Epidemiology, Clinical Features, and Severity of COVID-19 in Immunocompromised Children in Canada

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BACKGROUND

The impact of immunocompromised conditions on COVID-19 outcomes in the pediatric population remains unclear, and there has been limited exploration of potential variations in severity across different types of immunocompromised in children.

OBJECTIVES

To evaluate the clinical manifestations and outcomes of SARS-CoV-2 infection in children with (an) underlying immunocompromising condition(s) compared to immunocompetent individuals.

METHODS

- Canadian active surveillance for laboratory-confirmed COVID-19 hospitalizations among children <17 years, from April 2020–December 2022
- National data were captured through the Canadian Pediatric Surveillance Program and the Canadian Immunization Monitoring Program, ACTive, with the latter covering ~90% of all Canadian tertiary-care pediatric beds
- Definitions:
  - Immunocompromised children (IC): those who have a condition or are on a treatment which compromises the immune system (see examples in figure 1)
  - Severe COVID-19: child was admitted to the intensive care unit (ICU), required ventilatory or hemodynamic support, or died
- Ajusted risk ratios (aRR) for severe COVID-19 among IC versus not immunocompromised children (non-IC) were calculated using robust Poisson regression.

RESULTS

A total of 3218 children were hospitalized with COVID-19, of which 353 (11%) were IC (Fig.1).

IC were older (median age 6.5 years [interquartile range (IQR) 3.6–11.8] than non-IC (1.2 years [IQR 0.2–4.8] years; p<.001) and had fewer comorbidities other than immunocompromise (29.2% vs 41.8%; p<.001).

Fig.1

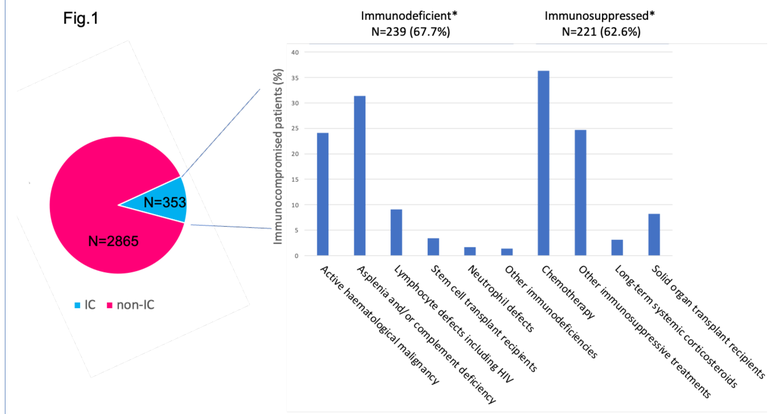

Figure 1 shows the frequencies of different subgroups of IC (N=353): immunodeficient (n/N=239/353) and immunosuppressed (n/N=221/353). *Patients could meet multiple categories of immunocompromise.

Immunocompromised children were not at increased risk for severe COVID-19

Severe COVID-19 (14.2% vs 29%; p<.001), as well as the need for any respiratory support (15.9% vs 35.6%; p<.001) and ICU admission (6% vs 17.4%; p<.001) were less frequent among IC (Fig.2).

In multivariable analyses, IC had a significantly lower likelihood of severe COVID-19 compared to non-IC (aRR=0.46 [95%CI: 0.35-0.61]) (Fig.3).
Subcategories of immunocompromise were individually also associated with a reduced likelihood of severe COVID-19 (Fig.3).
When compared to children with comorbidities other than immunocompromise (non-IC comorbidities subgroup), IC individuals were also less likely to experience severe COVID-19 (any immunodeficiency aRR=0.36 [95%CI: 0.53-0.70]; any immunosuppression aRR= 0.32 [95%CI: 0.22-0.46]) (Fig.3).

Fig.2

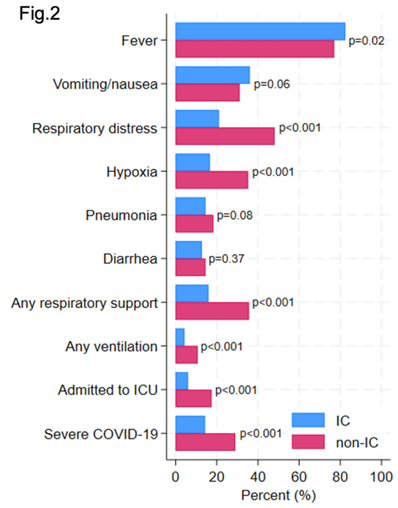

Figure 2 shows the clinical characteristics and outcomes of COVID-19 among IC and non-IC children. Adjustment for multiple comparisons was not done.

Fig.3

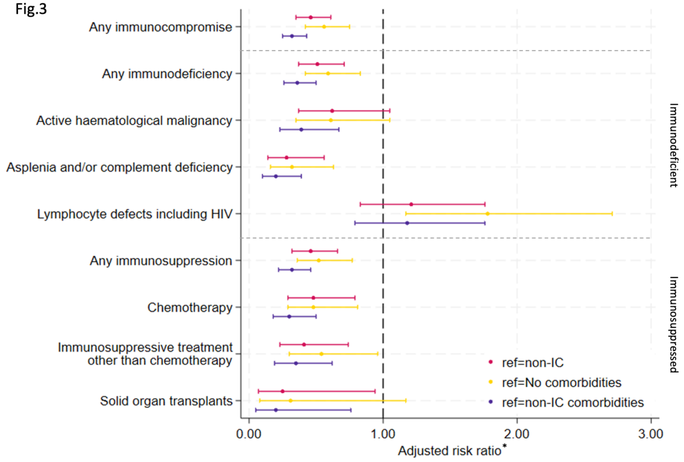

Figure 3 shows severe COVID-19 risk among IC subcategories (i.e., immunodeficiency and immunosuppression) compared to non-IC children, overall (represented in pink) and stratified into children with no comorbidities (represented in yellow) and with comorbidities other than compromising (represented in violet).
*adjusted for age, sex, non-IC comorbidities (any vs. none), SARS-COV-2 lineage, and vaccination status (categorized as zero doses, ≥one dose, or unknown). Adjustment for multiple comparisons was not done.

CONCLUSION

Lower risk of severe COVID-19 was observed in hospitalized IC compared to non-IC with and without other comorbidities.

Similar trends have been observed for Influenza (Schober T., et al. Clin Microbiol Infect. 2023), suggesting there may be a tendency for lower admission thresholds for IC children diagnosed with respiratory infections.

Population-based studies are needed to understand the impact of immunocompromised conditions on the severity of COVID-19 in the pediatric population.

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