PERINATAL AND NEONATAL COVID MANAGEMENT PROTOCOL

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Dept of Health & Family Welfare
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INTRODUCTION

- The coronavirus disease 2019 pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has swept across the world like an indiscriminating wildfire
- Spreads via direct person to person contact through respiratory droplet
- As of this briefing India suffered about 20 million cases with 2 lakh deaths (*WHO Coronavirus Dashboard - https://covid19.who.int/*)
- Common symptoms include – Fever, Cough, Sore throat, breathlessness, headache, loss of smell, myalgia, chest pain, loss of appetite, loss of taste, diarrhoea, abdominal pain, fatigue, confusion while symptoms become more nonspecific as the age of the infected diminishes
- Contrary to previous notion that physiological immune system changes in the pregnancy does not render them more susceptible to severe infections, pregnant women or recently pregnant women who are older, overweight, and have pre-existing medical conditions such as hypertension and diabetes seem to have an increased risk of developing severe COVID-19 (*Zambrano LD, et al. Update: Characteristics of symptomatic women of reproductive age with laboratory-confirmed SARS-CoV-2 infection by pregnancy status: United States, January 22-October 3, 2020. MMWR Morb Mortal Wkly Rep. 2020;69(44):1641-1647*)
- Currently, there is no data suggesting an increased risk of miscarriage in relation to COVID-19. (2% vs 10% in normal population) Recent studies indicate very less neonatal infection within 48 hrs of delivery in COVID positive mothers
- Risk of vertical transmission is low. Transmission through breast milk is very rare. However placental infection can potentially affect the fetus. (*Baud D, et al. Second-trimester miscarriage in a pregnant woman with SARS-CoV-2 infection. JAMA. 2020;323(21):2198-2200) (Karimi-Zarchi M, et al. Vertical transmission of coronavirus disease 19 (COVID-19) from infected pregnant mothers to neonates: a review. Fetal PediatrPathol. 2020:1-5*)
- Risk of premature delivery in 12.6% (*Delahoy M et al., MMWR Morb Mortal Wkly Rep 2020, doi:10.15585/mmwr.mm6938e1*)
- As for mode of delivery, WHO advice is that caesarean sections should only be performed when medically justified.
- American College of Obstetricians and Gynecologists and the Society of Maternal-Fetal Medicine have issued statements suggesting that pregnant and lactating women should be given a choice to receive the vaccine after discussing individual risks. As of now avoid vaccines on pregnant women but offer vaccines to lactating women (Academy of Breastfeeding Medicine).

ANTENATAL CARE DURING COVID

- Pregnant women are advised to attend routine antenatal care, minimum at 12, 18-22 and 30-32 weeks of gestation, unless they meet current self-isolation criteria.
- Referral to antenatal ultrasound services for foetal growth surveillance is recommended after 14 days following the resolution of acute illness.
- In context of imminent preterm delivery: Antenatal steroid should be administered to mothers with threatened preterm labour (gestational age 24-34 weeks and including 34-36^{+6} weeks) (*RECOVERY Collaborative Group; Horby P, Lim WS, Emberson JR, et al. Dexamethasone in hospitalized patients with COVID-19: preliminary report [published online ahead of print July 17, 2020]. New Engl J Med.*)

INTRAPARTUM CARE

- There should be provision for separate labour room and OT for pregnant COVID-19 positive patient in labour with negative pressure system
- Neonatal resuscitation corner should be located at least 2 metres away from the delivery table.
- Labour to be managed as per standard obstetric practice.
- Delivery to be attended by minimum number of skilled persons taking full protection, additional personnel should wait outside the DR/OR and be given a cue to enter if needed
- Current guidelines by the GOI do not recommend use of Hydroxychloroquine, Chloroquine or antiviral drugs in pregnant women.
- WHO and CDC endorses deferring cord clamping and early skin-to-skin contact in neonates born to mothers with COVID-19.
- If a pregnant woman has significant COVID-19–related illness and requires invasive mechanical ventilation, delivery may need to be conducted in the intensive care unit setting. (*Hou L, Li M, Guo K, et al. First successful treatment of a COVID-19 pregnant woman with severe ARDS by combining early mechanical ventilation and ECMO. Heart Lung. 2021;50(1):33-36*)

POSTNATAL CARE

- Positive mothers after delivery and their healthy babies, without need for maternal critical care or neonatal care, should be kept together in the immediate postpartum period.
- A separate isolation room should be available for the infant while they remain a suspect for the disease
- An infected mother should wear a surgical mask, wash her hands and breasts with soap and water before feedings, and breastfeed the infant

- Between feedings, the infant's crib (or incubator) should be placed at least 6 feet from an infected mother's bed, preferably behind a physical barrier (such as a curtain). (avoid bedding in even if you have to room in) (*Chandrasekharan P, Vento M, Trevisanuto D, et al. Neonatal resuscitation and post resuscitation care of infants born to mothers with suspected or confirmed SARS-CoV-2 infection. Am J Perinatol. 2020;37(8):813-824*)
- At all stages best possible protective measures must be utilised to prevent postnatal spread

BREASTFEEDING

- Exclusively breastfeed for first 6 months. Initiate breastfeeding within 1 hour of birth. (*American Academy of Pediatrics. Breastfeeding guidance post hospital discharge for mothers or infants with suspected or confirmed SARS-Co V-2 infection*)
- Breast milk may be beneficial by providing protective antibodies against SARS-CoV-2 infection. (*Lackey KA, Pace RM, Williams JE, et al. SARS-CoV-2 and human milk: what is the evidence? Matern Child Nutr. 2020;16(4):e13032*)
- During temporary separation, mothers who intend to breastfeed should be encouraged to express their breast milk to establish and maintain milk supply, dedicated breast pumps will help, avoid sharing of pumps.
- This expressed breast milk should be fed to the new-born by a healthy caregiver.
- Hand hygiene and droplet protection mandatory before each feeding or other close contact with her new-born.
- KMC should be promoted, following precautions

RESUSCITATION & COVID

- If possible, resuscitation of neonate should be done in a separate adjacent room or if not feasible, the resuscitation warmer should be physically separated from the mother's delivery area by a distance of at least 2 meters.
- Minimum number of personnel should attend and wear a full set of PPE including N95 mask.
- Mother should perform hand hygiene and wear triple layer mask.
- Delayed cord clamping and skin-to-skin contact can be practiced.
- Neonatal resuscitation should follow standard guidelines, less aerosol generating procedures
- Transport to NICU if required, along a predetermined path in a closed incubator with minimal exposure to other personnel. The whole pathway to be sterilised after transport.

ISOLATION NICU

- An isolation NICU should be created, which should be as well equipped with gadgets and minimum adequate skilled staff

Criteria of admission to Isolation NICU / Isolation beds:

The isolation NICU is meant for the following babies:

- Unstable neonates of COVID-19 positive / suspect mothers from the Labor room
- Unstable COVID-19 positive babies
- Ensure that at least 1-meter distance separates the neonatal beds and adequate cross ventilation.
- Medical and Nursing staff should be separate from the regular NICU staff.

Personal Protective Equipment:

- Staff caring for suspected and confirmed COVID 19, should follow strict precaution measures
- Follow the protocol of Donning and Doffing

POSTNATAL WARD

- Postnatal ward health care workers should use Face mask, face shields or goggles and perform adequate hand hygiene before and after examining each baby.

NEONATAL COVID SYMPTOMS

- The immature immune system, passive transfer of maternal IgG antibodies, and lower ACE-2 expression may result in less inflammation, milder illness, and hastened recovery in infants and children compared to adults. (*Rawat M, Chandrasekharan P, Hicar MD, Lakshminrusimha S. COVID-19 in newborns and infants-low risk of severe disease: silver lining or dark cloud? Am J Perinatol. 2020;37(8):845-849*)
- Most infected neonates are either asymptomatic (20%) or have mild symptoms such as rhinorrhea and cough (40%–50%) and fever (15%–45%)
- Moderate to severe symptoms such as respiratory distress (12%–40%), poor feeding, lethargy, vomiting and diarrhea (30%), and clinical evidence of multi organ failure have been observed as well. (*Raschetti R, Vivanti AJ, Vauloup-Fellous C, Loi B, Benachi A, De Luca D. Synthesis and systematic review of reported neonatal SARS-CoV-2 infections. Nature Communications. 2020;11(1):1-10*)
- Laboratory evidence of COVID-19 infection in a neonate may include leukocytosis, lymphopenia, thrombocytopenia, and elevated inflammatory markers. (*Zeng L, Xia S, Yuan W, et al. Neonatal early-onset infection with SARS-CoV-2 in 33 neonates born to mothers with COVID-19 in Wuhan, China. JAMA Pediatrics. 2020;174(7):722-725*)

- Neonatal multi-system inflammatory syndrome (MIS-N) has been rarely reported (*Orlanski-Meyer E, Yogev D, Auerbach A, et al. multi-system inflammatory syndrome in children associated with SARS-CoV-2 in an 8-week old infant [published online ahead of print November 11, 2020]. J Pediatric Infect Dis Soc*)

RECOMMENDED TESTING FOR SARS- CoV-2

- Babies born to mother with COVID-19 infection within 14 days before birth
- H/o contact of baby with COVID-19 positive person (mother, family members, care givers, health care worker)

Swab Collection: Nasopharyngeal/ orophayngeal /nasal swab is collected, and send for SARSCoV-2 RNA RT-PCR.

- *If baby is stable*: viral testing of the baby to be done within 24 hrs of birth if:
  - If mother is positive
  - Baby is symptomatic
  - Baby exposed to COVID-19 positive person (caregiver/ family member)
- *If baby is sick*: first test should be done within 24 hours of birth
- If first test is negative a repeat test should be done 5-14 days after birth/exposure.
- However, the test should be done immediatelyif new symptoms (RD, lethargy, seizures, apnoea, refusal to feed, diarrhea appear)
- *Serological testing – not recommended*

SUPPORTIVE CARE

- Incubators are preferred over Radiant warmer for temperature regulation
- Fluid and Electrolyte management as per guidelines
- Use of antibiotic as per unit protocol
- Non-Covid pathogens to be ruled out simultaneously
- Monitoring: For the neonates admitted to NICU the following need to be monitored- HR, RR, SpO2, temperature, BP monitoring, sugar monitoring and monitor for GI symptoms (feed tolerance, abdominal distension, vomiting)

Respiratory support

- Respiratory support for neonates with suspected or confirmed COVID-19 should follow the principles of lung protective strategy.
- The neonates with respiratory distress must be supported with nasal (CPAP) & is preferred over HHFNC or nasal IMV in a negative pressure area. CPAP is less aerosol generating.
- Intubation must be considered based on usual clinical indications and the most experienced health care provider must step forward

- Inline suction device for suctioning and bacterial/viral filter fitted in the expiratory limb before the exhalation valve (ventilator) or water chamber (bubble CPAP) if feasible. (*Shalish W, Lakshminrusimha S, Manzoni P, Keszler M, Sant'Anna GM. COVID-19 and neonatal respiratory care: current evidence and practical approach. Am J Perinatol. 2020;37(8):780-791*)
- Video laryngoscopy should be performed (if available)

SPECIFIC THERAPY

- For neonates infected with COVID-19, management remains supportive and includes supplemental oxygen, respiratory support, fluid resuscitation, and temperature control.
- Currently, evidence for the use of antiviral medications and steroids in neonatal COVID-19 is lacking.
- Use of adjunctive therapy such as systemic corticosteroids, intravenous immunoglobulin and convalescent plasma is also not recommended in symptomatic newborns
- Use of micro nutrients such as Zinc, Vitamin A, C and D etc., having immunomodulation effect can be considered

LATE-ONSET NEONATAL COVID-19 INFECTION

- The majority of symptomatic SARS-CoV-2 infections in neonates are diagnosed beyond 5 to 7 days after birth
- Many affected neonates had negative initial RT-PCR test results (at 24 and 48 hours after birth) before initial discharge from the hospital and were readmitted with symptoms suggestive of COVID-19 (*Schwartz DA, Mohagheghi P, Beigi B, Zafaranloo N, Moshfegh F, Yazdani A. Spectrum of neonatal COVID-19 in Iran: 19 infants with SARS-CoV-2 perinatal infections with varying test results, clinical findings and outcomes. J Matern Fetal Neonatal Med. 2020:1-10*)
- Chest radiographs were abnormal, with nonspecific opacities in 56% and ground-glass changes in 28% (half of those were preterm) (*Gale C, Quigley MA, Placzek A, et al. Characteristics and outcomes of neonatal SARS-CoV-2 infection in the UK: a prospective national cohort study using active surveillance. Lancet Child Adolesc Health. 2020*)
- Age less than 1 month has been associated with a 3-fold higher risk of critical care admission

DISCHARGE POLICY

The following policy is suggested:

- *COVID-19 positive asymptomatic mother and COVID-19 positive well baby*: Discharge together for home isolation. It is not necessary to document a negative swab for the neonate.

- *COVID-19 positive symptomatic mother with COVID-19 positive or negative 'well' baby*: Discharge baby early (3-4 days) with competent care-taker. It is not necessary to document a negative swab for the neonate.

- *COVID-19 positive baby with symptoms*: Discharge after the baby is well. A repeat swab can be done between 10 -14 days if baby is still symptomatic.

On Discharge:

- Counselling and communication regarding the disease process is extremely essential
- Baby should be brought back to hospital in case of any 'red flag' signs /symptoms. (refusal to feed, decreased urine output, breathing difficulties, jaundice, convulsion, lethargy or any symptom which the mother or care taker perceives as abnormal)
- If mother requires prolonged admission, and baby is well, it is advisable to discharge the baby with a competent care taker, with advice regarding feeding & neonatal care.
- Encourage mothers to BREASTFEED only, with proper breastfeeding 'position' and 'attachment'.
- FEEDING BOTTLES and pacifiers should not be advised.

IMMUNIZATION POLICY

- All neonates need to be immunized as per national guidelines
- BCG, OPV-0 dose and Hepatitis B should be given before discharge

FOLLOW UP POLICY

- Once stable COVID-19 positive or negative babies are discharged, they should be followed at 2 weeks of age, or earlier, if the baby becomes sick.
- Rest followup is similar to the follow up policy of other NICU graduates
- Infected neonates with no or mild symptoms may possibly remain hypoxaemia for a variable period before becoming overtly symptomatic similar to what has been observed in infected adults. (*Dhont S, Derom E, Van Braeckel E, Depuydt P, Lambrecht BN. The pathophysiology of 'happy' hypoxaemia in COVID-19. Respir Res 2020;21(1):198*)
- Long-term follow-up of exposed neonates to assess the respiratory, cardiovascular, and neurodevelopmental outcomes is warranted. Furthermore, the psychosocial impact on future generations remains to be understood

INFECTION PREVENTION AND CONTROL (IPC) FOR COVID-19

General Precautions

- Follow all the steps of hand hygiene.
- Social distancing of minimum 1 meter should be maintained between the team members (doctors/nurses/support staff, mothers and patient attendants).
- Restrict patient attendants' entry inside the NICU.

DISINFECTION PROTOCOL

- Wear PPE before disinfecting. If equipment or surface is visibly soiled, first clean with soap & water.
- Floors, Chairs, Tables, Door handles, Telephone, Light switches, nursing station - Once every shift, 0.5 % sodium hypochlorite.
- Stethoscope, BP cuff, Thermometer, Injection tray - After every use, 70 % ethyl alcohol.
- Follow routine biomedical waste management guidelines.

VISITORS POLICY

Visitor's policy in COVID situation

- Mother or attendant with suspected or confirmed COVID 19 should not be allowed to neonatal care area.
- COVID-19 mother may be allowed to visit her neonate admitted in NICU if she fulfills all of these:

  - Resolution of fever without the use of antipyretics for at least 72 hours

  AND

  - Improvement (but not full resolution) in respiratory symptoms

  AND

  - Negative results of a molecular assay for detection of SARS-CoV-2 in case of severe disease

- For neonates roomed in with mother having suspected or confirmed COVID 19, allow one healthy attendant to assist her in baby care activities taking all precautions

If the mother is sick and cannot visit the baby due to her comorbidities:

- *Unstable baby* - Show the baby once daily and explain the prognosis using digital technology like video calls
- *Stable baby* - Allow symptom free single designated attendant less than 60 years
- Once neonate is stable, shift the baby to postnatal ward in order to restrict the entry of visitors.
- All visitors should be screened using a routine drill

ETHICAL PRINCIPLES FOR OPTIMUM CARE DURING THE COVID-19 PANDEMIC

- Ethics are central to the clinical care of COVID-19 patients as in case of non-Covid patients
- Clinical care involves using evidence based medicine to do what is best for infants.

REPORTING OF DEATH DURING COVID-19

- Use of emergency ICD codes as outlined in the International guidance for certification and coding of COVID-19 as cause of death.

DISPOSAL OF COVID-19 SUSPECTED OR CONFIRMED DEAD BODIES

- Health worker attending to the dead body should use PPE
- Any puncture holes or wounds (resulting from removal of catheter, drains, tubes, or otherwise) should be disinfected with 1% hypochlorite and dressed with impermeable material.
- Dead body to be placed in leak-proof plastic bag, outer side of which should be decontaminated with 1% hypochlorite.
- May be shown to willing family members at the time of removal from the isolation room or area, following standard precautions.
- All surfaces of the isolation area (floors, bed, railings, side tables, IV stand, etc.) should be cleaned with 1% Sodium Hypochlorite solution with a contact time of 30 minutes

TELEMEDICINE DURING COVID-19

- Telemedicine, which is also used synonymously with 'remote medical care' refers to providing clinical health care through electronic communication technologies, rather than through in-person meeting
- This will greatly reduce the risk of COVID 19 transmission