


Operating Room Guide for Confirmed or Suspected COVID-19 Pregnant Patients Requiring Cesarean Delivery

Veronica M. Gonzalez-Brown, MD¹  Joseph Reno, MD² Heather Lortz, BSN, RNC-OB³
Kasey Fiorini, MD² Maged M. Costantine, MD¹

¹Division of Maternal Fetal Medicine, Department of Obstetrics and Gynecology, The Ohio State University College of Medicine, Columbus, Ohio

²Department of Anesthesiology, The Ohio State University College of Medicine, Columbus, Ohio

³Department of Labor and Delivery, The Ohio State University College of Medicine, Columbus, Ohio

Address for correspondence Veronica M. Gonzalez-Brown, MD, 395 West 12th Avenue, Columbus, OH 43210
(e-mail: veronica.gonzalez-brown@osumc.edu).

Am J Perinatol

Abstract

Keywords

- ▶ coronavirus
- ▶ cesarean delivery
- ▶ COVID-19
- ▶ team-based care
- ▶ protocol

We sought to provide a clinical practice protocol for our labor and delivery (L&D) unit, to care for confirmed or suspected COVID-19 patients requiring cesarean delivery. A multidisciplinary team approach guidance was designed to simplify and streamline the flow and care of patient with confirmed or suspected COVID-19 requiring cesarean delivery. A protocol was designed to improve staff readiness, minimize risks, and streamline care processes. This is a suggested protocol which may not be applicable to all health care settings but can be adapted to local resources and limitations of individual L&D units. Guidance and information are changing rapidly; therefore, we recommend continuing to update the protocol as needed.

Key Points

- Cesarean delivery for confirmed or suspected novel coronavirus disease 2019 (COVID-19) patients
- Team-based approach for streamline care
- Labor and delivery protocols for COVID-19 positive patients

The novel coronavirus disease 2019 (COVID-19) pandemic is an incredibly dynamic and rapidly evolving global health emergency. Protocols and procedures for clinical care management are evolving and require refinement as information continues to become available about the nature and breadth of the disease. With no clinical trials to guide practice, familiarity with the most recent recommendations from the experts in the field will assist in implementing the best possible treatment decisions for patients. To date, there is limited information from published scientific reports about the susceptibility and severity of COVID-19 infection in pregnant women. Avail-

able data in pregnancy are reassuring in regard to vertical transmission and maternal severe morbidities and mortality but are limited to small case series. While the reported series have included women who underwent cesarean delivery, the mode of delivery should be dictated by usual obstetric practice.^{1,2} Cesarean delivery is the most common surgical procedure in the United States and hence, it is essential that protocols to be developed for women with confirmed or suspected COVID-19 infections who require cesarean delivery. In this paper, we describe a protocol we developed for our labor and delivery (L&D) unit.

received

March 27, 2020

accepted after revision

March 30, 2020

Copyright © by Thieme Medical Publishers, Inc., 333 Seventh Avenue, New York, NY 10001, USA.
Tel: +1(212) 760-0888.

DOI <https://doi.org/10.1055/s-0040-1709683>.
ISSN 0735-1631.

Protocol

Our L&D unit consists of 13 labor and delivery rooms and three operating rooms (ORs), with one of them having access to its own substerile scrub room. Therefore, this room has been designated as the preferred room for procedures for patients with confirmed or suspected COVID-19 infection. While some guidelines³ recommend that surgeries on COVID-19 infected patients to be performed in ORs with negative pressure isolation, our ORs and their adjacent substerile rooms, and the preoperative and postoperative recovery rooms are not equipped with a negative pressure ventilation system. However, four of our labor rooms are equipped with a negative pressure ventilation system. To mediate and minimize the risk of infection, patients with confirmed or suspected COVID-19 infection presenting to L&D are placed and evaluated in these specified rooms (if not occupied). The roles and responsibilities of each OR team member are summarized in **Fig. 1**. A nurse, designated registered nurse 1 (RN1) in **Fig. 1**, will be assigned to initiate evaluation and preoperative assessment. RN1 will notify the appropriate team members (charge nurse, obstetric and anesthesia teams, neonatal intensive care unit [NICU], and postpartum charge nurses). RN1 will facilitate phone or video conferencing interviews and consults between the patient and anesthesia, obstetric, and NICU teams. This limits entrance/egress of teams into the patient room prior to procedure, conserving valuable personal protective equipment (PPE).

While RN1 is preparing the patient for imminent transfer into the OR, the surgical scrub technician, and obstetric surgeons (two persons), anesthesia (two persons), and NICU (two persons) teams assemble in the OR. They will don PPE in the substerile preoperative room and scrub to enter the OR. PPE in the OR will consist of N95 masks, face shields, cap, gown, and gloves. All team members will assure instruments and equipment ready for procedure. Two nurses (RN2 and RN3) will be assisting with the surgical procedure as per usual protocol.

Once the patient is ready for surgery, RN1 provides a hand-off report, by phone, to RN2 in the OR. RN1 then transports the patient with the assistance of a designated runner to the OR. Patient will be transported with mask on, and RN1 and runner wearing gloves and masks. When patient arrives to OR door, RN2 and RN3 will accept the patient from RN1, and transfer her from L&D bed to OR bed. L&D bed will be returned to hallway to await RN1, who will disinfect the bed for use after cesarean and place airborne/contact precautions signs on OR door. While the most accepted mode of transmission of COVID-19 is by droplets, an airborne precaution sign is placed at the event as a high-risk aerosolizing procedure is required during surgery (e.g., intubation and suctioning).

Regional or general endotracheal anesthesia may be used for cesarean delivery in pregnant women with COVID-19, but regional techniques are preferable. Regional techniques, including spinal and epidural procedures, eliminate the need for aerosolizing procedures (intubation and extubation) and avoids mechanical ventilation for a patient who

may be difficult to wean postoperatively. The decision about the mode of anesthesia is determined by the urgency of the case, the patient's health history including medications and lab work, and after discussion between the obstetric and anesthesiology teams.² If general anesthesia is indicated, rapid sequence induction and intubation is recommended and a high-efficiency particulate air or viral/bacterial heat moisture exchange filter (HMEF) is placed in the patient breathing circuit. During the procedure, a runner is stationed outside the OR if additional laboratories, medications, or equipment are needed.

At the end of the procedure, patient will complete anesthesia phase-1 recovery in the OR. Although our ORs are positive pressure rooms, extubation will take place in the OR to mitigate the use of personal protection equipment (PPE), staff, and equipment required in the negative pressure laboring room, where patient will complete her postoperative recovery. The obstetrician team (OB) team will doff PPE with the assistance of RN3 and exit the OR. Gown and gloves will be removed in OR prior to exiting, with the remainder of PPE (N95 masks) removed in the substerile room. NICU team will determine location for the neonate. If neonate is stable and does not require NICU admission, the neonate is moved out of the OR, placed in an awaiting isolette, and then transported by the awaiting postpartum nurse to the isolation nursery. If the neonate requires admission to NICU, then a separate NICU team will come to OR doors, receive the neonate from the team in OR and transport the neonate to the NICU. The OR NICU team will remove PPE in OR prior to exiting, except their N95 mask, which will be removed in the substerile adjacent room. One member of the anesthesia team and RN2 will transport patient back to her negative pressure room for continued postoperative care. Similar to other teams, they will remove their PPE in OR with assistance from RN3 and surgical scrub team, except for their N95 mask, which is removed in the substerile room or hallway. After proper hand hygiene, they will then don gloves and surgical masks for transport. Anesthesia team and RN2 will ensure that patient continues to have mask for transport back to room where RN1 receives the patient and continues with her postoperative care.

Back in the OR, the surgical scrub tech and RN3 will ensure that the room is initially stripped down, and instruments and trays removed from the room. RN3 and surgical scrub technician will assist each other to remove PPE prior to exiting OR. The room will remain closed for a minimum of thirty minutes. After this time, a complete decontamination of the room will occur to include all surfaces, screens, keyboards, cables, monitors, neonatal and anesthesia equipment and machines.

Discussion

Here we describe an example of a protocol developed at our institution for confirmed or suspected COVID-19 patients requiring cesarean delivery. This management plan has been distributed to all involved departments and briefed twice daily during our regular morning and evening huddles. We also conduct frequent drills to assure that all team members are

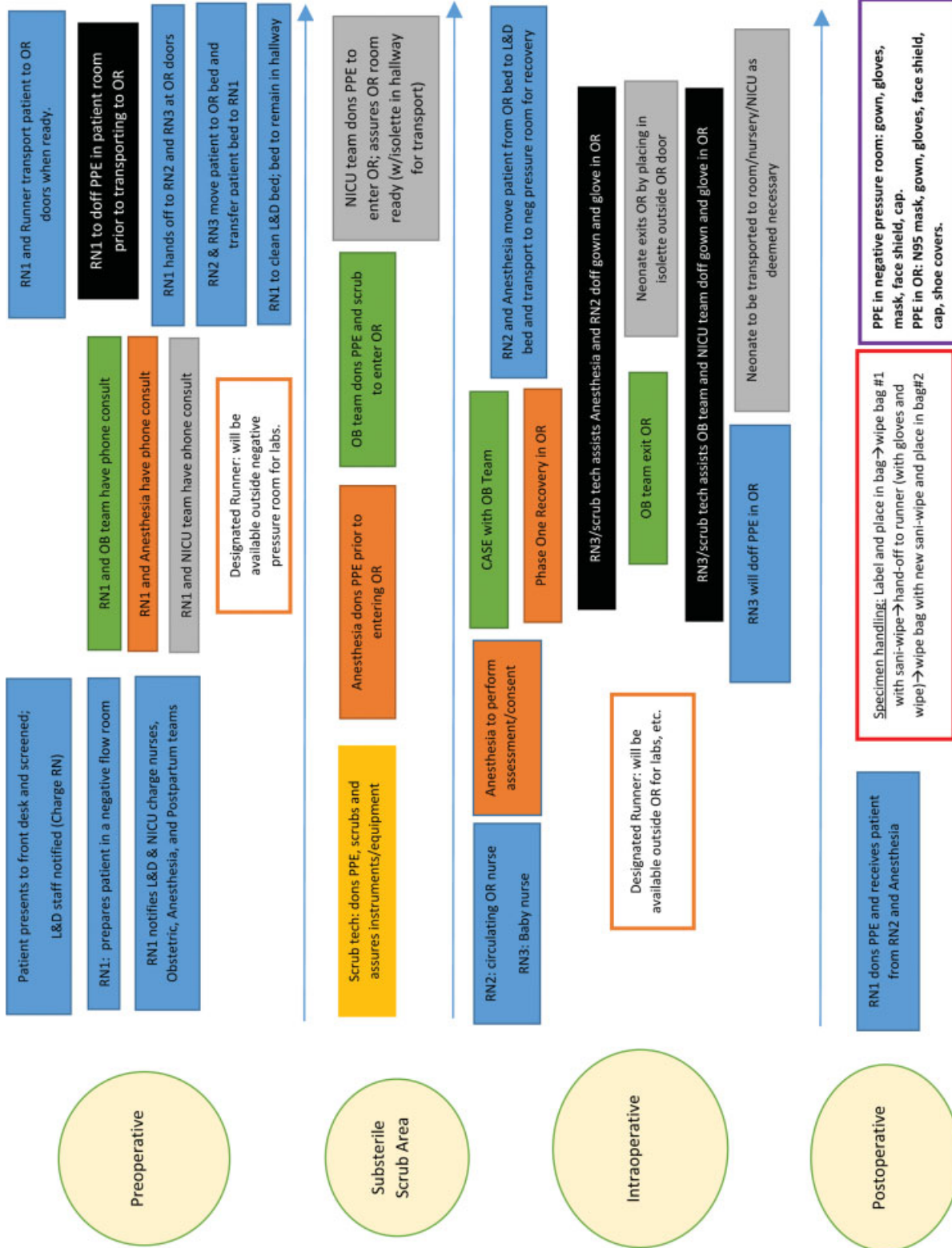


Fig. 1 Algorithm for suspected or confirmed COVID-19 patient necessitating cesarean. COVID-19, novel coronavirus disease 2019; L&D, labor and delivery; NICU, neonatal intensive care unit; OB, obstetrician team; OR, operating room; PPE, personal protective equipment; RN, registered nurse. Colored box indicators: blue box, nursing; orange box, anesthesia; green box, OB; gray box, pediatrics. Note: This protocol and other guidance should be adapted to your specific situation. No guideline can encompass every clinical scenario. Use clinical judgment as needed.

aware of their respective roles. We designed a protocol which can be used in patients requiring regional or general anesthesia to reduce staff confusion. We attempted to minimize staff present inside the OR, and limit air movement and OR door opening.

For patients requiring general endotracheal anesthesia, we recommend rapid sequence induction of anesthesia without positive pressure mask ventilation. Efforts to minimize coughing or patient's intolerance of the mask with subsequent high-flow gas exiting the breathing circuit are critical. While negative pressure ventilation rooms are designed to control the spread of airborne pathogens (e.g., measles and tuberculosis), they have been recommended for confirmed and suspected COVID-19 patients due to their proven effectiveness which helped to avoid cross-contamination during the severe acute respiratory syndrome (SARS) epidemic.⁴⁻⁶ At our hospital, ORs are not equipped with negative pressure systems, and portable high-efficiency portable filters are not recommended. Therefore, we designed our protocol to minimize the risk of aerosolization while performing cesarean delivery in a timely manner. Our protocol initiates with patient coming in through triage; however, this process remains the same if a patient is laboring and necessitates cesarean delivery. The laboring nurse becomes the preoperative and postoperative care nurse. Patients and staff are aware that an emergency "stat" cesarean delivery takes longer than usual, therefore it is imperative for obstetric team to be proactive to reduce the risk of emergency delivery. This protocol is not applicable to all health care settings and may be adapted based on resources and limitations of individual L&D units. We do not have sufficient measurable outcomes on its implementation to date, but it has improved our staff readiness for management of these patients.

Conclusion

In conclusion, we set out to describe a protocol designed to streamline the care processes of confirmed or suspected COVID-19 patients requiring cesarean delivery, and to mini-

mize risks of exposure to other patients and health care staffs.⁷ Guidance and information are changing rapidly; therefore, we recommend to continue to update the protocol as needed.

Note

The opinions and assertions contained herein are the private opinions of the authors and are not to be construed as official or reflecting the views of the Ohio State University, Department of Defense, or the Uniformed Services University of the Health Sciences.

Funding

None.

Conflict of Interest

None declared.

References

- 1 The Society for Maternal-Fetal Medicine; Dotters-Katz S, Hughes B. Coronavirus (COVID-19) and pregnancy: what maternal-fetal medicine subspecialists need to know. Available at: https://s3.amazonaws.com/cdn.smfm.org/media/2262/COVID19_PDF.pdf. Accessed April 2, 2020
- 2 Chen H, Guo J, Wang C, et al. Clinical characteristics and intra-uterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet* 2020;395(10226):809-815
- 3 Matos R, Chung K, et al. DoD COVID-19 practice management guide. *Clinical Management of 2019;COVID-19*:23
- 4 Wen X, Li Y. Anesthesia procedure of emergency operation for patients with suspected or confirmed COVID-19. *Surg Infect (Larchmt)* 2020;21(03):299
- 5 Twu SJ, Chen TJ, Chen CJ, et al. Control measures for severe acute respiratory syndrome (SARS) in Taiwan. *Emerg Infect Dis* 2003;9(06):718-720
- 6 Qian H, Li Y, Sun H, Nielsen PV, Huang X, Zheng X. Particle removal efficiency of the portable HEPA air cleaner in a simulated hospital ward. *Build Simul* 2010;3:215-224
- 7 Guan WJ, Ni ZY, Hu Y, et al; China Medical Treatment Expert Group for Covid-19. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med* 2020. Doi: 10.1056/NEJMoa2002032. (e-pub ahead of print)