CLINICAL CONCEPTS
IN OBSTETRICS

Clinical Concepts in Obstetrics, LLC
Care of the Pregnant Woman with COVID-19

This is interim guidance based on expert opinion and published recommendations from the literature, World Health Organization (WHO), Centers for Disease Control (CDC), American College of Obstetricians and Gynecologists (ACOG), Society for Maternal fetal Medicine (SMFM), Association of Women's Health Obstetrics and Neonatal Nursing (AWHONN), American Association of Pediatrics, and Society for Obstetrics Anesthesia and Perinatology (SOAP). The understanding of this virus is rapidly evolving. Please continue to consult with above listed agencies regarding guidelines for healthcare workers and rapidly changing recommendations. Hospitals may adapt these guidelines to meet patient care needs specific to each facility. The information contained in these guidelines does not define a standard of care, nor is it intended to dictate an exclusive course of management.

BACKGROUND

- COVID-19 is a new disease with limited data regarding the spectrum of clinical illness and management during pregnancy and the postpartum period.
- Testing for COVID-19 varies according to state and local public health policy and procedure.
- There is an estimated 0-14 day incubation period (mean 5-6 days); therefore, a woman may present without symptoms and develop symptoms during hospital admission.
- Most common mode of transmission is via respiratory droplets during close exposure to a person infected with COVID-19.
- There are no data that support scheduled cesarean birth due to maternal infection with COVID-19. Cesarean birth should follow obstetric indications.
- Based on emerging evidence, vertical transmission to the fetus may be possible, although probability and effect on newborn outcome is not clear.
- Infants born to mothers with confirmed COVID-19 are considered persons under investigation (PUIs) and should be isolated according to hospital protocol. The risk/benefit of separation of the newborn from the mother should be discussed and determined on a case by case basis considering maternal disease severity, newborn condition, and laboratory test results.
- Much is unknown regarding breastmilk and feeding practices in women positive for COVID-19. To date, breastmilk does not appear to harbor virus in infected mothers. Breast milk is the best source of nutrition for most infants and provides protection against many illnesses. There are rare exceptions when breastfeeding and/or feeding expressed breast milk is not recommended. Care should be taken to use all precautions to decrease the risk of transmission to the newborn.

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PURPOSE

To provide guidance for the care of pregnant or postpartum women who present with symptoms, have a confirmed positive test, or with potential exposure to COVID-19.

INTERPROFESSIONAL CLINICAL CARE GUIDELINES

I. General Considerations

A. Care of women with confirmed or suspected COVID-19 should occur in a private room with a private bathroom.

B. Care should be coordinated with involvement of Maternal-Fetal Medicine, Infectious Disease, OB Anesthesiology, Neonatology, and Pulmonary/Critical Care.

C. Personal protective equipment (PPE) should be worn in accordance with hospital policy and procedure.

D. Visitors
   1. The limitation of no more than one support person during labor and birth is recommended.
   2. Switching of visitors is not recommended.
   3. The support person should be screened.
   4. No children < 16-18 years of age should be permitted.
   5. Additional visitors for end of life may be considered and on a case-by-case basis.

E. Movement within the facility allowed according to hospital policy and procedure. However, consider limiting admission, birth, and postpartum to one room.

F. Access into obstetric services should be limited to one entrance point. Screening will occur at the designated access point and prior to bedding a patient.

G. Consider developing kits for procedures, which contain all necessary medications and equipment, to limit traffic in and out of the room.

H. Experienced, senior nursing and physician care is recommended.

I. Avoid emergency procedures if at all possible.

J. Allow adequate time between operative cases and following patient discharge for thorough room cleaning and air exchange.

K. Increased surveillance for women with positive COVID-19 tests or person under investigation (PUI) are needed due to reports of rapid decompensation.

L. If disease progression to sepsis occurs, implementation of an obstetric sepsis bundle is recommended.

M. Appropriate level of care and hospital should be determined, and maternal transport initiated as indicated. Maternal and fetal stabilization should be determined prior to transport.

N. Pregnant women without medical co-morbidities have the ability to compensate for a deterioration in respiratory function for a period of time and prior to sudden decompensation. Therefore, it is essential to recognize signs and symptoms of respiratory decompensation (e.g. rising respiratory rate), notify, and have a provider come to the bedside for timely intervention.

II. Triage or Admission to Obstetric Services

A. Pre-Screening Questions for every woman entering obstetrics services should be screened with the series of questions below.

1. Pre-Screening <u>Symptom</u> Questions
   - *Do you have a history of or currently have a fever, cough, shortness of breath, with or without extreme fatigue? If so, for how long?*

⟹ IF THE WOMAN ANSWERS "YES" TO 1 OR MORE SYMPTOMS, CONSIDER POSITIVE AND FOLLOW HOSPITAL POLICIES AND PROCEDURES

2. Pre-Screening <u>Exposure</u> Questions
   - *Have you traveled recently? If so, where?*
     Note: High risk countries and states
   - *Have you been exposed to anyone with a known positive COVID-19 virus test?*

⟹ IF THE WOMAN ANSWERS "NO" TO EXPOSURE QUESTIONS AND IS ASYMPTOMATIC, EVALUATE PER OB TRIAGE ROUTINE.

⟹ IF THE WOMAN ANSWERS "YES' TO 1 OR MORE EXPOSURE QUESTIONS, CONSIDER THE WOMAN AS A PUI

B. Triage Evaluation
    1. Prioritize triage of women presenting with respiratory symptoms. Care for other women, prioritization should occur according to the hospital's OB Triage Acuity Tool based on patient complaint.
    2. Assess for other obstetric issues (e.g. preterm labor, vaginal bleeding, decreased fetal movement).

C. Triage or Admission Care for Confirmed COVID-19 or PUI
    1. Provide the woman with a Level 1 mask
    2. Vital Signs and oxygenation
        a. Heart rate, respiratory rate, and blood pressure every 15 minutes during observation
        b. Temperature on admission and every 2 hours
        c. Continuous pulse oximeter
        d. Utilize nasal cannula or mask oxygen to maintain SpO2 $\geq$ 96%
    3. Disease Specific Assessment
        a. Breath sounds on admission and every 2 hours
        b. Shortness of breath and work of breathing
        c. Dyspnea
        d. Cough (productive, non-productive)
        e. Sore Throat
        f. Persistent pain or pressure in the chest
        g. Skin color and temperature
        h. Gastrointestinal symptoms
    4. Labs and Testing
       Labs and testing procedures are based on the woman's condition and diagnosis. The following represents labs and tests that may be considered and the rationale.

Lab	Discussion
CBC with differential	COVID-19 data suggests possibility of thrombocytopenia and lymphocytopenia
Clotting studies: fibrinogen	Consider for baseline or in cases of sepsis. Normal value in pregnancy ~400-700 mg/dL
Lactic acid	Consider for baseline or in cases of sepsis
Liver function: alanine transaminase (ALT), asparate transaminase (AST)	COVID-19 data suggests possibility of elevated liver enzymes

Renal function: BUN and Creatinine	Consider for baseline or in cases of sepsis
Serum albumin	Consider for baseline or in cases of sepsis
C-reactive protein (CRP)	Inflammatory process
Arterial blood gas	Depending on severity of disease and management plan. The pregnant woman should remain in a ***compensated respiratory alkalosis state***. Normal blood gas values in pregnancy: pH 7.40-7.45 pO_2 104-108 mmHg pCO_2 27-32 mmHg HCO_3^- 18-22
COVID-19 test	If patient meets organization's testing policy
Influenza/Respiratory Syncytial Virus	Rule out
Test	**Discussion**
Chest x-ray or CT	Rule out pneumonia
Ultrasound	As indicated for gestational age assessment (in the absence of prenatal records) or fetal assessment

5. Continuous electronic fetal and uterine monitoring if viable gestation
6. Note risk factors for progression to severe COVID-19 disease
    a. Women with chronic medical conditions such as chronic lung disease (including asthma), heart disease
    b. Immunocompromised, including cancer
    c. HIV
    d. Prolonged use of corticosteroids and other immune weakening medications
    e. Obesity with BMI $\geq$ 40
    f. Diabetes
    g. Renal failure
    h. Liver disease

III. Antepartum Care for Confirmed COVID-19 or PUI

A. Vital Signs and Oxygenation
    1. Assess Heart rate, respiratory rate, blood pressure Q 4 hours
    2. Assess Temperature Q 4 hours with intact membranes; Q 2 hours with ruptured membranes
    3. Assess SpO2 Q 4 hours

B. Assess disease specific symptoms Q 4 hours or more frequently with changes indicative of disease progression; this includes auscultation of breath sounds in all lung fields.

C. Labs according to patient condition and diagnosis.

D. Fetal and Uterine Monitoring Q shift if viable gestation; interpretation according hospital's *EFM Guidelines* and as appropriate for gestational age.

E. Administration of antenatal corticosteroids for fetal lung maturity is recommended if gestational age is between 23 - 33 6/7 weeks and delivery is anticipated in the next 7 days. Antenatal corticosteroids between 34 - 36 6/7 weeks should be considered on a case by case basis.

F. Magnesium Sulfate for neuroprotection is recommended when delivery is anticipated < 32 weeks gestation. Assess maternal respiratory status Q 1 hour during administration.

G. Tocolysis
   1. Indomethacin may be considered with mild-moderate symptoms.
   2. Nifedipine use may be considered with severe symptoms as indicated.

H. Diet: normal and as tolerated

I. Activity: normal activity within room as tolerated

J. Assess for fear and anxiety regarding the disease; provide reassurance and patient teaching

IV. Intrapartum Care for Confirmed COVID-19 or PUI

A. Induction of Labor
   1. Medically indicated inductions of labor should not be postponed or rescheduled unless there are no available beds and/or adequate nurse staffing.
   2. Consideration may be given for mechanical outpatient cervical ripening (e.g. Foley bulb) in lower risk women.

B. Fetal and uterine monitoring
   1. Continuous electronic fetal and uterine monitoring if viable gestation

2. Assessments according to high risk *EFM Guidelines* and stage of labor. Suggested frequency outlined below:

Stage of Labor	Vital Signs and SpO2	Fetal and Uterine Monitoring
First Stage, Latent Phase	Maternal HR, RR, BP Q 1 hour Temperature Q 4 hours if intact; Q 2 hours if ruptured or febrile Continuous SpO2 monitoring	Assess Q 30 minutes; Q 15 minutes on oxytocin
First Stage, Active Phase	Maternal HR, RR, BP Q 30 minutes Temperature Q 4 hours if intact; Q 2 hours if ruptured or febrile Continuous SpO2 monitoring	Assess Q 30 minutes; Q 15 minutes on oxytocin
Second Stage	Maternal HR, RR, BP Q 15 minutes Temperature Q 4 hours if intact; Q 2 hours if ruptured or febrile Continuous SpO2 monitoring	Continuously assess EFM; summary document Q 15 minutes
Third Stage	Maternal HR, RR, BP Q 15 minutes x 2 hours Temperature during hour 1 Continuous SpO2 monitoring	Uterine assessment Q 15 minutes Be prepared to treat uterine atony with oxytocin, tranexamic acid and misoprostol

C. Pain Management
   1. Notify Anesthesiology provider for interview and development of plan of care for pain management.
      Note: a COVID-19 diagnosis is not a contraindication for neuraxial anesthesia. (See SOAP Guidelines)
   2. Consider early neuraxial anesthesia to decrease the need for general anesthesia in an emergent cesarean birth.
   3. Nitrous oxide for pain management is not recommended due to potential risk of aerosolization of the virus.

D. Assess disease specific symptoms Q 4 hours or more frequently with changes indicative of disease progression; this includes auscultation of breath sounds in all lung fields.

E. Follow routine GBS prophylaxis protocols.

F. Activity: normal activity within room as tolerated; noted any drops in SpO2 with activity as this may indicate maternal compromise

G. Assess for fear and anxiety regarding the disease and provide reassurance and patient teaching.

H. All persons attending delivery should wear PPE.

I. Oxygen
    1. Oxygen for intrauterine fetal resuscitation is not recommended due to increased risk of aerosol transmission. Since there is a high incidence of asymptomatic carriers, use of oxygen for this purpose should be abandoned at this time.
    2. Oxygen use as indicated by maternal needs and to maintain SpO2 $\geq$ 96%

J. Positioning Aids for labor and birth are discouraged due to risk of contamination and spread of virus.

K. Birthing tubs should not be utilized due to lack of adequate PPE for providers and potential contamination via feces.

L. Intake and Output
    1. Intake and output assessed and documented Q 1 hour with shift totals.
    2. Solid food or liquids not restricted in first stage/latent phase of labor and may be considered as tolerated.
    3. Clear liquids as tolerated in the first stage/active phase and second stage
    4. If oral fluids are limited, dextrose IV fluids infuse at 250 mL/hour
    5. In the absence of sepsis, continuous bladder catherization is not recommended.

M. Consideration may be given to shorten the 2nd stage of labor with operative vaginal birth in the presence of maternal hypoxia and/or worsening symptoms.

N. Notify Neonatology team regarding patient admission and projected delivery. Determine plan for location of newborn care. (see additional information in Mother/Baby care section.
    1. The newborn is considered potentially infected and at risk for getting infected.
    2. CDC recommends hospitals consider separating babies from mothers who are infected or are PUI.

3. Newborn should be removed to an isolation room immediately after delivery if possible.

V. Perioperative Care for Confirmed COVID-19 or PUI

A. Implement pre-hospital screening for scheduled cesarean birth or other procedures (e.g. cerclage).

B. Implement droplet, contact and airborne precautions according to hospital policy practices.

C. Support person may attend cesarean birth according to hospital policy and practices.

D. Notify Anesthesiology team on admission for interview and determination of anesthesia plan of care.
If general anesthesia is utilized:
- Pre-oxygenation with a circuit extension and HEPA filter at the patient side of the circuit is recommended
- Use closed system for endotracheal (ET) suctioning
- Determine plan of care for extubation or continued ventilation following cesarean birth

E. Avoid emergent cesarean birth situations if possible (e.g. hypotension resulting in fetal heart rate Category 3)

F. Double gloving is recommended for anyone scrubbed in on the case.

G. Antiemetics should be administered to decrease the risk of vomiting.

H. Note: risk of delay from decision to incision may occur due to time required to adhere to recommended PPE and infection control recommendations.

I. Notify Neonatology team regarding patient admission and projected delivery. Determine plan for location of newborn care. (see additional information in Mother/Baby care section.
1. Newborn is considered potentially infected and at risk for getting infected
2. CDC recommends hospitals consider separating babies from mother infected or PUI
3. Newborn should be removed to an isolation room immediately after delivery

VI. Mother/Baby Care for Confirmed COVID-19 or PUI

Follow routine *Postpartum Care Guidelines* for mother with the following modifications:

A. Note risk factors for progression to severe COVID-19 disease (listed above). Cases of rapid progression to severe symptoms have been noted in the postpartum period. Therefore, increased surveillance is warranted.

B. Assess disease specific symptoms Q 4 hours or more frequently with changes indicative of disease progression; this includes auscultation of breath sounds in all lung fields.

C. Determine pain management plan according to patient goals.
Note: some experts have suggested avoiding the use of NSAIDS in women with COVID-19 to prevent worsening of symptoms; however, this is controversial, and data is lacking.

D. Newborn is considered potentially infected and at risk for getting infected.
    1. Newborn should be isolated from mother until mother is cleared from transmission precautions.
    2. Newborn should be housed in an isolation room until no longer a PUI.
    3. Limit visitors to newborn.
    4. Newborn should be cared for by healthy adult or family member who must wear PPE (gown, gloves, face mask, and eye protection).

E. Room in or timing of reuniting mother with baby is case-by-case basis.
    1. Same consideration as for hospitalized patients with COVID-19
    2. Involves consultation with clinicians, infection prevention and control specialists, and public health officials
    3. The decision should take into account disease severity, illness signs and symptoms, and results of laboratory testing for COVID-19 (CDC)
    4. If rooming in, consider physician barriers between mother and newborn and keeping newborn at least 6 feet away. (CDC)

F. Current CDC Guidelines for stopping transmission precautions which would allow reuniting mother and baby:
    1. Test-based strategy
        a. Resolution of fever without the use of fever-reducing medications and
        b. Improvement in respiratory symptoms (e.g., cough, shortness of breath), and

c. Negative results of an FDA Emergency Use Authorized COVID-19 molecular assay for detection of SARS-CoV-2 RNA from at least two consecutive nasopharyngeal swab specimens collected ≥24 hours apart (total of two negative specimens)

2. Non-test-based strategy
   a. At least 3 days (72 hours) have passed since recovery defined as resolution of fever without the use of fever-reducing medications and improvement in respiratory symptoms (e.g., cough, shortness of breath); and,
   b. At least 7 days have passed since symptoms first appeared

G. Breastfeeding
1. Breastmilk appears to be safe with COVID-19 infected mothers.
2. Breastmilk should be pumped using a dedicated pump specific for that mother
   a. Mother should cleanse hands and breast before pumping.
   b. Pump should be thoroughly cleaned after each use according to manufacturer's recommendations and kept in the room.
3. Process to transfer pumped breastmilk to clean source should be established and practiced.
4. Newborn should be fed by healthy adult.
5. If newborn separation is not practiced and mother is feeding at the breast, mother should cleanse hands and before handling the newborn and wear a facemask throughout contact with the newborn.

H. Assess readiness for discharge according to *Postpartum Guidelines* in conjunction with pediatrics/neonatology.

I. Prioritize discharge as soon as possible for any positive or PUI woman
1. Goal postpartum Day 0 or 1 for vaginal birth
2. Goal postoperative Day 1 or 2 for cesarean birth

J. Offer long-acting reversible contraceptive (LARC) placement or Depo-provera injection to desiring women in order to eliminate need for in person postpartum visit.

VII. Discharge Instructions for Confirmed COVID-19 or PUI

When the woman is discharged home, provide teaching which may include, but is not limited to:

A. Worsening symptoms:
1. Trouble breathing

2. Persistent pain or pressure in the chest
3. New confusion or inability to arouse
4. Bluish lips or face
5. Inability to hold down food or fluids

B. Follow up with provider; consideration for telehealth visit
C. Procedure to call ahead before visiting provider
D. Wear a facemask and isolate away from other people if you are feeling sick

VIII. Notification of Provider

A. Persistent abnormal vital signs:
   - HR > 120 bpm or < 60 bpm
   - RR > 24/minute or < 12/minute
   - SBP > 160 mmHg or < 90 mmHg
   - DBP > 110 mmHg or < 60 mmHg
   - SpO_2 < 96%

B. Change in maternal status and/or abnormal assessment findings
C. Signs and symptoms of disease progression
D. Change in fetal status and according to *EFM Guidelines*
E. Abnormal test/lab results

RESOURCES

Centers for Disease Control and Prevention

- General Information: https://www.cdc.gov/coronavirus/2019-nCoV/index.html

- Interim Considerations for Infection Prevention and Control of Coronavirus Disease 2019 (COVID-19) in Inpatient Obstetric Healthcare Settings: https://www.cdc.gov/coronavirus/2019-ncov/hcp/inpatient-obstetric-healthcare-guidance.html

- Discontinuation of Transmission-Based Precautions and Disposition of Patients with COVID-19 in Healthcare Settings (Interim Guidance): https://www.cdc.gov/coronavirus/2019-ncov/hcp/disposition-hospitalized-patients.html

Other

- ACOG Practice Advisory: https://www.acog.org/clinical/clinical-guidance/practice-advisory/articles/2020/03/novel-coronavirus-2019

- ACOG/SMFM Algorithm: https://www.acog.org/-/media/project/acog/acogorg/files/pdfs/clinical-guidance/practice-advisory/covid-19-algorithm.pdf

- Society for Maternal-Fetal Medicine: https://www.smfm.org/covid19

- Society for Obstetrics Anesthesiology and Perinatology Interim Considerations for Obstetrics Anesthesia Care Related to COVID19: https://soap.org/wp-content/uploads/2020/03/SOAP_COVID-19_Obstetric_Anesthesia_Care_032320.pdf

- Anesthesia Patient Safety Foundation Perioperative Considerations for the 2019 Novel Coronavirus (COVID-19). https://www.apsf.org/news-updates/perioperative-considerations-for-the-2019-novel-coronavirus-covid-19/

REFERENCES

- American College of Obstetricians and Gynecologists. Practice Advisory Novel Coronavirus 2019 (COVID-19). March 2020. Accessed on March 23, 2020; https://www.acog.org/clinical/clinical-guidance/practice- advisory/articles/2020/03/novel-coronavirus-2019

- Boelig, RC, Saccone, G, Bellussi, F, Berghella, V. MFM Guidance for COVID-19 [published online ahead of print, 2020 Mar 19]. Am J Obstet Gynecol MFM; 100106. https://doi.org/10.1016/j.ajogmf.2020.100106

- Chen, H, Guo, J, Wang, C, Luo, F, Yu, X, Zhang, W, 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; Available at: http://www.sciencedirect.com/science/article/pii/S0140673620303603

- Di, Mascio, D, Khalil, A, Saccone, G et al. Outcome of Coronavirus spectrum infections (SARS, MERS, COVID-19) during pregnancy: a systematic review and meta-analysis. Am J Obstet Gynecol MFM 2020 In Press.

- Royal College of Obstetricians & Gynaecologists. Coronavirus (COVID-19) Infection in Pregnancy. Version 4: Published 21rst March 2020. Accessed on March 30, 2020; https://www.rcog.org.uk/globalassets/documents/guidelines/2020-03-28-covid19-pregnancy-guidance.pdf

- Ti, LK, Ang, LS, Foong, TW, Ng, BSW. What we do when a COVID-19 patient needs an operation: operating room preparation and guidance. CanJAnaesth2020. https://www.ncbi.nlm.nih.gov/pubmed/32144591