

Neonatal Management Pathway-Highlight of changes over time

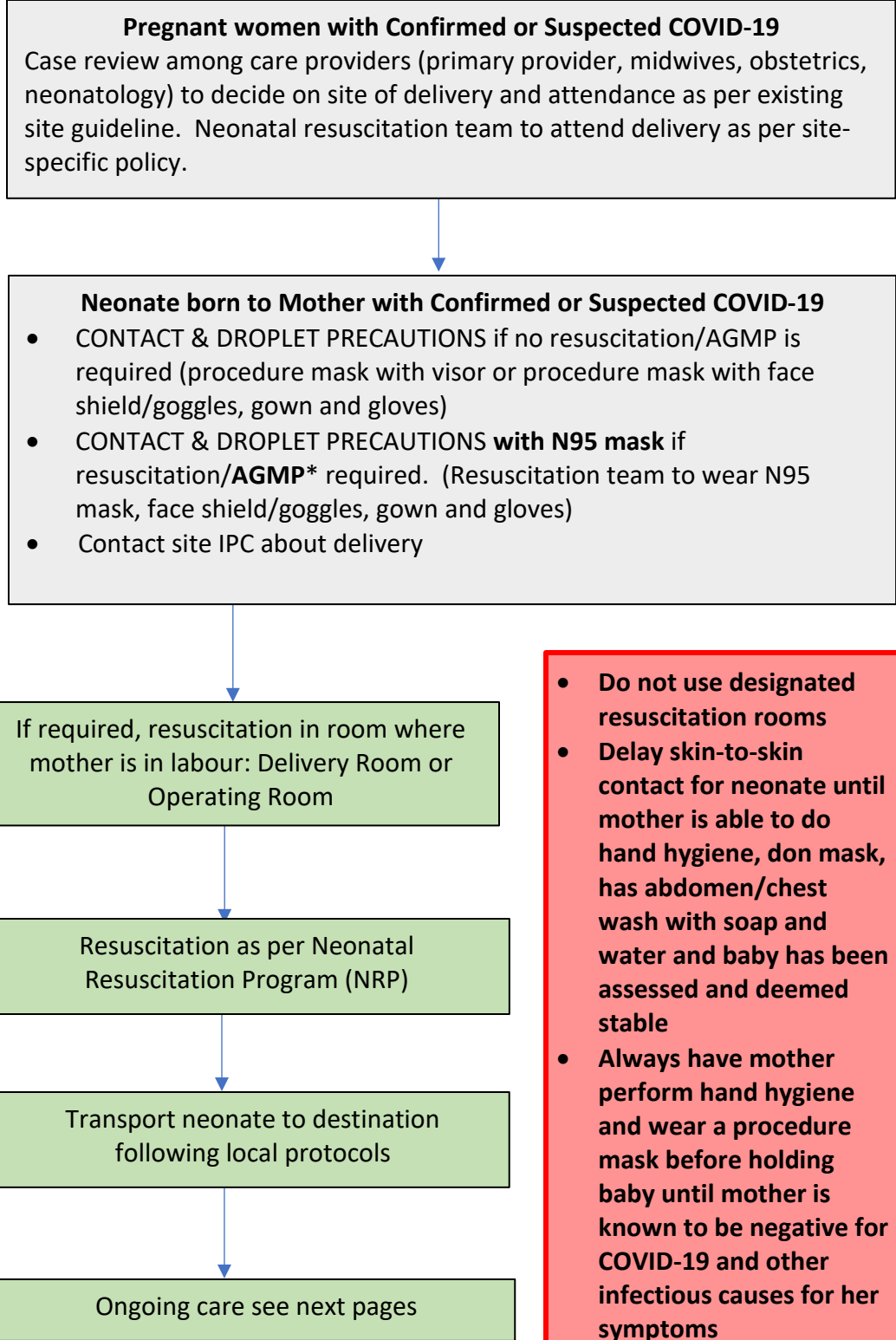
Date of document & version with changes	Change made as compared to previous	Rationale as applicable
July 2, 2020	Updated following IPC input and meeting to make consistent with AHS guidance	AHS visitor guidance and IPC patient screening information has been updated.
June 23, 2020	Updated for AHS visitor information update, number of visitors, screening processes and form updates, CMOH exemption, feeding updates, and clarifications	AHS visitor guidance and IPC patient screening information has been updated. CMOH exemption provided. Needs to align.
May 19, 2020 V.14	Updated visitor information for clarification	Feedback from IPC that there is some site variation in practice for asymptomatic mother/family exposed to COVID-19
May 19, 2020 V.14	Added a session in the appendix on rationale for current COVID testing algorithm	Provide background information on how a neonate can acquire SARS-CoV-2 infection, i.e., COVID-19
May 19, 2020 V.14	Change wording for pediatric consult: "Pediatric consult may be considered for the newborn of a COVID positive mother. This consult may be done by phone or virtually."	As there is zone/site variation in flow of care for these babies
May 14, 2020	Changed from plan for early discharge to: do not discharge baby prior to 24 hours. Added recommendation to consider consult Pediatrics Added option for COVID specimen collection by NP aspirate. Added links to PPE and AGMP and Discharge Planning and Community follow-up guides. Reformatted for improved clarity.	As little is known about impact of COVID-19 on newborn these babies require closer monitoring Links to provide rapid access to more detailed information for end-user
April 17, 2020	Nasopharyngeal or Throat swab may be used to test COVID in mother or baby	Both NP and Throat swabs are effective in detecting Coronavirus-19.
April 9, 20100	Continue N95 for neonatal resuscitation of baby from Positive COVID Mother or mother with ILI till further evidence collected.	<p>There is a lack of evidence to indicate the need for N95 in the immediate newborn resuscitation period. This in conjunction with logistics of quickly changing PPE for location changes, supports a "risk stratification" approach to NRP and the use of N95 masks. Example:</p> <ul style="list-style-type: none"> • Low risk delivery- in which there is a low risk of baby requiring intubation- attended by NICU/Baby RN as well as LDR nurse, the RT stays outside room unless needed and N95 readily available if needed • Moderate risk delivery- moderate risk of baby needing intubation- NICU/Baby nurse with N95, Physician and RT outside of room, N95 readily

		available <ul style="list-style-type: none"> High risk delivery- NRP team wears N95
April 9, 2020 V.11	Specify timing for specimen collection for COVID-19 testing in neonates born to suspect/confirmed COVID mothers	All neonates born to suspect/confirmed COVID-19 mothers get first nasopharyngeal swab collected within 24 hours after birth as close to before discharge as possible (trying to detect virus from baby instead of surface contamination during birth) <u>If the first swab is positive</u> , attempt will be made to collect a second swab to differentiate between surface contamination versus persistent viral shedding from infection of the neonate <u>If the first swab is negative</u> : <ul style="list-style-type: none"> Neonates that have been discharged home will only be tested if symptoms suspicious for COVID-19 infection develop Neonates who requires hospital admission since birth will be tested again on day 5 to rule out perinatal infection to assess need for contact and droplet precaution
April 9, 2020	Transport neonate to destination following local protocols	The baby is not considered infectious at this time and there are no special requirements for an isolette to transport between the LDR/OR and the postpartum/newborn area or NICU.
April 9, 2020	Addition of an appendix of rationale behind recommendations	

Delivery Room Neonatal Management for 2019 Novel Coronavirus Infection (COVID-19)

Key Messages

- **As of date, there is no clear evidence of transplacental/ intrauterine infection of fetus among pregnant women infected with COVID-19**
- Family/support persons to obstetrical care areas should follow [COVID-19 Essential Visitor and Designated Family/Support Guidance](#).
- A CMOH [exemption](#) to quarantine and isolation for obstetrical support persons has been provided in some situations.
- If resuscitation team is required for neonate(s), only essential personnel should attend the resuscitation. No learner should participate.
- Call site IPC if there are any questions.
- Provide additional emotional support for families of babies who test positive for COVID
- Support breastfeeding and handling of Expressed Breast Milk according to [feeding instructions](#)



- **Do not use designated resuscitation rooms**
- **Delay skin-to-skin contact for neonate until mother is able to do hand hygiene, don mask, has abdomen/chest wash with soap and water and baby has been assessed and deemed stable**
- **Always have mother perform hand hygiene and wear a procedure mask before holding baby until mother is known to be negative for COVID-19 and other infectious causes for her symptoms**

* [AHS Aerosol-Generating Medical Procedure \(AGMP\) Guidance Tool](#)

- Intubation or extubation
- Cardiopulmonary Resuscitation
- Respiratory supportive therapies including High Flow nasal cannula, CPAP, BiPAP, Non-Invasive Mechanical Ventilation (NIMV), High Frequency Oscillatory Ventilation (HFOV) and High frequency Jet Ventilation HFJV, nebulized therapy and open airway suctioning.

Note: NP swab or aspirate is NOT an AGMP

Neonatal Management for 2019 Novel Coronavirus Infection (COVID-19)

ASYMPTOMATIC NEONATE & MOTHER ABLE TO CARE FOR NEONATE

Neonate born to Mother with Confirmed or Suspected COVID-19 due to symptoms who is able to look after neonate

- CONTACT & DROPLET PRECAUTIONS if no resuscitation/AGMP is required (procedure mask with visor or procedure mask with face shield/goggles, gown and gloves)
- CONTACT & DROPLET PRECAUTIONS **with** N95 mask if resuscitation/AGMP* required. (Resuscitation team to wear N95 mask, face shield/goggles, gown and gloves)
- Contact site IPC about delivery

Neonate ASYMPTOMATIC will room-in with Mother who can look after neonate

- If Mother is suspect COVID-19, confirm NP/Throat swab is being tested for COVID-19
- Collect NP swab/aspilate or throat swab from neonate within **first 24 hours after birth and as close to before discharge as possible** (trying to detect virus from baby instead of surface contamination)

- Admit neonate to single patient room with mother at appropriate unit for the site, e.g., post-partum or NICU
- CONTACT & DROPLET PRECAUTIONS and contact site IPC
- Consider consult to pediatrics if mother is COVID-19, by phone/virtual care
- Monitor neonate for symptoms - Vital Signs every 4 hours
- Support breastfeeding following mother's hand and breast hygiene
- Family/Support Person(s) to follow [guidance on visitor requirements](#)
- Aim for 2 meter separation when mother not providing direct infant care

If mother's condition changes and unable to look after neonate
See page 3

If infant becomes **SYMPTOMATIC**
See page 4

Mother COVID-19 negative

- COVID-19 test NOT required for neonate
- If NP aspirate/swab obtained from neonate before mother's result was available, expect COVID-19 negative

If still in hospital:

- maintain Contact & Droplet precautions till other infectious causes of mother's symptom has been ruled out
- Contact IPC for plan
- Routine Newborn care & Discharge planning

If discharged prior to test results:

- MRHP/MOH to Communicate results to family

Mother COVID-19 positive

If still in hospital:

- Maintain contact & Droplet Precautions
- Do not discharge baby prior to 24 hours of age
- Consider virtual/phone pediatric consult
- Mother/Family positive for COVID-19 or have acute infectious symptoms cannot visit NICU. Consult with local IPC when there is a COVID-19 exposure, as defined by the [Essential Visitor Screening Questionnaire](#) prior to entering NICU.
- All maternal patients should be screened for new/changed symptoms using the [COVID-19 Symptom Identification and Monitoring tool](#), once every 12 hours. Tool N/A for neonates.
- Arrange for public health and clinician follow-up post-discharge – require close community follow-up
- See [Discharge Planning and Follow-up](#) guide

If discharged prior to test results:

- MRHP/MOH to communicate results to family and assess current conditions and confirm follow up instructions.

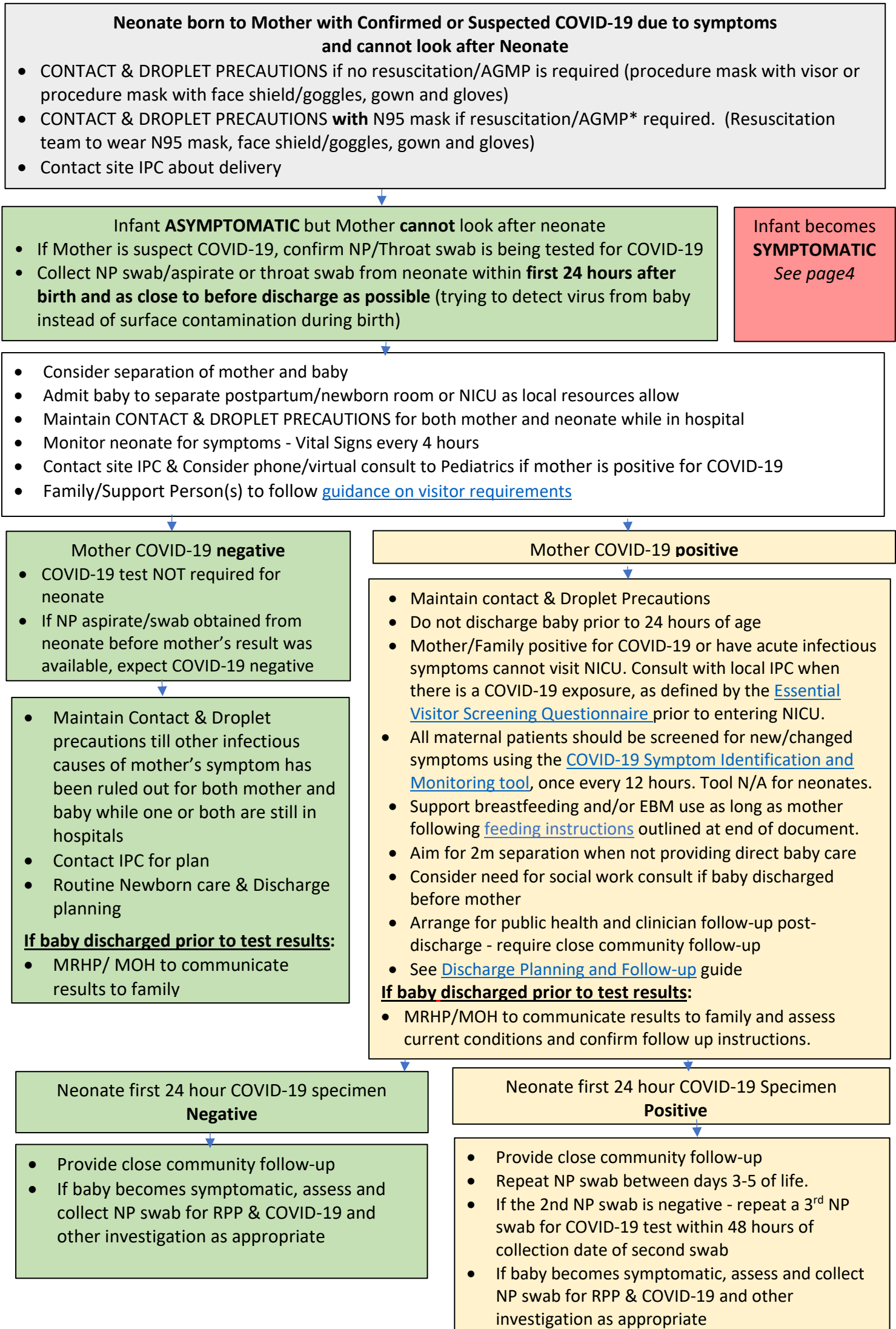
Neonate first 24 hour COVID-19 Specimen Negative

- Provide close community follow-up
- If baby becomes symptomatic, assess and collect NP swab/aspilate for RPP & COVID-19 and other investigation as appropriate

Neonate first 24 hour COVID-19 Specimen Positive

- Provide close community follow-up
- Repeat NP swab/aspilate between days 3-5 of life.
- If the 2nd NP swab is negative - repeat a 3rd NP swab for COVID-19 test within 48 hours of collection date of second swab
- If baby becomes symptomatic, assess and collect NP swab/aspilate for RPP & COVID-19 and other investigation as appropriate

Neonatal Management for 2019 Novel Coronavirus Infection (COVID-19)
ASYMPTOMATIC NEONATE & MOTHER CANNOT LOOK AFTER NEONATE



Neonatal Management for 2019 Novel Coronavirus Infection (COVID-19)

SYMPTOMATIC NEONATE

**Neonate Born to Mother with Confirmed or Suspected COVID-19
OR**

Exposed to Close Contact with confirmed COVID-19 without mask while in nursery/NICU

- CONTACT & DROPLET PRECAUTIONS if no resuscitation/AGMP is required (procedure mask with visor or procedure mask with face shield/goggles, gown and gloves)
- CONTACT & DROPLET PRECAUTIONS **with** N95 mask if resuscitation/AGMP* required. (Resuscitation team to wear N95 mask, face shield/goggles, gown and gloves)
- **PLEASE NOTE that upon admission, neonate to remain on CONTACT & DROPLET PRECAUTIONS and use N95 mask for AGMP** as neonate might have been exposed to COVID-19 during delivery and to remain on precaution till consultation with site IPC
- **Contact local IPC & Consult Pediatrics/Neonatology regarding symptomatic neonate**

Neonate requiring NICU admission for any clinical reason

- Admit to single patient room in NICU
- CONTACT & DROPLET PRECAUTIONS (with N95 mask if AGMP)
- Mother/Family positive for COVID-19 or have acute infectious symptoms cannot visit NICU. Consult with local IPC when there is a COVID-19 exposure, as defined by the [Essential Visitor Screening Questionnaire](#) prior to entering NICU.
- Manage in Incubator or Isolette
- Supportive Care as needed
- Collect NP swab/aspirate or throat swab (and endotracheal tube aspirate if intubated) **at ~24 hours after birth** for COVID-19 PCR
- All other investigations as per NICU team
- Family/Support Person(s) to follow [guidance on visitor requirements](#)

Mother COVID-19 negative

- COVID-19 test NOT required for neonate
- If NP aspirate/swab obtained from neonate before mother's result was available, expect COVID-19 negative
- Contact IPC
- Reassess Contact & Droplet Precautions based on underlying disease for mother and baby, i.e., other infectious respiratory causes
- Neonatal management according to symptoms/condition

Mother COVID-19 positive or Neonate had close contact to COVID-19 positive symptomatic person without mask

- Contact IPC
- Contact & Droplet Precautions (with N95 mask if AGMP) while in hospital till baby's COVID-19 status has cleared
- Mother/Family who are positive for COVID-19 or have symptoms suggestive of an acute infectious syndrome cannot visit NICU. Consultation with local IPC team in advance when there is/has been a COVID-19 exposure, as defined by the [Essential Visitor Screening Questionnaire](#) is required before entering the NICU as a visitor.
- Can be discharged home as per routine if well
- Arrange for public health and clinician follow-up post-discharge
- Contact Public Health regarding COVID status and need for follow-up before discharge. See [Discharge Planning and Follow-up](#) guide

Neonate's first specimen after date of exposure is **Negative**

- If baby discharged <5 days from exposure to COVID-19, provide close community follow-up
- If baby becomes symptomatic, assess and collect NP swab for RPP & COVID-19 and other investigation as appropriate
- If baby still in NICU on day 5 after exposure to COVID-19, repeat swab/aspirate for COVID-19 test or sooner if symptoms develop

Neonate's first specimen after date of exposure is **Positive**

Repeat swab/aspirate for COVID-19 test 24-48 hours from collection of first specimen

- If 2nd specimen is negative for COVID, repeat asp/swab 24-48 hours from date of collection of second specimen
- If the 3rd specimen also negative, baby required a repeat swab on day 5 from date of exposure if not already, to clarify COVID-19 status

Feeding Instructions

Feeding neonates born to Mother with Confirmed or Suspected COVID-19 Infection

- Breast milk is the healthiest source of nutrition for most neonates. COVID-19 virus has not, to date (April 28/20) been detected in the breastmilk of any mother with confirmed/suspected COVID-19 (WHO, April 28, 2020 FAQ). However, there are many unknowns about COVID-19 and each family has its own context to consider. Therefore, families should participate in the decision to use breastmilk for infant feeding with the support of the healthcare providers.
- During *temporary separation*, mothers who intend to breastfeed should be encouraged to express their breast milk to establish and maintain milk supply.
- If possible, a dedicated breast pump should be provided to an inpatient staying in an AHS facility who is separated from her neonate. Prior to expressing breast milk, mothers should practice hand and breast hygiene including washing with soap and water. After each pumping session, breast pump parts should be thoroughly washed and the entire pump should be appropriately disinfected per the manufacturer's instructions.

Well Neonates ROOMING WITH their mothers

The feeding options are:

1. Breastfeeding

- A symptomatic mother with confirmed or suspected infection should take all possible precautions to avoid spreading the virus to her infant, including washing her hands before touching the infant AND wearing a face mask while feeding at the breast
- The mother should wear a face mask while feeding her baby and while handling expressed breastmilk and feeding equipment.

2. Feeding expressed breastmilk by bottle

- If expressing breast milk with a manual or electric breast pump, the mother should practice hand and breast hygiene before touching any pump or bottle parts and follow recommendations for proper pump cleaning after each use.
- If possible, consider having someone who is well, feed the expressed breast milk to the infant
- Follow the AHS Procedure, Expressed Breastmilk: Safe Handling
- If fridge/freezer storage is required follow the Container Handover Method as outlined below:
 - Patient care nurse (PCN) sets a clean paper towel on a cart/table outside the mothers room
 - PCN dons full PPE and enters the room
 - PCN obtains the EBM container, ensuring it is properly labelled with infant's ID label, as well as date and time the milk was pumped. Place the container on the paper towel located on the cart/table outside the mothers room
 - Doff PPE as per AHS doffing procedure, follow the Container Wiping Procedure as outlined below and discard the paper towel.
 - Don non-sterile gloves to handle the containers and disinfect each container of milk with a disinfectant wipe as per the manufacturer's instructions as listed on the container of disinfectant wipes.
 - Mark each containers' label to indicate it has been wiped and can now be handled
 - Place container in individual patient labelled storage bin in the designated milk fridge or freezer

3. Feeding infant formula by bottle

- For mothers too unwell to breastfeed or to express breastmilk with a breast pump and for mothers who have decided to use formula to feed their infant.
- The mother should wear a face mask while feeding her baby and while handling formula and feeding equipment.
- If possible, consider having someone who is well feed the infant.

Neonates SEPARATED FROM their mothers

Each site should decide the best approach and strategies to support parents' feeding choices given their local resources and individual family resources and preferences.

The feeding options are:

1. Feeding expressed breastmilk by bottle

- For neonates where the mother is well enough to express breast milk with a manual or electric breast pump, the mother should wash her hands before touching any pump or bottle parts and follow recommendations for proper pump cleaning after each use.
- The mother should wear a face mask while handling expressed breastmilk and feeding equipment.
- If possible, consider having someone who is asymptomatic/well feed the expressed breast milk to the infant.
- Each site will need to develop a plan with each family to transport breast milk from the mother to the infant.

2. Feeding donor breastmilk

For neonates who qualify for donor breastmilk as per current NICU feeding guidelines.

3. Feeding infant formula

For mothers too unwell to breastfeed or to express breastmilk with a breast pump and for mothers who have chosen formula to feed their infant.

APPENDIX

Description of potential pathways for neonates to acquire COVID-19 infection and rationale for current algorithm (May 19, 2020)

Overall there are three mechanisms that a neonate can be infected with COVID-19:

1. Intrauterine/transplacental infection – congenital infection of the fetus
2. Perinatal infection – infection of the neonate due to exposure to the virus during delivery, e.g., infectious COVID-19 virus has been cultured from stool samples of some COVID-19 patients
3. Postnatal infection – infection of the neonate due to exposure of the virus after birth, either at home (community acquired infection) or at hospital (hospital/nosocomial infection). Of note, once a neonate is in the community, there are other circulating respiratory virus that can also cause respiratory illnesses.

SARS-CoV 2003 is closely related to SAR-CoV-2 (79% similarity in terms of genetic sequence). Of interest, no intrauterine/transplacental infection was observed with SARS-CoV 2003 but infection during pregnancy was associated with morbidity and mortality mainly because of severe illness in the pregnant women associated with pregnancy loss or early labour. And based on past experience of respiratory viruses, it is generally believe that intrauterine/transplacental infection of COVID-19 is unlikely.

Doing a swab on a neonate within the first 24 hours of life is to test for intrauterine/transplacental infection as the average incubation of COVID-19 is 5.2 days after exposure. Doing this swab is to collect local data on possible intrauterine/transplacental infection. Ideally the swab is to be collected as close to 24 hours after birth as possible to avoid false positive result due to surface contamination of the neonate by the virus during delivery.

Most of the first-24-hour swabs will be negative as intrauterine/transplacental infection is unlikely. For the neonates born to COVID-19 positive mothers who are discharged home, while the family will try their best to protect the neonate from positive COVID-19 cases at home, there is still exposure risk. If a baby is infected with COVID-19 after discharge, it is not clear whether it is due to perinatal or postnatal infection, thus these neonates are not routinely swabbed if the first swab is negative. Rather, the more important action is to provide information for the mothers who are positive for COVID-19 during labour so they can recognize illness in their babies early to have the baby assessed as indicated. These symptomatic neonates born to COVID-19 positive mom after being discharged likely need assessment and testing not just COVID-19 but for other common illness or infection in the neonatal period.

For the very few neonates with a positive first-24-hour COVID-19 swab, majority will represent surface

contamination of the virus during birth instead of true infection; thus we want to repeat a test on: day 3-5 in the community or 24-48 hours after the first swab if baby is in the NICU if first-24-hour swab is positive. If the second swab is also positive, it indicates persistence of virus and the neonate should be assessed. But if the second swab is negative, then we would like a 3rd swab to see if the 1st swab is a 'false' positive or if the 2nd swab is a 'false' negative.

For the neonates who are admitted to a NICU soon after birth, strictly speaking, these neonates are not exposed to any symptomatic visitors/healthcare providers. With universal masking of visitor and healthcare providers as well as hand hygiene, a baby hopefully would not acquire COVID-19 at the hospital. On the other hand a baby might have been exposed to SARS-CoV-2 virus during delivery thus these neonates need to be put on contact and droplet precautions in the NICU as they might be in the incubation period for the infection. If the baby is otherwise doing as expected in the NICU, the algorithm is to retest the baby on day 5, hoping the result is negative and isolation and precaution can be discontinued. It is very difficult to keep a baby isolated for 14 days in NICU especially when the baby need intubation and ventilation as most units shared opened areas; thus these neonates are not routinely isolated for 14 days with the attempt to find a feasible period to isolating these neonates while minimizing risk. If a baby admitted to NICU manifest new symptoms within the 14 days of life, the baby will need to be tested and isolated pending results. If a baby has a <5 days of NICU stay and is discharged home, there is no further scheduled COVID-19 test, i.e., testing to be done based on symptoms.

Synthesis of Literature as of April 4, 2020

- The risk of intrauterine/transplacental infection from COVID-19 is extremely low based on reported cases in scientific literature as of date. Even though COVID-19 is novel, genetically it is very close to SARS-CoV and is related to other common human coronavirus; there is no reported cases of intrauterine/transplacental infection from SARS-CoV 2003 and related coronavirus in general.
- There are few case reports of viremia in COVID-19 patients but persistent viremia has not been demonstrated. Respiratory viruses have not been identified as a blood-borne pathogen; viremia detected in molecular tests can represent naked RNA in blood stream instead of infectious virions.
- There are case reports of infectious virus in stool samples of some COVID-19 cases thus there is potential risk of exposure for the neonate during vaginal delivery or C/S with rupture membranes. Theoretically C/S with ruptured members is different from C/S with no ruptured membrane but an issue is identifying the duration of rupture membrane that contribute to increased risk.
- Incubation of COVID-19 is day 2 to 14 after exposure, so a positive NP swab if collected within first 24 hours that is confirmed by repeat positive tests demonstrating ongoing viral shedding (expect long duration of shedding) will represent intrauterine/transplacental infection. Ideally the first swab should be delayed as much as possible within the first 24 hours to avoid picking up surface contamination and follow-up tests
- So far most of the 30+ babies born to COVID-19 positive mothers (except for 4 babies in published studies with positive but hard to interpret PCR tests and those reported on public media) were not infected so risk of infection from perinatal exposure is probably low as well. For neonates whom have been discharged home, they would be on self-isolation for 14 days from the day of last exposure, depending on the illness status in household members, as per public health guidelines. Those babies if readmitted would be isolated for 14 days from last exposure date. For babies admitted directly from birth to NICU and essentially separated from household cases of infectious COVID-19, current plan is to keep them on additional precaution during NICU stay as required for clinical reasons and a COVID-19 test can be repeated on day 5 (based on average incubation of ~5.2 days) as a second test to rule out perinatal infection so that need for additional precaution can be reviewed by site IPC if day-5 test is negative, to optimize resource utilization and feasibility in NICUs in the province.

Guidelines Reviewed:

- Wang L et al. Chinese expert consensus on the perinatal and neonatal management for the prevention and control of the 2019 novel coronavirus infection (First edition). Ann Transl Med 2020 | <http://dx.doi.org/10.21037/atm.2020.02.20>
- UK <https://www.rcog.org.uk/coronavirus-pregnancy/>
- UK <https://www.rcpch.ac.uk/resources/covid-19-guidance-paediatric-services>
- AAP <https://downloads.aap.org/AAP/PDF/COVID%2019%20Initial%20Newborn%20Guidance.pdf>
- CPS <https://www.cps.ca/en/tools-outils/covid-19-information-and-resources-for-paediatricians>

References

1. Li N, Han L, Peng M, Lv Y, Ouyang Y, Liu K, Yue L, Li Q, Sun G, Chen L, Yang L. Maternal and neonatal outcomes of pregnant women with COVID-19 pneumonia: a case-control study. *Clin Infect Dis*. 2020 Mar 30. pii: ciaa352. doi: 10.1093/cid/ciaa352. [Epub ahead of print] PubMed PMID: 32249918.
2. Poon LC, Yang H, Kapur A, Melamed N, Dao B, Divakar H, David McIntyre H, Kihara AB, Ayres-de-Campos D, Ferrazzi EM, Carlo Di Renzo G, Hod M. Global interim guidance on coronavirus disease 2019 (COVID-19) during pregnancy and puerperium from FIGO and allied partners: Information for healthcare professionals. *Int J Gynaecol Obstet*. 2020 Apr 4. doi: 10.1002/ijgo.13156. [Epub ahead of print] PubMed PMID: 32248521.
3. Davanzo R, Moro G, Sandri F, Agosti M, Moretti C, Mosca F. Breastfeeding and Coronavirus Disease-2019. Ad interim indications of the Italian Society of Neonatology endorsed by the Union of European Neonatal & Perinatal Societies. *Matern Child Nutr*. 2020 Apr 3:e13010. doi: 10.1111/mcn.13010. [Epub ahead of print] Review. PubMed PMID: 32243068.
4. Chawla D, Chirla D, Dalwai S, Deorari AK, Ganatra A, Gandhi A, Kabra NS, Kumar P, Mittal P, Parekh BJ, Sankar MJ, Singhal T, Sivanandan S, Tank P; Federation Of Obstetric And Gynecological Societies Of India (FOGSI), National Neonatology Forum Of India (NNF), And Indian Academy Of Pediatrics (IAP). Perinatal-Neonatal Management of COVID-19 Infection - Guidelines of the Federation of Obstetric and Gynecological Societies of India (FOGSI), National Neonatology Forum of India (NNF), and Indian Academy of Pediatrics (IAP). *Indian Pediatr*. 2020 Apr 1. pii: S097475591600154. [Epub ahead of print] PubMed PMID: 32238615.
5. Karimi-Zarchi M, Neamatzadeh H, Dastgheib SA, Abbasi H, Mirjalili SR, Behforouz A, Ferdosian F, Bahrami R. Vertical Transmission of Coronavirus Disease 19 (COVID-19) from Infected Pregnant Mothers to Neonates: A Review. *Fetal Pediatr Pathol*. 2020 Apr 2:1-5. doi: 10.1080/15513815.2020.1747120. [Epub ahead of print] PubMed PMID: 32238084.
6. Kamali Aghdam M, Jafari N, Eftekhari K. Novel coronavirus in a 15-day-old neonate with clinical signs of sepsis, a case report. *Infect Dis (Lond)*. 2020 Apr 1:1-3. doi: 10.1080/23744235.2020.1747634. [Epub ahead of print] PubMed PMID: 32233816.
7. Panahi L, Amiri M, Pouy S. Risks of Novel Coronavirus Disease (COVID-19) in Pregnancy; a Narrative Review. *Arch Acad Emerg Med*. 2020 Mar 23;8(1):e34. eCollection 2020. Review. PubMed PMID: 32232217; PubMed Central PMCID: PMC7092922.
8. Lee DH, Lee J, Kim E, Woo K, Park HY, An J. Emergency cesarean section on severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) confirmed patient. *Korean J Anesthesiol*. 2020 Mar 31. doi: 10.4097/kja.20116. [Epub ahead of print] PubMed PMID: 32229802.
9. Chen S, Liao E, Shao Y. Clinical analysis of pregnant women with 2019 novel coronavirus pneumonia. *J Med Virol*. 2020 Mar 28. doi: 10.1002/jmv.25789. [Epub ahead of print] PubMed PMID: 32222119.
10. Yu N, Li W, Kang Q, Xiong Z, Wang S, Lin X, Liu Y, Xiao J, Liu H, Deng D, Chen S, Zeng W, Feng L, Wu J. Clinical features and obstetric and neonatal outcomes of pregnant patients with COVID-19 in Wuhan, China: a retrospective, single-centre, descriptive study. *Lancet Infect Dis*. 2020 Mar 24. pii: S1473-3099(20)30176-6. doi: 10.1016/S1473-3099(20)30176-6. [Epub ahead of print] PubMed PMID: 32220284.
11. Dong L, Tian J, He S, Zhu C, Wang J, Liu C, Yang J. Possible Vertical Transmission of SARS-CoV-2 From an Infected Mother to Her Newborn. *JAMA*. 2020 Mar 26. doi: 10.1001/jama.2020.4621. [Epub ahead of print] PubMed PMID: 32215581; PubMed Central PMCID: PMC7099527.
12. Wang J, Wang D, Chen GC, Tao XW, Zeng LK. [SARS-CoV-2 infection with gastrointestinal symptoms as the first manifestation in a neonate]. *Zhongguo Dang Dai Er Ke Za Zhi*. 2020 Mar;22(3):211-214. Chinese. PubMed PMID: 32204755.
13. Fan C, Lei D, Fang C, Li C, Wang M, Liu Y, Bao Y, Sun Y, Huang J, Guo Y, Yu Y, Wang S. Perinatal Transmission of COVID-19 Associated SARS-CoV-2: Should We Worry? *Clin Infect Dis*. 2020 Mar 17. pii: ciaa226. doi: 10.1093/cid/ciaa226. [Epub ahead of print] PubMed PMID: 32182347.
14. Schwartz DA. An Analysis of 38 Pregnant Women with COVID-19, Their Newborn Infants, and Maternal-Fetal Transmission of SARS-CoV-2: Maternal Coronavirus Infections and Pregnancy Outcomes. *Arch Pathol Lab Med*. 2020 Mar 17. doi: 10.5858/arpa.2020-0901-SA. [Epub ahead of print] PubMed PMID: 32180426.
15. Chen R, Zhang Y, Huang L, Cheng BH, Xia ZY, Meng QT. Safety and efficacy of different anesthetic regimens for parturients with COVID-19 undergoing Cesarean delivery: a case series of 17 patients. *Can J Anaesth*. 2020 Mar 16. doi: 10.1007/s12630-020-01630-7. [Epub ahead of print] PubMed PMID: 32180175; PubMed Central PMCID: PMC7090434.
16. Wang S, Guo L, Chen L, Liu W, Cao Y, Zhang J, Feng L. A case report of neonatal COVID-19 infection in China. *Clin Infect Dis*. 2020 Mar 12. pii: ciaa225. doi: 10.1093/cid/ciaa225. [Epub ahead of print] PubMed PMID: 32161941; PubMed Central PMCID: PMC7108144.

17. Zhu H, Wang L, Fang C, Peng S, Zhang L, Chang G, Xia S, Zhou W. Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia. *Transl Pediatr.* 2020 Feb;9(1):51-60. doi: 10.21037/tp.2020.02.06. PubMed PMID: 32154135; PubMed Central PMCID: PMC7036645.
18. Chen H, Guo J, Wang C, Luo F, Yu X, Zhang W, Li J, Zhao D, Xu D, Gong Q, Liao J, Yang H, Hou W, Zhang Y. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet.* 2020 Mar 7;395(10226):809-815. doi: 10.1016/S0140-6736(20)30360-3. Epub 2020 Feb 12. Erratum in: *Lancet.* 2020 Mar 28;395(10229):1038. *Lancet.* 2020 Mar 28;395(10229):1038. PubMed PMID: 32151335.
19. Zhang L, Jiang Y, Wei M, Cheng BH, Zhou XC, Li J, Tian JH, Dong L, Hu RH. [Analysis of the pregnancy outcomes in pregnant women with COVID-19 in Hubei Province]. *Zhonghua Fu Chan Ke Za Zhi.* 2020 Mar 7;55(0):E009. doi: 10.3760/cma.j.cn112141-20200218-00111. [Epub ahead of print] Chinese. PubMed PMID: 32145714.
20. Cao Q, Chen YC, Chen CL, Chiu CH. SARS-CoV-2 infection in children: Transmission dynamics and clinical characteristics. *J Formos Med Assoc.* 2020 Mar;119(3):670-673. doi: 10.1016/j.jfma.2020.02.009. Epub 2020 Mar 2. PubMed PMID: 32139299.