

Sonny Thiara, MD, Bonnie Henry, MD, David Patrick, MD, MHSc, Hussein Kanji, MD, MSc, MPH

# British Columbia's COVID-19 experience

BC's success in managing COVID-19 to date can be attributed, in part, to a timely and comprehensive public health response.

**ABSTRACT:** Since the emergence of COVID-19 in late 2019, health care systems around the world have been dealing with the pandemic. Mortality rates of patients admitted to ICUs and placed on mechanical ventilators were a concern initially. We sought to compare the burden of disease that BC has experienced with that of other Canadian provinces and other countries. In March 2020, 66.7% of the COVID-19 deaths in Canada had occurred in BC, but by 11 July 2020, the proportion had declined to 2.1%. In April 2020, critical care mortality and mechanical ventilator mortality of New York patients with COVID-19 was 78.0% and 88.1%, respectively. As of 8 July 2020, critical care mortality and mechanical ventilator mortality of BC patients with COVID-19 were 16.6% and 15.4%, respectively. Overall, BC has experienced a lower burden of disease and significantly lower critical care mortality

than described in initial reports from China, Italy, and New York. This is likely due, in part, to a timely public health response that included broad early testing and case and contact management, travel and mass gathering restrictions, physical distancing measures, and prevention of "superspreader" events. BC has also benefited from decisive action by hospital administrators, and the sharing of data and resources such as ventilators and personal protective equipment. To ensure that inpatient mortality in ICUs does not increase in the event of another wave of COVID-19, contingency plans must be put in place. Capacity should be built into the system so that staff-to-patient ratios allow for optimal patient care, personal protective equipment is available to protect staff, and isolation room availability is increased.

and an 88.1% mortality rate for patients who required mechanical ventilation.<sup>6</sup>

The experience with COVID-19 in BC has been different than in other jurisdictions. Although BC has approximately 13.4% of the Canadian population,<sup>7</sup> on 20 March 2020, the province recorded 29.0% (n = 271) of Canada's COVID-19 cases and 66.7% (n = 8) of the country's COVID-19 deaths.<sup>8</sup> However, by 11 July 2020, BC had recorded 2.8% (n = 3053) of Canada's COVID-19 cases and 2.1% (n = 187) of the country's COVID-19 deaths.<sup>9</sup> As of 8 July 2020, 16.6% (36 of 217) of critical care COVID-19 patients in BC had died, and 15.4% (20 of 130) had died while mechanically ventilated, according to Provincial Health Services Authority data.

Initially in March 2020, BC testing focused on sicker patients and health care workers. This led to concern that subsequent case counts could underestimate the size of the epidemic; however, universal testing of suspect patients resumed on 21 April 2020. As of 11 July 2020, the cumulative testing rate in BC was approximately 3.6% of the population, compared with 10.9% in Ontario and 7.9% in Quebec.<sup>9</sup>

Hospital admission rates, which may represent a more accurate, albeit delayed, account of COVID-19 trends in BC than confirmed cases, have not dramatically increased as initially projected. During May and June 2020, admission rates decreased or were constant, likely the result of timely and stringent physical distancing measures.<sup>8</sup>

Overall, BC has experienced a lower burden of disease and significantly lower critical care mortality than described in initial reports from China, Italy, and New York.

**A** novel coronavirus, SARS-CoV-2, was first identified in December 2019 and resulted in cases of pneumonia in Wuhan, China.<sup>1</sup> Since then, SARS-CoV-2 has spread rapidly around the globe. On 11 March 2020, the World Health Organization declared COVID-19 a pandemic.<sup>2</sup> As of 6 September 2020, more than 27 million people worldwide have been infected and more than 900 000 have died.<sup>3</sup>

## Jurisdictions compared

Initial reports from China showed mortality rates ranging from 38.0% to 97.0% for patients in ICUs.<sup>4,5</sup> On 22 April 2020, Richardson and colleagues reported that 320 of 2634 patients with COVID-19 in the New York City area (12.2%) required mechanical ventilation.<sup>6</sup> In that case series there was a 78.0% mortality rate for patients who were admitted to the ICU

---

*Dr Thiara is an intensive care specialist in the Department of Critical Care at Vancouver General Hospital and the University Hospital of Northern British Columbia. Dr Henry is the Provincial Health Officer, Ministry of Health, for British Columbia. Dr Patrick is the director of research for the BC Centre for Disease Control. Dr Kanji is an intensive care specialist in the Department of Critical Care at Vancouver General Hospital.*

---

*This article has been peer reviewed. It was written in April 2020 and accepted for publication on 26 June 2020, and figures were last updated in September 2020.*

## Public health response

BC's success in limiting the spread of COVID-19 and avoiding an initial hospital bed resource crisis is likely due to a timely public health response and some unknown variables. The public health response included broad early testing and case and contact management, travel and mass gathering restrictions, physical distancing measures, and prevention of "super-spreader" events.

The first case in BC was recorded on 28 January 2020 and involved a traveler returning from Wuhan.<sup>10</sup> On 7 March 2020, the first two cases at the Lynn Valley Care Centre in North Vancouver were reported.<sup>11</sup> One resident and one staff member were diagnosed; the staff member was likely Canada's first case of community transmission. By 13 March 2020, the Canadian government had recommended against international travel.<sup>12</sup> On 17 March 2020, a BC public health emergency was declared, and a province-wide state of emergency was declared the next day.<sup>13,14</sup> Since May 2020, there have been very few new hospitalizations or critical care admissions in BC.

Case fatality, critical care admission, the need for mechanical ventilation, and the duration of mechanical ventilation are important indicators of the severity of illness, the burden on the health care system, and the ability of patients to regain quality of life postinfection. Management of patients who are critically ill with COVID-19 is emergent and based mostly on first principles, with clinicians around the world collaborating and sharing their experience because of a lack of high-quality randomized control trial data. Most COVID-19 patients in BC are cared for in tertiary or quaternary critical care units and are managed by specialty-trained (fellowship) intensive care physicians. Managing patients with COVID-19 can involve additional delays in care related to the need to use personal protective equipment (PPE) to prevent disease transmission to health care staff and the need for a high index of suspicion regarding complications and deterioration. Given the new stressors and potential delays in care, maintaining and even increasing the ratio of health care providers to patients has been required, specifically in our dedicated COVID-19 units.

Decisive action by hospital administrators and a collaborative provincial response allowed hospitals in BC to create capacity by limiting the number of elective surgeries and transplant programs. This process was aided by multiple collaborative groups and committees with widespread representation of various specialties, including the BC COVID-19 Therapeutics Committee. Also, new physical space and capacity for ventilated and critically ill patients was created by restructuring areas of care. Having critical care nurses, respiratory therapists, physiotherapists, dietitians, and pharmacists working alongside intensive care specialists who had a manageable patient load and were not limited by the number of critical care beds may have resulted in lower mortality rates than previously reported. As a result of diligent preparation and PPE training by ICU managers and directors, the largest ICU in BC, which employs more than 200 allied health practitioners, had zero confirmed cases of COVID-19 transmission from patient to staff from late January to late June 2020.

BC was also able to mobilize intensivists from its various health authorities through the coordination of the British Columbia Critical Care Working Group supported by the BC Patient Safety and Quality Council. Mobilizing the previously created provincial network allowed for the sharing of data and resources such as ventilators and PPE, and supported the creation of a real-time provincial COVID-19 capacity and resource critical care dashboard. The regular clinical sharing this permits has fostered further collaboration and contributed to overall enhanced care.

## Plans for the future

We have undoubtedly been lucky in our experience to date and should not take credit for factors outside of our control. Modeling shows there is considerable potential for further waves of COVID-19 transmission in the months and years to come.<sup>15</sup> The creation of

a vaccine is likely many months away, and we are almost certainly well below a herd immunity threshold.<sup>16</sup> Governments will be forced to balance the benefits of public health measures and their economic and physical health/mental health impacts.

While necessary in the short-term, the diversion of ICU capacity to COVID-19 care has jeopardized our standard of care and resulted in a backlog of testing and therapies for other illnesses, which may result in worsening prognoses and morbidities, and a late increase in critical care admissions.<sup>17,18</sup> Prior to the COVID-19 pandemic, most ICUs operated near 100% capacity year-round, and capacity was often crippled by the lack of isolation room availability. Now that some of the capacity for

handling COVID-19 cases has been released for other care, contingency plans must be put in place in case another large wave occurs.

In the future, capacity should be built into the system so that staff-to-patient ratios allow for optimal patient care, PPE is available to protect staff, and isolation room availability is increased.<sup>19</sup> Such planning is imperative to ensure that inpatient mortality in ICUs in BC follows the current rates, which are in stark contrast to those reported around the world. ■

**Planning is imperative to ensure that inpatient mortality in ICUs in BC follows the current rates, which are in stark contrast to those reported around the world.**

## Acknowledgments

We would like to thank the Provincial Health Services Authority for providing overwhelming support and data that was critical to the creation of this article, and in coordinating a response to the pandemic.

## Competing interests

None declared.

## References

1. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020;395(10223):497-506.
2. World Health Organization. Coronavirus disease (COVID-19) outbreak. Accessed 10 July 2020. <https://www.who.int>.

3. World Health Organization. Coronavirus disease 2019 (COVID-19) situation report. Accessed 13 September 2020. [www.who.int/docs/default-source/coronavirus/situation-reports/20200907-weekly-epi-update-4.pdf?sfvrsn=f5f607ee\\_2](http://www.who.int/docs/default-source/coronavirus/situation-reports/20200907-weekly-epi-update-4.pdf?sfvrsn=f5f607ee_2).
4. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: A retrospective cohort study. *Lancet* 2020;395(10229):1054-1062.
5. Wu C, Chen X, Cai Y, et al. Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. *JAMA Intern Med* 2020;180:1-11.
6. Richardson S, Hirsch JS, Narasimhan M, et al. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City area. *JAMA* 2020;323:2052-2059.
7. Statistics Canada. Population estimates, quarterly. Accessed 21 April 2020. [www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000901](http://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000901).
8. BC Centre for Disease Control. BC COVID-19 data. Accessed 10 July 2020. [www.bccdc.ca/health-info/diseases-conditions/covid-19/data](http://www.bccdc.ca/health-info/diseases-conditions/covid-19/data).
9. Government of Canada. Coronavirus disease (COVID-19): Outbreak update. Accessed 10 July 2020. [www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection.html?topic=tilelink](http://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection.html?topic=tilelink).
10. Government of British Columbia. Joint statement on the first case of 2019 novel coronavirus in BC. BC Gov News. 28 January 2020. Accessed 30 March 2020. <https://news.gov.bc.ca/releases/2020HLTH0015-000151>.
11. Tahirali J, Singh M, Ho S, et al. Tracking every case of COVID-19 in Canada. CTV News. Updated 17 April 2020. Accessed 20 April 2020. [www.ctvnews.ca/health/coronavirus/tracking-every-case-of-covid-19-in-canada-1.4852102](http://www.ctvnews.ca/health/coronavirus/tracking-every-case-of-covid-19-in-canada-1.4852102).
12. Connolly A. Canadians should postpone, cancel non-essential foreign travel amid coronavirus: Officials. *Global News*. 13 March 2020. Accessed 18 April 2020. <https://globalnews.ca/news/6671621/justin-trudeau-coronavirus-travel>.
13. Little S. Coronavirus: BC declares public health emergency amid 3 new deaths and 83 new cases. *Global News*. 17 March 2020. Accessed 18 April 2020. <https://globalnews.ca/news/6691983/bc-coronavirus-update-tuesday-march-17>.
14. Government of British Columbia. Province declares state of emergency to support COVID-19 response. BC Gov News. 18 March 2020. Accessed 18 April 2020. <https://news.gov.bc.ca/releases/2020PSSG0017-000511>.
15. Kissler SM, Tedijanto C, Goldstein E, et al. Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period. *Science* 2020;368:860-868.
16. Lurie N, Saville M, Hatchett R, Halton J. Developing Covid-19 vaccines at pandemic speed. *N Engl J Med* 2020;382:1969-1973.
17. Burn-Murdoch J, Romei V, Giles C. Global coronavirus death toll could be 60% higher than reported. *The Financial Times*. 26 April 2020. [www.ft.com/content/6bd88b7d-3386-4543-b2e9-0d5c6fac846c](http://www.ft.com/content/6bd88b7d-3386-4543-b2e9-0d5c6fac846c).
18. Pramesh CS, Badwe RA. Cancer management in India during Covid-19. *N Engl J Med* 2020;382:e61.
19. Sakr Y, Moreira CL, Rhodes A, et al. The impact of hospital and ICU organizational factors on outcome in critically ill patients: Results from the Extended Prevalence of Infection in Intensive Care study. *Crit Care Med* 2015;43:519-526.