Waning infant pertussis during COVID-19 pandemic

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ABSTRACT

Measures to reduce the spread of COVID-19 have been associated with reduction in other respiratory infections. Results of a national Swedish cohort study of infant pertussis during April 2020–September 2021 were compared with those during January 2014–March 2020. The number of pertussis cases decreased significantly during the COVID-19 pandemic, from an average of 21 infant cases per quarter of a year before the pandemic to an average of 1 case per quarter during the pandemic. Swedish strategies to mitigate the spread of COVID-19 seem to have had an impact on pertussis incidence in infants.

What is already known on this topic?

- During the COVID-19 pandemic other respiratory infections have declined.
- Pandemic mitigation strategies include social distancing and isolation.

What this study adds?

- The number of infant pertussis infections fell during the COVID-19 pandemic (April 2020–September 2021).
- Swedish strategies to mitigate the spread of COVID-19 seem to have had an impact on pertussis incidence in infants.

INTRODUCTION

Worldwide, COVID-19 has caused respiratory infections since 2020. Severe COVID-19 cases are rare among newborns and infants. However, infants are vulnerable to severe disease caused by other respiratory infections, such as pertussis.

This report describes the number of cases of pertussis in Swedish infants during the COVID-19 pandemic compared with the prepandemic situation.

METHODS

In a national retrospective cohort study, the inclusion criterion for pertussis was a case under 1 year of age during January 2014–September 2021 reported to the Swedish register of notifiable diseases according to the Swedish Communicable Diseases Act and Communicable Diseases Ordinance (SmiNet). Reporting of pertussis is mandatory and ongoing throughout the year. The method used to diagnose pertussis was a positive PCR test. During the study period, diagnostics and reporting routines remained essentially unchanged.

The outcome was the number of infant cases of pertussis during the study period. The number of pertussis cases is presented per quarter of a year.

In this study, the COVID-19 pandemic period was defined as starting in April 2020 and data were collected until September 2021. This period was compared with the prepandemic period from January 2014 to March 2020.

Differences in reported cases of pertussis per month between the pandemic and the prepandemic period were estimated by χ^2 test.

RESULTS

The number of infant cases of pertussis decreased significantly ($p<0.001$) during the COVID-19 pandemic period (April 2020–September 2021) compared with the prepandemic period (January 2014–March 2020) (figure 1).

After 5 years (2009–2013) with low numbers of reported infant cases of pertussis, a threefold increase was seen in 2014 (n=114). This was followed by a period from 2015 until 2019 with significantly lower numbers of reported cases of infant pertussis compared with 2014 (88, 87, 84, 68 and 62 infant cases in 2015, 2016, 2017, 2018 and 2019, respectively). During January 2020–March 2020, 14 infant cases of pertussis were reported.[1]

During the COVID-19 pandemic period from April 2020 to September 2021, only six cases of infant pertussis were reported.[2]

DISCUSSION

This study found that the number of infant pertussis infections fell during the COVID-19 pandemic. The clinical implications of this include significantly reduced morbidity from pertussis in newborns and infants during a COVID-19 pandemic period in Sweden. This might indicate that recommendations issued by the Public Health Agency of Sweden (PHAS) to reduce the spread of COVID-19 also prevented the proliferation of other respiratory infections, such as pertussis.

In late February 2020, the PHAS issued recommendations to mitigate the spread of COVID-19. Recommendations throughout the pandemic have focused mainly on hand hygiene practices, staying at home when sick, social distancing indoors and outdoors, working from home when possible and avoiding unnecessary travel. Neither lockdowns nor facial mask mandates were issued. Mothers

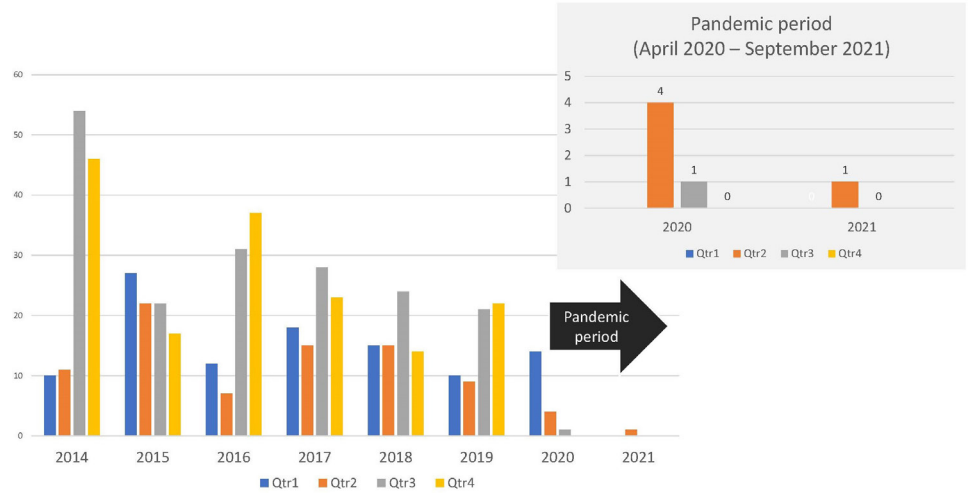

Figure 1 Number of reported cases of pertussis in Swedish infants in the prepandemic period (January 2014–March 2020) and pandemic period (April 2020–September 2021), reported quarterly (Qtr 1–4) (SmiNet data). SmiNet, Swedish Communicable Diseases Act and Communicable Diseases Ordinance.

with COVID-19 infection and their newborns were not separated in hospitals and breast feeding was promoted. Preschools, elementary, middle and high schools remained open throughout the pandemic, with strict regulations for staff and children to stay at home when displaying the slightest symptoms. Survey data from the Swedish Civil Contingencies Agency showed that the vast majority quickly adapted to these changes. This may suggest that, in contrast to total lockdowns, softer restrictions when adhered to, as in Sweden, also reduce the spread of other respiratory pathogens.

Globally, countries reported fewer non-coronavirus respiratory infections during the pandemic after the introduction of measures to reduce social interactions and virus transmission.[3] Although data in our study were collected from a robust register and well-established reporting routines, our findings must be interpreted with caution in light of the retrospective design of the study. Although data on test activity are not available for the pandemic period, pertussis is a notifiable disease and usually presents with severe symptoms in infants. Therefore, we assume that the pandemic has not altered test activity much in infants. Data in this study cover a limited period. As the lower number of pertussis cases is unlikely to be permanent, longer follow-up on the data is needed beyond pandemic lockdown measures.

Today's situation with exceptionally low numbers of pertussis cases in Sweden will probably not be maintained in the future. As people have been less exposed to pertussis during the pandemic, immunity may have waned. Thus, there is a considerable risk of outbreaks of pertussis when restrictions are lifted.

According to the Swedish National Immunization Program (NIP), the first dose of pertussis vaccination is recommended at 3 months of age. During the COVID-19 pandemic, the NIP was resilient, with >97% of infants receiving three doses of pertussis-containing vaccines during their first year of life, according to the programme.[4] Despite good compliance with the NIP, the youngest infants, who are not yet vaccinated, remain at risk of severe pertussis when outbreaks occur. Therefore, other protective measures are needed.

Maintaining strict COVID-19 restrictions over time to reduce the spread of other respiratory pathogens is not feasible. Raising awareness and advising minimal social contacts, specifically for a family with a newborn child, could help maintain low numbers of cases of infant pertussis and protect infants from severe disease in the postpandemic era. Limiting social contacts is a delicate balance, as interacting with peers is important for developing parenthood and contributing to the well-being of parents. Such recommendations, however, require further study and discussion.

Raised awareness and maternal pertussis vaccination during pregnancy can protect infants from severe disease. Reassuring data on the safety of maternal vaccination against pertussis for mothers and infants at birth are available from many countries.[5] To date, a booster dos containing diphteria, tetanus and pertussis antigen (dTp) is not generally recommended in Sweden and thereby not routinely offered to pregnant women. Subsequently, there is no specific surveillance of maternal pertussis vaccination in place. According to primary healthcare professionals, only a small number of pregnant women are vaccinated against pertussis each year, too few to influence the total incidence of infant pertussis in Sweden.

CONCLUSIONS

This national cohort study highlights epidemiological changes in infant pertussis infection during a global pandemic. A sudden resurgence of pertussis with severe morbidity may occur in Sweden in the postpandemic period. It is therefore important to discuss the role of limited social contact for families with infants and consider maternal pertussis vaccination before postpandemic outbreaks of infant pertussis occur. It would be of interest in future studies to systematically compare the effect of different strategies across countries.

Contributors KF-H took the lead in writing the manuscript and coordinated the project. EA contributed to data analysis and manuscript revisions. HK performed the data analysis. A-SFC, LJN and S-AS contributed to analysis of the results and to writing of the manuscript. JS contributed to design of the research report, data control and manuscript revisions. BA conceived of the presented report and directed the project. All authors discussed the results and contributed to the final manuscript.

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Competing interests JS reports having been a member of the safety monitoring committee organised by ILIAD, USA in 'A phase 2b multicenter placebo-controlled – randomized study of 3P2EI intranasal pertussis vaccine in healthy adults' in 2020. He did not receive payment.

Patient consent for publication Not required.

Ethics approval As the study was an audit based on public data and did not handle sensitive personal identifiers, an ethical review was deemed unnecessary.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available in a public, open access repository.

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