SARS-CoV-2 Respiratory Viral Coinfection Severity in Hospitalized Canadian Children: An IMPACT Study

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BACKGROUND

Co-circulation of SARS-CoV-2 with other respiratory viruses has led to frequent coinfections in hospitalized children. Whether coinfection independently affects COVID-19 severity remains unclear and may reflect variation in testing practices across centres.

OBJECTIVES

To compare disease severity between children with SARS-CoV-2 respiratory viral coinfection and monoinfection hospitalized in centres routinely performing multiplex PCR testing for all acute respiratory illness admissions.

METHODS

- National surveillance of children <17 years hospitalized with laboratory-confirmed COVID-19 (July 2021–December 2022) across 13 tertiary-care centres participating in the Canadian Immunization Monitoring Program, ACTive (IMPACT).
- Primary analysis included centres with routine multiplex PCR testing for all acute respiratory illness admissions (n=5); secondary analyses included all centres (n=13).
- Exposure: SARS-CoV-2 respiratory viral coinfection (SARS-CoV-2 plus ≥1 additional respiratory virus) versus monoinfection.
- Outcome: Severe COVID-19 (intesntive care unit [ICU] admission, ventilation, hemodynamic support, organ complications, or death).
- Associations were estimated using mixed-effects multivariable logistic regression adjusted for age, sex, comorbidities, SARS-CoV-2 lineage, and vaccination status.

RESULTS

- Of 2,832 children hospitalized with acute COVID-19 across 13 IMPACT centres, 939 (33.2%) were admitted to centres routinely performing multiplex PCR testing.
- Among these, 174 (18.5%) had ≥1 respiratory viral coinfection and 765 (81.5%) had SARS-CoV-2 monoinfection.
- Median age (1.3 vs 1.7 years; p=0.26) and comorbidity distribution were similar among coinfections and monoinfections.
- RSV (39.7%) and enterovirus/rhinovirus (38.5%) were the most common coinfecting viruses.

Compared with monoinfection, RSV coinfection showed higher bronchiolitis (55.1% vs 5.9%), hypoxia (84.1% vs 36.7%), and respiratory distress (88.4% vs 47.1%).
EV/RV coinfection demonstrated increased respiratory distress (79.1% vs 47.1%) and hypoxia (61.2% vs 36.7%).

In centres with systematic multiplex PCR testing, respiratory viral coinfection was not independently associated with severe COVID-19.
Coinfection was independently associated with increased need of any respiratory support (Fig.1).

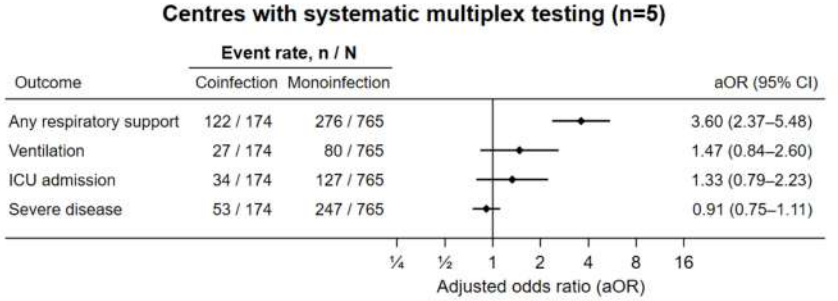


Fig.1. Adjusted odds of severity outcomes by viral coinfection in centres with routine multiplex PCR testing (n=5).

RSV and EV/RV coinfections were associated with respiratory support but not severe COVID-19 (Fig.2)

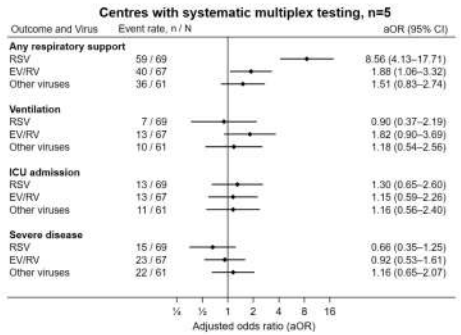


Fig.2. Adjusted odds of severity outcomes by specific viral coinfection in centres with routine multiplex PCR testing (n=5).

In analyses including all IMPACT centres regardless of testing strategy, coinfection was associated with increased risk of severe COVID-19 (Fig.3).

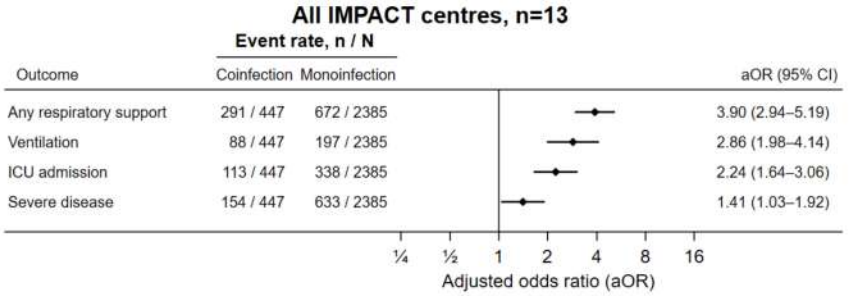


Fig.3. Adjusted odds of severity outcomes by viral coinfection in all IMPACT centres (n=13).

CONCLUSIONS

In centres with routine multiplex PCR testing, respiratory viral coinfection was not associated with severe COVID-19.
Increased respiratory support likely reflects virus-specific respiratory phenotypes rather than greater COVID-19 severity.
Apparent severity increases in centres without systematic multiplex testing may reflect severity-dependent testing.

PLAIN SUMMARY

In hospitalized children, having another respiratory virus along with COVID-19 did not increase the risk of severe illness.

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