Derivation of monthly testing windows to optimize use of molecular testing for diagnosis of viral respiratory infection in adults: An 8-year retrospective study

**Background & Objectives**

- Multiplex panels for respiratory viruses (MPRVs) have been widely adopted for diagnosis and management of viral respiratory infections.
- Using MPRVs year-round may be wasteful, especially during periods of low incidence.
- Few studies have systematically examined how to best limit unnecessary MPRV use based on epidemiology of circulating viruses.

In our institution, MPRV was available continuously without restrictions for the past 8 years for any patient with new onset viral respiratory symptoms.

The objective of this study was to describe the seasonality of nine respiratory viruses and to derive monthly testing windows to optimize judicious use of MPRV testing.

**Methods**

- We retrospectively reviewed all non-duplicate adult MPRV results from Sunnybrook Health Sciences Centre (627 acute-care beds, 530 Veterans long-term care (LTC) beds).
- For the eight-year study period (1 July 2010 to 30 June 2018), a directive was in place to collect upper respiratory swabs from any inpatient or admitted emergency department patient with new or worsening cough, rhinorrhea, sore throat, wheeze or dyspnea.
- MPRV included nine virus groups: influenza A and B viruses, enterovirus/rhinovirus, coronavirus, respiratory syncytial virus (RSV), human metapneumovirus (hMPV), parainfluenza virus (PIV), adenovirus, and bocavirus.
- Indeterminate results were excluded from analysis and samples with co-pathogens were analysed as unique tests.
- In acute care, results were classified as community-associated if the sample was collected earlier than day 4 of admission, or hospital-associated if it was collected on or after day 4 of admission.
- Testing windows were compared by running 12 permutations of start-month testing windows to optimize use of molecular testing.
- Optimal testing months in LTC were determined using non-restrictive year-round testing months.
- Monthly proportions of positives were compared.
- Median age in acute care was 76.5 years (50.3% female). Median age in LTC was 92 years (10.5% female).

**Results**

- 36,918 MPRV results were included from 11,196 patients.
- The overall positivity rate of respiratory viral testing was 35.7% of positive MPRV results in acute care, and 17.2% in LTC.
- Optimal testing months in acute care were November and December for community-associated cases, and September for hospital-associated cases.
- Optimal testing months in LTC were December for community-associated cases, and November to April for hospital-associated cases.
- The overall positivity rate of respiratory viral testing was 28.4% in acute care and 46% in long-term care.
- Focusing viral testing to reduce non-restrictive testing months during periods of low incidence would be cost-effective.

**Conclusions**

- Overall, the largest variety of pathogens occurs between November and May where MPRV is most justified.
- Conversely, the viruses identified on MPRVs from June to October mostly represent enterovirus/rhinovirus and parainfluenza viruses, for which antiviral therapy is currently unavailable, therefore testing during this period would likely not alter clinical management.
- Restricting multiple panel testing to October to May would have saved over 3500 swabs during the study period (an average of over 400 per year).
- Implementing viral-pathogen specific monthly testing windows for MPRV based on expected seasonality is feasible for most respiratory viruses and could result in improved resource utilization.

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