

Investigating the post-COVID-19 Spike in Bronchiolitis Emergency Admission among Infants: A Cohort Study from Northern Italy

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INTRODUCTION

Bronchiolitis is the leading cause of Emergency Room (ER) visits and hospitalizations in infants, primarily due to Respiratory Syncytial Virus (RSV) infection [1,2]. The COVID-19 pandemic, along with the associated non-pharmaceutical interventions, led to a marked decline in bronchiolitis cases during the 2020–2021 season [3]. However, in 2021, a resurgence of RSV resulted in a double increase in bronchiolitis-related hospital admissions in several countries [4]. In Italy, data on bronchiolitis trends after COVID-19 remain limited. A multicentre study from 27 hospitals in Lombardy [5] and a single-centre study from Genoa [6] both suggest increased hospitalizations and ER visits in recent seasons but relying on data limits a comprehensive national understanding.

OBJECTIVES

This study aims to analyse the impact of the COVID-19 pandemic on bronchiolitis-related Emergency Room (ER) visits in infants aged 0–6 months in Lombardy, Italy. It also explores potential factors underlying any observed changes, including shifts in population demographics, variations in disease severity, alterations in age distribution, and the effects of COVID-19 on infant susceptibility.

METHODS

We used linked administrative data on healthcare utilization covering the entire population of residents in Lombardy. Two distinct cohorts were analysed: a paediatric cohort of one million births for descriptive trend analyses to assess the indirect effects of COVID-19, and a maternal-paediatric cohort

for hypothesis-driven analyses on the potential direct effects. We calculated incidence rates (IRs) of bronchiolitis-related ER visits between 2012 and 2023, using hospital admissions as a proxy for more severe disease. Due to the lack of swab testing in newborns, we used maternal COVID-19 vaccination as a proxy to investigate direct effects. Multivariable-adjusted logistic regression was employed to assess the association between COVID-19 vaccination before or during pregnancy and bronchiolitis-related ER visits in the first six months of life. To evaluate whether any observed associations could be explained by underlying family-level factors, we applied a negative control design, comparing ER visit rates in older siblings born to mothers who were later vaccinated with those born to mothers who remained unvaccinated.

RESULTS

Bronchiolitis incidence rates (IRs) showed a marked shift after 2020, with rates dropping to near zero in 2020–2021, then doubling in 2021–2023 compared to pre-pandemic levels, increasing from 2 to ≥ 4 per 100 person-time, as shown in Figure 1. In exploring potential explanations for this change, we ruled out shifts in population demographics, disease severity (hospital admissions remained consistently at half the IR of ER visits, as illustrated in Figure 1), and age distribution at the time of visits. Maternal COVID-19 vaccination before or during pregnancy was associated with a reduced risk of bronchiolitis-related ER visits in infants (adjusted OR = 0.59 [95% CI: 0.50–0.69]). The negative control analysis suggested that this association is unlikely to be fully explained by family-level confounding, as no similar association was observed in older siblings (adjusted OR = 1.50 [0.93–2.47]).

CONCLUSIONS

Consistent with previous studies, our findings confirm the absence of bronchiolitis ER visits during the first COVID-19 lockdown and highlight the subsequent rise in cases during 2021–2023. The protective role of maternal COVID-19 vaccination on infant bronchiolitis strongly suggests that (pre- or post-natal) SARS-CoV-2 infection contributes to explaining the large increase in incidence post-pandemic.

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Figure 1. Monthly incidence rates of Emergency Room visits for bronchiolitis and of visits resulting in hospitalization among infants aged 0–6 months.

