## Less Than 27 Weeks Gestation

### Antenatal admission of woman with suspected or confirmed COVID-19 **<27 weeks gestation**
- Neonatal team to be informed at time of admission
- Senior neonatal team to meet and begin preparations including:
  - Identification and allocation of staff roles
  - Location of mother
  - Route for transfer of infant
  - Intended admission location for infant

### Delivery, resuscitation and stabilisation
- **Designated consultant and senior nurse to attend delivery**
- Attend delivery area and don appropriate PPE, in designated donning area
- Only when delivery is anticipated, enter delivery area and prepare resuscitaire and essential equipment
- Delayed cord clamping should be considered as per unit protocol
- Infant should be moved directly to resuscitaire once cord cut
- Resuscitate and stabilise as per NLS algorithm
- An in-line micro HME filter should be used with all respiratory support

### Maternal suspected or confirmed COVID-19: **mother asymptomatic** or **only mildly symptomatic**
- Infant may be initially shown to parents but social distancing should be observed
- Once infant stabilised, if the mother is able to apply a surgical face mask and gel hands, she may have contact with her infant if desired and/or feasible, prior to transfer to NICU

### Maternal suspected or confirmed COVID-19, **mother symptomatic** and/or **acutely unwell**
- Infant may be shown to parents but social distancing should be observed throughout
Transfer to NICU

- Once the infant has been stabilised, NICU should be informed of the pending admission
- Transfer to NICU should be via the agreed route only
- Additional 'clean' helpers should be available to clear corridors, and open doors etc
- Only the 'middle lift' should be used for transport between floors
- Infants <27 weeks gestation should be transferred using a resuscitate

Admission to NICU

- Admit to designated cohort area within NICU
- Give a clear handover to the receiving team before transferring the infant to the incubator
- The transport resuscitate should be moved to the designated doffing area to have an initial clean, before moving it to an area outwith the cohort area for further cleaning
- Staff should doff PPE in the designated area before exiting the cohort area

Inform NNNI

- The NNNI should be informed of all admissions of an infant born to a mother with suspected or confirmed COVID-19
- Consideration should be made to whether a Network Call should be scheduled
<table>
<thead>
<tr>
<th>Antenatal admission of woman with suspected or confirmed COVID-19 27 - 34+6 wks gestation</th>
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<tbody>
<tr>
<td>• Neonatal team to be informed at time of admission</td>
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<td>• Senior neonatal team to meet and begin preparations including:</td>
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<th>Delivery, resuscitation and stabilisation</th>
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<tr>
<td>• ST4+ and senior nurse to attend delivery unless infant considered 'high risk'</td>
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<tr>
<td>• Attend delivery area and don appropriate PPE, in designated donning area</td>
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<td>• Resuscitate and stabilise as per NLS protocols</td>
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<tr>
<td>• An in-line micro HME filter should be used with all respiratory support</td>
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<td>• All infants of this gestation will require admission</td>
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Transfer to NICU

- Once the infant has been stabilised, inform the NICU of the pending admission
- Transfer to NICU should be via the agreed route only
- Additional 'clean' helpers should be available to clear corridors, and open doors etc
- Only the 'middle lift' should be used for transport between floors
- Infants requiring respiratory support should be transported on a resuscitator. All other infants may be transported in an incubator

Admission to NICU

- Admit to designated cohort area within NICU
- Give a clear handover to the receiving team before transferring the infant to the incubator
- The transport resuscitator or incubator should be moved to the designated doffing area to have an initial clean, before moving it to an area outwith the cohort area for further cleaning
- Staff should doff PPE in the designated area before exiting the cohort area

Inform NNNI

- The NNNI should be informed of all admissions of an infant born to a mother with suspected or confirmed COVID-19
- Consideration should be made to whether a Network Call should be scheduled
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<tr>
<th>Greater Than or Equal to 35 Weeks Gestation</th>
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<tr>
<td><strong>Antenatal admission of woman with suspected or confirmed COVID-19 ≥ 35 weeks gestation</strong></td>
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<tr>
<td>• Neonatal team to be informed at time of admission</td>
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<td>• Senior neonatal team to meet and begin preparations including: identification and allocation of staff roles</td>
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<tr>
<td>• Location of patient</td>
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<tr>
<td>• Route for transfer of infant</td>
</tr>
<tr>
<td><strong>Attendance at delivery</strong></td>
</tr>
<tr>
<td>• Neonatal attendance at deliveries of infants ≥ 35 weeks should be requested as per current RMH policy</td>
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<tr>
<td>• Suspected or confirmed maternal COVID-19 status is NOT an indication in itself for neonatal attendance at birth</td>
</tr>
<tr>
<td><strong>Delivery, resuscitation and stabilisation</strong></td>
</tr>
<tr>
<td>• If neonatal attendance is required at delivery but the is infant considered 'low risk' - ST4+ to attend delivery</td>
</tr>
<tr>
<td>• If infant considered 'high risk' - consultant and senior nurse to attend and be present in room prior to delivery</td>
</tr>
<tr>
<td>• Attend delivery area and don appropriate PPE in designated donning area</td>
</tr>
<tr>
<td>• Wait outside delivery area and only enter room if newborn requires resuscitation (unless high risk). It is the responsibility of the midwifery team within the delivery area to have checked and prepared resuscitaire</td>
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<td>• Delayed cord clamping should be performed as per unit protocol</td>
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<td>• If required, resuscitate and stabilise as per NLS algorithm</td>
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<td><strong>Maternal suspected or confirmed COVID-19: mother asymptomatic or only mildly symptomatic</strong></td>
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<tr>
<td>• If infant well, every effort should be made to keep the infant and mother together postnataally</td>
</tr>
<tr>
<td>• Depending on maternal infection status and symptoms, there should be consideration of maternal use of a face mask when handling and feeding the infant while in hospital, with distancing measures observed at other times. Infant should be nursed in an incubator</td>
</tr>
<tr>
<td>• Discharge home should be facilitated as soon as feasible</td>
</tr>
<tr>
<td>• Family should be educated in hygiene and distancing measures to avoid viral spread</td>
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Maternal confirmed COVID-19: mother acutely unwell

- Infant to be isolated from mother at birth. If the infant is well it may remain within same room initially, within an incubator, until a suitable carer or care area can be identified (not NNU)
- Infant discharge with an alternative carer (clinically well and not self isolating) should be considered

Transfer to NICU

- If the infant requires admission, NICU should be urgently informed of the pending admission
- Transfer to NICU via the agreed route only
- Additional 'clean' helpers should be available to clear corridors, and open doors etc
- Only the 'middle lift' should be used for transport between floors
- Infants requiring respiratory support should be transported on a resuscitaire. All other infants may be transported in an incubator

Admission to NICU

- Admit to designated cohort area within NICU
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- Staff should doff PPE in the designated area before exiting the cohort area

Inform NNNI

- The NNNI should be informed of all admissions of an infant born to a mother with suspected / confirmed COVID-19
- Consideration should be made to whether a Network Call should be scheduled
Resuscitation Equipment

Newborn resuscitation should continue as per the standard NLS algorithm.

Although the vertical transmission of SARS-CoV-2 is considered possible, it remains to be definitively proven. It is assumed that, even if an infant was infected at birth, the viral load would be either very low or undetectable. This, in combination with the fact that infants’ lungs are not aerated at time birth and much lower tidal volumes are used compared to adults practice, means that newborn resuscitation, including AGPs, is considered to carry a low risk of infection.

However, we are advising a slight alteration to our standard equipment to further minimise risk of transmission to staff. This is the inclusion of an in-line heat and moisture exchanger (HME) micro filter during respiratory support. These filters should be used for both Neopuff/mask support and when intubated. The photos below demonstrate their position within the equipment. Although some recent work has indicated that tidal volumes and pressures delivered are not affected with the inclusion of a filter, both the weight and the potential dead space of the circuit may be increased and staff should be cognisant of this. Once the ETT position is confirmed with the Neostat and visible chest rise, there is an option to remove the Neostat from your circuit.
Transfer of a Newborn Infant to NNU

If a newborn requires admission to the NNU at birth, the Sister-in-charge should be informed as soon as this decision is made in order to allow time for preparation and staff allocation.

The infant will be admitted to the cohort area within the NNU.

There are specified transfer routes out of both delivery suite and theatres and these should be adhered to. Specifically, the potentially exposed team and infant should NOT use the back lift or enter the NNU through the NICU area.

Additional identified members of staff will travel before and behind the neonatal transfer team to ensure corridors are cleared and doors are open. They will remain at a distance of at least 2 metres from the team and will not assist in the transport itself.

From Delivery Suite (Rooms 19 – 16): Exit out of the back door of the link corridor (doffing area) onto the main hospital corridor. Travel to the middle lift and ascend to the 2nd floor. Enter the NNU cohort area via the side door.

From Theatre (ground floor): Exit out of Theatre 2 onto the main theatre corridor. Travel out through theatre reception into the main corridor and out onto the main hospital ground floor. Travel to the middle lift and ascent to the 2nd floor. Enter the NNU cohort area via the side door.

Walk through videos of each of these routes have been made and shared with the wider group.
Admission to NNU: Suspected Newborns

All preterm or term unwell infants of mothers with either suspected or confirmed COVID-19 will be admitted directly to the cohort area in the NNU (see below). Given the low likelihood that a newborn will be COVID-19 positive at birth, medical treatment and management should be mainly determined based on their pathology and clinical needs rather than being influenced by specific considerations around coronavirus.

All infants should be nursed in a closed incubator for the duration of their stay within the cohort area. This acts as a further layer of isolation.

COVID-19 Screening in Infants of Suspected or Confirmed Mothers

All infants of mothers who have a suspected or confirmed COVID-19 status, admitted to the NNU immediately following birth, require screening. It has been suggested that optimal testing for possible vertical transmission should include IgM / IgG analysis of cord blood at birth. This requires written parental consent but is not being undertaken in RMH until reliable IgM/IgG testing has been developed.

Current screening schedule for infants admitted at birth is:

- First set of swabs at admission
- Second set of swabs at 72hrs (day 3)
- Third set of swabs on day 5

Two dry swabs should be taken at each screen with one swab of the nasopharynx and one deep throat swab. This should make the patient gag to be effective. If the infant is ventilated, then secretions obtained by ET suction should be sent. The process for swabbing is outlined below with further Trust guidance available on the Hub:

- Label the universal container before entering the cohort area. A hazard warning label should be affixed to the container
- Do not take the paper request form into the cohort area. A hazard label should also be added to the form
- Take the nasopharyngeal and throat swabs as above
- Place both swabs into the same universal container
- Wipe outside of sample with Difficil-S or Actichlor Plus (1/1000ppm)
- Place into a leak proof bag and wipe outside with with Difficil-S or Actichlor Plus
- Ideally a buddy should meet you at door and hold open a second bag for you to place leak proof bag into
- Place the form into this bag too and seal
- A ‘COVID-19 biohazard’ label should be attached to the outside of the second bag
- The bag containing the samples must be hand transported to the lab by a porter. The pneumatic tube system must not be used
Infant of mothers with suspected or confirmed COVID-19, requiring admission to NNU from delivery suite or theatres

Admit to COVID-19 cohort area

Swab all infants at admission

Mother confirmed NEGATIVE

Infant may be moved out of cohort area immediately

Mother confirmed POSITIVE

Further swabs on day 3 and day 5 of life

Infant swabs remain NEGATIVE

ANTICIPATED respiratory symptoms

Respiratory symptoms resolve < 14 days

Infant may be moved out of cohort area once respiratory symptoms resolved

Must remain in incubator until at least day 14 of life unless discharged #

Respiratory symptoms persisting for 14 days

Infant may be moved out of cohort area after 14 days if respiratory symptoms remain typical of non COVID-19 pathology

UNANTICIPATED respiratory symptoms

Infant may be moved out of cohort area after symptoms RESOLVED and all 3 swabs NEGATIVE

Infant swab reported as POSITIVE

Infant may be moved out of cohort area once symptoms RESOLVED and all 3 swabs NEGATIVE

Infant may be moved out of cohort area after 14 days if respiratory symptoms remain typical of non COVID-19 pathology

Must remain in incubator until at least day 14 of life unless discharged #

NO respiratory symptoms

Infant may be moved out of cohort area once all 3 swabs negative

Must remain in incubator until at least day 14 of life unless discharged #

Discuss with ID

# Isolate at home until day 14
Transfer Out of the COVID-19 Cohort Area

The flow chart above also outlines timeframes for when the infant may be considered for transfer out of the cohort area.

If an infant is admitted to the cohort area due to maternal ‘suspected’ status, and maternal results are subsequently reported as negative, the infant may be moved out of the cohort area immediately. There is no need for a further period of isolation within an incubator, and normal neonatal care should continue.

For infants of mothers with confirmed COVID-19, the duration within the cohort area is mainly based on the presence and nature of their respiratory symptoms.

**No Respiratory Symptoms:** If the infant has been admitted for reasons other than respiratory support, and they have no respiratory symptoms, they may be transferred into the general clinical areas once all 3 sets of swabs are reported as negative. Examples would include late preterm infants who are admitted due to gestation and feeding support but require no respiratory support.

**Anticipated Respiratory Symptoms:** Anticipated respiratory symptoms are defined as clinical features in keeping with the diagnosed pathology. Examples would include respiratory distress and x-ray changes in keeping with surfactant deficiency in a 25 week preterm infant.

**Unanticipated Respiratory Symptoms:** Unanticipated respiratory symptoms are defined as clinical features that are outwith the expected clinical course for an infant of their gestation or pathology. An example would be a 36 week infant with no antenatal concerns who required intubation due to increased work of breathing and climbing oxygen requirements, with no acute pathology to account for this.

If an infant is able to be moved out of the cohort area, into either the general clinical areas within the NNU or the PNW, before 2 weeks of age they should remain within an incubator until day 14 of life regardless of weight etc.

Finally, if an infant is ready for discharge home prior to a full set of swab results being performed, they may be discharged home directly from the cohort area. No further swabs will be required. The family should be advised to self-isolate at home until the infant is 2 weeks of age.
Admission to NNU: PNW Infant

Whilst COVID-19 should be considered as a possible diagnosis in PNW infants who become unwell, it is anticipated that the majority of admissions will be more likely due to common pathologies such as hypoglycaemia or infants requiring lumbar puncture. Accordingly, the vast majority of these infants will be able to be admitted to the NNU as normal, rather than the COVID-19 cohort area.

It is expected that all cases will be discussed with the consultant on duty, regardless of symptoms. As shown in the flowchart below, an infant admitted from PNW with unanticipated respiratory symptoms, or whose mother is suspected or confirmed Covid, should be admitted directly to the COVID-19 cohort areas (Bay 3 or 4) initially. These infants should have swabs performed at admission with 2 more sets performed at 48hrly intervals.

In the situation where the mother has no suspicions of COVID-19 but her infant is swabbed, the mother must also be swabbed regardless of symptoms and is unable to visit the NNU until her results are confirmed negative.

If an infant is considered fit for discharge either back to the PNW or home, prior to completing a full set of screening swabs, they should be discharged and no further swabs are required. If an infant has been investigated for coronavirus, the family should self-isolate for 14 days after the onset of symptoms, regardless of swab results.

The flow chart below aims to represent the journey of a PNW admission. We have endeavoured to represent the range of reasons for PNW admissions and try and encompass the various clinical outcomes, but recognise the complexity of the chart as a result.
PNW infant requiring admission to NNU from PNW

Maternal Suspected or Confirmed COVID-19

Admit to COVID-19 cohort area regardless of symptoms

Swab infant at admission to cohort area

Mother confirmed POSITIVE

Infant will require 2 further swabs at 48hrly intervals

If NO concerning symptoms of COVID-19: May move out of cohort area once x3 swabs NEGATIVE

Must remain in incubator for 14 days after onset of symptoms unless discharged

If symptoms concerning of COVID-19 present: May move out of cohort area once symptoms RESOLVED and x3 swabs NEGATIVE

Must remain in incubator for 14 days after onset of symptoms unless discharged

Mother confirmed NEGATIVE

If NO concerning features of COVID-19: Infant requires 2 further sets of swabs at 48hrly intervals

If symptoms concerning of COVID-19 present: May move out of cohort area once x3 negative swabs, regardless of symptoms

Must remain in incubator for 14 days after onset of symptoms unless discharged

Infants may be moved out of cohort area once x3 swabs NEGATIVE
PNW infant requiring admission to NNU

No maternal COVID-19 concerns

Clinical symptoms / concerns of possible COVID-19

Admit to COVID-19 cohort area

Swab infant at admission to cohort area

Will require 2 further swabs at 48hrly intervals

Infants may be moved out of cohort area once x3 negative swabs, regardless of symptoms

Must remain in incubator for 14 days after onset of symptoms unless discharged

Swab mother

Mother unable to visit until swab confirmed NEGATIVE

No symptoms / concerns of possible COVID-19

Admit to ICU / HDU / SCBU as required

Do NOT swab

If at any point infant develops any symptoms in keeping with possible COVID-19, immediately transfer to the cohort area and swab

Nurse within incubator

Discharge back to PNW or home when able
COVID-19 Concerns in NNU Inpatient

Although strict general IPC protocols remain in place and visiting has been significantly restricted, our vulnerable patients within the NNU remain at theoretical risk of infection with COVID-19 from both parents and staff.

If an infant within the general NNU areas has an unexpected deterioration, COVID-19 should be considered as a differential diagnosis if they fit the ‘case definition’ as defined by Public Health England:

- They are an inpatient
  AND
- have either clinical or radiological evidence of pneumonia
  OR
- acute respiratory distress syndrome
  OR
- influenza like illness (fever ≥37.8°C and at least one of the following respiratory symptoms, which must be of acute onset: persistent cough (with or without sputum), hoarseness, nasal discharge or congestion, shortness of breath, sore throat, wheezing, sneezing

However, the RCPCH have also noted that “newborn infants may not show all the features of an influenza-like illness, particularly a fever, so clinicians should have a high index of suspicion in all infants admitted to NICU and monitor for signs of respiratory illness during the admission”.

It remains essential however to consider all other possible pathologies that are encountered within routine neonatal care and there should be a discussion with either the consultant on service or on-call before investigating or cohorting an infant from the general NNU area, for suspected COVID-19.

Below is a flowchart designed to aid with decision making around these infants.

Of note, we again advise that, if an infant is moved to the cohort area and screened for possible COVID-19, the mother should also be swabbed regardless of her symptoms. She will be unable to visit the NNU until her swab is confirmed negative.
Isolate at home until day 14 of symptom onset

- Neonatal inpatient, within general clinical area, who develops symptoms of possible COVID-19
  - Admit to COVID-19 cohort area
    - Swab Mother
    - Infant swab reported as POSITIVE
      - Discuss with ID
        - Infant swab reported as POSITIVE
          - Infant may be moved out of cohort area if respiratory symptoms resolved and 2 NEGATIVE swabs
          - Infant may be moved out of cohort area if respiratory symptoms persisting at 5 days post onset
          - Respiratory symptoms resolved within 5 days of onset
            - Infant swab reported as NEGATIVE
              - Infant may be moved out of cohort area
            - Respiratory symptoms persisting at 5 days post onset
              - Infant may be moved out of cohort area once 3 NEGATIVE swabs
                - Infant swab reported as NEGATIVE
                  - Mother unable to visit NNU
                - Infant swab reported as POSITIVE
                  - Discuss with ID