

Estimating the cost of COVID-19 hospitalizations in Canada

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Canadian Institute for Health Information

Outline

1. CIHI – who we are and what we do
2. CIHI's cost estimation methodology
3. Challenges of estimating COVID-19 hospitalization costs in Canada and our solutions
4. COVID-19 reporting



Canada



- 2nd largest country in the world in surface area
- Population – 38 m people
- Diverse in people, climates and geography
- A federal government, 10 provinces and 3 territories
- Canada Health Act, 1984
 - ✓ **Universality** – every resident is entitled to healthcare services
 - ✓ **Public administration** - funded by federal and provincial governments
- 600+ hospitals and
- 2,000+ other health organizations

CIHI: Who we are

- Independent, not-for-profit organization
- Established in 1994
- Approximately 750 employees with offices in 4 cities
- Custodian of pan-Canadian healthcare data
- Our stakeholders: federal and provincial governments, health system managers and professionals, researchers, and Canadian public

CIHI: What we do

- Collect and deliver timely, comparable and accessible data across the health continuum
- Build quality and data standards
- Deliver reporting tools, methods and information
- Build partnerships to provide collective expertise

Better data. Better decisions. Healthier Canadians.

CIHI hosts extensive linkable, pan-Canadian data across the health care continuum...



Types of care

- Hospital and emergency
- Mental health
- Home care
- Long-term care
- Rehabilitation
- Pharmaceuticals
- Clinical registries: organ transplant/renal, hip and knee replacements; trauma
- More



Patient-reported data

- Patient-reported outcome measures (PROMs)
- Patient-reported experience measures (PREMs)



Health spending

- Patient costing data
- Hospital and regional health authority financial accounts
- Physician billing
- System-wide health expenditures



Health workforce

- Physicians
- Nurses
- Occupational therapists
- Pharmacists
- Physiotherapists
- Allied health professionals
- More

- 10 billion records
- 3 terabytes of unique records
- Pan-Canadian coverage

Linkable data:

- Example: Population Grouper links 8 databases, 3 provinces, over 23 million patients

CIHI databases used to estimate hospital costs



DAD



CMDB



CPCD

- Discharge Abstract Database (DAD):
 - ❖ administrative, clinical and demographic information on hospital stays
- Canadian MIS Database (CMDB)
 - ❖ facility level financial and statistical operations information
- Canadian Patient Costing Database (CPCD)
 - ❖ detailed patient level cost data



CIHI's cost estimation methodology

Patient Cost Estimator: Pneumonia

Major Clinical Category: D&D Respiratory System

Case Mix Group: 136:Bacterial Pneumonia



- (All)
- 0 Days (Newborns)
- 0-7 Days (Neonates)
- 8-28 Days (Neonates)
- 29-364 Days (Paediatric)
- 1-7 Years (Paediatric)
- 8-17 Years (Paediatric)
- 18-59 Years (Adult)
- 60-79 Years (Adult)
- 80+ Years (Adult)

- Provides estimated hospital cost per Case Mix Group
- Physician cost is available for some provinces
- Information is calculated nationally, by jurisdiction, and by patient age group

Jurisdiction	YT	BC	AB	SK	MB	ON *	QC	NB	NS	PE	NL	CA
Estimated Average Hospital Cost	\$5,044	\$10,182	\$11,634	\$10,624	\$14,412	\$7,226	\$9,354	\$10,956	\$13,039	\$5,091	\$8,072	\$8,645
Volume (Typical Cases)	1	414	514	94	67	5,062	1,364	73	67	30	54	7,746
AVG Acute LOS	7.0	7.3	7.4	7.7	8.7	5.8	6.8	10.1	8.9	4.5	7.3	6.3
AVG ALC LOS	0.0	0.1	0.2	0.0	0.0	0.2	0.0	0.3	0.0	0.0	0.0	0.2

Link: <https://www.cihi.ca/en/patient-cost-estimator>

Patient Cost Estimator: Pneumonia

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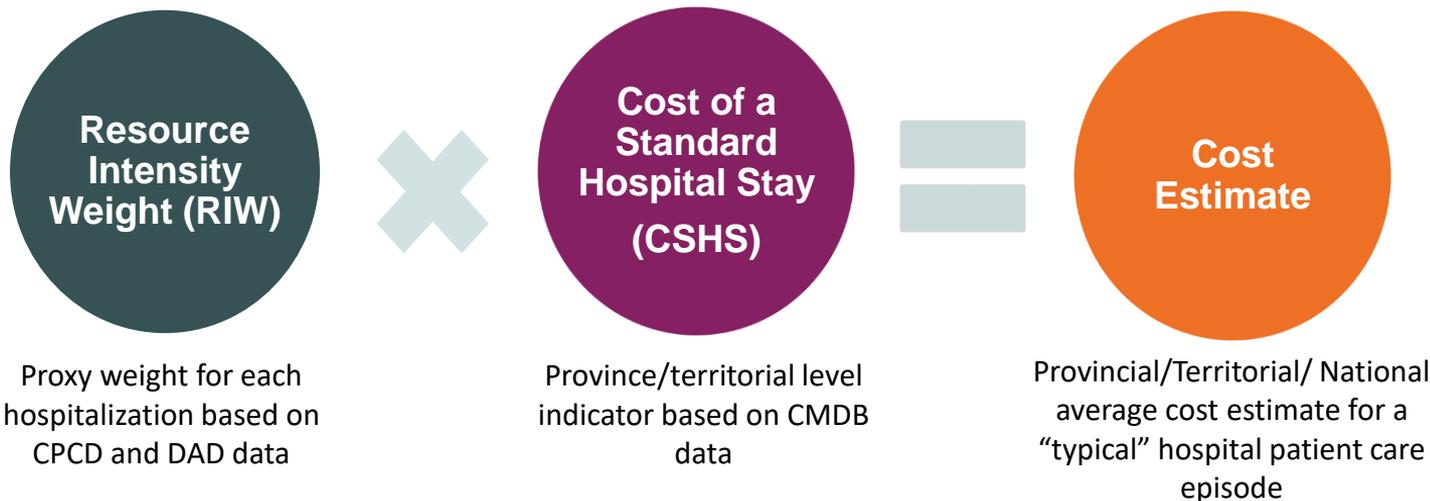


Jurisdiction
Estimated Average Hospital Cost
Volume (Typical Cases)
AVG Acute LOS
AVG ALC LOS

CA
\$8,645
7,746
6.3
0.2

- Provides estimated hospital cost per Case Mix Group
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Cost Estimation Methodology



- Cost estimates are calculated by multiplying the RIW for an individual hospitalization by the provincial or territorial CSHS where the hospitalization occurs

Resource Intensity Weight (RIW)

- Represents the relative resources used by a patient
- Relative to average typical acute inpatients
- $RIW=1.0$ represents the average inpatient
- Affected by factors such as
 - patient age
 - type of diagnosis
 - intervention
 - comorbidities
- Estimated using patient level cost information



Cost of a Standard Hospital Stay (CSHS)

- Average full cost of treating the average acute inpatient (with RIW=1)
- Calculated at the hospital, regional, provincial or territorial, and national levels

Total acute inpatient cost*



Total acute inpatient RIWs†

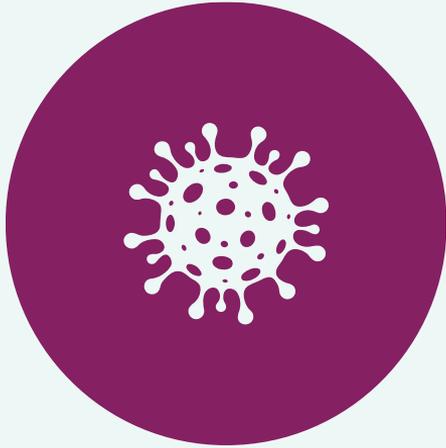
* Includes actual inpatient costs from Canadian hospitals that report to the CMDB

† Sum of Resource Intensity Weights assigned to all acute inpatients in the Discharge Abstract Database (DAD)

Note: Physician cost is not included.

Cost of a Standard Hospital Stay





Challenges of estimating COVID-19 hospitalization costs in Canada and our solutions

Data challenges



Urgent need for the information

- Clinical information on COVID-19 patients
 - Usually available only after the fiscal year ends
- The RIWs for COVID-19 patients
 - Uses patient level cost, which is 2-years behind clinical data
- CSHS for the FY 2020
 - Uses hospital spending data, which is a year behind clinical data

Solution: clinical data



- Use provisional (open-year) data
 - more timely
 - may be less complete and/or
 - have other quality issues, such as uneven coverage

Solution: RIW



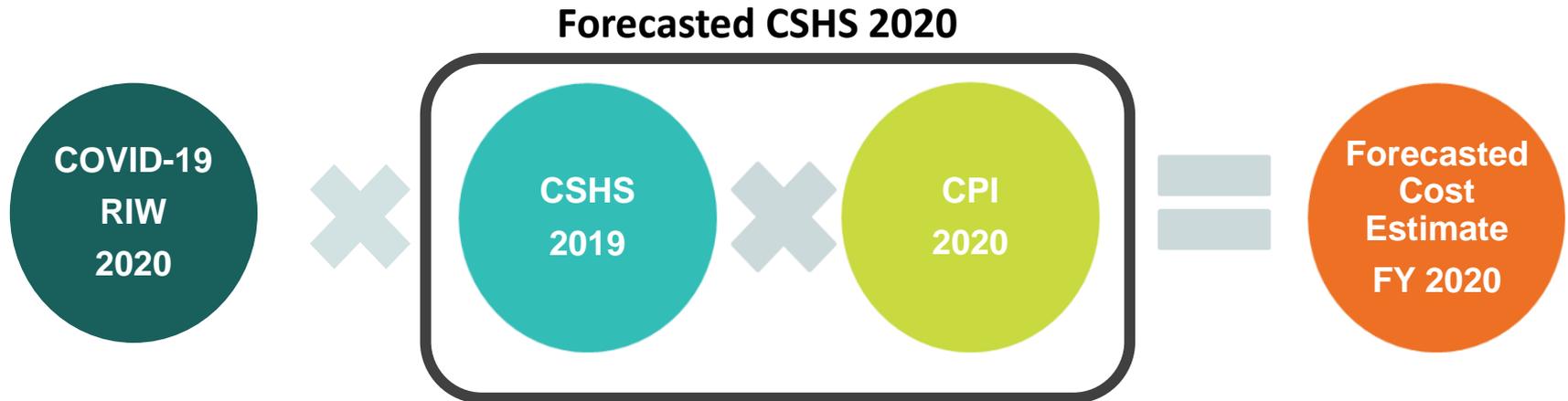
Calculate proxy values

- Group to the case mix cell CMG 133
 - “infectious and parasitic diseases of the respiratory system”
- Adjust estimated length of stay (or ELOS) and RIWs for CMG 133 using open year data
 - traditionally, those indicators are calculated using the most recent two years of closed-year fiscal data;
 - included over 6,500 additional COVID-19 cases from open-year 2020/21 data to create estimates more representative of COVID-19 cases overall

Solution: CSHS 2020



- Apply forecasting methodology to calculate CSHS for the FY 2020
 - Latest available CSHS is inflated with health and personal care portion of the Consumer Price Index (CPI)





How well did forecasting methodology perform based on pre-COVID financial data?

Results

Estimated average cost of the
COVID-19 related hospitalization



\$23,100

based on **forecasted**
CSHS2020

Results

Estimated average cost of the COVID-19 related hospitalization



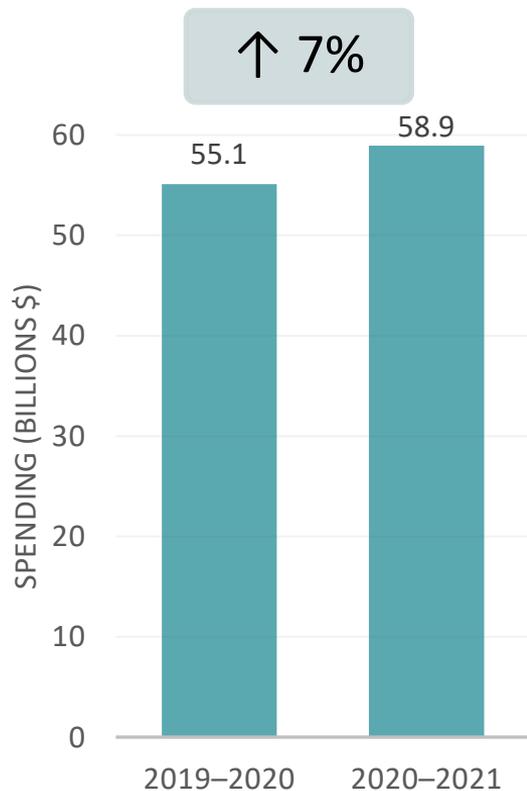
based on **forecasted**
CSHS2020



based on **actual**
CSHS2020

- The national value underestimated by 10%
- Forecasting error varies between 2% and 18% for jurisdictions
- Using only CPI, our forecasting methodology could not account for a variety of changes brought to the healthcare system by the pandemic
- The methodology allowed us to develop cost estimates on a timely basis

What We've Learned – Hospital Spending



Increased Expenses

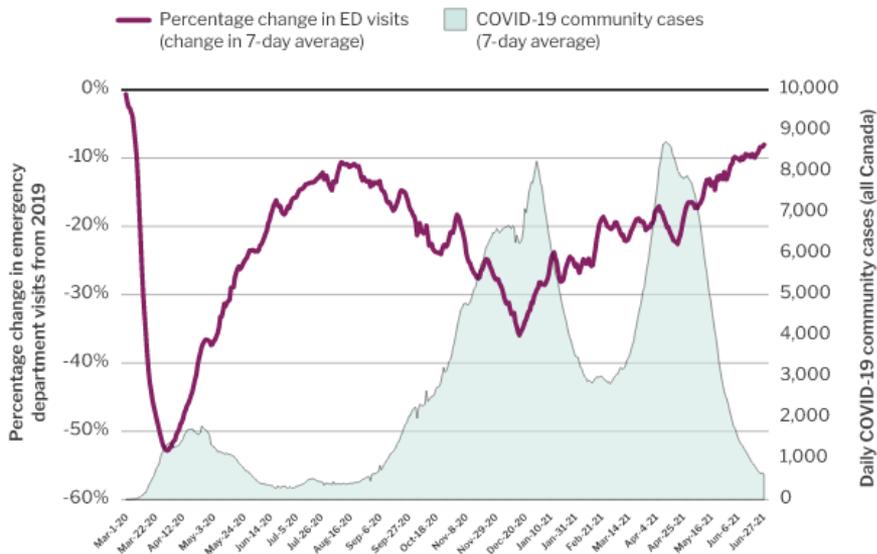
- **Hospital spending increased by 7%**
 - compare to 5-year average of 3%
- **Supplies and equipment had highest growth, 8%**
 - significant investment in PPE
 - purchasing equipment – ventilators, lab equipment and others
- **Compensation had double growth rate, 6%**
 - corresponds with growth in hours worked (4%)

Source

Canadian Institute for Health Information. [Hospital spending](#) [Sept 15, 2022].

What We've Learned – Hospital Services

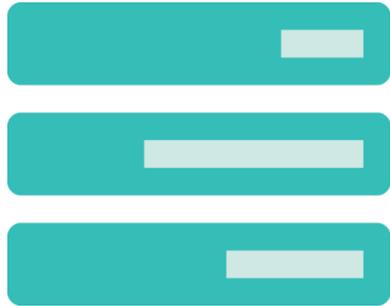
Reduced Activity



- **Hospitals admitted 11% fewer inpatients**
- **Operating room visits declined by 14%**
- **Emergency department visits were 22% below pre-pandemic levels**
 - Children and youth had the largest decrease in emergency department visits
 - Visits for children age 0 to 4 decreased by 50% per month

Source

Canadian Institute for Health Information. Impact of COVID-19 on Canada's health care systems [Report].



COVID-19 reporting

COVID-19 reporting at CIHI

COVID-19 RESOURCES

Data collection and coding
direction

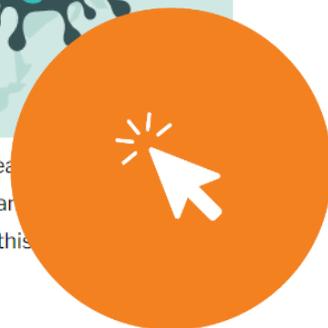
Data and information

Impact of COVID-19 on
Canada's health care
systems +

External data resources



August 26, 2021 — CIHI is committed to collecting, analyzing and sharing credible health care data to improve the performance of health care systems and the health of all Canadians. We've compiled our key reports and information related to the COVID-19 (coronavirus disease) pandemic and will update this page whenever possible.



Link: <https://www.cihi.ca/en/covid-19-resources>

COVID-19 Hospitalization and ED Statistics

- One of the first CIHI releases on pandemic data
- Provisional (open-year) CIHI data used to produce timely, quarterly releases
- Provides a better understanding of resource utilization and outcomes for COVID-19 patients

Key information available

- Number of Hospitalizations
- Demographics (age, sex)
- ICU, ventilation
- Emergency Department Visits
- **Estimated Cost**
- Other (e.g., Comorbidities, Income Quintile)

COVID-19 Estimated Average Hospital Costs



Most recent data period: **April 1, 2021 to March 31, 2022**



\$61,000
per stay
Hospitalized -ICU

The icon shows a hospital bed with a patient, a monitor displaying a line graph, and a pulse oximeter.

COVID hospitalization costs
\$25,000 per stay
3x as much as average
hospital stay



\$16,000
per stay
Hospitalized non-ICU

The icon shows a hospital bed with a patient, a monitor, and a pulse oximeter.

Notes:

- Estimated hospitalization costs exclude compensation paid to physicians
- Quebec is excluded

Comparison Between Two Data Periods



Q4 FY 2019 & FY 2020 (Jan 1, 2020 to March 31, 2021)	FY 2021 (April 1, 2021 to March 31, 2022)
42,245 Number of Hospitalizations	101,031 Number of Hospitalizations
59.6% ICU admission requiring ventilation	59.5% ICU admission requiring ventilation
15 Average LOS	13 Average LOS
\$25,500 Estimated average cost	\$25,000 Estimated average cost
\$1 billion Total estimated cost of hospitalizations	\$2.5 billion Total estimated cost of hospitalizations

Notes:

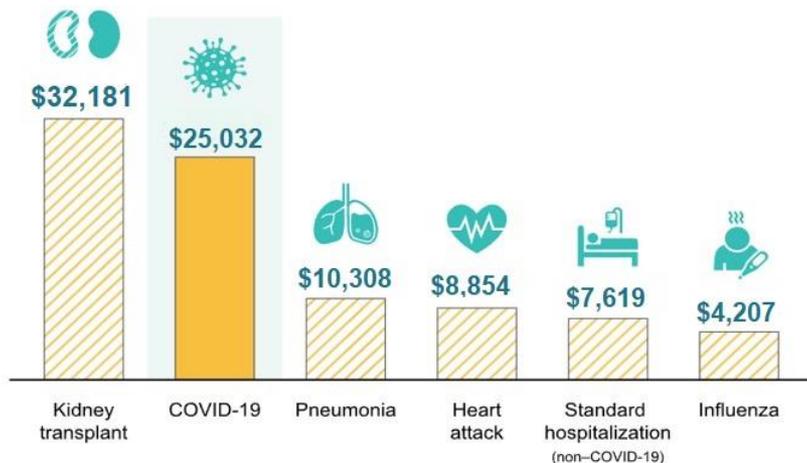
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COVID-19 and other common conditions

Comparing hospital costs

Average estimated cost of a hospital stay

2021 forecast



On average, a hospital stay for COVID-19 costs



Notes

Estimated hospitalization costs exclude compensation paid to physicians.
 COVID-19 hospitalizations include both confirmed and suspected cases with any diagnosis type reported between April 2021 and March 2022.
 Hospitalizations used for comparison are based on the 2021 Case Mix Groups+ (CMG+) for the same year.
 Quebec data is not available.

Sources

Discharge Abstract Database 2021–2022, Canadian Institute for Health Information.
 Canadian MIS Database 2020–2021, Canadian Institute for Health Information.

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Key Takeaways



- **Canada benefited from having high quality cost data**
 - ✓ Working on improving timeliness of data
- **Collecting financial data brings value to many stakeholders**
- **When timely information is not available forecasting methods can be used**



Contact us

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Canadian Institute for Health Information
Better data. Better decisions. Healthier Canadians.