The Conference Board of Canada

Health Care Cost Drivers in Canada

Pre-and Post-COVID-19

Impact Paper | September 2020

Contents

Key findings

- Recent projections for long-term health care spending, conducted by The Conference Board of Canada prior to the COVID-19 pandemic, indicated expenditures would increase at an average annual pace of 5.4 per cent out to 2030-31.

- Of the 5.4 per cent average annual growth in health care expenditures projected out to 2030-31, about 46 per cent stemmed from inflation, 18 per cent from population growth, 19 per cent from population aging, and the remaining 17 per cent from increases in health care access and system improvements.

- During 2018–19, governments spent about $4,656 per person on health care. By 2040-41, this was expected to rise to an inflation adjusted $7,039.

- The COVID-19 pandemic has already had a significant impact on Canada's health care sector, not only by adding to the overall health care costs incurred by governments through activities that mitigate the virus's impact on the health of Canadians but also by fostering change in health care delivery (such as an increase in virtual care services).

- Data provided by the Council of the Federation Secretariat suggest that between January 1 and June 5, 2020, nearly $11.5 billion in spending was attributed directly to deal with the health challenges posed to provincial and territorial health systems by the COVID-19 pandemic. These funds went to the testing, treatment, and recovery of individuals, personal protective equipment (PPE), medical supplies, pharmaceuticals, and other supplies and services focused on addressing the health effects of the pandemic.

- Given the extreme uncertainty surrounding COVID-19, we developed three scenarios to project the additional health care spending associated with the pandemic over the short, medium and long term. Two of the scenarios—an optimistic perspective, in terms of how well the disease is contained, and a pessimistic one in terms of containment—assume an effective vaccine will be available late in 2021, while the third scenario—a more balanced perspective, in which the disease is partially controlled—assumes an effective vaccine will not be found to reduce or eliminate COVID-19 transmission.

- Along with the uncertainty surrounding how the COVID-19 pandemic might evolve, the current literature evaluating complications and long-term effects associated with COVID-19 has significant limitations and should thus be interpreted with caution.

- With these caveats in mind, the three scenarios suggest the additional health care costs due to the COVID-19 pandemic will range from $20.1 billion to $26.9 billion in 2020-21 and between $15.7 billion and $21.9 billion in 2021-22. The projections of additional health care costs for 2022-23 vary dramatically, from $6.9 billion and $7.1 billion in the two scenarios involving an effective vaccine to $18.7 billion in the scenario without an effective vaccine. For the scenarios with a vaccine, we estimate $1.7 billion will be needed in 2021-22 and $3.5 billion in 2022-23 to acquire and administer the vaccine.

- The projected increases in health care expenditures under each of the three scenarios include costs beyond those directly incurred to mitigate the impact of the COVID-19 pandemic on the health of Canadians. The increases include the costs on health care systems to deal with any potential new health complications found in recovering COVID-19 patients, as well as to remove the backlog of postponed and displaced surgeries and other non-COVID-19-related health care interactions.

- The projections in this report suggest that the COVID-19 pandemic is a significant new cost driver that will greatly add to health care spending, particularly over the short to medium term. We estimate that by 2022-23, COVID-19-related costs will have accounted for an additional $42.7 billion to $63.3 billion in health care spending in total from the beginning of the outbreak—depending on how the pandemic evolves and whether an effective vaccine can be discovered and administered widely to Canadians by then.

- Accounting for the COVID-19 pandemic, total health care expenditures for governments are projected to increase by between 20.9 per cent and 27.5 per cent from 2019-20 to 2022-23, or by an average annual pace of between 6.5 per cent and 8.4 per cent.

- Over the long term, the COVID-19 pandemic is projected to have a less significant impact on health care expenditures, increasing the average annual growth by between 0.1 and 0.3 percentage points out to 2030-31. But this increase still amounts to an additional $80 billion to $161 billion in health care expenditures incurred over the next 10 years. Overall, including COVID-19 as a cost driver suggests health care spending will increase at an average annual rate of between 5.5 and 5.7 per cent over the next decade, depending on the scenario.

- In addition to the many quantified direct and indirect implications of the COVID-19 pandemic on health care spending in this report, it should be noted that other consequences of the virus will likely play a role in shaping and influencing health care over the coming years. The report discusses two notable implications of the pandemic—namely, telehealth and long-term care—but stops short of quantifying their potential impact on health care spending.

- While the COVID-19 pandemic has undoubtedly imposed significant health and economic challenges on Canadians, it has also contributed to an expanded adoption of telehealth by both patients and physicians and has improved the reimbursement landscape around it. However, to maximize the potential benefits, additional investments in telehealth infrastructure will be needed. At this point, it remains unclear if overall health care spending in the long term will increase, decrease, or be virtually unchanged as a result of increases in telehealth.

- The COVID-19 outbreak has also drawn attention to systemic challenges associated with long-term care, including outdated infrastructure and crowded rooms, inconsistent regulations, staff shortages, and suboptimal working conditions. In spite of these challenges, there are opportunities to improve outcomes for long-term care residents and staff. However, this too will require strategic investments in infrastructure and supports for raising the standards of care through enhanced regulation. While addressing many long-term care issues will likely contribute to increases in health care spending for governments, the decision to address these issues and at what scale will revolve around policy decisions that are still unknown at this time.

Background

Although the precise economic and financial toll of COVID-19 on the economy remains uncertain and depends on how long the crisis lasts, Canada's health care systems are already experiencing significant change and will likely continue to do so over the longer term. In addition to the traditional drivers of health care costs (population aging, prevalence of chronic disease, provision of long-term care, pharmaceuticals, and technology), the costs going forward will be shaped by changes in health care delivery (such as an increase in virtual care services) and structural changes that contribute to making health care systems better prepared to deal with current and future pandemics (including new medical infrastructure, equipment, and staffing).

Overall, health spending as a share of Canada's gross domestic product (GDP) has been trending upward; health expenditures represented 11.6 per cent of Canada's GDP in 2019. The largest shares of public expenditures on health care go to hospitals (26.6 per cent), drugs (15.3 per cent), and physician services (15.1 per cent). While hospitals account for the largest single share of health spending by the public sector, hospital budgets have increased only slowly during periods of fiscal restraint. In response, hospitals have changed how they deliver care. In fact, people who were once treated in hospitals are now being treated as outpatients, leading to a large overall increase in ambulatory and community visits, with only modest growth in inpatient activity.

The analysis in this report unpacks not only the traditional sources of health care spending cost pressures but also the additional cost pressures related to COVID-19.

Health care cost drivers pre-COVID-19

The Conference Board of Canada has a history of regularly producing long-term health care spending projections. The accuracy of these projections is due to the way they incorporate the cost drivers that have been found to largely account for year-over-year changes in health care expenditures. The cost drivers considered include population growth, population aging, inflation, and the implementation of strategic changes that increase access and improve health care outcomes. Recent projections show that, combined, these factors will result in aggregate provincial and territorial health care spending increasing at an accelerated pace.

Spending on health care increased from $131.7 billion in fiscal year 2010–11 to $172.6 billion in 2018–19. Not adjusting for inflation, the overall 31.1 per cent increase during the period represents an average annual growth rate of 3.4 per cent. During 2018–19, governments spent about $4,656 per person on health care. By 2040-41, this was expected to rise to an inflation-adjusted $7,039.

Prior to COVID-19, accounting for population growth, population aging, inflation, and a trend rate that allows for continued growth in access and system improvements, health care expenditures were projected to increase at an average annual rate of 5.4 per cent between 2019-20 and 2030-31. (See Table 1.) Longer term, these drivers were projected to result in average annual growth in health care spending of nearly 5.2 per cent between 2030-31 and 2040-41.

The following sections provide further insights into the assumptions behind each significant cost driver in projecting future health care expenditures.

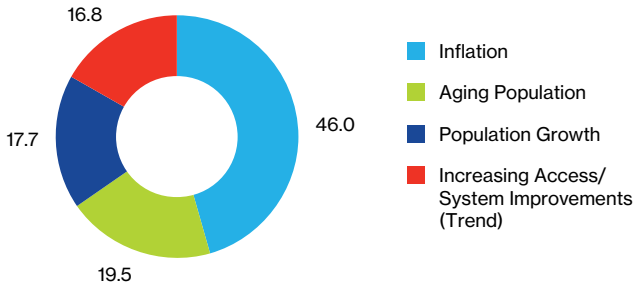
Demographics

Population growth and an aging population are two key factors that have contributed to and are projected keep contributing to increasing the demand for health care services in Canada. Between 2019-20 and 2030-31, these two factors combined are projected to account for 37 per cent of the total increase in health care costs by adding about 2 per cent to costs each year. (See Chart 1.)

Chart 1

Health care cost drivers – baseline pre-COVID-19 projection, 2019-20 to 2030-31

(contribution of each driver to overall increase during period, per cent)



Source: The Conference Board of Canada

Table 1

Contribution to average annual growth of various health care drivers, pre-COVID-19

(average annual growth)

Cost driver component	2019-20 to 2030-31	2030-31 to 2040-41	Overall (2019-20 to 2040-41)
Inflation	2.50%	2.52%	2.51%
Demographics	2.02%	1.71%	1.87%
Aging	1.07%	0.93%	1.00%
Population growth	0.95%	0.78%	0.87%
Increasing access/system improvements (trend)	0.90%	0.83%	0.87%
Total	**5.42%**	**5.16%**	**5.25%**

Source: The Conference Board of Canada; Public Accounts of Canada; Canadian Institute for Health Information.

Population growth

On its own, the growth in Canada's population is projected to add just under 1 per cent to health care costs per year between 2019-20 and 2030-31 before easing to add just under 0.8 per cent per year between 2030-31 and 2040-41. Obviously, the assumptions behind the population projections are important not only to health care but to virtually all aspects of the economic environment the health care sector operates within. To provide more context to our population growth assumptions, this report draws on other Conference Board of Canada projections. In particular, the following information on population growth has been adapted from the Conference Board's long-term economic forecast.

Canada's demographic changes: Population growth

There are two main factors to examine when considering population growth: natural increase and net migration.

Natural increase

The natural rate of increase is simply the number of births minus the number of deaths in any given year. The natural rate is greatly influenced by the age structure of the population, as an older population tends to have a lower birth rate (since women of child-bearing age are relatively under-represented) and a higher death rate (since older people are relatively over-represented). The fertility rate—the average number of children born to women over their lifetime—and the mortality rate also play an important role in determining a population's rate of natural increase.

To maintain the current population through natural increase, a fertility rate of 2.1—called the "natural replacement rate"—is required to replace the number of Canadians who die each year. However, the national fertility rate has remained relatively stable at around 1.5 or 1.6 over the last 15 years, including in the latest 2016 census estimates. This fertility rate, being well below 2.1, is not high enough to maintain the population through natural means. In fact, Canada's fertility rate has not been above the natural replacement rate since the late 1960s. However, despite the projected flat fertility rate, the number of births will continue to rise throughout most of the forecast period as the members of Generation Y (children of the baby boomers) cohort move through their peak child-bearing years and the country experiences a steady inflow of young immigrants. The number of births is expected to increase from 381,900 in 2018 to 416,011 by 2040.

The mortality rate in a population is determined by a combination of demographic and non-demographic factors. The most crucial demographic driver is the age structure of the population. In developed economies, mortality rates are projected to rise with the aging of the population, as the risk of death increases with age. The most important non-demographic drivers of the mortality rate include economic well-being and access to quality health care. Technological, social, and economic

advancements over the last 80 years have improved overall life expectancy dramatically in developed countries. Prior to the 1930s, men and women could both expect to live to be roughly 60 years old. Since then, the life expectancy for the average Canadian has risen to around 82 years. Over the next two decades, life expectancy in Canada should continue to rise, assuming continued medical advances and economic prosperity. But as the population ages, the death rate will also increase – from 7.9 deaths per 1,000 people in 2019 to 10.8 per 1,000 by 2040 – simply because there are so many more people near the end of their lives.

With slowing births and accelerating deaths, it makes sense that the natural rate of increase (births minus deaths) will decline steadily over the forecast period. In fact, the natural rate will turn negative in 2033 as the number of deaths per year overtakes the number of births. Consequently, the natural rate will detract from the Canadian population; if not for immigration, the total population of Canada would decline.

Net migration

Net migration is the number of new residents (immigrants) minus the number of people who leave a country (emigrants). Immigration has been a key driver of Canada's population growth in recent years and will make up the entirety of population growth before 2040 as deaths outweigh the number of births in Canada.

The previous Conservative government's targeted immigration levels ranged from 240,000 to 265,000. The Liberal government then upped this target substantially, starting with 300,000 in 2016, rising to 310,000 in 2018, and increasing to 350,000 by 2021.

The other component of net migration is emigration. (Temporary emigration is offset by temporary immigration in the numbers and therefore does not have a significant impact.) Since international emigration from Canada as a share of total population has been stable in the past, we assume the historical share will be maintained over the forecast period. (The number of returning Canadians makes up a small fraction of the population gains in Canada.) Thus, the projection for emigration will follow a slow upward trend – from around 72,000 in 2018 just under 88,000 by 2040. Overall, net migration will account for the entirety of Canada's population growth, starting in 2033 when the natural rate of population growth becomes negative.

Source: The Conference Board of Canada, *Canadian Outlook Long-Term Economic Forecast: 2020*.

Impact of population aging

On its own, the aging of Canada's population is projected to add nearly 1.1 per cent per year to health care costs between 2019-20 and 2030-31 and just over 0.9 per cent per year between 2030-31 and 2040-41. The main driver of population aging in Canada is the aging of the baby-boom cohort (population currently aged 55 to 74)—by 2040, the youngest baby boomer will reach 75. Since the largest per capita costs of providing health care occur in the older age groups, this cohort is projected to dramatically increase total health care spending.

As with our projections on the growth of Canada's population, the assumptions behind the aging of the population will have important implications for the health care sector and the broader economic environment. Once again, to provide further context to the impact of population aging, the following information has been adapted from the Conference Board's long-term economic forecast.

Canada's demographic changes: Aging population

It could be argued that the most influential force shaping Canada's economy in the 21st century is its aging demographics. By 2040, Canadians aged 65 and over will make up nearly 25 per cent of the population, up from roughly 18 per cent in 2020.

The aging is being driven in large part by the baby-boom generation. These Canadians, who are now between the ages of 55 and 74, make up one of the largest age cohorts in the country and are either approaching retirement or already retired. As more boomers enter retirement, the demands they place on Canada's pension and health care systems will increase rapidly, raising the pressure on federal and provincial budgets. With their mass exodus from the workforce, the baby boomers will transform Canada's economy, shrinking the pool of available labour and dramatically slowing Canada's economic potential. These trends have major implications for all Canadians and all levels of governments over the long term.

Since the end of the Second World War, the baby-boom generation has dominated the cultural and economic life of Canada and many other Western countries. A larger generation, and with a more distinct sense of self-identity than the cohort that preceded them, the baby boomers shaped Canada in a way no other generation had before. Following the end of the Second World War, soldiers returned home to a land of flourishing optimism, leading to a boom in fertility that persisted for 20 years. In terms of its duration and magnitude relative to the size

of the population, the baby boom was larger in Canada than in other Western countries, and it fundamentally altered the country's demographic landscape. At its peak, the Canadian fertility rate reached almost four children per woman.

The baby-boom cohort in Canada is large not only because of the high fertility rate that followed the Second World War but also because of the surge in immigration to Canada that occurred during the 1980s and 1990s. Many of these new Canadians came from countries that also had a large baby boom, further boosting the predominance of this age group. By 2019, an estimated 9.3 million Canadians belonged to the baby-boom generation, accounting for 24.8 per cent of the total population. While most baby boomers are currently in the age range associated with peak labour market participation, the oldest members of the cohort have entered retirement age. As a result, the bulk of the generation will leave the labour force over the coming decade or so. Today, the baby-boom cohort is concentrated in the 55–74 age group. By 2040, the youngest of the boomers will be 75, and the vast majority will have left the labour force. This will put substantial pressure on social programs, such as Old Age Security and medicare, that were introduced when they were younger. This means that, although they may be leaving economic life, the baby-boom generation will continue to have an outsized impact on Canada's economy.

Source: The Conference Board of Canada, *Canadian Outlook Long-Term Economic Forecast: 2020*.

Inflation in the health care sector

The Conference Board of Canada projects the overall inflation rate in the health care sector based on weighting the projected cost increases associated with different health care components. The individual components projected are the same as those used by the Canadian Institute for Health Information's National Health Expenditure Database. Table 2 shows the average annual growth rate projected for inflation by component as well as for total health care expenditures.

Overall, health care inflation is projected to account for about 46 per cent of the total increase in health care costs between 2019-20 and 2030-31 and nearly 49 per cent of the increase between 2030-31 and 2040-41. On an annual basis, inflation is projected to add roughly 2.5 per cent to health care costs each year going forward. The strongest growth is projected for physicians, other health care professionals, and other institutions (which exclude hospitals but include long-term care facilities).

Table 2
Inflation by health care component, pre-COVID-19
(average annual growth)

Cost driver component	2019-20 to 2030-31	2030-31 to 2040-41	Overall (2019-20 to 2040-41)
Administration	2.02%	2.02%	2.02%
Capital	2.00%	2.16%	2.08%
Drugs	1.02%	1.01%	1.01%
Hospitals	2.71%	2.74%	2.72%
Other institutions	2.82%	2.84%	2.83%
Other professionals	2.98%	2.99%	2.98%
Other health spending	2.02%	2.02%	2.02%
Public health	2.02%	2.02%	2.02%
Physicians	3.10%	3.11%	3.11%
Total health care expenditures	**2.50%**	**2.52%**	**2.51%**

Sources: The Conference Board of Canada; Public Accounts of Canada; Canadian Institute for Health Information.

Increased access to health care systems

In addition to the health care drivers discussed so far (population growth, population aging, and inflation), health care spending is also influenced by policy decisions that change the way Canadians interact with the health care systems and by the outcomes derived by those interactions. In the process of back-casting, or re-estimating, our health care projection model, history has shown that, on average, strategic decisions that increase access and improve health care outcomes add between 0.8 to 0.9 per cent to costs per year.

Specific policies and milestones have clearly affected health care costs in the past (such as changes to Ontario's drug program to include the OHIP+ program covering residents age 24 and younger who are not covered by a private plan)[1] and will continue to do so in the foreseeable future. But the provision to account for a continued quest to increase access and improve health care outcomes is not tied to any specific policy or milestone specific. Indeed, this trend factor is projected to continue to add 0.8 to 0.9 per cent per year to overall health care costs, and account for nearly 17 per cent of the total growth in health care spending between 2019-20 and 2040-41.

COVID-19 as a new cost driver

Based on the level of new expenditures already incurred by governments and the expectation that the COVID-19 pandemic will continue to dramatically impact daily life in Canada for the foreseeable future, COVID-19 should be seen as a significant new cost driver that will impact health care spending throughout Canada, particularly over the short to medium term.

1 Canadian Institute for Health Information, "Larger Portion of Canada's Public Drug Dollars Spent on High-Cost Drugs."

The following section provides a sense of the scope and magnitude of the cost implications of the COVID-19 pandemic for health care. In particular, this section attempts to quantify the increase in health care spending associated with mitigating the impact of COVID-19 on the health of Canadians, as well as any additional spending that may be required to deal with new health complications arising in COVID-19 patients and the costs to remove the backlog of postponed or displaced surgeries and other non-COVID-19 health care system interactions.

Direct costs associated with COVID-19

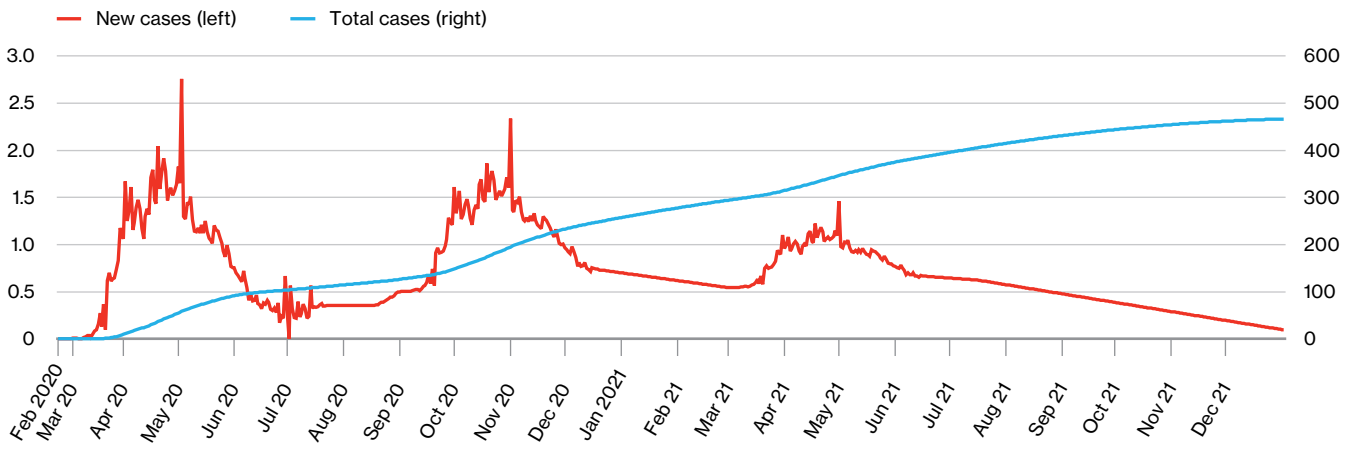
The direct costs associated with COVID-19 encompass not only the testing, treatment, and recovery of individuals but also the personal protective equipment (PPE), medical supplies, pharmaceuticals, and any other costs incurred by governments that directly relate to challenges introduced in providing health care because of the COVID-19 pandemic.

While it is perhaps unreasonable to assume that any analysis at this point in time could accurately project the full incremental COVID-19 costs that governments will incur, using available data it is possible to provide a range based on a few assumptions. For this study, cost estimates are examined using three scenarios that depict how the COVID-19 pandemic might continue to evolve, specifically in Canada and among Canadians.

Scenario 1: Optimistic trajectory with vaccine (generally contained disease and effective vaccine scenario[2]): In this scenario, the outbreak can be viewed as contained until late 2021, when an effective vaccine is made available to the population. In this scenario, periodic outbreaks appear during both 2020 and 2021, but these outbreaks are generally well contained. Still, as the economy opens, the rate of transmission among the population is projected to increase even in a steady-state (non-outbreak) period. In this scenario, the incremental cases from new outbreaks (or a second wave) never exceed the initial number of cases in March to June 2020. From 2022 on, only 50,000 or fewer cases of COVID-19 are projected annually due to the presence of an effective vaccine. (See Chart 2.)

2 In this study, an "effective" vaccine is assumed to have a vaccine efficacy of 75 per cent for COVID-19 – that is, a 75 per cent reduction in disease occurrence among the vaccinated group. It is also assumed that 75 per cent of population would be vaccinated. These assumptions are reasonable considering that the most highly effective vaccines (like those for measles) provide immunity to about 95 per cent of population. At the time of writing, there is no universal standard on the minimum vaccination coverage against COVID-19 among health agencies. For instance, the U.S. Food and Drug Administration issued a 50 per cent efficacy threshold, with an adjusted lower bound of >30 per cent; its Center for Biologics Evaluation and Research suggested a 70 per cent vaccine efficiency threshold. Operation Warp Speed (a public–private partnership, initiated by the U.S. government, to facilitate and accelerate the development, manufacturing, and distribution of COVID-19 vaccines) estimated the vaccine efficiency could fall in the 90 per cent range. In terms of the share of the population that would choose to get vaccinated, a survey by Research Co. in June 2020 indicates 75 per cent of Canadians would take the vaccine if it were available. (Alyse Kotyk, "Here's How Many Canadians Would Choose to Take a COVID-19 Vaccine: Poll.")

Chart 2
COVID-19 confirmed case projections – Scenario 1
(number of cases, 000s)



Sources: The Conference Board of Canada; Government of Canada, Coronavirus disease (COVID-19): Outbreak update (as of July 13, 2020).

Scenario 2: Pessimistic trajectory with vaccine (less-contained disease, then effective vaccine scenario): In this scenario, the amplitude of outbreaks escalates to the point where the disease is on the verge of not being contained; however, full control is established when an effective vaccine is made available. (See Chart 3.)

As in Scenario 1, outbreaks appear during both 2020 and 2021 under Scenario 2; however, they are less controlled than in Scenario 1. Also, as with Scenario 1, as the economy opens, the rate of transmission is projected to increase during the steady-state (non-outbreak) period. In this scenario, the number of incremental cases from new outbreaks (or a second wave) is twice as significant as that experienced during the initial March to June 2020 outbreak. Still, from 2022 on, 50,000 cases or fewer are projected annually due to the presence of an effective vaccine.

Scenario 3: Medium trajectory without vaccine (partially contained with no vaccine scenario): In this scenario, outbreaks are projected to escalate to the verge of being only partially contained; however, control is generally restored after a 3.5-month period (the same amount of time as the initial wave, from March 15 to June 30, 2020). This scenario essentially represents the mid-point between Scenario 1 and Scenario 2, with the exception that an effective vaccine is assumed to not be found. Instead, over time, the treatments that become available are assumed to lessen the likelihood of death and complications associated with the disease but not the transmission rate. (See Chart 4.)

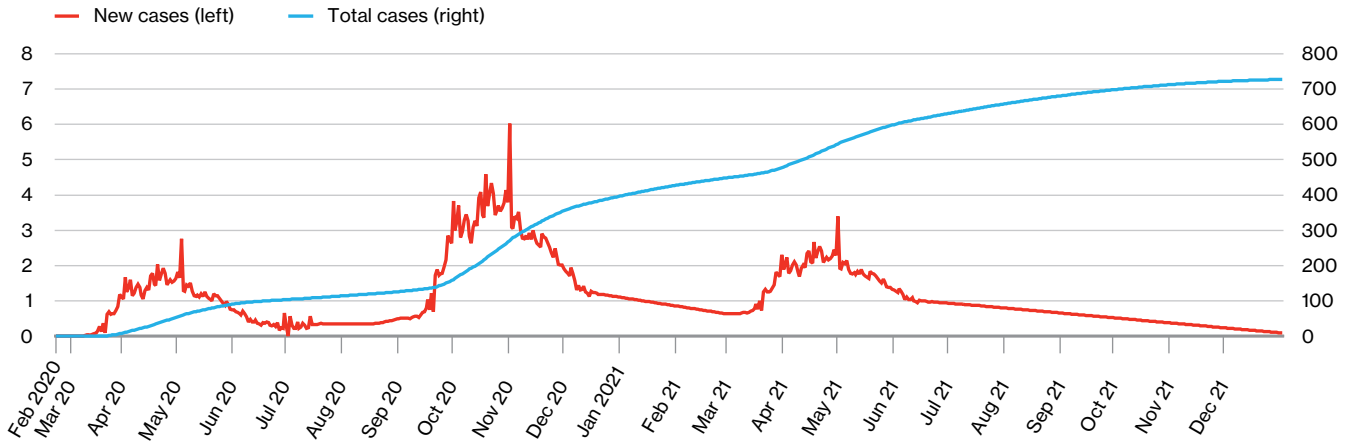
In this scenario, the outbreaks that occur during 2020 and 2021 are less controlled than in Scenario 1 but more controlled than in Scenario 2. As with the other two scenarios, as the economy opens, the rate of transmission is projected to increase even in the steady-state (non-outbreak)

period. The number of incremental cases from new outbreaks (or a second wave) is projected to be 1.5 times as significant as that experienced during the initial March to June period. In 2022, the number of cases is projected to be 90 per cent of that in 2021. Going forward, the number of cases for 2023, 2024, and 2025 is projected to be equal to 95, 98 and 99 per cent, respectively, of the previous year.

Chart 3

COVID-19 confirmed case projections – Scenario 2

(number of cases, 000s)

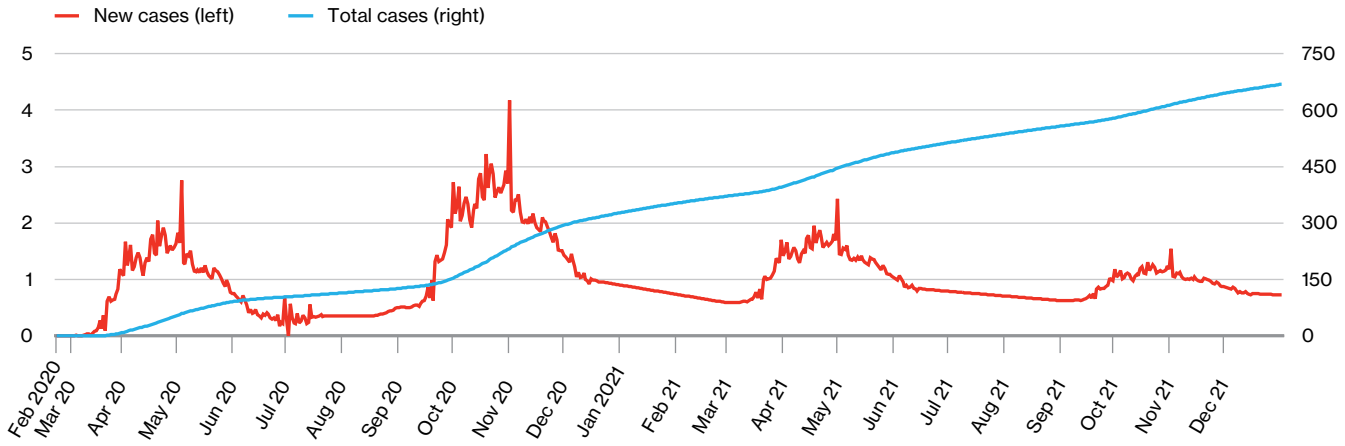


Sources: The Conference Board of Canada; Government of Canada, Coronavirus disease (COVID-19): Outbreak update (as of July 13, 2020).

Chart 4

COVID-19 confirmed case projections – Scenario 3

(number of cases, 000s)



Sources: The Conference Board of Canada; Government of Canada, Coronavirus disease (COVID-19): Outbreak update (as of July 13, 2020).

A summary of COVID-19 case projections for the three scenarios is shown in Table 3. The monthly average for January 1 to June 30 in 2020 is calculated based on the active 3.5-month period between March 15 and June 30, 2020.

In conjunction with the COVID-19 case projections shown in Table 3, it is also important to have projections of the number of patients that require hospitalization. (See Table 4.) The projections of hospitalizations will impact not only the outcomes and direct cost projections attributed to COVID-19 but also the extent to which patients may encounter health complications even after recovery.[3] Projections related to specific complications are provided later in the report.

Based on the projections in tables 3 and 4, as well as the level and scope of new health care costs already incurred by the provinces and territories and the assumptions related to the breakdown of those expenses, annual cost projections can be generated for each scenario.[4]

Table 3

COVID-19 confirmed case projections – Scenario 1, 2, and 3

(total cases by year, time frame, and monthly average)

		Scenario 1		Scenario 2		Scenario 3	
Year	Time frame	**Number of cases**	**Monthly average**	**Number of cases**	**Monthly average**	**Number of cases**	**Monthly average**
2020	Jan. 1–June 30	104,193	29,769*	104,193	29,769*	104,193	29,769*
	Jul. 1- Dec. 31	153,203	25,534	292,760	48,793	222,982	37,164
	Full year	**257,396**	**27,094**	**396,953**	**41,785**	**327,175**	**34,439**
2021	Jan. 1–June 30	138,319	23,053	233,758	38,960	186,039	31,006
	July 1–Dec. 31	70,947	11,824	96,317	16,053	155,488	25,915
	Full year	**209,266**	**17,439**	**330,075**	**27,506**	**341,527**	**28,461**
2022	Jan. 1–June 30	25,000	4,167	25,000	4,167	153,687	25,615
	July 1–Dec. 31	25,000	4,167	25,000	4,167	153,687	25,615
	Full year	**50,000**	**4,167**	**50,000**	**4,167**	**307,374**	**25,615**

* based on the active 3.5-month period between March 15 and June 30, 2020
Sources: The Conference Board of Canada; Government of Canada, Coronavirus disease (COVID-19): Outbreak update (as of July 13, 2020).

3 See Appendix A, Projections on the number of hospitalizations, for details on the assumptions used to derive hospitalizations.

4 See Appendix A for details on the level and scope of new health care costs already incurred by the provinces and territories (Table A1) and the assumptions related to the breakdown of those expenses on a fixed and variable cost basis (Table A2).

Table 4
COVID-19 projection for hospitalizations – Scenario 1, 2, and 3
(total hospitalizations by year, time frame and monthly average)

		Scenario 1		Scenario 2		Scenario 3	
Year	**Time frame**	**Number**	**Monthly average**	**Number**	**Monthly average**	**Number**	**Monthly average**
2020	Jan. 1–June 30	15,212	4,346*	15,212	4,346*	15,212	4,346*
	July 1– Dec. 31	20,995	3,499	39,995	6,666	30,495	5,082
	Full year	**36,207**	**3,811**	**55,207**	**5,811**	**45,707**	**4,811**
2021	Jan. 1–June 30	16,734	2,789	28,189	4,698	22,461	3,744
	July 1–Dec. 31	7,501	1,250	10,193	1,699	16,163	2,694
	Full year	**24,235**	**2,020**	**38,382**	**3,198**	**38,625**	**3,219**
2022	Jan. 1 – June 30	3,125	521	3,125	521	16,172	2,695
	July 1–Dec. 31	3,125	521	3,125	521	11,638	1,940
	Full year	**6,250**	**521**	**6,250**	**521**	**27,810**	**4,635**

* based on the active 3.5-month period between March 15 and June 30, 2020
Sources: The Conference Board of Canada; Government of Canada, Coronavirus disease (COVID-19): Outbreak update (as of July 13, 2020).

Scenario 1: Optimistic trajectory with vaccine

Table 5 presents annual estimates of the new health care costs directly tied to COVID-19 under Scenario 1 over 2020 to 2022. Not included in these projections are the costs associated with the purchase and administration of a vaccine (assumed to be ready in late 2021). These vaccine costs are discussed later in the section and shown in Table 8.[5]

Scenario 2: Pessimistic trajectory with vaccine

Table 6 present annual estimates of the new health care costs directly tied to COVID-19 under Scenario 2 during 2020 to 2022. Not included in these projections are the costs associated with the purchase and administration of a vaccine (assumed to be ready in late 2021).[6]

Scenario 3: Medium trajectory without vaccine

Table 7 presents annual estimates of the new health care costs directly tied to COVID-19 under Scenario 3 for 2020 to 2022.[7]

In addition to the direct costs shown in tables 5 and 6, corresponding to scenarios 1 and 2, respectively, costs to acquire and dispense a COVID-19 vaccine need to be considered. The costs of vaccine supplies and distribution include vaccine development, injection syringes, safety boxes, and transportation and storage of vaccines and injection equipment, as well as costs associated with waste management, personnel, surveillance, and monitoring.[8]

5 See Appendix B for the aggregate longer-term implication of Scenario 1 (including the cost of the vaccine) on the direct health care costs associated with COVID-19 (Table B2).

6 For the aggregate longer-term implication of Scenario 2 (including the cost of the vaccine) on the direct health care costs associated with COVID-19, see Appendix B (Table B3).

7 For the aggregate longer-term implication of Scenario 3 on the direct health care costs associated with COVID-19, see Appendix B (Table B4).

8 World Health Organization, “Guidelines for estimating costs of introducing new vaccines into the national immunization system.”

Table 5

New health care costs related to COVID-19 – Scenario 1

($ 000s)

Cost categories	2020	2021	2022
PPE	6,806,713	4,619,309	1,143,845
Medical supplies and equipment	453,819	209,448	52,380
Drugs and pharmaceuticals	312,183	221,599	54,574
Physician and other health profession compensation	2,042,969	1,572,773	389,323
Public health systems	1,805,225	1,346,286	335,295
Mental health and addictions supports, and other social supports	122,744	93,300	23,661
Long term care and continuing care, retirement home, and home/community care requirements	1,436,973	1,071,654	266,897
Emergency health operations costs	303,499	233,648	57,837
Isolation costs	177,897	132,670	33,042
Technology costs	101,739	63,659	16,108
Additional health costs	4,013,573	2,830,130	702,169
Indirect health systems operating costs	202,650	108,643	27,431
Total costs	**17,779,983**	**12,503,119**	**3,102,561**

Sources: The Conference Board of Canada; Council of the Federation Secretariat.

Table 6

New health care costs related to COVID-19 – Scenario 2

($ 000s)

Cost categories	2020	2021	2022
PPE	9,091,894	6,647,013	1,143,845
Medical supplies and equipment	527,863	275,149	52,380
Drugs and pharmaceuticals	438,926	334,062	54,574
Physician and other health profession compensation	2,828,553	2,269,843	389,323
Public health systems	2,360,906	1,839,357	335,295
Mental health and addictions supports, and other social supports	136,934	105,892	23,661
Long-term care and continuing care, retirement home, and home/community care requirements	1,879,299	1,464,142	266,897
Emergency health operations costs	420,204	337,203	57,837
Isolation costs	232,656	181,260	33,042
Technology costs	113,501	74,096	16,108
Additional health costs	5,335,370	4,002,996	702,169
Indirect health systems operating costs	226,079	129,433	27,431
Total Costs	**23,592,186**	**17,660,446**	**3,102,561**

Sources: The Conference Board of Canada; Council of the Federation Secretariat.

Table 7
New health care costs related to COVID-19 – Scenario 3
($ 000s)

Cost categories	2020	2021	2022
PPE	7,949,263	6,839,211	6,422,641
Medical supplies and equipment	490,840	281,377	269,373
Drugs and pharmaceuticals	375,552	344,722	320,753
Physician and other health profession compensation	2,435,747	2,335,916	2,192,329
Public health systems	2,083,056	1,886,093	1,790,372
Mental health and addictions supports, and other social supports	129,839	107,085	106,114
Long term care and continuing care, retirement home, and home/community care requirements	1,658,128	1,501,344	1,425,150
Emergency health operations costs	361,849	347,019	325,688
Isolation costs	205,276	185,866	176,433
Technology costs	107,620	75,086	73,939
Additional health costs	4,674,448	4,114,168	3,877,170
Indirect health systems operating costs	214,364	131,403	128,664
Total Costs	**20,685,980**	**18,149,289**	**17,108,626**

Sources: The Conference Board of Canada; Council of the Federation Secretariat.

At the time of writing, nearly 200 groups appeared to be working on a coronavirus vaccine, with at least two dozen reaching the clinical trial stage.[9] While the cost, or even if an effective vaccine is possible, has yet to be determined, based on the U.S. federal government's awarding of $1.6 billion to Maryland-based vaccine maker Novavax in exchange for ownership of the first 100 million doses, a preliminary estimate of US$16 per dose might seem reasonable.

The costs of administering vaccines differ across Canadian provinces and territories. For existing vaccines, the average fee claimable by pharmacists is C$13.12 per injection, with fees ranging from $4.14 to $21.21.[10] By assuming that other costs associated with administering the vaccine would be equal to the acquisition cost alone, a total cost per dose can be estimated at C$45. In the projections for scenarios 1 and 2, it is assumed that each Canadian would receive one injection in 2021 and two every year thereafter until it is determined that dosage intervals could be changed, presumably because the vaccine becomes effective for longer periods. (See Table 8.)

Table 8
Crude COVID-19 vaccine costs – scenarios 1 and 2
($ 000s)

Vaccine cost categories	2020	2021	2022
Vaccine cost (C$22.50 per dose)	0	855,000	1,752,750
Vaccine dispensing and administering (C$22.50 per patient)	0	855,000	1,752,750
Total costs of COVID-19 vaccine	**0**	**1,710,000**	**3,505,500**

Source: The Conference Board of Canada.

9 Ben-Achour, "How much will a coronavirus vaccine cost?"

10 Houle and others, "Publicly Funded Remuneration for the Administration of Injections by Pharmacists."

Indirect costs associated with COVID-19

In addition to the level of new direct health care costs projected in each of the 3 scenarios, the COVID-19 pandemic will also exert indirect cost pressures on health care systems, including through new or increased health complications brought on by COVID-19 and the clearing of the backlog of surgeries that were postponed or displaced because of the virus.

As is the case with the direct cost projections related to COVID-19, it is unreasonable to assume that indirect cost projections related to COVID-19 can be developed without basing them on specific assumptions. Even under the three scenarios developed for this report, the degree to which the COVID-19 pandemic will transform health care is still speculative. In this regard, a review of the literature was performed to gather and synthesize the scope and scale of these influences in a Canadian context. The possible health complications brought on by COVID-19 are discussed below.

Lasting health complications for patients who had COVID-19

As more people recover from COVID-19 globally, a better understanding of long-term complications of the disease is evolving. While most patients who had mild symptoms can expect no lasting harm, those who survived the severe type of the illness may face a much more complicated picture that goes beyond the impact on their lungs and respiratory function. A growing number of studies is showing there may be long-term impacts on other organs, such as the heart, kidneys, and brain. A better understanding of the systemic effects of COVID-19 is of critical importance for populations who have convalesced and survived the virus. It has the potential to help the health care systems plan for and try to mitigate any long-term consequences that may emerge.

Though it is still early in the global pandemic's timeline, the four main types of serious complications that have been consistently observed among those who have been hospitalized with COVID-19 are respiratory, cardiac, renal, and neurologic.

Note: The current literature evaluating complications and long-term effects associated with COVID-19 has important limitations and should thus be interpreted with caution. The limitations and biases include low sample sizes, short study durations, and heterogeneity in patient selection, outcomes, comparators, and study designs. Furthermore, given the urgency and thirst for information about COVID-19, much of the literature on the topic is getting published before it goes through a full peer review.

Given the uncertainty surrounding long-term complications, our assessment of the additional costs is only based on the year in which the complication is projected to occur. It is likely, however, that many individuals will experience complications that last many years and, as such, require additional health care expenditures over multiple years.

Respiratory complications

Concerns have been growing globally about the potential for long-lasting and permanent impacts of COVID-19 on lung function, based on what is known of other infections that lead to pneumonia and ventilator use. Recent studies from China confirmed these suspicions. In one study, more

than half (54 per cent) of the discharged patients had residual lung abnormalities revealed via a computed tomography (CT) scan of the chest 30 days after discharge, and about three-quarters developed pulmonary function impairment.[11] The impairments and abnormalities were greater in those who experienced more severe infection. Another study from China showed that lung abnormalities increased quickly after the onset of symptoms, peaked around 6–11 days, and persisted in high levels for 24 days and longer.[12] A more recent study noted that residual abnormalities of pulmonary function and chest radiography performed with a CT scan were still observed in 75 per cent of the patients at three months after discharge.[13]

Studies with longer follow-up are needed to evaluate the permanence of the observed changes. Huang and others noted that their results were similar to those obtained with SARS survivors, some of whom went on to show respiratory abnormalities for three years after discharge.[14] These findings imply it is necessary to follow these patients, by performing comprehensive assessments and early rehabilitation exercises to detect and appropriately manage any persistent or emerging long-term radiological and physiological conditions.

Based on the rates uncovered in the literature, Table 9 reflects the number of COVID-19 patients projected to suffer lung complications after recovery.

Table 9
COVID-19 lung complications
(number of patients)

Year	Scenario 1	Scenario 2	Scenario 3
2020	19,552	29,812	24,682
2021	13,087	20,726	20,857
2022	3,375	3,375	15,017

Source: The Conference Board of Canada.

Based on the direct costs reported by broad International Classification of Diseases (ICD) category along disease prevalence rates in Canada, we estimated individuals with respiratory conditions (ICD-Chapter X: Respiratory system) will cost health care systems an average of $1,472 per year.[15] Table 10 reflects the additional health care costs (including inflation) that would be associated with COVID-19 patients experiencing lung complications after recovery.

Table 10
COVID-19 lung complications
(health care costs, $ millions)

Year	Scenario 1	Scenario 2	Scenario 3
2020	28.8	43.9	36.3
2021	19.7	31.3	31.5
2022	5.2	5.2	23.2

Source: The Conference Board of Canada.

11 Huang and others, “Impact of Coronavirus Disease 2019 on Pulmonary Function in Early Convalescence Phase.”
12 Wang and others, “Temporal Changes of CT Findings in 90 Patients With COVID-19 Pneumonia: A Longitudinal Study.”
13 Zhao and others, “Follow-up Study of the Pulmonary Function and Related Physiological Characteristics of COVID-19 Survivors Three Months After Recovery.”
14 Huang and others, “Impact of Coronavirus Disease 2019 on Pulmonary Function in Early Convalescence Phase.”
15 Based on figures from the Public Health Agency of Canada’s “Economic Burden of Illness in Canada” that include health care costs related to hospitals, physicians, and drugs in 2010 and have been inflated to 2020 using an overall health care systems inflation rate.

Cardiac complications

Lessons from previous coronavirus and influenza epidemics indicate that viral infections can trigger acute coronary syndromes, arrhythmias, and development or exacerbation of heart failure.[16] These effects are believed to be due to a combination of a significant systemic inflammatory response plus localized vascular inflammation at the arterial plaque level (in addition to other effects). It is also worth noting that cardiovascular issues have caused more deaths during past influenza outbreaks than pneumonia or influenza causes.[17] A study from Wuhan, China, demonstrated that cardiac injury occurred in about 20 per cent of patients hospitalized with COVID-19 and was associated with higher risk of in-hospital mortality.[18] Another study from Wuhan showed that 16.7 per cent of patients developed arrhythmia and 7.2 per cent experienced acute cardiac injury, in addition to other COVID-19 complications.[19]

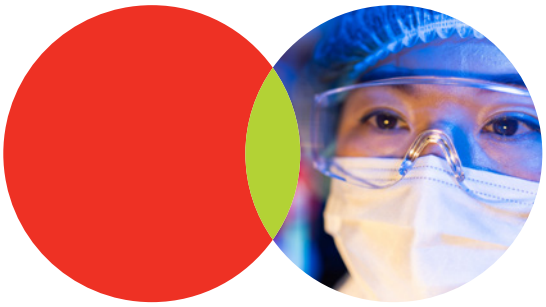
It is currently believed that COVID-19 may induce new cardiac pathologies and/or exacerbate underlying cardiovascular diseases, though researchers caution that the severity, extent, and duration of the cardiovascular effects along with the effects of specific treatments are not yet known.[20] In addition, some of the medications used to treat COVID-19 also have potential cardiac complications.[21] The key implications of these findings are twofold: 1) it is important for emergency departments and other clinicians to be aware of these complications when treating COVID-19 patients; and 2) cardiologists should be prepared to help other clinical specialties in managing cardiac complications in severe cases of COVID-19.

Based on the rates uncovered in the literature, Table 11 reflects the number of COVID-19 patients projected to suffer cardiac complications after recovery.

Table 11
COVID-19 cardiac complications
(number of patients)

Year	Scenario 1	Scenario 2	Scenario 3
2020	7,241	11,041	9,141
2021	4,847	7,676	7,725
2022	250	250	5,562

Source: The Conference Board of Canada.



16 Madjid and others, “Potential Effects of Coronaviruses on the Cardiovascular System: A Review.”
17 Madjid and Casscells, “Of Birds and Men: Cardiologists’ Role in Influenza Pandemics.”
18 Shi and others, “Association of Cardiac Injury With Mortality in Hospitalized Patients With COVID-19 in Wuhan, China.”
19 Wang and others, “Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China.”
20 Madjid and others, “Potential Effects of Coronaviruses on the Cardiovascular System: A Review.”
21 Long and others, “Cardiovascular Complications in COVID-19.”

Based on the direct costs reported by broad International Classification of Diseases category and disease prevalence rates in Canada, it is estimated that individuals with cardiac conditions (ICD-Chapter IX: Circulatory system) will cost the health care systems an average of $1,726 per year.[22] Table 12 reflects the health care costs associated with the number of COVID-19 patients projected to suffer cardiac complications after recovery.

Table 12
COVID-19 cardiac complications
(health care costs, $ millions)

Year	Scenario 1	Scenario 2	Scenario 3
2020	12.5	19.1	15.8
2021	8.6	13.6	13.7
2022	2.3	2.3	10.1

Source: The Conference Board of Canada.

Renal complications

Among those who develop severe COVID-19 infection and require hospitalization, kidney damage is frequent, with clinical presentation ranging from mild proteinuria to progressive acute kidney injury and even necessitating renal replacement therapy.[23] In more than 40 per cent of cases, abnormal proteinuria at hospital admission has been observed.[24]

Acute kidney injury has been shown to affect approximately 20–40 per cent of patients admitted to intensive care.[25] It can indicate the disease's severity and is a negative prognostic factor for survival.[26]

About 15 days from the illness's onset, close to 20 per cent of COVID-19 patients in intensive care required renal replacement therapy.[27] Although further research is needed to improve understanding of these complications, the implications of these findings are that early recognition of kidney involvement in COVID-19 and use of preventive and therapeutic measures to limit subsequent acute kidney injury and progression to more severe stages are crucial to reduce morbidity and mortality associated with COVID-19 infection.

Based on the rates uncovered in the literature, Table 13 reflects the number of COVID-19 patients projected to suffer renal complications after recovery.

Table 13
COVID-19 renal complications
(number of patients)

Year	Scenario 1	Scenario 2	Scenario 3
2020	13,578	20,703	17,140
2021	9,088	14,393	14,484
2022	469	469	10,429

Source: The Conference Board of Canada.

22 Based on figures from the Public Health Agency of Canada's "Economic Burden of Illness in Canada" that include health care costs related to hospitals, physicians, and drugs in 2010 and have been inflated to 2020 using an overall health care systems inflation rate.

23 Ronco, Reis, and Husain-Syed, "Management of Acute Kidney Injury in Patients With COVID-19."

24 Cheng and others, "Kidney Disease Is Associated With In-Hospital Death of Patients With COVID-19."

25 Richardson and others, "Presenting Characteristics, Comorbidities, and Outcomes Among 5700 Patients Hospitalized With COVID-19 in the New York City Area."

26 Cheng and others, "Kidney Disease Is Associated With In-Hospital Death of Patients With COVID-19."

27 Zhou and others, "Clinical Course and Risk Factors for Mortality of Adult Inpatients With COVID-19 in Wuhan, China: A Retrospective Cohort Study."

Based on the direct costs reported by broad International Classification of Diseases category and disease prevalence rates in Canada, it is estimated that individuals with renal conditions (ICD-Chapter XIV: Genitourinary) will cost the health care systems an average of $1,189 per year.[28] Table 14 reflects the health care costs associated with the number of COVID-19 patients projected to suffer renal complications after recovery.

Table 14
COVID-19 renal complications
(health care costs, $ millions)

Year	Scenario 1	Scenario 2	Scenario 3
2020	16.1	24.6	20.4
2021	11.1	17.5	17.7
2022	2.9	2.9	13

Source: The Conference Board of Canada.

Neurologic complications

While understanding of the coronavirus is still unfolding, there are indications that COVID-19 might have a neurologic component in some instances, similar to what has been observed with other coronaviruses diseases such as MERS.[29] Neurologic manifestations that involved the central nervous system (dizziness, headache, impaired consciousness, acute cerebrovascular disease, ataxia, and seizure), peripheral nervous system (taste impairment, smell impairment, vision impairment, and nerve pain), and skeletal muscles were reported in 36 per cent of 214 COVID-19 patients in China.[30] Greater neurologic involvement was more likely in those with severe infection, presenting as acute cerebrovascular disease, conscious disturbance, and skeletal muscle injury. Interestingly, some patients who came to the hospital with only the neurological manifestations as presenting symptoms did not display typical COVID-19 symptoms, highlighting potential for delayed diagnosis or misdiagnosis of COVID-19.

The implication of these findings is that neurologists and other providers should be vigilant for possible signs of the virus when seeing patients with these neurologic manifestations and should consider COVID-19 infection as a differential diagnosis to avoid delayed diagnosis or misdiagnosis and prevention of transmission.

Based on the rates uncovered in the literature, Table 15 reflects the number of COVID-19 patients projected to suffer neurologic complications after recovery.

Table 15
COVID-19 neurologic complications
(number of patients)

Year	Scenario 1	Scenario 2	Scenario 3
2020	13,034	19,875	16,455
2021	8,725	13,818	13,905
2022	450	450	10,011

Source: The Conference Board of Canada.

28 Based on figures from the Public Health Agency of Canada's "Economic Burden of Illness in Canada" that include health care costs related to hospitals, physicians, and drugs in 2010 and have been inflated to 2020 using an overall health care systems inflation rate.

29 Rahman and others, "Neurological and Psychological Effects of Coronavirus (COVID-19): An Overview of the Current Era Pandemic."

30 Mao and others, "Neurologic Manifestations of Hospitalized Patients With Coronavirus Disease 2019 in Wuhan, China."

Based on the direct costs reported by broad International Classification of Diseases category and prevalence rates in Canada, it is estimated that individuals with neurologic conditions (ICD-Chapter VI: Nervous system) will cost health care systems an average of $2,178 per year.[31] Table 16 reflects the health care costs associated with the number of COVID-19 patients projected to have neurologic complications after recovery.

Table 16
COVID-19 neurologic complications
(health care costs, $ millions)

Year	Scenario 1	Scenario 2	Scenario 3
2020	28.4	43.3	35.8
2021	19.5	30.8	31.0
2022	5.1	5.1	22.9

Source: The Conference Board of Canada.

Postponed and displaced traditional health care services

It is difficult to estimate with certainty the potential additional cost pressures that may result from displaced health care activity, in part because the level of displacement on a calendar-year basis in not yet known. A further challenge will be to identify if these displaced services can be absorbed while health care systems are still adapting to the challenges imposed by the COVID-19 pandemic.

Still, with the initial COVID-19 outbreak (or first wave) coming to an end across the country, very preliminary evidence on displaced health care services and their associated cost implications for provincial governments is starting to emerge. The following section summarizes the available evidence on the level of displaced health care services—with a focus on postponed or cancelled surgeries—and additional investments that may be needed to clear the backlog under the three scenarios.

Impacts from cancelled or displaced physician visits (e.g., primary care physicians, specialists) are not included here. Preliminary evidence shows that visits (either in person or virtually) "rebounded" quickly and that significant additional volumes—and thus costs—are not expected in the short or long term.

Volume of displaced surgeries

The COVID-19 pandemic has disrupted the delivery of health care services in Canada and worldwide. Most notably, hospitals in regions and provinces affected by outbreaks had to reduce the number of elective surgeries performed. This was done to ensure patient safety and redirect resources toward COVID-19 patients and the wider response.[32]

31 Based on figures from the Public Health Agency of Canada's "Economic Burden of Illness in Canada" that include health care costs related to hospitals, physicians, and drugs in 2010 and have been inflated to 2020 using an overall health care systems inflation rate.

32 COVIDSurg Collaborative, "Elective Surgery Cancellations Due to the COVID-19 Pandemic"; American College of Surgeons, "COVID-19: Elective Case Triage Guidelines for Surgical Care."

In Canada, an estimated 394,572 elective surgeries were cancelled or postponed during the peak 12 weeks of hospital disruption due to COVID-19.[33] This volume of displaced surgeries was derived from a global expert response study, which estimated the total number of cancelled surgeries for 190 countries, including Canada. Projections of 12-week surgery cancellation rates combined with case-mix data on elective surgeries by specialty and indication (i.e., cancer vs. benign condition) were applied to surgical volumes in Canada to calculate the total number of cancelled surgeries.

Province-specific data from Ontario and British Columbia were used to validate this estimate of 394,572 displaced surgeries for Canada overall. A study published in the Canadian Medical Association Journal showed that between late March and early April alone, 45,000 surgeries were postponed in Ontario due to the COVID-19 outbreak.[34] Relatedly, 30,000 surgeries were postponed in British Columbia between the middle of March and early May.[35] When the volume of postponed surgeries for these two provinces is extrapolated to a 12-week period, the numbers align well with the province-specific share of postponed surgeries (based on population size) calculated in the global expert response study.[36]

Once the number of displaced surgeries in Canada over a 12-week period (corresponding to the first wave) was validated, we estimated the volume of surgeries that would be rescheduled by calendar year and for each of the three scenarios. (See Table 17.) Assuming that 75 per cent of cancelled and postponed surgeries could be rescheduled within the same calendar year, the balance (25 per cent) would then spill over to the next calendar year.

Table 17
Number of rescheduled surgeries due to COVID-19
(number of patients, by scenario)

Scenario	2020	2021	2022	2023 (Scenario 3 only)
Scenario 1	547,469	345,251	54,254	0
Scenario 2	762,887	579,818	108,507	0
Scenario 3	655,178	667,073	373,900	186,950

Source: The Conference Board of Canada.

Indeed, as hospitals resume regular activities such as elective surgeries, patients are likely to be prioritized by clinical urgency. This means that less-urgent cases may incur greater wait times spanning several months.[37] Recently, British Columbia's health minister put forward a plan to catch up on the province's surgical backlog within 15 months,[38] down from a forecast of up to two years made in May.[39] Further, around half of the surgeries that were postponed in the spring were rescheduled and performed between May 18 and June 25.[40] However, catching up on this backlog within a "reasonable" delay while absorbing the continuous inflow of both urgent and elective surgeries requires sizable investments and planning.

33 COVIDSurg Collaborative, "Elective Surgery Cancellations Due to the COVID-19 Pandemic."
34 Urbach and Martin, "Confronting the COVID-19 Surgery Crisis."
35 B.C. Ministry of Health, "A Commitment to Surgical Renewal in B.C."
36 COVIDSurg Collaborative, "Elective Surgery Cancellations Due to the COVID-19 Pandemic."
37 Stahel, "How to Risk-Stratify Elective Surgery During the COVID-19 Pandemic?"
38 Bains, "B.C. Aims to Clear Backlog of 32,400 Surgeries in 15 Months if COVID-19 Surge Doesn't Happen."
39 B.C. Ministry of Health, "A Commitment to Surgical Renewal in B.C."
40 BC Gov News, "B.C. Fulfilling Surgical Renewal Commitment."

Cost implications of displaced surgeries

Cancelling and postponing surgeries has many cost implications, including potential cost "savings" (e.g., from reduced volume of fee-for-service physician services) but also investments needed to clear the backlog. Net savings are likely not occurring over a given calendar year for two main reasons: 1) governments have had to redirect health care funds toward the COVID-19 response (i.e., prevention, detection, treatment); and 2) clearing the backlog of displaced surgeries is putting additional cost pressures on hospitals and, by extension, governments.

Hospitals, especially those in regions hardest hit by COVID-19, are faced with the challenging task of resuming "normal" operations while addressing the wait list of cancelled and postponed surgeries. With the ongoing risk of infection and the looming threat of a second wave, hospitals therefore need to increase their levels of activity while ensuring the safety of patients and staff. To accomplish these goals, additional investments—net of any potential "savings" incurred from surgeries having been postponed in the first place—may be needed to meet the sudden increase in demand. These include:

- increasing staffing capacity (e.g., nurses, specialists, other health care workers, and non-medical support staff) and hours (including overtime pay, more surgeries performed evenings and weekend)
- funding more operating rooms
- purchasing additional supplies and equipment (e.g., PPE, other standard materials)
- building up a larger stockpile of drugs and pharmaceuticals
- increasing patient and staff testing for COVID-19
- funding the space, equipment, and systems needed to keep patients clear of COVID-19 before and after their surgery

While this list is not exhaustive, it gives examples of the types of investments hospitals—and by extension governments—need to incur as they resume regular activities and catch up on cancelled procedures. In early May, British Columbia estimated it will take at least $250 million in extra funding to clear the backlog of 30,000 postponed surgeries due to halted operations since the middle of March.[41] This amounts to about $8,333 per rescheduled surgery. Although this dollar figure was calculated from the backlog of surgeries and investments announced in May, we believe the resulting "cost per case" ($8,333 per rescheduled surgery) is still valid and can be leveraged in our calculations. More recent investments had not been announced by provincial governments as of the end of July 2020.

41 Schmunk, "Catching Up on B.C. Surgery Backlog Will Take Up to 2 Years, Province Says."

However, we also know that expenditures have already been incurred by provinces to address some of the disruptions imposed by the COVID-19 pandemic, as presented in the first section of this report. With that in mind, it may be realistic to assume that governments will incur a further 50 per cent of the calculated cost per rescheduled surgery (of $8,333), or $4,167 on average, to clear the current backlog of postponed surgeries. This cost per case can then be applied to the estimated volume of rescheduled surgeries (presented in Table 17) to derive the potential costs of clearing the backlog of surgeries under the three scenarios. (See Table 18.)

Table 18
Cost of rescheduled surgeries due to COVID-19
($ millions, by year and scenario)

Scenario	2020	2021	2022	2023 (Scenario 3 only)
Scenario 1	2,281	1,438	226	0
Scenario 2	3,179	2,416	452	0
Scenario 3	2,730	2,779	1,558	779

Source: The Conference Board of Canada.

Other potential cost implications of displaced services

Lastly, displaced surgeries may lead to additional costs that are harder to anticipate and quantify without better data. For example, delaying surgeries could lead to worsening of chronic conditions or ailments in some individuals, especially for time-sensitive cancer or transplant surgeries.[42] This could lead to greater health care costs, as well as indirect cost impacts from premature mortality or reduced productivity (in the case of working-age individuals, or their caregiver, unable to work as they await surgery).[43] The loss in quality of life may also be considerable, especially when taking into account the stress and anxiety associated with delayed treatment and increased vulnerability.

Additional costs—or cost savings—could also result from disruptions to emergency department visits during peak COVID-19 outbreaks and beyond. In the United States, data from the National Syndromic Surveillance Program reported a 42 per cent drop in emergency department visits in April 2020 compared with the same time last year.[44] This statistic corroborates anecdotal evidence on reduced emergency department visits across Canada. For example, Alberta apparently saw a reduction of around 40 per cent in expected volume in April 2020 and of around 25 per cent in May 2020.[45] In Ontario, Dr. David Carr, an emergency room doctor in Toronto, reported a 20 to 50 per cent drop in volume, depending on the hospital.[46]

The reduction in emergency department visits seems to span various medical and social issues, ranging from non-urgent (e.g., the common cold) to serious conditions (e.g. heart attacks, strokes, infections) and domestic violence. This has led to concerns that some individuals may be avoiding

42 Grass and others, "Impact of Delay to Surgery on Survival in Stage I-III Colon Cancer"; Shin and others, "Delay to Curative Surgery Greater Than 12 Weeks Is Associated With Increased Mortality in Patients With Colorectal and Breast Cancer but Not Lung or Thyroid Cancer."

43 COVIDSurg Collaborative, "Elective Surgery Cancellations Due to the COVID-19 Pandemic."

44 Hartnett and others, "Impact of the COVID-19 Pandemic on Emergency Department Visits—United States, January 1, 2019–May 30, 2020."

45 Gerein, "Why One Small COVID-19 Outbreak Could Worsen a Big Worry for Alberta's Hospitals."

46 Warnica, "Fear of COVID-19 Believed to Be Behind Plummeting Number of Non-Coronavirus ER Visits Across Canada."

or delaying necessary care due to fears of going to the hospital. Emergency physicians are indeed reporting instances where patients are coming in with more serious illness after avoiding care during the peak of the pandemic.[47]

However, more information is needed to adequately assess the short- and long-term implications of this phenomenon from a health, health care, and economic perspective.

For the aggregate impact on health care spending of both potential new health complications associated with COVID-19 and the costs to clear postponed and displaced traditional health care interactions over the longer term, see Appendix B (Table B5 through to Table B7).

Total costs associated with COVID-19

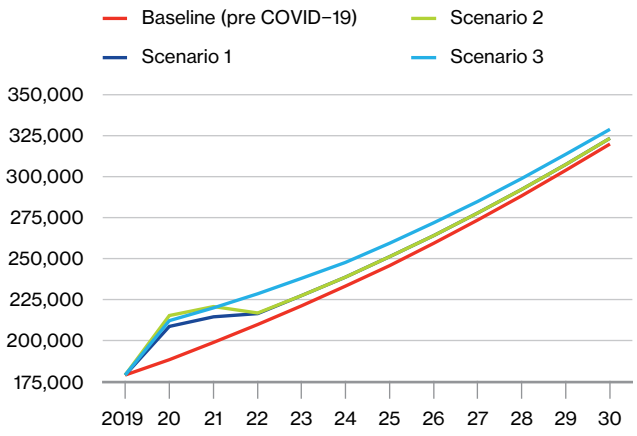
Combined, the projected increase in spending to mitigate the impact of COVID-19 on the health of Canadians, to address new health complications in COVID-19 patients, and to remove the backlog of postponed and displaced surgeries suggests that total cost of COVID-19 for health care systems will be significant.

Under these three scenarios, additional health care costs due to COVID-19 range between $20.1 billion and $26.9 billion in 2020-21 and between $15.7 billion and $21.9 billion in 2021-22. During 2022-23, the projections of additional health care costs vary dramatically, from $6.9 billion and $7.1 billion in the two scenarios involving an effective vaccine to $18.7 billion in the scenario without an effective vaccine. By 2022-23, COVID-19 is projected to have accounted for an additional $42.7 billion to $63.3 billion in health care spending in total from the beginning of the outbreak—depending on how the pandemic evolves and if an effective vaccine can be discovered and administered widely to Canadians.

With COVID-19, total health care costs for governments are projected to increase by between 20.9 per cent and 27.5 per cent between 2019-20 and 2022-23—or at an average annual pace of between 6.5 per cent and 8.4 per cent.

COVID-19 is projected to have a less significant impact on health care expenditures over the long term—increasing average annual growth by between 0.1 and 0.3 percentage points (to an average annual rate of 5.5 and 5.7 per cent) out to 2030-31. But this increase will still amount to an additional $80 billion to $161 billion in health care expenditures to be incurred over the next 10 years. (See Chart 5.)

Chart 5
Health care cost projections—baseline and 3 COVID-19 scenarios
(health care costs, $ millions)



Sources: The Conference Board of Canada; Public Accounts of Canada.

47 Jones, "Ontario Emergency Rooms Fill Up Again as COVID-19 Fears Ebb, Patients With Other Illnesses Return."

Other health care changes due to COVID-19

Aside from the additional costs either directly or indirectly related to the COVID-19 pandemic, the provision of health care in Canada, post-COVID-19, may look quite different over the short, medium, and longer term. The degree to which it differs from the pre-COVID-19 projection between and 2040 is the subject of this section.

The advancement of telehealth

The COVID-19 pandemic has served as a catalyst for a rapid adoption of telehealth across Canada. In a very short time, the country's health care systems have been transformed out of necessity to respond to the public health directives advising against direct patient care in non-urgent situations. In these circumstances, health professionals were urged to consider the delivery of health care via telehealth. These directives were paralleled by rapid regulatory changes in each province and territory designed to broaden access to care: for example, new fee codes were introduced for virtual care, facilitating physician payment for a wider range of telehealth services. In many cases, delivery of care through virtual modalities were to be reimbursed at a rate equivalent to an in-person visit.

Extensive telehealth and virtual care guidelines, information, and updates have been organized by the provinces and territories and regularly updated on the website of the Royal College of Physicians and Surgeons of Canada.[48] While the Royal College does not promote any specific virtual care platforms, its physician members were encouraged to refer to their respective provincial or territorial authorities for information and guidance on approved platforms that are compliant with privacy laws. In partnership with the College of Family Physicians of Canada and the Canadian Medical Association, the Royal College released the *Virtual Care Playbook for Canadian Physicians* to help integrate virtual patient encounters into their daily practices.[49]

Is telehealth here to stay?

Recent evidence indicates that Canadians have embraced virtual health care during the COVID-19 crisis and would like these services to continue. According to a national poll released by the Canadian Medical Association (CMA), 47 per cent of Canadians have used "virtual care" options, including calls, emails, texts, and video, during the pandemic. Of these, 91 per cent said they were satisfied with the experience. Moving forward, almost half (46 per cent) of Canadians who had the opportunity to use virtual care since the outbreak indicated that they would prefer a virtual method as a first point of contact with their doctor.[50]

48 Royal College of Physicians and Surgeons of Canada, "Telemedicine and Virtual Care Guidelines (and Other Clinical Resources for COVID-19)."

49 Dermer, *Virtual Care Playbook for Canadian Physicians*.

50 Canadian Medical Association, "What Canadians Think About Virtual Health Care. "

Telehealth will also have to demonstrate its utility to providers, and the COVID-19 pandemic provided a fertile ground for a national demonstration case for virtual care. Historically, the key barriers to implementation included (i) digital interoperability across health care systems, (ii) licensure requirements and quality of care concerns, (iii) physician payments, and (iv) medical education needs.

The pandemic has addressed some of these barriers (physician payments in particular) and is helping overcome others. While virtual care will likely become more common in Canadian health care systems, excellence in delivery will require a pan-Canadian framework to ensure that the quality of care is comparable between virtual and in-person care. This was a recommendation of the CMA-led task force on virtual care, which issued a special report in February 2020 outlining specific recommendations on how the federal government and stakeholders can improve and expand virtual care throughout Canada.[51]

Benefits of telehealth

Telehealth has shown significant benefits in Canada for both clinicians and patients, as highlighted in the 2011 Pan-Canadian Study *Telehealth Benefits and Adoption: Connecting People and Providers*."[52] The key benefits include improved access to specialty services for Canadians living in rural and remote communities, avoided clinician and patient travel, and reduced wait times to obtain specialty care. The reduction in wait times is particularly important, since avoiding delays in accessing care can prevent complications and additional health care costs.

While many cost-effectiveness studies have shown that telehealth can reduce costs, several systematic reviews of the literature argue that the findings on the cost-effectiveness of telehealth compared with usual care are inconclusive.[53] This has been attributed to the fact that many individual studies evaluated pilot services, had small sample sizes, did not last beyond two years, did not compare costs with a baseline, and often omitted indirect costs. It is also important to note that in pre-COVID-19 telehealth studies, the benefits (and cost-effectiveness) were seen in situations where patients and physicians had a choice between a telehealth and in-person visits, or in situations where telehealth addressed an access to care issue. The post-COVID-19 environment and expectations of both patients and providers are different, thus the outcomes may be expected to be different.

The bottom line

The COVID-19 crisis has dramatically expanded patient and physician adoption of telehealth and has rapidly and favourably changed the reimbursement landscape around it. This temporary modernization of physician payments is significant, as physician reimbursement has been a major barrier to adoption of telehealth. With the introduction of new fee codes and reimbursement being equivalent to in-person visits, significant cost savings should not be expected, given that physician payments have been identified as a

51 Virtual Care Task Force, "Virtual Care Recommendations for Scaling Up Virtual Medical Services: Report of the Virtual Care Task Force."

52 Canada Health Infoway, *Telehealth Benefits and Adoption: Connecting People and Providers Across Canada*.

53 De la Torre-Díez and others, "Cost-Utility and Cost-Effectiveness Studies of Telemedicine, Electronic, and Mobile Health Systems in the Literature: a Systematic Review"; Mistry and others, "Critical Appraisal of Published Systematic Reviews Assessing the Cost-Effectiveness of Telemedicine Studies."

major cost driver in health care. However, better care in terms of access and timeliness could potentially lead to cost savings by preventing complications resulting from delayed care.

Another cost factor related to telehealth is investment in infrastructure and innovation. The one limiting component of many virtual platforms, for example, is the ability to complete a physical examination. There is a need to explore in more detail what types of visits and conditions are appropriate for telehealth, particularly given the fact that rapid innovations in telehealth could expand current applications. These will require additional investment to materialize.

While telehealth will not likely replace traditional in-person health care delivery, it can effectively complement it by allowing providers to treat patients outside physical clinical settings. What we are learning from the COVID-19 pandemic is that implementing telehealth proactively rather than reactively is more likely to generate greater benefits in the long term and help to manage everyday (and emergency) challenges in health care. Given the continued emphasis on physical distancing measures, rapid and thoughtful investment in telemedicine infrastructure is critical.

Changes to long-term care

The COVID-19 outbreak has drawn attention to systemic challenges with long-term care in Canada. Key issues include outdated infrastructure and crowded rooms, inconsistent regulations, staff shortages and suboptimal working conditions. In spite of ongoing challenges, there are opportunities to improve outcomes for long-term care residents and staff. This would require strategic investments in infrastructure and supports for raising the standards of care through enhanced provincial and territorial regulations.

In addition to analyzing the current gap in infrastructure, level and quality of services, and staffing practices, long-term investments (i.e., over the next decades) will need to be informed by supply and demand models. These models take into account demographic changes (such as population growth and aging) to project future needs. These needs can then be compared with a projection of the supply (e.g., of infrastructure or health human resources) to help guide investments. In past research, The Conference Board of Canada has explored some of the most pressing challenges of population aging. Highlights from the Future Care for Seniors research series include:

An aging population means more needs. By 2026, over 2.4 million Canadians age 65 and over will require paid and unpaid continuing care supports—up 71 per cent from 2011. By 2046, this number will reach nearly 3.3 million.[54]

54 Stonebridge, Hermus, and Edenhoffer, *Future Care for Canadian Seniors: A Status Quo Forecast.*

The demand for personal support workers will increase. Personal support workers, also known as health care aides or home support workers (among other terms), are a critical part of the health and social care systems in Canada.[55] Providing continuing care support to seniors is projected to increase demand for personal support workers by an average of 3.4 per cent annually out to 2036.[56]

The demand for nursing services will increase. The demand for nurses to provide continuing care to seniors in home, community, and facility living settings (including long-term care) is projected to increase from just under 64,000 full-year jobs in 2011 to 142,000 full-year jobs by 2035.[57]

More long-term care beds are needed. By 2035, an additional 199,000 long-term care beds will be required in Canada, up from the 255,000 available in 2016. This will require almost $200 billion in investment (to 2035): $64 billion in capital spending on these new beds and $130 billion in operating expenses.[58]

Investments in long-term care will lead to economic gains. Spending to increase the number of beds will have a positive effect on the economy, contributing a total of $235 billion to real GDP and accounting for 123,000 jobs each year. In the cost-benefit analysis, the benefits of the new beds are greater than the costs, even without considering the improved health outcomes.[59]

The research above is far from exhaustive, as many other aspects of long-term care need to be assessed at the provincial level. Indeed, the issues with long-term care are multi-dimensional and call for varied solutions. With the ongoing threat from COVID-19 and rising demand due to population aging, key issues need to be scaled in order to prioritize immediate, medium-term, and long-term actions. With mounting pressure to fix systemic issues and reform long-term care across the country, strategic investments from provinces will surely be front and centre.

55 Ibid.
56 Ibid.
57 Hermus and Stonebridge, *Future Care for Canadian Seniors: A Primer on Nursing Supply and Demand*.
58 Gibbard, *Sizing Up the Challenge: Meeting the Demand for Long-Term Care in Canada*.
59 Ibid.

Concluding remarks

This study unpacks and analyzes not only the various cost drivers and pressures that have traditionally been used to generate longer-term health care spending projections but also the additional direct and indirect cost pressures related to the COVID-19 pandemic.

Recent pre-COVID-19 health care projections had already suggested that aggregate provincial and territorial health care spending would increase at a growing pace, in large part due to Canada's population aging. In fact, the aging of the population alone was projected to account for just under 20 per cent of the total increase in health care spending projected between 2019-20 and 2030-31. The main driver of population aging in Canada is the aging of the baby-boom cohort (those currently aged 55 to 74)—by 2040, the youngest baby boomers will reach 75. Since the largest per capita costs of providing health care occur in older age groups, this cohort is projected to dramatically increase total health care spending.

The increase in the population is another key cost driver behind the increase in health care expenditures. This driver is projected to account for nearly 18 per cent of the total increase in health care costs over the projection period from 2019-20 to 2030-31. As Canada's population growth slows between 2030-31 and 2040-41, so too will its impact on the growth in health care spending. During this period, this cost driver is projected to account for only 15 per cent of the overall growth in spending.

In addition to demographic changes, inflation is projected to add roughly 2.5 per cent to health care costs each year going forward. Strong inflation is projected in spending for physicians, other health care professionals, and other institutions (which exclude hospitals but include long-term care facilities). Meanwhile, the continuing shift to costlier services, the increased use of services, and new services being made available to the public are projected to account for nearly 17 per cent of the total increase in health care expenditures between 2019-20 and 2040-41.

Though it is still early in the global pandemic's timeline, the Conference Board's three scenarios depict how the COVID-19 pandemic might continue to evolve. Projections of the associated number of COVID-19 cases and hospitalizations provide the foundation for the cost estimates based on specific assumptions. The analysis is intended to provide governments with a sense of the potential scope and scale of the impact of the COVID-19 pandemic on health care spending over the forecast. The direct cost estimates associated with the COVID-19 pandemic account for a wide range of spending initiatives, including spending on personal protective equipment, medical supplies, hospitalizations, and pharmaceuticals (and potential vaccines), as well as any other costs incurred by governments that directly relate to the challenges of providing health care because of the COVID-19 pandemic.

Aside from the significant amount projected to be spent by governments on initiatives to directly combat the impact of the COVID-19 pandemic, the report also identifies the scope and magnitude of other costs indirectly imposed by the virus, including the handling of potential new health complications for recovering COVID-19 patients and the costs incurred to remove the backlog of postponed or displaced surgeries and other non-COVID-19 health care system interactions.

Overall, the projections in this report suggest that the COVID-19 pandemic is a significant new cost driver of health care spending in Canada, particularly over the short to medium term. Longer term, however, the report suggests that traditional (pre-COVID-19) cost drivers will have the largest impact on health care cost increases.

Although the COVID-19 pandemic is clearly seen as having an outsized impact on current health care spending in Canada, the pandemic has also served as a catalyst for a rapid adoption of telehealth across the country. While telehealth is not likely to replace in-person health care delivery, it is expected to further evolve, particularly with physical distancing measures in place. Investment and improvement in telemedicine infrastructure will be needed to maximize the potential benefits of telehealth.

The COVID-19 pandemic has also drawn special attention to one of the most vulnerable population segments—seniors, particularly seniors in long-term care. The study identifies some of the most pressing challenges to overcome in order to shore up the safety of long-term care in Canada and outlines the importance of enhancing sector regulations, including the realization that some steps forward will require a sizable investment in infrastructure and staffing.

Appendix A
Methodology

Health care cost drivers—pre-COVID-19

The Conference Board of Canada's health care model projects demand for provincial and territorial health spending for nine different categories. The forecast for five of these categories is driven by the outlook for population based on age and gender. That means that our model incorporates not only population growth but also how demand changes based on age and gender shifts in our population. Spending on hospitals, physicians, other institutions, other professionals, and drugs is broken down into 40 separate age and gender cohorts to provide a detailed analysis of how demographic changes will impact health spending. The other four categories in our model—administration, capital investment, public health, and other health spending—are forecast on a real per capita basis and are not broken down by age or gender.

Our analysis explores different scenarios for changes in real per capita spending. To do this, we first had to take the nominal spending estimates from our health care model and convert those figures into real (inflation-adjusted) estimates. We created health spending deflators based on a weighted average of four price deflators for health wages, drugs, health investing, and other goods. These four deflators were used to create individual deflators for each of our nine components of health care spending. The individual deflator for each spending category is based on a weighted average of the four price deflators. We determined the weights using Statistic Canada's input-output database, which provides a detailed snapshot of the industrial structure of the Canadian economy. Once we created real per person spending estimates we were able to estimate historical real increases in spending, which excludes the effects of inflation, population growth, and aging.

Health care cost drivers—post-COVID-19

The scope and magnitude of new health care costs already incurred collectively from the 13 provinces and territories to combat COVID-19 is shown in Table A1. Data provided by the Council of the Federation Secretariat suggest that nearly $11.5 billion was spent to directly deal with the COVID-19 pandemic between January 1 and June 5, 2020. It should be noted that governments have incurred much more cost than that shown in Table A1; however, the primary focus of the other costs was not related to health care. As a point of reference, as of June 5, 2020, Canada had 94,324 confirmed cases of COVID-19.

Table A1

New health care costs related to COVID-19 – preliminary from 13 provinces and territories

($ 000s, Jan.1–June 5, 2020)

Cost categories	Total
PPE (e.g., masks, gowns)	4,319,645
Medical supplies and equipment (e.g., ventilators) (include capital costs)	373,235
Drugs and pharmaceuticals (e.g., increased use of drugs in hospitals, long-term care settings, correctional institutions)	174,241
Physician and other health profession compensation (e.g., overtime costs; additional billing for new services, such as expanded pharmacist services, pandemic pay/incremental salary costs for pandemic related service)	1,187,982
Public health systems (e.g., testing, contact tracing, monitoring, IT systems, assessment centres/primary assessment clinics, isolation costs, costs associated with deferred health services)	1,200,452
Mental health and addictions supports, and other social supports (e.g., mental health apps, mental health supports, support to women's shelters)	107,299
Long term care and continuing care, retirement home, and home/community care requirements (e.g., staff resources, cleaning, monitoring, occupancy considerations such as beds)	955,569
Emergency health operations costs (e.g., costs associated with staffing up assessment/operations centres, ambulances)	176,484
Isolation costs (e.g., costs for isolation for congregate settings such as shelters and group homes, returning travellers)	118,299
Technology costs (e.g. telehealth, virtual health care, expansion of existing service, additional technology required in health care settings)	88,937
Additional health costs	2,575,000
Indirect health systems operating costs (e.g., additional security, non-medical equipment or renovation cost)	177,151
Total Costs	**11,454,293**

Sources: The Conference Board of Canada; Council of the Federation Secretariat.

To apply the costs in Table A1 to the three scenarios in this report, it is important to try and break down the costs already incurred by the provinces and territories into two cost perspectives: fixed costs and variable costs. In a true sense, no single cost category is purely fixed or variable; instead all cost categories likely comprise a combination of fixed and variable components. Fixed costs are assumed to remain largely independent of both the level of patients treated and the residing population, whereas variable costs increase proportionally to both the level of patients treated and the residing population.

An example of where the fixed cost component is estimated to outweigh the variable cost component would be technology enhancements needed to support telehealth or virtual health care during the pandemic. Another example would be the costs incurred to prepare hospitals and emergency rooms to handle COVID-19 cases. On the other hand, examples where the variable costs are estimated to outweigh the fixed costs would be spending on drugs and pharmaceuticals and on personal protective equipment. Fixed costs may be further broken down into those that are assumed to be a one-time occurrence versus those that may need to be incurred on an annual basis.

The assumptions that identify the degree to which the costs shown in Table A1 are fixed or variable are shown in Table A2. These assumptions are important in estimating the degree to which the total level of new health care costs reported as of June 5, 2020, reflect full calendar-year outlays based on the case projections suggested by the three scenarios in the coming years. For instance, during the pandemic, it is reasonable for governments or health institutions to incur one-time costs associated with the difficulty in sourcing supplies and also make regular (annual) purchases to ensure sufficient supplies. Given that the requirements for PPE are highly dependent on both the population size and the number of confirmed COVID-19 cases, provincial governments would need to purchase PPE accordingly to meet short-term demands and to ensure sufficient inventory. Unlike PPE purchases, which can be adjusted on a more variable basis, spending on medical supplies and equipment has a larger sunk cost component, which implies they tend to be less variable based on the demand at any one time. As an example, governments and health institutions would need to make sure a sufficient number of oxygen concentrators ventilators, kidney machines, patient lifts, and cardiopulmonary bypass (CB) devices are available during the pandemic. Therefore, the one-time purchase cost accounts for most of the expenditures incurred to date.

Table A2

New health care costs related to COVID-19—fixed vs. variable

(% allocation to fixed or variable components)

	Fixed costs		Variable costs			Total
Cost categories	**One-time**	**Annual**	**Population**	**COVID-19 cases**	**Inventory**	**All**
PPE	5%	5%	20%	40%	30%	100%
Medical supplies and equipment	60%	20%	5%	15%	0%	100%
Drugs and pharmaceuticals	5%	5%	10%	55%	25%	100%
Physician and other health profession compensation	10%	5%	25%	50%	10%	100%
Public health systems	25%	10%	30%	35%	0%	100%
Mental health and addictions supports, and other social supports	25%	15%	50%	10%	0%	100%
Long-term care and continuing care, retirement home, and home/community care requirements	25%	10%	30%	35%	0%	100%
Emergency health operations costs	20%	10%	20%	50%	0%	100%
Isolation costs	25%	10%	30%	35%	0%	100%
Technology costs	40%	20%	30%	10%	0%	100%
Additional health costs	14%	7%	23%	39%	17%	100%
Indirect health systems operating costs	50%	25%	15%	10%	0%	100%

Source: The Conference Board of Canada.

Projections of the number of hospitalizations

While our projection of the number of confirmed cases to a large extent is shaped by our description of the three scenarios, the associated projection of hospitalizations requires some additional assumptions. As of July 13, 2020 (the last date used for actual case volumes), 14.6 per cent of all cases up to that point required hospitalization. Unfortunately, the Government of Canada *Coronavirus disease (COVID-19): Outbreak update* website does not provide daily hospitalization figures; however, the degree to which many of the initial cases involved older individuals, particularly those in nursing homes, likely contributed to elevating the hospitalization rate early on. To account for a larger share of younger individuals contracting COVID-19 over the forecast horizon, we projected that the hospitalization rate on a go-forward basis will trend down. In particular, by late 2021, we estimate it will dip below 10 per cent.

Appendix B
Annual cost breakdown

Tables B1–B7 show projections for public sector health care costs in Canada as they would have been without COVID-19 and under each of the three scenarios developed for this report. In each table, the "trend" projections include the additional cost driver attributed to the assumption that the health care sector continues to make policy decisions that strive to increase access and improve overall health systems. In contrast, the "no trend" projections do not incorporate this trend factor but still incorporate the changes in costs related to the other key health care cost drivers, including population growth, population aging, inflation, and COVID-19.

Table B1
Pre-COVID-19 health care costs
($ millions)

	2019	2020	2021	2022	2023	2024
No trend	179,192	186,955	195,422	204,291	213,562	223,209
Trend	179,192	188,631	198,931	209,800	221,250	233,264
	2025	**2026**	**2027**	**2028**	**2029**	**2030**
No trend	233,367	243,970	255,077	266,662	278,680	291,115
Trend	246,000	259,394	273,521	288,368	303,901	320,117
	2031	**2032**	**2033**	**2034**	**2035**	**2036**
No trend	304,001	317,506	331,437	345,762	360,517	375,598
Trend	337,056	354,901	373,475	392,762	412,810	433,521
	2037	**2038**	**2039**	**2040**		
No trend	391,111	407,061	423,445	440,290		
Trend	455,014	477,321	500,459	524,480		

Source: The Conference Board of Canada.

Table B2

New direct COVID-19 health care costs – Scenario 1

($ millions)

	2019	2020	2021	2022	2023	2024
No trend	0	17,780	14,213	6,608	6,096	5,624
Trend	0	17,780	14,213	6,608	6,096	5,624
	2025	**2026**	**2027**	**2028**	**2029**	**2030**
No trend	5,188	4,786	4,415	4,073	3,757	3,466
Trend	5,188	4,786	4,415	4,073	3,757	3,466
	2031	**2032**	**2033**	**2034**	**2035**	**2036**
No trend	3,197	2,949	2,721	2,510	2,315	2,136
Trend	3,197	2,949	2,721	2,510	2,315	2,136
	2037	**2038**	**2039**	**2040**		
No trend	1,970	1,818	1,677	1,547		
Trend	1,970	1,818	1,677	1,547		

Source: The Conference Board of Canada.

Table B3

New direct COVID-19 health care costs – Scenario 2

($ millions)

	2019	2020	2021	2022	2023	2024
No trend	0	23,592	19,370	6,608	6,096	5,624
Trend	0	23,592	19,370	6,608	6,096	5,624
	2025	**2026**	**2027**	**2028**	**2029**	**2030**
No trend	5,188	4,786	4,415	4,073	3,757	3,466
Trend	5,188	4,786	4,415	4,073	3,757	3,466
	2031	**2032**	**2033**	**2034**	**2035**	**2036**
No trend	3,197	2,949	2,721	2,510	2,315	2,136
Trend	3,197	2,949	2,721	2,510	2,315	2,136
	2037	**2038**	**2039**	**2040**		
No trend	1,970	1,818	1,677	1,547		
Trend	1,970	1,818	1,677	1,547		

Source: The Conference Board of Canada.

Table B4

New direct COVID-19 health care costs – Scenario 3

($ millions)

	2019	2020	2021	2022	2023	2024
No trend	0	20,686	18,149	17,109	15,783	14,560
Trend	0	20,686	18,149	17,109	15,783	14,560
	2025	**2026**	**2027**	**2028**	**2029**	**2030**
No trend	13,431	12,390	11,430	10,544	9,727	8,973
Trend	13,431	12,390	11,430	10,544	9,727	8,973
	2031	**2032**	**2033**	**2034**	**2035**	**2036**
No trend	8,278	7,636	7,044	6,498	5,995	5,530
Trend	8,278	7,636	7,044	6,498	5,995	5,530
	2037	**2038**	**2039**	**2040**		
No trend	5,102	4,706	4,342	4,005		
Trend	5,102	4,706	4,342	4,005		

Source: The Conference Board of Canada.

Table B5

New indirect COVID-19 health care costs – Scenario 1

($ millions)

	2019	2020	2021	2022	2023	2024
No trend	0	2,367	1,497	242	14	13
Trend	0	2,367	1,497	242	14	13
	2025	**2026**	**2027**	**2028**	**2029**	**2030**
No trend	12	11	10	10	9	8
Trend	12	11	10	10	9	8
	2031	**2032**	**2033**	**2034**	**2035**	**2036**
No trend	8	7	6	6	5	5
Trend	8	7	6	6	5	5
	2037	**2038**	**2039**	**2040**		
No trend	5	4	4	4		
Trend	5	4	4	4		

Source: The Conference Board of Canada.

Table B6

New indirect COVID-19 health care costs – Scenario 2

($ millions)

	2019	2020	2021	2022	2023	2024
No trend	0	3,309	2,509	468	14	13
Trend	0	3,309	2,509	468	14	13
	2025	**2026**	**2027**	**2028**	**2029**	**2030**
No trend	12	11	10	10	9	8
Trend	12	11	10	10	9	8
	2031	**2032**	**2033**	**2034**	**2035**	**2036**
No trend	8	7	6	6	5	5
Trend	8	7	6	6	5	5
	2037	**2038**	**2039**	**2040**		
No trend	5	4	4	4		
Trend	5	4	4	4		

Source: The Conference Board of Canada.

Table B7

New indirect COVID-19 health care costs – Scenario 3

($ millions)

	2019	2020	2021	2022	2023	2024
No trend	0	2,838	2,873	1,627	843	59
Trend	0	2,838	2,873	1,627	843	59
	2025	**2026**	**2027**	**2028**	**2029**	**2030**
No trend	54	50	46	43	39	36
Trend	54	50	46	43	39	36
	2031	**2032**	**2033**	**2034**	**2035**	**2036**
No trend	34	31	29	26	24	22
Trend	34	31	29	26	24	22
	2037	**2038**	**2039**	**2040**		
No trend	21	19	18	16		
Trend	21	19	18	16		

Source: The Conference Board of Canada.

Bibliography

American College of Surgeons. "COVID-19: Elective Case Triage Guidelines for Surgical Care," March 24, 2020. https://www.facs.org/covid-19/clinical-guidance/elective-case.

Bains, Camille. "B.C. Aims to Clear Backlog of 32,400 Surgeries in 15 Months if COVID-19 Surge Doesn't Happen." *The Globe and Mail*, July 22, 2020. https://www.theglobeandmail.com/canada/british-columbia/article-bc-aims-to-clear-surgery-backlog-in-15-months-if-covid-19-surge/.

BC Gov News. "B.C. Fulfilling Surgical Renewal Commitment," July 21, 2020. https://news.gov.bc.ca/22682.

B.C. Ministry of Health. "A Commitment to Surgical Renewal in B.C." May 7, 2020. https://www2.gov.bc.ca/assets/gov/health/conducting-health-research/surgical-renewal-plan.pdf.

Ben-Achour, Sabri. "How Much Will a Coronavirus Vaccine Cost?" *Marketplace*, July 17, 2020. https://www.marketplace.org/2020/07/17/how-much-will-coronavirus-vaccine-cost/.

Canada Health Infoway. *Telehealth Benefits and Adoption Connecting: People and Providers Across Canada*. May 30, 2011. https://www.infoway-inforoute.ca/en/component/edocman/333-telehealth-benefits-and-adoption-connecting-people-and-providers-full/view-document?Itemid=0.

Canadian Institute for Health Information (CIHI). "Larger Portion of Canada's Public Drug Dollars Spent on High-Cost Drugs." Accessed July 29, 2020. https://www.cihi.ca/en/larger-portion-of-canadas-public-drug-dollars-spent-on-high-cost-drugs.

———. "National Health Expenditure Trends, 1975 to 2019." Accessed August 4, 2020. https://www.cihi.ca/en/national-health-expenditure-trends-1975-to-2019.

Canadian Medical Association. "What Canadians Think About Virtual Health Care." May 2020. https://www.cma.ca/sites/default/files/pdf/virtual-care/cma-virtual-care-public-poll-june-2020-e.pdf.

Cheng, Yichun, Ran Luo, Kun Wang, Meng Zhang, Zhixiang Wang, Lei Dong, Junhua Li, Ying Yao, Shuwang Ge, and Gang Xu. "Kidney Disease Is Associated With In-Hospital Death of Patients With COVID-19." *Kidney International* 97, no. 5 (May 2020): 829–838. https://doi.org/10.1016/j.kint.2020.03.005.

Conference Board of Canada, The. *Canadian Outlook Long-Term Economic Forecast: 2020*. Ottawa: CBoC, 2020. www.conferenceboard.ca/e-library/abstract.aspx?did=10522.

COVIDSurg Collaborative. "Elective Surgery Cancellations Due to the COVID-19 Pandemic: Global Predictive Modelling to Inform Surgical Recovery Plans." *British Journal of Surgery* (May 2020). https://doi.org/10.1002/bjs.11746.

COVIDSurg Collaborative. "Global Guidance for Surgical Care During the COVID-19 Pandemic." *British Journal of Surgery* 107, no. 9 (April 15, 2020). https://doi.org/10.1002/bjs.11646.

De la Torre-Díez, Isabel, Miguel López-Coronado, Cesar Vaca, Jesus Saez Aguado, and Carlos de Castro. "Cost-Utility and Cost-effectiveness Studies of Telemedicine, Electronic, and Mobile Health Systems in the Literature: a Systematic Review." *Telemedicine Journal and E-Health* 21, no. 2 (February 2015): 81-85. https://doi.org/10.1089/tmj.2014.0053.

Dermer, Mark. *Virtual Care Playbook for Canadian Physicians*. Ottawa: College of Family Physicians of Canada, Royal Collage of Physicians and Surgeons of Canada, and Canadian Medical Association, March 2020. https://www.cma.ca/sites/default/files/pdf/Virtual-Care-Playbook_mar2020_E.pdf.

Gerein, Keith. "Why One Small COVID-19 Outbreak Could Worsen a Big Worry for Alberta's Hospitals." *Edmonton Journal*, July 14, 2020. https://edmontonjournal.com/news/local-news/keith-gerein-why-one-small-covid-19-outbreak-could-worsen-a-big-worry-for-albertas-hospitals.

Gibbard, Robyn. *Sizing Up the Challenge: Meeting the Demand for Long-Term Care in Canada*. Ottawa: The Conference Board of Canada, 2017.

Government of Canada, "Coronavirus Disease (COVID-19): Outbreak Update." Accessed July 13, 2020. https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection.html.

Grass, Fabian, Kevin T. Behm, Emilie Duchalais, Jacopo Crippa, Grant M. Spears, William S. Harmsen, Martin Hubner, and others. "Impact of Delay to Surgery on Survival in Stage I-III Colon Cancer." *European Journal of Surgical Oncology* 46, no. 3 (March 2020): 455–61. https://doi.org/10.1016/j.ejso.2019.11.513.

Hartnett, Kathleen P., Aaron Kite-Powell, Jourdan DeVies, Michael A. Coletta, Tegan K. Boehmer, Jennifer Adjemian, Adi V. Gundlapalli, and National Syndromic Surveillance Program Community of Practice. "Impact of the COVID-19 Pandemic on Emergency Department Visits—United States, January 1, 2019–May 30, 2020." *Morbidity and Mortality Weekly* Report 69, no. 23 (June 12, 2020): 699–704. https://doi.org/10.15585/mmwr.mm6923e1.

Hermus, Greg, and Carole Stonebridge. *Future Care for Canadian Seniors: A Primer on Nursing Supply and Demand*. Ottawa: The Conference Board of Canada, 2017.

Houle, Sherilyn K. D., Kelly A. Grindrod, Trish Chatterley, and Ross T. Tsuyuki. "Publicly Funded Remuneration for the Administration of Injections by Pharmacists: An International Review." *Canadian Pharmacists Journal/Revue Des Pharmaciens Du Canada* 146, no. 6 (November 2013): 353–64. https://dx.doi.org/10.1177%2F1715163513506369.

Huang, Yiying, Cuiyan Tan, Jian Wu, Meizhu Chen, Zhenguo Wang, Liyun Luo, Xiaorong Zhou, and others. "Impact of Coronavirus Disease 2019 on Pulmonary Function in Early Convalescence Phase." *Respiratory Research* 21, no. 163 (2020). https://doi.org/10.1186/s12931-020-01429-6.

Jones, Sabrina. "Ontario Emergency Rooms Fill Up Again as COVID-19 Fears Ebb, Patients With Other Illnesses Return." *CBC*, July 14, 2020. https://www.cbc.ca/news/canada/toronto/ontario-emergency-rooms-filling-up-again-1.5647999.

Kotyk, Alyse. "Here's How Many Canadians Would Choose to Take a COVID-19 Vaccine: Poll." *CTV News Vancouver*, July 10, 2020. https://bc.ctvnews.ca/here-s-how-many-canadians-would-choose-to-take-a-covid-19-vaccine-poll-1.5019565.

Long, Brit, William J. Brady, Alex Koyfman, and Michael Gottlieb. "Cardiovascular Complications in COVID-19." *American Journal of Emergency Medicine* 38, no. 7 (July 2020):1504–1507. https://dx.doi.org/10.1016%2Fj.ajem.2020.04.048.

Madjid, Mohammad, Payam Safavi-Naeini, Scott D Solomon, and Orly Vardeny. "Potential Effects of Coronaviruses on the Cardiovascular System: A Review." *JAMA Cardiology* 5, no. 7 (2020): 831-840. https://doi.org/10.1001/jamacardio.2020.1286.

Madjid, Mohammad, and S. Ward Casscells. "Of Birds and Men: Cardiologists' Role in Influenza Pandemics." *The Lancet* 364, no. 9442 (October 2004): 1309. https://doi.org/10.1016/S0140-6736(04)17176-6.

Mao, Ling, Huijuan Jin, Mengdie Wang, Yu Hu, Shengcai Chen, Quanwei He, Jiang Chang, and others. "Neurologic Manifestations of Hospitalized Patients With Coronavirus Disease 2019 in Wuhan, China." *JAMA Neurology* 77, no. 6 (April 2020): 683–690. https://doi.org/10.1001/jamaneurol.2020.1127.

Mistry, Hema, Hyeladzria Garnvwa, and Raymond Oppong. "Critical Appraisal of Published Systematic Reviews Assessing the Cost-Effectiveness of Telemedicine Studies." *Telemedicine and e-Health* 20, no. 7 (May 2014): 609–618. https://doi.org/10.1089/tmj.2013.0259.

Public Health Agency of Canada. "Economic Burden of Illness in Canada." https://www.canada.ca/en/public-health/services/chronic-diseases/chronic-disease-knowledge-development-exchange/economic-burden-illness-canada.html.

Rahman, Jawaria, Abilash Muralidharan, Sohail J. Quazi, Hajra Saleem, and Safeera Khan. "Neurological and Psychological Effects of Coronavirus (COVID-19): An Overview of the Current Era Pandemic." *Cureus* 12, no. 6 (June 2020). https://doi.org/10.7759/cureus.8460.

Richardson, Safiya, Jamie S Hirsch, Mangala Narasimhan, James M. Crawford, Thomas McGinn, Karina W. Davidson, and the Northwell COVID-19 Research Consortium. "Presenting Characteristics, Comorbidities, and Outcomes Among 5700 Patients Hospitalized With COVID-19 in the New York City Area." *JAMA* 323, no. 20 (April 2020): 2052-2059. https://doi.org/10.1001/jama.2020.6775.

Ronco, Claudia, Thiago Reis, and Faeq Husain-Syed. "Management of Acute Kidney Injury in Patients With COVID-19." *Lancet Respiratory Medicine* 8, no. 7 (2020):738-742. https://doi.org/10.1016/S2213-2600(20)30229-0.

Royal College of Physicians and Surgeons of Canada. "Telemedicine and Virtual Care Guidelines (and Other Clinical Resources for COVID-19)." Updated July 6, 2020. http://www.royalcollege.ca/rcsite/documents/about/covid-19-resources-telemedicine-virtual-care-e.

Schmunk, Rhianna. "Catching Up on B.C. Surgery Backlog Will Take Up to 2 Years, Province Says." *CBC*, May 7, 2020. https://www.cbc.ca/news/canada/british-columbia/elective-surgeries-resuming-in-bc-covid-19-1.5559340.

Shi Shaobo, Mu Qin, Bo Shen B, Yuli Cai, Tao Liu, Fan Yang, Wei Gong, and others. "Association of Cardiac Injury With Mortality in Hospitalized Patients With COVID-19 in Wuhan, China." *JAMA Cardiology* 5, no. 7 (March 2020): 802–810. https://doi.org/10.1001/jamacardio.2020.0950.

Shin, Dong Wook, Juhee Cho, So Young Kim, Eliseo Guallar, Seung Sik Hwang, Belong Cho, Jae Hwan Oh, Ki Wook Jung, Hong Gwan Seo, and Jong Hyock Park. "Delay to Curative Surgery Greater Than 12 Weeks Is Associated With Increased Mortality in Patients With Colorectal and Breast Cancer but Not Lung or Thyroid Cancer." *Annals of Surgical Oncology* 20, no. 8 (August 2013): 2468–76. https://doi.org/10.1245/s10434-013-2957-y.

Stahel, Philip F. "How to Risk-Stratify Elective Surgery During the COVID-19 Pandemic?" *Patient Safety in Surgery* 14, no. 8 (March 2020). https://doi.org/10.1186/s13037-020-00235-9.

Stonebridge, Carole, Greg Hermus, and Klauus Edenhoffer. *Future Care for Canadian Seniors: A Status Quo Forecast*. Ottawa: The Conference Board of Canada, 2015.

Urbach, David R., and Danielle Martin. "Confronting the COVID-19 Surgery Crisis: Time for Transformational Change." *CMAJ* 192, no. 21 (May 25, 2020): E585–86. https://doi.org/10.1503/cmaj.200791.

Virtual Care Task Force. "Virtual Care Recommendations for Scaling Up Virtual Medical Services: Report of the Virtual Care Task Force." Ottawa: Canadian Medical Association, The College of Family Physicians of Canada, and Royal College of Physicians and Surgeons of Canada, February 2020. https://www.cma.ca/sites/default/files/pdf/virtual-care/ReportoftheVirtualCareTaskForce.pdf.

Wang, Dawei, Bo Hu, Chang Hu, Fangfang Zhu, Xing Liu, Jing Zhang, Binbin Wang, and others. "Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China." *JAMA* 323, no. 11 (February 2020: 1061-1069. https://doi.org/10.1001/jama.2020.1585.

Wang, Yuhui, Chengjun Dong, Yue Hu, Chungao Li, Qianqian Ren, Xin Zhang, Heshui Shi, and Min Zhou. "Temporal Changes of CT Findings in 90 Patients With COVID-19 Pneumonia: A Longitudinal Study." *Radiology* 296, no. 2 (2020): E55-E64. https://doi.org/10.1148/radiol.2020200843.

Warnica, Richard. "Fear of COVID-19 Believed to Be Behind Plummeting Number of Non-Coronavirus ER Visits Across Canada." *National Post*, April 17, 2020. https://nationalpost.com/news/fear-of-covid-19-believed-to-be-behind-plummeting-number-of-non-coronavirus-er-visits-across-canada.

World Health Organization. "Guidelines for Estimating Costs of Introducing New Vaccines into the National Immunization System," no. WHO/V&B/02.11 (2002). https://apps.who.int/iris/handle/10665/67342.

Zhao, Yu-miao, Yao-min Shang, Wen-bin Song, Qing-quan Li, Hua Xie, Qin-fu Xu, Juan-li Jia, and others. "Follow-up Study of the Pulmonary Function and Related Physiological Characteristics of COVID-19 Survivors Three Months After Recovery." *EClinicalMedicine* (July 2020). https://doi.org/10.1016/j.eclinm.2020.100463.

Zhou, Fei, Ting Yu, Ronghui Du, Guohui Fan, Ying Liu, Zhibo Liu, Jie Xiang, and others. "Clinical Course and Risk Factors for Mortality of Adult Inpatients With COVID-19 in Wuhan, China: A Retrospective Cohort Study." *Lancet* 395, no. 10229 (March 2020): 1054-1062. https://doi.org/10.1016/S0140-6736(20)30566-3.

Acknowledgements

This report was undertaken by The Conference Board of Canada with funding and support from the Council of the Federation Secretariat. In keeping with Conference Board guidelines for custom research, the design and method of research, as well as the content of this study, were determined solely by the Conference Board.

Greg Hermus (principal economist) and Isabelle Gagnon-Arpin (principal research associate) were the lead researchers on this project, under the general direction of Darren De Jean (executive director). The authors acknowledge the suggestions and contributions of Monika Slovinec D'Angelo, Director of Health, Isabella Moroz, Senior Research Associate in Health; and Zhenzhen Ye, senior economist in the Board's economic research group.

Health Care Cost Drivers in Canada: Pre-and Post-COVID-19
The Conference Board of Canada

To cite this research: The Conference Board of Canada. *Health Care Cost Drivers in Canada: Pre-and Post-COVID-19*. Ottawa: The Conference Board of Canada, 2020.

An accessible version of this document for the visually impaired is available upon request.
Accessibility Officer, The Conference Board of Canada
Tel.: 613-526-3280 or 1-866-711-2262
E-mail: accessibility@conferenceboard.ca

Where insights meet impact

The Conference Board of Canada

Publication: 10816
Price: Complimentary
conferenceboard.ca