

# Clinical outcomes of women with COVID 19 during pregnancy: an update

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## Abstract

*In December 2019, a cluster of four cases of pneumonia of unknown etiology in Wuhan, China, were reported to the World Health Organization (WHO). Since then, the world has seen unprecedented effects of this virus on our health and life in general and every country of the world has been affected. Pregnant women are considered the most vulnerable population and clinical trials and research are going on to ensure the safety of mother and the fetus during this pandemic. The data regarding management of pregnancy during COVID-19 era is evolving every day. In this review, we evaluate the recent evidence of the effects of SARS-CoV-2 infection throughout pregnancy and provide a balanced and informed evidence-based management of pregnancy during the COVID-19 era.*

**Key words:** COVID-19, pregnancy, SARS-CoV-2.

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## INTRODUCTION

Since the appearance of the virus causing coronavirus disease 2019 (COVID 19), in Wuhan, China in December 2019, it has quickly spread globally and has been declared a pandemic by the World Health Organization (WHO) in March 2020.<sup>1</sup> The number of infected individuals is continuing to rise and as of 13<sup>th</sup> November 2020, approximately 53 million individuals have been infected, with a mortality rate of about 2.44%.<sup>2</sup>

Pregnant women have a disproportionately higher risk of complications from other types of viral pneumonia; however, little is known about the full impact of COVID 19 in pregnancy. Pregnant women are uniquely

susceptible to severe illnesses caused by viral infection, possibly due to the shift from cellular to humoral immunity during pregnancy and the puerperium.<sup>3</sup>

The present article reports what is currently known about pregnancy outcomes among women with COVID 19 infection at the time of publication. This information is likely to continue to evolve as the course of this novel disease unfolds.

## COVID-19 pandemic: Bangladesh scenario

United Nations International Children's Emergency Fund (UNICEF) has predicted that some 2.4 million babies will be born under the shadow of the COVID-19 pandemic in Bangladesh.<sup>4</sup>

Globally, the number is 116 million.<sup>4</sup> These babies are projected to be born up to 40 weeks after COVID-19 was recognized as a pandemic on March 11 2020. Bangladesh ranks at number 9 in terms of the highest expected number of births during this period.<sup>4</sup>

Even though there is no significant change in the maternal mortality ratio and neonatal mortality rate, an analysis of data in the Directorate General of Health Services (DGHS) dashboard shows that since the beginning of the COVID-19 crisis, there is a significant reduction in the uptake of maternal and newborn health services at the health facilities.<sup>4</sup>

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Only 33 district hospitals in Bangladesh were performing all key functions of emergency obstetric care out of 63 during May 2020.<sup>4</sup>

Between 8 March and 9 November 2020, according to the DGHS Press Release, there were four hundred twenty-one thousand nine hundred twenty-one (421,921) COVID-19 confirmed by rRT-PCR, including six thousand ninety-two (6,092) related deaths (CFR 1.76%). Bangladesh is the top 22nd country in the world and accounts for about 1% of the COVID-19 disease burden in the world.<sup>5</sup>

### Transmission

Pregnant women do not appear more likely to contract the infection than the general population.<sup>6-8</sup> Pregnancy itself alters the body's immune system and response to viral infections in general, which can occasionally cause more severe symptoms. This may be the same for COVID-19 but there is currently no evidence that pregnant women are more likely to be severely unwell, need admission to intensive care, or die from the illness than non-pregnant adults.<sup>9</sup>

With regard to vertical transmission (transmission from woman to her baby antenatally or intrapartum), evidence suggests that vertical transmission might be possible.<sup>10</sup> However, the initial data from China have shown that there was no evidence of the coronavirus in amniotic fluid samples, cord blood, neonatal throat swabs, placental swabs and genital fluid from COVID-19 infected mothers.<sup>11-15</sup> At present, there are some emerging evidence at present suggesting that vertical transmission is probable. Two reports have published evidence of immunoglobulin M (IgM) for SARS-CoV-2 in neonatal serum at birth.<sup>1,16</sup> Another recent report has demonstrated a high SARS-CoV-2 viral load in the placenta, associated with a maternal viraemia and followed by a neonatal infection, including neurological manifestations with inflammatory changes in the neonatal cerebrospinal fluid.<sup>17</sup> In the interim report from the UK Obstetric Surveillance System (UKOSS), six babies (2.5%) had a positive nasopharyngeal swab within 12 hours of birth.<sup>18</sup> In a systematic review of 24 pregnant women with COVID-19, there was no evidence of SARS-CoV-2 on polymerase chain reaction (PCR) testing of placenta, amniotic fluid, cord blood or breastmilk samples.<sup>19</sup> In a larger systematic review of 666 neonates born to women with confirmed COVID-

19, 28 out of 666 (4%) neonates had confirmed COVID-19 infection postnatally. The study showed that neonatal COVID-19 infection is uncommon and the rate of infection is no greater when the baby is born vaginally, breastfed or stays with the woman after birth.<sup>20</sup>

### Effect of COVID-19 on pregnant women

Available data suggest that pregnant women with COVID-19 may be at increased risk for more severe illness compared with nonpregnant peers.<sup>21-24</sup> Specifically, these data indicate an elevated risk of intensive care (ICU) admissions and mechanical ventilation. No increase in the rate of mortality has been noted. Pregnant patients with comorbidities such as obesity and gestational diabetes may be at an even higher risk for severe illness consistent with the general population with similar comorbidities.<sup>18,21,24</sup> Importantly, analyses so far are limited by a large amount of missing data and the fact that many reports do not include an appropriate nonpregnant comparative control group.

Although these data from the Centres for Disease Control and Prevention (CDC) suggest an increase in risk of severe outcomes in pregnant women with SARS-CoV-2 infection, the absolute risk is still substantially lower than that of pandemic H1N1 influenza infection during pregnancy.<sup>25,26</sup>

### Symptoms of COVID-19 in pregnant women

Most pregnant women who are infected with SARS-CoV-2 will experience only mild or moderate cold/flu-like symptoms.<sup>27</sup> The PregCOV-19 Living Systematic Review has so far included over 11 000 currently and recently pregnant women worldwide with suspected or confirmed COVID-19 (reported prior to 26 June 2020).<sup>28</sup> In this review, the most common symptoms of COVID-19 in pregnant women were fever (40%) and cough (39%). Less frequent symptoms were dyspnoea, myalgia, loss of sense of taste and diarrhoea, each present in more than 10% of women. Pregnant women with COVID-19 were less likely to have fever or myalgia than non-pregnant women of the same age.

A significant proportion of pregnant women with COVID-19 may be asymptomatic: an estimated 74% (95% CI 51–93) are asymptomatic based on studies that reported universal screening for a total of 162 pregnant women.<sup>28</sup>

### Classification of disease severity

In the United States, the National Institutes of Health have categorized disease severity as:<sup>29</sup>

- **Asymptomatic or pre-symptomatic infection**– Positive test for SARS-CoV-2 but no symptoms.
- **Mild illness**–Any signs and symptoms (e.g., fever, cough, sore throat, malaise, headache, muscle pain) without shortness of breath, dyspnoea, or abnormal chest imaging.
- **Moderate illness**–Evidence of lower respiratory disease by clinical assessment or imaging and a saturation of oxygen (SaO<sub>2</sub>) >93 percent on room air at sea level.
- **Severe illness** – Respiratory frequency >30 breaths per minute, SaO<sub>2</sub> ≤93 percent on room air at sea level, ratio of arterial partial pressure of oxygen to fraction of inspired oxygen (PaO<sub>2</sub>/FiO<sub>2</sub>) <300, or lung infiltrates >50 percent.
- **Critical illness**–Respiratory failure, septic shock, and/or multiple organ dysfunction.

### Severe illness in pregnant women

Severe illness appears to be more common in later pregnancy. In the UKOSS study, most women were hospitalised in their third trimester or peripartum (n = 342, 81%). The median gestational age at hospital admission was 34+0 weeks of gestation (interquartile range [IQR] 29–38 weeks of gestation).<sup>19</sup> Similarly, an analysis of women in French hospitals showed that those in the second half of pregnancy, from 20 weeks of gestation, were five times more likely to be admitted to ICU than those in the first half of pregnancy.<sup>30</sup>

### Effect on pregnancy

Maternal COVID-19 is associated with an approximately three times greater risk of preterm birth. A systematic review estimated the risk at approximately 17%.<sup>28</sup> Most of these preterm births (94%) were iatrogenic. In the UKOSS study, 58% of women gave birth during the data collection period; the median gestational age at birth was 38 weeks (IQR 36–39 weeks). Of the women who gave birth, 27% had preterm births: 47% of these were iatrogenic for maternal compromise and 15% were iatrogenic for foetal compromise.<sup>18</sup>

Maternal COVID-19 is also associated with an increased rate of caesarean birth. Again, from the UKOSS study, 59% of women had caesarean births; approximately half of these were because of maternal or foetal compromise. The remainder were for obstetric reasons (e.g. progress in labour, previous caesarean birth) or maternal request (6%). Of the women having a caesarean birth, 20% required general anaesthesia (GA) because of severe COVID-19 symptoms or urgency of birth.<sup>18</sup>

### Effect of COVID-19 on the foetus

It is reassuring that, despite over 31 million confirmed COVID-19 infections, there has been no significant reported increase in the incidence of congenital abnormalities. In the PregCOV-19 Living Systematic Review, there was no evidence of an increase in stillbirth or neonatal death among women with COVID-19, although there was insufficient available evidence to comment on the risk of miscarriage.<sup>28</sup>

There has also been no evidence to date that foetal growth restriction (FGR) is a consequence of COVID-19; however, this is considered a theoretical possibility as two-thirds of pregnancies with SARS were affected by FGR.<sup>31,32</sup>

### Management of pregnancy during COVID era

#### Pre-pregnancy counselling

Clinicians should counsel pregnant women and those contemplating pregnancy about the potential risk for severe illness from COVID-19, and measures to prevent infection with SARS-CoV-2 should be emphasized for pregnant women and their families.<sup>33</sup> Pregnant individuals in particular are encouraged to take all available precautions to optimize health and avoid exposure to COVID-19 including:

- maintaining prenatal care appointments
- wearing a mask and other recommended PPE, if applicable, at work and in public
- washing hands frequently
- maintaining physical distancing
- limiting contact with other individuals as much as practicable
- maintain an adequate supply of preparedness resources including medications.

### Antenatal care during the COVID-19 pandemic

Antenatal and postnatal care should be regarded as essential and women encouraged to attend, while observing social distancing and infection prevention measures. Even though World Health Organization (WHO) recommends for eight ANC visits as standard, during the COVID-19 pandemic, WHO recommends a combination of face to face and remote antenatal (ANC) contact where technology and services are available. Based on the WHO recommendations, Obstetric and Gynaecological Society of Bangladesh (OGSB) with the technical inputs from International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) and The United Nations population funds (UNFPA) has adopted the simpler version of minimum Face to Face Antenatal visit recommendation with the recommendation of remote contact in it.<sup>34</sup>

The UK based National institute for health and care excellence (NICE) has recommended that schedule of antenatal care should be offered in full wherever possible. Ideally and where safe, these appointments should be offered in-person, particularly to those from Black, Asian and minority ethnic (BAME) communities.<sup>35</sup>

Special attention should be given to women with associated comorbidities like hyperglycemia and hypertension and existing management protocols must be followed. Women with COVID-19 pneumonia and associated hyperglycemia in pregnancy requiring medical therapy should preferably be shifted to insulin therapy.

Supplementation of folic acid, iron and folic acid and calcium should be continued/supplied in adequate amount. Tetanus Toxoid vaccination should be done following the national protocol.<sup>34</sup> Ultrasonogram Scan for diagnosis of early pregnancy, anomaly scan should be performed at set time.

Women with suspected COVID-19 sign symptoms can be considered for 2 weeks of home isolation. In that situation, USG can be rescheduled 2 weeks later with proper precaution.<sup>34</sup>

Important considerations for antenatal care for women who have recovered from COVID-19

For women who have recovered from COVID-19 with mild, moderate or no symptoms, without requiring

admission to hospital, antenatal care should remain unchanged.

In the first instance, a foetal growth scan should be offered approximately 14 days following recovery from their illness to women who have been seriously or critically unwell, unless there is a pre-existing clinical reason for an earlier scan.<sup>35</sup>

### Medical management of pregnant women with COVID-19

The clinical care of pregnant women with COVID-19 is based on illness severity.

**Home care:** Most (at least 86 percent<sup>36</sup>) pregnant patients with known or suspected COVID-19 have mild disease (no shortness of breath) that does not warrant hospital-level care in the absence of obstetric problems (e.g., preterm labour), concern for rapid deterioration, or an inability to promptly return to the hospital. Patient instructions and other aspects of home care are similar to that in nonpregnant persons, except pregnant women in the third trimester should perform foetal kick counts and report decreased foetal movement.<sup>37</sup>

### Medical and obstetric care of hospitalized patients:

Pregnant women with mild disease plus comorbidities or moderate to critical disease are hospitalized. Pregnant hospitalized patients with severe disease, an oxygen requirement plus comorbidities, or critical disease should be cared for by a multispecialty team at a level III or IV hospital with obstetric services and an adult intensive care unit (ICU).<sup>37</sup>

**Maternal respiratory support:** General supportive care of the critically ill patient with COVID-19 pneumonia is similar to that in patients with ARDS due to other causes.

During pregnancy, maternal peripheral oxygen saturation (SpO<sub>2</sub>) should be maintained at  $\geq 95$  percent, which is in excess of the oxygen delivery needs of the mother. If SpO<sub>2</sub> falls below 95 percent, an arterial blood gas is obtained to measure the partial pressure of oxygen (PaO<sub>2</sub>): Maternal PaO<sub>2</sub> greater than 70 mmHg is desirable to maintain a favourable oxygen diffusion gradient from the maternal to the foetal side of the placenta. The World Health Organization suggests maintaining maternal SpO<sub>2</sub>  $\geq 92$  to 95 percent once the patient is stable.<sup>38</sup>

In the ICU, severely ill patients with COVID-19 are often managed in the prone position; the left lateral position is an alternative but may not be as effective. Some ICUs have extended this approach to pregnant women, although even a semi-prone position can be a difficult position in which to place a pregnant woman in the last half of pregnancy. Padding above and below the gravid uterus >24 weeks is desirable to offload the uterus and avoid aortocaval compression.<sup>39</sup>

**Use and type of venous thromboembolism prophylaxis:** Women who are self-isolating at home should stay well hydrated and mobile throughout isolation.<sup>35</sup> For antepartum prophylaxis in women who are not severely or critically ill and who may deliver within a few days, unfractionated heparin 5000 units subcutaneously every 12 hours is a reasonable dose. Unfractionated heparin is generally preferred in pregnant women who might be proximate to delivery because it is more readily reversed than low molecular weight heparin. Low molecular weight heparin (eg, enoxaparin 40 mg daily) is reasonable in women unlikely to be delivered within several days and those who are postpartum.<sup>40,41,42</sup>

All pregnant women who have been hospitalised and have had confirmed COVID-19 should be offered thromboprophylaxis for 10 days following hospital discharge. A longer duration of thromboprophylaxis may be considered for women with persistent morbidity.<sup>34</sup>

**Use of dexamethasone:** Dexamethasone 6 mg daily for 10 days or until discharge is recommended for severely ill nonpregnant patients who are on supplemental oxygen or ventilatory support. Glucocorticoids may also have a role in the management of refractory shock in critically ill patients with COVID-19.<sup>43,44</sup>

In pregnant women who meet criteria for use of glucocorticoids for maternal treatment of COVID-19 and are at increased risk for a preterm delivery at 24+0 and 33+6 weeks of gestation within seven days, usual doses of dexamethasone (four doses of 6 mg given intramuscularly 12 hours apart) or betamethasone (two doses of 12 mg given intramuscularly 24 hours apart) can be prescribed to induce foetal pulmonary maturation followed by either prednisolone (40 mg orally daily) or hydrocortisone (80 mg intravenously twice daily) to complete the maternal steroid course.<sup>45</sup>

**Safety of antiviral drug therapy:** Several agents are being evaluated for treatment of COVID-19. Although some of these agents are clinically available for other indications, their use for COVID-19 remains investigational.

**Remdesivir:** At some hospitals, pregnant women with severe COVID-19 are being offered remdesivir in a compassionate-use protocol. Randomized trials of the drug during the COVID-19 pandemic have excluded pregnant and breastfeeding women.

**Other drugs:** Data from randomized trials generally suggest no benefit from administration of hydroxychloroquine or chloroquine. Furthermore, adverse maternal effects include abnormal heart rhythms (QT interval prolongation and ventricular tachycardia). Hydroxychloroquine crosses the placenta. Accumulation in foetal ocular tissue has been observed in animal studies, but an increased risk of foetal ocular abnormalities has not been observed in humans, which is reassuring given that the drug has been used by pregnant women for treatment of systemic lupus erythematosus or for prevention of malaria. Available data are limited, however, and a risk to the foetus cannot be ruled out when used at different doses for other indications.<sup>46</sup>

Labour and birth during the COVID-19 pandemic

Infection control precautions

**Prehospital notification of possible infection:** The CDC recommend that pregnant patients who have confirmed or suspected COVID-19 notify the obstetric unit before arrival so that the facility can make appropriate infection control preparations.<sup>47</sup>

**Evaluation of all patients presenting to the hospital:** All patients should be screened for signs and symptoms of COVID-19, as well as whether they have had close contact with a confirmed case or persons under investigation, before entering the hospital for admission to the labour and delivery unit.<sup>48</sup> The CDC advises prioritizing the testing of pregnant women with suspected COVID-19 at admission or who develop symptoms of COVID-19 during admission.<sup>47</sup>

**Care of COVID-19 positive in patients:** Ideally, pregnant COVID-19 in patients should be cared for in specially equipped (e.g. negative-pressure) single-patient rooms in antepartum, intrapartum, and

postpartum COVID-19-only units, similar to other adult COVID-19 inpatients who are usually placed in dedicated COVID-19-only units, halls, or hospitals.

Timing delivery in infected women

**Non severe illness:** For most women with preterm COVID-19 and non-severe illness who have no medical/obstetric indications for prompt delivery, delivery is not indicated and ideally will occur sometime after a negative testing result is obtained or isolation status is lifted, thereby minimizing the risk of postnatal transmission to the neonate.<sup>49</sup>

**Severe/critical illness:** For women with severe illness, there are multiple issues to consider, and timing of delivery needs to be individualized.<sup>37</sup> For the hospitalized patient with COVID-19 with pneumonia but not intubated, some authorities have advocated consideration of delivery in pregnancies >32 to 34 weeks.

Timing of delivery of the hospitalized pregnant woman intubated and critically ill with COVID-19 is challenging. After 32 to 34 weeks, some have advocated delivery if the patient is stable to avoid any pregnancy-related problems if the maternal condition subsequently deteriorates, but this could exacerbate the maternal condition. Others consider delivery only for patients with refractory hypoxemic respiratory failure or worsening critical illness.<sup>39</sup>

**Route of delivery:** There is no evidence to favour one mode of birth over another in women with COVID-19.<sup>35</sup> The rate of neonatal COVID-19 infection is no greater when the baby is born vaginally, breastfed or stays with the woman after birth.<sup>20</sup>

Caesarean delivery is performed for standard obstetric indications, which may include acute decompensation of mother with COVID-19.

**Screening patients scheduled for induction or caesarean delivery:** Patients should be screened for COVID-19 and can undergo pre-induction/pre-caesarean laboratory testing the day before a planned induction or caesarean delivery.

**Analgesia and anaesthesia:** There is no evidence that the use of Entonox is an aerosol-generating procedure (AGP), so can be safely offered with a standard single-patient microbiological filter.<sup>35</sup> There is no evidence that epidural or spinal analgesia or

anaesthesia is contraindicated in the presence of coronaviruses.<sup>50</sup> Intubation, required for GA, is an AGP which significantly increases the risk of transmission of SARS-CoV-2 to the attending staff. Acetaminophen can be used as the preferred analgesic agent, if possible, and if NSAIDs are needed, the lowest effective dose should be used.<sup>43</sup>

**Labour management:** Generally, management of labour is not altered in women giving birth during the COVID-19 pandemic or in women with confirmed or suspected COVID-19 that is asymptomatic or mild.<sup>51</sup>

Continuous electronic foetal monitoring is recommended in women with suspected or confirmed COVID-19. Intake and output of fluids should be carefully monitored in these women, and aggressive hydration should be avoided since it can lead to pulmonary oedema and worsen maternal oxygenation that may already be compromised.<sup>52</sup> Total fluids <75 cc/hour is reasonable.

SARS-CoV-2 has not been detected in vaginal secretions or amniotic fluid, so rupture of fetal membranes and internal fetal heart rate monitoring may be performed for usual indications, but data are limited.<sup>15</sup> It should be noted that labour, and particularly pushing, often causes loss of faeces, which can contain the virus and spread the infection.<sup>53,54</sup>

**Delivery procedures:** For women with known or suspected infection, American College of Obstetrics and Gynaecology (ACOG) has stated that delayed umbilical cord clamping is highly unlikely to increase the risk of transmitting pathogens from an infected mother to the fetus.<sup>49</sup>

Umbilical cord blood banking can be performed if planned; the risk of COVID-19 transmission by blood products has not been documented and is unclear at present.<sup>49</sup>

**Post-delivery:** Placental tissue, miscarried embryos/foetuses should be treated as infectious tissues and disposed of appropriately. Routine pathologic examination should be encouraged and if possible, testing of these tissues for SARS-CoV-2 by qRT-PCR should be undertaken.

Postnatal care during the COVID-19 pandemic

**Maternal monitoring:** For patients with known or suspected COVID-19 who are asymptomatic,

postpartum maternal monitoring is routine. For patients with mild illness, vital signs are checked and monitoring intake and output every 4 hours for 24 hours after vaginal delivery and 48 hours after caesarean delivery. For patients with moderate illness, continuous pulse oximetry monitoring is done for the first 24 hours or until improvement in signs and symptoms, whichever takes longer. The type and frequency of follow-up laboratory studies and chest imaging (initial or repeat) are guided by the patient's course.<sup>43</sup>

For patients with severe or critical illness, very close maternal monitoring and care on the labour and delivery unit or intensive care unit are indicated.<sup>43,44</sup>

**Infant evaluation:** The infants of mothers with COVID-19 are considered COVID-19 suspects, and they should be tested, isolated from other healthy infants, and cared for according to infection control precautions for patients with confirmed or suspected COVID-19.<sup>47</sup> Where testing capacity is available, neonates should be tested for SARS-CoV-2 infection as soon as possible and within the first 24 hours of age using available molecular assays.<sup>55</sup> Repeat testing should be performed at approximately 48 hours of age if the infant is still at the birth facility.

**Mother-baby contact:** WHO has opined that mothers who have suspected, probable, or confirmed COVID-19 virus infection should be enabled to remain together with their infants and practice skin-to-skin contact.<sup>56</sup> The CDC advise determining whether to separate a mother with known or suspected COVID-19 and her infant on a case-by-case basis, using shared decision making between the mother and the clinical team.<sup>47</sup>

**Breastfeeding and formula feeding:** In light of the evidence to date, the benefits of breastfeeding outweigh any potential risks of transmission of the virus through breastmilk,<sup>57</sup> and this is a view supported by the UNICEF UK Baby Friendly Initiative. In the setting of maternal COVID-19 infection, the infant may receive passive antibody protection from the virus since breast milk is a source of antibodies and other anti-infective factors.<sup>58</sup>

In a WHO study, breast milk samples from 43 mothers were negative for SARS-CoV-2 by RT-PCR and samples from three mothers tested positive, but specific testing for viable and infective virus was not performed.<sup>56</sup> More data are needed to assess any potential risk of viral transmission from ingesting breast milk.

Babies should not wear masks or other face coverings as they may risk suffocation.<sup>35</sup>

**Postpartum visit:** Modifying or reducing postpartum outpatient care is appropriate to reduce the risk of inadvertent exposure. Recommendations on postnatal care should be maintained up to 8 weeks after birth.<sup>59</sup>

### Summary and recommendations

- Pregnant women should follow the same recommendations as nonpregnant persons for avoiding exposure to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)
- Pregnant women should avoid close contact with persons with confirmed or suspected COVID-19, maintain 6 feet of distance from non-household members, and take general COVID-19 preventive measures, including wearing masks and practicing hand hygiene.
- Clinical manifestations of COVID-19 in pregnant women are similar to those in nonpregnant individuals.
- Pregnant women with confirmed COVID-19 infection should be managed by designated tertiary hospitals.
- Pregnancy does not appear to increase susceptibility to infection, and most infected mothers recover without undergoing delivery. However, pregnant women may be at increased risk for severe disease necessitating maternal intensive care unit admission and mechanical ventilation. Maternal deaths have been reported but not in excess of those in nonpregnant women of reproductive age.
- Infected women, especially those who develop pneumonia, appear to have an increased frequency of preterm birth and caesarean delivery. These complications are likely related to severe maternal illness. Whether intrauterine infection occurs is still under investigation. A few early new-born infections and placental infections have been reported, suggesting possible but rare vertical transmission. Postnatal contamination could not be excluded conclusively.
- In pregnant women who meet criteria for use of glucocorticoids for treatment of COVID-19 and are at increased risk for a preterm delivery at 24+0 to 33+6 weeks within the next seven days, the usual doses of dexamethasone or betamethasone should be initiated to induce foetal pulmonary maturation.

- For most women with preterm COVID-19 and non-severe illness who have no medical/obstetric indications for prompt delivery, delivery is not indicated and ideally will occur sometime after a negative testing result is obtained or isolation status is lifted, thereby minimizing the risk of postnatal transmission to the neonate. Severely ill patients at least 32 to 34 weeks of gestation with COVID-19 pneumonia may benefit from early delivery.
- Generally, management of labour is not altered in women giving birth during the COVID-19 pandemic or in women with confirmed or suspected COVID-19. SARS-CoV-2 has not been detected in vaginal secretions or amniotic fluid, so rupture of foetal membranes and internal foetal heart rate monitoring may be performed for usual indications, but data are limited. COVID-19 is not an indication to alter the route of delivery.
- Infants born to mothers with known COVID-19 are COVID-19 suspects and should be tested, isolated from other healthy infants, and cared for according to infection control precautions for patients with confirmed or suspected COVID-19.
- Breastfeeding is recommended to all women, where it is safe, feasible.
- All medical staff involved in management of infected women should wear appropriate PPE as required.
- Healthcare professionals engaged in obstetric care should be appropriately trained.
- Management of COVID-19-infected pregnant women should be undertaken by a multidisciplinary team (obstetricians, maternal-foetal medicine subspecialists, intensivists, obstetric anaesthetists, internal medicine or respiratory physicians, midwives, virologists, microbiologists, neonatologists, infectious disease specialists).
- Continued surveillance for COVID-19 in pregnant women is important to understand and improve health outcomes for mothers and new-borns.

### Conclusion

Providing safe care to pregnant women with COVID 19 infection is a cornerstone of healthcare system. Establishing local hospital guidelines can help regulate safe services provided to pregnant women and their new-borns during this COVID-19 era.

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