

# Health Sector responses to the COVID-19 pandemic in Ontario, Canada — January to May 2020

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## Abstract

The first positive case of COVID-19 in Canada was reported on January 25, 2020, in the city of Toronto, Ontario. Over the following four months, the number of individuals diagnosed with COVID-19 in Ontario grew to 28,263 cases. A state of emergency was announced by the Premier of Ontario on March 17, 2020, and the provincial health care system prepared for a predicted surge of COVID-19 patients requiring hospitalization. The Chief Medical Officer of Health and the Minister of Health guided the changes in the system in response to the evolving needs and science related to COVID-19. The pandemic required a rapid, concerted, and coordinated effort from all sectors of the system to optimize and maximize the capacity of the health system. The response to the pandemic in Ontario was complex with some sectors experiencing multiple outbreaks of COVID-19 (i.e. long-term care homes and hospitals). Notably, numerous sectors shifted to virtual delivery of care. By the end of May 2020, it was announced that hospitals would gradually resume postponed or cancelled services. This paper explores the impact of the COVID-19 pandemic on multiple health system sectors (i.e., public health, primary care, long-term care, emergency medical services, and hospitals) in Ontario from January to May 2020. Given the scope of the sectors contributing to the health system in Ontario, this analysis of a regional response to COVID-19 provides insight on how to improve responses and better prepare for future health emergencies.

**Key words:** COVID-19, SARS-CoV-2, Ontario, Health Care Sector, Health Policy

**Słowa kluczowe:** COVID-19, SARS-CoV-2, Ontario, sektor opieki zdrowotnej, polityka zdrowotna

## Introduction

On January 7, 2020, the causative agent of an outbreak of bilateral pneumonia in Wuhan, China, was identified as a novel coronavirus [1, 2]. Over two weeks later on January 25, 2020, the first case of COVID-19 was announced in Ontario, the most populous province in Canada (population: 14.7 million) [3, 4]. By the end of May 2020, over 28,000 cases were identified in the province [5]. Given the severity of the COVID-19 pandemic, a concerted effort from all parts of the health care system was required to address the public health emergency and to maximize system capacity. Due to the size and multi-faceted health care system in the province, Ontario is an ideal setting to provide an example of a regional response to the COVID-19 pandemic in order to inform future planned efforts in addressing infectious disease outbreaks. As such, the impact of the pandemic on multiple sectors of Ontario's health care system, including on public health, primary care, long-term care, emergency medical services, and in hospitals, will be examined in this paper.

## Public health

### Health Policy

Federalist systems of government exist in all Canadian provinces and territories [6]. Ontario receives a tax transfer from the federal government which funds a portion of first-dollar coverage for physician and medically necessary hospital services [7]. This is part of the Canada Health Transfer, which is a component of the *Canada Health Act* – the federal piece of legislation underpinning universal health insurance coverage for residents [7]. While the federal government is mainly responsible for financing health care in Canada, each province and territory manages health insurance coverage, including the funding of health care services [8]. The primary piece of legislation pertaining to public health in Ontario is the *Health Promotion and Protection Act* [9]. The Act covers health programs and services, community health protec-

tion, communicable diseases, health units and boards of health, and provincial public health powers. In the context of the COVID-19 pandemic, it provides the provincial government and municipal and/or regional boards of health with the powers to act and preserve the health, safety, and well-being of the public [9].

With respect to the governance of public health and related agencies in Ontario, the Ministry of Health is the branch of government concerned with the delivery of health care and governance of the health care system, while the Ministry of Long-Term Care is responsible for the delivery of home care services and overseeing the long-term care system in the province [10, 11]. The Ministry of Health and the Ministry of Long-Term Care were formed on June 20, 2019, from the Ministry of Health and Long-Term [12]. In terms of the oversight of health care delivery, the province is currently undergoing a health system transformation to consolidate the fourteen Local Health Integration Networks and other health care organizations into a single agency called Ontario Health [13]. There are 34 public health units across Ontario, which are responsible for local public health service delivery [14]. The Chief Medical Officer of Health is the lead public health physician in Ontario, appointed within the Ministry of Health, whereas regional Medical Officers of Health lead local public health units [15, 16]. Public Health Ontario provides scientific advice and evidence to inform policies and improve the health of all citizens in the province [17].

### Epidemiology

As of May 31, 2020, 28,263 Ontarians were diagnosed with COVID-19, representing 31% of the positive cases in the country [2, 5]. Of these cases, 17,306 (61%) were associated with close contact to confirmed cases or with outbreaks, 1,543 (6%) were associated with travel outside of Ontario, 5,633 (20%) were community acquired cases, and 3,781 (13%) had an unknown source of acquisition [5]. Among the total confirmed cases, 22,153 (78%) had

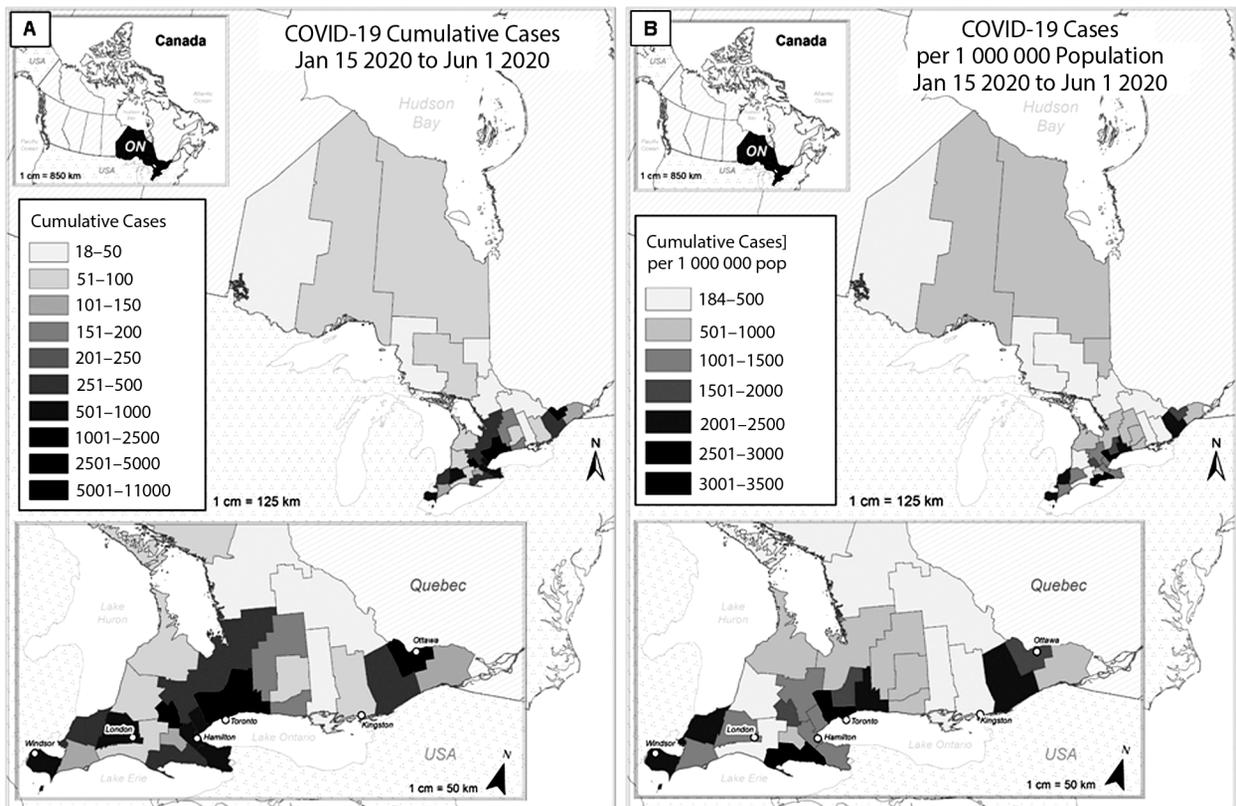
resolved by May 31, 2020 (14 days past episode date or symptom onset). Overall, 3,507 (12%) individuals required hospitalization, 756 (3%) required intensive care in hospital, and 2,276 (8%) died. Over 69% of the deaths were among individuals who were 80 years of age and older ( $n = 1,571$ ) [5]. Figure I presents the cumulative count of confirmed COVID-19 cases, as well as cases per one million people, from January to May 2020 for each of the 34 public health units in the province. Most of the confirmed cases of COVID-19 (66%) resided in the Greater Toronto Area [5].

**Timeline**

On January 22, 2020, COVID-19 was added as a reportable disease under the province’s public health legislation, requiring health care professionals and facilities to report confirmed or suspected cases of the disease to Medical Officers of Health at local public health units [18]. The Chief Medical Officer of Health of Ontario announced the first presumed positive case of COVID-19 on January 25, 2020, in a patient from Toronto, Ontario, who had travelled from Wuhan, China [19]. At that time, the Ministry of Health informed the public that it was in continuous contact with the national organization responsible for public health in Canada (Public Health Agency of Canada: PHAC) [19].

On the same day, the provincial government launched a website to educate the public about COVID-19, as well as to provide details of Ontario’s response, laboratory testing measures, and epidemiological information [20]. Prior to March 8, 2020, the risk of COVID-19 infection for the public was deemed to be low and the virus was not reported to be circulating in the community [21].

On March 2, 2020, the Minister of Health of Ontario presented the COVID-19 governmental response structure with the Command Table being the oversight body in charge of the direction and leadership of the action [22]. The Command Table would report to the Minister of Health and include the Chief Medical Officer of Health, the President and Chief Executive Officer of Ontario Health, and representatives from Public Health Ontario and the Ministries of Long Term Care and Labour, Training and Skills Development [22]. Aside from the Command Table, the governmental response structure also included: the regional planning and implementation tables for the five regions of Ontario Health working with public health units, primary care, emergency medical services, hospitals, and other groups; the Ministry’s Emergency Operations Centre; Sector or Issues Specific Coordination Tables; a Collaborations Table providing strategic advice from registered health care provider regulatory colleges, associations, and unions; and techni-



**Figure I. Map of COVID-19 confirmed cases in Ontario by public health unit, January 15 to June 1, 2020: cumulative cases (Figure A), cases per 1,000,000 population (Figure B)**

Source: [158–161].

cal advice provided by a Scientific Table and a Bioethics Table [22, 23].

Since March 12, 2020, the Chief Medical Officer of Health for Ontario has issued five Directives under the *Health Protection and Promotion Act*, addressing health care providers and health care entities, long-term care homes, ambulance services and paramedics, and hospitals (Table I) [24]. On March 15, 2020, the Minister of Health announced that the province had requested hospitals to implement their pandemic plans and ramp down non-emergent activities and elective procedures [25]. The following day, the Chief Medical Officer of Health advised against gatherings of more than 50 people and requested the closures of daycares, private schools (publicly funded schools closed on March 14, 2020), churches, libraries, recreational programs, and dine-in service at restaurants [26, 27]. Furthermore, individuals returning from outside of Canada were asked to undergo a 14-day period of self-isolation. On March 17, 2020, a declaration of emergency was made by the Ontario government under the *Emergency Management and Civil Protection Act* [28, 29].

### Testing

The first case of COVID-19 in Ontario was diagnosed by the Public Health Ontario Laboratory and confirmed by the National Microbiology Laboratory in Winnipeg, Manitoba, Canada [30]. This represented the process of specimen testing until the first week of March 2020 when regional testing facilities established in-house laboratory tests [31, 32]. COVID-19 was classified as a communicable disease reportable to the regional Medical Officer of Health and all positive cases were reported daily to Public Health Ontario [20]. In mid-March 2020, the Ontario government launched an online COVID-19 self-assessment tool, as well as opened COVID-19 assessment centers to divert patients requiring testing from emergency departments [33, 34]. The Ontario COVID-19 test results website was made available for patients to check their results [35].

While regional and local hospital laboratories were responsible for testing patients presenting at emergency departments and assessment centers, Public Health Ontario was responsible for testing health care workers and resi-

**Table I. Summary of Directives Issued by the Chief Medical Officer of Health in Ontario, Canada, up to May 31, 2020**

| Directive  | Date Issued   | Description   |
|--|---|---|
| “Directive #1 for Health Care Providers and Health Care Entities”  | March 12, March 30, 2020                                    | Specified the required precautions for patient care, including the observance of contact and droplet precautions and airborne precautions for aerosol generating medical procedures for patients with COVID-19 infection (suspected, presumed, confirmed), such as the use of personal protective equipment (PPE). Indicated that point-of-care risk assessments were to be completed on all patients prior to care. Infection Prevention and Control (IPAC) Recommendations from Public Health Ontario were recommended for review.  |
| “Directive #2 for Health Care Providers”   | March 19, May 26, 2020                                      | March 19: Overlooked the need for an immediate reduction in non-essential and elective health services, where clinically indicated and following the principles of minimizing harm to patients, equity, proportionality, and reciprocity. May 26: Outlined the requirements and operational guidelines surrounding the gradual restart of non-essential, elective, and deferred services. Indicated that providers would need to determine which services could be delivered remotely versus in-person with proper PPE and hazard controls, following the principles of minimizing harm to patients, equity, proportionality, and reciprocity.  |
| “Directive #3 for Long-Term Care Homes under the <i>Long-Term Care Homes Act, 2007</i> ”   | March 22, March 30, April 8, April 15, May 21, May 23, 2020 | Described the actions to reduce the risk of exposure to COVID-19 among residents of long-term care and retirement homes, initially disallowing short-stay absences and encouraging social distancing with visitors on site premises, as well as limiting the number of employment sites for long-term care workers. Further actions related to COVID-19 preparedness were mandated, including the screening of residents, staff, and admitted individuals; limiting visitors to those deemed essential; cohorting of residents and staff; and ensuring proper PPE use (including mandatory masking). Provided information on the management of COVID-19 positive cases among residents and staff, as well as the management of outbreaks. Overlooked testing protocols, communication strategies, and guidelines surrounding deliveries of food and products. |
| “Directive #4 for Ambulance Services and Paramedics under the <i>Ambulance Act</i> ”   | March 24, March 30, 2020                                    | Overlooked the need for point-of-care risk assessments to be completed by paramedics prior to patient care. Outlined the required precautions and PPE to be used when treating patients with COVID-19 infection (suspected, presumed, confirmed). Indicated that N95 respirators should be used when deemed necessary following a point-of-care risk assessment or for aerosol generating medical procedures.   |
| “Directive #5 for Hospitals within the meaning of the <i>Public Hospitals Act</i> and Long-Term Care Homes within the meaning of the <i>Long-Term Care Homes Act, 2007</i> ” | March 30, March 31, April 10, 2020                          | Overlooked the need for point-of-care risk assessments to be completed by health care workers in hospital settings prior to patient care. Outlined the required precautions and PPE to be used during routine care and when treating patients with COVID-19 infection (suspected, presumed, confirmed). Indicated that N95 respirators should be used when deemed necessary following a point-of-care risk assessment or for aerosol generating medical procedures. Described education around proper PPE use, as well as PPE supply management and contingency planning. Directive was extended to long-term care and retirement home settings on April 10, 2020 (prior to this date, the Directive was called “Directive #5 for Hospitals within the meaning of the <i>Public Hospitals Act</i> ”).   |

Source: [114, 155, 29, 156, 67–72, 92, 157, 108–110].

dents at long-term care facilities [36, 37]. The need to rapidly test large numbers of individuals meant that primary care providers became a major part of the testing process under the direction of public health units [38]. With a continued growth of patients suspected to have COVID-19 infection, there was an emphasis on the expansion of testing services, including through private labs [39]. Over the course of the pandemic, testing capacity gradually expanded from 2,000 tests per day to more than 20,000 tests per day by May 31, 2020 [2, 40]. As of that date, 694,851 tests for COVID-19 were conducted in Ontario, which corresponds to 47,231 tests per one million people [2, 41].

### ***Ontario Health Data Platform***

On April 12, 2020, the Ontario government announced its intention to develop the Ontario Health Data Platform to hold secure de-identified health data integrated from multiple publicly funded administrative health service records to improve detection, planning, predictive modelling, and responsiveness to the current COVID-19 pandemic [42, 43]. The platform would provide information on emergency department visits, hospitalizations, physician consultations, home and long-term care services, medical drug claims for individuals covered by the Ontario Drug Benefit Program, critical care capacity, and other information systems (e.g., public health, laboratory medicine, diagnostic imaging) [42].

## **PRIMARY CARE**

In Ontario, primary care came together to respond to the COVID-19 pandemic in a variety of ways through offering virtual methods of delivering patient care, ensuring the safety of practitioners and patients requiring in-patient visits, expanding mental health services, and offering home and community care services in altered form.

### ***Virtual Care Offerings***

The risk of transmitting COVID-19 during in-person physician visits led to concerns around regular consultations with patients. Due to this, the Ontario Medical Association endorsed physicians providing telephone and video consultations for patients [44]. Furthermore, the Ministry of Health released guidance for primary care providers around implementing systems for consultations provided virtually [45]. With the introduction of specific billing codes for such consults effective March 14, 2020, family physicians and other specialist physicians could be remunerated for patient care delivered virtually during the pandemic [46]. Virtual care has required new procedures to be put into place, such as around patient consent, systems for assessing COVID-19 virtually, and new guidelines outlining the medical conditions requiring in-person care [45, 47–49]. Due to the demand for virtual care, existing platforms were expanded and new platforms emerged. Ontario provided the government-funded Ontario Telemedicine Network, whilst other private vendors provided their own platforms with direct linkage

from electronic medical records [50–52]. In response to patients being limited in their access to in-person primary care during the pandemic, the Ontario Virtual Care Clinic was launched in the province, staffed by physicians who could assess, prescribe for, and care for patients via video appointments on demand [53, 54]. The number of virtual consultations has increased ten-fold in the province from approximately 1,000 visits per day in February 2020 to 10,000 visits per day in March 2020 [55].

### ***Family Practice Systems Change***

New infection control measures were implemented for patients in need of in-person appointments. Typically, clinic staff and patients were required to complete screening before entry into the clinic [45]. Family physicians used personal protective equipment as required, such as masks, visors, gowns, and gloves, as well as dressed in scrubs, while patients were required to wear masks. Family practice clinics installed plexiglass screens at patient contact areas, such as front desks, and ensured that surface sanitization was performed more frequently. All non-essential staff worked from home [45]. Furthermore, family practices developed contingency plans for surges in active cases to assist their local hospitals. These plans involved shifting work to space out the number of people in primary care clinics and physicians rotating between in-person primary care, phone care, and outreach visits to targeted community patients who needed to be seen in personal protective equipment [56].

### ***Mental Health Services***

The Ontario government implemented initiatives to actively address the emotional effects of COVID-19. The Ministry of Health, in partnership with the Centre for Addiction and Mental Health (CAMH), developed a mental health fact sheet that provided information on psychological services available, guidelines for maintaining well-being, and a number of coping strategies [57]. The Canadian Government launched the portal, Wellness Together Canada, that has self-guided courses and resources, as well as a crisis hotline for frontline staff [58]. In April 2020, the government put \$12 million (2020 CAD) towards online and virtual mental health services, which were further expanded in May 2020 to address the amplified psychosocial needs of Ontarians [59, 60]. These supports included internet-delivered Cognitive Behavioural Therapy, phone coaching, and psychoeducational workbooks. Interventions and services specifically targeted towards health care workers were introduced throughout the province. The Ministry of Health and Ontario Health, in collaboration with five Ontario hospitals, launched psychiatric and psychotherapy services for frontline health care workers [61]. Health care workers were able to self-refer to these services. The government also promoted resources for health care workers to engage in self-led support and peer support [60].

## Home and Community Care

Home and community care services in the province were impacted by the pandemic and where possible, shifted to virtual care. Certain home and community care services moved to remote delivery, including social work, dietetics, nursing, and therapies [62]. To enable this, Ontario Health established billing rates for professional services delivered virtually [63]. To continue providing care to seniors and other vulnerable populations, the Ministry of Health implemented care coordination initiatives, such as comprehensive telephone wellness checks to assess the physical, mental, functional, and social well-being of the home and community care clients [62]. Existing home care patients were prioritized for wellness checks according to emergency response levels and the client population [62]. Where care coordinators previously came into the home setting to complete interRAI clinical assessments, a telephone functional assessment was now completed in some regions of the province [64]. For services that required in-person delivery, the Ministry of Health provided guidance to home and community care providers [65]. The document overviewed self-monitoring for symptoms of COVID-19, wearing surgical or procedure masks throughout the visit, and performing hand hygiene. Prior to home care visits, providers were asked to screen clients and co-residents by phone using a patient screening questionnaire [65]. For clients suspected of having COVID-19 and requiring essential home care services, providers were mandated to wear personal protective equipment in accordance with the contact and droplet precautions [65].

### ■ Long-term care and retirement homes

The COVID-19 pandemic has particularly affected older adults living in long-term care and retirement homes in Ontario. Residents of these facilities accounted for 21% of all COVID-19 cases but 70% of all deaths in the province, as of the end of May 2020 [5]. There have been 306 outbreaks of COVID-19 in long-term care homes and 144 outbreaks in retirement homes in Ontario up to May 31, 2020 [5]. During this time, 5,097 long-term care home residents were infected, resulting in 1,445 deaths. Additionally, there were 1,814 cases of COVID-19 among health care workers in long-term care homes, resulting in 6 deaths [5]. In retirement homes, there were 697 confirmed cases among residents and 368 among staff members, as well as 148 resident deaths, as of the end of May 2020 [5].

### Provincial Directives

Beginning in February 2020, the provincial government provided guidance on screening protocols for COVID-19 in long-term care home settings. Visitor restrictions in the homes were announced on March 13, 2020 [66]. The Chief Medical Officer of Health first released a directive specifically addressing long-term care homes on March 22, 2020, which was updated throughout April and May

2020 in response to the epidemiological situation (Directive #3 – see Table I) [67–72]. The directive included actions to reduce the risk of exposure to the virus among residents. Short stay absences were not permitted, meaning that a resident could not leave the home to stay with relatives during an outbreak. The directive also limited the number of long-term care homes or retirement homes that a health worker could work at, as it was noted that many health workers were employed at multiple homes. On April 15, 2020, the Ministry of Health put out a guidance document for mask use in long-term care homes and retirement homes, making it essential for staff to wear surgical masks at all times [73]. Around the same time, a temporary hold on transfers from hospital to long-term care and retirement homes was enforced [74]. A week later on April 23, 2020, patients in hospital could be transferred to retirement homes if the patient had a negative COVID-19 test at discharge and the retirement home could accommodate a 14-day period of self-isolation [75].

The Command Table released a memorandum on April 21, 2020, to commence surveillance testing in long-term care homes [76]. The Command Table encouraged local implementation to begin with homes in outbreak status with testing carried out by public health units. Furthermore, the Ministry of Health released a screening tool to be used in long-term care and retirement home settings, which included screening for symptoms among staff and residents twice daily [77]. All persons entering the institution were screened and those who screened negative were permitted to enter the home, don a mask, and perform their duties.

In April of 2020, the provincial government set up the Incident Management System Long-Term Care Table to support long-term care homes operationally, such as through addressing health human resources, equipment levels, and infection management practices [78]. The *COVID-19 Action Plan for Long-Term Care Homes*, released on April 15, 2020, came in response to a significant number of deaths and unchecked spread in several Ontario long-term care homes [79]. Furthermore, following the Canadian Armed Forces report on the epidemiological situation in five long-term care homes where assistance was being provided [80], temporary management of the homes was announced by the Ontario Ministry of Long-Term Care on May 27, 2020 [81]. At the same time, inspection teams were deployed to long-term care homes throughout the province.

### Surveillance and Screening

Several measures were implemented to reduce the spread of COVID-19 within long-term care and retirement homes. Communal dining, in particular, presented a challenge for maintaining a two metre distance between residents [82]. Dining shifts were employed with environmental cleaning between shifts. A shelter in place policy where meals were provided in the resident's room on trays was advised [82]. Schedules for medication administration were streamlined to coincide with other point of contact tasks to reduce the frequency of staff visits to resi-

dent rooms [82]. Resident activities that were previously conducted in groups were changed to one-on-one instruction and all non-essential activities were cancelled [82].

### **Health Human Resources**

The availability of human resources in long-term care homes in Ontario was in a state of crisis, particularly in facilities with large numbers of positive cases among residents and staff [83]. On April 17, 2020, a memorandum *Hospital Support for Long Term Care* was issued to facilitate redeployment of human resources [84]. Overall, 150 teams of health care professionals from hospitals aided with staffing shortages in long-term care homes as of May 28, 2020 [78]. At five long-term care homes in the province, assistance was provided by the Canadian Armed Forces [78]. Furthermore, the Health Workforce Matching Portal was created by the province to match employers with health care providers, including those who were non-active, retired, internationally trained, or in training [85]. The Registered Nurses' Association of Ontario created the VIANurse program on March 13, 2020, to enlist practicing and retired registered nurses and nurse practitioners, as well as nursing students, to self-identify availability for additional work [86]. Institutions requesting human resources were then communicated via e-mail to the nurse. Nursing students with a minimum of a year of training were able to work as personal support workers [86]. By the end of March 2020, 7,338 registered nurses, 1,022 critical care registered nurses, and 285 nurse practitioners enrolled in the program, while 190 long-term care and retirement homes were served [86].

### **Maintaining Connections through Technology**

In order to deliver health care remotely and maintain social connectivity while addressing social distancing requirements, many jurisdictions employed technological solutions. For instance in Hamilton, Ontario, a city-wide telemedicine initiative to provide virtual testing and diagnostic imaging, medical consultation, and medication deliveries aspired to keep patients managed for their medical issues without the need of leaving their facility [87]. In another example of the use of technology to maintain connections, Haldimand and Norfolk town mayors teamed up to deliver tablets to long-term care homes in their regions in late May 2020 [88]. Tablets were used to facilitate visual and auditory communication with family and friends unable to enter the homes due to visitor restrictions. It is important to note that despite guidance document directions for family caregivers and essential visitors, long-term care and retirement homes were not permitting these informal caregivers into the homes at the time.

### **Paramedic services**

Municipal paramedic services have been optimizing and improving the delivery of patient care during the COVID-19 pandemic, finding efficiencies in system design, better aligning with partners in the health system, and

contributing solutions to address the presenting challenges [89]. Starting on January 25, 2020, Central Ambulance Communication Services/Centres actively screened all calls for COVID-19 infection to ensure that proper Infection Prevention and Control practices were followed [90]. The Ministry of Health released the *COVID-19 Screening Tool for Paramedics*, which was updated according to the latest COVID-19 case definition and the World Health Organization's situation reports on the disease [91]. Furthermore, the Chief Medical Officer of Health issued Directive #4 in late March 2020 to outline the contact and droplet precautions required of paramedics (see Table 1) [92]. A Medical Directive was prepared for primary care paramedics to assist with identifying low acuity patients with confirmed or suspected COVID-19 who could be released from paramedic care [93, 94].

Municipal paramedic services that operate community paramedicine programs in Ontario have also adapted to the situation posed by the COVID-19 pandemic. Community paramedicine has been well-positioned to respond as it uses paramedics to offer health services on an urgent or scheduled basis to vulnerable populations in the areas of primary and specialized care, thereby addressing equity in access to care [95]. Community paramedicine programs have been implemented according to locally identified needs to reduce reliance on the 9-1-1 emergency system by individuals with complex medical conditions or who are isolated, vulnerable, or frail [96] – those who are most at risk for adverse outcomes associated with COVID-19. During the pandemic, community paramedics provided services to these patients through population health clinics and virtual triage centres [97, 98]. Many community paramedicine programs limited their face-to-face visits by increasing the use of Remote Patient Monitoring Program equipment and connecting over the telephone with their patients using a COVID-19 screening and preparedness module developed by CP@clinic for use with vulnerable populations [98–100]. Paramedic services worked to reduce the need to transport patients to hospitals during times of surge and thereby avoiding the associated vehicle decontamination and disinfection of equipment, thus lowering the risk of transmission to the general population [89]. Community and at-home assessments for COVID-19 were one of the first steps identified as having the potential to reduce the spread of the virus and redirect resources [101]. Across the province, community paramedics were involved in conducting COVID-19 testing in various locations, including in the homes of patients, long-term care facilities, or drive-through clinics [102–106].

### **Hospitals**

The COVID-19 pandemic has required Ontario hospitals to readapt to the rapidly evolving health care context. Since the declaration of the state of emergency in the province of Ontario, hospitals had sought to maximize their capacities [25, 107]. Hospital-level policy directives from the province, along with guidance from the Ontario Hospital Association (OHA) – a not-for-profit organiza-

tion focused on serving Ontario's hospitals, have supported hospital leadership in screening staff and visitors and making operational changes in the facilities [108–110]. Additionally, hospitals had independently implemented initiatives to protect staff, patients, and visitors, as well as to maintain the standard of care for their communities [111–113]. As of May 31, 2020, there have been 84 outbreaks reported in hospitals resulting in 352 patient and 366 staff infections [5]. Sixty-seven COVID-19 related deaths among hospital inpatients were linked to the outbreaks [5].

### ***Provincial Directives***

On January 22, 2020, the required reporting of suspected and confirmed COVID-19 cases by hospitals was announced [18]. The Chief Medical Officer of Health released Directive #1 on March 12, 2020, outlining the required droplet and contact precautions for health care workers during the care of patients suspected or confirmed to have COVID-19 and airborne precautions when completing aerosol generating medical procedures (see Table 1) [114]. Additionally, on March 19, 2020, the Chief Medical Officer of Health requested that hospitals immediately begin utilizing the electronic Canadian Triage and Acuity Scale (eCTAS) application and the Acute Care Enhanced Surveillance (ACES) system to increase monitoring of emergency department visits for COVID-19 symptoms at the hospital level [115]. Furthermore, on the same day, the government advocated for hospitals to conduct symptom screening and allow only essential hospital visitors [116]. The provincial definition of a nosocomial COVID-19 outbreak was released in mid-May 2020 and it included situations where two or more cases of COVID-19 arising from within the hospital were identified within a two-week period [111, 117]. Prior to this date, the outbreaks reported by hospitals were defined using variable criteria set by the hospitals in collaboration with their local public health units [117].

In consultation with the Ontario Hospital Association, the Ontario government requested the ramping down of elective procedures and clinical activities in order to prevent transmission, maximize health resources, preserve acute care bed capacity, and prioritize COVID-19 care [25]. Nevertheless, hospitals were given the discretion to guide these changes based on the circumstances in their area, while taking into account the following guiding principles: decision making guided by an ethical framework; the prevention of occult and high risk transmission; and being mindful of creating and preserving capacity within the health system [118].

### ***Screening of Staff and Visitors***

Many hospitals reduced the number of entrances used by staff, patients, vendors, pre-approved companions, and essential visitors [112, 119, 120]. Everyone entering the hospital was required to complete screening questionnaires regarding symptoms, travel history, and contact history, which were administered and/or reviewed by des-

ignated screeners at hospital entrances [113, 120, 121]. Some hospitals additionally checked patient and staff temperatures with no-touch thermometers [112]. Staff and patients who met COVID-19 screening criteria were directed for additional assessment to secondary screening areas [112, 119, 122]. All visitors and staff who passed screening were required to wear masks, which were either provided by the hospital or, depending on hospital policy, could be the visitors' own cloth or surgical masks from home [112, 119, 120, 122].

Effort was made to reduce the number of people entering hospitals. Most caregivers, visitors, and drivers were unable to accompany patients into hospitals or emergency departments with a few case-by-case exceptions (e.g. patients receiving end-of-life care, in active labour, or in critical condition) [119, 120]. As such, hospitals introduced a variety of creative offerings. For example, the North York General Hospital and the Thunder Bay Regional Health Sciences Centre, among others, introduced virtual family visits [113, 121]. In addition, window visits, whereby visitors could see hospital patients through the window while communicating via the telephone, were allowed at some hospitals [112, 123]. For the delivery of hospital-based outpatient health care services, virtual visits became more common [120]. St. Mary's and Grand River Hospital additionally developed a virtual emergency department to assess and address urgent and emergent medical issues [124].

### ***Operational Changes and Emergency Preparedness***

For patients admitted to hospital, operational changes were made to minimize infection risk and to prepare for a potential surge in the number of COVID-19 patients. Decreased elective surgeries and the cancellation of non-emergent clinics allowed post-surgical and inpatient wards to be converted for alternative use [125]. As of mid-April 2020, the average acute care bed capacity in Ontario hospitals was 64% in comparison to 96% prior to the pandemic [74, 125]. Around 7,300 acute care and 2,000 critical care beds were unoccupied at the time [125]. On April 16, 2020, it was announced that provincial hospital capacity was increased by 1,035 acute care and 1,492 critical care beds, bringing the total capacity to 20,354 acute care and 3,504 critical care beds with planned future increases to the number of acute care beds [125]. Furthermore, the number of critical care beds with ventilators doubled from 1,319 to 2,811 (out of the total 3,504 critical care beds) from before the pandemic to mid-April 2020, respectively [125]. Some hospitals' contingency plans involved the use of non-traditional spaces to expand capacity, such as the modular unit erected as a Pandemic Response Unit by Joseph Brant Hospital or the use of offsite spaces, including hotels or conference venues [126, 127]. Preparations were made for patients with confirmed or suspected COVID-19 to be "cohorted" and isolated in one ward in order to minimize spread among staff and patients [128].

Part of operational planning involved increasing staff availability in high-need areas of the hospital, which was

facilitated by a temporary order by the Ontario government allowing hospitals to override bargaining units to redeploy staff, change workplace duties, and hire additional staff [129]. Many hospitals redeployed nursing, allied health, and clerical staff from rehabilitation or non-emergent clinics to alternate roles in acute care or as entrance screeners [130–132].

Some hospitals used innovative methods to develop protocols for treating potentially infectious patients. For example, upon the declaration of the pandemic state, the Ottawa Hospital's Simulation Patient Safety Program trained staff to provide optimal patient care while protecting themselves from exposure via simulations of situations such as intubating patients, donning personal protective equipment, treating surgical patients, and readying patients for imaging [133]. In preparation for the re-opening of the operating rooms, some departments ran additional simulations [134]. This allowed teams to test protocols in order to identify and address safety gaps in their processes and to optimize staff protection, communication, and patient outcomes.

### ***Community Relationships***

Many hospitals have chosen to proactively share COVID-19-related data with the public. Some hospitals provided daily updates on their website, including information such as the number of patients tested, the number of admitted patients, the number of in-hospital deaths in patients who were COVID-19 positive, and/or the overall occupancy of the hospital [120, 135, 136]. Information regarding COVID-19 outbreaks among hospital staff and inpatients have also been reported on hospital websites [111, 137, 138]. In addition, numerous hospitals throughout the province looked to the support of the community with regards to obtaining personal protective equipment. Some hospitals requested and accepted donations of medical supplies including surgical masks, N95 respirators, gowns, face shields, gloves, and hand sanitizer [119, 120, 139, 140]. As of the beginning of May 2020, personal protective equipment supplies had proven to be sufficient, although some hospitals continued to collect and reprocess used N95 masks for potential future use, in case of a supply shortage [141].

### ***Resumption of Non-Emergent Services***

On April 27, 2020, the Ontario government released guiding principles for the phased approach to reopening the province [142]. In the document, it was signalled that scheduled surgeries and procedures in hospitals would partially resume during Stage 1 of the plan [143]. On May 26, 2020, the Ministry of Health released the operational requirements to guide the restart of the health care sector, outlining hazard controls, patient and visitor screening, patient testing, physical capacity and environment considerations, equipment supply, health human resources, infection prevention and control, and occupa-

tional health and safety [144]. Furthermore, Ontario Health indicated that hospitals should maintain acute care capacity at 85% occupancy in order to be prepared for a surge in COVID-19 patients [145]. Hospitals have begun planning for the resumption of clinical programs and activities in a gradual, stepwise manner, in order to ensure adequate supplies, medications, and personal protective equipment, as well as to allow for ongoing screening, hygiene, and physical distancing practices [146–148].

### **Further considerations**

An important function of public health is to identify health inequities within communities and to support the health needs of at-risk populations. Ontario had a complex response to the COVID-19 pandemic with important differences among groups. Although the general population had been compliant with distancing measures and successfully “flattened the curve”, there were multiple outbreaks in long-term care facilities [149–151]. It has been widely reported that the spread of COVID-19 in long-term care and congregate living environments led to an increased mortality rate among older adults and had a significant impact on the health care system [152]. Moreover, COVID-19 has underscored the importance of the social determinants of health in implementing public health policy during a pandemic [153]. Individuals who are precariously housed, unemployed, and/or who are part of at-risk populations have been disproportionately affected by COVID-19, and so calls from public health units, health care providers, and scholars regarding greater attention to equitable public health policy is an important consideration that has occurred in Ontario [153].

Furthermore, virtual care has been an important component of the response to COVID-19. This is particularly important during pandemic outbreaks such as COVID-19 in order to reduce unnecessary exposure and disease transmission. Despite the availability of telehealth in Ontario, scale up of innovation leveraging video-conferencing and other internet-based technologies had been slow prior to the COVID-19 pandemic [47, 154]. Many regions had been exploring telemedicine opportunities to provide virtual care during the pandemic and this will likely become a permanent fixture in the care of patients during future outbreaks. Such infrastructure should be readily retained and reactivated or expanded to other medical situations, especially in rural settings or in dealing with vulnerable populations.

### **Acknowledgments**

The following authors are currently funded by the Canadian Institutes of Health Research (CIHR) Health System Impact Fellowship: Iwona Bielska, Emily Moore, and Lauren Jewett. Emily Moore is also funded by a Vanier Canada Graduate Scholarship. Rebecca Liu and Matthew Leyenaar are alumni of the CIHR Health System Impact Fellowship.

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