

Impact of COVID19-related non-pharmacologic interventions on healthcare utilization for other virally-triggered respiratory illnesses

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Background: Acute and chronic respiratory illnesses are a leading cause of morbidity and mortality in Canada. While non-pharmacological interventions (NPIs) such as masking and physical distancing have effectively stemmed the spread of COVID19, the efficacy of NPIs in preventing other virally-triggered respiratory illnesses (VRIs) is less well understood. As the world moves into what may be the endemic phase of the COVID19 pandemic, better evidence is needed to inform rapidly-evolving public policy recommendations on the role of NPIs in infection control.

Methods: This study assessed the impact of NPI implementation on VRI-related healthcare utilization during the COVID19 pandemic. Following ethics approval from the Conjoined Health Research Ethics Board of Alberta (CHREB), long-term retrospective tableau data was extracted from the Alberta Health Services (AHS) data analytics enterprise data warehouse. International classification of disease (ICD-10) codes were used to identify patients who presented to an acute care facility in Alberta during the pandemic (Mar 2020-2021) and pre-pandemic (Feb 2015-2020) periods with a primary complaint of asthma, community-acquired pneumonia, influenza, or chronic obstructive pulmonary disease (COPD). Heart failure (HF) and acute appendicitis (AA) served as controls. The study team consisted of a medical student, an undergraduate student, a principal investigator from the Department of Emergency Medicine at the University of Calgary, members of the AHS provincial research data services team, and collaborating faculty members.

Evaluation Methods: The final study dataset comprised 585,809 ED visits and 175,456 hospitalizations. The primary outcome of interest was the change in ED visits and hospitalizations between the pandemic and pre-pandemic period for VRIs and controls. This was evaluated using quasi-experimental interrupted time-series analyses. A secondary outcome of interest was the cost-reduction associated with NPI implementation, for which multivariable regression models were constructed. These evaluation methods aimed to identify whether NPI implementation can (i) improve patient outcomes by preventing VRI-related ED visits and hospitalizations (ii) alleviate the strain on an already-constrained healthcare system by reducing VRI-associated healthcare spending.

Results: Triage acuity and comorbidity index scores were similar between the two periods. While a substantial decrease in healthcare utilization was observed in the early months of the pandemic for both VRIs and controls, a rapid rebound towards pre-

pandemic caseloads was observed only for controls, while VRI-related health utilization remained consistently low. Overall, there was a 43-62% and 41-84% decrease in weekly ED visits and hospitalizations for individual VRIs during the pandemic period (all $P < 0.001$). ED visits and hospitalizations for HF declined by a small magnitude of 6% ($P = 0.002$) and 8% ($P < 0.001$), respectively. In contrast, an 11% increase in ED visits ($P < 0.001$) and 3% increase in hospitalizations ($P = 0.046$) was observed for AA. The decrease in VRI-related healthcare utilization resulted in \$121 million in cost reduction. Surprisingly, even after accounting for COVID19, there was a significant decrease of 19,391 ED visits and 1,524 hospitalizations for respiratory illnesses during the pandemic period ($P < 0.001$).

Advice and Lessons Learned:

1. NPI implementation was followed by a substantial decrease in healthcare utilization for VRIs. This resulted in substantial decrease in healthcare utilization costs and likely prevented significant patient morbidity and mortality.
2. The greater magnitude decrease for VRIs than controls as well as the fact that acuity/comorbidity scores did not increase indicates that the observed decrease in healthcare utilization was primarily driven by NPI implementation rather than an avoidance of healthcare settings due to fears of nosocomial COVID19 acquisition.
3. NPIs appear to be an effective method of reducing the perennial burden of common respiratory illnesses. These findings provide a strong foundation for public policy recommendations on NPI use and establish the rationale for randomized studies on NPI use for preventing VRIs.