

## **Expert Review**

### **Labor and Delivery Guidance for COVID-19**

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COVID-19 disease is a global pandemic caused by a novel coronavirus, labelled as SARS-CoV-2. Currently, more than 100 million women are pregnant with more than 100 million fetuses worldwide, virtually all of whom are at risk for COVID-19. Pregnant women are somewhat immunosuppressed and thus may be at higher risk from developing severe disease from COVID-19, in particular pneumonia and respiratory failure. Early data from a meta-analysis of 41 pregnant women with COVID-19 shows that they have a higher risk of miscarriage, preterm birth, preeclampsia, and cesarean delivery, particularly if they are hospitalized with pneumonia.<sup>1</sup> Their babies are at higher risk of stillbirth (2.4%, 1/41 so far), neonatal death (2.4%, 1/41) and admission to the intensive care unit.<sup>1</sup> Asymptomatic women and women with mild disease have fewer complications. General guidance regarding prevention and management of COVID-19 in pregnancy has been published.<sup>2-5</sup> Regarding outpatient prenatal care, maternal-fetal medicine guidance for COVID-19 has been recently published.<sup>6</sup> It is currently estimated that over one-third and up to two-thirds of the world population may be infected with COVID-19.<sup>7</sup> Many of the 145 million annual births in the world are at risk, including the about 400,000 which give birth daily. This document addresses the current COVID-19 pandemic for providers and patients in labor and delivery (L&D). The goals are to:

- Provide guidance regarding methods to appropriately screen and test pregnant patients for COVID-19 prior to, and at admission to L&D,
- Reduce risk of maternal and neonatal COVID-19 disease through minimizing hospital contact and appropriate isolation,
- Provide specific guidance for management of L&D of the COVID-19 positive woman, as well as the critically-ill COVID-19 positive woman.

The first 5 sections deal with L&D issues in general, for all women, during the COVID-19 pandemic.

These include: Section 1: Appropriate screening, testing and preparation of pregnant women for COVID-19 before visit and/or admission to L&D; Section 2: Screening of patients coming to L&D triage; Section 3: General Changes to Routine L&D Work Flow; Section 4: Intrapartum care; Section

5: Postpartum care. Section 6 deals with special care for the COVID-19 positive or suspected pregnant woman in L&D. Section 7 deals with the COVID-19 positive/suspected woman who is critically-ill.

These are suggestions, which can be adapted to local needs and capabilities. Guidance is changing rapidly, so please continue to watch for updates. A website constantly being updated with COVID-19 pregnancy-specific guidance for both providers and patients is [www.pregnancy covid19.com](http://www.pregnancy covid19.com).

## **Section 1: Appropriate screening, testing and preparation of pregnant women for COVID-19 before visit and/or admission to L&D**

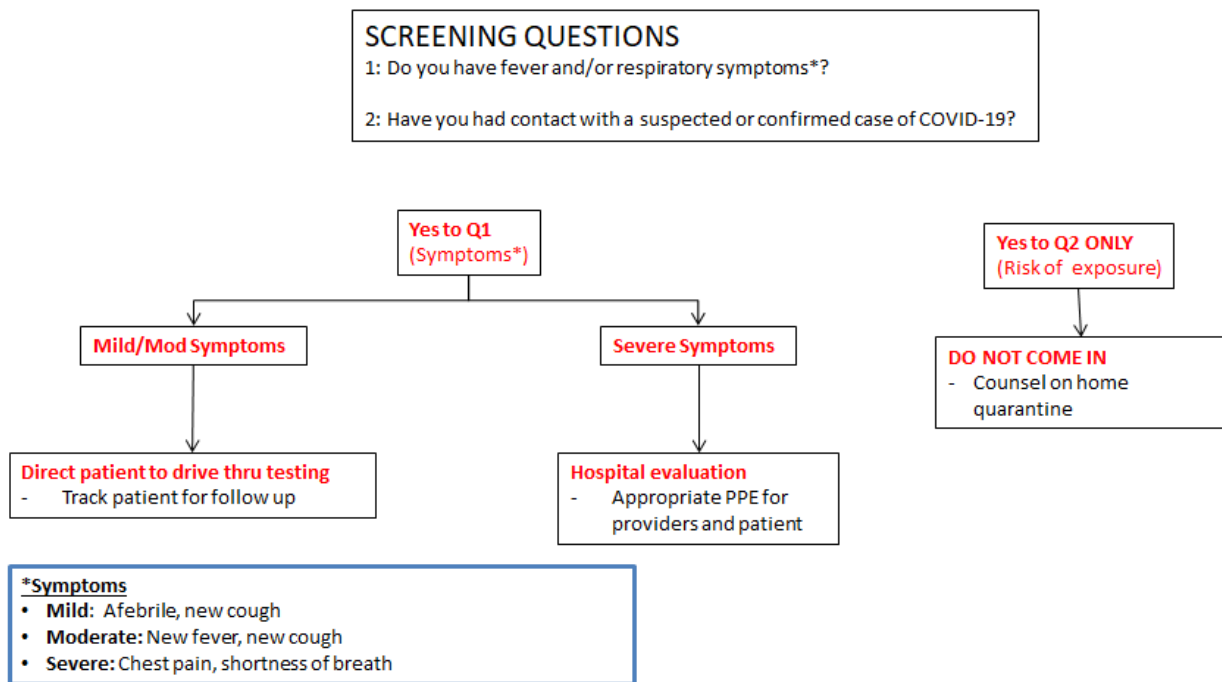
Suggested outpatient management of pregnant women without and with symptoms of COVID-19 has already been described.<sup>6</sup> Inpatient management of pregnant women is similar to outpatient recommendations with regards to minimizing and eliminating all unnecessary contact of the patient with the hospital or birth center to optimize social distancing. Most if not all patient necessary patient-provider contacts should be telehealth / remotely unless the patient describes an urgent problem.<sup>6</sup>

Phone calls to labor and delivery (L&D) should be triaged according to Figure 1. Patients calling with symptoms of COVID-19 or flu or with direct contacts who have no urgent obstetrical issues should be referred for testing outside of the hospital as per local protocols, e.g. through outside drive-through testing centers. Women without urgent obstetrical issues awaiting results should stay home to self-isolate. Those with urgent obstetrical issues (e.g. labor, rupture of membranes, vaginal bleeding, etc.), should be evaluated in an area on L&D dedicated to COVID-19 patients. Providers should follow up on test results and notify the team of any positive results.

Labor presents a unique scenario in the COVID-19 pandemic, as all hospital admissions are anticipated and the timing of many admissions to the hospital are planned. In anticipation of hospital admission, women should be instructed to discontinue work or begin working from home a minimum of 2 weeks prior to anticipated delivery, and to practice strict social isolation during this time. This is to limit the risk of exposure. For the majority of women, this should be initiated at 37 weeks. L&D units should prepare simulations for COVID-19 pandemic, including for PPE donning, etc. They should appropriate designate rooms and operating rooms (ORs). For women with planned admissions for induction of labor or cesarean section, consider screening each individual and her birthing partner by phone the day before admission.

Figure 1: Flow chart for triaging patients who call into labor and delivery

### PREGNANT PHONE TRIAGE



## **Section 2: Screening of patients coming to L&D triage**

When women arrive to L&D, a designated staff member at the front of the unit (e.g., patient access coordinator, unit coordinator, etc.) should verbally screen each individual for upper respiratory infection (URI) symptoms. Any woman reporting fever, cough, or respiratory symptoms should be given a surgical mask, and evaluated by RN or OB provider. See Figure 2 for recommended flow. All birthing partners should be screened; if screen positive, they should not be permitted on L&D and should be directed to appropriate testing or medical care as indicated.

### **Important considerations in the care of patients who screen positive:**

#### **A. Appropriate isolation and sanitation**

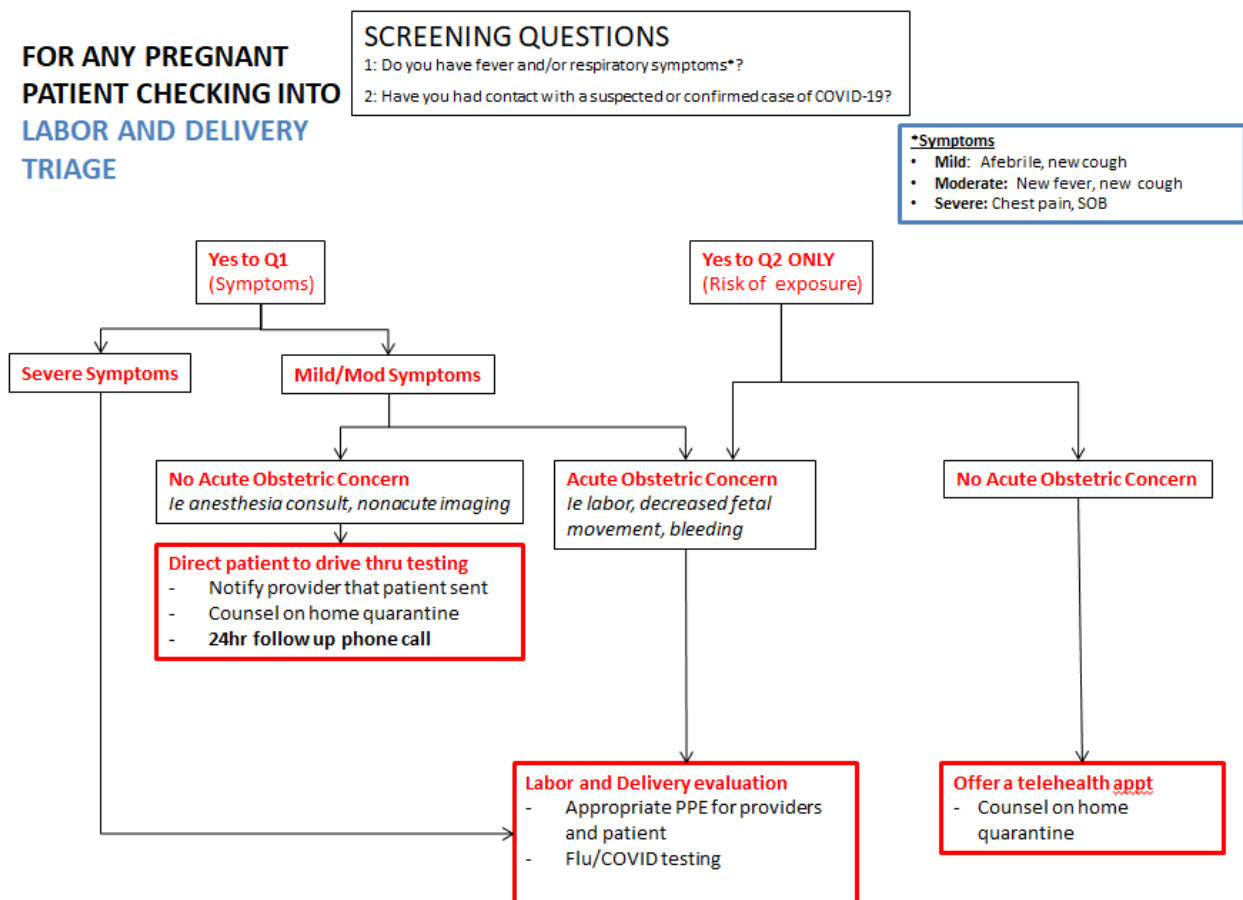
- All health care providers should be following CDC PPE recommendations until COVID-19 has been ruled out.
- Current CDC recommendations include a surgical mask, protective eyewear, gown, and gloves. N-95 mask should be utilized if available for any women with confirmed or suspected COVID-19.<sup>8</sup>
- Aerosolization should in general be avoided because it increases the spread of the virus. If absolutely necessary, N-95 masks should be used in setting of aerosolization, including if patient on bi-pap, has a tracheostomy, requires high flow nasal cannula O<sub>2</sub>, or when administering nebulized medications. Second stage of labor is likely high risk for aerosolization and N-95 mask should be used. The CDC has indicated that N-95 masks are as effective as PAPR equipment and should be used for protection in the event of short term exposure.<sup>8</sup>
- Practice vigilant hand hygiene.

#### **B. Management of patients who screen positive**

- **Acute complaint requiring evaluation** (severe symptoms, labor complaint, etc.):
  - A special room should be reserved as space allows for patients who screen positive (e.g., URI symptoms, fever), both for triage and labor.

- **Scheduled cesarean delivery OR induction of labor:**
  - Ideally this should be picked up when screening the patient by phone the day prior to admission to avoid travel to the hospital (as suggested above).
  - Evaluation to determine if rescheduling in 2-3 days is feasible to allow for results of COVID-19 testing.
  - For COVID-19 positive patients with mild or moderate symptoms not requiring immediate care, **it is important to recognize that the severity of disease peaks in the second week, so planning delivery prior to that time is optimal.**

Figure 2. Suggested flow for screening patients presenting to L&D triage



### Section 3. General Changes to Routine L&D Work Flow.

#### A. Respiratory Precautions and Personal Protective Equipment (PPE)

Given the risk of asymptomatic carriers and transmission, it should be the goal of every unit that every patient wear a surgical mask and every provider have a surgical mask for each patient encounter.<sup>9-10</sup> The ability to execute this recommendation is obviously limited by supply, but that should be the goal. For any patients with respiratory symptoms full droplet precautions should be utilized including gloves, gown, surgical mask with a face shield. N95 mask should be worn in addition to droplet precaution PPE for any patients with suspected or confirmed COVID, and for any patient, *regardless of respiratory symptoms*, during indispensable aerosolizing procedures, including second stage of labor.<sup>8,11</sup> As much as possible, oxygen should not be given aerosolized. In addition, hand hygiene with alcohol based rub after every patient contact and appropriate donning and doffing of PPE are critical.<sup>8-12</sup> Finally, rooms that are exposed need to be wiped down as respiratory viruses may spread from surface contact.<sup>13</sup> These aggressive measures can help limit transmission throughout providers in a healthcare setting. Table 1 summarizes our recommendations.

*Table 1: Suggested personal protective equipment (PPE) based on clinical situation*

Care Situation	Surgical Mask	Droplet PPE (Gown, gloves, surgical mask/face shield)	N-95 Mask
Patient (with or without respiratory symptoms)	X		
Provider during routine patient encounter	X		
Provider during patient with URI symptoms		X	
Provider during patient with suspected or confirmed COVID-19		X	X
Provider caring for patient during indispensable aerosolizing procedure		X	X



## **B. Visitor Policy**

Given the significant risk of COVID-19 transmission between patient/family/healthcare providers, there should be strict restrictions on visitor policy.

- Labor and Delivery:

**Visitation should be limited to one support person, in-person.** Preference is for support via video, if patient agrees. All in-person support people should be screened as per Section 2. The support person should be easily identifiable by L&D staff; one suggestion would be to provide them with a special colored wrist band that must be worn at all times. Switching of visitors will not be permitted. Given public health emergency, no additional in-person support people should be allowed, including doulas.

- Antepartum and postpartum:

There should be designated support person for the entire admission. This should be the same designated person as for delivery.

- Neonatal Intensive Care Unit: Parents may visit in the neonatal ICU - one at a time
- No children < 16-18 years of age permitted at any time
- Additional visitors for end-of-life situations may be considered / evaluated on a case-by-case basis

Visitation may be further restricted at the discretion of unit leadership and as the outbreak evolves.

## **C. Patient admissions and location**

In general, all efforts should be made to limit the movement of women from one care area to another (e.g., triage room to antepartum room to labor and delivery room). Admissions for delivery should remain on L&D; consider admitting stable admissions for antepartum monitoring directly to antepartum floor. For example, consider holding a woman with preterm prelabor rupture of membranes in triage for continuous monitoring and observation for a longer period of time than might

typically occur, and then transferring her directly to the antepartum unit rather than moving her to a labor and delivery room as an intermediary stop.

**D. Pre-cesarean delivery (CD) laboratory tests**

In order to limit multiple visits to a healthcare setting, women should have routine preoperative labs (e.g., complete blood count, type and screen) the day of their CD.

## **Section 4: Intrapartum care**

### **A. Inductions of Labor**

Inductions of labor with medical indications in asymptomatic women should NOT be postponed or rescheduled. This includes 39 week inductions, after patient counseling.<sup>14</sup> However, in cases of extreme healthcare system burden (see Section 2) it may be appropriate to consider postponing or rescheduling induction. This recommendation will vary depending on current state of COVID-19 pandemic. For example, in a region early in COVID-19 emergence it may be prudent to get patients delivered prior to high COVID-19 burden in the hospital. For sites with an existing high COVID-19 burden, an additional 1-2 days in the hospital, occupying a hospital bed, for an induction of labor may not be possible. Other site-specific and COVID-19 specific considerations may include options such as beginning the induction process at home to limit in-hospital time (e.g., outpatient Foley bulb cervical ripening). Induction can still be conducted as usual, with a combination of Foley 60-80 mL single balloon for 12 hours and either oral misoprostol 25 mcg initially, followed by 25 mcg every 2-4 hours, or 50 mcg every 4-6 hours (if no more than 3 contractions per 10 minutes or prior uterine surgery), or oxytocin infusion.<sup>15</sup> Outpatient Foley ripening can be considered for low risk women, to minimize contacts. Cesarean delivery should not be performed before 15 hours of oxytocin and amniotomy if feasible, and ideally after 18-24 hours of oxytocin.<sup>15</sup>

### **B. First stage**

#### *General guidance*

Management of the first stage should not be altered, unless specified below. Intrapartum antibiotic prophylaxis is recommended for GBS positive patients; immersion in water in the first stage of labor can be considered; oral restriction of fluid or solid food in the first stage of labor is not recommended; oral water and clear fluids can be encouraged as tolerated in labor. In the setting of oral restriction, IVF at a rate of 250ml/hr containing dextrose, is recommended; upright positions in the first stage of labor are recommended in women without regional anesthesia; women with regional anesthesia in the first stage can take up whatever position they find most comfortable; walking should be

recommended in the first stage of labor in women without regional anesthesia, but in the delivery room. Women with regional anesthesia can walk or not walk in the first stage; continuous bladder catheterization cannot be recommended in labor; the routine use of the peanut ball cannot be recommended in labor, as it has not been shown to be beneficial, and may be a way to transmit infection; oxytocin augmentation is recommended to shorten the time to delivery for women making slow progress in the first stage of spontaneous labor; higher doses of oxytocin can be considered; early intervention with oxytocin and amniotomy for the prevention and treatment of dysfunctional or slow labor is recommended; cesarean for arrest in the first stage of labor should not be performed unless labor has arrested for a minimum of 4 hours with adequate uterine activity, or 6 hours with inadequate uterine activity in a woman with ROM, adequate oxytocin, and  $\geq 6$  cm dilated cervix.<sup>15</sup>

#### *Oxygen therapy*

Although oxygen via nasal cannula is not considered an aerosolizing procedure, the fact that nasal cannula/face mask are in contact with maternal respiratory tract and secretions makes handling of such equipment (taking on/off/adjusting) higher risk for chance of contamination/exposure between patient and provider. Recent meta-analysis has demonstrated that intrapartum oxygen has no fetal benefit, and may cause harm.<sup>16,17</sup> In the current setting where reducing risk of COVID-19 spread among healthcare providers and patient is paramount, there is even more reason to **not utilize oxygen therapy for fetal resuscitation**. Given the likely high rate of asymptomatic carriers,<sup>18</sup> this principle applies regardless of patient's COVID-19 status.

#### *Nitrous Oxide*

Use of nitrous oxide is the procedure that involves risk of aerosolization and involves respiratory contamination includes use of nitrous oxide. Recommend eliminating nitrous oxide use during COVID-19 pandemic.<sup>19</sup>

### **C. Second stage**

Management of the second stage should not be altered, unless specified above or below. See general and specific guidance for first stage, much of which applies to the second stage as well. Pushing

should not be delayed, as it prolongs time to delivery, and increases chorioamnionitis and postpartum hemorrhage.<sup>20-21</sup> Perineal massage<sup>22</sup> and warm packs<sup>23</sup> are each associated with decrease in 3<sup>rd</sup> and 4<sup>th</sup> degree lacerations.

#### **D. Third stage**

There are concerns regarding limited resources for blood transfusion due to inability to run blood drives. Given this situation, all care should be taken to reduce need for blood transfusion including by optimizing antenatal hemoglobin prior to delivery. In addition to standard oxytocin, consideration should be made for prophylactic tranexamic acid and misoprostol (400 mcg buccally).<sup>24</sup> Use of cell-saver during cesarean delivery should be considered after stratification of risk of postpartum hemorrhage as well as institutional capabilities. If blood transfusion is indicated and hemorrhage is not ongoing, begin with transfusion of 1 unit rather than the typical 2 units of packed red blood cells, then reassess the clinical need for the second unit.

Some have advocated for avoiding delayed cord clamping, even if vertical transmission has not been confirmed at the time of the submission of this manuscript.

#### **E. Anesthesia Considerations**

The Society for Obstetric Anesthesia and Perinatology has published interim guidelines based on expert opinion. As with other COVID-19 guidelines these are rapidly evolving.<sup>19</sup>

- Early epidural to minimize need for general anesthesia in the event of emergent cesarean section
- COVID-19 is not a contraindication to neuraxial anesthesia
- Consider stopping nitrous oxide use due to potential risk of aerosolization.

## **Section 5. Postpartum Care**

Women should be notified that in order to limit the risk of infection to themselves, staff, and other patients, they will be discharged in an expedited and safe fashion.

### **A. Expedited Discharge Planning:**

- All vaginal deliveries should have a goal of discharge on postpartum day 1, or even same day if possible for selected women.
- All cesarean deliveries should have a goal of discharge on postoperative day 2, with consideration of postpartum day 1 discharge if meeting milestones.
- Discuss anticipated maternal discharge with pediatrics/neonatology to determine timing of infant discharge.
- Home care with supplies for blood pressure follow up will be critical to expediting discharge of patients with a hypertensive disorder.

### **B. Post-partum visit**

- All postpartum visits, including wound checks, should be arranged for telehealth. Postpartum evaluation of cesarean wound healing or mastitis concerns may be optimized through use of photo upload options available in many electronic medical record patient portal programs. Encourage either long acting reversible contraceptive (LARC) placement or Depo-provera injection prior to discharge for patients planning to use these to eliminate need for additional in person postpartum visits.

## **Section 6: Care for the suspected or confirmed COVID-19 positive Pregnant Patient in L&D**

### **A. Obstetric Medications**

Two commonly used medications in obstetrics have been the source of study and controversy in the setting of COVID-19; NSAIDS, in particular indomethacin, is commonly used for tocolysis, and steroids, specifically betamethasone or dexamethasone used for fetal lung maturity. Additionally, we will also address the use of magnesium given respiratory morbidity of COVID-19 (Table 2).

- **Indomethacin**

There were early reports postulating NSAIDS may worsen the course of COVID-19. The virus binds to cells through angiotensin converting enzyme-2 (ACE-2) receptor; thus it was postulated that NSAIDS, which increase ACE-2 expression, may result in worsening disease.<sup>25</sup> However, this has not been substantiated, and multiple organizations, including WHO and the FDA have advocated there should not be a restriction on NSAID use.<sup>26</sup> **In the setting of tocolysis, nifedipine may be considered as an alternative given the uncertainty regarding NSAID impact on COVID-19.** These recommendations may change as additional data emerges.

- **Bethamethasone/Dexamethasone**

The routine use of systemic corticosteroids in the setting of a viral pneumonia has been associated with increased morbidity.<sup>27,28</sup> One study showed delayed viral clearance with use of corticosteroids with MERS.<sup>29</sup> Specifically with COVID-19 there is an association between steroid use and mortality, although these studies do not control for baseline morbidity.<sup>30-31</sup> Generally, steroid use evaluated in these studies is higher than a two day course of steroids, **however given the association between steroids and worsening morbidity of viral pneumonia and specifically COVID-19, steroids for fetal lung maturity should be used judiciously. Consider the following TABLE for steroid use for fetal lung maturity** balancing benefit by risk of delivery within the next 7 days, gestational age, and potential risk based on maternal presentation.

These recommendations are supported by the WHO.<sup>5</sup>

### **Magnesium Sulfate**

Magnesium sulfate is indicated for neuroprotection when delivery is anticipated <32 weeks or for eclampsia prophylaxis.<sup>32-33</sup> There is no reported data regarding the impact of magnesium sulfate in setting of COVID-19. However, given potential respiratory complications with magnesium sulfate, it should be used judiciously in setting of severe respiratory symptoms. Magnesium sulfate may be used as indicated in patients with mild/moderate symptoms.

*Table 2: Use of common medications in preterm labor management in the setting of COVID-19 pregnant patient.*

Gestational Age	<32 weeks		32-34 weeks		34-36 weeks'
	Mild-Mod Sx	Severe	Mild Mod Sx	Severe	Any
Steroids for fetal maturity	Use	Discuss risks and benefits with multidisciplinary team including ID, Pulmonary-Critical Care, Neonatology	Consider	Avoid	Avoid
Indomethacin	May consider	Use nifedipine instead	Use nifedipine instead	Use nifedipine instead	Not indicated
Magnesium Sulfate (neuroprotection)	Use	Discuss risks and benefits with multidisciplinary team including ID, Pulmonary-Critical Care, Neonatal-perinatal medicine			

\*Severe signs or symptoms include need for respiratory support, hypoxia, etc.



## **B. Laboratory Value Changes**

There are some changes noted with COVID-19 that have important implications in care for the pregnant patient. **Specifically, COVID-19 may be associated with a transaminitis and thrombocytopenia.**<sup>30</sup> This is an important consideration in a patient presenting with a hypertensive disorder in assessing whether she has severe features of preeclampsia/HELLP syndrome.

## **C. Intrapartum Care**

- **Delivery timing:**
  - COVID-19 severity peaks in the second week, it may be prudent to expedite delivery of the term COVID-19 positive patient with only mild symptoms.
- **Mode of delivery**
  - COVID-19 is not an indication for a cesarean delivery
  - Delivery mode should be dictated by obstetric indications
- **Risk of vertical transmission:** There has been no documented vertical transmission as of our date of submission based on limited case series<sup>34-35</sup> of which 89% had cesarean sections.
- **Precautions for transmission prevention**
  - Designate nearby rooms, or section of floor to be used for suspected/confirmed COVID-19 positive patients
  - Respiratory precautions
    - Room type: Negative pressure room is not required
    - If a patient has known COVID19 or high suspicion for it, PPE should be used as per hospital specific guidelines. At a minimum, an N95 mask and full droplet should be used by the providers in the room during second stage of labor.

- Minimize change in providers. Depending on volume of COVID+ patients consider having one team designated for confirmed or suspected COVID-19 patients

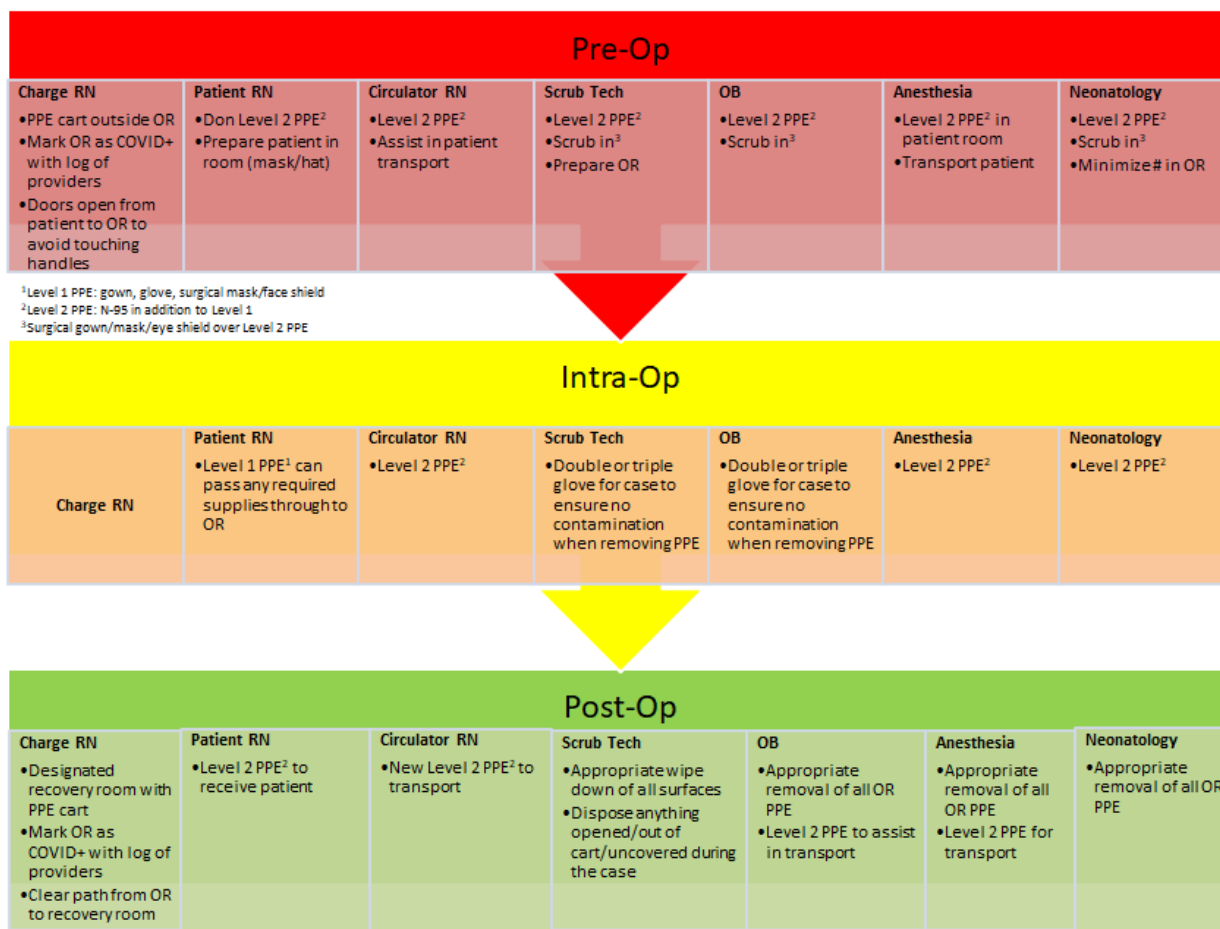
- **Medical Care**

- Multidisciplinary care coordination involving MFM, ID, Pulmonary/Critical care, OB anesthesia, and neonatology
- Consult Maternal Fetal Medicine regarding use of steroids for fetal maturity, indomethacin, magnesium sulfate (Table).
- Refer to intrapartum oxygen use guideline, given lack of fetal benefit, and risk of contamination/transmission with using an intranasal device, we do not recommend use of oxygen for fetal resuscitation in any patient, suspected COVID-19 or otherwise
- Fluid restriction (total fluids <75cc/hour) unless concern for sepsis/hemodynamic instability

- **Cesarean Delivery**

- Designate, when possible, one operating room (OR) for use for the suspected or confirmed COVID-19 patient, have appropriate PPE outside OR door.
- A designated PPE monitor should be assigned to ensure proper donning and doffing of PPE.
- Appropriate planning, including simulation training, should be done regarding planned, urgent, and emergent cesarean delivery. See Figure 3 below regarding a suggested flow to consider. Aspects to take into consideration include PPE placement in or near operating room to minimize time required donning PPE in case of emergent CS, which providers will need additional PPE for direct patient contact, minimizing the number of providers involved in direct patient contact etc.

**Figure 3**



#### D. Postpartum care

- Although breastfeeding continues to be encouraged (no evidence of COVID-19 transmission through breastmilk). However, given risk of neonatal morbidity from transmission through maternal exposure, CDC does recommend separation of mother and neonate.
- Breastfeeding considerations:
  - Breast milk provision (via pumping) is encouraged and is a potentially important source of antibody protection for the infant. The CDC recommends that during temporary separation, women who intend to breastfeed should be encouraged to express their breast milk to establish and maintain milk supply.
  - Before expressing breast milk, women should practice appropriate hand/skin hygiene washing not just hands but also breast prior to pumping.

- After pumping, all parts of the pump that come into contact with breast milk should be thoroughly washed, and the entire pump should be appropriately disinfected per the manufacturer's instructions.
- Expressed breast milk should be fed to the newborn by a healthy caregiver.
- For women and infants who are not separated, the CDC recommends that if a woman and newborn do room-in and the woman wishes to feed at the breast, she should put on a mask and practice hand hygiene before each feeding.<sup>36</sup>
- Pain control: current FDA and WHO guidelines are not to restrict NSAID use. We support continued use of acetaminophen and ibuprofen for pain control and do NOT suggest increased narcotic use to replace ibuprofen/NSAIDs. These general recommendations may be modified depending on patient specific morbidity and as we have more information regarding the interaction between NSAIDs and COVID-19 severity.<sup>26</sup>

## **Section 7: Care of the critically-ill COVID-19 pregnant patient**

All critically-ill COVID-19 patients should be in isolation as per hospital protocol.

PPE equipment should be outside the patient's room or unit if it is a dedicated COVID-19 unit.

### **A. Fetal Well Being**

- Corticosteroids: Given the potential risks of systemic steroids in the setting of COVID-19, steroids for fetal maturity should be used judiciously balancing benefit by gestational age with potential risks of worsening maternal morbidity. Decisions regarding use of corticosteroids for fetal lung maturity should be made in concert with critical care team and neonatology.
- For patients > 24 weeks, electronic fetal monitoring for antenatal surveillance should be performed at least daily and with any change in maternal status if a cesarean at bedside is feasible. The fetus can be a "sixth" vital sign reflecting early deterioration in maternal status.
- As per usual obstetric care, goal for saturations should be maintained >95%.

### **B. Maternal Medical Care**

Special consideration should be given to normal maternal respiratory physiology and how this impacts management of Acute Respiratory Distress Syndrome (ARDS):

- Pregnancy involves a natural respiratory alkalosis with a normal  $PCO_2$  of 28-32.<sup>37</sup>

Therapy for ARDS involves low tidal volumes and permissive hypercapnia ( $PCO_2 > 60$ ).<sup>38</sup> Data on permissive hypercapnia in pregnancy are limited but there do not appear to adverse fetal affects.<sup>39</sup>

- In the third trimester increased positive end expiratory pressures may be required.
- Goal blood pressure should be <160/110 mmHg.
- Patient should be positioned with left lateral tilt (if no other position is mandated for their treatment, for example, prone position) to relieve pressure from gravid uterus on venous return.

### **C. Delivery Planning**

- **Preparation**

- Equipment for an emergent cesarean delivery should be available at the bedside including neonatal equipment.
- A hemorrhage kit which includes methergine, hemabate and misoprostol should be at the bedside. Tranexamic acid needs to be refrigerated but should be requested for all deliveries and readily available in the ICU.
- The use of terbutaline should be reviewed with the critical care team depending on the patients clinical status due to risk of tachycardia
- An effective method of communication for the anesthesia team, neonatology team and obstetric team should be implemented.
- If an emergent delivery is planned, this should be performed at the bedside in the ICU to avoid transferring the patient.
- **Timing**
  - Consideration should be given to delivery >34 weeks for the critically ill maternal patient. Delivery can help optimize maternal respiratory status
- **Intrapartum care**
  - If a pregnant patient at term in critical condition goes into labor, precautions as above should be initiated.
  - An assisted second stage is likely to be necessary.
  - A dedicated obstetrician should be assigned to the patient with minimal change in providers, as the situation allows.
  - The neonatology team should be present at the time of delivery, the infant should be placed in isolation after delivery, given the unknown risks of transmission.
  - Prevention of postpartum hemorrhage should occur as detailed above.

#### **D. Postpartum care**

- The infant should be separated as soon as possible, and transferred to an isolation room appropriately.

- Breastpumping is encouraged, after review of maternal medications, see Section 6 above.

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