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NEONATAL COMPLICATIONS OF CORONAVIRUS DISEASE (COVID-19)

Abstract

Coronavirus disease (COVID-19) is an international public health crisis and is rapidly spreading around the world. So far it looks like most newborn babies and infants are not severely affected, but this is based on small numbers of cases so there might be important effects of COVID-19 in babies that we don't yet know about.

There are three main ways that COVID-19 might affect newborns and babies that need neonatal care:

1. Newborn babies might catch COVID-19 before, during or soon after birth and this may lead to problems with breathing or feeding that need support in hospital.
2. COVID-19 could affect babies that are already on neonatal units with other medical conditions (like being very premature) that make them more at risk of severe infection.
3. COVID-19 might affect that way that pregnant women are looked after in pregnancy or labour which could lead to problems for some babies, even if they do not catch COVID-19.

We plan to look at how COVID-19 is affecting newborns and babies on neonatal units in the United Kingdom through the British Paediatric Surveillance Unit (BPSU).

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www.rcpch.ac.uk/bpsu/covid-19

Background

The coronavirus SARS-CoV-2 leads to coronavirus disease (COVID-19); spread of which is increasing and is recognised as an international public health crisis.

To date there are only limited data describing the incidence, clinical course, treatments or outcomes of COVID-19 in neonates and children. The risk of severe disease in these groups appears low, although this may not continue to be the case. A retrospective review of 1099 cases of COVID-19 in China (14.2% of identified national cases at end of January 2020) identified only nine children (Guan et al., NEJM 2020), and a retrospective study of 266 hospitalised children in Wuhan, China isolated the virus in only six children (range 1-7 years age) and only one child had severe disease requiring intensive care (Liu et al., NEJM 2020). Three cases of neonatal COVID-19 have been described (Lu et al., J Med Virol 2020), with an additional case reported in the UK on 13th March. Transmission of neonatal COVID-19 appears to mainly occur in family clusters and a retrospective review of nine pregnant women with COVID-19 pneumonia in China found no evidence of vertical transmission (Chen et al., Lancet 2020). A systematic review of the outcomes of 32 women, including these 9, also found no evidence of vertical transmission (Mullins et al., UOG 2020). However, the recent UK case raises the concern that vertical transmission is a potential concern. Virus is known to be contained within most bodily secretions and there are suggestions that faecal oral transmission occurs, raising the possibility of transmission from mother to baby at birth, even if not prenatally.

Children and infants appear to be less severely affected by the SARS-CoV-2 virus generally, but COVID-19 may lead to considerable mortality and morbidity in preterm infants or those with conditions commonly found in babies requiring care soon after birth such as chronic lung disease. There are 184 neonatal units in the United Kingdom and approximately 90,000 infants require neonatal care annually. Some neonates (babies less than 29 days old), particularly those requiring surgery soon after birth or who become unwell after going home, are cared for in a paediatric intensive care unit (PICU) rather than a neonatal unit. Spread of the virus on neonatal units or on

PICU may be exacerbated by commonly used neonatal treatments such as continuous positive airway pressure (CPAP) and high-flow oxygen.

The impact of COVID-19 in pregnancy remains uncertain but in addition to the potential for vertical transmission the disease may lead to neonatal complications such as preterm birth as a consequence of maternal fever. Such neonatal impacts were seen in the 2009/10 H1N1 influenza pandemic (Pierce et al BMJ 2011); 47% of babies in the recent systematic review of COVID-19 in pregnancy were born preterm (Mullins et al., UOG 2020). During the same H1N1 pandemic, there were a number of reported outbreaks of H1N1 in neonatal intensive care units including deaths at some UK centres (Zinna et al., Pediatrics 2016).

COVID-19 raises three main issues in relation to newborn babies and babies that receive neonatal or PICU care.

1. So far, the reported incidence in the neonatal population is low, but data in this group are limited. National surveillance is therefore essential to understand the incidence, presentation, treatment and outcomes of COVID-19 in babies, and determine whether infection of the baby occurs in pregnancy (vertical transmission) occurs.
2. COVID-19 appears to be highly transmissible within healthcare settings. Many babies that require neonatal or PICU care have chronic respiratory illness (e.g. chronic lung disease) or are highly vulnerable (e.g. extreme preterm infants). Therefore, infants on these units represent a high-risk population for severe COVID-19 and risk of death, and commonly used neonatal treatments such as non-invasive ventilation may increase transmission within units. There is also a potential risk of mildly symptomatic healthcare workers or parents transmitting COVID-19 to babies in their care.
3. In cases where there is no vertical transmission of SARS-CoV-2, COVID-19 infection in pregnancy may affect the baby indirectly, for example through preterm birth where there is a higher risk for pregnant women with a fever. Data describing such indirect impacts of COVID-19 in pregnancy are limited to date.

Coverage

United Kingdom and Northern Ireland (Excluding Republic of Ireland)

Duration

March 2020 to March 2021 (13-months of surveillance) with a 6-month follow-up.

Research Questions

1. What is the incidence of neonatal COVID-19?
2. What is the clinical presentation of neonatal COVID-19?
3. What clinical treatments are being used for neonatal COVID-19?
4. What is the incidence of nosocomial spread of neonatal COVID-19?
5. What are characteristics of infants with nosocomially acquired neonatal COVID-19?
6. What is the outcome of neonatal COVID-19?
7. What is the rate of reported vertical transmission of COVID-19?
8. What are the secondary neonatal impacts (outcomes of maternal medical or obstetric management or neonatal management in the context of staff protection) of maternal COVID-19 infection (in addition to vertical transmission)?

Case definition

Any baby or infant:

1. That has a diagnosis of COVID-19 made on a sample taken before 29 days of age and receives inpatient care for COVID-19 (this includes postnatal ward, neonatal unit, paediatric inpatient wards, PICU)

   OR

2. Where the mother had confirmed COVID-19 at the time of birth or suspected COVID-19 at the time of birth that has subsequently been confirmed, and the baby was admitted for neonatal care (on a neonatal unit)

Reporting instructions

Please report any neonate that meets the case definitions for Neonatal Complications of Coronavirus Disease (COVID-19)

Methods

Each paediatrician reporting a child who meets the above case definition of neonatal complications of coronavirus disease (COVID-19) will be sent a clinical questionnaire by the study team.

Throughout the study, all patient data will be dealt with in strict confidence, and the families of affected infants will not be contacted directly by the study team at any stage.

Ethics approval

This study has been approved by North East –Newcastle & North Tyneside 2 Research Ethics Committee Research Ethics Committee (reference: 20/NE/0107); HRA Confidentiality Advisory Group (reference: 20/CAG/0058);the Public Benefit and Privacy Panel for Health and Social Care (reference: 2021-0001 (aka 1920-0288)); and the Public Health Agency and the Privacy Advisory Committee in Northern Ireland.

Support groups

Bliss (https://www.bliss.org.uk/).

Sands: Stillbirth and neonatal death charity (https://www.sands.org.uk/)

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