

Short- and Long-Term COVID-19-Attributable Health Care Costs: A Phase-Based, Population-Wide Matched Cohort Study

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- ### Background
- By June 30 2023, 80% of Ontario adults had infection-acquired SARS-CoV2 antibodies¹
 - Ongoing spread of SARS-CoV-2 → long-term costs to healthcare systems.

Objective

To estimate acute & long-term COVID-19-attributable healthcare costs among individuals who tested positive for SARS-CoV-2, from the healthcare payer perspective in Ontario, Canada.

- ### Methods
- #### Study design
- Matched, population-based cohort study using individually linked laboratory and health administrative data held at ICES. Excluding residents of long-term care homes.

- #### Cohort creation
- Exposed participants: positive SARS-CoV-2 PCR test, Jan 1, 2020 – Dec 31, 2020
 - Unexposed participants: 50% random sample of Ontario Health Insurance Plan registered population, Jan 1, 2016 – Dec 31 2018.
 - Historical unexposed to account for: altered service use during pandemic and differential access to testing

- #### Matching (1:1 exposed to unexposed)
- Hard matching: Index /death date, age category, sex, resource utilization band (RUB), logit of propensity score
 - Propensity score: frailty, immigration status, rurality, high risk occupation neighbourhood concentration quintile, Ontario Marginalization Index, census tract, public health unit

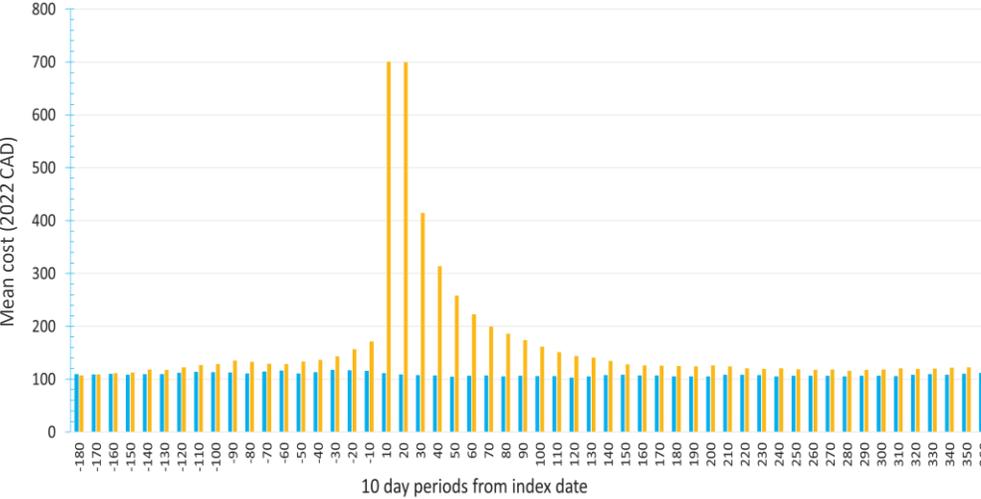
- #### Costing methodology
- Phase of care approach defines time periods of interest relative to disease onset where costs may differ due to disease progression and/or treatments²
 - Phase length determined by joinpoint analysis & expert opinion
 - Mean attributable costs – difference in mean publicly funded healthcare costs between exposed and unexposed, standardized to 10-day per capita costs per phase (2022 Canadian dollars) calculated using costing methodology developed at ICES³

Table 1. Phase definitions

Phase	Start Date	End Date
Phase 1: Pre-index	30 days prior to index date	1. Index date or, 2. 60 days prior to death date
Phase 2: Acute	Index date (exposed: infection onset; unexposed: pseudo-index date)	1. 79 days post-index date or, 2. 60 days prior to death date
Phase 3: Post-acute	80 days post-index date	1. End of follow-up (max 360 days post-index or, 2. 60 days prior to death date
Phase 4: Pre-death	60 days before death date	1. Death

Results

Figure 1. Mean healthcare costs for subjects exposed to SARS CoV-2 and matched historical unexposed subjects from 180 days pre-index to 360 days post-index date



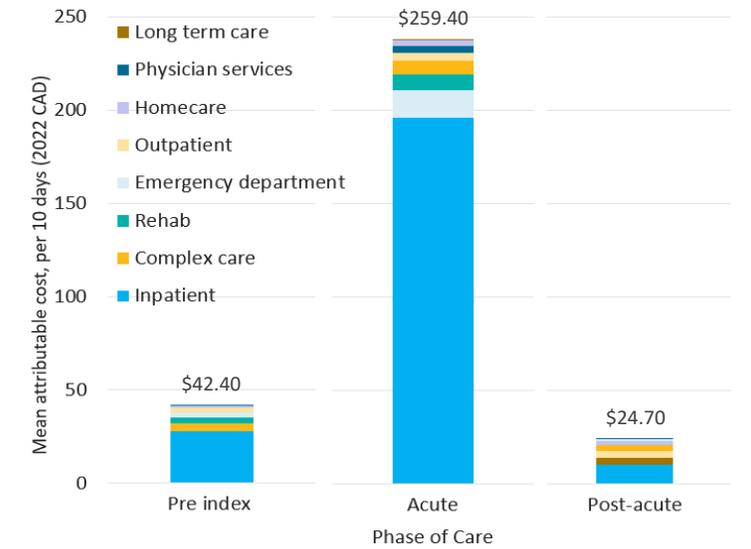
Conclusions

SARS-CoV-2 infection is associated with long-term increased healthcare costs, with differential cost patterns in the acute and post-acute phases, consistent with the evolving clinical understanding of the post-COVID condition. Our findings have important implications for stakeholders preparing plans to respond to the post COVID-19 condition at the policy and health system level.

Table 2. Descriptive statistics for SARS CoV-2 exposed and unexposed

Characteristic	Exposed	Unexposed
N	161,438	161,438
Mean age at index (± SD)	40.64 ± 19.92	40.77 ± 20.03
Female sex	50.70%	50.70%
Urban residence	96.50%	96.40%
Income quintile 1-2	46.30%	46.30%
Overall mortality	2.30%	3.00%

Figure 2. Mean 10-day attributable costs, by healthcare category



References

- ¹Seroprevalence in Canada - COVID-19 Immunity Task Force (covid19immunitytaskforce.ca)
- ²Barlow, W. E. (2009). Overview of methods to estimate the medical costs of cancer. *Medical care*, 47(7 Suppl 1), S33.
- ³Wodchis WP, Bushmeneva K, Nikitovic M, McKillop I. Guidelines on person-level costing using administrative databases in Ontario. Working Paper Series. Vol 1. Toronto: Health System Performance Research Network; 2013