Approved by Quality & Patient Safety Committee
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COVID-19 – MANAGEMENT OF SYMPTOMATIC NEWBORN INFANTS

*This Local Operating Procedure is developed to guide safe clinical practice in Newborn Care Centre (NCC) at The Royal Hospital for Women. Individual patient circumstances may mean that practice diverges from this Local Operating Procedure. It is **interim advice, and subject to change**.*

1. AIM

- To guide safe and appropriate management of newborn infants with suspected/confirmed COVID-19 in the NCC

2. PATIENT

- Symptomatic newborn infants with suspected/confirmed COVID-19

3. STAFF

- Medical and nursing staff

4. CLINICAL PRACTICE

NOTE:
The principles of respiratory management of neonates are not changed by the presence of COVID-19. Careful adaptation and application is required to maintain patient safety and healthcare worker safety with appropriate personal protective equipment (PPE).

Newborn infants born to women with COVID-19 are unlikely to be symptomatic at birth. The need for resuscitation (including intubation at birth) is more likely to be unrelated to COVID-19.

Precautions for staff

- Use contact and droplet precautions.
- Add airborne precautions when performing aerosol generating procedures (AGP) or in circumstances where staff feel that there is increased risk of aerosol exposure due to various patient and environmental factors (e.g. an infant with excessive secretions nursed in an open cot).
- AGPs include:
  - Endotracheal intubation and extubation
  - Open airway/nasopharyngeal/oropharyngeal suctioning
  - Opening a ventilator circuit for bag and mask or Neopuff ventilation
  - Non-invasive ventilation (CPAP or BiPAP)
  - High flow nasal cannula therapy
  - Mechanical ventilation through an uncuffed endotracheal tube
  - Nasopharyngeal swab/aspirate collection
  - Surfactant administration and nebulised medicines
    NB. Insertion of a gastric tube is not typically considered an AGP but staff may choose to adopt airborne precautions

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Management

General

- Keep the infant in isolation/single room where possible.
- Infants should be cohorted and isolated where single rooms are not available.
- Infant should be cared for in closed incubator.
- When incubator is not suitable (e.g. hyperthermia), infant can be nursed in an open cot, with a distance of 2 metres between cots.
- Perform sepsis work-up including FBC, CRP, blood cultures, blood gas, lactate, CXR, UEC. Add coagulation profile, CSF and liver function tests as appropriate.
- Perform combined nose/throat swab testing. Repeat testing in 24 hours if negative swab but ongoing clinical suspicion.
- If RT-PCR positive – perform D-Dimer, coagulation profile, fibrinogen, troponin-T.
- Administer empiric antibiotics promptly. **Empiric therapy should be de-escalated once the bacterial sepsis is no longer considered a possibility.**
- Closely monitor for any deterioration and respond immediately.

Respiratory support

- Provide appropriate support avoiding unnecessary aerosol generating interventions.
- Tachypnoea without increased work of breathing – consider less aerosol generating low flow nasal cannula oxygen.
- Commence CPAP promptly for any worsening respiratory distress.
- Ventilator CPAP is preferred over bubble CPAP (Draeger VN500 is used in our NCC). Attach the viral filter to the exhaust vent of Draeger VN500.
  NB. We do not use humidified high flow nasal cannula (HHFNC) as the initial respiratory support in our NCC.
- Administer surfactant as per regular indication.
- Watch closely for any worsening clinical condition.
- Intubation and mechanical ventilation – There is no change in the way intubation and airway access is managed in COVID-19 scenario except:
  - Consider elective mechanical ventilation in a controlled environment to minimise the viral exposure to staff
  - The most experienced NCC team member (consultant/fellow/trainee with advanced neonatal life support) should intubate
  - Keep the number of staff in the room to a minimum – proceduralist, RN and one other assistance (RN or doctor)
  - Prepare drugs including atropine in smaller infants to aid in the management of hypoxia induced bradycardia
  - If the infant is already receiving CPAP, continue CPAP for preoxygenation until intubation
  - Low flow nasal oxygen (<1 L/min) may be used alternatively for preoxygenation
  - ETT (for preterm infants any time and any infant requiring intubation at birth) – use the appropriate sized uncuffed ETT as per usual practice.
    - Rationale: (1) NCC teams are familiar with uncuffed ETT and it is best to use the familiar procedures in emergency; (2) Infants at birth are unlikely to be infectious through respiratory droplets and the requirement for intubation is more likely to be unrelated to COVID-19; (3) Staff are wearing appropriate PPE for AGPs
    - There is an option of using microcuffed ETT in bigger neonates, particularly neonates readmitted with COVID-19 pneumonia
- Provide further respiratory support (e.g. high frequency ventilation [HFOV], inhaled nitric oxide [iNO] therapy) as per clinical need.

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Mechanical ventilator filters

- In our NCC, we have 2 mechanical ventilators:
  - Draeger VN500 ventilator – has a bacterial in-built inspiratory and expiratory filter (within the machine). An external viral filter (Carefusion Airlife 303EU Bacterial/Viral filter) can be connected to the exhaust hose (Figure 1).
  - Macquet Servo-N ventilator –has an in-built viral filter on the expiratory limb with a filtration efficiency against microbes and viruses as small as 0.02 microns.

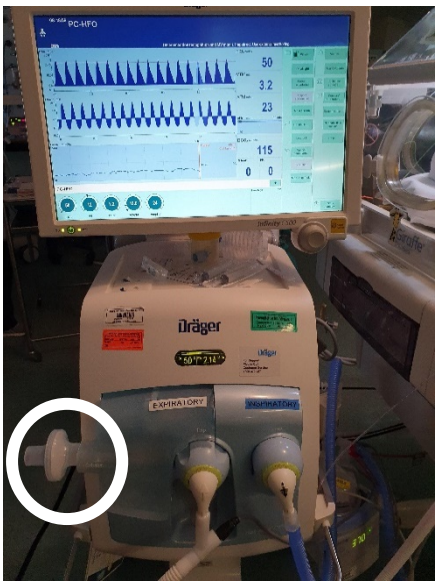

Figure 1. Draeger VN500 ventilator. An external viral filter can be connected to the exhaust hose (circled).

Fluid status and supportive therapy

- Monitor fluid status.
- Breastfeeding is to be supported as tolerated.
- Other supportive therapy including haemodynamic support should continue as usual and should not be influenced by COVID-19 status.

Antiviral therapy

- Discuss with paediatric infectious diseases physician about the need for remdesivir.
- Dose: IV loading dose of 5 mg/kg followed by 2.5 mg/kg daily for up to 10 days.[1,2]

De-isolation criteria

- De-isolation to general care can be considered after 24-48 hours of illness if the following two criteria are BOTH met:
  - Two consecutive negative swabs 24 hours apart
  - Consultation and approval from paediatric infectious diseases physician

Discharge

- ALL three criteria are to be met:
  - Resolution of acute illness for at least 48 hours
  - Two consecutive negative swabs at least 24 hours apart
  - Consultation and approval from paediatric infectious diseases physician

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Post discharge

- Follow the advice of the paediatric infectious diseases physician regarding ongoing quarantine and isolation at home.
- Arrange GP/paediatrician follow up as required.

5. EDUCATIONAL NOTES

- Coronaviruses are minute in size (65–125 nm in diameter) and contain a single-stranded RNA as a nucleic material.[3]
- Potential source of infection in newborn infants: (1) Vertical transmission from COVID-positive mother in the first 14 days of life – unclear at the moment; (2) Horizontal transmission through household cases or through community; (3) Nosocomial infection as a ward cluster.
- In Australia, as of now, community transmission is extremely low. However, once community transmission is established, COVID-19 screening is to be considered as part of sepsis screening in an unwell neonate.
- Although the patient may be suspected to have COVID-19, empiric antibiotic therapy for bacterial sepsis should not be delayed.
- Published reports so far suggest children have experienced lower-than-expected rates of COVID-19 and deaths in children appear to be rare. In more than 72,000 total cases from China, 1.2% were in patients aged 10 to 19 years and even fewer (0.9%) were in patients younger than 10 years.[4] In a separate analysis of 2,143 confirmed and suspected paediatric cases from China, infants were at the highest risk of severe disease (10.6%), compared with older children (4.1% for those aged 11 to 15 years; 3.0% in those 16 years and older).[5]
- Similarly, current published data suggest that neonates with COVID-19 pneumonia generally display mild symptoms. However, recent US media reported death of a 6 week old infant. (https://www.cbsnews.com/news/six-week-old-baby-dies-coronavirus-believed-to-be-youngest-fatality/).
- Clinical features: there are no distinguishing clinical features of COVID-19 and symptoms overlap with other acute respiratory infections.[6]
- WHO has provided definitions for adults and children. To date, there are only a few case reports of neonates with serious illness.
- Given the lack of data from neonatal populations, we have extrapolated the disease spectrum noted in adult and children to the following categorization to newborn infants:
  - Mild illness: Non-specific symptoms such as fever, cough, nasal congestion (rarely, diarrhoea and vomiting)
  - Mild pneumonia: Tachypnoea ≥60/min and no other signs of severe pneumonia
  - Moderate-severe pneumonia: Grunting, intercostal and subcostal recessions, inability to feed, opacities on chest x-ray
  - Septic shock: Hypotension, altered mental status, tachycardia (>160 bpm), bradycardia (<90 bpm), prolonged capillary refill (>2 sec), feeble pulse, mottled or cool skin, petechial or purpuric rash, increased lactate, oliguria, hyperthermia or hypothermia, disseminated intravascular coagulation, hyperbilirubinaemia
- HHFNC is not recommended as the initial therapy due to: (1) lack of efficacy and (2) concerns about higher risk of viral spread through aerosol.
- There is strong evidence supporting the use of iNO in term and near-term newborn infants with hypoxic respiratory failure [LOE I, GOR A].[7] COVID-19 status should not influence management of hypoxic respiratory failure.
- There is strong evidence supporting the use of surfactant in a range of neonatal conditions where surfactant deficiency or inactivation are implicated in the disease pathogenesis [LOE I, GOR A].[8,9] Based on these other conditions, we have recommended that surfactant should be considered in cases where surfactant deficiency or inactivation is suspected.
- There are case reports of IV remdesivir in neonates with severe SARS-COV-2 infection [LOE V, GOR D].[1,2]

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6. RELATED POLICIES/PROCEDURES/CLINICAL PRACTICE LOP

- Royal Hospital for Women Medical LOP – COVID-19 – Newborn Infants Born to Women with Suspected or Confirmed COVID-19
- Royal Hospital for Women Nursing LOP – COVID-19 – Collection of upper respiratory swabs for testing for SARS-COV-2
- Royal Hospital for Women Factsheet – COVID-19 Parent information

7. RISK RATING

- High

8. NATIONAL STANDARD

- Standard 1 Clinical Governance for Safety and quality in Health Service Organisation
- Standard 3 Preventing and Controlling Healthcare-Associated Infection
- Standard 5 Comprehensive Care
- Standard 8 Recognising and Responding to Acute Deterioration

9. ABBREVIATIONS AND DEFINITIONS OF TERMS

COVID-19	Coronavirus Disease 2019	CSF	Cerebrospinal Fluid
NCC	Newborn Care Centre	RT-PCR	Reverse Transcriptase Polymerase Chain Reaction
PPE	Personal Protective Equipment	HHFNC	Humidified High Flow Nasal Cannula
AGP	Aerosol Generating Procedure	RN	Registered Nurse
CPAP	Continuous Positive Airway Pressure	ETT	Endotracheal Tube
BiPAP	Bi-level Positive Airway Pressure	HFOV	High Frequency Oscillatory Ventilation
FBC	Full Blood Count	iNO	Inhaled Nitric Oxide
CRP	C-Reactive Protein	GP	General Practitioner
CXR	Chest X-Ray	WHO	World Health Organisation
UEC	Urea, Electrolytes, Creatinine	SARS-COV-2	Severe Acute Respiratory Syndrome Coronavirus 2

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11. AUTHOR

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