and population safety incidents to patients, families groups, organizations, communities, and populations accurately and appropriately

4. **Develop a common understanding on issues, problems, and plans with individuals, families, groups, organizations, communities, and populations, including colleagues and other professionals, to develop a shared plan**
    - 4.1. Identify and explore problems to be addressed, including stakeholders' context, responses, concerns, and preferences
    - 4.2. Respect diversity and differences, including but not limited to the impact of gender, religion and cultural beliefs on decision-making
    - 4.3. Encourage discussion, questions, and interaction in the encounter
    - 4.4. Assist all stakeholders to identify, access and make use of information and communication technologies
    - 4.5. Engage all stakeholders in shared decision-making to develop a plan
    - 4.6. Address challenging communication issues effectively, such as obtaining informed consent, delivering bad news, and addressing anger, confusion, misunderstanding, and conflicting priorities

5. **Convey effective oral, written, and electronic information**
    - 5.1. Maintain clear, concise, accurate, and appropriate records of encounters and plans
    - 5.2. Present reports of encounters and plans
    - 5.3. Convey medical information appropriately to ensure safe transfer of care
    - 5.4. Present health information effectively to the public or media about a health issue
        - 5.4.1. Present epidemiological data and risk information to affected individuals, the public, other professionals, and the media using a variety of modalities
        - 5.4.2. Apply risk communication theory, and communication styles
        - 5.4.3. Develop and implement a communication plan about a public health issue, including a media component
        - 5.4.4. Respond effectively to public and media enquiries about specific health issues using various media channels, as indicated
        - 5.4.5. Communicate effectively using social media and digital technology
        - 5.4.6. Share information in a manner that respects individual privacy and confidentiality

5.4.7. Evaluate the effectiveness of different types of media, including but not limited to print, broadcast and web-based, for reaching the intended audience

Collaborator

Definition:

As *Collaborators*, Public Health and Preventive Medicine specialists work effectively with others to achieve optimal health outcomes.

Key and Enabling Competencies: Public Health and Preventive Medicine Specialists are able to…

1. Participate effectively and appropriately in an interprofessional and interdisciplinary team and with other partners, including but not limited to community partners and populations served as well as sectors outside the health field

1.1. Describe the roles and responsibilities of the Public Health and Preventive Medicine specialist to other professionals, especially in circumstances involving legislative authority or emergency situations

1.2. Describe the roles and responsibilities of other professionals within the health team

1.2.1. Identify and describe the role, expected contribution and limitations of all members of an interdisciplinary team assembled to address a health issue, educational task or research question

1.2.2. Identify individuals, groups, and other service providers who can contribute meaningfully to the definition and solution of an individual, group, or community level public health issue, and education task or research question, including but not limited to social services agencies, mental health organizations, the not-for-profit sector, and volunteers

1.3. Recognize and respect the diversity of roles, responsibilities, competencies and, as applicable, authority of other professionals in relation to their own

1.3.1. Describe the organization, structure, function, and effectiveness of community health and social services in at least one province, including but not limited to maternal and child health; dental health; child abuse; income maintenance, including the not-for-profit sector; volunteers and; other service agencies

1.4. Work with others to assess, plan, provide, and integrate services for individuals, families, groups, organizations, communities, and populations

1.5. Work with others to assess, plan, provide, and review other tasks, such as research, education, program review, or administrative responsibilities

1.5.1. Employ a variety of means to engage and enable the participation of identified key stakeholders

1.5.2. Articulate the goals and objectives of a given collaborative process clearly

1.5.3. Foster collaboration among other individuals and groups

1.6. Participate effectively in interprofessional and interdisciplinary interactions, including but not limited to team meetings

1.7. Enter into relationships with other professions for the provision of quality care or health programs

1.8. Demonstrate effective team participation, including but not limited to team leadership, utilizing the principles of team dynamics, including but not limited to the dyad model of physician-manager integration

1.9. Respect team ethics, including confidentiality, resource allocation, and professionalism

1.10. Demonstrate leadership in a health team, where appropriate

2. Work with health professionals and other stakeholders effectively, including community partners and population served, to prevent, negotiate, and resolve interprofessional and other conflicts

2.1. Demonstrate a respectful attitude towards other colleagues and members of an interprofessional team

2.2. Work with other professionals to prevent conflicts

2.3. Employ collaborative negotiation to resolve conflicts

2.4. Respect differences and address misunderstandings and limits of scope of practice in other professions

2.5. Recognize one's own differences, misunderstandings, and limitations that may contribute to interprofessional and interdisciplinary tension

2.6. Reflect on interprofessional and interdisciplinary team function

2.7. Demonstrate the ability to work on initiatives with non health sector organizations and staff/volunteers

2.7.1. Enter into interdependent relationships with stakeholders/experts in other sectors for the assessment and application of responses to issues impacting the determinants of health or other services outside of health care including but not limited to school boards, water services, municipal planners, and ministries or other government departments outside of health

2.7.2. Demonstrate an ability to meaningfully engage with the public/clients/community members in the identification of issues and solutions that impact them

3. Handover the care of a patient or public health activity to another health professional to facilitate continuity of safe patient/population care

3.1. Determine when care/responsibility should be transferred to another physician or professional

3.2. Demonstrate safe handover of care/responsibility, both verbal and written, during a patient transition to a different health care professional, setting, or stage of care, and during transition in coverage for public health organizations

Manager

Definition:

As *Managers*, Public Health and Preventive Medicine specialists are integral participants in organizations, organizing sustainable practices, making decisions about allocating resources, and contributing to the effectiveness of health care and other systems.

Unique among the medical specialties, upon certification Public Health and Preventive Medicine specialists are expected to be competent to function in administration, management and leadership roles within public health service delivery organizations. These competencies are at the core of the Public Health and Preventive Medicine specialty practice.

Key and Enabling Competencies: Public Health and Preventive Medicine Specialists are able to…

1. Participate in activities that contribute to the effectiveness of their health care organizations and systems

1.1. Work collaboratively with others in their organizations

1.2. Participate in quality improvement initiatives to enhance the quality of care and patient safety in Public Health and Preventive Medicine, integrating the available best evidence and best practices

1.2.1. Design and implement data collection for a defined service question and integrate with other routinely available and relevant data

1.2.2. Assess the evidence for proposed or existing screening programs, using established criteria and the performance of screening tests including but not limited to sensitivity, specificity, predictive value, and number needed to screen

1.2.3. Monitor and appraise the impact of screening and other disease detection and prevention programs

1.2.4. Describe the principles of infection control and their application to effective and appropriate procedures and policies to reduce risk of infection

1.2.5. Develop, implement and critically appraise relevant practice guidelines

1.2.6. Investigate and intervene when a potential health hazard is identified in a clinical setting

1.2.7. Manage a project or program including human, financial and material resources

1.2.7.1. Hire, support and guide staff, monitor performance, receive and give constructive feedback

1.2.7.2. Develop and manage a budget including but not limited to alignment of activities and accountabilities with resources, assessment of results against objectives, and flexible budgeting

1.2.7.3. Develop and implement a plan to secure necessary material resources

1.2.7.4. Use information technology effectively in the management of a project or program

1.2.8. Implement quality improvement techniques as appropriate to the organization and setting, such as Lean, Plan-Do-Study-Act (PDSA)/Plan-Do -Check-Act (PDCA), statistical process control, and community balanced scorecard

1.3. Contribute to a culture that promotes patient/population safety

1.4. Analyze patient/population safety incidents to enhance systems of care and/or public health service delivery

1.5. Use health informatics to improve the quality of patient care and optimize patient safety in Public Health and Preventive Medicine

1.6. Describe the structure and function of the health care system as it relates to Public Health and Preventive Medicine, including the roles of physicians

1.6.1. Compare and contrast the different models of public health structures in Canada

1.6.2. Discuss the organization of workplace health services in at least one part of Canada

1.6.3. Describe principles of health care financing, including physician remuneration, budgeting and organizational funding

2. Manage their practice and career effectively

2.1. Set priorities and manage time to balance professional responsibilities, outside activities, and personal life

2.2. Manage a practice, including finances and human resources

2.3. Implement processes to ensure personal practice improvement

3. Allocate finite public health resources appropriately and participate in service planning, resource allocation and evaluation at the community, regional or provincial level

3.1. Recognize the importance of just allocation of health care resources, balancing effectiveness, efficiency and access with optimal patient care/health services delivery

3.1.1. Allocate finite health resources using evidence informed and ethical concepts

3.2. Apply evidence and management processes for cost-appropriate care

3.2.1. Apply a determinants of health analysis to a policy or program question to assess the equity implications of policy or program options

4. Serve in administration and leadership roles

4.1. Chair and participate effectively in committees and meetings

4.2. Lead or implement change in health systems

4.2.1. Develop a vision, implement a strategic plan, and communicate that effectively to other key stakeholders

4.2.2. Negotiate and influence in a multi-agency arena

4.3. Demonstrate critical self-appraisal and reflective practice with regards to administration and leadership roles

4.3.1. Demonstrate insight into one's own leadership style, personality style, and preferences in different circumstances

4.3.2. Discuss and apply different approaches to leadership development

4.3.3. Use effective and appropriate leadership styles in different settings and organizational cultures taking account of the differences between elected and appointed roles

4.3.4. Discuss and use the techniques of conflict management, including negotiation and arbitration

Health Advocate

Definition:

As *Health Advocates*, Public Health and Preventive Medicine specialists responsibly use their expertise and influence to advance the health and well-being of individuals, families, groups, organizations, communities, and populations. Public Health and Preventive Medicine specialists advocate for the health of individuals or groups and need to use judgement in balancing efforts to achieve health for all.

Competencies required to achieve this role include full understanding of tools of population health assessment, community engagement, and working in partnership with a wide range of interested parties. Public Health and Preventive Medicine specialists apply strategies to influence and build healthy public policy, as well as public health policy, and recognize the role of political factors and the political context, to make use of formal and informal systems to influence decision-makers and policy decisions.

Key and Enabling Competencies: Public Health and Preventive Medicine Specialists are able to…

1. **Respond to individual, family, community and population health needs and issues**
    - 1.1. Identify the health needs, concerns, and assets of individuals, families, communities, and populations served
    - 1.2. Identify opportunities for advocacy, health promotion and disease prevention with individuals, families, communities and populations served
    - 1.3. Demonstrate an appreciation of the possibility of competing interests and implement processes for decision making to resolve competing interests incorporating an ethical approach

2. **Identify the determinants of health for the populations that they serve**
    - 2.1. Recognize situations where advocacy is required and define strategies to effect the desired outcome
    - 2.2. Identify vulnerable or marginalized sub-populations within those communities and populations served and respond appropriately
        - 2.2.1. Engage and involve vulnerable or marginalized sub-populations, including but not limited to Indigenous Peoples, new immigrants and refugees, and socio-economically disadvantaged persons and groups, to address health inequities

3. **Promote the health of individuals, families, communities, and populations to improve health equity**
    - 3.1. Describe an approach to addressing a determinant of health of the population they serve, including identifying the roles of public health players
    - 3.2. Discuss and analyze health law and common law relevant to public health policy and healthy public policy
    - 3.3. Describe how public policy impacts on the health of the populations served
        - 3.3.1. Integrate public health and preventive medicine, and social science evidence into strategies for healthy public policy
        - 3.3.2. Discuss the processes for health impact assessment and analyze the health impact of public policy
        - 3.3.3. Discuss mechanisms of policy development and methods of implementation, including legislation, regulation, and incentives

3.3.4. Demonstrate an understanding of how competing values affect policy decision making including but not limited to, liberty of the individual, equality, common good of the community and prosperity

3.3.5. Conduct a policy analysis and policy evaluation

3.4. Identify points of influence in the health care system and its structure that impact population health

3.5. Describe the ethical and professional issues inherent in health advocacy, including altruism, social justice, autonomy, integrity, reciprocity and idealism

3.6. Demonstrate an appreciation of the possibility of conflict inherent in their role as a health advocate for a patient or community with that of manager or gatekeeper

3.6.1. Demonstrate an appreciation of the potential for, and implement strategies to address this conflict balancing multiple accountabilities including but not limited to individuals, employers, the public, and within the health profession

3.7. Describe the role of the medical profession in advocating collectively for healthy individuals, systems and populations

3.7.1. Discuss strategies for advocating for quality improvement and patient safety from a population health perspective that includes addressing health inequities

Scholar

Definition:

As *Scholars*, Public Health and Preventive Medicine specialists demonstrate a lifelong commitment to reflective learning, as well as the creation, dissemination, application and translation of relevant knowledge.

Key and Enabling Competencies: Public Health and Preventive Medicine Specialists are able to…

1. Maintain and enhance professional activities through ongoing learning

1.1. Describe the principles of maintenance of competence

1.2. Describe the principles and strategies for implementing a personal knowledge management system

1.3. Recognize and reflect on learning issues in practice

1.4. Continually evaluate one's abilities, knowledge, and skills, and know one's professional limitations, seeking advice, feedback and assistance where appropriate

1.5. Pose an appropriate learning question

1.6. Access and interpret the relevant evidence to a learning question

1.7. Integrate new learning into practice

1.8. Evaluate the impact of any change in practice

1.9. Document the learning process

2. Critically evaluate health and other information and its sources, and apply this appropriately to practice decisions

2.1. Describe the principles of critical appraisal

2.2. Identify, access and critically appraise data from a variety of sources, including individuals, administrative databases, the Internet and health, epidemiological and social sciences literature

2.3. Integrate critical appraisal conclusions into professional practice

3. Facilitate the learning of individuals, families, students, residents, other health professionals, the public and others, as appropriate

3.1. Describe principles of learning relevant to medical education

3.2. Identify collaboratively the learning needs and desired learning outcomes of others

3.3. Select effective teaching strategies and content to facilitate others' learning

3.3.1. Adapt educational and training strategies to the needs of the learner(s)

3.4. Deliver effective lectures or presentations

3.5. Assess and reflect on teaching encounters

3.6. Provide effective feedback

3.7. Describe the principles of ethics with respect to teaching

4. Contribute to the development, dissemination, and translation of new knowledge and practices

4.1. Describe the principles of research and scholarly inquiry

4.1.1. Discuss and apply the principles of quantitative, qualitative, and action research/scholarly inquiry, including but not limited to study question/objective, design, conduct, analysis, interpretation, and reporting

4.1.2. Discuss and apply sampling methods as well as the estimation of appropriate sample sizes, including study power, alpha and beta levels, and a consideration of type I and II error

4.1.3. Calculate and interpret measures of frequency including but not limited to counts, rates, ratios, and, as applicable, their standardization

4.1.4. Calculate and interpret measures of risk including but not limited to relative risk, risk difference, attributable risk, odds ratio, etiologic fraction and preventive fraction

4.2. Describe the principles of research ethics

4.3. Pose a scholarly question and participate in the research process

4.4. Conduct a systematic search for and review of relevant evidence including but not limited to systematic review, meta-analysis

4.4.1. Recognize potential sources of bias and confounding in research and discuss methods to reduce the impact of these through study design or analysis

4.4.2. Discuss interaction, including but not limited to additive, multiplicative, synergism and antagonism, and effect modification in research and discuss methods for their identification and interpretation

4.5. Select and apply appropriate methods to address the question

4.6. Disseminate and mobilize the findings of a study appropriately

4.7. Complete a scholarly research, quality assurance, or educational project relevant to Public Health and Preventive Medicine that is suitable for peer-reviewed publication or presentation at an academic meeting

Professional

Definition:

As *Professionals*, Public Health and Preventive Medicine specialists are committed to the health and well-being of individuals and society through ethical practice, profession-led regulation, and high personal standards of behaviour.

Key and Enabling Competencies: Public Health and Preventive Medicine Specialists are able to…

1. Demonstrate a commitment to individuals, families, groups, organizations, communities and populations served, their profession, and society through ethical practice

1.1. Exhibit appropriate professional behaviours in practice, including accountability, honesty, integrity, commitment, compassion, respect, and altruism

1.2. Demonstrate a commitment to delivering the highest quality practice and maintenance of competence

1.3. Recognize and appropriately respond to ethical issues encountered in practice

1.4. Recognize and manage real or perceived conflicts of interest

1.5. Recognize, discuss, and apply the principles and limits of confidentiality, privacy and access to information as defined by professional practice standards and applicable laws

1.6. Maintain appropriate relations with individuals, families, groups, organizations, communities, and populations

1.7. Exhibit professional behaviours in the use of technology-enabled communication

2. Demonstrate a commitment to individuals, families, groups, organizations, and populations served, profession, and society through participation in profession-led regulation

2.1. Demonstrate knowledge and an understanding of the professional, legal and ethical codes of practice

2.2. Fulfil the regulatory and legal obligations required of current practice in public health and preventive medicine

2.3. Demonstrate accountability to professional regulatory bodies

2.3.1. Distinguish among the roles of provincial and national licensing bodies, medical associations, and specialty societies

2.4. Recognize and respond appropriately to others' unprofessional behaviours in practice

2.5. Participate in peer review

2.6. Demonstrate a commitment to patient/population safety and quality improvement

3. Demonstrate a commitment to physician health and sustainable practice

3.1. Balance personal and professional priorities to ensure personal health and a sustainable practice

3.2. Strive to heighten personal and professional awareness and insight

3.3. Recognize other professionals in need and respond appropriately

This document is to be reviewed by the Specialty Committee in Public Health and Preventive Medicine by December 2019.

REVISED – Specialty Standards Review Committee – April 2014
EDITORIAL REVISION – Office of Specialty Education – March 2018

THIS IS EXHIBIT "10" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

10

AB2010

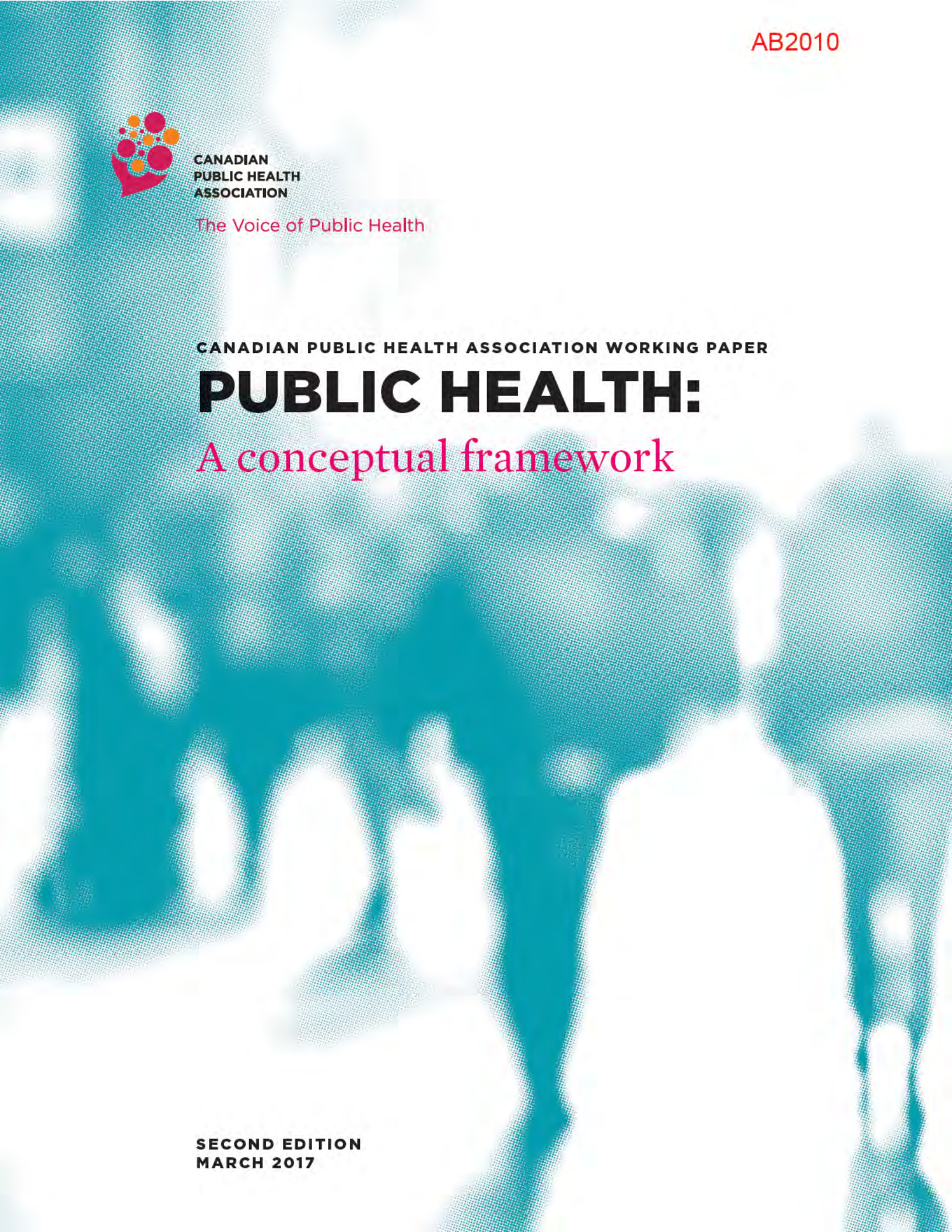
CANADIAN PUBLIC HEALTH ASSOCIATION

The Voice of Public Health

CANADIAN PUBLIC HEALTH ASSOCIATION WORKING PAPER

PUBLIC HEALTH:

A conceptual framework



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THE VOICE OF PUBLIC HEALTH

The Canadian Public Health Association is the independent national voice and trusted advocate for public health, speaking up for people and populations to all levels of government.

We champion health equity, social justice and evidence-informed decision-making. We leverage knowledge, identify and address emerging public health issues, and connect diverse communities of practice. We promote the public health perspective and evidence to government leaders and policy-makers. We are a catalyst for change that improves health and well-being for all.

We support the passion, knowledge and perspectives of our diverse membership through collaboration, wide-ranging discussions and information sharing.

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OUR VISION
A healthy and just world

OUR MISSION
To enhance the health of people in Canada and to contribute to a healthier and more equitable world.

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PREFACE

Health professionals often refer to looking at an issue from a "public health perspective" or "through a public health lens" and yet this concept has not been clearly defined. The following is a first effort at defining such a perspective, lens or approach. It is presented for consideration, and feedback is welcomed. All comments will be considered and may be incorporated into future iterations of what we hope will be an 'evergreen' document. Comments should be directed by e-mail to: policy@cpha.ca.

The development of this working paper began with our attempts to define a "public health approach" during the development of the Association's discussion paper *A New Approach to Managing Illegal Psychoactive Substances in Canada*. CPHA's Board of Directors subsequently directed that a more substantive effort be undertaken to provide a summary document that would describe the principles and practices that underlie public health activities. As a result, practicum students working at CPHA developed an initial manuscript followed by an extensive internal review process. It was then reviewed by public health professionals who voluntarily support CPHA activities. The result of those efforts was ultimately reviewed, edited and approved as an evergreen document by our Board. The Board of Directors and staff of CPHA thank all those who participated in developing *Public Health: A Conceptual Framework*.

PURPOSE

This working paper is meant to provide a **quick reference guide** to and portrait of the underlying principles that support current public health practice; **it is not intended to be the definitive treatise** on this topic. It defines the perspective that CPHA will use to develop its policy options.

PUBLIC HEALTH: A HISTORY OF CHANGE

The practice of public health can perhaps find its roots with the development of aqueducts during the Roman/Byzantine era for the transportation of clean water into populated areas, and the management of human waste. Its true beginnings, based on a causal relationship to the prevention of infectious disease, might be better traced back to actions that were taken in Europe during the fourteenth century to limit the spread of plague. One of the first documented actions was in Venice around 1348, with the appointment of three guardians of public health to detect and exclude ships with passengers infected with that disease. Similarly, the first quarantine actions seemed to be taken in Marseille (1377) and Venice (1403), where travellers from plague-infected countries were

detained for 40 days to protect against transmission of the infection. The first surveillance systems can be dated to the "bill of mortality" established in London, England in 1532 and subsequently John Graunt's publication of his "Natural and Political Observations" (1662) that was based on findings from the Bills of Mortality. John Snow, the father of epidemiology, published "On the Mode of Communication of Cholera" in 1849. The first consideration of the importance of the social determinants of health and the inclusion of social justice as a pillar of public health was described in 1790 when Dr. Johan Peter Frank argued "... curative and preventive measures had little impact on populations where people lived in abject poverty and squalor."[1]

In the Canadian context, the first Board of Health was established in Lower Canada in 1832, with Upper Canada following suit in 1833. As these boards developed, they provided the infrastructure necessary for inspection and regulation that addressed issues as varied as pasteurization of milk, management of tuberculosis in humans, quarantine activities for various illnesses, and the control of sexually transmitted diseases. The early 20th century brought an increasing emphasis on maternal and child health and the immunization of children and youth.[2] In a parallel fashion, during the 18th and 19th centuries, public health practitioners investigated and advocated against nutritional (scurvy), occupational (mesothelioma - cancer of the scrotum) and environmental (lead poisoning) disease, and urged measures to overcome inequities of health.[1]

Through the 20th century, an expansion of focus from a principally communicable disease perspective to one combining communicable and non-communicable illnesses broadened public health practice. Similarly, there is an ongoing movement from an agentic* approach based on behaviour modification, to a population-based approach that focuses more on adjustment of societal structures, with an emphasis on support for populations at risk. The goal of these changes and this expansion has always been to foster the health of people and to develop a strong, resilient and just society. In striving for this goal, our actions have not always been correct, or may at times have been clouded by the beliefs of the day. These efforts continue, yet there are basic principles that have underlain public health practice since the beginning.

* The term *agentic* denotes self-directed actions aimed at personal development or personally chosen goals (The Free Dictionary by Farlex. Available at: www.medical-dictionary.thefreedictionary.com). This concept is based on a social cognition theory perspective in which people are producers as well as products of social systems (definition from: www.wordnik.com/words/agentic).

DEFINING PUBLIC HEALTH PRACTICE

Public health practice can be viewed as an approach to maintaining and improving the health of populations that is based on the principles of social justice, attention to human rights and equity, evidence-informed policy and practice, and addressing the underlying determinants of health. Such an approach places health promotion, health protection, population health surveillance, and the prevention of death, disease, injury and disability as the central tenets of all related initiatives. It also means basing those initiatives on evidence of what works or shows promise of working. It is an organized, comprehensive, and multi-sectoral effort.[3-5]

This definition and the practice of public health have developed over time, and will continue to develop to meet the evolving health requirements of the population. As these demands grow, there will be debates concerning the role and purpose of public health practice and the scope of practitioners' activities. Underlying these debates and developments, however, are an amalgam of concepts and practices that are the foundation and building blocks of public health.

FOUNDATION OF PUBLIC HEALTH

The foundation of, and lenses through which to view, all public health activities are the concepts of social justice[6] and health equity,[7] which relate to the social determinants of health. These lenses continually influence and inform each building block. All public health practice is built on the interconnectivity of five main building blocks (evidence base, risk assessment, policy, program and evaluation) that have been widely described in the literature, continue to evolve, and are the subject of the next section of this paper. Each component has many sub-components, and all the parts must function in a complex adaptive system[*] (see Figure 1) to meet the goals of public health.

Social Justice

The goal of social justice is to develop the ability of people to realize their potential in the society in which they live. Classically, "justice" refers to ensuring that individuals both fulfil their societal roles and receive their due from society,[8] while "social justice" generally refers to a set of institutions that enable people to lead fulfilling lives and be active contributors to their community. These institutions, among others, include education, health care, and social security.[9]

In Canada, social justice finds its root in Section 7 of the *Canadian Charter of Rights and Freedoms*, which provides for "...the right to life, liberty and security of the person and the right not to be deprived thereof except in accordance with the principles of fundamental justice."[10] This clause was used as the legal argument for the Supreme Court decision concerning *Insite*, the supervised consumption facility in Vancouver,[11] and for the decision that struck down three federal prostitution laws.[12] The *Canadian Charter of Rights and Freedoms* is further supported by various United Nations Conventions[†] that provide the social foundation on which to build a public health approach. In this context, social justice ensures that the population as a whole has equitable access to all public health initiatives implemented to minimize preventable death and disability.[3]

Health Equity

Health equity is defined as "... the absence of avoidable or remediable differences in health among groups of people, whether those groups are defined socially, economically, demographically, or geographically."[13] It is based on the principle of social justice and refers to the absence of disparities in controllable or remediable aspects of health. Underpinning this notion is the concept of the *social gradient* that notes

> *"...the poorest of the poor throughout the world have the worst health. Within countries, the evidence shows that in general the lower an individual's socioeconomic position the worse their health. There is a social gradient in health that runs from top to bottom of the socioeconomic spectrum".*[14]

In general, those who are healthier are at the top of the socioeconomic spectrum. The concept applies to every country. This notion is further shaped when the influences of *structural violence* and *intersectionality* are integrated into this consideration.[‡]

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[*] Complex adaptive systems are systems composed of many interacting parts that evolve and adapt over time. Organized behaviour emerges from the simultaneous interaction of parts without a global plan (www.cognitern.psych.indiana.edu/rgoldsto/complex/intro.pdf). This approach has been applied to many complex issues, including economic, scientific and organizational design thinking.

[†] These include: the *International Convention on Civil and Political Rights*, the *International Convention on Economic, Social and Cultural Rights*, the *Convention Against Torture and Other Cruel, Inhuman and Degrading Treatment or Punishment*, the *Declaration of the Rights of Indigenous Peoples*, and the *International Convention on the Protection and Promotion of the Rights and Dignity of Persons with Disabilities*.

[‡] *Structural violence* refers to the physical and psychological harms that can be caused by society's social, political and economic systems. As such, it is avoidable and preventable. The theory is described in Ho K. Structural violence as a human rights violation. *Essex Human Rights Review* 2007;4(2):1-17. *Intersectionality* refers to "... a tool for analysis, advocacy and policy that addresses multiple discriminations and helps us understand how different sets of identities affect access to rights and opportunities." Association for Women's Rights in Development. Intersectionality: A tool for gender and economic justice. *Women's Rights and Economic Change*. 2004;9(August):1-8.

One challenge is that the concepts of "equity" and "equality" are sometimes used interchangeably. They are related; however, there are important distinctions where:

> *Equity … involves trying to understand and give people what they need to enjoy full, healthy lives. Equality, in contrast, aims to ensure that everyone gets the same things in order to enjoy full, healthy lives. Like equity, equality aims to promote fairness and justice but it can only work if everyone starts from the same place.*[15]

As such, consideration must be given to the **equitable** distribution of health services and the creation of culturally competent programming and policy to meet the requirements of the population that is at risk. Attention to that population is required such that the proposed change is supported through group empowerment and ownership.

Social Determinants of Health

The social determinants of health are defined as "the conditions in which people are born, grow, live, work and age".[16] They are shaped by the distribution of money, power and resources, which causes health inequities within populations. Although the list of social determinants of health may vary depending on the source of the information, there are some that are common to all sources and are generally viewed as having the greatest effect on population health. These include income, education, gender, physical environment, social environment, access to health services, and healthy childhood development. The intermingling of these factors creates the health situation specific to an individual or population.

Ecological Determinants of Health

There are many ecological processes and natural resources essential for health and well-being and that constitute Earth's life-support systems. These ecological determinants of health include adequate amounts of oxygen, water, and food. Other important ecological processes and natural resources include the ozone layer, nitrogen and phosphorus cycles, systems to detoxify wastes, and abundant fertile soil, fresh water and marine aquatic systems to grow food and other plants. For humans, three further requirements include materials to construct our shelters and tools, energy, and a stable global climate with temperatures conducive to human and other life forms.

THE BUILDING BLOCKS OF PUBLIC HEALTH

Public health, at its root, is the amalgamation of those activities that are taken to improve population-based health issues within the general domains of communicable and non-communicable disease. There is an internal tension between the domains; however, there are several activities (see Figure 1) that form the building blocks of all public health practice.

Evidence Base

Public health relies on the robustness, accuracy and validity of its evidence base. That base is composed of scientific research, population characteristics, needs, values and preferences, and professional expertise.[17] Research, surveillance and epidemiology, and community consultation are the vehicles through which that evidence is provided (see Figure 2). There is a strong connection between each component, such that research can be used to focus and strengthen surveillance activities. Surveillance can be conducted to inform research, while both surveillance and research can support or be directed by community consultation.

Research

Research is defined as those processes and activities that contribute to generalizable knowledge.[18] In this case, these activities inform public health practice

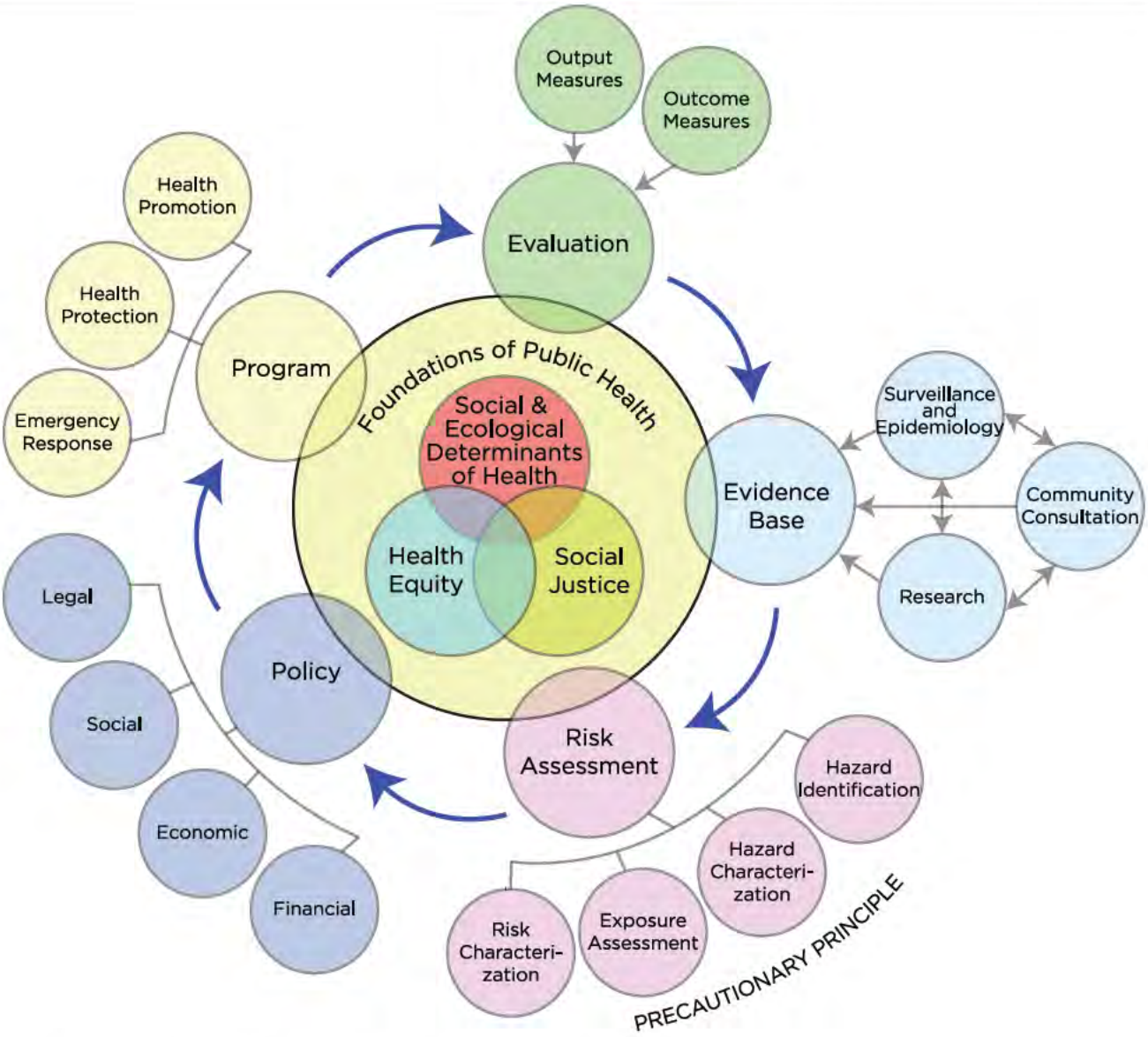

Figure 1: A conceptual framework for public health

and policy, and are targeted to develop, implement, and evaluate improved and more efficient ways of protecting and promoting health and preventing disease.[19] It can be divided into:

- *Quantitative research:* The use of data that can be counted or converted into numerical form.[20] It is primarily used to find statistical associations between variables, or when attempting to find variances in patterns of health between two populations, with an aim to minimize human bias.
- *Qualitative research:* The use of non-numerical observations to interpret phenomena.[20] It is used to gather insight as to how particular situations are interpreted by the study population. These results may come from clinical case studies,

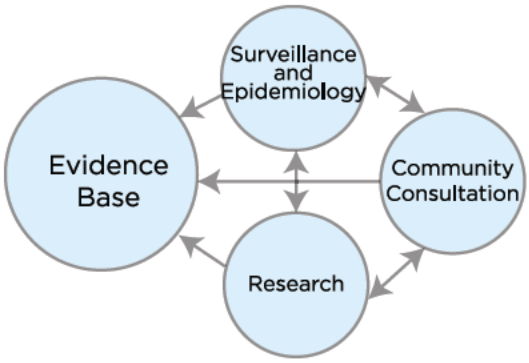

Figure 2: Interrelationship of the components of the evidence base

narratives of behaviour, ethnographies, and organizational or social studies, and can be used to develop theoretical pieces that are based on observable reality. Methods that may be used to gather this data include surveys, interviews, or focus groups to connect with the study population.

Both approaches can be combined to perform mixed methods or pragmatic research studies when seeking answers to complex research questions,[21] but there has to be a clear and strategic relationship between the methods used such that the data provides greater insight than can be obtained by using a single approach. Examples of mixed methods research are studies that link the social determinants of health with epidemiological data.

Surveillance and Epidemiology

Public health surveillance is defined as "the continuous, systematic collection, analysis, and interpretation of health-related data needed for planning, implementing, and evaluating public health practice." It can:

- serve as an early warning system for impending public health emergencies;
- document the impact of interventions, or track progress to specified goals; and
- monitor and clarify the epidemiology of health problems to allow priorities to be set and inform public health policies and strategies."[22]

Long-term or passive surveillance involves the monitoring of general health trends and health determinants[20] and provides information on, for example, current obesity or cancer trends in the population. Short-term, active or ongoing surveillance involves searching for emergent diseases or outbreaks, such as the surveillance conducted during the SARS or H1N1 outbreaks. Both types of surveillance target a specific health state, disease, or agent.

The distinction between surveillance and epidemiology should be noted. Epidemiology is defined as:

> *...the study of the distribution and determinants of health-related states or events (including diseases), and the application of this study to the control of diseases and other health problems. Various methods can be used to carry out epidemiological investigations: surveillance and descriptive studies can be used to study distribution; analytical studies are used to study determinants.*[23]

A fundamental concept for the application of epidemiological findings to preventive medicine is the distinction that separates the notion of a *high risk strategy*,* which is based on conventional medical approaches for resolving a health issue, from that of a *population strategy* that defines the public health approach for addressing preventive medicine.[24] Both concepts are developed from the *Rose Hypothesis*.†

* A *High Risk Strategy* focuses its efforts on individuals with the highest level of a risk factor and uses the established framework of medical practice to reduce that risk, while a *Population Strategy* predicts that shifting the population distribution of a risk factor prevents more burden of disease than targeting the people at high risk by providing a lower likelihood of an illness to the entire population.[22]

† The *Rose Hypothesis* notes that disease is a rare occurrence and that most people who adopt behaviour to lower a risk of disease will not benefit directly, but a few may benefit enormously. The challenge is that often a population-based approach must be applied so that those few who are at risk receive the benefits of preventive actions, or the necessary treatment. (Health Knowledge. Epidemiological basis for preventive strategies.

Research and surveillance/epidemiology may require the use of patient information, and could be subject to patient confidentiality requirements or review by organizational research ethics committees.

Community Consultation

Community consultation is a well-known methodology that can be viewed as a best practice for informed decision-making on complex issues within communities.[25] It is based on the following principles:

- Recognize the community as a unit of identity, with a shared sense of identification and emotional connection that influences common values, norms, and needs;
- Build on the strength and resources within a community to address local health concerns. Community consultation methodologies recognize and seek to expand social structures and processes that contribute to the ability of community members to work together to improve health; and
- Integrate knowledge and action for the mutual benefit of partners and stakeholders, as well as the reciprocal transfer of knowledge, skills, capacity and power.

This process enables community members to be active contributors, through collaboration and involvement, in an initiative that seeks to establish positive social change within the community.[26] The topic chosen must be of practical relevance to the community, and community members should be actively involved in the project's design, implementation, and dissemination. The design may involve aspects of quantitative and qualitative data collection methods, as well as information gathered through surveillance activities. At the completion of this process, results are transferable to community members to support positive social change. An example of where this process would prove, and has proven, useful is the development and implementation of a supervised consumption facility for illegal psychoactive substances.

Risk Assessment

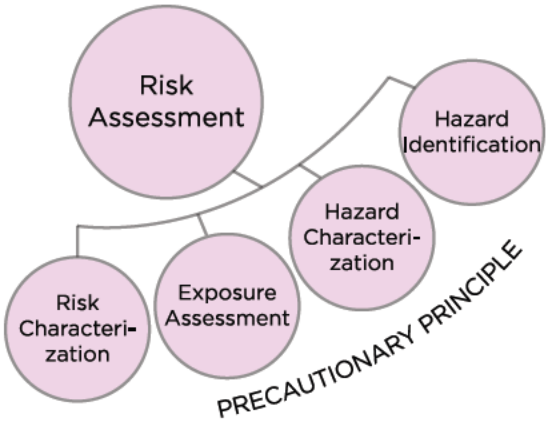

Figure 3: Components of risk assessment

The evidence base in public health is constantly expanding as new information is uncovered through research, surveillance, and community consultation. Issues recurring within that base become priorities for public health attention. Prior to taking action on a specific issue, a risk assessment is necessary to estimate the nature and likelihood of negative health outcomes in individuals.[27] It can be applied to conventional public health issues as well as occupational, environmental, social and behavioural risks. A four-step process (see Figure 3) is used, and includes:

- *Hazard identification:* Identification of specific health effects or hazards. Information from surveillance and epidemiology activities can be used to identify them.
- *Hazard characterization:* Evaluation of the nature of the effects associated with a particular hazard. Qualitative and quantitative research may be

Available at: http://www.healthknowledge.org.uk/public-health-textbook/research-methods/1c-health-care-evaluation-health-care-assessment/epidemiological-basis-pstrategies.)

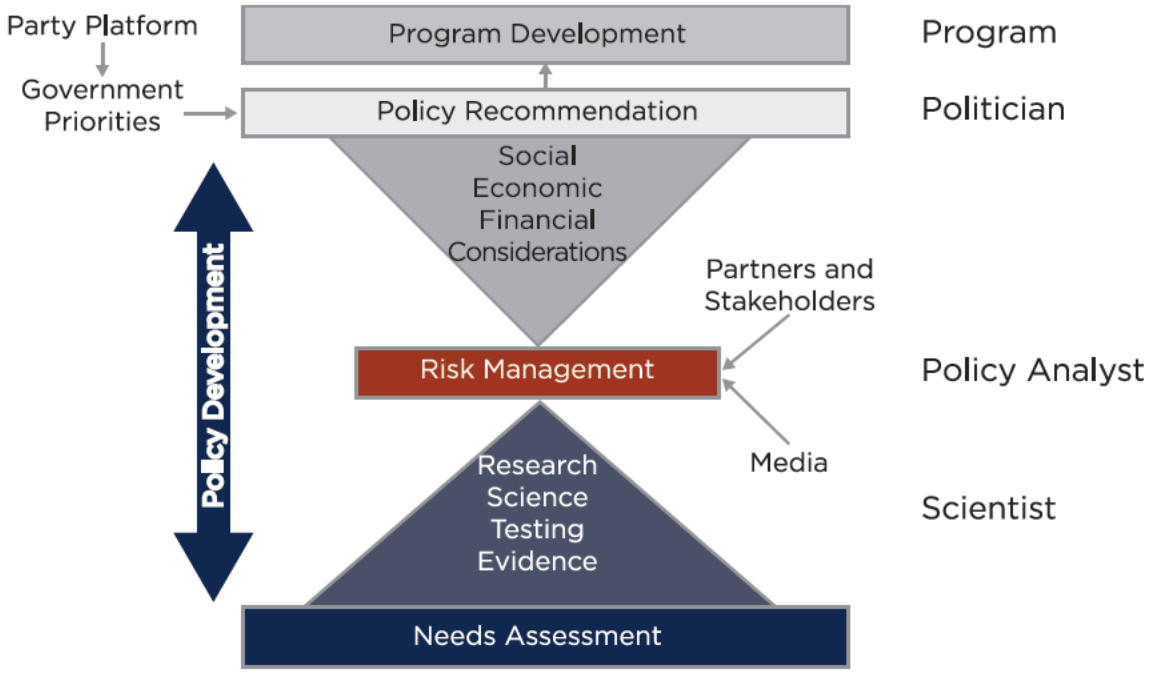

Figure 4: Simplified model of a public health policy development process

used to characterize biological, physical, and chemical hazards.

- *Exposure assessment:* Evaluation of the possible effect of the hazard.
- *Risk characterization:* Integration of hazard identification, hazard characterization, and exposure assessment into a holistic estimate of adverse effect at the population level.

Following completion of the risk assessment, response options are identified and a risk management plan developed. Managers with the appropriate level of authority must decide on actions and take steps to implement them. The desired action could be undertaken directly when immediate action is required, for example during a response to an infectious disease outbreak, or through policy and program development processes.

Underlying this decision process is the *Precautionary Principle*, an approach to managing risk that has been developed to address circumstances of scientific uncertainty. It reflects the need to take prudent action without having to wait for completion of scientific research. This principle was applied by Krever during the inquiry into the Canadian tainted blood scandal,[28] and was enshrined in the 1992 *Declaration of the Rio Conference on Environment and Development*.

Policy

Policy is defined as the principles or protocols adopted or proposed by a government, party, business or individual that provide a definitive course or method of action, and guide or determine present or future decisions. Policies are generally not time limited, and provide the supportive environment, framework and anticipated outcomes to focus program activities and enable future decision-making. Policies are usually developed through a flexible, iterative process that

encompasses issue identification, policy instrument development, consultation, coordination, decision-making, implementation and evaluation. Partner and stakeholder collaboration is required. Within the Canadian context, federal policy development can find its starting point either in the political platform of the ruling party, or through a process that originates within the bureaucracy.

Within the public health domain, an ongoing challenge is to balance the role of science in policy-making, as the evidence base and risk assessment should inform and support policy development, while the policy decision could modify scientific activities. Complicating the process is the inclusion of economic, financial and social policy, and legal and jurisdictional considerations within the decision-making process.

It is essential to engage in the process those partners and stakeholders affected by a decision. The goal is to support development of a final approach that will be acceptable to the affected groups. Those engaged in the consultation must be at a level and have the authority necessary to speak for the organization. The role of a non-governmental organization such as CPHA is to participate in the policy development process through advocacy at the political and bureaucratic levels with the expressed positions reflecting the interests of Association members and based on the best available evidence.

A simplified model of these relationships is presented in Figure 4.

Intervention

As policy development provides the framework and anticipated outcomes for public health activities, programs or interventions are the specific actions that respond to the policy direction. They address health protection, health promotion and emergency response activities. The goal of any intervention is to limit the onset and progression of disease, injury or infection,[20]

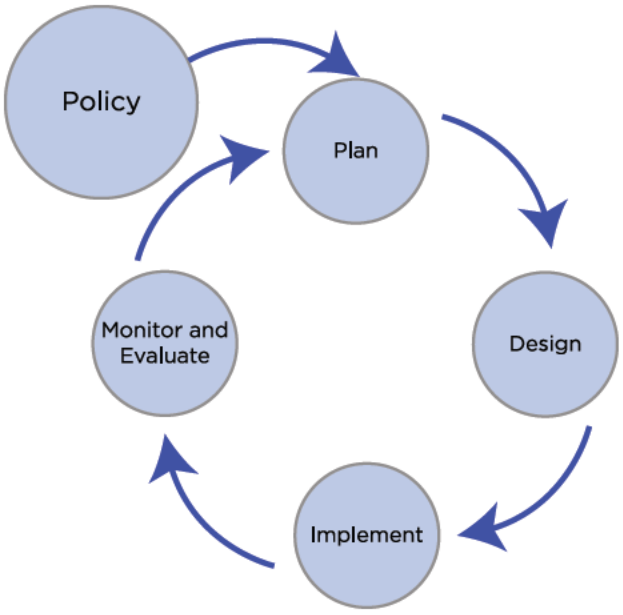

Figure 5: A generalized intervention development process

and may be implemented through collaboration with all levels of government, other government departments, non-governmental organizations, not-for-profit organizations, and private sector partners, as appropriate. In addition, all interventions must be evaluated to measure success in terms of the expected outputs (the desired product of the intervention), as well as the desired outcomes (improvement in the health of the population). Effective intervention development requires that those affected by the health issue addressed by the intervention be included in its development and implementation to improve its likelihood of success. A generalized program development process is presented in Figure 5.

Intervention activities generally address three broad categories of work and are listed below.

Health Protection

Health protection activities address the negative influences on health, and include interventions

as diverse as testing of food and water supplies, environmental testing, and surveillance to identify and track infectious disease outbreaks.[20] These activities rely on surveillance information to direct intervention activities, for example annual influenza vaccination programs, and can provide evidence for epidemiological investigations (food and water testing).

Health Promotion

Health promotion is the mix of activities that assist individuals and communities in taking charge of their personal health. It assists in developing healthy public policy, healthy environments, and personal resiliency, and "... involves any combination of health education and related organizational, economic, and political interventions designed to facilitate behavioural and environmental changes conducive to health."[20] This concept was first described as an entity in the *Ottawa Charter for Health Promotion*.[29]

Emergency Preparedness

Emergency preparedness interventions are those activities that provide the capacity to respond to acute harmful events that range from natural disasters to infectious disease outbreaks and chemical spills. They are founded on four building blocks:

- *Prevention:* those activities that reduce the likelihood of an event occurring
- *Preparedness:* planning, training and organizing to respond to harmful events and situations
- *Response:* the capacity to respond to acute, harmful events
- *Recovery:* the processes required to return to a "normal" state of existence

Evaluation

Each policy and program must be evaluated to determine whether it meets its agreed-to deliverables (output measures) and its desired effect in mediating the issue it was established to address (outcome measures). These can be described as implementation or process, and effectiveness or outcome evaluations.[30] Implementation evaluations assess whether a program is reaching its intended potential, and occur while the program is active. Qualitative and quantitative data are used to make informed judgements. Outcome evaluations measure progress in addressing the program's targeted public health challenge, and may include short-, intermediate-, and long-term results, that are also based on quantitative and qualitative data. The information gathered through evaluation can allow for further development of the program within the affected area of public health.

SUMMARY

Public health is a complex adaptive system which has evolved from providing clean water and managing human waste, to managing a broader cadre of communicable and non-communicable diseases, and continues to change as we address the influence of social determinants and the environment on health. Contributing to this challenge is the notion that the populations we serve are continually evolving, as are the related public health issues. Each public health practitioner must continually adjust his or her practise, but each adjustment must be based on the building blocks of evidence, risk assessment, policy, intervention and evaluation, which are supported by a foundation of health equity, social justice, and the social determinants of health. As such, this document should be considered a first attempt to define the basics of public health, and will continue to develop as the practice evolves.

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THIS IS EXHIBIT "11" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

11

Ethics in Practice for Registered Nurses

AB2025

FEBRUARY 2006 ISSN NUMBER 1480-9990

PUBLIC HEALTH NURSING PRACTICE AND ETHICAL CHALLENGES

Every nurse, regardless of his or her specialty, encounters ethical challenges. However, public health nurses may face unique challenges in their distinct focus on the health of the population in addition to individuals.

EXAMPLE 1

Nadia is a public health nurse working in the tuberculosis program in a large urban health unit. She has received a referral from the tuberculosis clinic at one of the city hospitals for Mr. John Landry, a 52-year-old single man who has worked in many northern communities as a miner. Mr. Landry came to the city four years ago. Since he has not been able to find a job, he has been living in rooming houses, shelters and sometimes on the street. When he has the funds, he engages in binge drinking. A shelter referred him to the tuberculosis clinic because of his increasing fatigue, a persistent cough lasting more than three weeks with blood-streaked sputum, night sweats and weight loss. He was diagnosed with active pulmonary tuberculosis. The clinic asked Nadia to consult because Mr. Landry is refusing to go into hospital for treatment. He could be treated at home, but since he has no home, hospitalization is considered the best option to prevent the spread of his infection.

Nadia meets with Mr. Landry in the tuberculosis clinic. She listens to him. He tells her that he doesn't want to be cooped up in the hospital. He wants to have his freedom and be able to drink if and when he wants. In her first meeting with Mr. Landry, Nadia assesses the client, seeking his point of view of his situation, but she is also aware of the need to protect the public from his communicable disease. She "wears the face" of public health and the expectation to protect the health of the larger community. This is the role for public health as outlined in provincial health protection law. Some describe this consideration for the larger good or public good as "given in trust" to public health organizations and practitioners.

EXAMPLE 2

Karen and Sean are public health nurses who work in the tobacco prevention program in their health unit. They are currently involved in a review of the strategies and interventions of the program. They are concerned about the smoking rate of

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teenaged women, which is significantly higher in their community than the national average. They both agree that one of the program's objectives should be to reduce the proportion of teenaged women who smoke daily. However, their views differ on the strategies they should undertake. Sean thinks they should develop a community-wide education campaign using TV and radio. Karen has been approached by teens at the local high school to work with them on developing a peer-led smoking cessation program. Karen believes that working with the teen women will empower them to take action about their own health and is consistent with community development principles. Sean argues that her approach will only reach a small number while his, using a population health approach, will reach all teens in the community.

CONTENTS

INTRODUCTION

Every nurse, regardless of his or her specialty, encounters ethical challenges. However, public health nurses may face unique challenges in their distinct focus on the health of the population in addition to individuals (Haugh & Mildon, 2005; Jeffs, 2004; Williams, 2004). These examples illustrate only two areas of public health nursing practice and show the ethical dimensions that public health nurses may encounter because of the dual focus on the health of the individual and of the population. Public health nurses may experience many other ethical challenges (Oberle & Tenove, 2000). These examples may also be relevant to nurses who deal with similar situations working in other specialties or sectors, such as occupational health or forensic nursing. This *Ethics in Practice* piece will use the Canadian Nurses Association (CNA) *Code of Ethics for Registered Nurses* (2002), the Community Health Nurses Association of Canada's (CHNAC) *Canadian Community Health Nursing Standards of Practice* (2003) and some suggested public health ethical principles (Upshur, 2002) to examine these ethical challenges.

WHAT IS PUBLIC HEALTH NURSING?

The term *public health nursing* has often been used interchangeably with community health nursing. Currently, the custom in Canada is to use community health nursing as an umbrella term that can include many sectors such as public health, home health or visiting nursing, occupational health, family practice, faith or parish nursing, community rehabilitation and community mental health (CHNAC, 2003; Jeffs, 2004; McKay, 2005; Underwood, 2003). Beginning in April 2006, community health nurses will be able to write national certification examinations, similar to 16 other certified nursing specialties offered by CNA's Certification Program (CNA, 2005). In 2003, CHNAC, the national organization of community health nursing, released standards of practice for community health nurses (2003). These standards are wide-ranging and intended for all community health

nursing sectors, including public health. CHNAC then developed practice competencies that are the foundation for the certification examination (Betker, Goodyear, Mildon & Reiter, 2005).[1]

Historically, the two dominant sectors in Canadian community health nursing have been public health nursing and visiting nursing, or home health nursing as it is now identified. The histories of public health nursing and home health nursing are intertwined; while their roots are in municipal governments and charitable health-care organizations respectively, both streams have blended, evolved and changed over time. Both also use primary health care as the framework for nursing practice (CHNAC, 2003; Cook, Dobbyn & Holmes, 2005; McKay, 2005; Mildon, 2004).

DEFINING PUBLIC HEALTH NURSING PRACTICE

Defining public health nursing practice, and indeed public health, is a "work in progress" that varies among the provinces. The Public Health Agency of Canada in collaboration with the Federal/Provincial/Territorial Joint Task Group on Public Health Human Resources has recently developed a draft set of public health workforce core competencies that are common to all public health professionals, recognizing that several public health disciplines are developing their own specific competencies (Ontario Public Health Association [OPHA], 2005). The core competencies are based on the core functions of the public health system. The Advisory Committee on Population Health recommended that the five main functions of the public health system should be population health assessment, health surveillance, disease and injury prevention, health promotion and health protection (OPHA, 2005; Emerson, 2005).

The CHNAC *Canadian Com rsing Standards of Practice* (2003) defines a public health nurse as a "community health nurse who synthesizes knowledge from public health science, primary health care (including the determinants of health), nursing science, and the theory and knowledge of social sciences to promote, protect, and preserve the health of populations" (p. 3). Several provincial statements also outline public health nursing practice (British Columbia Health Services, 2000; Manitoba Health, 1998; Rafael, Fox, Mildon & O'Donnell, 1998). Throughout these documents, two themes remain consistent: (1) public health nursing is based on the integration of public health sciences and nursing theory; and (2) the conceptualization of public health includes epidemiology, health protection, disease and illness prevention, and more recently, health promotion, community development, attention to the determinants of health, primary health care and population health (Canadian Public Health Association [CPHA], 1990; Rafael et al., 1998; Stamler & Yiu, 2005; Underwood, 2003). In essence, public health nurses combine common nursing skills such as counselling, teaching and advocacy with more specific skills such as community development, health promotion, disease and injury prevention and population health analysis (CPHA, 1990; Rafael et al,1998).

A public health nurse may begin the day by visiting a new mother to support her in establishing breastfeeding, then attend a community-based coalition promoting the proper use of car-safety restraints for children and end the work day by participating in an agency meeting developing pandemic influenza protocols. The client of a public health nurse may be an individual, a family, a group, a geographic community or the general population. Public health nurses may practice on a one-to-one basis with individual clients; however, the main focus of public health itself is the collective health of the population. These concerns, individual and collective health, are both integral to the public health nurse's role. "Public health nurses recognize that a community's health is inextricably linked with the health of its constituent members and is often reflected first in individual and family health experiences" (Rafael et al., 1998, p. 2).

1 For further information please see the following websites: http://www.communityhealthnursescanada.org/Standards.htm and http://www.cna-aiic.ca/CNA/nursing/certification/specialties/default_e.aspx (for the list of competencies for the community health nursing certification exam).

It is this duty of protecting and promoting the health of all in society that differentiates public health practitioners from other health professionals. "This mandate to ensure and protect the health of the public is an inherently moral one. It carries with it an obligation to care for the well-being of communities and it implies the possession of an element of power to carry out that mandate" (Thomas, Sage, Dillenberg, & Guillory, 2003, p. 1057). In the wake of 9-11, bio-terrorism, SARS and warnings of an influenza pandemic, there is renewed public attention to the "common good" and the role that public health agencies play in protecting the health of the population, particularly from communicable diseases (Bayer, 2003a; Gostin, 2001; Jennings, Kahn, Mastroianni, & Parker, 2003).

PUBLIC HEALTH ETHICS

Although discussions of ethical issues in health care have been prominent in the last several decades, they have mainly focused on the ethics of caring for individual clients (e.g., Beauchamp & Childress, 2001; Keatings & Smith, 2000; Yeo & Moorehouse, 1996). Since the focus for public health is the population's well-being, this individualistic perspective is, at best, incomplete; at worst, unhelpful. Recently, however, some attention has been given to ethics and the population focus of public health (Bernheim, 2003; Callahan & Jennings, 2002; Jennings, 2003). Public health practitioners have identified ethical issues that balance harm, risk and benefit to the community or among various groups within a community (Bernheim, 2003). Ethicists have acknowledged the tensions between the collective perspective and individual rights and have recently revisited and revised public health ethical principles and frameworks to guide decision-making (Berheim, 2003; Gostin, 2003; Jennings, 2003; Kass, 2001; Upshur, 2002). The importance of human rights within public health is also becoming prominent in ethics discussions (see for example, Mann, Gruskin, Grodin, & Annas, 1999).

Gostin (2001) distinguishes thr ealth ethics that serve as useful guidelines:

1. ethics *of* public health, which are the professional ethics of practitioners acting in a trustworthy manner for the common good;

2. ethics *in* public health, which are the ethical considerations or tradeoffs between the collective good and individual rights; and

3. ethics *for* public health, which are also advocacy ethics considering the value of healthy communities and the interests of populations, particularly the powerless and oppressed (Gostin, 2001, p. 124).

It is the second area of public health ethics that receives the most attention; that is, reconciling the tension between the public's health and the individual's rights to privacy, liberty and freedom of movement. In an attempt to provide systematic reflection, Upshur (2002) suggests four ethical principles for public health practitioners to use in ethical decision-making about public health interventions. These are: (1) harm principle; (2) least restrictive or coercive means; (3) reciprocity; and (4) transparency.

Harm principle – Upshur notes that the harm principle, based on the work of John Stuart Mill, is "perhaps the foundational principle for public health ethics in a democratic society as it delineates the justification for a government, or government agency, to take action to restrict the liberty of an individual or group" (2002, p. 102). Mill states that "the only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others. His own good, either physical or moral, is not a sufficient warrant" (1974, p. 68).

Least Restrictive or Coercive Means – This principle states that "the full force of state authority and power should be reserved for exceptional circumstances" and that "more coercive methods should be applied only when less coercive means have failed" (Upshur, 2002,

p. 102). Thus, there should be education and discussion before an individual is forced to do something she does not wish to do.

Reciprocity – This principle articulates that "society must be prepared to facilitate individuals and communities in their efforts to discharge their duties" (p. 102). This statement could mean that individuals who are isolated because they are quarantined should be compensated for lost income or have food delivered to them, for example.

Transparency – This principle sets out "the manner and context in which decisions are made. All legitimate stakeholders should be involved in the decision-making process, have equal input into deliberations" and the process "should be as clear and accountable as possible." It "should be free of political interference and coercion or domination by specific interests" (p. 102).

ETHICAL PUBLIC HEALTH NURSING PRACTICE

All nurses strive to provide ethical nursing care. Yet, the duality of the public health nurse's role – striving for the well-being of individual clients, while remaining focused on the welfare of the population – means that they may face ethical challenges not generally experienced by nurses in other spheres. Public health nurses also face ethical challenges not experienced by many other public health workers, who do not have the same kind of close individual relationship with people in the community.

Nurses caring for individuals, whether within institutions or in the community, have many sources of ethical guidance in addition to the CNA and provincial ethics and standards documents. For example, nursing literature contains numerous articles on the ethical aspects of end-of-life care, informed consent, capacity for decision-making and many other issues. Many nursing texts include sections on ethics that focus on the care of the individual patient (Potter & Perry, 2001), and there are texts devoted entirely to ethics (e.g., Keatings & Smith, 2000; Yeo & Moorehouse, 1996). There is also some recognition in the literature that unity face unique challenges (Burcher, 2004; Oberle & Tenove, 2000; Peter, Sweatman & Carlin, 2005). The CHNAC *Canadian Community Health Nursing Standards of Practice* (2003) provides some ethical guidance to nurses working in the community; however, the confluence of public health and home care nursing under the title of "community nursing" can obscure the ethical differences between the two areas of practice. The public health nurse's primary role is protector of the community (Cook, Dobbyn & Holmes, 2005; Haugh & Mildon, 2005). Continuing dialogue and education are needed to support this role's unique needs.

CODE OF ETHICS

The CNA *Code of Ethics for Registered Nurses* states that its values "are grounded in the professional nursing relationship with individuals…. [and] By upholding these values in practice, nurses earn and maintain the trust of those in their care" (2002, p. 7). When the object of care is an individual, the eight values in the code of ethics can provide a guide for ethical care. The code does state that the scope of nurses' responsibilities goes beyond the individual "to include families, community and society" (p. 7); however, when the object of care is the community, it is less clear how to apply the code's values. For example, how does a public health nurse initiate a relationship with a new client? Rafael et al. (1998) point out that, "The extent of a public health nurse's involvement in any part of the process is mutually determined by both the client and nurse… and is dependent on a trusting relationship between client and nurse"(p. 2). While this is usually unproblematic, what should happen when the individual client sees his or her interests in a way that potentially puts the broader community at risk? Is the nurse ethically bound to state that her loyalty is actually to the community rather than the individual? In most health-care settings, ethical practice includes respecting the autonomy of

the client, even when the nurse does not agree with the decisions the client makes. How should the nurse proceed when the well-being of the community is compromised by decisions made by an individual client about her own health? These questions are prominent in the nurse's handling of the situation presented in Example 1. In the next section, some relevant code of ethics values, and suggested principles used by Upshur (2002) are applied to Example 1 and 2.

EXAMPLE 1 – APPLYING THE CODE OF ETHICS

How can the values of the CNA *Code of Ethics for Registered Nurses* apply to Nadia's situation?

Safe, competent and ethical care

"Nurses value the ability to provide safe, competent and ethical care that allows them to fulfill their ethical and professional obligations to the people they serve" (CNA, 2002, p.8).

Based on the description of this value in the CNA code of ethics, the first question that Nadia must ask is "who is being served?" Professional and ethical responsibilities in this situation differ depending on whether the client is the individual or the population. Nadia must decide who should be served, and how, and be able to explain her choice to herself as well as others. How can she best fulfill her obligations to Mr. Landry and to the population?

Health and well-being

"Nurses value health promotion and well-being and assisting persons to achieve their optimum level of health in situations of normal health, illness, injury, disability or at the end of life" (CNA, 2002, p.8).

Under this value, Nadia will educate the client on treatment of his disease as well as on how to prevent communicable disease given the reality of his living conditions. She will also help him learn about and use the services of other professionals and community agencies that can assist him.

This value also points out th dvocating for a better environment for the client so that he has the opportunity to work towards better health. The public health nurse's role makes her aware of societal issues that need to be addressed for the community's health to be optimized. Once again, however, the value seems to assume the individual client is the focus. One explanatory statement of this value says "Nurses must provide care directed first and foremost toward the health and well-being of the person, family or community in their care" (p. 10). Sometimes, however, each type of client may require different ethical stances.

Choice

"Nurses respect and promote the autonomy of persons and help them to express their health needs and values, and also to obtain desired information and services so they can make informed decisions" (CNA, 2002, p.8).

Here Nadia is directed to give Mr. Landry sufficient information to make his own decisions about treatment or, if he is not capable of making a decision, to find the appropriate substitute decision-maker.

The explanation for this value in the code of ethics includes the statement, "Nurses must be committed to building trusting relations as the foundation of meaningful communication recognizing that this takes effort. Such relationships are critical to ensure that a person's choice is understood, expressed and advocated" (p. 11). A trusting relationship is one based on honesty. How should Nadia begin her relationship with Mr. Landry? He did not initiate contact with her; she has been asked by other health-care professionals to intervene. Is she being honest if she attempts to provide him with information about his options, even though she and the health unit have the legal power to place him in the hospital, regardless of whether this is his choice, in order to protect others? Does she simply explain at the onset that his choice is to go to the hospital

voluntarily or involuntarily (presuming these really are the only two options available)? If he decides that he does not wish to go to hospital, but has not been informed of the true limits of his choices, how is this therapeutic relationship based on trust? What will Mr. Landry's response be the next time he is approached by a health-care professional? These issues also surface in the section of this piece which applies the public health ethical principle of "least restrictive or coercive means."

Dignity

"Nurses recognize and respect the inherent worth of each person and advocate for respectful treatment of all persons" (CNA, 2002, p.8).

Mr. Landry wishes to live his life, one that many would find objectionable. Nadia may have to work hard to understand and respect his decisions. This may be especially difficult when his decisions puts her other client – the larger community – at risk. Is there a compromise alternative that she can find? As mentioned in the code of ethics in an explanatory statement, Nadia should attempt to find an alternative that will be acceptable to Mr. Landry. If she must exercise her power over him in regard to hospitalization, she must proceed in a way that preserves Mr. Landry's dignity in the situation.

Justice

"Nurses uphold principles of equity and fairness to assist persons in receiving a share of health services and resources proportionate to their needs and in promoting social justice" (CNA, 2002, p.8).

The CNA value of justice also states, "Nurses should put forward, and advocate for, the interests of all persons in their care. This includes helping individuals and groups gain access to appropriate care that is of their choosing" (CNA, 2002, p.15).

Mr. Landry, as someone without a permanent address, is among the most vulnerable in terms of access to health care. His health needs may be greater, and the continuity of his care may be le n the community. Nadia feels uncomfortable that Mr. Landry cannot get treatment in his home like other clients who have homes. As a public health nurse, Nadia must balance his need for resources with those of others in the community. She also has a responsibility to all of the vulnerable in the community and to advocate for health and social services resources for the well-being of the community in general. How can Nadia find a way to balance all of these needs and be true to each of the individuals and groups in her care? How can she provide justice for Mr. Landry when, if he were not homeless, he could most likely remain in the community even with TB? The principles which Upshur (2002) propose for public health practice may provide some further guidance.

EXAMPLE 1 – APPLYING PUBLIC HEALTH ETHICAL PRINCIPLES

Harm principle

Mr. Landry is not being sent to hospital for his own welfare (he is not refusing medication), but for the welfare of others. In this case the restriction of Mr. Landry's freedom is clearly for the prevention of harm to others, so the principle is satisfied. (If, however, his freedom was restricted only for his own benefit rather than the benefit of others, that would be considered paternalistic and a violation of his autonomy).

Least Restrictive or Coercive Means

Here Nadia must ask whether the hospital really is the only alternative. Is there a place in the community where Mr. Landry could be isolated? What is the shortest period of isolation? Education, facilitation, advocacy, collaboration with others, focusing on the client's strengths and wishes, and discussion should precede a drastic restriction of Mr. Landry's freedom. This principle does allow for compulsion under certain conditions and where less restrictive means have failed to achieve appropriate ends.

Nadia could choose to inform Mr. Landry about his choices, but in reality, he does not have autonomy to choose to refuse treatment and hospitalization in this situation. She could explain to him about the risk he poses to others and hope that he will agree to make the "right" choice of going to the hospital. Though she realizes that it is better to convince Mr. Landry to go to the hospital voluntarily, she can also tell him that ultimately he can be placed in hospital if he does not comply.

In nursing, the relationship with the client is central, but can this relationship be founded on trust? Does Nadia explain that she is there to protect others, and thereby, has the power to send him to hospital against his will? Is this role in conflict with a therapeutic trusting relationship? Is she being accountable to the client if she does not tell him this? And what about being accountable to her organization and the health protection mandate given to public health? How does a nurse ethically deal with this?

Reciprocity

Mr. Landry is being asked to give up his way of life, at least temporarily. How can Nadia work, perhaps with other professionals, to make this as easy as possible for him? Is this part of her responsibility as a nurse? Should the rest of the community also have a responsibility to provide an environment for him where he has access to alcohol?

Transparency

In Upshur's view, this principle applies to policy-making. For Nadia, following this principle on that level could mean that she makes sure that the views of those vulnerable in the community are brought to the table and are considered. In the specific circumstance of Mr. Landry, this principle could mean that others also have a legitimate voice in what happens to him. It also reinforces the need for Nadia to be explicit with him about her role and the options he faces and supports the code's emphasis on the nurse's advocacy role (CNA, 2002, p.12 - 14).

Thus, these principles can hel ions about community safety and how to protect Mr. Landry once a decision has been made about his isolation. However, the principles do not address her responsibility to establish and maintain a trusting, therapeutic nursing relationship with him.

EXAMPLE 2 – APPLYING THE CODE OF ETHICS

How can the values of the CNA *Code of Ethics for Registered Nurses* apply to Karen and Sean's situation?

Safe, competent and ethical care

The nurses in this example, Karen and Sean, must assess and decide who are "the people they serve." In this case, the client is either the group of teens in the local high school (Karen's view) or all teens in the community (Sean's). In public health practice, this is often an economic decision – how to use resources most efficiently – but it is also an ethical decision. What will Karen say to the teens if the tobacco program includes the community-wide campaign rather than the teens' request? Would she be fulfilling her ethical and professional obligation to them?

Health and well-being

While Karen's position is based on empowerment and community development principles, she also believes that if a client (in this case a small group) asks for assistance, the nurse is adhering to the ethical value of health and well-being by providing it. Sean's perspective is also grounded in the health and well-being value, since his approach would help people in the broader community to achieve their optimal level of health.

Choice

Karen would argue that she is respecting the choice of the teens, since they have asked for her assistance. However, the teens have not asked for the community education campaign (nor has the community). But Sean could argue that it is the teens' choice to listen or watch and to decide whether to change

their smoking behaviour. Again, the explanation for this value in the code includes the statement, "Nurses must be committed to building trusting relations as the foundation of meaningful communication, recognizing that building this relationship takes effort. Such relationships are critical to ensure that a person's choice is understood, expressed and advocated" (p. 11). If the community plan is implemented, how can Karen take into account the concerns of the teens who approached her?

Justice

Applying this value, Karen would argue that she is helping the teens access the care they choose. On the other hand, Sean would argue that in using his strategy, the nurses would be potentially helping more people in the community, and therefore it is more equitable. Perhaps this helps explain why public health nurses feel conflicted – torn between honouring the request of their clients as individuals (in this case the teens) and their commitment to the client as community using the population health approach.

Accountability

"Nurses are answerable for their practice, and they act in a manner consistent with their professional responsibilities and standards of practice" (CNA, 2002, p.8).

Both Karen and Sean are accountable, since they both use public health frameworks, namely, community development and population health. However, to be fully accountable, they must go a step further. Kass (2001) has outlined conditions for an ethical public health program. For example, the program must be shown to work before it is implemented (through research or data from other programs). Karen and Sean must consider the effectiveness of their programs before making a decision. Both of these nurses must also adhere to the CHNAC (2003) standard of accountability, which reminds them that they are accountable to a variety of stakeholders in this situation.

EXAMPLE 2 – APPLYING F ETHICAL PRINCIPLES

Two of Upshur's (2002) proposed principles seem especially relevant in this situation:

Least Restrictive or Coercive Means

Health communication campaigns that encourage the adoption of healthy behaviours and discourage unhealthy behaviours are the most common intervention used to promote behaviour change (Bayer, 2003b). Such approaches are viewed as the least coercive of public health strategies using the least restrictive or coercive means principle (Upshur, 2002). Some ethicists argue that health communication campaigns also represent the community's concern for the health and well-being of its members (Bayer, 2003b). However, sometimes the health messages may stigmatize those at risk. Would messages targeted at teens be perceived as paternalistic? Would they imply that teens need extra protection or that they are "bad" or delinquent if they smoke? Karen and Sean will need to consider these questions in weighing how they will proceed.

Transparency

Ultimately, a decision will have to be made about implementing a smoking cessation program. The principle of transparency can help Karen and Sean remember to include stakeholders in the decision. They can ask themselves whether stakeholders have an equal say. When the decision is made, communication about the process, those involved and the reasoning behind the decision will help the community and the teens understand it. Depending on time or resources available, extensive communication is not always feasible. However, such communication is important, given that, for the most part, public health departments are representatives of local government.

CONCLUSION

Public health nurses play a vital role in protecting the health of the population. They also work with individuals to help them protect and improve their health. In performing both of these roles, nurses have conflicting loyalties and obligations. Both bioethicists and nursing ethicists advocate systematically analyzing ethical issues using principles and decision-making frameworks to organize thinking, aid in decision-making and ultimately enhance practice (Fry, 2000; Jennings, 2003; Silva, Fletcher & Sorrell, 2004). This *Ethics in Practice* piece has added a way of thinking about public health ethics and has outlined some suggested principles for use in public health, as well as values from the CNA code of ethics, to help nurses analyze the complicated and difficult issues they may come across. In a Canadian study on the topic, Oberle and Tenove (2000) suggest that public health nursing ethical issues are "so rooted in context, and so interwoven and complex, that they may not always be amenable to systematic analysis" (p. 435). Thus, there needs to be continuing dialogue, mentoring, discussion and education to support public health nurses in working through the ethical aspects of situations they face everyday.

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FOR FURTHER INFORMATION

American Nurses Association – *Code of Ethics*
http://www.nursingworld.org/ethics/ecode.htm

American Public Health Association – *Code of Ethics*
http://www.apha.org/codeofethics/

Canadian Nurses Association
http://cna-nurses.ca

Canadian Public Health Association
http://www.cpha.ca

College of Nurse of Ontario
http://www.cno.org

Community Health Nurses Association of Canada
http://www.communityhealthnursescanada.org

Community Health Nurses Initiatives Group
http://chnig.org

International Council of Nurses
http://icn-apnetwork.org

Office of Nursing Policy (Health Canada)
http://www.hc-sc.gc.ca/onp-bpsi/english/index_e.html/

Public Health Agency of Canada
http://www.phac-aspc.gc.ca/new_e.html

Registered Nurses Association of Ontario
http://www.rnao.org

Ontario Public Health Association
http://opha.on.ca/projects/phcci.html

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THIS IS EXHIBIT "12" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

12

High SARS-CoV-2 Attack Rate Following Exposure at a Choir Practice — Skagit County, Washington, March 2020

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On May 12, 2020, this report was posted as an MMWR *Early Release on the* MMWR *website (https://www.cdc.gov/mmwr).*

On March 17, 2020, a member of a Skagit County, Washington, choir informed Skagit County Public Health (SCPH) that several members of the 122-member choir had become ill. Three persons, two from Skagit County and one from another area, had test results positive for SARS-CoV-2, the virus that causes coronavirus disease 2019 (COVID-19). Another 25 persons had compatible symptoms. SCPH obtained the choir's member list and began an investigation on March 18. Among 61 persons who attended a March 10 choir practice at which one person was known to be symptomatic, 53 cases were identified, including 33 confirmed and 20 probable cases (secondary attack rates of 53.3% among confirmed cases and 86.7% among all cases). Three of the 53 persons who became ill were hospitalized (5.7%), and two died (3.7%). The 2.5-hour singing practice provided several opportunities for droplet and fomite transmission, including members sitting close to one another, sharing snacks, and stacking chairs at the end of the practice. The act of singing, itself, might have contributed to transmission through emission of aerosols, which is affected by loudness of vocalization (*1*). Certain persons, known as superemitters, who release more aerosol particles during speech than do their peers, might have contributed to this and previously reported COVID-19 superspreading events (*2*–*5*). These data demonstrate the high transmissibility of SARS-CoV-2 and the possibility of superemitters contributing to broad transmission in certain unique activities and circumstances. It is recommended that persons avoid face-to-face contact with others, not gather in groups, avoid crowded places, maintain physical distancing of at least 6 feet to reduce transmission, and wear cloth face coverings in public settings where other social distancing measures are difficult to maintain.

Investigation and Findings

The choir, which included 122 members, met for a 2.5-hour practice every Tuesday evening through March 10. On March 15, the choir director e-mailed the group members to inform them that on March 11 or 12 at least six members had developed fever and that two members had been tested for SARS-CoV-2 and were awaiting results. On March 16, test results for three members were positive for SARS-CoV-2 and were reported to two respective local health jurisdictions, without indication of a common source of exposure. On March 17, the choir director sent a second e-mail stating that 24 members reported that they had developed influenza-like symptoms since March 11, and at least one had received test results positive for SARS-CoV-2. The email emphasized the importance of social distancing and awareness of symptoms suggestive of COVID-19. These two emails led many members to self-isolate or quarantine before a delegated member of the choir notified SCPH on March 17.

All 122 members were interviewed by telephone either during initial investigation of the cluster (March 18–20; 115 members) or a follow-up interview (April 7–10; 117); most persons participated in both interviews. Interviews focused on attendance at practices on March 3 and March 10, as well as attendance at any other events with members during March, other potential exposures, and symptoms of COVID-19. SCPH used Council of State and Territorial Epidemiologists case definitions to classify confirmed and probable cases of COVID-19 (*6*). Persons who did not have symptoms at the initial interview were instructed to quarantine for 14 days from the last practice they had attended. The odds of becoming ill after attending each practice were computed to ascertain the likelihood of a point-source exposure event.

No choir member reported having had symptoms at the March 3 practice. One person at the March 10 practice had cold-like symptoms beginning March 7. This person, who had also attended the March 3 practice, had a positive laboratory result for SARS-CoV-2 by reverse transcription–polymerase chain reaction (RT-PCR) testing.

In total, 78 members attended the March 3 practice, and 61 attended the March 10 practice (Table 1). Overall, 51 (65.4%) of the March 3 practice attendees became ill; all but one of these persons also attended the March 10 practice. Among 60 attendees at the March 10 practice (excluding the patient who became ill March 7, who also attended), 52 (86.7%) choir members subsequently became ill. Some members exclusively attended one practice; among 21 members who only attended March 3, one became ill and was not tested (4.8%), and among three members who only attended March 10, two became ill (66.7%), with one COVID-19 case being laboratory-confirmed.

Summary

What is already known about this topic?

Superspreading events involving SARS-CoV-2, the virus that causes COVID-19, have been reported.

What is added by this report?

Following a 2.5-hour choir practice attended by 61 persons, including a symptomatic index patient, 32 confirmed and 20 probable secondary COVID-19 cases occurred (attack rate = 53.3% to 86.7%); three patients were hospitalized, and two died. Transmission was likely facilitated by close proximity (within 6 feet) during practice and augmented by the act of singing.

What are the implications for public health practice?

The potential for superspreader events underscores the importance of physical distancing, including avoiding gathering in large groups, to control spread of COVID-19. Enhancing community awareness can encourage symptomatic persons and contacts of ill persons to isolate or self-quarantine to prevent ongoing transmission.

Because illness onset for 49 (92.5%) patients began during March 11–15 (Figure), a point-source exposure event seemed likely. The median interval from the March 3 practice to symptom onset was 10 days (range = 4–19 days), and from the March 10 practice to symptom onset was 3 days (range = 1–12 days). The odds of becoming ill after the March 3 practice were 17.0 times higher for practice attendees than for those who did not attend (95% confidence interval [CI] = 5.5–52.8), and after the March 10 practice, the odds were 125.7 times greater (95% CI = 31.7–498.9). The clustering of symptom onsets, odds of becoming ill according to practice attendance, and known presence of a symptomatic contagious case at the March 10 practice strongly suggest that date as the more likely point-source exposure event. Therefore, that practice was the focus of the rest of the investigation. Probable cases were defined as persons who attended the March 10 practice and developed clinically compatible COVID-19 symptoms, as defined by Council of State and Territorial Epidemiologists (*6*). The choir member who was ill beginning March 7 was considered the index patient.

The March 10 choir rehearsal lasted from 6:30 to 9:00 p.m. Several members arrived early to set up chairs in a large multipurpose room. Chairs were arranged in six rows of 20 chairs each, spaced 6–10 inches apart with a center aisle dividing left and right stages. Most choir members sat in their usual rehearsal seats. Sixty-one of the 122 members attended that evening, leaving some members sitting next to empty seats. Attendees practiced together for 40 minutes, then split into two smaller groups for an additional 50-minute practice, with one of the groups moving to a smaller room. At that time, members in the larger room moved to seats next to one another, and members in the smaller room sat next to one another on benches. Attendees then had a 15-minute break, during which cookies and oranges were available at the back of the large room, although many members reported not eating the snacks. The group then reconvened for a final 45-minute session in their original seats. At the end of practice, each member returned their own chair, and in the process congregated around the chair racks. Most attendees left the practice immediately after it concluded. No one reported physical contact between attendees. SCPH assembled a seating chart of the all-choir portion of the March 10 practice (not reported here because of concerns about patient privacy).

Among the 61 choir members who attended the March 10 practice, the median age was 69 years (range = 31–83 years); 84% were women. Median age of those who became ill was 69 years, and 85% of cases occurred in women. Excluding the laboratory-confirmed index patient, 52 (86.7%) of 60 attendees became ill; 32 (61.5%) of these cases were confirmed by RT-PCR testing and 20 (38.5%) persons were considered to have probable infections. These figures correspond to secondary attack rates of 53.3% and 86.7% among confirmed and all cases, respectively. Attendees developed symptoms 1 to 12 days after the practice (median = 3 days). The first SARS-CoV-2 test was performed on March 13. The last person was tested on March 26.

Three of the 53 patients were hospitalized (5.7%), including two who died (3.8%). The mean interval from illness onset to hospitalization was 12 days. The intervals from onset to death were 14 and 15 days for the two patients who died.

SCPH collected information about patient signs and symptoms from patient interviews and hospital records (Table 2). Among persons with confirmed infections, the most common signs and symptoms reported at illness onset and at any time during the course of illness were cough (54.5% and 90.9%, respectively), fever (45.5%, 75.8%), myalgia (27.3%, 75.0%), and headache (21.2%, 60.6%). Several patients later developed gastrointestinal symptoms, including diarrhea (18.8%), nausea (9.4%), and abdominal cramps or pain (6.3%). One person experienced only loss of smell and taste. The most severe complications reported were viral pneumonia (18.2%) and severe hypoxemic respiratory failure (9.1%).

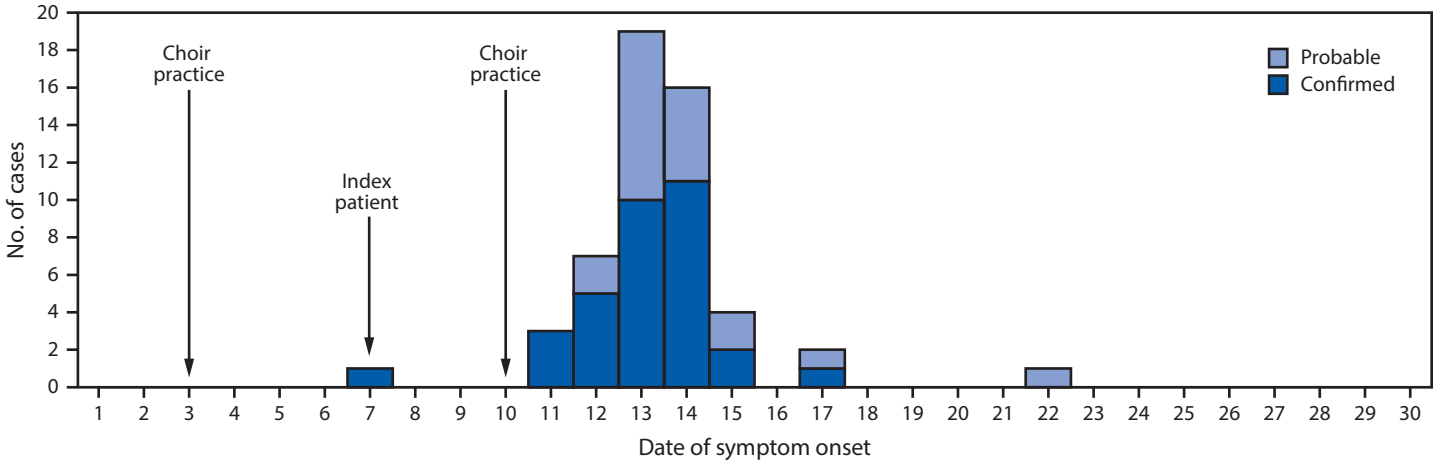
Among the recognized risk factors for severe illness, the most common was age, with 75.5% of patients aged ≥65 years. Most patients (67.9%) did not report any underlying medical conditions, 9.4% had one underlying medical condition, and 22.6% had two or more underlying medical conditions. All three hospitalized patients had two or more underlying medical conditions.

TABLE 1. Number of choir members with and without COVID-19–compatible symptoms (N = 122)* and members' choir practice attendance† — Skagit County, Washington, March 3 and 10, 2020

	No. (row %)					
	March 3 practice			March 10 practice		
Attendance	Total	Symptomatic	Asymptomatic	Total	Symptomatic	Asymptomatic
Attended	78	51 (65.4)	27 (34.6)	61	53§ (86.9)	8 (13.1)
Did not attend	40	4 (10.0)	36 (90.0)	61	3 (4.9)	58 (95.1)
Attendance information missing	4	1 (25.0)	3 (75.0)	0	0 (—)	0 (—)
Attended only one practice	21	1 (4.8)	20 (95.2)	3	2 (66.7)	1 (33.3)

Abbreviation: COVID-19 = coronavirus disease 2019.
* No choir members were symptomatic at the March 3 practice.
† Thirty-seven choir members attended neither practice; two developed symptoms, and 35 remained asymptomatic.
§ Includes index patient; if the index patient excluded, 52 secondary cases occurred among the other 60 attendees (attack rate = 86.7%).

FIGURE. Confirmed* and probable† cases of COVID-19 associated with two choir practices, by date of symptom onset (N = 53) — Skagit County, Washington, March 2020



Abbreviation: COVID-19 = coronavirus disease 2019.
* Positive reverse transcription–polymerase chain reaction test result.
† Attendance at the March 10 practice and clinically compatible symptoms as defined by the Council of State and Territorial Epidemiologists, Interim-20-ID-01: Standardized surveillance case definition and national notification for 2019 novel coronavirus disease (COVID-19). https://cdn.ymaws.com/www.cste.org/resource/resmgr/2020ps/interim-20-id-01_covid-19.pdf.

Public Health Response

SCPH provided March 10 practice attendees with isolation and quarantine instructions by telephone, email, and postal mail. Contacts of patients were traced and notified of isolation and quarantine guidelines. At initial contact, 15 attendees were quarantined, five of whom developed symptoms during quarantine and notified SCPH.

Before detection of this cluster on March 17, Skagit County had reported seven confirmed COVID-19 cases (5.4 cases per 100,000 population). At the time, SCPH informed residents that likely more community transmission had occurred than indicated by the low case counts.* On March 21, SCPH issued a press release to describe the outbreak and raise awareness about community transmission.† The press release emphasized the highly contagious nature of COVID-19 and the importance of following social distancing guidelines to control the spread of the virus.

Discussion

Multiple reports have documented events involving superspreading of COVID-19 (*2*–*5*); however, few have documented a community-based point-source exposure (*5*). This cluster of 52 secondary cases of COVID-19 presents a unique opportunity for understanding SARS-CoV-2 transmission following a likely point-source exposure event. Persons infected with SARS-CoV-2 are most infectious from 2 days before through 7 days after symptom onset (*7*). The index patient developed symptoms on March 7, which could have placed the patient within this infectious period during the March 10 practice. Choir members who developed symptoms on March 11 (three) and March 12 (seven) attended both the March 3

* Skagit County, updated social distancing information. https://skagitcounty.net/departments/home/press/031620.htm.
† Skagit County, public health investigating cluster of related COVID-19 cases. https://skagitcounty.net/departments/home/press/032120.htm.

TABLE 2. Signs and symptoms reported at the onset of COVID-19 illness and during the course of illness among persons infected at a choir practice (N = 53)* — Skagit County, Washington, March 2020

Sign or symptom	No. (%) Reported at onset of illness: All cases (N = 53)	No. (%) Reported at onset of illness: Confirmed cases (N = 33)	no./No. (%) Reported during course of illness: All cases (N = 53)	no./No. (%) Reported during course of illness: Confirmed cases (N = 33)
Cough	27 (50.9)	18 (54.5)	47/53 (88.7)	30/33 (90.9)
Fever	28 (52.8)	15 (45.5)	36/53 (67.9)	25/33 (75.8)
Myalgia	13 (24.5)	9 (27.3)	34/52 (65.4)	24/32 (75.0)
Headache	10 (18.9)	7 (21.2)	32/53 (60.4)	20/33 (60.6)
Chills or rigors	7 (13.2)	6 (18.2)	23/51 (45.1)	16/31 (51.6)
Congestion	4 (7.5)	2 (6.1)	25/52 (48.1)	15/32 (46.9)
Pharyngitis	2 (3.8)	2 (6.1)	12/52 (23.1)	8/32 (25.0)
Lethargy	4 (7.5)	2 (6.1)	5/52 (9.6)	3/32 (9.4)
Fatigue	3 (5.7)	1 (3.0)	24/52 (46.2)	15/32 (46.9)
Aguesia (loss of taste)	1 (1.9)	1 (3.0)	11/48 (22.9)	5/28 (17.9)
Anosmia (loss of smell)	1 (1.9)	1 (3.0)	10/48 (20.8)	5/28 (17.9)
Chest congestion or tightness	1 (1.9)	1 (3.0)	5/52 (9.6)	4/32 (12.5)
Weakness	1 (1.9)	1 (3.0)	3/52 (5.8)	2/32 (6.3)
Eye ache	1 (1.9)	1 (3.0)	1/52 (1.9)	1/32 (3.1)
Dyspnea	0 (—)	0 (—)	8/51 (15.7)	8/31 (25.8)
Diarrhea	0 (—)	0 (—)	8/52 (15.4)	6/32 (18.8)
Pneumonia	0 (—)	0 (—)	6/53 (11.3)	6/33 (18.2)
Nausea	0 (—)	0 (—)	3/52 (5.8)	3/32 (9.4)
Acute hypoxemic respiratory failure	0 (—)	0 (—)	3/53 (5.7)	3/33 (9.1)
Abdominal pain or cramps	0 (—)	0 (—)	2/52 (3.8)	2/32 (6.3)
Malaise	1 (1.9)	0 (—)	1/52 (1.9)	0/32 (—)
Anorexia	0 (—)	0 (—)	1/52 (1.9)	0/32 (—)
Vomiting	0 (—)	0 (—)	0/52 (—)	0/32 (—)

Abbreviation: COVID-19 = coronavirus disease 19.
* Including the index patient.

and March 10 practices and thus could have been infected earlier and might have been infectious in the 2 days preceding symptom onset (i.e., as early as March 9). The attack rate in this group (53.3% and 86.7% among confirmed cases and all cases, respectively) was higher than that seen in other clusters, and the March 10 practice could be considered a superspreading event (*3*,*4*). The median incubation period of COVID-19 is estimated to be 5.1 days (*8*). The median interval from exposure during the March 10 practice to onset of illness was 3 days, indicating a more rapid onset.

Choir practice attendees had multiple opportunities for droplet transmission from close contact or fomite transmission (*9*), and the act of singing itself might have contributed to SARS-CoV-2 transmission. Aerosol emission during speech has been correlated with loudness of vocalization, and certain persons, who release an order of magnitude more particles than their peers, have been referred to as superemitters and have been hypothesized to contribute to superspeading events (*1*). Members had an intense and prolonged exposure, singing while sitting 6–10 inches from one another, possibly emitting aerosols.

The findings in this report are subject to at least two limitations. First, the seating chart was not reported because of concerns about patient privacy. However, with attack rates of 53.3% and 86.7% among confirmed and all cases, respectively, and one hour of the practice occurring outside of the seating arrangement, the seating chart does not add substantive additional information. Second, the 19 choir members classified as having probable cases did not seek testing to confirm their illness. One person classified as having probable COVID-19 did seek testing 10 days after symptom onset and received a negative test result. It is possible that persons designated as having probable cases had another illness.

This outbreak of COVID-19 with a high secondary attack rate indicates that SARS-CoV-2 might be highly transmissible in certain settings, including group singing events. This underscores the importance of physical distancing, including maintaining at least 6 feet between persons, avoiding group gatherings and crowded places, and wearing cloth face coverings in public settings where other social distancing measures are difficult to maintain during this pandemic. The choir mitigated further spread by quickly communicating to its members and notifying SCPH of a cluster of cases on March 18. When first contacted by SCPH during March 18–20, nearly all persons who attended the practice reported they were already self-isolating or quarantining. Current CDC recommendations, including maintaining physical distancing of at least 6 feet and wearing cloth face coverings if this is not feasible, washing hands often, covering coughs and sneezes, staying home when ill, and frequently cleaning and disinfecting

high-touch surfaces, remain critical to reducing transmission. Additional information is available at https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html.

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THIS IS EXHIBIT "13" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

13

High COVID-19 Attack Rate Among Attendees at Events at a Church — Arkansas, March 2020

Allison James, DVM, PhD[1,2]; Lesli Eagle[1]; Cassandra Phillips[1]; D. Stephen Hedges, MPH[1]; Cathie Bodenhamer[1]; Robin Brown, MPAS, MPH[1]; J. Gary Wheeler, MD[1]; Hannah Kirking, MD[3]

On May 19, 2020, this report was posted as an MMWR *Early Release on the* MMWR *website (https://www.cdc.gov/mmwr).*

On March 16, 2020, the day that national social distancing guidelines were released (*1*), the Arkansas Department of Health (ADH) was notified of two cases of coronavirus disease 2019 (COVID-19) from a rural county of approximately 25,000 persons; these cases were the first identified in this county. The two cases occurred in a husband and wife; the husband is the pastor at a local church (church A). The couple (the index cases) attended church-related events during March 6–8, and developed nonspecific respiratory symptoms and fever on March 10 (wife) and 11 (husband). Before his symptoms had developed, the husband attended a Bible study group on March 11. Including the index cases, 35 confirmed COVID-19 cases occurred among 92 (38%) persons who attended events held at church A during March 6–11; three patients died. The age-specific attack rates among persons aged ≤18 years, 19–64 years, and ≥65 years were 6.3%, 59.4%, and 50.0%, respectively. During contact tracing, at least 26 additional persons with confirmed COVID-19 cases were identified among community members who reported contact with church A attendees and likely were infected by them; one of the additional persons was hospitalized and subsequently died. This outbreak highlights the potential for widespread transmission of SARS-CoV-2, the virus that causes COVID-19, both at group gatherings during church events and within the broader community. These findings underscore the opportunity for faith-based organizations to prevent COVID-19 by following local authorities' guidance and the U.S. Government's Guidelines: Opening Up America Again (*2*) regarding modification of activities to prevent virus transmission during the COVID-19 pandemic.

On March 10 and 11, the wife of the church pastor, aged 56 years, and the pastor, aged 57 years, developed fever and cough. On March 12, the pastor, after becoming aware of similar nonspecific respiratory symptoms among members of their congregation, closed church A indefinitely. Because of fever, cough, and increasing shortness of breath, the couple sought testing for SARS-CoV-2 on March 13; both were notified of positive results by reverse transcription–polymerase chain reaction testing on March 16. The same day, ADH staff members began an investigation to identify how the couple had been exposed and to trace persons with whom they had been in contact. Based on their activities and onset dates, they likely were infected at church A events during March 6–8, and the husband might have then exposed others while presymptomatic during a Bible study event held on March 11.

During March and April 2020, all persons in Arkansas who received testing for SARS-CoV-2 at any laboratory were entered into a database (Research Electronic Data Capture [REDCap]; version 8.8.0; Vanderbilt University) managed by ADH. Using a standardized questionnaire, ADH staff members interviewed persons who had positive test results to ascertain symptoms, onset date, and potential exposure information, including epidemiologic linkages to other COVID-19 patients; this information was stored in the database. Close contacts of patients with laboratory-confirmed cases of COVID-19 were interviewed and enrolled in active symptom monitoring; those who developed symptoms were tested and their information was also entered into the database. Church A–associated cases were defined as those in 1) persons who had laboratory results positive for SARS-CoV-2 who identified contact with church A attendees as a source of exposure and 2) actively monitored contacts of church attendees who had a test result positive for SARS-CoV-2 after becoming symptomatic.

The public health investigation focused on the transmission of SARS-CoV-2 among persons who attended church A events during March 6–11. To facilitate the investigation, the pastor and his wife generated a list of 94 church members and guests who had registered for, or who, based on the couple's recollection, might have attended these events.

During March 6–8, church A hosted a 3-day children's event which consisted of two separate 1.5-hour indoor sessions (one on March 6 and one on March 7) and two, 1-hour indoor sessions during normal church services on March 8. This event was led by two guests from another state. During each session, children participated in competitions to collect offerings by hand from adults, resulting in brief close contact among nearly all children and attending adults. On March 7, food prepared by church members was served buffet-style. A separate Bible study event was held March 11; the pastor reported most attendees sat apart from one another in a large room at this event. Most children and some adults participated in singing during the children's event; no singing occurred during the March 11 Bible study. Among all 94 persons who might have attended any of the events, 19 (20%) attended both the children's event and Bible study.

Summary

What is already known about this topic?

Large gatherings pose a risk for SARS-CoV-2 transmission.

What is added by this report?

Among 92 attendees at a rural Arkansas church during March 6–11, 35 (38%) developed laboratory-confirmed COVID-19, and three persons died. Highest attack rates were in persons aged 19–64 years (59%) and ≥65 years (50%). An additional 26 cases linked to the church occurred in the community, including one death.

What are the implications for public health practice?

Faith-based organizations should work with local health officials to determine how to implement the U.S. Government guidelines for modifying activities during the COVID-19 pandemic to prevent transmission of the virus to their members and their communities.

The husband and wife were the first to be recognized by ADH among the 35 patients with laboratory-confirmed COVID-19 associated with church A attendance identified through April 22; their illnesses represent the index cases. During the investigation, two persons who were symptomatic (not the husband and wife) during March 6–8 were identified; these are considered the primary cases because they likely initiated the chain of transmission among church attendees. Additional cases included those in persons who attended any church A events during March 6–11, but whose symptom onset occurred on or after March 8, which was 2 days after the earliest possible church A exposure. One asymptomatic attendee who sought testing after household members became ill was included among these additional cases.

Consistent with CDC recommendations for laboratory testing at that time (*3*), clinical criteria for testing included cough, fever, or shortness of breath; asymptomatic persons were not routinely tested. To account for this limitation when calculating attack rates, upper and lower boundaries for the attack rates were estimated by dividing the total number of persons with laboratory-confirmed COVID-19 by the number of persons tested for SARS-CoV-2 and by the number of persons who attended church A during March 6–11, respectively. All analyses were performed using R statistical software (version 4.0.0; The R Foundation). Risk ratios were calculated to compare attack rates by age, sex, and attendance dates. Fisher's exact test was used to calculate two-sided p-values; p-values <0.05 were considered statistically significant.

Overall, 94 persons attended church A events during March 6–11 and might have been exposed to the index patients or to another infectious patient at the same event; among these persons, 92 were successfully contacted and are included in the analysis. Similar proportions of church A attendees were aged ≤18 years (35%), 19–64 years (35%), and ≥65 years (30%) (Table 1). However, a higher proportion of adults aged 19–64 years and ≥65 years were tested (72% and 50%, respectively), and received positive test results (59% and 50%), than did younger persons. Forty-five persons were tested for SARS-CoV-2, among whom 35 (77.8%) received positive test results (Table 2).

During the investigation, two church A participants who attended the March 6–8 children's event were found to have had onset of symptoms on March 6 and 7; these represent the primary cases and likely were the source of infection of other church A attendees (Figure). The two out-of-state guests developed respiratory symptoms during March 9–10 and later received diagnoses of laboratory-confirmed COVID-19, suggesting that exposure to the primary cases resulted in their infections. The two primary cases were not linked except through the church; the persons lived locally and reported no travel and had no known contact with a traveler or anyone with confirmed COVID-19. Patient interviews revealed no additional common exposures among church attendees.

The estimated attack rate ranged from 38% (35 cases among all 92 church A event attendees) to 78% (35 cases among 45 church A event attendees who were tested for SARS-CoV-2). When stratified by age, attack rates were significantly lower among persons aged ≤18 years (6.3%–25.0%) than among adults aged 19–64 years (59.4%–82.6%) (p<0.01). The risk ratios for persons aged ≤18 years compared with those for persons aged 19–64 years were 0.1–0.3. No severe illnesses occurred in children. Among the 35 persons with laboratory-confirmed COVID-19, seven (20%) were hospitalized; three (9%) patients died.

At least 26 additional confirmed COVID-19 cases were identified among community members who, during contact tracing, reported contact with one or more of the 35 church A members with COVID-19 as an exposure. These persons likely were infected by church A attendees. Among these 26 persons, one was hospitalized and subsequently died. Thus, as of April 22, 61 confirmed cases (including eight [13%] hospitalizations and four [7%] deaths) had been identified in persons directly and indirectly associated with church A events.

Discussion

This investigation identified 35 confirmed COVID-19 cases among 92 attendees at church A events during March 6–11; estimated attack rates ranged from 38% to 78%. Despite canceling in-person church activities and closing the church as soon as it was recognized that several members of the congregation had become ill, widespread transmission within church A and within the surrounding community occurred. The primary patients had no known COVID-19 exposures in

TABLE 1. Demographic characteristics, church A event attendance, and SARS-CoV-2 testing status of persons who attended church A events where persons with confirmed COVID-19 (N = 92) also attended — Arkansas, March 2020

Characteristic	All attendees No. (%)*	No. (%) tested†	p-value§	No. (%) who tested positive†	p-value§
Total	**92 (100)**	**45 (49)**	—	**35 (38)**	—
Age group (yrs)					
≤18	32 (35)	8 (25)	0.001	2 (6)	0.004
18–64	32 (35)	23 (72)		19 (59)	
≥65	28 (30)	14 (50)		14 (50)	
Sex					
Male	44 (48)	22 (50)	1.0	17 (39)	1.0
Female	48 (52)	23 (48)		18 (38)	
Church A event attendance					
Weekend only (Mar 6–8)	64 (70)	33 (52)	0.28	28 (44)	0.16
Bible study only (Mar 11)	9 (10)	2 (22)		1 (11)	
Both weekend and Bible study	19 (21)	10 (53)		6 (32)	

Abbreviation: COVID-19 = coronavirus disease 2019.
* Includes all persons who were confirmed to have attended church A events during March 6–11; percentages are column percentages.
† Percentage of attendees (row percentages).
§ Calculated with Fisher's exact test.

TABLE 2. Estimated attack rates of COVID-19 among attendees at church A events — Arkansas, March 6–11, 2020

	All Mar 6–11 church A attendees (lower bound)			All tested Mar 6–11 church A attendees (upper bound)		
Characteristic	**No. of cases/no. exposed (%)**	**Risk ratio (95% CI)**	**p-value**	**No. of cases/no. tested (%)**	**Risk ratio (95% CI)**	**p-value**
Overall	**35/92 (38.0)**	—	—	**35/45 (77.8)**	—	—
Age group (yrs)						
≤18	2/32 (6.3)	0.1 (0.03–0.4)	<0.001	2/8 (25.0)	0.3 (0.1–1.0)	0.003
19–64	19/32 (59.4)	Referent	—	19/23 (82.6)	Referent	—
≥65	14/28 (50.0)	0.8 (0.5–1.3)	0.47	14/14 (100.0)	1.2 (1.0–1.5)	0.10
Sex						
Male	17/44 (38.6)	1.0 (0.6–1.7)	0.91	17/22 (77.3)	1.0 (0.7–1.3)	0.94
Female	18/48 (37.5)	Referent	—	18/23 (78.3)	Referent	—
Church A event attendance						
Weekend only (Mar 6–8)	28/64 (43.8)	1.4 (0.7–2.8)	0.3	28/33 (84.8)	1.4 (0.8–2.4)	0.09
Bible study only (Mar 11)	1/9 (11.1)	0.4 (0.05–2.5)	0.25	1/2 (50.0)	1.7 (0.4–6.8)	0.21
Both weekend and Bible study	6/19 (31.6)	Referent	—	6/10 (60.0)	Referent	—

Abbreviations: CI = confidence interval; COVID-19 = coronavirus disease 2019.

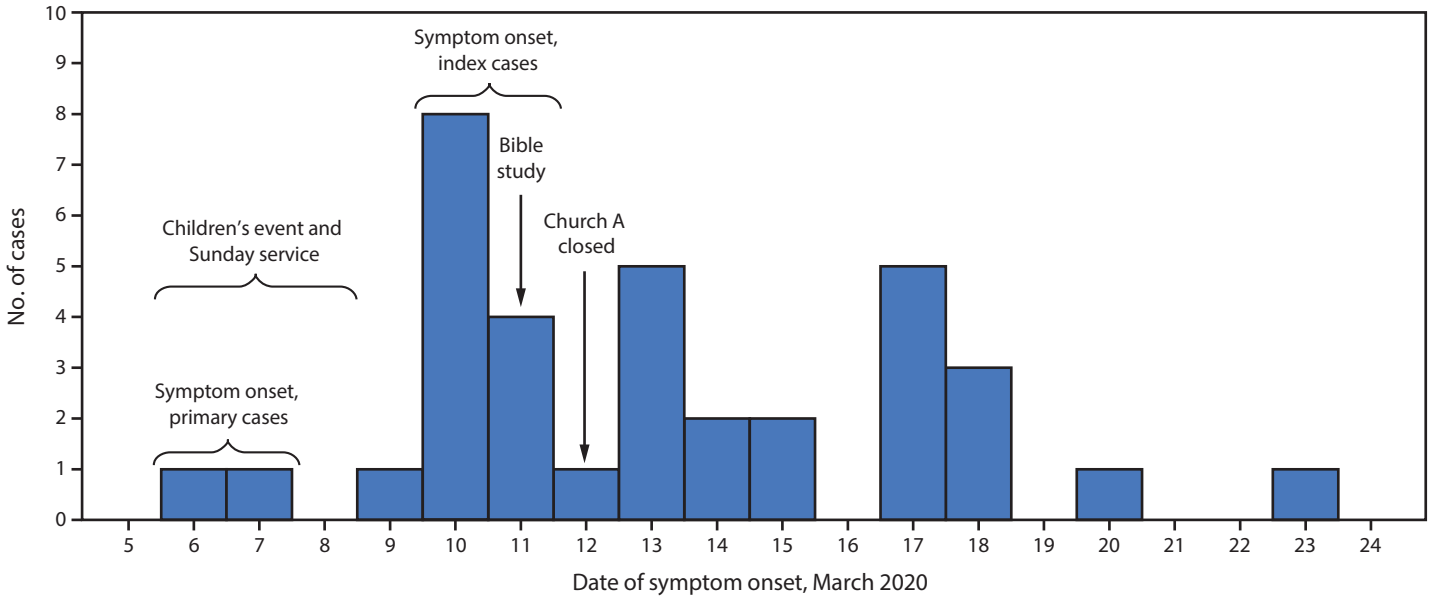
the 14 days preceding their symptom onset dates, suggesting that local transmission was occurring before case detection.

Children represented 35% of all church A attendees but accounted for only 18% of persons who received testing and 6% of confirmed cases. These findings are consistent with those from other reports suggesting that many children with COVID-19 experience more asymptomatic infections or milder symptoms and have lower hospitalization rates than do adults (*4*,*5*). The role of asymptomatic or mildly symptomatic children in SARS-CoV-2 transmission remains unknown and represents a critical knowledge gap as officials consider reopening public places.

The risk for symptomatic infection among adults aged ≥65 years was not higher than that among adults aged 19–64 years. However, six of the seven hospitalized persons and all three deaths occurred in persons aged ≥65 years, consistent with other U.S. data indicating a higher risk for COVID-19–associated hospitalization and death among persons aged ≥65 years (*6*).

The findings in this report are subject to at least four limitations. First, some infected persons might have been missed because they did not seek testing, were ineligible for testing based on criteria at the time, or were unable to access testing. Second, although no previous cases had been reported from this county, undetected low-level community transmission was likely, and some patients in this cluster might have had exposures outside the church. Third, risk of exposure likely varied among attendees but could not be characterized because data regarding individual behaviors (e.g., shaking hands or hugging) were not collected. Finally, the number of cases beyond the cohort of church attendees likely is undercounted because tracking out-of-state transmission was not possible, and patients might not have identified church members as their source of exposure.

FIGURE. Date of symptom onset* among persons with laboratory-confirmed cases of COVID-19 (N = 35) who attended March 6–11 church A events — Arkansas, March 6–23, 2020



Abbreviation: COVID-19 = coronavirus disease 2019.
* One asymptomatic person who had a positive test result is included on the date of specimen collection (March 18).

High transmission rates of SARS-CoV-2 have been reported from hospitals (*7*), long-term care facilities (*8*), family gatherings (*9*), a choir practice (*10*), and, in this report, church events. Faith-based organizations that are operating or planning to resume in-person operations, including regular services, funerals, or other events, should be aware of the potential for high rates of transmission of SARS-CoV-2. These organizations should work with local health officials to determine how to implement the U.S. Government's guidelines for modifying activities during the COVID-19 pandemic to prevent transmission of the virus to their members and their communities (*2*).

Acknowledgments

Members of the congregation of church A, including the pastor and his wife; Arkansas Department of Health; Suzanne Beavers, CDC; Laura Rothfeldt, Arkansas Department of Health; state and local health departments where out-of-state visitors resided.

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[1]Arkansas Department of Health; [2]Epidemic Intelligence Service, CDC; [3]COVID-19 Response Team, CDC.

All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. No potential conflicts of interest were disclosed.

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THIS IS EXHIBIT "14" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

14

COVID-19

Infection Prevention and Control Guidance for Personal Care Homes

This document is informed by currently available scientific evidence and expert opinion and is subject to change as new information becomes available.

Please refer regularly to Manitoba's Provincial COVID-19 Resources for Health-Care Providers and Staff at https://sharedhealthmb.ca/covid19/.

Note: As this outbreak evolves, there will be continual review of emerging evidence to understand the most appropriate measures to take.

This document provides guidance specific to the COVID-19 pandemic in PCHs. Individuals responsible for implementation and oversight of infection prevention and control (IP&C) measures at specific PCHs should be familiar with relevant IP&C background documents on Routine Practices and Additional Precautions.

Individuals responsible for implementation and oversight of occupational and environmental health and safety measures should be aware of occupational health and safety legislation. The term "staff" is intended to include anyone working in PCHs, including but not limited to health care workers.

Table of Contents

Highlights

Important measures to prevent the introduction and spread of COVID-19 in Personal Care Homes (PCHs):

All staff must work proactively to identify suspect or confirmed cases of COVID-19 in staff, residents, and any visitors/volunteers. Staff and residents with symptoms should be tested, staff self-screening must be conducted prior to every shift and all permitted visitors must be screened for symptoms, exposure and travel history prior to entry.

- All staff will use Droplet/Contact precautions with Airborne precautions for Aerosol Generating Medical Procedures (AGMPs) in addition to Routine Practices, for all care of residents with suspected or confirmed COVID-19.

- Training and monitoring of all staff and permitted visitors/volunteers for compliance with the Personal Protective Equipment (PPE) requirements for long term care, as well as appropriate donning and doffing protocols to minimize the risk of contamination. Staff must support visitors/volunteers in appropriate use of PPE.

- Training of all staff and visitors/volunteers permitted on other IP&C measures such as proper hand hygiene and the importance of maintaining a 2-metre spatial distance between residents, and other staff during breaks, etc.

- Environmental cleaning and disinfection practices are monitored for compliance
    - Frequent cleaning and disinfection of regularly used surfaces, recreation equipment, electronics and other personal belongings with a facility-approved disinfectant.

- Adherence to the "Single Site Restriction" for staff who work at licensed PCHs.

- Management of Visitors as per Shared Health guidance. Guidelines for Exceptions to Visitor Restrictions to Health Facilities should be followed.

- All permitted visitors must be screened prior to entry as per Shared Health recommendations for signs/symptoms of COVID-19 prior to entry.

- Signage must be posted at all entry locations to indicate visitor restrictions and screening requirements:
    - Shared Health LTC-Poster-Letter-Size
    - Shared Health COVID-19-Screening-Questions-Poster

- Exploration of alternate mechanisms for interactions between residents and other individuals (e.g., video call on cell phones or tablets).

Background

In December 2019, a cluster of cases of pneumonia of unknown origin was reported from Wuhan, Hubei Province in China. On January 10, 2020, a novel coronavirus, causing a disease now referred to as COVID-19 was identified as the cause of this cluster of pneumonia cases. A pandemic was declared on March 11, 2020.

Over the last few months, our understanding of COVID-19 has rapidly expanded, for example:

- Person-to-person transmission is occurring in Canadian communities.
- COVID-19 is most commonly spread from an infected person through respiratory droplets generated through cough or sneezing, close personal contact such as touching or shaking hands, or touching something with the virus on it and then touching your mouth, nose or eyes before washing your hands.
- COVID-19 can also be spread through the air during Aerosol Generating Medical Procedures.

PCH residents are vulnerable to infection with COVID-19 due to behavioral factors, shared spaces, and transit between other healthcare facilities. Older adults and those with pre-existing medical conditions are also at risk for more severe disease and have higher mortality when infected with COVID-19.

Introduction

Coronaviruses can cause illness in humans and in animals. Sometimes an animal coronavirus can cause illness in a human. Common coronaviruses that infect humans usually cause mild symptoms similar to the common cold. COVID-19 is a new strain of the virus that has not been previously identified in humans.

On March 22, 2020, the Manitoba government declared a province-wide state of emergency to elevate Manitoba's response to this pandemic. The invocation of a state of emergency was made to equip the Manitoba government with the full range of resources needed to mitigate the impact of COVID-19.

Symptoms of COVID-19

Prompt identification of all persons with signs and symptoms of possible COVID-19 is required. Refer to the Screening Tool for Public Health and Health Links Staff or the COVID-19 Online Screening Tool.

Older people and those living with chronic health conditions appear to be more vulnerable to becoming severely ill.

At this time, there is no vaccine to prevent the spread of COVID-19. There are no specific treatments for coronavirus illnesses.

Most people with COVID-19 will have mild symptoms and get better on their own. Some individuals, however, may require medical treatment and supportive care (e.g. supplementary oxygen).

Infection Prevention and Control

PCH operators must ensure:

1. Up to date awareness of data on the local and provincial spread of COVID- 19. https://www.gov.mb.ca/covid19/updates/index.html.

2. Awareness of and adherence to Manitoba's Provincial Personal Protective Equipment Requirements.

3. Staff receive ongoing training and monitoring of compliance with Routine Practices, including hand hygiene, and implementation of additional precautions, including Droplet/Contact precautions with Airborne precautions for AGMPs. Refer to: https://www.gov.mb.ca/health/publichealth/cdc/docs/ipc/rpap.pdf.

    - Staff IP&C training, testing and monitoring for compliance and education must be in place, tracked, recorded, and kept up-to-date.

4. AGMPs are only performed if deemed medically necessary and according to Provincial guidance: https://sharedhealthmb.ca/files/agmps-and-long-term-care.pdf.

5. An updated list of AGMPs is available at https://sharedhealthmb.ca/files/aerosol-generating-medical-procedures-AGMPs.pdf. If AGMPs are performed, please note the following:

    - There is to be appropriate training and N95 respirator fit-testing for all staff who may be required to participate in or who may be exposed to these procedures.
    - The fewest staff necessary to perform the procedure should be present.
    - These procedures should be performed in an Airborne Infection Isolation Room where available, or a single room with the door closed.

6. Procedures are in place to prevent the introduction of COVID-19 into PCHs, and to prevent and control the spread of infection if identified and informed by regional and/or provincial recommendations. This includes procedures to:
    - Communicate with staff, residents and families on COVID-19 updates.
    - Limit access points and conducting entrance screening at all access points.
    - Restrict visitors.

7. A Point of Care Risk Assessment (PCRA) is conducted by all staff prior to any interaction with a resident:
    - Prior to any resident interaction, all staff have a responsibility to assess the infectious risks posed to themselves, other staff, other residents and essential visitors/volunteers from a resident, situation or procedure.
    - The PCRA should be applied before every clinical encounter regardless of COVID-19 status and is based on staff's professional judgment (e.g. knowledge, skills, reasoning and education) regarding the likelihood of exposing themselves and/or others to infectious agents (e.g. COVID-19), for a specific interaction, a specific task, with a specific resident, and in a specific environment, under available conditions.

- The PCRA helps staff select the appropriate actions and/or PPE to minimize the risk of exposure to known and unknown infections (e.g. asking oneself, “Will I be in contact with body fluids?”).

8. Routine scheduled and additional environmental cleaning occurs with attention paid to high touch, high risk surfaces (e.g. bed rails, bed headboard and footboard, chair arms, light switches, hand and support rails, toilets, sinks and grab rails, shower chairs, call bell cords and buttons, telephones, white boards).
9. Responsibility for cleaning and disinfection of resident care equipment is identified.
10. Proper cleaning, disinfection, and disposal of PPE occurs.
11. Review of scheduling and restriction of staff work assignments to specific units or areas occurs wherever feasible and safe. This is intended to limit potential spread within facilities, even before COVID-19 is detected in a PCH, with capacity to acquire necessary staffing.
12. Active screening of residents and visitors/volunteers for signs or symptoms of COVID-19 occurs.
13. A plan for how to manage resident or staff exposures, symptoms, or confirmed COVID-19 is in place as per Infection Prevention and Control (IP&C) and Occupational and Environmental Safety & Health (OESH) guidelines.
14. A plan for how to safely transport residents within and outside of PCH when necessary exists.
15. Residents, staff and visitors/volunteers should be provided with printed or posted information about COVID-19, how the virus causes infection, and how to protect themselves and others, including:
    - The importance of hand hygiene and how to wash hands and how to use alcohol-based hand rub (ABHR).
    - Instructions on appropriate respiratory hygiene (e.g. covering their cough with a tissue or coughing into their elbow followed by performing hand hygiene).
    - Posters illustrating the current methods for putting on and removing required PPE placed inside and outside of resident rooms for easy visual cues.
    - Instructions on how and where to dispose of used supplies.
16. There should be regular assessment to determine stock of necessary PPE (e.g. gloves, gowns, masks, face or eye protection) and clinical supplies including nasopharyngeal swab kits.
17. PPE must be securely stored while not hindering staff’s access to PPE.
18. Coordinated procurement of supplies to maximize access occurs.
19. Appropriate number and placement of ABHR dispensers should be in place, in hallways, at the entry to each resident room, in communal areas and at point of care for each resident.
20. Respiratory hygiene products (e.g. masks, tissues, ABHR, no-touch waste receptacles) are to be available and easily accessible to staff and residents.

21. Environmental cleaning and disinfection practices are to be monitored for compliance.

22. Appropriately clean and disinfect essential items (e.g., dentures, hearing aids) upon arrival. Personal/Other Items (e.g. food, plants, flowers, newspapers, cards, and books) are permitted but must be dedicated to the intended resident only and not shared amongst residents. Staff must ensure hand hygiene before and after interaction with items and maintain physical distancing (maintaining 2 meters spatial separation) at the hand off.

23. Physical distancing measures are utilized for staff wherever feasible, and while providing safe care.

24. Physical distancing measures (e.g. use of single rooms when available, maintaining 2 meters spatial separation between residents in hallways, all recreation, activity, dining or other communal areas) are utilized for all residents.

25. All residents with suspect or confirmed COVID-19 are immediately placed into Droplet/Contact precautions with Airborne precautions for AGMPs for all staff or visitors/volunteers who enter the resident room or who are within 2 metres of resident until COVID-19 or other respiratory infection is ruled out.

26. All residents with suspect or confirmed COVID-19 infection, or high-risk contacts[1] of a confirmed COVID-19 positive person, are cared for in a single room with a dedicated toilet and sink dedicated to their use. Where this is not possible, a 2-metre separation **must** be maintained between the bed spaces of the affected residents and all roommates with privacy curtains drawn.

27. Signage indicating Droplet/Contact precautions with Airborne precautions for AGMPs is placed on the outside of rooms or areas where resident(s) with suspected or confirmed COVID-19 are located.

28. Where required, N95s for performing AGMPs (according to https://sharedhealthmb.ca/files/agmps-and-long-term-care.pdf), may be worn across zones (Green, Orange, Red). Extend use of N95s for repeat encounters with multiple residents (except intubation).

29. Strategies are developed to manage a high volume of residents with COVID- 19 (e.g. cohorting staff to work only with suspect or confirmed).

30. Waste, soiled linen and the care environment are managed and/or adequately cleaned and disinfected according to PCH policies and procedures.

PCH operators should ensure staff are:

31. Adhering to PCH IP&C policies and procedures and public health guidance.

32. Self-monitoring for new signs or symptoms and immediately report any new symptoms, including not reporting to work if symptoms exist.

[1] Any person, such as a health-care provider, family member/caregiver, or anyone else who had prolonged contact with or provided care to a probable or confirmed COVID-19 person.

33. Prior to working every shift, staff must report to PCH management if they have had potential exposure to a case of COVID-19 in order to determine whether restrictions are necessary. Staff should also consult with their own healthcare provider for any needed follow-up.

34. Staff must be knowledgeable about:

- How to conduct a PCRA prior to all interactions to determine what IP&C measures are needed to protect residents and themselves from infection.
- Where to get tested if they become symptomatic or if requested by local public health authorities or the PCH.
- Routine Practices followed for all resident interactions, e.g. hand hygiene.
- The use and limitations of the specific PPE available for their use.
- Programs to conserve PPE.

Screening

PCHs shall minimize access points and ensure:

- Screening of all residents, visitors/volunteers and contractors or outside care providers is conducted at all PCH access points, with signage, and assessment for symptoms or known exposure to COVID-19 prior to entry.

- Signage (multilingual as required) is available on Shared Health Website and is posted at access points instructing staff, essential visitors/volunteers regarding screening and visitor restriction: Shared Health COVID-19-Staff Screening-Questions-Poster.

- Masks, tissues, alcohol-based hand rub and a no-touch waste receptacle are available for staff, resident, and essential/compassionate visitors at screening at each entrance.

Staff

Refer to Shared Health guidelines for staff screening:

- https://sharedhealthmb.ca/covid19/providers/
- Guiding principles for sustainable staff screening
- Staff screening tool
- Staff screening FAQs
- Self-isolation letter

Residents

Resident screening must begin prior to admission. Following admission, it should include daily assessment for symptoms of COVID-19. Residents with signs or symptoms or potential exposures to COVID-19 should be immediately isolated, and if symptomatic tested for COVID-19. Symptoms in elderly residents may be subtle or atypical, and screening staff should be sensitive to detection of changes from resident baseline.

Managing Visitors

All entrants to health facilities in Manitoba, including visitors, must be screened for COVID-19 risk factors upon entry each time they attend a facility. They must also follow appropriate Public Health recommendations including hand washing, infection control practices and social distancing.

Refer to the **Screening Tool**, https://sharedhealthmb.ca/files/covid-19-visitor-triage-process-for-long-term.pdf.

Visitor restrictions are designed to reduce the number of individuals that enter facilities in order to limit the risk of exposure to COVID-19 to staff and to residents.

In collaboration with Public Health, Operators of Health Facilities throughout Manitoba will adhere to the **Long Term Care Resident Visitation Principles** (https://sharedhealthmb.ca/files/covid-19-pch-visitation-principles.pdf) and Current Screening Requirements that align with the presence and transmission of the COVID-19 virus.

Resident Care and Infection Control Measures

Routine Practices apply to all staff and residents, at all times, in all PCHs and include but are not limited to:

- Conducting a PCRA.
- Hand hygiene.
- Appropriate use of PPE.
- Adhering to respiratory hygiene (i.e., covering a cough with a tissue or coughing into elbow followed by performing hand hygiene).

Hand Hygiene

Staff are required to perform the following hand hygiene:

- On entry to and exit from the PCH.
- Before and after contact with a resident, regardless of whether gloves are worn.
- After removing gloves.
- Before and after contact with the resident's environment (e.g. medical equipment, bed, table, door handle) regardless of whether gloves are worn.
- Any other time hands are potentially contaminated (e.g. after handling blood, body fluids, bedpans, urinals, or wound dressings).
- Before preparing or administering all medications or food.
- Before performing aseptic procedures.
- Before donning on PPE and doffing of PPE according to the facility procedure for donning or doffing PPE.

- After other personal hygiene practices (e.g. blowing nose, using toilet facilities, etc.).

Train visitors/volunteers to perform hand hygiene; they are expected to perform hand hygiene under the same circumstances outlined above for staff.

Train residents to perform hand hygiene and assist with this if they are physically or cognitively unable. **Residents should perform the following hand hygiene**:

- Upon entering or leaving their room.
- Prior to eating, oral care, or handling of oral medications.
- After using toileting facilities.
- Any other time hands are potentially contaminated (e.g. after handling blood, body fluids, bedpans, urinals, wound dressings, or tissue, use of bathroom, etc.).

Hands may be cleaned using alcohol based hand rub (ABHR) containing 60-90% alcohol, or soap and water. Washing with soap and water is preferable immediately after using toilet facilities, if hands are visibly soiled, when caring for a resident with norovirus or *Clostridioides difficile* infection, or during an outbreak of norovirus or *Clostridioides difficile*.

Masking for all staff providing or participating in resident care, and any visitors/Volunteers

Given the rapid increase in community spread of COVID-19 within Canada and increasing evidence transmission may occur from those who have few or no symptoms, masking for the full duration of shifts or visits for all PCH staff and any /volunteers is required.

The rationale for full-shift masking of PCH staff and volunteers is to reduce the risk of transmitting COVID-19 infection from staff or /volunteers to residents or other PCH staff, at a time when no symptoms of illness are recognized, but the virus can be transmitted. Staff must support/volunteers to ensure appropriate use of masks. Refer to **Long Term Care Resident**

Visitation Principles for masking requirements for the visitors:
https://sharedhealthmb.ca/files/covid-19-pch-visitation-principles.pdf

Staff and volunteers will perform hand hygiene before they don a mask, after doffing, and prior to putting on a new mask. They shall not touch the front of mask while wearing it, nor allow it to dangle under the chin, off the ear, under the nose, or place on top of the head. Wear masks as outlined in the provincial guidelines for long term care.

Generally, it is a foundational concept in IP&C practice that masks should not be re-worn. However, in the context of the COVID-19 pandemic and PPE supply chain management conservation follow the provincial guidance with regard mask use, reuse, and reprocessing.

Mask reuse shall follow the provincial guidance for the removal, storage and extended wear of face masks.

Dispose of masks and replace when they become wet, damp, or soiled (from the wearer's breathing or external splash). Inform staff how to access additional masks if needed.

Droplet and contact precautions

Remove PPE (except mask and eye protection when extended use during all shifts is practiced) in the correct order and discard prior to exiting the resident's room or entering the anteroom in the nearest no-touch waste receptacle.

Implement Droplet/Contact precautions for all residents presenting with new signs or symptoms of possible COVID-19.

Hand hygiene should occur according to Routine Practices and as required for donning and doffing PPE.

Gloves, long-sleeved cuffed gown (covering front of body from neck to mid-thigh), mask and face or eye protection (which should already be worn due to PPE framework) should be worn upon entering the resident's room or when within 2 meters of the resident on Droplet/Contact precautions.

Examples of face or eye protection (in addition to mask) include:

- Full face shield.
- Mask with attached visor.
- Safety glasses or goggles (regular eyeglasses are not sufficient).

Ensure the area where PPE is put on is separated as much as possible from the area where it is removed and discarded.

Aerosol-Generating Medical Procedures (AGMPS)

An AGMP is any medical procedure that can induce production of aerosols of various sizes, including droplet nuclei. AGMPs are rarely performed in PCH, though a potential example in this setting may include use of non-invasive positive pressure ventilation (CPAP) machines.

Follow the provincial guidance on AGMPs in LTC or other procedures that require the use of Airborne in addition to Droplet/Contact precautions.

Only perform AGMPs on a resident suspected or confirmed to have COVID-19 if:

- It is medically necessary and performed by the most experienced person.
- The minimum number of persons required to safely perform the procedure are present.
- All persons in the room are wearing a fit-tested, seal-checked N95 respirator, gloves, gown and face or eye protection.
- The door of the room is closed.
- Entry into a room of a patient is minimized.

Admissions/Re-Admissions

Screen new admissions/re-admissions for signs or symptoms or potential exposure to COVID-19, even if asymptomatic. A re-admission is considered to be any stay in hospital longer than 24 hours. This includes any stay in an Emergency Department longer than 24 hours. Give all new residents a mask during transfer and preferentially admit to a single room if available or semi-private with curtains drawn between beds, maintaining at least 2 metres between residents.

To better understand how COVID-19 is spreading in Manitoba, Public Health officials are conducting surveillance testing of people without symptoms of COVID-19 (asymptomatic people). Expanding the testing criteria to monitor the spread in people without symptoms will help officials monitor transmission of COVID-19 in Manitoba, particularly as social (physical) distancing measures are lifted. New evidence on the spread of COVID-19 suggests that infected people may spread the virus without experiencing symptoms (*asymptomatic transmission)* or just before they develop symptoms *(presymptomatic* transmission). To further enhance early detection of cases in PCH's, testing is recommended for all new admissions and readmissions.

Asymptomatic new admissions/re-admissions from Green Zones of Health Care facilities do not require isolation after arrival in the facility. However, those admitted/readmitted from community should remain in their room for 14 days after arrival in the facility as much as possible, including eating their meals in their room. They should not participate in any group activities or meals during this period.

Green Zone PPE is indicated and testing an asymptomatic individual does not indicate additional PPE is required. Droplet/Contact and Airborne precautions are not required for asymptomatic new admissions/readmissions unless exposure criteria have been met. If a new admission/readmission becomes symptomatic they will need to be re-tested and at that time would be treated as a suspect case and would require Droplet/Contact precautions.

NOTE: There are no restrictions to admitting COVID-19 recovered patients to either green units or ones with orange/red residents. This decision can be based on bed availability. Additionally, residents recovered from COVID-19 infection do not require the 14 day quarantine (or isolation) period.

Note, In an event of **Pandemic Response System Level RED (CRITICAL)**

All new admissions/re-admissions require 14 day quarantine after arrival in the facility. Individuals should remain in their room as much as possible for the full 14 days. During this time frame, individuals who are in quarantine should not participate in any group activities, including meals. Meals should be eaten in their room.

NOTE: The calculation of the 14 day time frame may include days spent in isolation in another facility/setting prior to transfer.

Quarantine refers to time spent in a facility where the following are in place:

- staff are wearing universal PPE at all times; and
- no exposures occurred (e.g. no new staff positive and unprotected exposure, no new patients/residents/clients and unprotected exposure); and

- individual did not have a roommate/was in a private room; and
- individual was restricted to their room with the exception of departure for medically necessary procedures/appointments.

Green Zone PPE is indicated and testing an asymptomatic individual does not indicate additional PPE is required.

Droplet/Contact and Airborne precautions are not required for asymptomatic new admissions/readmissions unless exposure criteria have been met.

If a new admission/readmission becomes symptomatic they will need to be re-tested and at that time would be treated as a suspect case and would require Droplet/Contact precautions.

For all new admissions follow these guidelines:

- Continue admissions to PCH units/sites with no suspected/confirmed outbreak per the usual regional process considering screening/testing/isolation requirements, regardless of new resident COVID-19 status.

- Do not admit to PCH units/sites with suspected/confirmed outbreaks unless the new resident is already confirmed COVID-19 positive or recently (within previous 3 months) deemed recovered. If positive, isolate for 10 days from symptom onset and/or until 72 hours after symptoms resolved, whichever is longer.

  Droplet/Contact precautions plus Airborne precautions for AGMPs must be implemented. Consult with IP&C/designate prior to discontinuation of the precautions.

- If a resident is transferred from a unit with a known outbreak of COVID-19 or is a known contact of a COVID-19 case, Droplet/Contact precautions plus Airborne precautions for AGMPs must be implemented for 14 days. If the resident becomes symptomatic, isolate for 10 days from symptom onset and/or until 72 hours after symptoms resolved, whichever is longer.

- These residents should be met by a health care worker wearing PPE and immediately escorted to a single room or a space where at least 2 metres between residents can be ensured.

- In PCHs where it is not possible to maintain physical distancing of staff or residents from each other, manage all residents or staff as if they are potentially infected, and use Droplet/Contact precautions with Airborne precautions for AGMPs when in an area affected by COVID-19.

- Support resident physical, social and emotional well-being when isolated. Consider use of one-on-one programs, as well as technology, to allow resident contact with family and friends.

Testing

Testing of Symptomatic Residents

Immediately collect a nasopharyngeal (NP) specimen from any symptomatic resident for COVID-19 testing. Decisions regarding how many residents would be tested in an outbreak should be made in consultation with the Medical Officer of Health (MOH) and IP&C. Consideration will be made if other respiratory viruses are prevalent in the community and require testing.

- In addition to routine investigations relevant to the resident's symptoms and care, testing for COVID-19 requires a nasopharyngeal (NP) swab placed in viral transport medium or NP aspirate. If such a specimen is being collected for ILI or presumed viral respiratory tract infection, a second swab is not required.

- Clearly identify on the Cadham Laboratory General Requisition: contact of a case or other relevant screening criteria (e.g. resident lives in a PCH), relevant symptoms, and request for COVID-19.

- Additional laboratory testing for other respiratory viruses may also be done. Positive results will be reported to Public Health and IP&C.

Testing of Asymptomatic Residents

Any person who is admitted or readmitted to a PCH who is asymptomatic will receive COVID-19 testing. A health care provider at the PCH will collect a nasopharyngeal swab (NP). Clearly mark the lab requisition with "Asymptomatic Surveillance" and send it to the laboratory for testing. A resident may refuse this asymptomatic testing and still be admitted into the PCH.

If the new admission's test comes back as COVID-19 positive, they should be isolated for 10 days from the specimen collection date. These individuals will be treated as a COVID-19 case, and Droplet/Contact precautions plus Airborne precautions for AGMPs must be implemented. Please see the Outbreak Management section for more information.

Please note, criteria for testing will continue to change as Manitoba's response to COVID-19 evolves. Check Shared Health for updates.

For PCH residents, fever = temperature 37.8°C or greater; some resources suggest that repeated oral temperatures >37.2°C or rectal temperatures >37.5°C or an increase in temperature of >1.1°C over baseline represent fever in older adults.

Specimen Collection Process

Follow Routine Practices as well as Droplet/Contact precautions with Airborne Precautions for AGMPs at all times when handling specimens.

Process includes:

- Assemble all supplies outside of the isolation space:
    - Dedicate specimen collection equipment to the specific patient.
    - Do not take phlebotomy trays/carts into the room/space.

    - Plan and take all required equipment into the room at the start of the procedure after donning PPE.
- Perform hand hygiene.
- Don personal protective equipment.
- Collect one nasopharyngeal (NP) swab placed in viral transport medium in addition to routine investigations. Refer to Video.
- Doff gloves and gown.
- Perform Hand Hygiene.
- Exit room/space.
- Deposit specimen(s) into an impervious, sealable bag immediately following removal from the resident room. Each site might vary in the process of how to achieve this step, with the goal to ensure the outside of the bag does not become contaminated.
- Perform hand hygiene.

COVID-19 Vaccination

Vaccination of PCH residents will be completed either by clinical staff working within the PCH or by provincial immunization teams which have been created to administer first and second vaccination does at sites throughout the province. In both instances, vaccination of PCH residents will require the consent form to be completed.

According to the National Advisory Committee on Immunization (NACI), individuals that are immunosuppressed, due to disease, treatment or who have an autoimmune disorder should consult with their primary care provider about the risks and benefits of receiving this vaccine.

If a risk assessment deems that the benefits of the vaccine outweigh the risk, and if informed consent from the resident/substitute decision maker includes discussion about the insufficient evidence with this population, then the COVID-19 vaccination series may be administered.

Admissions to PCH will not be dependent on if the new resident has received their immunization. The quarantine requirements upon admission are the same regardless of whether or not the new resident has been immunized.

Residents admitted between the two (2) scheduled doses may be able to receive their first dose when the team arrives to administer the second dose. It is preferred that the site arrange for the second dose to be administered however, it this is not possible, there is benefit to the resident if they are only able to receive a single dose of the vaccine as some immunity will be present.

Families of residents panelled and waiting PCH placement may chose to take the resident to a super-centre for immunization prior to admission if that age cohort is eligible to receive the vaccine. The same brand of vaccine is required for both the first and second doses, therefore, the new resident must also attend the super-centre for the second dose as well.

All Public Health and Infection Prevention and Control guidance must continue to be followed regardless of the vaccination status of the resident.

Outbreak Management

For COVID-19, a single case in resident or staff is considered an outbreak. A single suspected case of COVID-19 is justification to apply outbreak measures to a unit or facility. Please refer to Manitoba Coronavirus/Interim Guidance for specific definitions.

If a result comes back as COVID-19 positive, the resident should be isolated in their room for 10 days from symptom onset and/or until 72 hours after symptoms resolve, whichever is longer. Droplet/Contact precautions plus Airborne precautions for AGMPs must be implemented. Consult with IP&C/designate prior to discontinuation of the precautions.

Contact tracing of individuals (staff and residents) with potential exposure to the case will be immediately undertaken in consultation with regional IP&C staff and/or public health. For staff testing and return-to-work policies for staff with suspected or confirmed COVID-19 whose symptoms have resolved, refer to the Occupational and Environmental Safety and Health (OESH) guidance.

To identify additional cases of COVID-19, PCHs must test all individuals who have symptoms compatible with COVID-19. In some cases, testing of asymptomatic residents may be recommended. Regional IP&C staff in consultation with Medical Officer of Health can provide guidance on this, as well as on documentation and communication protocols related to the outbreak. Staff should initiate and maintain a line list listing of residents with suspected or confirmed COVID-19.

Outbreak management strategies include:

- Immediate isolation of residents with signs or symptoms or potential exposures to COVID-19 on Droplet/Contact precautions plus Airborne precautions for AGMPs.
- Notification of the transferring hospital and local public health authorities if a resident develops symptoms and/or is diagnosed with COVID-19 within 14 days of admission from the community or transfer from another facility.
- Determination of applying outbreak precautions to the affected unit or entire PCH based on knowledge of the PCH and staffing, and in accordance with provincial public health guidance and directives.
- Increased frequency of cleaning and disinfecting with a focus on high-touch surfaces.
- Further restriction of movement of residents within the PCH, with discontinuation of all non-essential activities, including communal activities.
- Arranging for the use of portable equipment to help avoid unnecessary resident transfers (e.g. portable x-rays), while ensuring it is cleaned and disinfected between residents.
- New resident admissions are generally not recommended in the context of an outbreak of COVID-19.
- Increased frequency of active screening for COVID-19 symptoms in residents.
- Reviewing and reinforcing visitor restrictions.
- Consultation with their regional IPC staff regarding resident and staff cohorting, including the following:
    - Resident cohorting of the well (together) and unwell (together):

        - Utilizing respite and palliative care beds and rooms, or utilizing other rooms as appropriate.
    - Staff cohorting:
        - Designating staff to work with either ill residents or well residents.
        - Staff assignment between multiple units should be limited.
    - When the number of confirmed or suspected COVID-19 cases in a PCH is high, consideration should be given to having dedicated teams of staff specific to residents with suspected or confirmed COVID-19, where feasible, to reduce the risk of further transmitting infection in the PCH.

An outbreak may be declared over after two incubation periods after isolation of the last case (i.e., 28 days with no new COVID-19 HAI cases after last case isolated).

- Where the outbreak involves only staff cases, it may be declared over after two incubation periods following the last positive staff person's last day at work while infectious

Handling Resident Care Equipment

Dedicate all reusable equipment and supplies, electronics, personal belongings, etc., to the use of the resident with suspect or confirmed COVID-19 infection. If use with other residents is necessary, clean and disinfect equipment and supplies with a Facility-Approved-Disinfectant before reuse. Discard items that cannot be appropriately cleaned and disinfected upon resident transfer or discharge, into a no-touch waste receptacle after use.

Environmental Cleaning and Disinfection

Increased frequency of cleaning high-touch surfaces in resident rooms and any central areas is important for controlling the spread of microorganisms during a respiratory infection outbreak; only use a Facility-Approved-Disinfectant.

Clean and disinfect all resident room and central area surfaces, that are considered "high touch" (e.g. telephone, bedside table, over-bed table, chair arms, call bell cords or buttons, door handles, light switches, bedrails, handwashing sink, bathroom sink, toilet and toilet handles and shower handles, faucets or shower chairs, grab bars, outside of paper towel dispenser) **at a minimum of twice daily and when soiled**. Use facility approved disinfectant with the recommended wet contact time to disinfect resident care equipment (e.g. BP cuffs, electronic thermometers, oximeters, stethoscope) after each use.

In addition, perform room cleaning and disinfection at least once daily on all low touch surfaces (e.g. shelves, bedside chairs or benches, windowsills, headwall units, over-bed light fixtures, message or white boards, outside of sharps containers). Keep floors and walls visibly clean and free of spills, dust and debris. Environmental services/Housekeeping staff are to wear PPE as outlined in https://sharedhealthmb.ca/files/ppe-provincial-requirements-inpatient-and-outpatient-settings-cleaning.pdf when cleaning and disinfecting the resident room.

Follow the PCH protocol for cleaning and disinfection of the resident's room after discharge, transfer, or discontinuation of Droplet/Contact precautions. Discard toilet brushes, unused toilet paper and other disposable supplies. Remove and launder privacy curtains upon a resident's discharge or transfer.

At discharge, room transfer or death of a resident, remove any resident-owned items (e.g. clothing, photos, televisions, furniture, cards and ornaments). All items with hard surfaces are to be cleaned and disinfected and placed in a bag for family or representative. While the risk of transmission of COVID-19 via items is likely low, at this time best practice may be for families to store for 5 days prior to handling. If the family wishes to donate any of the resident's items to the

PCH or another resident they must first be thoroughly cleaned and disinfected and meet established regional processes.

Clean and disinfect all surfaces or items outside of the resident room that are touched by, or in contact with staff (e.g. computer carts and/or screens, medication carts, charting desks or tables, computer screens, telephones, touch screens, chair arms) at least daily and when soiled. Staff should ensure that hands are cleaned before touching the above-mentioned equipment.

Linen, Dishes and Cutlery

No special precautions are recommended; Routine Practices are used.

Waste Management

No special precautions are recommended; Routine Practices are used.

Resident Transport Within Site

Only transport residents out of isolation rooms for medically essential purposes.

Notify Transport Services and receiving department in advance of transport regarding Droplet/Contact Precautions with Airborne precautions for AGMPs.

Assist resident to apply a mask and to perform hand hygiene.

Discontinuing Additional Precautions

To discontinue precautions for an asymptomatic COVID-19 suspect resident with known exposure history consult IP&C/designate*. Precautions may be discontinued 14 days from last exposure. If symptoms develop, collect specimen. In this situation, precautions may be discontinued 10 days from symptom onset and 72 hours while asymptomatic must have passed, whichever is longer.

To discontinue precautions for a resident who is COVID-19 positive, consult IP&C/designate. **10** days from symptom onset and 72 hours while asymptomatic must have passed, whichever is longer. Where residents with confirmed COVID-19 infection have been cohorted and one has recovered, the recovered resident may be moved into the Green Zone as required.

COVID19 positive residents may be discharged home positive; they do not have to stay in a facility.

Where there are negative COVID-19 test results in a resident that does not meet the ‘exposure’ criteria OR exposure to a confirmed case of COVID-19 OR in a laboratory working directly with biological specimens that contain COVID-19) in residents with respiratory symptoms:

- Consult IP&C. Resident management maybe adjusted to follow seasonal viral respiratory management protocols (i.e., droplet/contact precautions and discontinuation of precautions when symptom resolve)
- Decisions are based on relevant epidemiological data (i.e., known COVID-19 case(s) in a facility, community or congregated/work setting, or outbreaks). Those with known exposure history (contact, travel, or lab exposure) would not change additional precautions, regardless of swab results.

**IP&C/designate: Person(s) with responsibility for providing IP&C guidance at the site. This may include, but not limited to, ICP, unit manager, educator, director of care, IP&C physicians, or medical officer or health.*

Recovered Laboratory-Confirmed COVID-19 Cases

There is not enough evidence to ensure lasting immunity from previous COVID-19 infection. For persons previously identified as COVID-19 positive (within 3 months of initial infection)

- Do not re-test unless there is a known exposure or outbreak. Before retesting, consult IP&C/designate
    - Asymptomatic person: Further testing is not recommended, including asymptomatic admission screening
        - Comprehensive clinical assessment
    - Symptomatic person: Investigation according to clinical presentation (example: testing for influenza or other respiratory viruses for acute respiratory syndrome)
        - Clinician must perform a diligent and in-depth clinical evaluation to verify whether the symptoms can be explained by an alternative diagnosis (e.g., bacterial pneumonia, pulmonary embolism, heart failure, etc.) and document the epidemiological context of the new episode
        - Isolate case during the investigation. In the absence of an alternative diagnosis, manage as COVID-19 suspect.
- Patients may have chronic respiratory symptoms and/or a post-viral cough, which do not require maintenance of enhanced precautions for COVID-19
- If re-testing, place on Droplet/Contact precautions plus Airborne precautions for AGMPs. Evaluate results in cooperation with IP&C/designate, for interpretation to determine if case is considered communicable and any contact tracing necessary
- There are no restrictions to admitting COVID-19 recovered patients to either green units or ones with orange/red patients. This decision can be based on bed availability; private room is not required

Handling of Deceased Bodies

Routine Practices and additional precautions should be used properly and consistently when handling deceased bodies or preparing bodies for autopsy or transfer to mortuary services. Funeral Homes should be notified in advance of the demise of the resident due to COVID-19.

Short-Stay Absences and Resident Activities

Short-stay absences are those off-site visits or leaves of any duration that are not required for essential health care services Absences from the facility that are not required for essential

health services are discouraged. However, if the family caregiver/ resident requests social pass, that should only be considered for Green Zone residents.

If a resident/family elect to leave a facility on a pass, due to the inability to maintain consistent physical distancing during social passes/leave (i.e. personal vehicles), all Green Zone residents must wear a medical/procedure mask. Drivers/escort(s) must also be masked (non-medical is acceptable). If either the escort/driver and/or the resident are unable or unwilling to wear a mask, pass is not permitted. During transport, If possible, travel with car windows open. Hand hygiene should be practiced often.

Drivers/escorts must be designated, up to a maximum of 2. The number of people in the vehicle should be minimized to those considered necessary. Passes are to be kept to a minimum; recommended up to 2 times weekly for up to 2 hours each.

All drivers/escorts that will be in the vehicle must be screened before entry to facility.

There should be direct travel to the destination for the pass and back to facility, with no stops in between. Escort(s) should be informed on how to put on and remove a mask, and the importance of maintaining physical distancing from others.

The destination could be a personal home, an outdoor venue or an indoor public venue such as a hairdresser, a church, synagogue or mosque, a restaurant or a store/shop. Social distancing and masks are required other than for purposes of eating/drinking. Perform hand hygiene and replace masks after removal i.e. eating/drinking

If all elements are not adhered to, passes will revert to essential purposes only.

Reassess all group activities for their potential to unnecessarily bring residents in close proximity to each other. During group activities, space residents to maintain a minimum distance of 2 meters between them.

Recommended restrict group activities to a single unit and floor. Ensure materials used for any resident activities (e.g. electronic tablets or other devices, craft supplies, bingo cards, magazines, books, cooking utensils, linens, tools) are not shared among residents unless appropriately cleaned and disinfected between uses for each resident. If the items cannot be easily cleaned and disinfected, do not share.

Maintain residents with confirmed or suspected COVID-19 infection in their rooms unless there is essential need for movement and/or transport. Only transfer within and between facilities if medically indicated.

Transfer to and from Hospital

Care for residents in-place to preserve hospital capacity as much as possible. Only send residents to hospital if they cannot be managed in PCH.

Every resident requiring transfer to hospital must be triaged by a physician/nurse practitioner. Refer to: COVID-19 Guiding Document on Long-Term Care Communication & Symptom Guidelines.

Limiting Work Locations

PCHs should limit the number of physical visits from clinicians (physician or nurse practitioner). Refer to: COVID-19 Guiding Document on Communication & Symptom.

All staff at licensed PCHs are restricted to working at one specified licensed PCH (the "Single Site Restriction"). Refer to: COVID-19-Single-Site-Staffing-Model-For-Licensed-PCHs.

Questions

Personal Care Homes may contact their local Regional Health Authority Representative.

References/Adapted From

- Ontario, Province: *COVID-19 Directive #3 for Long-Term Care Homes under the Long-Term Care Homes Act, 2007 (*March 30, 2020). http://www.health.gov.on.ca/en/pro/programs/publichealth/coronavirus/docs/directives/LTCH_HPPA.pdf
- Public Health Agency of Canada: *Infection Prevention and Control for COVID-19. Interim Guidance for Long Term Care Homes (*April, 2020). https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/prevent-control-covid-19-long-term-care-homes.html

Change Log

January 11, 2021

1. Added Vaccination Protocols (pg. 15).

2. Updated Outbreak Management protocols for PCHs where cases are solely identified in staff. (pg. 17).

December 9, 2020

1. Added “There are no restrictions to admitting COVID-19 recovered patients to either green units or ones with orange/red residents. This decision can be based on bed availability. Additionally, residents recovered from COVID-19 infection do not require the 14 day quarantine (or isolation) period.” (pg. 12)

November 26, 2020

1. Changed period of time a COVID-19 positive or symptomatic resident must be isolated from 14 days to 10 days from symptom onset (pgs. 13 & 15)
2. Changed period of time an asymptomatic resident who tests positive for COVID-19 must be isolated from 14 days to 10 days from specimen collection date (pg. 14)
3. Changed period of time for discontinuing additional precautions for a symptomatic resident from 14 days to 10 days from symptom onset (pg. 18)

November 23, 2020

1. Added information for Recovered Laboratory-Confirmed Cases of COVID-19 (pg. 18)

October 22, 2020

1. Updates to Admission/Readmission when in Pandemic Response System Level RED (pg. 12/13).

2. Update to Discontinuing Precautions guidance (pg. 18).

July 9, 2020:

1. Changes to admission/readmission section (pg. 13). Asymptomatic admissions/readmissions from Green Zones do not require isolation after arrival in facility.
2. Changes to Managing Visitors (pg. 9). Changed visitor restrictions to match current Public Health orders.

July 14, 2020

1. Updated to link to PCH Visitation Principles document.

July 24, 2020

1. Updated short-stay absences and visitor guidelines

Sept. 11, 2020

1. Updated information on what constitutes a fever (pg. 14)

Sept. 16, 2020

1. Updated staff screening information

THIS IS EXHIBIT "15" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

15

COVID-19

Infection Prevention and Control Checklist for Personal Care Homes

Preamble:

This checklist is intended to guide Personal Care Homes (PCH) in Manitoba in conducting infection prevention and control (IP&C) assessments related to COVID-19 to ensure appropriate preparedness for prevention as well as readiness to respond in the event of a COVID-19 Outbreak. This checklist may also be used by Manitoba Health, Seniors and Active Living (MHSAL) during their standards review visits.

Activity	Yes	No
Screening		
Facility has minimized access points		
Active screening of all staff, residents, volunteers, permitted visitors, designated caregivers and contractors or outside care providers is conducted at all access points https://sharedhealthmb.ca/files/covid-19-visitor-triage-process-for-long-term-orange-red.pdf https://sharedhealthmb.ca/files/COVID-19-screening-for-points-of-entry-and-admitting.pdf		
Signage is posted at access points instructing staff, visitors/volunteers regarding screening and visitor restriction https://sharedhealthmb.ca/files/covid-19-screening-questions-poster.pdf		
Procedure masks, tissues, alcohol-based hand rub and a no-touch waste receptacle are available for staff, resident, and designated family caregivers at screening at each entrance.		
A written process is in place for active screening of residents for symptoms or signs of COVID-19		
Most recent guidelines for visitation are being adhered to: https://sharedhealthmb.ca/files/covid-19-pch-visitation-principles.pdf		
There is a process to record visitors who enter and exit the PCH (including appropriate contact information)		
Activity	**Yes**	**No**
Routine Practices		
Sites have a process with tools for teaching those receiving care (where feasible) and visitors the basic principles of Routine Practices, including PPE use, hand hygiene and respiratory etiquette for residents and visitors. Visitor tool: https://sharedhealthmb.ca/files/covid-19-ltc-visitor-ipc-teaching-resource-list.pdf		
Sites monitor for staff compliance with Routine Practices https://sharedhealthmb.ca/files/routine-practices-protocol.pdf including but are not limited to: – Point of Care Risk Assessment		

– Hand hygiene – Appropriate use of Personal Protective Equipment		
Direct care staff receive ongoing training for – Routine Practices and Additional Precautions – Point of Care Risk Assessment – Hand Hygiene – Personal Protective Equipment – Implementation of additional precautions, including Droplet/Contact precautions with Airborne precautions for AGMPs. Refer to: https://www.gov.mb.ca/health/publichealth/cdc/docs/ipc/rpap.pdf **All staff IP&C training including monitoring for compliance must be tracked, recorded, and kept up to date.**		
Adherence to Provincial guidance re: AGMPs https://sharedhealthmb.ca/files/agmps-and-long-term-care.pdf		
Activity	**Yes**	**No**
PPE		
There should be regular assessment to determine stock of necessary PPE (e.g. gloves, gowns, masks/N95 respirators, face or eye protection)		
There is a documented and monitoring process for compliance with Manitoba's COVID-19 Personal Protective Equipment Supply Management and Stewardship Planning and Guidance Framework: https://sharedhealthmb.ca/files/covid-19-provincial-ppe-framework-guidance.pdf and Provincial requirements for PPE according to the settings: https://sharedhealthmb.ca/files/covid-19-provincial-ppe-requirements.pdf This process includes a plan with follow up actions for identified concerns.		
Extended use PPE (mask/N95 respirator, eye protection) are worn by all staff providing or participating in resident care		
Proper cleaning, disinfection, and disposal of PPE occurs.		
Activity	**Yes**	**No**
Admissions/ Readmissions		
Process in place to screen new admissions/re-admissions for signs or symptoms or potential exposure to COVID-19.		
Site adhering with current Shared Health guidance on IP&C management of new admissions and readmissions		
Activity	**Yes**	**No**
Testing of Asymptomatic Residents		
Process in place to request asymptomatic surveillance testing of all asymptomatic new admissions/ readmissions		
Activity	**Yes**	**No**
Testing of Symptomatic Residents		
Process in place for testing symptomatic residents		

FAQs exist to support staff in answering questions from families exist https://sharedhealthmb.ca/files/covid-19-asymptomatic-testing-faq-for-staff.pdf.		
Timely process in place, including identification of persons responsible, for contact tracing of individuals (staff and residents) with potential exposure to the case immediately undertaken in consultation with regional IP&C staff and/or public health.		
Shared Health process in place to discontinue precautions for a COVID-19 positive resident in consultation with IP&C/designate.		
Activity	**Yes**	**No**
Outbreak Management Preparedness		
Site has up to date outbreak management plans including COVID prevention and response readiness plans		
PCH has identified who will lead COVID response/ outbreak management		
PCH has up to date list of resident family contacts		
PCH has up to date list of IP&C, Public Health, and Regional contacts		
Isolation carts/appropriate substitutes and signage available for immediate isolation of residents with signs or symptoms or potential exposures to COVID-19		
Alternative accommodation plans have been considered to support resident physical separation		
Resident cohorting plans are in place in an event of need to cohort suspected/ confirmed cases		
There is a process for inter-facility transfers that includes advance notification of transport personnel and receiving facilities about a resident's suspected or confirmed diagnosis (e.g., presence of respiratory symptoms or known COVID-19) prior to transfer.		
Test kits/requisitions/specimen collection: – PCH has a process in place for ordering tests kits/ requisitions/ specimen collection – PCH has supply of COVID-19 test kits – PCH has a policy/procedure on nasopharyngeal (NP) swab collection – Staff are educated and trained on NP swab collection		
There is an appropriate and safe process for transporting COVID-19 specimens to laboratory for testing.		
Activity	**Yes**	**No**
Short-Stay Absences and Resident Activities		
Adherence to most recent guidance in https://sharedhealthmb.ca/files/covid-19-ipc-guidance-for-pch.pdf		
Activity	**Yes**	**No**
Environmental Cleaning and Supplies		
All resident rooms and central area surfaces considered "high touch" (e.g., telephone, bedside table, over-bed table, chair arms, call bell cords or		

buttons, door handles, light switches, bedrails, handwashing sink, bathroom sink, toilet and toilet handles and shower handles, faucets or shower chairs, grab bars, outside of paper towel dispenser, hallway grab bars, unit desk) are cleaned and disinfected at a minimum of twice daily and when soiled.		
Shared Health facility approved disinfectant for environmental cleaning and disinfection is used: https://sharedhealthmb.ca/files/facility-approved-disinfectants.pdf and wet contact time achieved. Environmental cleaning is performed using a health care grade cleaner/disinfectant with a drug identification number (DIN).		
Responsibility for cleaning and disinfection of resident care equipment is identified, tracked, and documented.		
Cleaning and disinfection of low touch surfaces (e.g. shelves, bedside chairs or benches, windowsills, headwall units, over-bed light fixtures, message or white boards, outside of sharps containers) is performed at least once daily and when visibly soiled.		
Environmental cleaning and disinfection practices are monitored for compliance.		
Aerosol or trigger spray bottles are not used to apply cleaner/disinfectants.		
Alcohol Based Hand Rub dispensers are available at the point of use (e.g., at the entry to each resident room, in communal areas) ensuring compliance with local fire regulations.		
Respiratory hygiene products (e.g. masks, tissues, ABHR, no-touch waste receptacles) are to be available and easily accessible to staff and residents.		
Appropriately clean and disinfect essential items (e.g., dentures, hearing aids) upon arrival.		
Personal/Other Items (e.g. food, plants, flowers, newspapers, cards, and books) are permitted but must be dedicated to the intended resident only and not shared amongst residents. Staff must ensure hand hygiene before and after interaction with items and maintain physical distancing (maintaining 2 meters spatial separation) at the hand off.		
Physical distancing measures (e.g. use of single rooms when available, maintaining 2 meters spatial separation between residents in hallways, all recreation, activity, dining or other communal areas) are utilized for all residents.		
Activity	**Yes**	**No**
Ventilation		
The heating, ventilation and air conditioning (HVAC) system is regularly monitored by qualified staff or a contractor including: a) It operates in all resident care spaces 24/7 b) Monitoring of filter systems for effectiveness by weekly physical inspections or monitored with a manometer (to check pressure drop over the filters)		

c) Regular maintenance inspection (at least twice annually) to check the correct operation and internal components including condition of coils, fan belt tightness, etc.) (e.g., by the HVAC contractor).		
Evidence of proper maintenance of heating and ventilation systems exists in the occupied areas. Evidence includes: a) Little or no dirt on supply air diffusers (black film on diffusers or dust on adjacent ceiling tiles) b) Little or no evidence of dirt or dust in or on any radiators or radiant heat sources in rooms c) Exhaust grills (usually found in resident washrooms) are generally clean (some lint dust is acceptable), but certainly are not blocked. d) Return air grills (in other locations) are generally clean (some lint dust is acceptable) but certainly not caked on or blocking airflow e) Thermostats are reported as functioning		
Where aerosol generating medical procedures (AGMPs) (https://sharedhealthmb.ca/files/aerosol-generating-medical-procedures-AGMPs.pdf) occur on COVID positive (Red Zone), suspect (Orange Zone), and non-suspect (Green Zone) residents who have been admitted for less than 14 days a plan is in place that includes airborne precautions; as well as a private room with the door closed during the procedure and post-procedure to ensure appropriate air clearance (noted in the Shared Health AGMP reference).		
Portable fan use is restricted to only extreme situations to provide cooling to a room. If used, the fans must only draw air from the common corridor and into the patient room (not the other way around). Any fans found shall be generally clean (some lint dust acceptable) but certainly not layers of dust.		
Activity	**Yes**	**No**
Laundry		
Process of handling dirty and clean linen separately exists		
Laundry room is organized with proper flow of dirty and clean		
Activity	**Yes**	**No**
Handling of Deceased Bodies		
Process in place to notify funeral homes if resident demise due to COVID 19		
Staff are screened and are aware and use Routine Practices and additional precautions properly and consistently when handling deceased bodies or preparing bodies for autopsy or transfer to mortuary services.		
An area in the facility that could be used as a temporary morgue has been identified.		
Activity	**Yes**	**No**
Transfer to and from Hospital		
Plans in place to care for residents in-place to preserve hospital capacity as much as possible.		

Process in place to ensure every resident requiring transfer to hospital must be triaged by a physician/nurse practitioner		
Activity	**Yes**	**No**
Staff Breaks		
Breaks and lunches are staggered to help ensure physical distancing of HCWs and staff: – Outdoor spaces are considered for breaks as weather permits		
– The number of tables and chairs in staff common areas are limited		
– A 2 metre/6 feet distance between chairs is maintained (i.e., additional chairs are removed from the space)		
– There is a minimum of 2 metres/6 feet distance between tables		
– Meeting spaces are chosen that will allow 2 metre/6 feet distance between attendees and or multiple meetings are held with smaller number of attendees		
– Staff disinfect their eating area prior to and following eating/breaks		
Room capacity is posted for all meeting rooms/conference rooms		
Smoking rooms social distance markers in place for staff and residents		
Staff store personal belongings appropriately		
Activity	**Yes**	**No**
Human Resources		
Adherence to COVID-19-Single-Site-Staffing-Model-For-Licensed-PCHs. https://sharedhealthmb.ca/files/covid-19-single-site-staffing-model-for-licensed-pchs.pdf		
PCH is adhering to the Provincial PCH Staffing Guideline		
PCH Operators continue to attempt to fill all vacant positions		
A contingency plan with respect to human resources has been developed that identifies the minimum staffing needs and prioritizes critical and non-essential services based on residents' health status, functional limitations, disabilities, and essential facility operations.		
PCH is aware of the Provincial Recruitment and Redeployment Team (PRRT) that can be accessed and utilizing as appropriate		

Resource: Infection Prevention and Control Guidance for Personal Care Homes: https://sharedhealthmb.ca/files/covid-19-ipc-guidance-for-pch.pdf

Change Tracker:

January 11, 2021

- Updated to include requirement for facility to provide procedure masks at each screening location/entrance.

THIS IS EXHIBIT "16" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

16

COVID-19
Long Term Care/Transitional Care Cohorting Guidelines

Cohorting refers to the physical separation (e.g., in a separate room, ward, end of hallway) of two or more residents exposed to (COVID-19 Suspect) or infected with (COVID-19 Positive) COVID-19 from those residents who have not been exposed to or infected with COVID-19.

Each long term care (LTC)/transitional care (TC) facility should prepare plans for resident cohorting for use in the event of a situation where multiple residents are either infected with COVID-19 or considered COVID-19 Suspects. Cohort areas should be separate, well ventilated areas, ideally with separate entrances where possible. Cohorting may include the re-designation of other rooms in the facility as appropriate.

Resident Cohorting

Upon identification of a positive staff or resident case of COVID-19:

- Assess each resident and categorize them into one of three cohort groups (green, orange, or red).

Note the following when preparing to implement cohorting:

- Non-Suspect (Green Zone) Residents may share a room with other Green Zone residents. They must not share a room with Orange or Red Zone residents.
- Suspect (Orange Zone) Residents should be provided a private room wherever possible.
- Positive (Red Zone) Residents may share a room with other confirmed positive residents. They must not share a room with Green or Orange Zone residents.

- Symptom screening information is available by referring to https://manitoba.ca/asset_library/en/covid/screening_tool.pdf
- **Note:** direction to cohort residents will be provided by the designated individuals within each organization. This may include the Medical Officer of Health (MOH), in consultation with the LTC Medical Director and Infection Prevention and Control (IP&C)/designate.

Upon identification of the scope of exposure to a COVID-19 positive resident, note the following:

- MOH and IP&C/designate will determine the scope of exposure to a COVID-19 positive resident. This could include all residents in some situations. At a minimum, exposure would include roommates and bathroom mates of a COVID-19 positive resident as well as residents of any/all units in which physical distancing cannot be assured.
- All *exposed* residents are to be managed as COVID-19 Suspect (Orange Zone).

Cohorting Interventions

- Suspect (Orange Zone) Residents are the highest priority for single rooms with access to a dedicated toilet and sink for their use. If the number of Orange Zone residents exceeds the number of single rooms, priority should be given to those residents identified as the highest risk contacts of confirmed COVID-19 positive cases. Where this is not possible, a six feet/two metre separation between the bed spaces of the affected residents must be maintained and privacy curtains drawn. Residents should remain in the rooms as much as reasonable/possible.
- Where possible, place COVID-19 positive residents in a single room with a dedicated toilet and sink dedicated to their use. Where this is not possible, cohort with other COVID-19 positive residents.

- Residents should remain in their room. Obtain adequate supply of basins to accommodate sponge baths for all residents with no access to shower or tub rooms. Consider the use of disposable bathing products
- Utilize other rooms in the facility (e.g. respite and palliative care rooms/beds, recreation, lounge, storage, waiting rooms, staff rooms, etc.) as appropriate to help maintain isolation.
- Review the COVID-19 Physical Distancing and Restoring Services at Health Facilities guidelines. Consider the following when assessing alternate spaces that may not typically be used for resident accommodation:
  - Number of electrical outlets
  - Required equipment (e.g. basins, commodes, concentrator, lifts etc.)
  - Separation of bed space (e.g. curtains, dividers, screens)
  - Ability of beds to maneuver through doorway
  - Window coverings
  - Call bell access
  - Flooring (e.g. no carpet)
  - Access to hand hygiene sink or ABHR
- Do not share washrooms. If limited to a shared or alternate washroom space utilize alternate options such as:
  - A commode for one resident
  - Use of body fluid solidification system (e.g., Zorbi)
  - Where single rooms have a shared washroom, dedicate the washroom to the COVID-19 positive resident
- Designate a room/location in the cohort area for:
  - Medical equipment (e.g., lifts, blood pressure monitor, thermometers), PPE stock and clean supplies
  - Medication preparation and storage (plan for monitoring expiration date)
  - Resident nutrition/snack storage
  - Staff charting
  - Staff breaks away from resident care areas
  - Donning PPE
  - Doffing PPE
  - Soiled utility room
- Consider 1:1 supervision for residents who are unable to comply with IP&C measures. Staff will attempt to distract and redirect the resident as well as clean and disinfect surfaces the resident touches and frequently assist resident with safe alcohol-based hand rub (ABHR) application
- Cancel group activities
  - Consider the potential impact on resident's physical, social and emotional well-being
- Align with COVID-19 Long Term Care Resident Visitation Principles
- Cancel or reschedule non-urgent appointments where postponement will not risk the health or well-being of the resident
- Consider where and how resident belongings will be stored
- If the door to the unit cannot be locked and there are residents at risk of elopement, consider the need to hire security staff to monitor the door
- Ensure appropriate signage is visibly displayed in designated cohort areas

Traffic Flow

- Separate Suspect and Positive COVID-19 resident rooms (Orange and Red Zone) from Non-suspects (Green Zone)
  - Restrict contact between residents on affected floors/units/wards with unaffected

areas
    - Wherever possible, locate the red zone and/or orange zone at the furthest point away from high traffic areas where staff congregate (e.g., away from the main floor of a multi-floor facility)
- Consider the ability to lock the door to the entry of the cohort area or the need for security/staff at the door to monitor for residents who wander or unauthorized entry
    - Note: If the door to the cohort area is not normally closed, the fire inspector may need to be consulted

Staff Cohorting

- Continue with the principles of single-site staffing (staff to work in only one PCH location); avoid/limit staff working on multiple units
- Restrict or minimize movement of staff, students or volunteers between units/floors, including staff common areas
- Designate staff to work with either ill residents or well residents. When the number of confirmed or suspected COVID-19 cases is increased, consider having dedicated teams of staff (e.g., Nursing, Housekeeping/Environmental Services) specific to residents with suspected/confirmed COVID-19
- Consider availability or access to communication devices such as hand-held radios between zones, or for runners
- Wherever possible, staff assigned to specific areas do not interact with residents outside of their assigned area

Dining Considerations

- Cancel congregate meals, serve meals in doorway of resident rooms
    - Cohort areas should consider use of a dedicated meal cart and develop a process for safe, coordinated meal delivery, including snacks and food ward stock.

Environmental Cleaning

- Assign Housekeeping/Environmental Services (HSKG/ES) staff to specific zones
- Units to declutter the area by removing all but essential items especially in specialized dementia care units or on units with a high prevalence of dementia
    - Consider where items will be stored (e.g., totes)
- Increase frequency of cleaning and disinfection of high-touch surfaces in resident rooms and any central areas using only facility-approved disinfectants
- Clean and disinfect all resident room and central area surfaces considered 'high touch' (e.g., telephone, bedside table, over-bed table, chair arms, call bell cords or buttons, door handles, light switches, bedrails, handwashing sink, bathroom sink, toilet and toilet handles and shower handles, faucets or shower chairs, grab bars, outside of paper towel dispenser) **minimally twice daily and when soiled**
- Use facility approved disinfectant with the recommended wet contact time to disinfect resident care equipment (e.g., BP cuffs, electronic thermometers, oximeters, stethoscope) after each use
- For specialized dementia care units and/or units with high prevalence of ambulatory residents with dementia, extend high frequency cleaning to low touch surfaces and include "staff only" areas in high frequency cleaning and disinfection

Alternate Accommodations

- If a facility is not able to accommodate separate and distinct cohort areas, alternate cohorting strategies outside of the facility may need to be considered in collaboration with the respective RHA, including:
    - Relocate all COVID-19 positive residents to alternative COVID ready facility/location
    - Relocate residents without COVID-19 out of the facility
- Prior to the implementation of an alternate accommodation plan, consultation with the Primary Care Provider, MOH, LTC Medical Director, Care Team Manager, IP&C/designate, and Incident Command Team needs to occur
- In the event of an alternate accommodation plan, refer to client wing occupancy list or alternate resident tracking method to ensure residents are all accounted for

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THIS IS EXHIBIT "17" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

17

Genomic evidence for reinfection with SARS-CoV-2: a case study

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See Comment page 3

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Summary

Background The degree of protective immunity conferred by infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is currently unknown. As such, the possibility of reinfection with SARS-CoV-2 is not well understood. We describe an investigation of two instances of SARS-CoV-2 infection in the same individual.

Methods A 25-year-old man who was a resident of Washoe County in the US state of Nevada presented to health authorities on two occasions with symptoms of viral infection, once at a community testing event in April, 2020, and a second time to primary care then hospital at the end of May and beginning of June, 2020. Nasopharyngeal swabs were obtained from the patient at each presentation and twice during follow-up. Nucleic acid amplification testing was done to confirm SARS-CoV-2 infection. We did next-generation sequencing of SARS-CoV-2 extracted from nasopharyngeal swabs. Sequence data were assessed by two different bioinformatic methodologies. A short tandem repeat marker was used for fragment analysis to confirm that samples from both infections came from the same individual.

Findings The patient had two positive tests for SARS-CoV-2, the first on April 18, 2020, and the second on June 5, 2020, separated by two negative tests done during follow-up in May, 2020. Genomic analysis of SARS-CoV-2 showed genetically significant differences between each variant associated with each instance of infection. The second infection was symptomatically more severe than the first.

Interpretation Genetic discordance of the two SARS-CoV-2 specimens was greater than could be accounted for by short-term in vivo evolution. These findings suggest that the patient was infected by SARS-CoV-2 on two separate occasions by a genetically distinct virus. Thus, previous exposure to SARS-CoV-2 might not guarantee total immunity in all cases. All individuals, whether previously diagnosed with COVID-19 or not, should take identical precautions to avoid infection with SARS-CoV-2. The implications of reinfections could be relevant for vaccine development and application.

Funding Nevada IDEA Network of Biomedical Research, and the National Institute of General Medical Sciences (National Institutes of Health).

Introduction

Infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) leads to a detectable immune response, but the susceptibility of previously infected individuals to reinfection with SARS-CoV-2 is not well understood. SARS-CoV-2 infection results in generation of neutralising antibodies in patients.[1] However, the degree to which this immune response indicates a protective immunity to subsequent infection with SARS-CoV-2 has not yet been elucidated. In studies of immunity to other coronaviruses,[2–9] loss of immunity can occur within 1–3 years. Cases of primary illness due to infection followed by a discrete secondary infection or illness with the same biological agent can best be ascertained as distinct infection events by genetic analysis of the agents associated with each illness event. Reports of secondary infection events with SARS-CoV-2 have been published from Hong Kong,[10] the Netherlands and Belgium,[11] and Ecuador.[12] We present a case report of an individual who had two distinct COVID-19 illnesses from genetically distinct SARS-CoV-2 agents.

Methods

Case history

We present a case report of a 25-year-old male patient who was a resident of Washoe County in the US state of Nevada. The patient presented to a community testing event held by the Washoe County Health District on April 18, 2020. He had symptoms consistent with viral infection (sore throat, cough, headache, nausea, and diarrhoea), which had started on March 25, 2020 (figure 1). The patient had no history of clinically significant underlying conditions, and no indications of compromised immunity were identified. During isolation, the patient's symptoms resolved (reported on April 27, 2020) and he continued to feel well until May 28, 2020. On May 31, 2020, the patient sought care at an urgent care centre with self-reported fever, headache, dizziness, cough, nausea, and diarrhoea, at which time chest radiography was done and he was discharged home. 5 days later (on June 5, 2020), the patient presented to a primary care doctor and was found to be hypoxic with shortness of breath. He was

Research in context

Evidence before this study

We searched PubMed, preprint servers (*MedRxiv*, *BioRxiv*, and *SSRN*), and general news channels (via Google search) from June 30 to Sept 9, 2020, for reports of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) reinfection, using keywords including "reinfection", "SARS-CoV-2", and "secondary infection". We restricted our search to publications in English. Three reports of reinfection, with variable symptom severity on reinfection, have been published worldwide to date, supporting the possibly for SARS-CoV-2 reinfection.

Added value of this study

We present, to our knowledge, the first North American case of reinfection with SARS-CoV-2. A 25-year-old man, who was a resident of Washoe County in the US state of Nevada, had laboratory-confirmed SARS-CoV-2 infection in April, 2020, followed by secondary infection within a period of around 6 weeks, in June, 2020. The second infection was symptomatically more severe than the first. Genomic analysis showed the two viral agents were genetically distinct. The patient's immune reaction in vitro was not assessed and, thus, conclusions cannot be made about the duration or degree of immunity.

Implications of all the available evidence

Reinfection with SARS-CoV-2 has been reported in at least four individuals worldwide. Thus, previous exposure to SARS-CoV-2 does not necessarily translate to guaranteed total immunity. The implications of reinfections could be relevant for vaccine development and application. From a public health perspective, all individuals—whether previously diagnosed or not—must take identical precautions to prevent infection with SARS-CoV-2. Further work is needed to assess immune reactions in vitro after reinfection.

instructed to go to the emergency department after provision of oxygen.

This work was done under an emergency order by the Chief Medical Officer of the Division of Public and Behavioral Health for the State of Nevada. Ethics approval was waived by the University of Nevada, Reno Institutional Review Board. The patient provided written consent to publish this report.

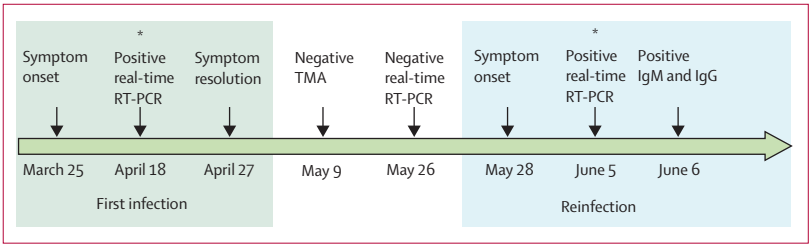

Figure 1: **Timeline of symptom onset, molecular diagnosis, and sequencing of specimens**
TMA=transcription-mediated amplification. *Sequenced specimens.

Procedures

Specimens were obtained from the patient by nasopharyngeal swab at the community testing event, during the period of isolation and recovery, and on presentation to hospital. Swabs were transported to the Nevada State Public Health Laboratory (Reno, NV, USA) in either viral transport medium or Aptima Multiswab Transport Media (Hologic, San Diego, CA, USA). Specimens were transported on cold packs and stored by refrigeration (4–8°C) for no longer than 72 h before nucleic acid extraction and subsequent real-time RT-PCR.

Nucleic acid extraction was done using Omega Biotek MagBind Viral DNA/RNA 96 Kit (Omega Bio-tek, Norcross, GA, USA), per manufacturer's instructions and with an elution volume of 100 µL. Aliquots of eluted RNA underwent real-time RT-PCR with either the Taqpath COVID-19 Emergency Use Authorized (EUA) Multiplex Assay (ThermoScientific, Waltham, MA, USA; 10 µL aliquots) or the US Centers for Disease Control and Prevention (CDC) 2019-nCoV Real-Time RT-qPCR Diagnostic Panel (CDC, Atlanta, GA, USA; 5 µL aliquots). Specimens transported on Aptima Multiswab Transport Media were tested by transcription-mediated amplification using the Aptima SARS-CoV-2 (Panther System) assay (Hologic, Marlborough, MA, USA). Assays were done according to their respective EUA procedures, unless otherwise indicated. For the Taqpath real-time RT-PCR test, the threshold for calling a specimen positive was reactivity of two of three target sequences, each with reactivity at a cycle threshold of less than 40·00. A positive or negative result on the Hologic Aptima assay was based on proprietary processes. Antibody testing was done with the Roche Elecsys Anti SARS-CoV-2 test (Roche Diagnostics, Indianapolis, IN, USA).

For viral genomic sequencing, total RNA was extracted from nasopharyngeal swabs as described. 70 µL of extracted RNA was treated for 30 min at room temperature with Qiagen DNase I (Qiagen, Germantown, MD, USA) and then cleaned and concentrated with silica spin columns (Qiagen RNeasy MinElute; Qiagen) with a 12 µL water elution. A portion (7 µL) of this RNA was annealed to an rRNA inhibitor (Qiagen FastSelect rRNA HMR; Qiagen) and then reverse-transcribed (cDNA) using random hexamers. The synthesised DNA was strand-ligated and isothermally amplified into micrograms of DNA (Qiagen FX Single Cell RNA Library Kit; Qiagen). A portion (1 µg) of this amplified DNA was sheared and ligated to Illumina-compatible sequencing adapters, followed by six cycles of PCR amplification (KAPA HiFi HotStart Library Amplification Kit; Roche Sequencing and Life Science, Kapa Biosystems, Wilmington, MA, USA) to enrich for library molecules with adapters at both ends. Next, these sequencing libraries were enriched for a sequence specific to SARS-CoV-2 using biotinylated

	Specimen A			Specimen B	
	April 18, 2020	May 9, 2020	May 26, 2020	June 5, 2020	June 6, 2020
Test methodology	Real-time RT-PCR	TMA	Real-time RT-PCR	Real-time RT-PCR	Immunoassay (IgG and IgM antibody detection)
Test result	Positive	Negative	Negative	Positive	Positive
Quantitative result	Ct 35·24	RLU 299	..	Ct 35·31	..

TMA=transcription-mediated amplification. Ct=cycle threshold. RLU=relative light units.

Table 1: **Summary of laboratory results**

	Coverage (reads)	Allele frequency (%)	Forward/ reverse balance*	Average quality†
Shared variants of specimens A and B versus reference genome				
241C→T				
Specimen A	67	100%	0·37	35·6
Specimen B	6	100%	0·38	36·0
1059C→T				
Specimen A	144	100%	0·48	35·6
Specimen B	55	92·7%	0·26	35·4
3037C→T				
Specimen A	89	100%	0·42	35·6
Specimen B	425	99·8%	0·19	35·5
14408C→T‡				
Specimen A	73	100%	0·40	35·7
Specimen B	1145	99·6%	0·43	35·6
23403A→G				
Specimen A	6859	99·9%	0·19	35·7
Specimen B	10484	99·9%	0·46	35·6
25563G→T				
Specimen A	421	100%	0·45	35·2
Specimen B	757	99·1%	0·48	35·4
Specimen A-specific variants versus reference genome				
539C→T	141	99·3%	0·45	35·6
4113C→T	159	70·4%	0·38	35·6
7921A→G	182	98·9%	0·49	35·7
16741G→T	173	99·4%	0·47	35·6
Specimen B-specific variants versus reference genome				
8140C→T	1046	85·0%	0·43	35·6
11102C→T	1713	99·9%	0·44	35·5
14407C→T‡	1145	99·7%	0·43	35·6
15190G→C	139	90·6%	0·33	35·7
15981C→T	224	100%	0·38	35·5
26013C→T	1415	99·2%	0·38	35·5
29466C→T	86	98·8%	0·07	35·8

Reference genome was Wuhan Hu 1 (GenBank MN908947.3). *Ratio of forward to reverse reads covering the locus. †Phred score. Phred is a measure of base calling accuracy, a higher score indicates higher quality. A Phred score of 30 indicates a base-calling accuracy of 99·9%. ‡CLC Genomics classified this variant as a dinucleotide multinucleotide variant. The two variants have been split in this table for clarity.

Table 2: **Variants noted in specimens A and B compared with the reference genome**

oligonucleotide baits (myBaits Expert Virus, Arbor Biosciences, Ann Arbor, MI, USA). A further eight to 16 cycles of PCR were done after enrichment (98°C for 45 s, 98°C for 15 s, 60°C for 30 s, repeat for eight to 16 cycles, then 72°C for 60 s and 4°C to complete), and these SARS-CoV-2-enriched sequencing libraries were pooled and sequenced with an Illumina NextSeq 500 (Illumina, San Diego, CA USA) as paired-end 2×75 base pair reads using the NextSeq version 2.5 mid-output 150 cycle kit (Illumina).

For bioinformatics analysis of the two SARS-CoV-2 agents (referred to herein as specimen A and specimen B), after sequencing of each library, FASTQ files were imported into CLC Genomics Workbench version 20.0.4 (Qiagen A/S, Vedbæk, Denmark) with the CLC Microbial Genomics Module, CLC Genome Finishing Module, and Biomedical Genomics Analysis. Briefly, reads were imported, trimmed, and mapped to National Center for Biotechnology Information SARS-CoV-2 reference sequence MN908947.3. The alignment was refined using the InDels and Structural Variants module, followed by the Local Realignment module. Variants were identified by a minimum coverage of five reads, minimum count of five, and minimum frequency of 70·0%.

To ascertain repeatability of results, a second bioinformatics analysis was done using an independent process and open source tools. Potential reinfection sequence libraries were trimmed using Trimmomatic version 0.39, with the ILLUMINACLIP adapter-clipping setting 2:30:10:2:keepBothReads. Sequence pairs were aligned to the SARS-CoV-2 reference genome (MN908947.3) using Bowtie 2 version 2.3.[13] PCR optical duplicates were flagged using Picard MarkDuplicates in picard-slim version 2.22.5. Variants were called for both samples in concert using Freebayes version 1.0.2, with ploidy settings of 1, a minimum allele frequency of 0·70, and a minimum depth of five reads for any variant call. The genome sequence of each sample was constructed using coverage statistics from BBtools pileup.sh and applyvariants.sh version 38.86, whereby only variants supported by coverage of five or more reads were written to bcftools consensus version 1.10.2, and all positions supported by fewer than five reads, whether reference or alternative, were replaced with Ns.[14]

For phylogenetic analysis, the whole genome sequences of the isolates (specimen A and specimen B) were compared with those of 171 contemporaneous sequences from Nevada,[15] the SARS-CoV-2 reference strain (MN908947.3), and one sequence derived from isolate USA-WA1/2020 (Bei Resources, Manassas, VA, USA). After trimming six 5′ uncalled bases (Ns) from specimen A and 98 Ns from specimen B, genomic sequences were aligned and related using NGPhylogeny.fr PhyML+SMS.[16] Sequences were then first-aligned using MAFFT with automatic flavour selection.[17] Informative regions were selected using Block Mapping and Gathering with Entropy, a sliding window

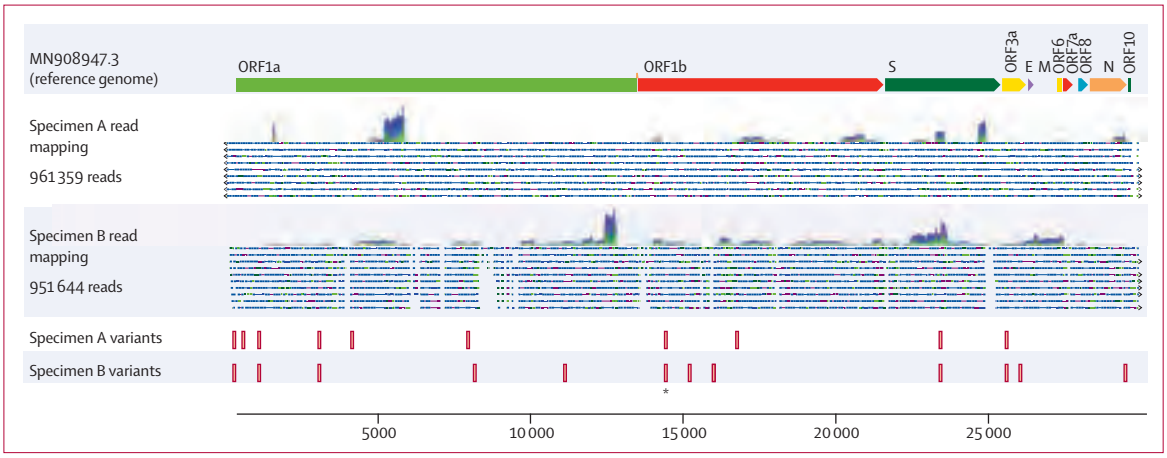

***Figure 2*: Variant mapping of specimens A and B against the reference genome**
ORF1a and ORF1b encode replicase proteins. The other ORFs encode assembly proteins. ORF=open reading frame. S=spike. E=envelope. M=membrane. N=nucleocapsid. *Identifies variant 14 407 in specimen A and variants 14 407 and 14 408 in specimen B.

size of 3, and maximum entropy of 0·5.[18] Unrooted trees were constructed by PhyML with Smart Model Selection, the Akaike information criterion, and Subtree Pruning and Regrafting.[19] Newick trees were visualised using Interactive Tree Of Live version 4 and rooted at the Wuhan reference strain.[20] Major SARS-CoV-2 clade memberships were predicted using Nextclade.

To confirm specimens A and B were from the same individual, the original swab specimens, transport media, and residual samples of extracted RNA supplied to the sequencing core facility underwent short tandem repeat (STR) analysis for identity comparison, by the Washoe County Sheriff's Forensic Science Division (Reno, NV, USA). 2 µL of extracted DNA was quantified using the Quantifiler Trio DNA Quantification Kit (Applied Biosystems, Foster City, CA, USA) on the 7500 Real-Time PCR System and analysed with 7500 HID software version 1.3 (Applied Biosystems). Amplification of 24 GlobalFiler STR markers (Thermo Fisher Scientific, Waltham, MA, USA) was accomplished on the ProFlex PCR Instrument (Thermo Fisher Scientific) for 29 cycles. The 3500xL Genetic Analyzer (Applied Biosystems) was used for fragment analysis of the amplified STR marker regions in conjunction with HID Data Collection Software version 4.0.1 (Applied Biosystems) and Genemapper ID-X software version 1.6 (Thermo Fisher Scientific). Statistical interpretation of STR data was achieved using allele frequencies maintained in the National Institute of Standards and Technology population database.[21]

Role of the funding source
The funder had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all data in the study and had final responsibility for the decision to submit for publication.

Results
The first nasopharygeal swab, obtained at the community screening event on April 18, 2020, was positive for SARS-CoV-2 on real-time RT-PCR testing. Two subsequent nucleic acid amplification tests obtained after resolution of symptoms were negative for SARS-CoV-2 RNA (table 1). The patient's symptoms returned on May 28, 2020, and he was admitted to hospital on June 5, 2020, at which time a second nasopharyngeal swab was obtained and was positive for SARS-CoV-2 infection by real-time RT-PCR testing. The patient required ongoing oxygen support in hospital and reported symptoms that included myalgia, cough, and shortness of breath. Chest radiography showed development of patchy, bilateral, interstitial opacities suggestive of viral or atypical pneumonia. On June 6, 2020, the patient was tested for IgG and IgM against SARS-CoV-2 and positive results were obtained (figure 1).

With two episodes of symptoms consistent with COVID-19, and two specimens positive for SARS-CoV-2 separated by a period of 48 days, in addition to resolution of symptoms and two non-reactive (negative) SARS-CoV-2 test results in between positive test results, nucleic acid sequencing was done of the viruses associated with the two positive tests. Illumina sequencing yielded 738 617 read pairs for the specimen obtained in April, 2020 (specimen A), and 1 410 885 read pairs for the specimen obtained in June, 2020 (specimen B). Sequence data indicated that specimen A was a member of clade 20C, because genomic sequence analysis identified five mutations (single nucleotide variants [SNVs]) that were hallmarks of the 20C clade (3037C→T, 14408C→T, 23403A→G, 1059C→T, and 25563G→T). Specimen B was also a member of clade 20C and presented the same five hallmark SNVs. Specimen A had five further SNVs compared with the reference genome. Specimen B showed six additional SNVs and a mutation at position 14 407, adjacent to the SNV 14408C→T and

For more on **Nextclade** see https://clades.nextstrain.org

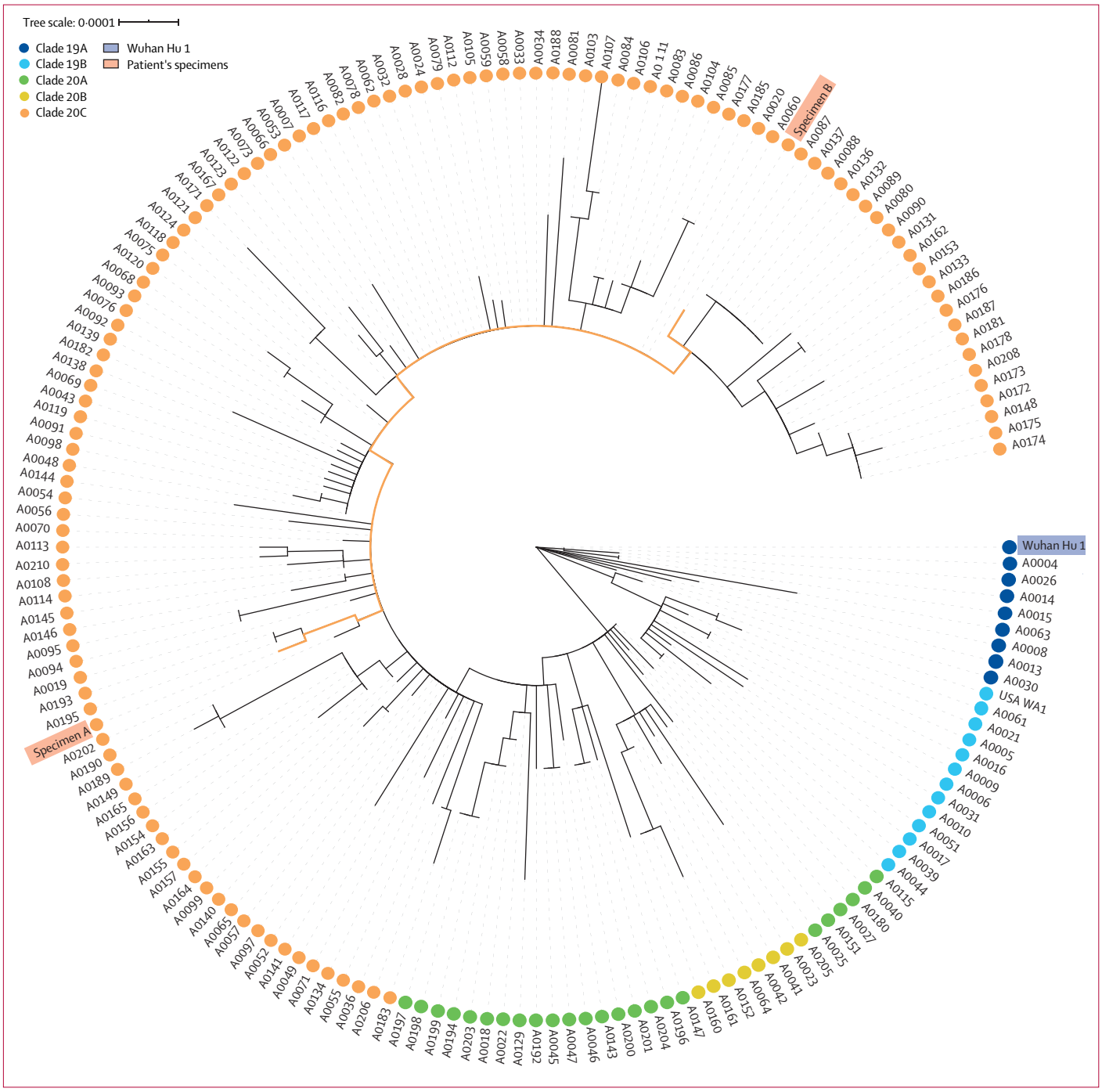

Figure 3: **Phylogenetic placement of specimens A and B within Nevada isolates, reference genomes, and global clades**
171 sequences were from Nevada. Wuhan Hu 1 was the reference genome (GenBank MN908947.3). USA WA1 was the isolate USA-WA1/2020 (Bei Resources, Manassas, VA, USA).

See Online for appendix

recorded as a dinucleotide multinucleotide variant (MNV) at positions 14407 and 14408 of the genome. Six SNVs were shared between specimen A and specimen B (table 2). Specimen A had four additional SNVs not seen in specimen B, whereas specimen B had seven SNVs that were absent in specimen A. A visualisation of the relation of sequence data sets between specimens A and B is shown in figure 2. An additional three deletions and one insertion were noted in the sequence of specimen B relative to the reference genome (appendix p 2). These findings were confirmed by additional analyses of FASTQ files generated from specimens A and B (only the SNV at

locus 4113 in specimen A was not verified). Predictions of insertions and deletions were less stable, with only the deletion at loci 2084 and the insertion at 6018 confirmed. The Freebayes analysis detected a deletion at 22 832 in specimen B that was not identified by the first sequence analysis (appendix p 3), but insertion and deletion predictions from short-read alignments are less reliable than are SNV predictions[22] and are merely presented for completeness.

Specimens A and B were among 171 samples obtained in the US state of Nevada between March 5 and June 5, 2020, and sequenced. Phylogenetic analysis showed the relatedness of specimens A and B to each other and their comparative distance among additional positive samples (figure 3). To rule out the possibility of specimen mishandling, or mislabelling errors during RNA extractions, forensic identity testing was done to investigate the source and intermediate materials of specimens A and B. Analysis of each of the specimens, residual extractions, and aliquot residuals showed that that specimens A and B were derived from the same individual, with a one in $53 \cdot 48 \times 10^{24}$ chance of the specimens being from different people.

Discussion

Our case report presents details of the first individual in North America to have symptomatic reinfection with SARS-CoV-2. Similar to observations with the reinfection case in Ecuador,[12] our patient showed increased symptom severity in their second infection, whereas the cases from Belgium and the Netherlands[11] and Hong Kong[10] did not show a difference in severity of symptoms. The mechanisms that could account for a more severe secondary infection can only be speculated. First, a very high dose of virus might have led to the second instance of infection and induced more severe disease.[23] Second, it is possible that reinfection was caused by a version of the virus that was more virulent, or more virulent in this patient's context. Third, a mechanism of antibody-dependent enhancement might be the cause, a means by which specific Fc-bearing immune cells become infected with virus by binding to specific antibodies. This mechanism has been seen previously with the beta-coronavirus causing severe acute respiratory syndrome.[24] In that case, the patient recovered and was discharged from hospital.

The individual associated with these two SARS-CoV-2 infections had no immunological disorders that would imply facilitation of reinfection. They were not taking any immunosuppressive drugs. The individual was negative for HIV by antibody and RNA testing (data not shown) and had no obvious cell count abnormalities. The secondary positive case (reinfection) occurred simultaneously to a positive case in a cohabitant (parent), who also provided a specimen on June 5, 2020, that was positive by nucleic acid amplification testing (transcription-mediated amplification). Sequencing is underway on the co-habitant specimen to ascertain its potential role in reinfection. However, the positive specimen from the co-habitant was obtained and tested in the Hologic Aptima format, which did not align with the procedures established at our sequencing laboratory. Nevertheless, the co-habitant positive case provides a possible source for secondary exposure and reinfection of our patient.

It is possible that we have reported a case of continuous infection entailing deactivation and reactivation. However, for such a hypothesis to be true, a mutational rate of SARS-CoV-2 would be required that has not yet been recorded.[25–28] Specimens A and B showed an extrapolated rate of SNV and MNV accumulation of 83·64 substitutions per year, a rate that greatly exceeds the currently observed rate of 23·12.[28] However, even more importantly, the four substitutions noted in specimen A would have to revert to the ancestral genotype, and the odds of this reversion occurring are remote. Of course, if such an amount of base change did occur in that timeframe, the remarkable nature of specimens A and B would shift from a case of possible reinfection to one of high-rate evolution within an infected individual. Another alternative explanation for the observed differences in specimens A and B would be that of co-infection. In a co-infection hypothesis, the patient would have been infected with viruses of both genotypes at the time of sample collection. Such a hypothesis would then further require that the specimen B type virus be present, yet undetected in April, 2020, and then conversely, specimen A type virions become depleted before the June, 2020, sample collection date. Specimens A and B were both in clade 20C, which was the predominant major clade seen in northern Nevada at the time samples were obtained. Our survey of viruses in Nevada identified samples resembling each of the case genotypes.[15] Although evidence exists that SARS-CoV-2 quasispecies exist at low and fluctuating frequencies in infected samples,[29] whereby low-frequency (eg, 1%) SNVs could be seen in various samples from the same patient, this possible situation would not itself account for the genotype switch observed between the first infection and reinfection.

Our findings have implications for the role of vaccination in response to COVID-19. If we have truly reported a case of reinfection, initial exposure to SARS-CoV-2 might not result in a level of immunity that is 100% protective for all individuals. With respect to vaccination, this understanding is established, with influenza regularly showing the challenges of effective vaccine design.[30] A major limitation of our case study is that we were unable to undertake any assessment of the immune response to the first episode of SARS-CoV-2 infection. We also could not assess fully the effectiveness of the immune responses (eg, neutralising antibody titres) during the second episode, when the individual was antibody-positive for total antibody assay to the SARS-CoV-2 nucleocapsid protein. If our patient is a case of natural viral evolution in vivo (although highly unlikely

in view of the requirement of four reversions to reference genotypes) then the implications of these data are that SARS-CoV-2 can adapt with enough genetic dexterity to avoid a natural immune response in a manner to re-establish detectable levels of infection in an individual. If our patient is a case of reinfection, it is crucial to note that the frequency of such an occurrence is not defined by one case study: this event could be rare. The absence of comprehensive genomic sequencing of positive cases in the USA and worldwide limits the advances in public health surveillance needed to find these cases. Certainly, limitations in screening and testing availability for SARS-CoV-2 exacerbate the poor surveillance efforts being undertaken not only to diagnose COVID-19 but also to obtain actionable genetic tracking of this agent.

Contributors

RLT contributed to writing of the report and data analysis. JRS contributed to review and editing of the report and data analysis. PDH contributed to sequencing and analysis. HK contributed to public health intelligence and case identification. NC contributed to clinical data and clinical care. AG and CL contributed to diagnostics analysis. SCV and CCR contributed to writing and editing of the report and figure generation. DJ and MJF contributed to identity testing and confirmation. SVH contributed to diagnostics and laboratory management. MP had the idea for the study and contributed to diagnostics, formal analysis, and writing and editing of the report.

Declaration of interests

JRS reports personal fees from Qiagen Digital Insights, outside of the submitted work. All other authors declare no competing interests.

Data sharing

The CLC workflow, combined mapping report, parameters for CLC modules, FASTA-format sequences, the open-source workflow, BAM alignments, and VCF-format files are available online.

For **shared resources** see https://doi.org/10.5281/zenodo.3988782

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THIS IS EXHIBIT "18" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

18

Hamilton, Ontario

Cite this as: *BMJ* 2020;370:m3340
http://dx.doi.org/10.1136/bmj.m3340
Published: 26 August 2020

Covid-19: Hong Kong scientists report first confirmed case of reinfection

Jane Parry

A 33 year old man from Hong Kong is reported to have the first confirmed case of covid reinfection.

Researchers from the University of Hong Kong's Li Ka Shing Faculty of Medicine Department of Microbiology found that the patient's two episodes were caused by virus strains with clearly different genome sequences. Their findings have not yet been published but were accepted for publication in the journal *Clinical Infectious Diseases* on 24 August.

"The man first acquired this infection in March, locally, probably from a colleague who travelled from London to work with him. At that time he had very mild symptoms and tested positive for covid-19," said Ivan Fan-Ngai Hung, research team member and clinical professor in the university's Department of Medicine.

"When he was hospitalised three or four days later he was already asymptomatic—all confirmed positive cases of covid-19 in Hong Kong are hospitalised for observation, symptomatic treatment, and prevention of onward transmission—and remained in hospital for three weeks until he tested negative twice," Hung added. "After that, he was very well until four and a half months later, when he came back to Hong Kong having been in Spain for a week, and he was tested on return, because everyone gets tested on arrival in Hong Kong. He was asymptomatic but still tested positive and had quite a high viral load."

"Short lived" immunity

A press release from the team said that a total of 24 nucleotides differed between the viruses from the first and second episode. Amino acid differences were found in nine proteins, including a 58 amino acid truncation of ORF8 protein that was present only in the virus from the first infection. The findings suggest that acquired immunity after natural infection may be short lived.

"Vaccination should still be considered for those with previous infection," said Hung. He noted that thee vaccines under development were "pretty safe from this kind of mutation. But you never know: the virus could change significantly—so much so that those vaccines currently under trial may not work."

He said that the evidence of reinfection should not be surprising, a view echoed by other observers.

Paul Hunter, professor in medicine at the University of East Anglia, UK, said, "It should not be too surprising. It is, however, important that this is documented. Commentators have been saying for some time that immunity is unlikely to be permanent and may only last a few months.

"Given the different intensity of the antibody response in people with mild or severe illness and the subsequent decay in levels, it is likely that those with a mild illness will have a shorter duration of immunity than those with severe illness."

Regarding the implications for vaccine research, Brendan Wren, professor of microbial pathogenesis at the London School of Hygiene and Tropical Medicine, said, "With over three million cases of covid-19 worldwide, the first reported case of a potential reinfection with SARS-CoV-2 needs to be taken into context. It is to be expected that the virus will naturally mutate over time. This is a very rare example of reinfection, and it should not negate the global drive to develop covid-19 vaccines."

THIS IS EXHIBIT "19" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

19

AB2095

Notifications

COVID-19 remains a public health threat. Mandatory measures are in effect provincewide.

Close

Alberta

Articles

Herd immunity and the Great Barrington Declaration

Alberta's Chief Medical Officer of Health on the right approach for Alberta.

Posted by

Dr. Deena Hinshaw

Date

October 28, 2020

Topic

COVID-19

There has been a significant amount of discussion recently about the Great Barrington Declaration[1]. Its authors promote an approach to COVID-19 that they call "Focused Protection". They describe this approach as follows: "…to allow those who are at minimal risk of death to live their lives normally to build up immunity to the virus through natural infection, while better protecting those who are at highest risk."

This is a very appealing statement to those who are tired of restrictions and in a context where the economic and social impacts of the restrictions are being felt keenly by those under 60, ("retirement age" is the cut off proposed in the Barrington document) who are at lower risk of severe outcomes. Unfortunately, the claim that this approach is achievable with minimal impact is not correct for several reasons.

Evidence around long-lasting immunity is still unclear

First, the stated goal of this approach is to build up herd immunity through infection, which assumes that infection by SARS-CoV2, the virus that causes COVID-19, will automatically confer long-lasting protection against future infections.

This is not currently known to be the case. Other common coronaviruses that cause respiratory infections in humans have been shown to cause repeat infections[2]. With COVID-19 specifically, there have been rare individual documented cases of re-infection with SARS-CoV2.[3, 4, 5, 6] At a population level, the Brazilian city of Manaus was widely cited as having reached herd immunity with approximately 66% of the population testing positive for antibodies[7, 8, 9], yet there are recent reports of a resurgence of cases with up to 50 new deaths per day.[10, 11]

Therefore making the assumption that widespread infection will confer lasting immunity is not certain to be true.

Increased deaths

However, if we assumed for the sake of argument that infection does confer immunity, there are still issues with the herd immunity plan. The second problem with the premise of the Great Barrington Declaration is the inaccurate assertion that if we segregate the old and the young, and let the young live 'normally', potentially getting infected along the way but not passing the virus to older people, herd immunity could be achieved with few costs in health related to COVID.

Returning to the city of Manaus in Brazil, it is important to know that although just 6% of its population is over the age of 60[9], the high antibody level in the city still came at a high price – a death toll estimated between 2,500 and 3,400[8, 11], in a city of about 1.8 million. If we had the same overall per-capita death rate, to reach 66% antibody positivity would cost us between 6,100 and 8,300 deaths in Alberta. It is not clear what proportion of the deaths in Manaus were in those over age 60, but even if we assume that we could somehow completely protect those over 60 from infection, and that the risk of death from infection would just be in those living 'normally' (under age 60), there would still be a cost in deaths.

If we use our own Alberta data on the age-specific risk of death in those diagnosed with COVID[12], and if we assumed that reaching a 50% infection rate was sufficient for herd immunity (though many estimates are that a higher percentage would be required), infecting 50% of those in the Alberta population under 60 would cost approximately 1,000 lives in that same younger population.

Increased hospitalizations

Assuming we were willing to pay that cost in lives for the benefit of 'normal' life in younger age groups, the other thing to remember is that death is not the only severe outcome. Hospitalization and ICU admissions are also severe outcomes that are more common than death in all age groups. Again, assuming we could somehow successfully segregate those over 60 from those under 60, and using our own Alberta data for age-specific risk of hospitalization in diagnosed cases, we would expect over 39,000 hospitalizations to achieve an infection rate of 50% in the population under the age of 60.

Using diagnosed case fatality and hospitalization rates could over-state the risks, as not all cases are diagnosed, and those cases that are more severe are more likely to be diagnosed.

However, all serology studies in Alberta have consistently shown antibody prevalence in our population at present to be less than 1%. Assuming a maximum 1% infection rate as of early August (our last serosurvey timeframe for when we have results) and calculating a non-age-adjusted ratio of diagnosed cases as of mid-July (2 weeks prior to the time of serology testing – 9673 cases) to serologically positive Albertans (1% of the Alberta population is 44,219), we could estimate that actual infections may be about 4.6 times higher than what was diagnosed.

If we reduce the estimated deaths and hospitalizations in the under 60 population by 4.6, we would still have about 240 deaths and 8,600 hospitalizations as a consequence of a 50% infection rate in Albertans under 60. If these infections were allowed to spread unchecked over a short period of time (the Barrington document does not state for how long those over “retirement age” should be restrained in their movement, but commentary on the document suggests 3 months), the hospitalization volume alone would be sufficient to impair the ability of our acute care system to manage all the other health care needs of our population.

In order to manage the demand for hospital beds and ICU care, other services would have to be paused or stopped in order to care for the acutely ill. This would worsen, not improve, the outcomes of concern in the Barrington document such as cardiac care, cancer screening and childhood immunizations.

Long-term health impacts

In addition, while hospitalizations, ICU admissions and deaths are the most obvious severe outcomes of COVID-19 illness, there is a growing body of evidence on the long term impacts that some people experience after an infection with SARS-CoV2. These include prolonged illness[13, 14], sometimes called “Long COVID Syndrome”, which in some cases resembles Chronic Fatigue Syndrome, and emerging case reports of other possible long-term health impacts[15, 16] that could irrevocably alter the course of people’s lives.

Limits to any "Focused Protection"

Finally, the premise that we could successfully shield continuing care facilities and hospitals from COVID-19, and that we would be able to support all those over 60 (and presumably those with high risk chronic conditions) to stay home with limited activities is not supported by evidence. In fact, those who work in continuing care facilities and hospitals can unintentionally be the source of infection in these locations.

We are working hard to ensure that every protection possible is put into place to prevent these introductions, but no measures will be perfect. In addition, we heard very clearly that the quality of life for those in continuing care was severely worsened when no visitors were allowed in, highlighting the tension between COVID protection and overall wellbeing in these high risk locations.

In addition, those over the age of 60 are often still working, contributing in many diverse fields, and the impact of having them all stay home would be significant. For example, more than 30% of Alberta physicians in 2018 were over the age of 55, and 10% were older than 65[17], and removing them from the work force would be a poor choice in a time when health care is under significant pressure.

Finally, allowing the virus to spread rampantly in the age group under 60 would almost certainly result in impacts on critical services as those who are ill, even if the symptoms are mild, would need to be home for 10 days to prevent spread to those at high risk (for example, in health care settings) and critical sector continuity would be put at risk.

Balancing COVID-19 restrictions with protecting our overall health

So, is there anything that can be taken from the Barrington document? First, the societal risks of public health measures that it outlines are real, and are exactly the reason that in Alberta we moved early on to targeting restrictions only where and when they are needed. The Barrington document implies that “lockdown” is binary – all or none, and that no restrictions should be in place for the young. This is a false dichotomy. The best way to prevent severe illness and death from COVID-19 is to prevent large spreading events, quickly identify cases, trace and isolate contacts, and keep the spread of the virus to a manageable level. This is exactly what we are doing.

Second, we already have policies that accept some risks of transmission in younger populations knowing that the benefits of activities outweigh the risks for those populations. Examples include opening schools and supporting youth sports. We can learn from what is working well in these areas and continue to judiciously expand activities in low risk

populations as long as spread remains manageable.

We are not in lockdown in Alberta. We are using targeted measures to keep spread manageable and to ensure that our health system can cope with demands. We must continue to pursue this balanced approach, learning as we go along how best to minimize both the risks of public health measures and the risks of COVID-19. Herd immunity by natural infection is not a wise, or possibly even an achievable, goal to pursue.

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14. Long covid: How to define it and how to manage it
15. A case of probable Parkinson's disease after SARS-CoV-2 infection
16. New-Onset Diabetes in Covid-19
17. AHS Physician Workforce Plan and Forecast: 2018-2028 (PDF, 1.4 MB)

Dr. Deena Hinshaw

Dr. Deena Hinshaw was appointed Alberta's Chief Medical Officer of Health on January 28, 2019.

Learn more

THIS IS EXHIBIT "20" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

20

Scientific consensus on the COVID-19 pandemic: we need to act now

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has infected more than 35 million people globally, with more than 1 million deaths recorded by WHO as of Oct 12, 2020. As a second wave of COVID-19 affects Europe, and with winter approaching, we need clear communication about the risks posed by COVID-19 and effective strategies to combat them. Here, we share our view of the current evidence-based consensus on COVID-19.

SARS-CoV-2 spreads through contact (via larger droplets and aerosols), and longer-range transmission via aerosols, especially in conditions where ventilation is poor. Its high infectivity,[1] combined with the susceptibility of unexposed populations to a new virus, creates conditions for rapid community spread. The infection fatality rate of COVID-19 is several-fold higher than that of seasonal influenza,[2] and infection can lead to persisting illness, including in young, previously healthy people (ie, long COVID).[3] It is unclear how long protective immunity lasts,[4] and, like other seasonal coronaviruses, SARS-CoV-2 is capable of re-infecting people who have already had the disease, but the frequency of re-infection is unknown.[5] Transmission of the virus can be mitigated through physical distancing, use of face coverings, hand and respiratory hygiene, and by avoiding crowds and poorly ventilated spaces. Rapid testing, contact tracing, and isolation are also critical to controlling transmission. WHO has been advocating for these measures since early in the pandemic.

In the initial phase of the pandemic, many countries instituted lockdowns (general population restrictions, including orders to stay at home and work from home) to slow the rapid spread of the virus. This was essential to reduce mortality,[6,7] prevent health-care services from being overwhelmed, and buy time to set up pandemic response systems to suppress transmission following lockdown. Although lockdowns have been disruptive, substantially affecting mental and physical health, and harming the economy, these effects have often been worse in countries that were not able to use the time during and after lockdown to establish effective pandemic control systems. In the absence of adequate provisions to manage the pandemic and its societal impacts, these countries have faced continuing restrictions.

This has understandably led to widespread demoralisation and diminishing trust. The arrival of a second wave and the realisation of the challenges ahead has led to renewed interest in a so-called herd immunity approach, which suggests allowing a large uncontrolled outbreak in the low-risk population while protecting the vulnerable. Proponents suggest this would lead to the development of infection-acquired population immunity in the low-risk population, which will eventually protect the vulnerable.

This is a dangerous fallacy unsupported by scientific evidence.

Any pandemic management strategy relying upon immunity from natural infections for COVID-19 is flawed. Uncontrolled transmission in younger people risks significant morbidity[3] and mortality across the whole population. In addition to the human cost, this would impact the workforce as a whole and overwhelm the ability of health-care systems to provide acute and routine care. Furthermore, there is no evidence for lasting protective immunity to SARS-CoV-2 following natural infection,[4] and the endemic transmission that would be the consequence of waning immunity would present a risk to vulnerable populations for the indefinite future. Such a strategy would not end the COVID-19 pandemic but result in recurrent epidemics, as was the case with numerous infectious diseases before the advent of vaccination. It would also place an unacceptable burden on the economy and health-care workers, many of whom have died from COVID-19 or experienced trauma as a result of having to practise disaster medicine. Additionally, we still do not understand who might suffer from long COVID.[3] Defining who is vulnerable is complex, but even if we consider those at risk of severe illness, the proportion of vulnerable people constitute as much as 30% of the population in some regions.[8] Prolonged isolation of large swathes of the population is practically impossible and highly unethical. Empirical evidence from many countries shows that it is not feasible to restrict uncontrolled outbreaks to particular sections of society. Such an approach also risks further exacerbating the socioeconomic inequities and structural discriminations already laid bare by the pandemic. Special efforts to protect the most vulnerable are essential but must go hand-in-hand with multi-pronged population-level strategies.

Once again, we face rapidly accelerating increase in COVID-19 cases across much of Europe, the USA, and many other countries across the world. It is critical to act decisively and urgently. Effective measures that suppress and control transmission need to be implemented widely, and they must be supported by financial and social programmes that encourage community responses and address the inequities that have been amplified by the pandemic. Continuing restrictions will probably be required in the short term, to reduce transmission and fix ineffective pandemic response systems, in order to prevent future lockdowns. The purpose of these restrictions is to effectively suppress SARS-CoV-2 infections to low levels

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For the **WHO COVID-19 dashboard** see https://covid19.who.int/

that allow rapid detection of localised outbreaks and rapid response through efficient and comprehensive find, test, trace, isolate, and support systems so life can return to near-normal without the need for generalised restrictions. Protecting our economies is inextricably tied to controlling COVID-19. We must protect our workforce and avoid long-term uncertainty.

Japan, Vietnam, and New Zealand, to name a few countries, have shown that robust public health responses can control transmission, allowing life to return to near-normal, and there are many such success stories. The evidence is very clear: controlling community spread of COVID-19 is the best way to protect our societies and economies until safe and effective vaccines and therapeutics arrive within the coming months. We cannot afford distractions that undermine an effective response; it is essential that we act urgently based on the evidence.

To support this call for action, sign the John Snow Memorandum.

For the **John Snow Memorandum** see https://www.johnsnowmemo.com/

See **Online** for appendix

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THIS IS EXHIBIT "21" referred to in the Affidavit of Brent Roussin affirmed this 8th day of March, 2021.

A Barrister-at-Law in and for the Province of Manitoba.

21

AB2102

COVID-19 Infections in Manitoba:

Race, Ethnicity, and Indigeneity

External Report

March 1, 2021

Manitoba

Data from around the world has shown COVID-19 infections are not evenly distributed by population groups. To understand the situation in Manitoba, data is collected on race, ethnicity and Indigeneity (REI) information from people who test positive for COVID-19. This began on May 1, 2020.

Collecting REI data helps us know which communities the pandemic is affecting the most and how to help them. This is a component of reaching health equity.[1] Health equity means "that all people can reach their full health potential and should not be disadvantaged from attaining it because of their race, ethnicity, religion, gender, age, social class, socio-economic status or other socially determined circumstance."[2]

It is not race, ethnicity or Indigeneity that may increase the risk of COVID-19 infection. Rather, the structures of society place people at advantage or disadvantage. During challenging societal times such as the current pandemic, pre-existing inequities tend to be intensified, creating an unequal playing field in terms of how people experience and are affected by the spread of novel coronavirus. Data from around the world has shown that Black, Indigenous and People of Colour (BIPOC) are overrepresented in COVID-19 infections.

Systemic racism, that is the differential access to the goods, opportunities and services of society by race, determines where and how people are positioned to experience the pandemic.

The risk of being infected by COVID-19 may be increased through:

- exposures to COVID-19 through employment such as occupations that are direct service provision or considered essential work; part time work without paid sick time or benefits;
- some underlying health conditions;
- overcrowded or inadequate housing or experiencing house-lessness;
- stress from racism, discrimination and economic and social disadvantage; and
- barriers to accessing health care and social services.

Other factors, such as cultural and family gatherings, strong community networks and identity, and/or communal living, have important positive health and well-being effects. With COVID-19, it has been observed that some of these factors increase close contacts, and in some circumstances that has contributed to the spread of the virus.

Collecting and analyzing data helps public health officials to figure out what needs to be done to address differences in COVID-19 infections. Data also helps officials understand if the actions they are taking are making a difference.

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About REI Data Collection

The data collection process and data sharing is supported by an Advisory Working Group. This group is primarily Black, Indigenous and People of Colour. They have knowledge of and experience with this type of work and established relationships with their communities.

How REI Identifier Data are Collected

When a person tests positive for COVID-19 in Manitoba, regional public health staff ask them a question about their race, ethnicity and Indigeneity. While this question is a mandatory part of the case investigation (i.e. the question must be asked, and asked according to the script provided) it is voluntary to self-identify which REI group they belong to. Staff enter the responses into the Public Health Information Management System (PHIMS) used by Manitoba to track reportable illness.

More information on the process for this is available in the training video and script available at this link: https://sharedhealthmb.ca/covid19/providers/public-health-resources/.

The current REI identifiers were based on census categories and population sizes within Manitoba. They include:

REI Identifiers	**Examples of Possible Countries/ Regions of Origin**
African	Algeria, Cameroon, Cote d'Ivoire, Democratic Republic of the Congo, Egypt, Eritrea, Ethiopia, Kenya, Morocco, Nigeria, Somalia, South Africa, Tunisia[3]
Black	Canada, United States, Caribbean, Africa
Chinese	
Filipino	
South Asian	India, Pakistan, Bangladesh, Sri Lanka, Bhutan, Nepal, Maldives

[3] Note: There are 50+ countries in Africa. These examples are based on census information on place of birth for immigrants to Manitoba and this list should not be considered exhaustive.

Southeast Asian	Vietnam, Cambodia, Laos, Thailand, Singapore, Malaysia, Indonesia, Timor-Leste, Myanmar (Burma), Brunei
Latin American	Mexico, Brazil, Colombia, El Salvador, Guyana, Peru, Argentina, Venezuela, Cuba, other countries in Central and South America
North American Indigenous	
White	Canada, United States, Britain, France, other European countries, Australia, New Zealand
Other[4]	

REI Identifier Data Collection

Since the REI question was added on May 1, 2020, the collection of REI data has increased.

Table 1: Rate of REI question asked in Manitoba: May 1 to December 31, 2020

	Total Cases as of May 1	Total Asked[5]	Ask Rate
Total	24,582	16,448	67%

Potential Limitations to Collecting REI Identifier Data

There is wide variability among regional health authorities (RHAs) in how often the question is being asked, from 47 per cent to 81 per cent of the time. Since the demographics of regions also varies widely, this may significantly affect the population breakdowns that follow. Although this is a mandatory question, a number of factors contribute to variability in how often it is being asked, including system factors, reluctance to ask because of discomfort with the topic, or in situations where the public health nurse is struggling to get any information. That being said, even with the current data, public health officials can see very concerning trends and reliable and accurate information is needed to inform the public health response.

There is not concurrent collection of language information, so it is unknown how the question is being received or interpreted for people whose primary language isn't English.

[4] Examples of REI Indicators for Other include Nepalese, Mexican and Middle Eastern

[5] This is the number of times the question has been asked and the response entered into PHIMS.

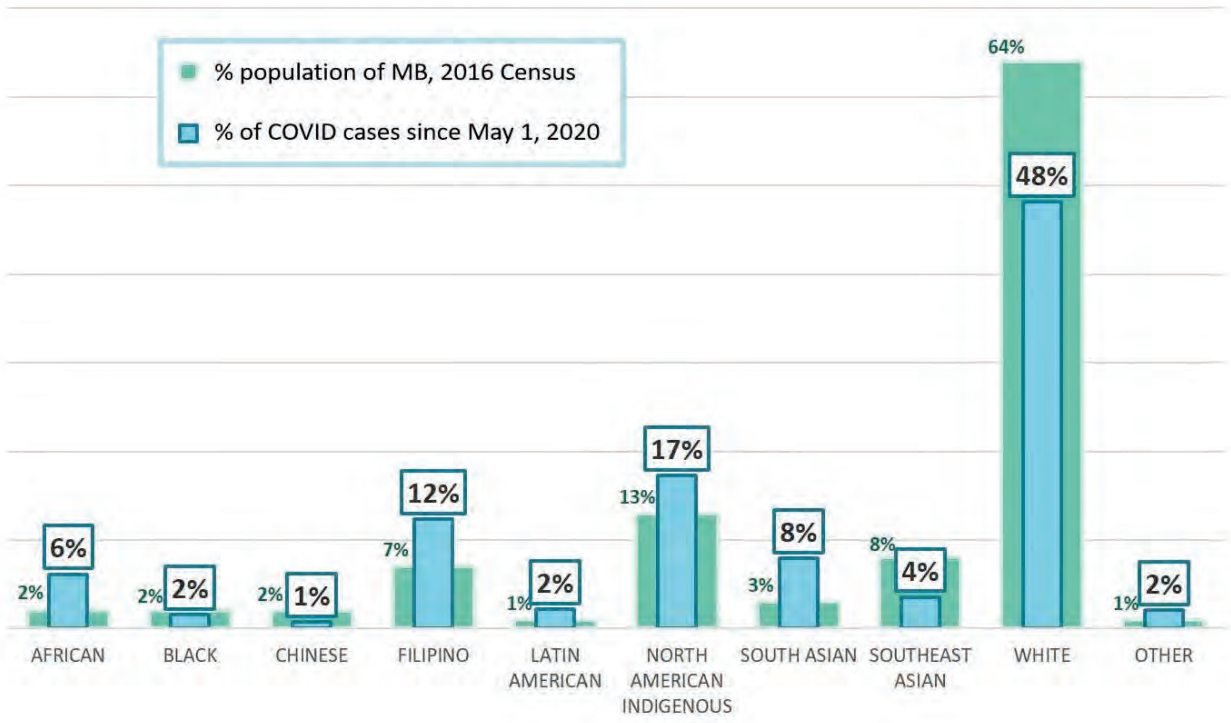
Findings

COVID-19 by Race, Ethnicity, and Indigeneity

Fifty-one per cent of people who have tested positive for COVID-19 in Manitoba from May 1 to December 31 self-identify as BIPOC. This is 1.5 fold higher than expected, as 35 per cent of people in Manitoba belong to a BIPOC group (Statistics Canada Census, 2016). This shows that COVID-19 is not equally distributed across population groups. Figure 1 shows this in more detail. This graph shows the share of COVID-19 cases by REI compared to the share of people in Manitoba who belong to each group.

These data tell us that some racialized groups, specifically African, Filipino, North American Indigenous, and South Asian, are over-represented in COVID-19 case counts. This also shows us that White people are under-represented by 16 percentage points.

Figure 1: Share of COVID-19 cases compared to the share of people living in Manitoba, by race, ethnicity, and Indigeneity (n=15,848: [May 1 to December 31, 2020]



Note: *The information in Figure 1 about "North American Indigenous" comes from the question on REI Identity and not the more specific question on Indigenous Identity that includes First Nations, Métis Nation, and Inuit specific identifiers. For more specific information on the First Nations experience of COVID-19, refer to the daily and weekly bulletins released by the Manitoba First Nations Pandemic Response Coordination Team.*

COVID-19 cases are evenly distributed by sex[6] across REI groups. Data shows:

- *Cases in Filipino people living in Manitoba show the greatest disparity in population size burden of COVID-19. Filipino women are slightly more affected by men.*
- *While South Asian people are overrepresented in cases, the burden of disease is higher in South Asian men.*
- *While people are underestimated in cases with the highest degree of differences (15 percentage points in women, 18 percentage points in men).*
    - The burden of disease is lowest for White men.
- North American Indigenous people are overrepresented in cases, with a similar burden between sexes.

[6]The case investigation forms include the options of male, female, intersex and unknown. It is not clear how this information is collected and could be carried over from previous chart/ information or self-identification. This limits interpretation of the gendered impacts of COVID-19.

Table 2: Differences in race or ethnicity case proportionality between men and women

COVID-19: OVERREPRESENTED POPULATIONS				
	FEMALE		MALE	
	% of female population	% of female cases	% of male population	% of male cases
FILIPINO	7%	13% (up 1.9-fold)	7%	11% (up 1.6-fold)
SOUTH ASIAN	2%	7% (up 3.5-fold)	3%	9% (up 2.9-fold)
AFRICAN	2%	6% (up 2.9-fold)	2%	6% (up 3.1-fold)
LATIN AMERICAN	1%	2% (up 2.0-fold)	1%	2% (up 2.3-fold)
OTHER	1%	2% (up 1.8-fold)	1%	2% (up 2.3-fold)
NORTH AMERICAN INDIGENOUS	14%	17% (up 1.2-fold)	13%	17% (up 1.3-fold)
COVID-19: UNDERREPRESENTED POPULATIONS				
BLACK	1%	2% (down 1.3-fold)	2%	2% (down 1.2-fold)
WHITE	64%	49% (down 1.2-fold)	64%	46% (down 1.3-fold)
CHINESE	1%	2% (down 1.2-fold)	1%	2% (down 1.6-fold)
SOUTHEAST ASIAN	8%	3% (down 1.6-fold)	8%	4% (down 1.5-fold)

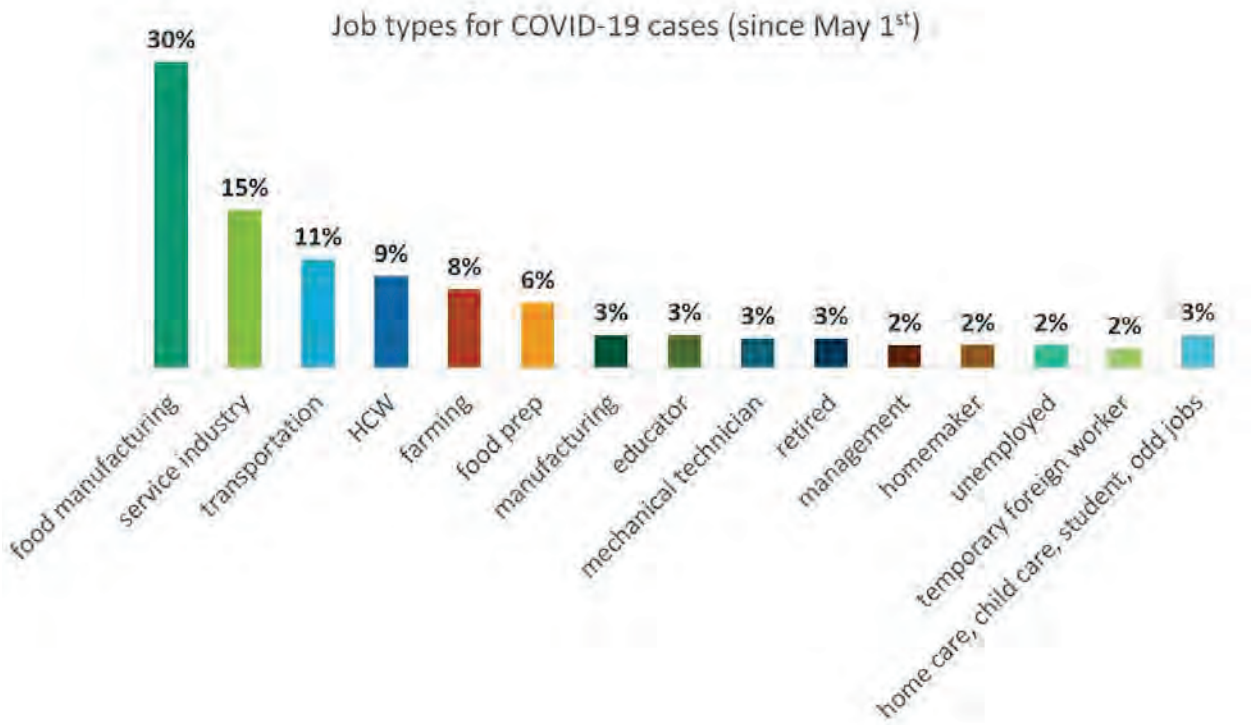
Contextualizing Disaggregated REI Data

In order to understand how race influences COVID-19 impacts, it is important that this disaggregated data be contextualized with other factors such as occupation, income and housing adequacy as examples of the way racialized experiences and opportunities impact this health outcome. We do not have all of this information at an individual level on the case investigation forms, but in the following sections we include what we can to highlight some patterns

COVID-19 by Occupation

At the time of data collection, 90% (710 people) of all cases were 15 years or older. Of those cases, 46% (324 people) provided their occupation. Among people who reported their employment status, 74% also reported their race/ethnicity (239 people). Figure 2 shows us that COVID-19 cases vary by type of occupation.

Figure 2: Employment of COVID cases 15 years and over (n=234): [May 1 – September 30, 2020]



This shows us that COVID-19 cases are over-represented in some occupations:

- food manufacturing;
- service industry; and
- transportation.

To better understand how COVID-19 rates by occupation affects different populations in Manitoba, we can look at how occupation varies by race, ethnicity and Indigeneity, as shown in Figure 3.

Figure 3: COVID-19 case occupations in BIPOC versus non-BIPOC communities compared to the same population in Manitoba (n=191 cases).[7]

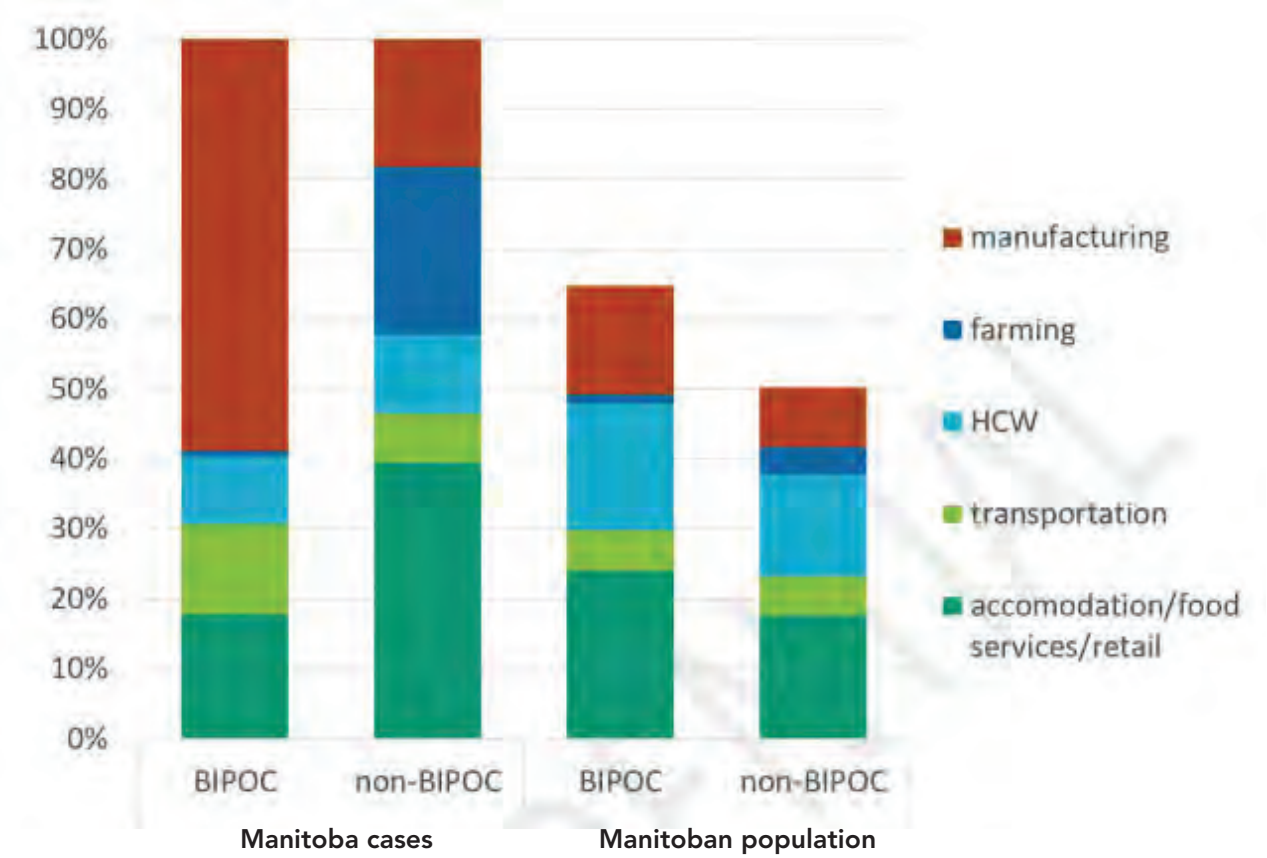


Figure 3 shows us that Black, Indigenous, and People of Colour are over-represented in the manufacturing labour sector, which has the highest rates of COVID-19 cases:

- 59 per cent of all COVID-19 cases in BIPOC communities report employment in manufacturing, a 3.3-fold increase over manufacturing among non-BIPOC community cases; and
- at 16 per cent of the Manitoban workforce, members of a BIPOC community working in manufacturing are overrepresented 3.7-fold.

There are significant limitations to the use of occupation data from the case investigation forms because of the lack of standardization and incomplete data available. Within the currently available data, it can be seen that BIPOC are more likely to be in the occupations that are most commonly reported by COVID-19 cases. This does not necessarily mean that the acquisition source was the occupational setting.

[7] Note that the employment categories have been collapsed to better reflect the census categories. In doing so, only 80 per cent of cases (191 people) could be used in this figure. Also, the entirety of the Manitoban labour force are not represented in Figure 3, as only sectors reported by COVID-19 cases in Manitoba have been presented.

Updates: March 2, 2021 – Updated Table 2, updated dates for Figure 2