



EXECUTIVE SUMMARY

COVID-19 Pandemic: The Impact on Canada's Intensive Care Units

June 2022

An RSC Policy Briefing

The COVID-19 pandemic has challenged our ability to deliver life-saving acute and critical care to Canadians more than any other stress to the healthcare system in our recent history. It has exposed the precarious demand-capacity balance that has evolved in Canadian health care; one where capacity *just matches* demand during most periods of the year.

In its 2016 report on intensive care units (ICUs) in Canada, the Canadian Institute for Health Information (CIHI) found that ICUs had an average occupancy of 86 percent and 90 percent in large urban hospitals and teaching hospitals, respectively. This indicates that for significant periods of time, occupancy rates are nearly 100 percent, particularly at times of high demand such as during “influenza season” in the winter and during a busy “trauma season” in the spring and summer. High ICU occupancy rates, particularly those above 80 percent, have been shown to be associated with ICU mortality, hospital mortality, and ICU readmission within seven days of discharge. Based on this, it has generally been advised that ICUs should have an average occupancy of no more than 80 percent to be able to respond to surges in demand.

In addition to augmenting public health and acute health care capacity in Canada, this pandemic has shown us the need and value of cooperation across health systems. Without the regional and inter-provincial/territorial cooperation and transportation of critically ill patients that was undertaken, many more patients would have suffered or died from an inability to receive the care they needed. This is a demonstration of the ability and necessity to evolve our federally supported and provincially/territorially administered system of acute care to one that is more nationally connected and perhaps federally incentivized as a component of the transfer payment system.

It is also now clear that an effective health system response to a new illness demands the readiness to conduct the research needed to establish effective treatment on a national basis. The most efficient mechanism to quickly learn what does and does not work is to have a pre-existing national network of research infrastructure – investigators and research coordinators as part of a durably funded national acute and critical care network, conducting clinical trials, with pre-existing research ethics and contract agreements. National funders, regulators, research ethics boards, and researchers need to be ready to respond immediately to a declared public health crisis with input from patients, the population, and other stakeholders. In addition, involved stakeholders need to establish focused national observational and experimental research priorities that this network will turn its attention towards, focusing on sufficiently powered research designs that will definitively answer questions, as opposed to many individual and uncoordinated projects.

We have learned that pandemics have long-lasting effects on patients, health care workers, and the general population. An important element of this pandemic response should now be focused on preventing and treating post-COVID-19 syndrome in patients, supporting the mental and

physical health of health care workers and solidifying the national research infrastructure needed to respond to the next health care crisis.

We must not forget what we have learned and continue to prepare for the next pandemic. In its 2004 report, The National Advisory Committee on SARS and Public Health found that there was much to learn from the outbreak of SARS in Canada - in large part because too many earlier lessons were ignored.

In 2006, Mr. Justice Archie Campbell, Chair of the SARS Commission wrote:

“SARS taught us lessons that can help us redeem our failures. If we do not learn the lessons to be taken from SARS, however, and if we do not make present governments fix the problems that remain, we will pay a terrible price in the face of future outbreaks of virulent disease”.

Canada needs to understand the impact of the COVID-19 pandemic on the country and to prepare for the next pandemic. As of June 5th, 2022, this pandemic has caused the deaths of 41,354 Canadians over 26 months, a higher death rate than that seen in World War II in which 45,500 Canadians died over 5 and a half years. Viruses are jumping across species constantly and new outbreaks are likely to occur more frequently as humans increasingly encroach on other species’ habitats. Future pandemics caused by novel pathogens with case fatality rates higher than experienced with COVID-19 are not only likely but are inevitable.

High levels of immunity to COVID-19 must be maintained in the Canadian population

Although most people becoming sufficiently sick from COVID-19 to require hospitalization have been unvaccinated, fully vaccinated individuals represent 20 to 25 percent of hospitalizations and 10 to 12 percent of ICU admissions. These serious breakthrough infections are typically occurring in older individuals more than 6 months following their second vaccination shot. However, younger, apparently healthy fully immunized individuals are also contracting the infection, possibly due to a combination of decreasing levels of neutralizing antibodies over time and transmission from infected individuals with high viral loads and new variants. In Ontario, according to the Science Table, even with the omicron variant, unvaccinated people are currently almost six times more likely to be hospitalized, and almost 12 times more likely to require care in an ICU, than a person who has received two or three vaccines and booster shots. Put simply, the best way to prevent our ICUs becoming overwhelmed by COVID-19 infections again is to maintain a high level of immunity, including booster shots in the Canadian population.

Vaccination against a viral pathogen with such high prevalence globally is without precedent and we, therefore, have found ourselves in uncharted waters. However, as long as vaccines remain effective, a higher uptake of the vaccines will: (1) reduce the number of COVID-19-related deaths, (2) stem the spread of the transmissible strain of the virus, (3) reduce risk of other, potentially more, virulent strains evolving in the future, and (4) dramatically reduce the impact of the pandemic on our healthcare systems.

Without maintenance of immunity, Canadians and the health care system remain at risk. Public health officials and the medical profession must work to gain the trust of the population regarding the benefits of vaccination and work to increase the percentage of people who are fully immunized, recognizing that the definition being fully immunized will evolve over time.

Canada's ICU capacity must be expanded significantly

The ability to increase ICU capacity in response to a surge in critically ill patients is severely lacking and has been the case for some time in many provinces in Canada. Consequently, each province must consider how to increase the number of staffed ICU beds available for invasive mechanical ventilation and multiple organ support. In the first instance, this will require accurate regular reporting of the number of staffed, funded ICU beds available for the care of a critically ill patient requiring mechanical ventilation. Subsequently, funding will be required to expand existing ICUs and build new ones, as well as funding for the increased numbers of healthcare professionals needed to deliver critical care. This will require careful consideration at all levels of government and, likely, federal financial support. The eventual model would see an average occupancy in Canadian ICUs of no more than 80 percent, but with clear plans to rapidly increase ICU beds to 200 percent of regular occupancy in the event of a severe surge or another pandemic.

Since most ICUs in Canada operated at, or close to, 100 percent occupancy prior to the pandemic, an average increase of at least 20 percent in ICU beds over current capacity is necessary nationally, although some provinces will require a significantly higher percentage as their current ICU capacity is insufficient. One of the challenges is being able to allocate skilled human resources to other tasks when ICUs are less busy and being able to repatriate them when demand for critical care increases.

Critical care professionals must be retained, and new professionals recruited

New hospitals and ICUs are of little value without trained health professionals to work in them. Even prior to the pandemic, there was a shortage of nurses, including in ICUs. Critical care professionals have been warning of an impending workforce shortage, especially in ICUs, during the remainder of this pandemic and into the future. Because of the stress, ICU staff are struggling, many have already left their positions, and some are leaving the profession entirely. Unfortunately, it is likely that more professionals will leave in the coming months and years.

There has been extensive media coverage and concern expressed by professional associations about the physical, mental, and psychological impact of COVID-19 on the critical care workforce. Twenty-five months of constant exposure to suffering, death, and dying in understaffed, under-resourced, and often unsafe working environments have led to serious and potentially long-term negative consequences and strain on the health of critical care professionals including RNs, RTs, intensivists, and support staff.

Timely and easily accessible psychological services should be made available to the critical care staff since many have yet to process the traumatic experience they are currently living and have yet to unravel the extent of their emotional distress. This may have a significant impact on the retention of critical care staff at the end of this pandemic. It has been suggested that workplace violence, staffing shortages, and health care burnout are all connected.

An additional factor causing further moral distress in critical care staff is the inappropriate behaviour toward them by a vocal minority of patients, family members, and sections of the public. Critical care professionals are being exposed to verbal abuse that includes sexist and racist hate messages, as well as angry notes on their vehicles, death threats, baseless complaints, assault, anger, and mistrust, particularly during the 4th wave. These acts of violence are not only contributing to workers worsening mental, psychological and physical health, but is putting their

lives and safety at risk. The Canadian Medical Association and the Ontario Medical Association are calling for legislation to protect health care workers and patients from aggressive protestors.

The impact of this ongoing pandemic on the critical care workforce cannot be minimized. It is imperative that governments, hospitals, and health authorities implement strategies to train, retain and recruit this immensely valuable highly skilled workforce to ensure the delivery of quality care to Canadians that require care in our ICUs.

Canadian acute care hospitals must be upgraded

Many older hospitals in Canada struggled during waves of the pandemic to even provide an adequate and consistent supply of oxygen under the burden of the numbers of seriously and critically ill patients.

The heating, ventilation, and air conditioning (HVAC) systems in many older hospitals have not been upgraded to the current standard (12 air exchanges per hour) required when aerosol generating procedures are performed. When designing new hospitals, it is important to incorporate features that prevent airborne transmission of pathogens. Patients admitted for non-COVID-related illnesses were placed in rooms and open wards where they contracted the infection. Hospitals across Canada have reported significant numbers of outbreaks of hospital acquired COVID-19 infections that have resulted in illness and deaths of vulnerable patients and staff.

ICUs in many hospitals struggled with having to place two patients in cubicles built and equipped to care for one patient. It is time to examine the state of our acute care hospitals in Canada, consider how we can upgrade our hospital infrastructure to modern standards, where necessary, and to construct modern, state-of-the-art hospitals.

New hospital buildings must be acuity adaptable

As new hospitals and wings are planned and constructed across Canada, careful consideration should be given to incorporating acuity adaptability into the design and functionality of these new buildings. In particular, consideration should be given to supplying regular medical/surgical units with additional gas, suction, power, and data outlets so that they can be readily converted to the care of critically ill patients. In addition, these hospitals should have concealed gas, vacuum, power plumbing, and data outlets in non-clinical areas such as conference rooms, underground car parks, and even entrance hallways to enable those areas to become medical units in the event of a pandemic.

We must understand that SARS-CoV-2 is not finished with us

While it is widely hoped that the combination of immunization and natural infection is leading to the end of the pandemic, it is now clear this virus and future variants are not yet finished with us. The appearance of omicron and its many subvariants, make it clear that the virus has the capacity to mutate frequently and to create variants that have the potential to evade the immunity provided by our vaccines. Although fewer individuals infected with omicron have become seriously ill, this variant is so much more transmissible that hospital systems have been put under severe pressure. It has been widely stated that as viruses evolve, they tend to become more efficient at transmission and to also cause less serious illness after two years of dealing with COVID-19. However, the reality is that RNA viruses, such as SARS-CoV-2, mutate in a random fashion so there is no reason they cannot also cause more serious disease. In this respect, higher transmission rates increase the

evolutionary potential of the virus by increasing the input of new mutations, potentially resulting in even more virulent strains.

In a best-case scenario, COVID-19 will become endemic. A pandemic is an emergency, with disease spreading out of control across countries and continents. “Endemic” suggests the infection is regular, present intermittently and predictable. However, if the pandemic stages fades and COVID-19 becomes endemic, it is critical that diagnostic testing capacity is not lost, that appropriate stores of personal protective equipment are maintained and that health systems remain capable of responding to new surges of the disease.

The federal and provincial governments must conduct honest and open in-depth reviews of their pandemic responses and initiate the development of a system of coordinated responses

The Canadian provinces have varied greatly with regards to when and how they implemented public health restrictions and vaccination mandates. Despite pleas from intensivists and public health experts, some provinces delayed the implementation of effective public health measures resulting in needless deaths and the eventual requirement to evacuate critically ill patients to hospitals in other provinces. Similarly, as COVID-19 cases surged in the early autumn of 2021 some provinces prematurely discontinued public health measures and ignored pleas from experts. Additionally, some provinces delayed the implementation of vaccine mandates and have been the first to remove them, as well as masking requirements. It is evident that it is unwise for jurisdictions to rely on vaccines alone, particularly when their rates of vaccination, including booster shots is low. It is also apparent that the timing of initiation and removal of public health measures is vital to manage the severity of surges of severe illness due to COVID-19.

Despite messaging from some provinces, the pandemic is not yet over, and COVID-19 is not yet endemic. It is vital that each province and territory should perform an open and honest interim analysis of their individual responses and that the Government of Canada should conduct an interim review of the impact of the pandemic on health systems in the country to determine how to manage future waves of infection from yet unknown variants.

Formal mechanisms need to be developed to ensure consistency in public health responses, in line with acute hospital and critical care capacity across Canada. Additional mechanisms need to be developed to rapidly facilitate licensing requirements for health professionals being redeployed from one province to another. The Government of Canada must be prepared to enact the necessary emergency powers to protect its citizens, regardless of where they live, should the provinces not act appropriately if a new highly resistant variant develops.

The following is a list of other recommendations in the report

- Accurate national data should be collected on the number ICU beds capable of providing mechanical ventilation and other necessary supportive care to patients with multiple organ failure.
- In addition to increasing ICU capacity and staffing, as recommended above, a selected group of non-ICU nurses in each hospital should be trained in critical care and be available if required. Their skills should be maintained by intermittent scheduled shifts in the ICU.

- Although the PICUs provided substantial assistance to the care and outcomes of adults, it may be more efficient to maximize adult ICU capacity and to send staff to the adult ICUs rather than send adult patients to PICUs.
- Strategies need to be implemented now to ensure appropriate use of adult and PICU resources during future crises.
- Provincial licensing bodies should be prepared to rapidly provide licenses for intensivists and other ICU health professionals from other provinces and territories in the event of a surge in demand for ICU beds.
- Health Canada, the Department of National Defence, and provincial departments of health should prepare contingency plans for the evacuation of critically ill patients to ICUs in other provinces in the event a province's ICUs are being overwhelmed.
- ICU Triage Plans should be standardized across all provinces and territories and the public should be made aware of their existence.
- With appropriate precautions, family members and close friends should be able to visit patients in the ICU.
- Increased funding should be allocated for the development and operation of specialized ICU Survivor Clinics. These would provide ongoing care in a holistic manner, including mental health issues, for patients with Post Intensive Care Syndrome.
- Strategies should be implemented to actively monitor the well-being of the critical care staff to prevent moral and psychological distress, and to ensure that the impacts of workload changes are properly understood and mitigated where possible.
- Mental Health Liaison Teams should be developed to facilitate and assist families navigating the system, and to ensure they receive appropriate mental health support in the community
- Clinical research must be integrated into and across our health systems.
- A discussion should be initiated on the lack of clinical research within Canadian health systems, and its consequences.
- Clinical and biological data should be collected nationally for research purposes.
- A standard trial contract agreement template, should be available at research institutes across Canada.