



Office of the Chief
Science Advisor of Canada

Bureau du conseiller
scientifique en chef du Canada

Submission to the Standing Committee on Health (HESA)

Briefing from the Chief Science Advisor of Canada
on the response to the COVID-19 pandemic

May 19, 2020

1 – Introduction

Dr. Mona Nemer was appointed as Canada’s Chief Science Advisor on September 26, 2017, with a mandate to support the Government of Canada’s decision-making processes.

More specifically, her mandate can be broken down into four key areas:

Science advice: ensuring scientific analyses are considered in Government decisions, coordinating expert advice to Cabinet, and providing recommendations on ways to improve the Government’s science advisory function.

Open science: providing advice and guidelines for Government science to be fully available to the public, and for federal scientists to be able to speak freely about their work.

Better science: recommending ways for the Government to better support quality scientific research within the federal system.

Science diplomacy and outreach: promoting a positive and productive dialogue between federal scientists and academia, both in Canada and abroad, and raising awareness about scientific issues.

Since the beginning of the COVID-19 pandemic, the Chief Science Advisor of Canada has had the opportunity to make contributions that involved all four of these areas.

2 - The Chief Science Advisor’s involvement in response to COVID-19

As the Government response to COVID-19 was ramping up, the Chief Science Advisor put in place advisory structures to enable the federal government to have timely access to diverse experts from the public, private and academic sectors. For this, she assembled a fifteen-member science expert panel of leading biomedical, clinical, risk and behavioural scientists, as well as disease modellers. In addition to their role on the expert panel, members have also participated, along with additional colleagues, in more theme-focused expert groups and task forces (see Appendix A).

The **COVID-19 Expert Panel** has been meeting regularly since March 10 to discuss ongoing clinical and scientific challenges and best practices for pandemic response in Canada.

The Chief Science Advisor is also co-chairing two expert groups with the Deputy Minister of Health Canada:

The **Expert Group on Health Systems** provides practical advice on issues regarding health services needs and innovation. This group has been most helpful in making sense of emerging health systems issues. Its members have also assumed leadership of task forces, recruiting additional experts from across the country to answer very specific questions.

The **Expert Group on Disease Modeling Approaches** reviews modelling approaches used to predict and manage disease spread, and identify hot spots in provinces and territories, as well

as determine recovery strategies, data accessibility and data gaps. This group has been extremely helpful in making sense of model-based predictions and clarifying data needs.

Task forces were also used to quickly assemble expert perspectives relevant to addressing specific emerging issues in the COVID-19 response.

The **Task Force on Reprocessing of Respirators/N95 Masks** examined available evidence on reprocessing and re-use of N95 face masks (also referred to as respirators) and provided recommendations regarding decontamination technologies and the reuse of reprocessed masks in light of potential shortages.

The **Task Force on Ventilators** explored approaches to ensure that federally acquired ventilators go to the right places at the right time.

The **Task Force on Virtual Care** examined opportunities for the rapid and orderly deployment of virtual care in support of COVID-19 containment efforts.

The **Task Force on Long-Term Care** provided recommendations on how to address the unique challenges of combating COVID-19 in long-term care homes.

The **Task Force on Data Analytics** examined health system capacity as well as data collection frameworks needed to support optimal activity planning. In other words, what data should be captured, how it can be gathered and how it can be accessed.

In addition to the experts that have been assembled through the Office of the Chief Science Advisor, the Canadian Institute for Advanced Research (CIFAR) convened an expert group, at the Chief Science Advisor's request, on technology use in pandemics. CIFAR provided a report on legal and ethical considerations for technology use entitled "[Society, technology and ethics in pandemics](#)".

In the context of the COVID-19 crisis, the Chief Science Advisor has regular exchanges with the Prime Minister, the Deputy Prime Minister, and the Ministers of Health and of Innovation, Science and Industry.

The Chief Science Advisor has also been involved in science coordination efforts within the Government with respect to medical countermeasures and diagnostic testing. She has worked with the broader science and research community at a time when academic researchers were stepping up their efforts to learn more about the virus, but also as they and their institutions were offering to support the Government's testing and tracing efforts. Among other things, the Chief Science Advisor helped set up CanCOVID, a pan-Canadian research platform to optimize collaboration during the COVID-19 crisis. More than 2000 researchers are registered on the CanCOVID platform, which testifies to the extraordinary engagement of the Canadian scientific community in the response to the pandemic. CanCOVID also provides a valuable database of Canadian experts in multiple fields relevant to the management of the pandemic.

In parallel to her domestic engagement, the Chief Science Advisor has been actively involved with several international discussions related to science advice in managing the pandemic. Chief science advisors (or equivalents) from a dozen countries, including Australia, France, Germany, India, Italy, New Zealand, South Korea, the United Kingdom and the United States, have been meeting weekly for the past two months. Participants discuss the dynamic developments and challenges of the pandemic, its evolving characteristics in different countries and at different times. They also share data and information on social and medical measures. These interactions have provided important insight, as well as opportunities for coordinating research and science advice. A tangible example of this international effort was the group's call to publishers to make COVID-19 scientific publications openly accessible to all, which the publishers quickly agreed to. This has meant that research results are now quickly disseminated and used by decision makers and scientists alike to help manage the pandemic everywhere. It is an unprecedented development that is supporting scientific data sharing at a rate never witnessed before.

3 - State of COVID-19 science and policy impacts

Over the past few months, our knowledge of the new SARS-CoV2 virus that causes COVID-19 has rapidly progressed but there are still many unknowns that affect disease prevention and management. Key areas include:

Disease susceptibility: Not everyone in the population appears to have similar risk of infection, but it is unclear how exposure to different viral loads results in different individual response. This knowledge is relevant to prevention measures in different settings.

Infectivity: Infected individuals are contagious two to three days prior to symptoms onset until around seven days thereafter. This implies that significant transmission comes from asymptomatic individuals and creates an added challenge for case detection and for controlling transmission.

Disease outcome: Older age and chronic pre-conditions such as cardiovascular disease, diabetes or obesity, have been associated with higher risk of poor COVID-19 outcome for reasons that remain unexplained. Canadian experts have pointed out to the need for harmonized quality data collection and sharing to sort out confounding variables and use available data to more precisely guide disease management in the Canadian context.

Prevention and treatment: In the absence of acquired immunity or an effective vaccine, avoiding exposure to the virus is the best prevention. Vaccine development is underway, including in Canada, using a wide range of classical and novel approaches. It will take 12 months or more before clinical efficacy and safety of one or more vaccine is confirmed, and longer for mass production and vaccination. The fact that success cannot be guaranteed should be kept in mind and therapeutic approaches should be pursued in parallel.

With respect to treatments, very few broad-acting antiviral drugs are available. Several clinical trials to test the efficacy of existing drugs are ongoing but so far the results are disappointing. The development of new antiviral drugs should be considered in parallel to vaccine production efforts. Successful management of Hepatitis C and HIV with antiviral therapies is a case in point.

Diagnostics: The availability of the genetic sequence of the virus enabled the development of a laboratory-based molecular (qPCR) test to detect infected individuals. This multi-step test requires specialized equipment and personnel and highly sought-after reagents. Dependence on international supply chains has hindered Canadian testing efforts. Notwithstanding its high sensitivity and accuracy, the qPCR test is not ideal for remote areas or for situations requiring faster or repeated screening (for example, at borders or in primary care).

The qPCR test provides a snapshot of the infected population at a specific time. However, determining the prevalence of the disease (percentage of the population that has already been infected) requires testing for the presence of antibodies in individuals. The **Immunity Task Force** was set up to coordinate pan-Canadian serology efforts, which will help to better understand the epidemiology of the disease including infection and fatality rates. The data will also inform vaccine development. However, to determine whether previous exposure protects against future infection, immunological studies will need to be carried out.

4 – Prospective

Until a vaccine is available, Canada and the world will need to live with COVID-19, minimize flare-ups and prepare for possible new waves. As confinement measures are relaxed and the economy reopened, it will be important to strengthen infection detection and contact tracing efforts, and better protect vulnerable populations and settings. Meanwhile, the scientific community will continue to gather more data to better understand both the virus and the disease it causes. Similarly, with better data collection and management, the results of ongoing screening and testing efforts across the country will shed further light on infection susceptibility and on risk factors for poor outcome. Analysis of COVID-19 infection, symptoms and transmission in children is important and is getting underway. Together, these efforts are instrumental for our ongoing preparedness to live with and overcome the virus.

Around the globe, countries are stepping up their efforts in key areas that include:

1. Deploying robust and agile systems for virus testing and contact tracing as well as understanding the level of the population that has been exposed to the virus.
2. Standardization of data collection in the context of COVID-19 testing and health management, and protocols for sharing and mining the data (including using AI-supported tools) to better understand the disease epidemiology and in turn prepare for

possible future waves.

3. Expanding local manufacturing of personal protective equipment as well as COVID-19 diagnostics and medical countermeasures.
4. Expanding research and development efforts and considering approaches to national health security across the entire medical supply chain.
5. Strengthening health emergency preparedness including at the level of multidisciplinary science advisory function.

In Canada, the pandemic is highlighting the critical value of research networks and the importance of coordination between different initiatives, sectors and levels of government. We are playing catch-up right now, but current R&D investments will hopefully result in a more attractive and sustainable environment for infectious disease research and development. This must be sustained post-COVID-19 in order to be prepared for future infectious disease epidemics.

COVID-19 has shown that science and research play a critical role in understanding and responding to health emergencies. Let us ensure that Canada's strong research ecosystem and scientific excellence continues to be mobilized for the benefit of all Canadians.

Structure of the scientific advisory committees on COVID-19

