EPH212

Severity of COVID-19 pre- and During Omicron Period in Pediatric Patients: A Global Systematic Review

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INTRODUCTION

- SARS-CoV-2 infections remain a significant health burden for patients worldwide, with evolving variants causing periodic surges and changes in disease severity.[1-3]
- The risk of COVID-19 hospitalization continues to be high among infants and is comparable to risk among older adults.[4]
- There is a need to understand the potential impact of SARS-CoV-2 variant evolution on COVID-19 severity among the pediatric population to inform future vaccination programs.

AIM

- To understand COVID-19-related severity and medical outcomes in pediatric patients (aged ≤18 years) stratified by SARS-CoV-2 variant.

METHODS

- The SLR was registered a-priori with PROSPERO (ID: CRD42024619193), conducted according to Cochrane gold standard methods and is reported following the PRISMA guidelines.
- EMBASE® and MEDLINE® databases were searched on November 26th, 2024, using the OVID platform.
- Database searches were supplemented by allied grey literature search of conference proceedings from ESCMID and IDWeek from January 1st, 2022 to December 31st, 2024.
- Two independent reviewers screened titles and abstracts, then full text publications of citations retrieved from the database searches against Population, Exposure, Comparisons, Outcomes (PECO) eligibility criteria.
- Eligible publications reported acute COVID-19 outcomes indicative of disease severity (e.g., hospital or ICU admission, mortality), by SARS-CoV-2 variant infection status in individuals aged ≤18 years.

RESULTS

- A total of 2,482 records were identified with 46 unique studies reporting pediatric data were included (Table 1).
- Statistical comparison (unadjusted and adjusted estimates) between pre-Omicron and post-Omicron (most recent variant captured was XBB.1.5) variant periods were reported for each of hospitalization, ICU admission, and organ support by 6 studies, and for mortality by 4 studies.
- For all hospitalization, ICU admission, and mortality outcomes, either no statistically significant change or a statistically significant (as determined by study author testing) decrease in severity was reported when comparing post-Omicron emergence versus pre-Omicron (Figure 1).
- Findings were mixed for organ support outcomes. A statistically significant increase in non-invasive ventilation, oxygen therapy, and receipt of vasopressors during post-Omicron was reported in 2 studies. However, 6 organ support outcomes indicated a statistically significant decrease in severity during post-Omicron, and 6 found no statistical difference.
- Five studies (three reporting adjusted estimates) stratified outcomes by extent of comorbidity (e.g., number, specific conditions). Across all assessed periods, comorbidities were statistically significant predictors of worse outcomes among patients with COVID-19, with severity of outcomes increasing with number of comorbid conditions.

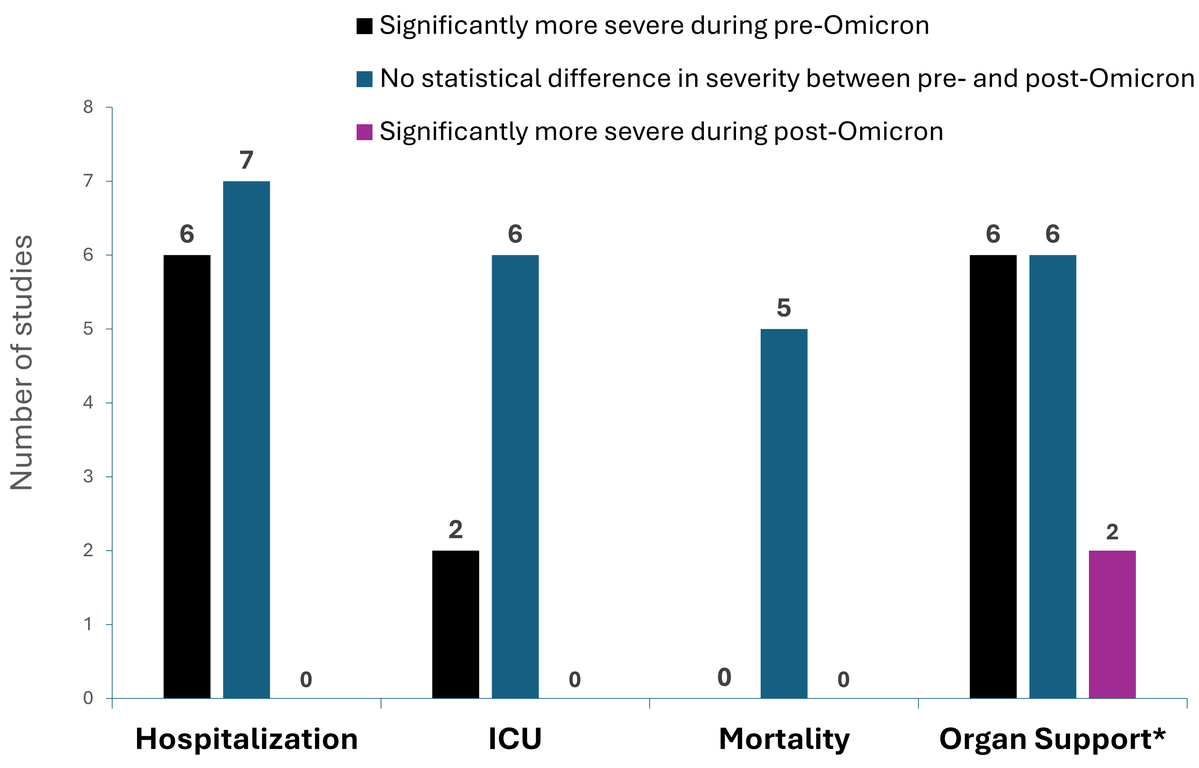
Table 1. Overview of study characteristics (N=46)

Characteristic	Pubs, N (%)
Study design	
Case-control study	8 (17)
Prospective cohort study	5 (11)
Retrospective cohort study	33 (72)
WHO region	
African Region	2 (4)
Americas	24 (52)
Eastern Mediterranean	1 (2)
European	12 (26)
Western Pacific	7 (15)
Exposure (variant)*	
Pre-Omicron	23 (50)
Omicron	29 (63)
Dominant variant definition	
Defined by study author/external source	38 (83)
Variant sequenced	8 (17)
Outcomes reported*	
Hospitalization	38 (83)
ICU	30 (65)
Mortality	28 (61)
Organ support†	28 (61)

ICU: intensive care unit; WHO: World Health Organization.
*Included studies may have reported multiple variants or outcomes, therefore, total counts and proportions can exceed the number of studies (n=46) and cumulative percentage may exceed 100%. † Forms of organ support included types of invasive and non-invasive ventilation and oxygen therapy, receipt of vasopressors.

RESULTS (cont.)

Figure 1. Comparative direction of effect between pre- and post-Omicron periods across healthcare outcomes indicative of COVID-19 severity (assessed through association testing)



ICU: intensive care unit.
Each bar represents an individual outcome reported in each study, therefore studies may be represented more than once for each outcome category)
*Forms of organ support included types of invasive and non-invasive ventilation and oxygen therapy, receipt of vasopressors.

CONCLUSIONS

Key Findings…

most (24/40) outcomes indicated no **statistically significant difference** in the proportions of hospitalization, ICU admission, mortality, receipt of organ support, or in hospital and ICU length of stay between SARS-CoV-2 variant predominance **during pre- vs post-Omicron**

Of the 14 studies reporting a statistically significant change in hospitalization, ICU admission, and mortality outcomes, all indicated a decrease in severity following Omicron emergence

Implications…

these findings underscore the continued importance of pediatric COVID-19 vaccination, as a key strategy to reduce severe outcomes among children in the post-Omicron era

Further research…

should assess trends in acute pediatric COVID-19 disease severity in contemporary lineages (e.g., LP.8.1, NB.1.8.1, and XFG) and whether these similarly occur in chronic COVID-19 conditions (i.e., Long COVID)

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Disclosures

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