Obstetric Anesthesia during the COVID-19 Pandemic

Sahar Siddik-Sayyid, MD
Professor and
Program Director

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Introduction

- **Goal of this presentation:**
  - To provide evidence-based recommendations or,
  - when evidence is limited, expert opinion for anesthesiologists caring for pregnant women during the COVID-19 pandemic
  - **with a focus on preparedness and best clinical obstetric anesthesia practice.**

CONSIDERATIONS FOR TESTING ON ADMISSION

- **Screening criteria for COVID-19 infection include the following:** (1) fever, (2) cough or shortness of breath, (3) diarrhea, and (4) any possible exposure to COVID-19.
- Women with COVID-19 infection may be asymptomatic at the time of admission and some may present with overlapping pregnancy symptoms.
- Therefore, **universal screening** may miss pregnant women infected with SARS-CoV-2 in communities with a high prevalence or high projected infection rate.

CONSIDERATIONS FOR TESTING ON ADMISSION

- **Universal testing** with RT-PCR tests for SARS-CoV-2 viral (RNA) may improve case detection in high prevalence communities.
- However, current assays may return false-negative results if the viral load is low or if specimen collection is incomplete.

CONSIDERATIONS FOR TESTING ON ADMISSION

- **Goals of COVID-19 testing specific to pregnant patients admitted to LDUs are 2-fold:**

  (1) to prevent vertical transmission and ensure separation of the neonate after birth and

  (2) to protect HCWs by ensuring use of appropriate PPE.

CONSIDERATIONS FOR TESTING ON ADMISSION

- Besides the unclear sensitivity of RT-PCR testing, the time for nucleic acid detection varies between 6 and 8 h or longer depending on availability.
- Thus, management of women on LDUs located in a community with a high prevalence of COVID-19 infection should err on the side of caution.

CONSIDERATIONS FOR TESTING ON ADMISSION

- For purposes of clinical management and PPE use, women may therefore be categorized as follows:
  (1) COVID-19 (-)
  (2) Asymptomatic
  (3) Symptomatic (persons under investigation [PUI])
  (4) COVID-19 (+)
- This information should be made available to all HCWs and updated at all times as it may change during the course of labor.

CONSIDERATIONS FOR TESTING ON ADMISSION

- Women who are COVID-19 (+) (or high-risk PUI) should ideally be placed in an isolation room.
- **Airborne infection isolation rooms** (single-patient negative-pressure rooms with a minimum of 6 air changes/ h) should be used if performance of AGPs is anticipated.
- Strategies for exposure mitigation and cohorting, as well as considerations for transportation of patients who are PUI or COVID-19 should follow the same recommendations as for general patient cases.

SYSTEMS PREPARATION

- **A multidisciplinary team** of anesthesiologists, obstetricians, LD nurses, neonatologists, critical care experts, infectious disease and infection control experts, employee health services, environmental health services, and telemedicine services **should create and implement protocols** to support the management of patients with COVID-19 infection in the setting of a LDU.

SYSTEMS PREPARATION

- Resource allocation within the LDU should be proactively addressed.
- It is imperative to establish a **back-up team to care for patients without COVID-19 infection**
- due to the time-intensive tasks of donning/doffing PPE, transporting the patient, providing anesthetic care, and performing surgery in patients with active COVID-19 infection.

SYSTEMS PREPARATION

- From a logistical standpoint, a designated OR within the LDU should be prepared.
- Dedicated trays (or carts) containing the most commonly used supplies and drugs for both neuraxial labor analgesia and CD should be available to minimize traffic and contamination of anesthesia workstations and other anesthesia equipment.

PATIENT EVALUATION AND MONITORING

- **A pregnant woman who is PUI or COVID-19 (+)** should be evaluated including VS, PE, and review of lab tests to assess appropriate level of care and monitoring plan for potential deterioration.
- **Early multidisciplinary collaboration** should be arranged to determine level of care, fetal monitoring, and delivery plan.
- Discussion of the risks and benefits of steroids for fetal lung maturity, Mg for neuroprotection, and indomethacin for tocolysis should be addressed (drugs that may worsen COVID-19 infection).

PATIENT EVALUATION AND MONITORING

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Table 2. Specific Considerations for Medication Use in PUI or COVID-19–Positive Patients During Labor, Delivery, and the Postpartum Period

	Considerations	Case Context	Mechanism
Oxygen[9]	The routine use of oxygen for fetal indications should be suspended	Overall, the use of oxygen for fetal indications is controversial	The use of high-flow nasal cannula or facemask oxygen may be an aerosolizing procedure
Nitrous oxide[9]	Discuss the relative risks and benefits of nitrous oxide for labor analgesia and consider suspending its use	Overall, for all parturients	"There is currently insufficient information about the cleaning, filtering, and potential aerosolization of nitrous oxide in labor analgesia systems in the setting of COVID-19"
Remifentanil/ fentanyl[14]	Consider avoiding the use of IV PCA opioids (remifentanil/fentanyl) for labor analgesia	Women at risk for respiratory depression and opioid-induced nausea and vomiting	Opioid-induced respiratory depression increases the risk of sedation, respiratory depression, and oxygen desaturation, and increases the risk for emergent airway instrumentation and aerosolizing procedures
Ketorolac/ ibuprofen[9,15]	For women who are asymptomatic or mildly symptomatic that require analgesic medication beyond acetaminophen, NSAIDs can continue to be used, as the alternative of opioids likely poses more clinical risks. For sick COVID-19 patients, consider avoiding NSAIDs	It has been suggested that the use of NSAIDs for management of COVID-19 symptoms may aggravate COVID-19 infection trajectory (although the evidence is not robust) The use of ACE inhibitors was suggested to increase the risk for COVID-19 infection	NSAIDs are associated with increased ACE2, to which COVID-19 binds
Dexamethasone[9]	Consider avoiding the use of dexamethasone for PONV prophylaxis	In all women undergoing cesarean delivery, alternative antiemetics should be administered to prevent vomiting	Prolonged exposure to high-dose steroids has been associated with worsening COVID-19 outcomes in the general population
Carboprost (Hemabate)[14]	Consider avoiding the use of carboprost for treatment of uterine atony	For women at risk of bronchospasm, use alternative second-line uterotonics	Prostaglandin F_2 alpha causes bronchoconstriction and pulmonary vasoconstriction
Magnesium sulfate[9]	Consider avoiding or as an alternative to usual dosing, a 4 g bolus dose may be preferred in the setting of mild respiratory distress	For women with increasing oxygen requirement, the risk:benefit ratio should be considered before using magnesium for fetal neuroprotection, or for preeclampsia without severe features	Magnesium sulfate has central nervous system and respiratory depressant effects

Abbreviations: ACE, angiotensin-converting enzyme; COVID-19, coronavirus disease 2019; IV, intravenous; NSAIDs, nonsteroidal anti-inflammatory drugs; PCA, patient-controlled analgesia; PONV, postoperative nausea and vomiting; PUI, persons under investigation.

PATIENT EVALUATION AND MONITORING

- Avoiding urgent CD is essential to reduce the risk for GA and provider exposure during uncontrolled transfers to OR.
- Therefore, ongoing assessment of both maternal and fetal statuses are key to balance risks of prolonged labor vs CD.

LABORING PATIENTS WITH ACTIVE COVID-19 INFECTION

- Neuraxial labor analgesia remains a mainstay of obstetric care even with concurrent COVID-19 infection.
- Early epidural placement is desirable
  - to avoid exacerbation of respiratory symptoms with labor pain and
  - to reduce the likelihood of GA if intrapartum CD becomes needed.

LABORING PATIENTS WITH ACTIVE COVID-19 INFECTION

- The risk of COVID-19 exposure for the anesthesiologist during neuraxial labor analgesia placement is low, since this is not an AGP.
- **All HCWs in the room should wear contact (impervious gown and gloves) and droplet (surgical mask and eye protection) precautions.**

LABORING PATIENTS WITH ACTIVE COVID-19 INFECTION

- The patient should wear a surgical mask at all times to limit droplet spread,
- and the number of personnel present during placement of neuraxial labor analgesia should be minimized with assistance readily available.

LABORING PATIENTS WITH ACTIVE COVID-19 INFECTION

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Box 1. Empirical Strategies That May Be Implemented to Minimize Contamination of Equipment and COVID-19 Exposure of Anesthesiologists to Reduce the Use of PPE

1. Limit in-person encounters for preanesthesia evaluations by utilization of video—consultations (including for antenatal consultations for high-risk patients).
2. Limit encounters on admission to the labor floor—consider using mounted iPads in each labor room for hourly evaluations.
3. Limit the use of electronic devices or pens for written consents by use of electronically documented witnessed verbal consents.
4. Avoid bringing into the patients' room the epidural cart or tray—the required equipment (epidural kit) and drugs should be prepared and brought into the room in a bag before the procedure.
5. Have the most experienced anesthesiologist perform the procedure to ensure adequate placement and reduce the risk of accidental dural puncture that may require an epidural blood patch.

Box 1. Empirical Strategies That May Be Implemented to Minimize Contamination of Equipment and COVID-19 Exposure of Anesthesiologists to Reduce the Use of PPE

6. Increase the dosing of neuraxial medications for labor analgesia (eg, increasing the bupivacaine concentration from 0.0625% to 0.1%) or changing the setting of the programmed epidural intermittent bolus (eg, increasing the volume from 5 to 8 mL, or decreasing the interval from every 45 to 30 minutes) or adding neuraxial adjuvants (eg, epidural clonidine) to minimize intrapartum breakthrough pain requiring epidural top-up.
7. Round on parturients with video or phone calls into the patient's room for hourly assessments of general status and effects of neuraxial analgesia.
8. Ensure appropriate cleaning of all equipment in the room including the epidural pump and the on demand-button.
9. Limit encounters for postpartum rounds by utilization of video—consultations.
10. Consider suspending prolonged patient-controlled epidural analgesia services (if applicable).

LABORING PATIENTS WITH ACTIVE COVID-19 INFECTION

Obstetric Anesthesia and COVID-19

Indication of precaution level (PPE)

In Operating Room:
Airborne protection
(N-95 & fluid shield mask)

In Labor Room:
Contact/Droplet protection
(Surgical mask)

Equipment readiness & access to supplies

OR preparedness
Cover Anesthesia workstation

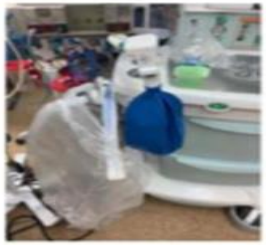
Buckets with supplies
(uncovered here for display)

Propofol
Succinylcholine
Rocuronium
Lidocaine-Epi 2%

Ephedrine, phenylephrine
Atropine, epinephrine, $CaCl_2$
Tranexamic acid
Ondansetron, ketorolac

Spinal kit
Chloraprep™
IV catheters
IV tubing

Anesthesia machine



Endotracheal tube
Suction

HEPA filter
Mask

Figure. Set-up for OR and labor epidural analgesia. HEPA indicates high-efficiency particulate air; IV, intravenous; OR, operating room.

LABORING PATIENTS WITH ACTIVE COVID-19 INFECTION

- A parturient who is symptomatic PUI, or COVID-19 (+), should have CBC before neuraxial analgesia placement.
- Thrombocytopenia may be associated with COVID-19 infection.
- It is generally safe to perform neuraxial procedures at platelet counts of ≥70,000 × 10^6/L.

ANESTHESIA FOR CD

- **In the absence of universal testing** and rapid availability of results, COVID-19 status may not necessarily be known at the time of CD.
- Urgent intrapartum CD represents an important risk factor for failed conversion from intrapartum neuraxial labor analgesia to CD anesthesia—

ANESTHESIA FOR CD

- Ongoing communication with the obstetricians is crucial to allow safe transfer to the OR, and adequate time for initiation of surgical block to avoid GA.
- **To minimize the risk of exposure during urgent ETI, airborne protection (N95 mask) is recommended for all providers in the OR unless the patient is known to be COVID-19 (-).**

INTERIM CONSIDERATIONS FOR OBSTETRIC ANESTHESIA CARE RELATED TO COVID-19

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SOAP RECOMMENDATION Implement pre-hospital screening:

- **For elective procedures (e.g. planned CD, elective induction of labor, cerclage):**
  - Patients should be phoned prior to admission to screen for symptoms consistent with COVID.
  - Screening of the planned support person(s) should be included in this call.

SOAP RECOMMENDATION
Staff, training & equipment:

- Plan and minimize who will be in the room to care for the COVID19 patient during labor and at delivery and CD.
- Log all staff that goes in and out of the room.
- Plan with the neonatal team for potential separation of the infant to reduce the chance of post-partum viral transmission.

SOAP RECOMMENDATION
Staff, training & equipment:

- Simulate scenarios for the care of a COVID19 patient.
- Create COVID19 kits with all equipment including drugs for labor analgesia and CD that would minimize the traffic and would avoid contaminating drug dispensing machines in an OR setting.
- Limit visitors/ support people for suspected and confirmed COVID19 patients per hospital policy.

SOAP RECOMMENDATION
OB Anesthesia specific considerations:

- **Guidelines for management of women COVID19 (+) or PUI:**

  (1) Admit to isolation room, preferably a negative pressure room, and limit the number of care providers.

  (2) Patients and support people should wear a face mask at all times.

  (3) ALL HCWs should implement droplet and contact precautions with eye protection upon entering delivery room (gown, gloves, surgical mask, face shield)

SOAP RECOMMENDATION
OB Anesthesia specific considerations:

(4) Donning and doffing takes time. Avoid emergency situations by anticipating needs:

- Early epidural analgesia may reduce the need for GA for emergent CD.
- A COVID19 diagnosis itself is NOT considered a CI for neuraxial anesthesia.
- Avoid emergent CDs as much a possible – proactive communication with obstetrical and nursing teams. For respiratory distress intubate early using appropriate PPE.
- Assign the most experienced anesthesia provider whenever possible for procedures (neuraxial, intubation)
- Minimize number of personnel in the room.

SOAP RECOMMENDATION
OB Anesthesia specific considerations:

(5) Prior to entering the OR, regardless of the type of anesthesia:

- Anesthesia providers and necessary assistants should implement droplet and contact precautions with eye protection. Risk of an AGP should be evaluated for consideration of airborne PPE precautions (gown, gloves, and N95 with face shield or powered air-purifying respirator (PAPR)).
- Use donning and doffing check lists and trained observers.
- Double glove for ALL procedures and replace the outer layer of gloves after intubation.

SOAP RECOMMENDATION OB Anesthesia specific considerations:

(6) If GA indicated – All personnel in the OR at the time of intubation should wear airborne PPE precautions. Minimize to only essential personnel during intubation –make sure you have some assistance readily available

- Pre-oxygenation should occur with a circuit extension and HEPA filter at the patient side of the circuit
- Use a closed suction system (if available).
- Intubation should occur via a means to maximize success on first attempt and minimize any need to provide bag-mask ventilation (video-laryngoscope)
- Extubation is equally, if not more of a significant risk.

SOAP RECOMMENDATION
OB Anesthesia specific considerations:

(7) As WHO, hospitals are recommending airborne PPE precautions only for special procedures, e.g. AGPs such as intubations/extubations. Institutions may have different institutional guidelines, which should be followed for don/doff.

(8) Since the care of a COVID19 patient is time intensive, additional staffing may be needed, and back-up strategies may need to be developed.

SOAP RECOMMENDATION
OB Anesthesia specific considerations:

(9) It is unknown if the treatment of postpartum pain with NSAIDs will worsen the trajectory of COVID+ patients. NSAIDs can likely continue to be used safely in asymptomatic patients.

(10) Due to potential risks of steroids in the setting of COVID infection, consider avoiding the use of dexamethasone for PONV prophylaxis in PUI/COVID+ patients.

BEFORE ADMISSION FOR DELIVERY

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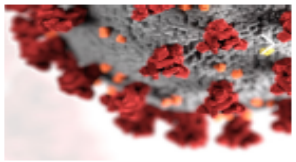

Screen every pregnant patient admitted to your L&D unit

Fever
Cough or shortness of breath
Diarrhea
Close contact with (+) case

Fit-testing for respirators
Donning/doffing training

Use phone/video for pre-anesthesia encounter: Assessment, counseling and consent

Encourage frequent drills:
- Donning/doffing PPE
- Patient transfers
- Intubation

Minimize interactions with patient

Establish back-up coverage for your unit

Keep log of all staff in contact with patient

DURING LABOR & DELIVERY

(for suspected or confirmed COVID-19+)

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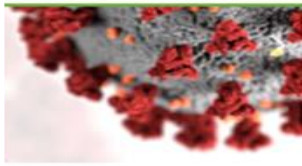

- Admit patient to negative pressure room, if available
- Support person per institutional guidelines
- Pre-anesthesia assessment via phone/video
- Video-assisted electronic multidisciplinary discussions
- Surgical mask for patient at ALL TIMES

PPE for direct patient care

Gloves | Mask | Gown | Face-shield

- PPE cart outside room Paired donning/doffing
- Encourage early neuraxial labor analgesia
- Minimize crash cesareans Response time will be delayed

DURING NEURAXIAL PLACEMENT

(for suspected or confirmed COVID-19+)

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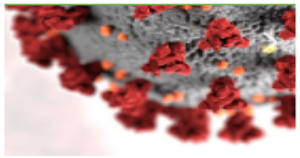

COVID-19 in itself NOT a contraindication for neuraxial analgesia/anesthesia

IV PCA Opioids?
Risk of respiratory depression and emergent airway instrumentation

Assemble a separate COVID-19 neuraxial procedure kit/cart

Rescue medications bag/kit to remain inside labor room

Experienced provider

PPE
DROPLET/CONTACT PRECAUTION
Gloves, gown, face-shield, mask
(per institutional guidance)

DURING CESAREAN DELIVERY

(for suspected or confirmed COVID-19+)

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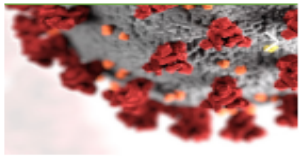

- Activate back-up coverage for L&D
- Assemble kits/bags for neuraxial anesthesia and general anesthesia/intubation
- Identify a ***runner,*** to be stationed outside OR, who will provide help/supplies
- Minimize number of staff per case
- Anesthesia providers and assistants should implement droplet/contact and ideally airborne precautions (N95 or PAPR)
- Use donning/doffing checklists under direct observation
- DOUBLE GLOVE for all procedures
- Consider avoiding Carboprost (Hemabate) if concerns with bronchospasm

3/26/2020

DURING INDUCTION & MAINTENANCE OF GENERAL ANESTHESIA

(for suspected or confirmed COVID-19+)

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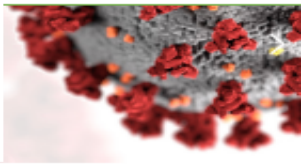

Minimize personnel in OR for induction – only essential staff

PPE for personnel within 6 feet During intubation/extubation
AIRBORNE PROTECTION
Gloves, gown, N95 with face shield or PAPR
(per institutional guidance)

- Ensure HEPA filter between patient and anesthesia circuit
- Pre-oxygenation: 100% O_2
- Rapid sequence induction (RSI)
- Avoid positive pressure bag-mask ventilation except if assisting spontaneous respiratory efforts
- Use video-laryngoscopy if available
- Extubation in the OR to nasal cannula or O_2 mask with low flow
  or
  Consider transferring to ICU or a negative pressure room for extubation
- Maintain surgical mask on patient

If needed: 2 operators,
- one to hold mask with tight seal
- one to manually ventilate (maintain P < 20 cmH_2O, small tidal volume)

CONCLUSION

- Close communication around COVID-19 status of all patients admitted to the LDU is essential, and anticipation of emergencies is of the essence.
- **Overall, providing the best clinical care for pregnant and postpartum women with COVID-19 infection also must take into account strategies to prevent HCW exposure to SARS-CoV-2 and contracting COVID-19.**

REFERENCES

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Thank you

Any Questions?