GUIDELINES ON MANAGEMENT OF CORONAVIRUS DISEASE 2019 (COVID-19) IN NEONATES

Updated March 2022

Introduction

The COVID-19 global pandemic, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has rapidly spread worldwide with substantial consequences for public health. At this time, there is limited data on the epidemiology of placental and perinatal SARS-CoV-2 infection, due to the lack of data, the limitations of diagnostic tests, and the lack of standardized definitions.

Emerging evidence suggests that it is considered possible, that SARS-CoV-2 can be transmitted to the neonate via intrapartum vertical transmission. However the incidence of vertical transmission is low. Majority of neonates born to mothers with COVID-19 are either uninfected or only exhibit mild symptoms at birth

While this route of transfer needs to be considered, neonates are at increased risk of COVID-19 in the postnatal period through close contact with infected mother, family member or caregivers via respiratory droplets transmission. This is the most likely mode of transmission. Hence, when caring for these neonates, droplet and contact precautions must be adhered to at all times and airborne precautions when performing aerosol generating procedures.

This guideline has been prepared taking into account the scientific data available as of March 1 2022. The guidance is subject to change with the acquisition of further knowledge about the COVID-19 pandemic, its perinatal transmission and clinical characteristics of cases of neonatal COVID-19 infection.

Each hospital is encouraged to tailor this guideline individually according to the availability of resources, hospital logistics, patient volume, potential risk of exposure to the neonate and health care workers (HCW) during the care of a neonate with suspected or confirmed COVID-19 infection.

1. Case Definition

1.1. Definition for neonate suspected of COVID-19 infection:

a. Neonates born to pregnant women who are suspected, probable or confirmed cases of COVID-19 infection. (Refer Annex 1: Case Definition of COVID-19). **b.** Neonates exposed after birth to those who are suspected, probable or confirmed cases of COVID-19 infection

All suspected neonates are under consideration in this guideline regardless of whether they are symptomatic or asymptomatic. (Refer Annex 1: Case Definition of COVID-19.)

1.2. Definition for neonate with confirmed COVID-19 infection:

A neonate with infection with COVID-19, irrespective of clinical signs or symptoms (Refer Annex 1: Case Definition of COVID-19)

2. Delivery Room Management of Neonates

2.1. Preparation prior to delivery

- **a.** Referral to the neonatal team prior to delivery
- b. If possible, resuscitation of the neonate should be conducted in adjacent room. If not feasible, the resuscitaire should be physically separated from the mother's delivery area by a distance of at least 2 meters. A curtain/physical barrier can be used between the two areas to minimize the risk of exposure to maternal aerosol. Intubation of the mother for a GA Caesarean section is a significant aerosol generating procedure (AGP)
- **c.** The number of HCW handling the resuscitation should be kept to a minimum to limit the staff exposure. Only essential and experienced HCW should be in the delivery area, with backup team available outside the room. Each hospital should make their own arrangements for designating staff
- **d.** Adequate time (at least 30 mins prior to delivery) should be given to the neonatal team to don personal protective equipment (PPE). PPE should be donned in an adjacent room/area before entering the delivery room
- e. Commonly used equipment for neonatal resuscitation should be readily available (e.g. kept in a disposable bag) to avoid taking the full resuscitation trolley into the delivery area unless required
- **f.** If additional equipment is required, this can be passed to the resuscitation team by the backup team outside the delivery area
- **g.** A designated resuscitaire, transport incubator and single use equipment (if available) should be used

h. Neonatal team to counsel parents regarding delivery and postnatal care management plans. This can be done via telephone rather than face to face

2.2. Resuscitation/Stabilization of the neonate at birth

- **a.** There is insufficient evidence to make recommendations on immediate skin to skin contact. If skin to skin contact Is considered, the mother should use a surgical face mask while holding the neonate
- b. Delayed cord clamping (DCC) can be performed as usual during delivery (Refer Annex 23a Guidelines on the management of COVID-19 in Obstetrics)
- **c.** Stabilization/resuscitation of the neonate should be according to Neonatal Resuscitation Program (NRP) Guidelines. Precautionary measures should be taken to minimize potential COVID-19 exposure
 - Initial steps:

Routine neonatal care and the initial steps of neonatal resuscitation are unlikely to be aerosol generating. These include drying, tactile stimulation, placement into a plastic bag or wrap, assessment of heart rate, placement of pulse oxymetry and ECG leads.

- <u>Suction</u>: Suction of the airway after the delivery should not be performed routinely for clear or meconium stained amniotic fluid. Suctioning is considered an AGP and is not indicated for uncomplicated deliveries
- Positive pressure ventilation:

Bag and mask/T piece and mask ventilation should be used as recommended by the NRP. A small viral/bacterial filter should be placed in between the self-inflating bag/T piece resuscitator device and the mask (Figure 1). It remains unclear if the use of a T-piece resuscitation device to provide CPAP/PPV via facemask could generate aerosols. *Note: The filter adds significant dead space and the smallest available filter should be used. Since there has been no reported cases of COVID-19 in neonates < 1000g, it may be reasonable not to use filters while applying bag and mask ventilation to these neonates. This is to avoid the possible risk of hypercapnia with subsequent intraventricular haemorrhage*

• Endotracheal intubation:

Endotracheal intubation should be by the most experienced person. If available, use a video laryngoscopy system to maintain some distance from the neonate's airway. An appropriately sized endotracheal tube (ET) should be used to avoid excessive leak

• Endotracheal medications:

Endotracheal instillation of medications, such as surfactant or epinephrine are AGPs. Intravenous delivery of epinephrine via a low lying umbilical venous catheter is the preferred route of administration during neonatal resuscitation

- **d.** Post stabilization, the neonate should be transferred into the transport incubator without undergoing any non-urgent neonatal care
- e. Transport the neonate via a passage of minimal exposure. Each hospital should develop a predefined route and elevator for transport to the ward. If the neonate is delivered in an undesignated hospital, the neonate should be transferred to the designated hospital from the delivery room. Transport team should be in appropriate PPE according to Annex 8: Guidelines on Infection Prevention and Control (IPC) Measures in Managing Person under Surveillance (PUS), Suspected, Probable or Confirmed Coronavirus Disease (COVID-19), COVID-19 Management Guidelines in Malaysia. If the team transporting the baby is the same as that attending the delivery, consider changing PPE before the transfer as the PPE used in the delivery area will be contaminated
- f. The equipment used should be disposed off based on universal recommendations following a biohazard decontamination protocol. If the equipment is reused, follow general protocol for disinfection and sterilization (Refer Policies and Procedures on Infection Prevention and Control, Ministry of Health Malaysia, 2019)

3. Post-Natal Care of the Neonate

- **a.** There is limited evidence to guide the postnatal care of neonates born to mothers who are suspected, probable, or confirmed COVID –19 in the third trimester of pregnancy
- **b.** Maternal COVID-19 infection is not itself an indication for the baby to be admitted to a neonatal unit
- **c.** Temporary separation of mother and newborn after birth may minimize the risk of postnatal infection from maternal respiratory secretions

- **d.** Mothers with suspected, or confirmed COVID-19 infection may room in with their newborns. Adequate precautions should be taken to minimize the risk of transmission from maternal respiratory secretions
- e. Whenever possible, the decision of whether a neonate should room in with the mother should be made on a case-by-case basis using shared decision making between the parents and the health care provider. Considerations in this decision should include:
 - The clinical condition of the mother
 - The gestational age and clinical condition of the neonate
 - COVID-19 testing results of mother (suspected, or confirmed), and maternal vaccination status
 - Individual hospital policy and hospital logistics
 - Parental preference and desire to breast feed
- f. Each hospital is encouraged to develop individual guidelines on this aspect of care.
- g. Place of care

i. Well neonates who do not require medical intervention born to COVID-19 mothers Category 1 and 2

- If neonate is well and does not require admission to a neonatal unit (as per local unit neonatal admission criteria), it is recommended that the neonate remain with mother in the postnatal ward
- Temporary separation of mother and neonate may be considered to prevent transmission of COVID-19 to the neonate
- If the mother is rooming in with her neonate, the following guidelines should be followed:
 - The neonate should be kept at least 2 meters (6 feet) from the mother unless she is providing direct care or breast feeding
 - Mother should be placed in a single room with no other patient and to practice hand hygiene before and after handling the neonate
 - Mother to wear surgical mask when providing hands on care or breastfeeding/feeding the neonate. Avoid touching and kissing the neonate's face
 - Mother to be educated on respiratory hygiene and cough etiquette such as to cough or sneeze into the elbow
 - Breast feeding should be allowed (Refer no. 7 Nutritional support)
 - o Mother to wash her hands and breast before feeding
 - Regular cleaning and disinfection of surfaces in the room

- Neonates to be monitored with observations as per routine standard newborn care. Maintain awareness of signs of COVID -19 infection i.e. fever, tachypnea
- Mothers with suspected or confirmed COVID-19 infection should not be considered as posing a potential risk of virus transmission to their neonates if they have met the following criteria
 - At least 7 10 days(depending on the mother's vaccination status) have passed since their symptoms first appeared (up to 20 days if they have more severe to critical illness or are severely immunocompromised), <u>AND</u>
 - At least 24 hours have passed since their last fever without the use of antipyretics, <u>AND</u>
 - Their other symptoms have improved
- ii. Separation of mother and neonate maybe necessary for :
 - COVID-19 mothers who are Category 3 to 5 or too unwell to care for the neonate
 - Neonates who are unwell or at higher risk of illness (e.g. preterm infants, infants with underlying medical conditions)
- h. General care of the neonates requiring admission to NICU or SCN
 - Negative pressure isolation room if available. If negative pressure isolation room is not available, admit to a single room and keep the doors closed. If a single room is not available, then cohort the neonate in a designated area away from other non-COVID patients. Each unit should develop an isolation plan Recommended PPE must be worn by all attending HCW when attending to the mother and caring for the neonate [Refer to Annex 8]
 - On arrival to the room, the neonate should be cleaned. and weighed in the room. Vitamin K and immunization should be given. There is no contraindication to immunization
 - Closed incubator should be used
 - Neonates of confirmed COVID-19 mothers must remain under COVID-19 precautions for a 7-day period despite negative tests unless the neonate is suitable for discharge
 - Soiled linen should be disposed of according to Annex 8
 - Terminal cleaning and disinfection of the room should be done following discharge of the neonate (Refer Annex 8)

4. Clinical Manifestations

4.1. Clinical Findings

- **a.** Neonates with COVID-19 infection are classified according to the presence or absence of apparent symptoms and signs
- **b.** Early onset neonatal COVID-19 infection is likely caused by perinatal transmission (intrapartum or more commonly immediately after birth). The onset of illness is within the first week of life (generally 2 and 7 days after birth). Most infected neonates have either asymptomatic or mild symptoms such as cough and rhinorrhoea
- **c.** Late onset neonatal COVID-19 infection. The onset of illness is beyond 5-7 after birth. Most neonates become symptomatic at home after discharge from hospital. Postnatal transmission by neonatal exposure to maternal respiratory secretions or exposure to infected household contacts probably plays a major role in late-onset neonatal COVID-19 infection
- d. Clinical findings, especially in premature infants, are non-specific
- **e.** Therefore, it is important to closely monitor vital signs, respiratory and gastrointestinal symptoms and signs. The signs may include:
 - Temperature instability: the temperature of an infected neonate may be elevated, depressed, or normal
 - Respiratory and cardiovascular signs may include nasal congestion, cough, tachypnea, grunting, nasal flaring, increased work of breathing (WOB), hypoxia, apnea, or tachycardia.
 - Gastrointestinal symptoms may include vomiting and diarrhea
 - Other findings may include poor feeding and lethargy
- f. Multisystem inflammatory syndrome in neonates (MIS-N) has rarely been reported

4.2. Laboratory findings

- a. Laboratory examinations may be non-specific
- **b.** Full blood count (FBC) may show normal or decreased leukocyte counts, or decreased lymphocyte counts

- **c.** Other findings include:
 - I. mild thrombocytopenia, and
 - II. elevated levels of creatine kinase, alkaline phosphatase, alanine aminotransferase, aspartate aminotransferase, and lactate dehydrogenase
- d. COVID-19 can be detected in the
 - Upper respiratory tract (URT; nasopharyngeal and oropharyngeal)
 - Lower respiratory tract (LRT; endotracheal aspirate, or bronchoalveolar lavage)
 - Blood
 - Stool

4.3. Radiography findings

- **a.** Chest radiograph or lung ultrasound is likely to show evidence of pneumonia.
- **b.** Abdominal radiograph may show the characteristic radiographic features of intestinal ileus.

4.4 Clinical Staging of Confirmed COVID-19 Case

Staging	
Category 1	Asymptomatic
Category 2	Symptomatic, No pneumonia
Category 3	Symptomatic, Pneumonia
Category 4	Symptomatic, Pneumonia, Requiring supplemental oxygen
Category 5	Critically ill with or without other organ failures

5. Guidelines for Management of Neonate with Suspected or Confirmed COVID-19 Infection

- Figure 1: Management of Asymptomatic Neonate Born to Mother with Suspected COVID-19 Infection
- Figure 2: Management of Symptomatic Neonate Born to Mother with Confirmed COVID-19 Infection
- Figure 3: Management of Late Onset Neonatal COVID-19 Infection
- Figure 4: Management of Symptomatic Neonate with Postnatal Close Contact of COVID-19 Case



Figure 1: Management of Asymptomatic Neonate Born to Mother with Suspected COVID 19 Infection



Figure 2: Management of Symptomatic Neonates Born to Mother with Confirmed COVID 19 Infection

Figure 3: Management of Late Onset Neonatal COVID-19 Infection







6. Neonatal Management: Respiratory Support

A major concern when applying any type of respiratory support to patients with suspected or confirmed COVID-19 infection is the generation of aerosol-containing particles that can spread the disease.

- **6.1.** For neonates born to mothers who are suspected, or confirmed COVID-19 infection
 - **a.** The need for respiratory support is less likely to be COVID-19 lung disease and more likely to be neonatal lung disease such as RDS, TTN, MAS, etc (low concentration of virus in respiratory secretions).
 - **b.** Consider nursing in negative pressure isolation room. If a negative pressure isolation room is not available, admit to a single room and keep the doors closed
 - c. Neonates should be cared for in an incubator.
 - **d.** Surfactant administration by intratracheal/ less invasive surfactant administration (LISA) or minimally invasive surfactant therapy (MIST) is considered aerosol generating procedure (AGP). Both the person carrying out the procedure and the assistant should use recommended PPE (including N95 mask/PAPR and face shield) according to Annex 8.
 - e. Intubation/extubation, non-invasive ventilation, mechanical ventilation, tracheal suctioning are AGPs. PPE should be used according to Annex 8.
 - f. Endotracheal intubation should be performed by a skilled person. If available, use a video laryngoscopy system to maintain some distance from the neonate's airway. An appropriately sized ET should be used to avoid excessive leak
 - **g.** Respiratory support as per neonatal unit guidelines should be used
 - **h.** Term infants with mild respiratory distress can be treated with nasal cannula oxygen less than 2L/min
 - **i.** If bag and mask is required, the use of self-inflating bag or T-piece resuscitator with bacterial/viral filter is recommended (Figure 1)

- j. Non-invasive ventilation
 - Use of non-invasive ventilation is acceptable as long as all protective measures are in place
 - Ensure careful fitting of the interface
 - If indicated, NIV should be delivered by ventilator or dual limb NIV. A viral/bacterial/HEPA filter should be placed on the expiratory limb
 - The viral /bacterial/HEPA filter cannot be placed on a single limb NIV
 - Use of bubble CPAP is not encouraged. If bubble CPAP has to be used, a viral or bacterial filter should be placed in the expiratory limb (before the water reservoir)
 - The bacterial/viral/HEPA filter should be replaced every 24 hours or earlier if soiled
 - Use single-use disposable tubing and disposable humidifier chamber
- k. Mechanical ventilation
 - There is no evidence to recommend any mode. Follow unit guidelines
 - Compulsory to use closed circuit (in line) suction catheter
 - Single-use dual heating ventilator tubing with disposable heated humidifier chamber should be used
 - HEPA/viral/bacterial filter should be placed on the expiratory limb of ventilator circuit as shown in Figure 2.
 - Filter should be changed every 24 hours or earlier if soiled
 - Avoid any disconnection from ventilator circuit
 - Sedation maybe considered according to unit guidelines
 - Cluster all nursing cares to minimise exposure/contact to patient
 - No routine respiratory physiotherapy



Figure 1: Self-inflating bag with bacterial / viral filter attached



Figure 2: HEPA filter at expiratory limb of ventilator circuit

- **6.2** For neonates admitted with acute respiratory tract infection after postnatal exposure to close contacts who are suspected, probable or confirmed COVID-19 infection (i.e. neonate is suspected to have COVID-19 infection)
 - **a.** The need for respiratory support is more likely to be due to COVID-19 pneumonia/lung disease (high concentration of virus in respiratory secretions)
 - **b.** Consider nursing in negative pressure isolation room if available. If negative pressure isolation room is not available, admit to single room and keep doors closed
 - c. Neonate should be cared for in an incubator
 - d. Respiratory support as per neonatal unit guidelines should be used
 - e. If mild, respiratory distress can be treated with nasal canula oxygen less than 2L/min
 - f. Early intubation and mechanical ventilation should be considered
 - **g.** Endotracheal intubation should be performed by a skilled person. If available, use a video laryngoscopy system to maintain some distance from the neonate's airway. An appropriately sized ET should be used to avoid excessive leak
 - Non-invasive ventilation (NIV) as first line may be considered as long as protective measures are in place
 - CPAP or bilevel CPAP is preferred to high flow nasal cannula (HFNC). No data are available for use of HFNC in neonates. NIV should be delivered by ventilator or dual limb NIV. A viral/bacterial/HEPA filter should be placed in the expiratory limb
 - If these measures are not available, then intubation and mechanical ventilation should be considered. For neonates on trial of NIV, close monitoring is essential, and escalation of therapy should not be delayed if there is no improvement within 30-60 minutes
 - h. Mechanical ventilation
 - There is no evidence to recommend any mode. Follow unit guidelines
 - Compulsory to use closed circuit (in line) suction catheter
 - Use single-use dual heating ventilator tubing

- For airway humidification, heat moisture exchange filters (HMEF) at the inspiratory limb is preferred to reduce aerosol contamination (Figure 3a and 3b). However, there is also no strong evidence for its use in neonates
- HMEF should be changed every 24 hours or earlier if soiled
- Heated humidification should be used once the neonate's COVID-19 swab is negative
- Place HEPA/viral/bacterial filters on the expiratory limb of ventilator circuit as shown in Figure 2 and Figure 3a. Filter should be changed every 24 hours or earlier if soiled
- Avoid any disconnection from ventilator circuit
- Sedation maybe considered according to unit guidelines
- Cluster all nursing cares to minimise exposure/contact to patient
- No routine respiratory physiotherapy



Inspiratory limb of ventilator circuit

Figure 3A:

Viral Filter at expiratory limb of ventilator circuit, before the ventilator exhalation valve No heated humidifier



Figure 3B: HMEF at inspiratory limb of ventilator circuit

Temperature probe used with heated humidifier is not required

7. Neonatal Management: Nutritional Support

- **a.** There is no current compelling evidence suggesting that SARS-CoV-2 can be transmitted from an infected mother to her neonate via breast milk. However, droplet transmission could occur through close contact during breast feeding
- **b.** A shared decision between healthcare provider and mother before delivery regarding the potential risks and benefits of breast feeding is necessary to choose optimal nutrition for these infants. The risk of holding the baby in close proximity where the mother maybe infected, should be discussed with the parents
- **c.** Depending upon the availability of resources, equipment, patient volume, potential risk of exposure to the HCWs and parents understanding of the potential risk of exposure to the baby, three feeding options are recommended
- **d.** Each hospital should develop individual guideline on feeding options and the safe use, expression, transportation, handling, storage and administration of expressed breast milk to reduce risk of exposure to HCW
- **e.** The feeding options are:

i. Breast feeding

- Parents should understand that the risk of transmission with this approach is uncertain but possible. Breast feeding can be allowed for a well neonate rooming in with a Category 1 or 2 COVID-19 positive mother. The mother should take all possible precautions to avoid spreading the virus to her baby, including
 - Mother to practise meticulous breast and hand hygiene with soap and water before breast feeding
 - Mother to wear a surgical mask when breastfeeding the baby.
 - Educate mother to avoid coughing or sneezing on the baby while breast feeding

ii. Feeding expressed breastmilk (EBM) by a HCW

• This feeding option maybe considered if parents and health care providers prefer to limit risk of transmission. Feeding EBM by HCW is allowed for neonates rooming in with an asymptomatic mother or neonates isolated and separated from mother

iii. Feeding infant formula

• This option is for neonates whose mothers are unwell to breastfeed or to express breast milk and for mothers who have chosen formula to feed the baby

f. Guidelines for expressing, handling and transporting breast milk:

- Clean the surface where the collection containers will be placed before and after pumping
- Prior to expressing breast milk, the mother should practise meticulous hand hygiene with soap and water and wash her breast with soap and water
- The mother should wear a surgical mask when expressing and handling expressed breast milk
- The mother can express her breast milk either by hand or by using a breast pump
- Ensure all containers containing EBM are not externally contaminated by wiping the outside of the container/bottles with alcohol/sanitizing wipe
- HCW assisting the mothers during expression of breast milk should wear appropriate PPE according to MOH guidelines
- HCW handling and transporting the EBM to the baby should wear appropriate PPE according to MOH guidelines
- A dedicated breast pump should be used
- After each pumping session, ALL breast pump parts should be thoroughly washed, and the entire pump should be appropriately disinfected per the manufacturer's instructions
- EBM of these mothers should not be stored together with EBM from noninfected mothers
- However, it should be noted that the precautions, as described above, for reducing potential transmission of COVID-19, has not been formally studied

8. Discharge Planning and Post Discharge Care of Neonate with Confirmed or Suspected COVID- 19 Infection

There is limited evidence for post discharge management of neonates born to mothers with confirmed COVID-19 infection. Shared decision making with the parents regarding post discharge care is recommended. In the event that neither mother nor father are able to care for the neonate due to illness, the neonate can be discharged to the care of a designated healthy (non-infected) caregiver. If the mother is well and still hospitalised, the neonate can be allowed rooming in with mother or transferred together the with mother to the Quarantine and Treatment Centres (PKRC). Variations in practice will be determined by each individual hospital.

a. Neonates born to confirmed COVID -19 mothers can be discharged when the neonates fulfil criteria for discharge. These neonates will be required to complete the Home surveillance under supervision and observation order (Refer Annex 2m: Guidelines on management of confirmed COVID-19 cases in primary care) and will need to complete 10 days starting from the day of birth

- **b.** For neonates with confirmed COVID-19 infection, parents/caregiver to continue home monitoring using Home Assessment Tool in MySejahtera questions for dependents (adult and children)]
- **c.** For neonates who are SARS-CoV-2 PCR negative and still need to complete the quarantine period for 10 days, parents/caregivers should continue monitoring using the neonatal home assessment tool (HAT) in Appendix 1
- **d.** Provide education to parents/caregivers regarding possible course of disease, danger signs and steps to minimize the risk of transmission during mother and baby interactions (e.g. hand hygiene, mask wearing)
- e. Prior to discharge ,weight check and assessment of jaundice should be done
- f. Prior to discharge , notify the district health office
- **g.** Each unit is encouraged to have local guidelines on outpatient follow-up and management of common neonatal problems such as neonatal jaundice. Coordination with the local health clinic is encouraged to ensure that the neonate attends the clinic at a specific and agreed time
- **h.** Parents should be advised to bring the baby to the hospital if they have any concerns that their baby is not well during home isolation
- i. Early discharge to home should be followed by close community follow up i.e. telephonic follow up by a designated healthcare worker
- j. Upon discharge from hospital, a discharge note should be provided
- **k.** For neonates with co-morbidities, an appointment for follow-up should be arranged at the nearest health facility and adequate supply of medications should be ensured until the next appointment.
- I. For neonates who are with COVID-19 mothers in Quarantine and Treatment Centres (PKRC)
 - **i.** If a mother is transferred out to PKRC, discharge of the neonate to the care of a healthy (non-infected) caregiver should be considered.
 - ii. Only neonates in Category 1 are allowed to be with the mother in PKRC
 - iii. A daily review by the on-site health care team may be required
 - iv. If the neonates develop neonatal related complications i.e. neonatal jaundice or signs suggestive of COVID -19 infection while being admitted in PKRC, discussion with the local Paediatric team should be made for admission to the nearest COVID -19 hospital

References:

- 1. COVID-19 Management Guidelines in Malaysia No 5/2020 http://www.moh.gov.my/index.php/pages/view/2019-ncov-wuhan-guidelines
- 2. Laishuan Wang, Yuan Shi et al. Chinese expert consensus on the perinatal and neonatal management for the prevention and control of the 2019 novel coronavirus infection (First edition) on behalf of the Working Committee on Perinatal and Neonatal management for the Prevention and Control of the 2019 Novel Coronavirus Infection. Ann Trans Med 2020;8(3):47
- **3.** Dunjin Chen, Huixia Yang, et al. Expert consensus for managing pregnant women and neonates born to mothers with suspected or confirmed novel coronavirus (COVID-19) infection. Int J Gynecol Obstet. 2020.
- 4. Practice Advisory: Novel Coronavirus 2019 (COVID-2019). 2020 <u>https://www.acog.org/clinical/</u> advisory/articles/2020/03/novel-coronavirus-2019.
- Interim Considerations for Infection Prevention and Control of Coronavirus Disease 2019 (COVID-19) in Inpatient Obstetric Healthcare Settings <u>https://www.cdc.gov/coronavirus/2019-ncov/hcp/inpatient-obstetric-healthcareguidance.html</u>
- 6. Care for breast feeding women. Interim guidance on breast feeding and breast milk feeds in the context of COVID-19 <u>https://www.cdc.gov/coronavirus/2019-ncov/hcp/care-breastfeeding-women.html</u>
- **7.** Royal College of Obstetricians and Gynaecologists. Coronavirus (COVID-19) Infection in pregnancy. Version 8 (2020)
- **8.** Royal College of Paediatrics and Child Health. COVID-19 guidance for neonatal settings (2020)
- **9.** Chen H, Guo J, Wang C, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet.* 2020;395(10226):809–815.
- **10.** Chen Y, Peng H, Wang L, Zhao Y, Zeng L, Gao H, et al. Infants born to mothers with a new coronavirus (COVID 19). Front Pediatr. 2020
- 11. Zeng L, Xia S, Yuan W, Yan K, Xiao F, Shao J, et al. Neonatal early onset infection with SARS-CoV-2 in 33 neonates born to mothers with COVID-19 in Wuhan, China. JAMA Pediatr. 2020
- **12.** Dong L, Tian J, He S, Zhu C, Wang J, Liu C, et al. Possible vertical transmission of SARS-COVID-2 from an infected mother to her newborn. JAMA 2020
- **13.** Kimberlin DW, Stagno S. Can SARS-CoV-2 infection be acquired in utero? More definitive evidence is needed. JAMA 2020
- 14. Martin CJ Kneyber, Alberto Medina, et al. Practice recommendations for the management of children with suspected or proven COVID-19 infections from the Paediatric Mechanical Ventilation Consensus Conference (PEMVECC) and the section Respiratory Failure from the European Society for Paediatric and Neonatal Intensive Care (ESPNIC). A consensus statement.
- **15.** Mimouni F, Lakshminrusimha S, et al. Perinatal aspects on the COVID-19 pandemic: a practical resource for perinatal- neonatal specialists. J of Perinatology 2020

- 16. Karen M Puopolo, David W Kimberlin. Initial guidance: Management of infants born to mothers with COVID -19. American Academy of Pediatrics Committee of Fetus And Newborn Section on Neonatal Perinatal Medicine and Committee on Infectious Disease (2020)
- **17.** Edelson DP et al. Interim Guidance for Basic and Advanced Life Support in Adults, Children, and Neonates with Suspected or Confirmed COVID-19. Circulation 2020
- 18. Davanzo R, Moro G, et al. Breast feeding and coronavirus disease 2019. Ad interim indications of the Italian Society of Neonatology endorsed by the Union of European Neonatal and Perinatal Societies. Matern Child Nutr 2020WHO. COVID-19 and breast feeding- Position paper (2020)
- 19. Trevisanuto D, Moschino L, et al. Neonatal Resuscitation Where the Mother Has a Suspected or Confirmed Novel Coronavirus (SARS-CoV-2) Infection: Suggestion for a Pragmatic Action Plan. Neonatology April 2020
- 20. Chandrasekharan P, Vento M, et al. Neonatal resuscitation and post resuscitation care of infants born to mother with suspected or confirmed SARS-CoV 2 infection. Am J of Perinatol. March 2020
- **21.** Shalish W, Lakshminrusimha S, at al. COVID-19 and neonatal respiratory care: Current evidence and practical approach. Am J Perinatol. 2020
- 22. Ashokka B, Loh MH, et al. Care of the pregnant woman with COVID-19 in labor and delivery: Anesthesia, emergency caesarean delivery, differential diagnosis in the acutely ill parturient, care of the newborn, and protection of the healthcare personnel. Am J Obstet Gynecol.2020
- **23.** J Madar, C Roehr, et al. European Resuscitation Council COVOD-19 Guidelines Section 5 Newborn Life Support
- 24. Trevisanuto D, et al.Coronavirus infection in neonates: A systemic review. Arch Dis Child Fetal Neonatal Ed September 2020
- 25. Harriel KL, Nolt Dawn, et al. Management of neonates after postpartum discharge and all children in the ambulatory setting during the coronavirus disease 2019 (COVID-19) pandemic. Curr Opin Paediatrics 2020 Aug
- **26.** Deepika Sankaran, Natasha Nakra, et al. Perinatal SARS-CoV-2 Infection and Neonatal COVID-19:A 2021 Update. Neoreviews Vol 22 No 5 May 2021
- 27. L. Ryan, Frans B Plotz, et al. Neonates and COVID-19: state of the art. Pediatric Research
- 28. Jeffrey M Perlman, Christine Salvatore. Coronavirus Disease 2019 Infection in Newborns. Clin Perinatol 49 (2022) 73-92
- **29.** British association of perinatal medicine . CoVID-19 pandemic frequently asked questions within neonatal services. Updated January 2022

APPENDIX 1: 'HOME ASSESSMENT TOOL' UNTUK NEONATE

(Disi oleh ibubapa/penjaga bayi)

Nama	
No. Kad Pengenalan Ibu/ MyKid	:
No. Telefon	: Bimbit: Rumah:
Alamat Rumah	:
Tarikh Pendedahan Terakhir Kepada Kes*	:

JADUAL PEMANTAUAN HARIAN BAYI

ARAHAN:

Bagi sebarang gejala yang dilaporkan oleh kontak, sila tandakan ($\sqrt{}$) pada ruang yang berkenaan.

Hari 1	Hari 2	Hari 3	Hari 4	Hari 5
Tarikh:	Tarikh:	Tarikh:	Tarikh:	Tarikh:
Gejala:	Gejala :	Gejala:	Gejala:	Gejala:
Demam ()	Demam()	Demam ()	Demam ()	Demam ()
Batuk ()	Batuk ()	Batuk ()	Batuk ()	Batuk ()
Selsema ()	Selsema ()	Selsema ()	Selsema ()	Selsema ()
Nafas Laju (Nafas Laju ()	Nafas Laju (Nafas Laju ()	Nafas Laju (
Kurang Menyusu ()	Kurang Menyusu ()	Kurang Menyusu ()	Kurang Menyusu ()	Kurang Menyusu ()
Kurang Aktif ()	Kurang Aktif ()	Kurang Aktif ()	Kurang Aktif ()	Kurang Aktif ()
Lesu()	Lesu ()	Lesu ()	Lesu()	Lesu()
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Hari 6	Hari 7	Hari 8	Hari 9	Hari 10
Tarikh:	Tarikh:	Tarikh:	Tarikh:	Tarikh:
Gejala:	Gejala:	Gejala:	Gejala:	Gejala:
Demam ()	Demam()	Demam ()	Demam ()	Demam()
Batuk ()	Batuk ()	Batuk ()	Batuk ()	Batuk ()
Selsema ()	Selsema ()	Selsema ()	Selsema ()	Selsema ()
Nafas Laju (Nafas Laju ()	Nafas Laju (Nafas Laju ()	Nafas Laju ()
Kurang Menyusu ()	Kurang Menyusu ()	Kurang Menyusu ()	Kurang Menyusu ()	Kurang Menyusu ()
Kurang Aktif ()	Kurang Aktif ()	Kurang Aktif ()	Kurang Aktif ()	Kurang Aktif ()
Lesu ()	Lesu ()	Lesu ()	Lesu ()	Lesu. ()
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