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Building an obstetric intensive care unit during the COVID-19 pandemic at a tertiary hospital and selected maternal-fetal and delivery considerations

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ABSTRACT

During the novel Coronavirus Disease 2019 pandemic, New York City became an international epicenter for this highly infectious respiratory virus. In anticipation of the unfortunate reality of community spread and high disease burden, the Anesthesia and Obstetrics and Gynecology departments at NewYork-Presbyterian / Columbia University Irving Medical Center, an academic hospital system in Manhattan, created an Obstetric Intensive Care Unit on Labor and Delivery to defray volume from the hospital's preexisting intensive care units. Its purpose was threefold: (1) to accommodate the anticipated influx of critically ill pregnant and postpartum patients due to novel coronavirus, (2) to care for critically ill obstetric patients who would previously have been transferred to a non-obstetric intensive care unit, and (3) to continue caring for our usual census of pregnant and postpartum patients, who are novel Coronavirus negative and require a higher level of care. In this chapter, we share key operational details for the conversion of a non-intensive care space into an obstetric intensive care unit, with an emphasis on the infrastructure, personnel and workflow, as well as the goals for maternal and fetal monitoring.

Goals of the unit in the setting of COVID19 pandemic

In the face of the COVID-19 pandemic, healthcare facilities have had to undergo a restructuring and reallocation of resources, due to the increasing demand for intensive care unit (ICU) beds for the treatment of patients diagnosed with SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), the novel coronavirus. Located in one of the international epicenters of the pandemic, NewYork-Presbyterian (NYP) / Columbia University Irving Medical Center (CUIMC) was the first institution in New York City to place elective surgeries on hold so that operating rooms and resources diverted to management of ventilated and ICU-level COVID-19 infected patients. It was projected that at the peak of the crisis, an

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increase from 421 ICU beds to nearly 1000 critical care beds would be required – more than twice the NYP enterprise's usual capacity.[1] Construction was undertaken to create much-needed ICU space using operating rooms and procedure suites, with capabilities for negative pressure and piping in oxygen.[2]

Due to the demand placed on existing ICUs and the anticipated increase in need, the Obstetrics and Anesthesiology Departments at CUIMC created an alternative setting to care for COVID-19 and non-COVID-19 infected critically ill pregnant and postpartum patients requiring ICU level-of-care. With the goal of providing quality of care on par with the existing ICUs in the system, this shift required not only a conversion of facilities and equipment, but also an expansion of critical care knowledge and competency among providers at all levels. Since patients with a diverse set of diagnoses would be receiving treatment in the same space now known as the Obstetrical ICU (OBICU), safety protocols were implemented that encompassed care of pregnant patients with a highly infectious virus as well as those with critical medical and obstetrical issues. The functioning of such a unit required an interdisciplinary approach, with collaboration between multiple medical specialties and supportive services including maternal-fetal medicine (MFM), obstetric anesthesia, neonatal ICU (NICU), adult and pediatric critical care medicine, nursing, pharmacy, respiratory therapy, perfusion medicine, physical therapy, social work, and supply managers ***(see Fig. 1)***. As the subspecialist experts in critical care of obstetric patients, the MFM specialists and obstetric anesthesia physicians co-led the provision of critical care due to their understanding of physiological changes in pregnancy affecting health status, awareness regarding processes with potential for in-utero compromise, and alertness of complications endangering fetal well-being. Due to the acute and variable nature of diagnoses in the OBICU, providers needed to remain flexible and responsive to dynamic changes in unit flow and patients' condition. Coordinated teamwork and communication between providers and staff was paramount in creating a safe and successful environment.

Fig. 1 – Patient centered approach Adapted from Scott *et. al.*[7]

OBICU infrastructure

Prior to the COVID-19 pandemic, our Labor and Delivery (L&D) unit consisted of 10 private labor and delivery rooms and a high-risk unit comprising of three rooms with two beds in each, where patients requiring a higher level of maternal or fetal care were managed. Importantly, these beds had telemetry capability for patients undergoing invasive monitoring during administration of vasopressors and inotropic medications, as well as fetal monitoring, but did not have ventilator capacity. Using our high-risk unit space, we established a six-bed OBICU comprised of three pods ***(see Fig. 2)*** that could accommodate ICU-level critically-ill obstetric patients, including those who required mechanical ventilation. Integrating our OBICU into the high-risk space on Labor and Delivery not only preserved the advantage of close proximity to the obstetrical operating rooms, in case of urgent surgery for maternal or fetal indications, but also allowed our team to care for the majority of our obstetrical patients – including critically ill COVID-19 infected antepartum or postpartum women - while alleviating some of the burden on the existing medical and surgical ICUs.

The first challenge, given the specific concerns of the pandemic, was ensuring that each pod was converted into a room with negative pressure ventilation so that aerosol-generating procedures (AGP) that may be needed in obstetric patients with severe COVID-19 infection, such as nebulizer treatments, high flow nasal oxygen delivery, bilevel positive airway pressure (BiPAP), continuous positive airway pressure (CPAP) therapy, and tracheal intubation could be performed without increasing the exposure risk for healthcare providers or the other patients and staff in the vicinity. Facilities management services performed assessments of each room to ensure that the gas connections were adequate for the ventilators and assessed airflows to determine the necessary modifications to achieve negative pressure. A phased approach for converting each pod to negative pressure was undertaken immediately, and the first room was successfully converted within five days of program initiation. This entailed installation of a negative pressure machine and construction of an airtight exhaust pathway through which air from the machine could escape out of the room in a unidirectional fashion.

The following equipment was initially included in each pod: a set up for up to two ventilators (stored offsite to prevent contamination), two cardiac monitors, two fetal heart rate monitors, an electronic medical record (EMR) computer station, a medication scanner, a label printer, a nursing equipment cart, and a point-of -care analyzer to facilitate rapid testing for blood gasses, electrolytes, and metabolites. Additional equipment ordered for each pod included a surveillance camera with audio and video capabilities to ensure that ventilator alarms and settings could be appropriately surveilled, as well as to facilitate remote monitoring by clinical staff. All other necessary equipment including the code cart, medication storage unit, electrocardiogram (EKG) machine, and portable bedside ultrasound machines (for maternal and fetal point of care assessment) were located centrally in the OBICU. The medication cart in the OBICU was

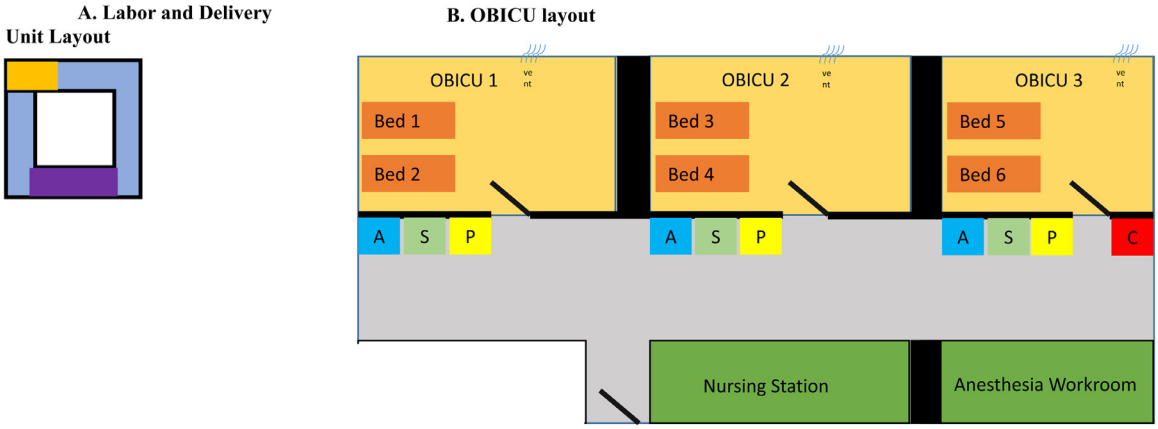

Fig. 2 – OBICU Infrastructure - physical structure.

stocked with standard ICU-appropriate medications including a range of cardiac drugs (e.g. vasopressors, inotropes, and antiarrhythmics) and anticoagulants, in accordance with our standard hospital pharmacy practices. Personal protective equipment (PPE) was stored outside of each pod according to institutional Infection Control and Prevention guidance, based on individual patient circumstances. Donning took place outside the negative pressure room (in the hallway) and doffing of gowns inside the negative pressure room (and masks outside).

Staffing

Several studies have shown that the organizational structure of an ICU influences patient outcomes and an OBICU is no exception.[3] The establishment of such a unit for the treatment of critically ill patients depends on hospital size and available resources.[4] In the last decade, there has been emerging interest in increasing the efficient allocation of healthcare resources, including staff distribution for critically ill patients.[5,6] This is a crucial issue in times of the COVID-19 pandemic, given the personnel re-deployment throughout New York State and the need for adequate staffing while preserving PPE and minimizing staff exposure. Similar to other critical care units, the ideal nurse-patient ratio is 1:1 or 1:2, depending on the clinical acuity and the needs of both the patient and her fetus. Alternatively, for a postpartum patient, an OBICU nurse has the additional responsibilities of helping with the psychosocial needs of the patient facing concerns about her COVID-19 infection and obstacles in bonding with her newborn due to the ICU environment. With an unstable patient, a 2:1 nurse-patient ratio may be needed so that a critical care nurse is at the bedside managing cardiopulmonary monitoring, blood draws, and medication administration while the critical care obstetrics (CCOB) nurse provides fetal monitoring, resuscitation and observes for symptoms of preterm labor.[7]

Our care team model was adapted from the NewYork-Presbyterian concept of supervised pyramid-staffing.[1] Our staffing model is described below and outlined in *Fig. 3A-3B*. The first-call physician responsible for patient management was a senior obstetric resident or MFM fellow. This physician was immediately available at all times and, ideally, performed an

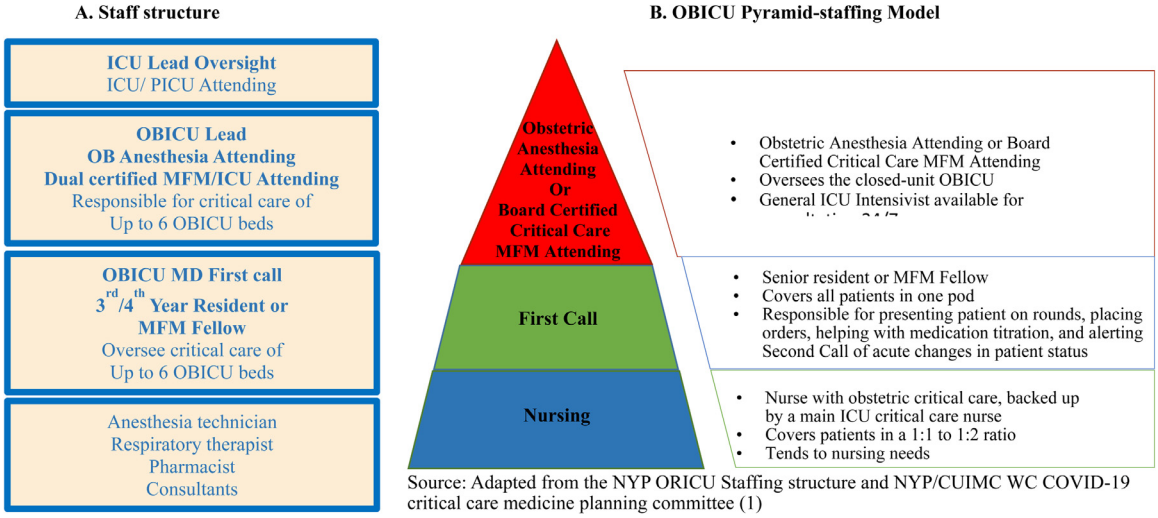

Fig. 3 – (A) Staff structure. (B) OBICU Pyramid-staffing Model.

assessment approximately every two hours, to ensure stable maternal and fetal status, given the potential unpredictable course in critically ill obstetric patients. The first-call physician reported directly to the obstetric anesthesia attending (dedicated to OBICU coverage 24/7) or a dual certified obstetrician in MFM and critical care, who functioned as the OBICU attending physician responsible for oversight of all patients in the OBICU. In certain cases, an obstetric anesthesia fellow was involved and served as a second call while working closely with the obstetric anesthesia attending. A designated intensivist in one of the main ICUs was available 24/7 for consultation if deemed needed by the OBICU attending. The existing model of 24/7 labor and delivery coverage by core MFM attending physicians and fellows was preserved, which facilitated multidisciplinary rounds and management discussions around the clock.

A multidisciplinary team approach was applied to our closed OBICU with leadership from MFM, anesthesia, nursing, NICU, critical care medicine, pediatrics, respiratory therapy, physical therapy, perfusion medicine, and pharmacy who designated daily experienced personnel to staff the unit (8) ***(see Fig. 1)***. No specific guidelines exist to inform the OBICU leadership structure, however given the level of expertise required, our OBICU was led 24/7 by a certified obstetric anesthesiology attending or a dual-certified obstetrician in MFM and ICU care. To address the inevitable mental health sequelae on our patients, psychologists and social workers through our Women's Mental Health Department were also an integral part of our OBICU team. Case managers, nutritionists, and spiritual care services were also involved.

In accordance with the Task Force of the American College of Critical Care Medicine and the Society of Critical Care Medicine guidelines,[7,9] there were also designated medical and nursing directors responsible for assuring appropriate patient triage through enforcement of our newly developed protocols for patient admission and discharge.

Workflow

To ensure alignment with the existing coverage on labor and delivery and minimize handoffs, we designed a schedule based on 12-hour shifts, with shift changes at 7am and 7pm daily.

The first two hours of the shift were dedicated to data gathering, prior to the interdisciplinary rounds that occurred daily at 9am and 9pm. Given our high volume and acuity on labor and delivery, the OBICU attending, the L&D MFM attending and fellow, and the OBICU first-call physician huddled to discuss obstetric concerns prior to formal OBICU rounds. A checklist was developed to ensure a smooth transition between teams and ensure availability of all needed equipment, housekeeping and personal protective equipment ***(see Table 1)***. The OBICU first-call physician and the OBICU attending then led formal interdisciplinary rounds with the first-call physician presenting the patient course, following a specific systems-based presentation approach. Consulting providers and respiratory therapists were informed of rounds and attended as their other clinical responsibilities allowed. The respiratory therapist rounded independently with the registered nurse and made recommendations based on the patient's clinical status. The OBICU attending and team were immediately notified of any need for escalation in patient's oxygen delivery.

Table 1 – OBICU Daily Huddle.

Leaders: MFM and OBICU lead attending before OBICU Attending Rounds

Include interdisciplinary team: OB and ICU nurses, OBICU and MFM team physicians, nursing leadership, respiratory therapists if present

Checklist:

- ☐ Review patient census:
  - Clearly designate OBICU, Step-down, or High-Risk level of care
  - Clearly designate primary care team as OBICU or MFM Team
- ☐ Review PPE access
- ☐ Review medication access issues
- ☐ Discuss any equipment shortages
- ☐ Discuss housekeeping issues (room cleaning, trash removal, etc.)
- ☐ Ensure staff assignments are up to date
- ☐ Review where emergency numbers are

Considerations for patient tracking and documentation included designating the OBICU as a new ICU location within the EMR and granting access to include ICU note templates and order sets for the providers for the OBICU.

Education

The increasing societal need for intensivists calls for more attention to critical care training for medical students, residents and fellows. Studies show that patients' outcomes are improved when cared for by a board certified intensivist,[10–12] hence the increasing focus on promoting intensive care educational efforts. The acute demands of the COVID-19 pandemic inspired a hospital-wide ICU expansion project and accompanying this, the dissemination of virtual critical care education sessions, with the goal of providing timely education to non-ICU clinicians.[1] The staff were also encouraged to access the Society for Maternal Fetal Medicine (SMFM) webinars on COVID-19 and Critical Care, as well as the Society for Critical Care Medicine lecture series Critical Care for Non-ICU Clinicians.[13,14]

The ICU is very dynamic and provides a unique environment for active learning. Keeping this in mind, our OBICU staffing included residents and fellows as integral team members. Most teaching occurred during attending rounds. There were no medical students involved given COVID-19 guidelines to reduce exposures. During our interdisciplinary rounds, care was taken to involve OB/GYN residents and MFM fellows in the presentation of patients and the management discussions, to promote the continuing education of the staff. The opportunity to interface directly with other ICU team members ensured trainees' exposure to obstetrical ICU care and management that will persist beyond COVID-19-related issues. Specifically, on rounds, physician leadership highlighted concepts including the physiologic changes that occur during pregnancy, system changes implemented during the pandemic, basic ventilator setting, ICU essentials, and

rationale for treatment and monitoring of critically ill patients, and indications for delivery in appropriate patients.

Educational considerations extended to the nursing staff as well. In addition to the online education options to enhance background knowledge as noted above, there were clinical skills that required partnerships with nurses from the ICU or post-anesthesia care unit (PACU). While the labor and delivery unit already has a designated core of critical care obstetrics (CCOB) nurses who are experienced with running infusions and interpreting cardiac monitors, most are unfamiliar with the full range of ICU infusions (e.g. sedatives, anti-arrhythmics, and inotropes) and none are experienced with ventilator management. The CCOB nurse provided the insight into anticipated maternal and fetal physiology as well as expertise in fetal monitoring.

Designated medical and nursing directors also played a leading role in education, by assuring appropriate patient triage according to admission and discharge criteria as well as by communicating with other unit directors and staff to ensure quality of care and appropriate provision of services. The co-directors of the OBICU -a dual MFM / critical care and an obstetric anesthesia attending, in collaboration with the nursing manager, oversaw the implementation of technology, care protocols, guidelines, disease care bundles, and endeavors to improve patient safety and infectious disease control.

Minimizing staff exposures

With the arrival of this pandemic, heightened precautions were observed in order to minimize staff exposures to the SARS-CoV2 virus. COVID-19 infected patients were cohorted together in a pod deemed COVID-19 positive. Every effort was made to consolidate as many tasks as possible in an encounter, in order to preserve PPE and minimize frequency of exposure. During rounds, all communication between members of the team regarding the course, overnight events, as well as assessment and plan for patients was conducted at the OBICU station prior to entering rooms and performing a physical exam ***(see Fig. 2A-2B).*** A single provider entered the room to perform an exam and discuss the plan of care with the patient. Each provider had an N95 mask that was worn underneath a regular surgical mask to preserve PPE. Based on recent evidence from our institution of the high numbers of asymptomatic patients on L&D who tested positive for the SARS-CoV-2 virus, our protocols evolved over time to require that every provider wore the necessary PPE (face shield or goggles, N95 mask, gown, gloves, bouffant cap) unless the reverse transcription polymerase chain reaction (RT-PCR) screening performed on admission had returned with a negative result.[15]

Notably for certain subspecialty services, consultations with the NICU providers, psychologists, social workers, as well as some interactions with the obstetrical team as appropriate were provided via telemedicine to minimize staff exposures.

Transitions in level of care

The staff from the outpatient units, labor and delivery unit, and postpartum floors worked closely with the inpatient team in the event that a patient needed evaluation for the OBICU. Following proposed guidelines for OBICU level of care, once a patient was deemed eligible by the OBICU team for transfer, nursing leadership was contacted to facilitate room allocation, nursing assignment and handoff. Patient transport services were contacted and the accepting OBICU first call physician assisted in coordinating patient transfer in a timely manner. Once the patient was transferred, the assigned ICU nurse, first call physician, when applicable (see *Fig. 3B*) and OBICU attending evaluated the patient. Consultants were contacted by the first call physician who made plans throughout the shift with the lead attending.

Patient inclusion criteria for OBICU

In a two-year experience with 483 critically ill peripartum women in Parkland Hospital, two thirds had obstetric complications, including pregnancy-associated hypertension and obstetric hemorrhage. Non-obstetric medical disorders were common in the other one third of women.[4] This provides an example of what we expected in our OBICU, with the anticipation of increased medical disorders due to COVID-19 infection. Guidelines for admission to our OBICU are outlined in *Table 2*, though this was by no means an exhaustive or exclusive list. The diagnoses were intentionally open-ended, leaving room for clinical judgement regarding level of care and management on a case-by-case basis. In our institution, the COVID-19 pandemic changed the flow of obstetric patients, by maintaining critically ill patients in our OBICU who ordinarily would have been sent to a medical ICU for respiratory or hemodynamic support. However, given the highly specialized supportive services at our institution, (eg. patients with neurological disorders or cardiothoracic disease or injury), transfer to a specialized ICU such as the Neurosurgical ICU or Cardiothoracic ICU was still considered if clinically indicated. Patients in our OBICU with worsening acute respiratory distress syndrome (ARDS) despite maximal ventilator support were also considered candidates for transfer to one of the ICUs with a dedicated team for prone ventilation.

Maternal monitoring in OBICU

Antepartum patients with COVID-19 infection admitted to the OBICU were on telemetry with the goal oxygen saturation greater than or equal to 95% to ensure adequate fetal oxygenation.[16] For postpartum COVID-19 infected patients, oxygenation goals were lower (greater than 92%), consistent with our institution's general adult management guidelines. While guidelines surrounding maintenance of hemodynamic stability generally target a mean arterial pressure (MAP) of at least 65 mmHg, clinical assessment of adequate perfusion, including maternal parameters (e.g. urine output, peripheral perfusion, laboratory assessment such as lactate and end organ function) and continuous fetal monitoring when obstetrically appropriate, took precedence in management decisions. In patients with COVID-19 pneumonia, continuous maternal blood pressure monitoring with an arterial line was also

Table 2 – Criteria for OBICU Admission.

Obstetric complications	Complications of preeclampsia, HELLP syndrome, eclampsia
	Acute fatty liver of pregnancy
	Bleeding disorders (secondary to DIC from abruption, peripartum or postpartum hemorrhage), severe hemorrhage
	Complicated peripartum hysterectomy (eg. from placenta accreta spectrum)
	Amniotic fluid embolism
	Cardiac dysfunction with relative or absolute contraindications to pregnancy
	Peripartum cardiomyopathy
	Respiratory failure due to obstetrical infection or sepsis (endometritis, necrotizing fasciitis, chorioamnionitis)
Medical complications	Sepsis
	Diabetic ketoacidosis
	Thyroid storm
	Active venous thromboembolism (on heparin drip)
	Acute respiratory distress syndrome (secondary to pyelonephritis, COVID-19)
	Severe asthma exacerbation or pneumonia
	Significant kidney injury or renal failure (requiring dialysis)
	Symptomatic electrolyte abnormalities
	Hemodynamically stable GI bleeding or liver failure
	Ruptured viscus
	Drug overdose or withdrawal (toxidromes/overdose); alcohol withdrawal
Surgical complications	Complicated appendicitis, cholecystitis, pancreatitis
	Surgical injury during cesarean delivery
	Trauma-related injuries
Anesthesia complications	High spinal
	Adverse medication reaction
	Malignant hyperthermia
Medical-surgical intensive care requirements	Mechanical ventilation
	Impending cardiac or respiratory compromise necessitating ventilation or ECMO
	Persistent pressor requirement
	Hemodynamic instability necessitating invasive hemodynamic monitoring
	Inotropic drugs
	Life threatening arrhythmia
	Coma

HELLP: hemolysis, elevated liver enzymes, low platelet count.
ECMO: extracorporeal membrane oxygenation.

favored to ensure frequent blood draws, most importantly serial arterial blood gasses (ABG).

Fetal monitoring in OBICU

There has been significant debate surrounding fetal monitoring guidelines in the ICU, measures for fetal resuscitation in cases of non-reassuring fetal heart tracing, and effects on maternal and fetal outcomes. One of the major advantages of an OBCIU with proximity to the L&D unit was co-location with operating rooms fully equipped for maternal and neonatal resuscitation as well as immediate availability of MFM providers, L&D nursing staff, obstetric anesthesia, and neonatology. Decisions regarding fetal monitoring were based on gestational age, patient or healthcare proxy/surrogate desires, fetal prognosis, and clinical status. Based on our Level IIIC NICU, we were able to offer full resuscitation to women starting at 23 weeks gestation following appropriate counseling by our NICU team. If fetal resuscitation was appropriate and desired, continuous electronic fetal monitoring was maintained throughout a patient's care and management in our OBICU. It is important to note that maternal hypoxemia was one of the most common causes of fetal heart rate decelerations in our pregnant OBICU patients, which was ameliorated with oxygen supplementation and improved maternal status. Thus, fetal monitoring when performed provided an additional vital sign to ensure adequate maternal resuscitation.

Obstetric considerations during the COVID-19 pandemic

Acute COVID-19 has been reportedly associated with high rates of preterm delivery, with emerging cases studies describing preterm delivery rates as high as 47%.[17] Standard treatment was adopted in patients presenting with preterm labor with no risk of imminent delivery, with some success reported.[18] Hence, in the absence of maternal compromise as described above, or in the presence of risk for early delivery at less than 34 weeks, corticosteroids should be administered, and standard preterm labor management initiated.[16,19] Although earlier studies in mid-March 2020 suggested that NSAIDs may worsen clinical status among COVID-positive patients, the Food and Drug administration issued a

statement disproving this claim due to lack of evidence, suggesting no difference in antipyretic use (NSAIDs and acetaminophen), thus allowing indomethacin use for tocolysis.[19,20] Nifedipine may also be used as a tocolytic agent, except in cases of septic shock and maternal hypotension; beta sympathomimetics should be used with caution as some admitted OBICU patients may already be tachycardic due to their disease process.[20]

In terms of corticosteroids use and COVID-19 infection, the NIH Panel guidelines state that antenatal corticosteroids (betamethasone and dexamethasone) should be reserved for fetal indications.[20] This is supported by both the American College of Obstetricians and Gynecologists (ACOG) and SMFM, who also recommend against administration of corticosteroids in the late preterm period (34 0/7 weeks – 36 6/7 weeks) as the reported benefits during that gestational age window are less well established.[16,19] Risks and benefits of corticosteroid administration in a patient infected in COVID-19 should be carefully considered when preterm delivery is likely, to avoid worsening maternal status. If delivery is imminent with insufficient time for corticosteroids administration and fetal benefit, then they should not be given.

Delivery and pregnancy termination in the critically-ill pregnant patient

Delivery or termination of pregnancy may be considered in various circumstances when pregnant patients are critically ill. The physiologic alterations of pregnancy make it essential that the intensivist considers not only the impact of the disease process in the context of these changes, but also the maternal and fetal risk-benefit ratio of managing disease in a pregnant versus a non-pregnant state. As is the case with fetal monitoring, these discussions are complex and involve shared decision-making between the patient and/or the patient's healthcare proxy/ surrogate, as well as the multidisciplinary care team including the critical care team, anesthesia, MFM, and potentially NICU. For instance, in critically ill patients with severe respiratory disease in their third trimester, their physiological changes of pregnancy particularly later in gestation, namely decreased inspiratory and expiratory reserve volumes and functional residual capacity, may hinder effective ventilation of the gravid patient.[16-21] In such cases, as maternal status worsens, SMFM recommends delivery following a careful discussion with MFM and the intensivists.[16] Requiring mechanical ventilation itself is not an indication for delivery and the decision to deliver should be carefully considered particularly at less than 30–32 weeks gestation.[16]

In the context of the COVID-19 pandemic, a recent United States multicenter cohort study reported that 50% of pregnant women hospitalized for severe or critical illness, mostly in the third trimester, were delivered during the course of their infection. Cesarean section was the mode of delivery in 75% of patients with the most common indication for delivery (69%) being worsening maternal status.[22] However, attempting labor and vaginal delivery could be an appropriate option depending on the patient's clinical status, degree of urgency for delivery, as well as risks of surgical management and benefits of an induction in the absence of spontaneous term labor or advancing preterm labor.

Conclusions

Acutely ill obstetric patients are well-placed in an OBICU, as obstetricians are familiar with the delicate balance between maternal treatment and fetal well-being, which can present medical and ethical dilemmas. Decreased maternal oxygenation and decreased organ perfusion can adversely affect a fetus, and fetal heart monitoring is essential for medical decision-making and delivery timing. The complex interplay of maternal and fetal needs in a critically ill pregnant patient requires a multidisciplinary approach for care management, including obstetricians, obstetric anesthesiologists, neonatologists, and other specialists, as well as nursing and other healthcare support staff.

While most ICU admissions in peripartum patients are related to complications from hypertensive disease, hemorrhage and infection[4,7] the onset of the pandemic has brought in overlapping concerns regarding the sequelae of respiratory compromise from COVID-19 to the forefront. Responding rapidly to early warning signs of respiratory decompensation or worsening disease, following treatment protocols and best practices, working with interdisciplinary subspecialists, encouraging collaboration between physicians and nursing, and evaluating shortcomings in the system, were important elements in developing an effectively functioning OBICU that prioritized patient care and was optimized to provide the best possible outcomes for patients.

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