

# Antenatal Care in Pandemic and Managing Pregnancy with COVID-19

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## ABSTRACT

Limited data were available for managing a pregnant woman developing coronavirus disease-2019 (COVID-19) infection as the pandemic gripped the world. Presumptive information for guiding the management of pregnancy and COVID-19-infected women came from various bodies, such as Royal College of Obstetricians and Gynaecologists (RCOG) and American College of Obstetricians and Gynecologists (ACOG), which were updated from time to time as more information was built up, publications came from China, US, and UK as pregnant women with COVID-19 got admitted with infection. Indian Council of Medical Research also prepared guidelines for India based on the publications of international agencies. The obstetrician should have protocols to manage women who are pregnant, individualizing risk stratification of each woman, management of person who is under investigation (PUI) or the suspect for COVID-19, and management protocol for confirmed case of COVID-19 infection, with adequate preparation to face the situation and training of all healthcare workers. It appears that pregnant women are not at increased risk to develop the viral infection and only 5% will have severe pneumonia. If infected most would have mild disease and the pregnancy will not impact the overall outcome of the illness. The incidence of cesarean section is reported higher in women delivered with COVID-19. Vertical transmission to the baby is controversial and women may be advised to breast feed.

**Keywords:** Antenatal care, Cesarean section, Coronavirus, COVID-19, Delivery, Pregnancy.

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## INTRODUCTION

The concerns for pregnant women in the coronavirus disease-2019 (COVID-19) pandemic are on either sides, that is for the women as well as for the obstetrician who is managing antenatal women in the form of providing routine and emergency care when needed, the care of the pregnant women needing delivery and the women suspected to suffer with COVID-19 or who test positive for the COVID-19 virus. Till date, the data regarding SARS-CoV-2 is limited, therefore as obstetricians we need to keep updated with the building data regularly through the online resources available.

## PREGNANCY AND COVID-19 WHAT WE EXPECT?

Pregnancy itself is a state where a woman is prone to respiratory ailments and pneumonia as seen in the Middle East respiratory syndrome (MERS) and hemagglutinin type 1 and neuraminidase type 1 - 'Influenza' A (H1N1) infections, as it causes physiological changes in the immune and cardiopulmonary systems, such as diaphragm elevation, increased oxygen requirement overall, and edema of respiratory tract mucosa, which can render her intolerant to hypoxia, but the paradox is that the women of reproductive age group are younger and healthy and the overall severity of COVID-19 is directly proportional to age, the evidence has shown that the female infectivity is lower for reasons not really understood till now. Current evidence supports that the overall disease, its outcome as well as mortality in pregnant women is like non-pregnant women of similar age. Most cases reported mild infection in pregnant women with only about 5% developing severe acute pneumonia and acute respiratory distress syndrome.<sup>1</sup>

## IMPACT OF PANDEMIC ON ANTENATAL CARE

It was challenging for the obstetric team to prepare themselves with little evidence for the care of women who were pregnant.

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Initially, the literature was gathered from few case reports of delivery of pregnant women in China and then the case reports were published from UK. The American College of Obstetricians and Gynecologists (ACOG) and Royal College of Obstetricians and Gynaecologists (RCOG) issued information and advisory for the care of women in pregnancy.<sup>2,3</sup>

In an effort, to prevent infection from spreading, lockdowns were imposed and this impacted the overall regular care of pregnant women. The women missed their visits, but the emergency services functioned in most centers. Based on the guidelines issued by international bodies, Indian Council of Medical Research (ICMR) also published guidelines for care of women in the pandemic.<sup>4</sup>

The women were advised to follow social distancing, hand hygiene, use of triple-layered mask, and were asked not to attend hospitals unless they were called after teleconsultation at the nearest healthcare facilities. The interstate borders were also sealed to prevent mixing of women from one state to another, similarly the areas were divided into zones and therefore women were labelled

as pregnant women coming from areas where the incidence was high and pregnant women residing in low-risk areas.

The women are advised to take antenatal appointments telephonically, and the healthcare workers (HCW) are expected to do screening on phone prior to their visit in the clinic to confirm their residence, any contact history with person visiting them after international travel or from containment zone (high-incidence zone), any family member suffering from COVID-19 or symptoms of fever or cough or feeling unwell, if any positive history she is suggested to delay her visit by 1 week.<sup>2,4</sup>

Each antenatal clinic is advised to setup a screening area where the arriving women are screened telephonically else by HCW using universal precautions of wearing eye shield, mask, and gown and once screened allowed in premises. Women with positive screening need to be isolated and cared for using personal protective equipment (PPE) and tested for COVID-19.

All obstetric units are expected to formulate protocols and prepare isolation areas for the management of any COVID-19 patient. The information of diagnosing any woman with COVID-19 needs to be notified to the local health authorities. No woman is to be denied emergency healthcare and if stable then she is to be shifted to COVID-19 dedicated hospitals. An adequate provision of PPE is the responsibility of the head of the clinic or the institute.<sup>4</sup>

## MONITORING PREGNANCY DURING PANDEMIC

- Telephonic registration, screening, and record keeping.
- Thermal screening to be performed before entering the hospital premises in all cases for women and HCW.
- A single initial visit to include all first trimester investigations and ultrasound if needed.
- Disinfection of ultrasound equipment and all other equipment used for any patient.
- Maintain distancing between women visiting the clinic and avoiding many patients visiting simultaneously, and attempt made to decrease the number of HCW at any given time.
- Give printed information in the language they understand or the online resource to know about the healthcare needed and create a virtual link with the woman.
- As these women need psychological support as well which needs to be provided to assure them help in case of emergency or otherwise.
- During their visit, the woman may visit alone or with attendant who may be asked to wait outside the clinic, or a single screened attendant may be allowed in the premises at the time needed.
- Some clinics are taking COVID-19 consent from woman attending their hospitals which may be of no benefit explaining the risk of acquiring COVID-19 infection.
- The regular antenatal visits may be reduced, and the second visit may be confined to second trimester anomaly scan either at the clinic or with the radiologist and include giving tetanus immunization.
- Total antenatal visits can be reduced to 4, that is one visit each in first trimester and second trimester then at around 28 weeks and then at 36–37 weeks.<sup>2,4</sup>
- The growth scans may be avoided, thereby decreasing the contact of the women with HCW.

## TESTING THE ASYMPTOMATIC PREGNANT WOMEN

Initially, all women needing intervention in the form of delivery were advised for testing using reverse transcription polymerase chain

reaction (RT-PCR) and this is still being followed by most obstetricians. Universal testing may be recommended in areas of high prevalence in women likely to deliver in 5 days, in labor or needing delivery in order to diagnose infection in asymptomatic women.

In a publication from New York, US which included 215 women attending for delivery being tested for SARS-CoV-2 and the incidence of infectivity was 15.4% which included asymptomatic women. However, based on this publication, screening and testing pregnant women were considered in many centers without factual understanding that New York's over all case load of COVID-19 was far exceeding other regions. It may be suggested that there needs to be local policy based on the number of cases in that region and available of resources based on which testing in pregnant women needing intervention can be decided.<sup>5</sup>

## Person under Investigation

All pregnant women with any symptoms of COVID-19 or who are residing in high infectivity zone visit the healthcare facilities and awaiting test report for COVID-19 or women who test negative despite symptoms should be managed in isolation using universal precautions. In the present scenario, all asymptomatic women who are not tested and present to the emergency should also be examined using universal precautions with face shield and a 3-ply surgical mask if N95 masks are unavailable to the examining doctor.

## MANAGING WOMEN WITH COVID-19

### Protocol for Managing Women with COVID-19

#### *Signs and Symptoms*

Most women would give a contact history or belong to place where the overall incidence of infection is high. Pregnancy as such has not shown to predispose them to infection.<sup>6</sup> Fever is the commonest presentation with 98% women having this as the presenting sign, then about 56% will have dry cough, myalgias are common, other features are anosmia, diarrhea, headache, and respiratory symptoms like dyspnea and then pneumonia. There may be associated loss of appetite.

#### Testing

The woman needs to be counseled (pretest counseling) to alleviate her anxiety and explain the reason why it is needed and how it would be performed. The suspected women are tested by taking deep nasopharyngeal swab checked by RT-PCR SARS-CoV-2.

#### Asymptomatic or Women with Mild Disease

Pregnant women who are detected to have COVID-19 and are asymptomatic or having mild disease may be kept in COVID-19 dedicated hospital and they are less likely to need any treatment or intervention if they do not develop pregnancy-related complications. Depending on the availability of resources and healthcare facilities, they may be allowed home isolation and retested for resolution of infection.

Home monitoring should involve temperature recording and watch for any respiratory symptoms. Once infection resolves routine antenatal care can be continued; however, there is need to monitor fetal viability after the woman becomes negative, especially if she has had high fever spikes.

#### Women with Moderate-to-severe Infection

Women with any respiratory symptoms need to be monitored in high definition unit where oxygen levels need to be monitored and the possibility of worsening may be considered.

Fever needs to be controlled with paracetamol orally and tepid sponging. Thromboprophylaxis needs to be considered in women requiring admission till the women remain admitted.<sup>7</sup>

Pregnancy itself induces a thrombogenic state and literature now points to the presence of disseminated coagulopathy due to COVID-19, therefore there is a need to give anticoagulants to the mother during admission or illness.<sup>2</sup> Low-molecular heparin may have anti-inflammatory benefits in a woman with viral infection.

During admission, fetal well-being may be documented, and fetal heart rate be monitored daily. Injection dexamethasone may be preferred for fetal lung maturity as data are emerging suggesting its beneficial effect in the improvement of affected women.<sup>2</sup>

### Laboratory Findings

There are finding of leukocytopenia, thrombocytopenia, and lymphocytopenia with increase in C-reactive protein and serum ferritin levels. There is elevation of D-dimer; however, it may not be easy to interpret as these levels are also raised in pregnancy. Eosinopenia is also present at the onset of illness.<sup>8</sup>

### Radiological Examination

Chest X-ray and computed tomography (CT) may be needed for symptom assessment and if suggested may be performed with abdominal shielding. Unnecessary exposure may be replaced by ultrasonography of the lungs. If the overall management is less likely to be altered by radiological findings, then clinical findings may guide further therapy without repeated scanning.

### Women with Comorbidities

Pregnant women with underlying hypertension, diabetes, who are elderly (age >35), obese, or having other medical illnesses are likely to have more severe form of the illness as compared to the healthier and younger pregnant woman similar to the findings in non-pregnant women.<sup>2</sup>

### Effect of COVID-19 on the Pregnancy

The virus is not known to be teratogenic; however, it will be seen probably in later this year whether this virus had any impact on the babies when women who were affected in first trimester would deliver their babies.<sup>6</sup>

In a systematic review of 6 studies including 51 women, the overall outcome had been promising and with no maternal death recorded; however, two of the women at the time of publication were having severe disease and on mechanical ventilation and outcome is not known, 1 still birth and 1 neonatal death was recorded in these women, there was high rate of cesarean section reported leading to premature births which were iatrogenic, as obstetrician chose to deliver electively by cesarean. Two vaginal deliveries were also recorded.<sup>9</sup>

The largest study quoted by the RCOG information publication, included 16,749 hospitalized individuals with COVID-19, which included 6% pregnant women similar to age-related general population and their overall outcome was similar to general population without mortality difference.<sup>6,10</sup> Mean gestation of admission was 34 weeks and most were discharged without intervention and they improved and subsequently pregnancy continued.

The UK-based study showed that women of black, Asian, or minorities ethnicity were more at risk showing that the severity of disease could vary in various ethnic groups and these groups were more likely to die because of COVID-19.<sup>10</sup> The reason was not clearly

defined but socioeconomic variation could also be affecting the type of care they received.<sup>2,10</sup>

The babies are likely to be born premature due to iatrogenic reasons either due to maternal or fetal compromise.<sup>2,10</sup>

In a published paper by Yan et al., 116 pregnant women with coronavirus disease were included<sup>11</sup> and till the paper was published 99 women delivered in China were included in the analysis and their key findings were about 12.5% women had missed abortion (1 out of 12 first trimester women). The spontaneous preterm labor was 6.1% mainly due to preterm premature rupture of membranes. The overall preterm deliveries were higher (21%) due to preterm cesarean sections performed. Of the 99 women, 8 had pneumonia and 6 needed noninvasive ventilation, whereas 2 needed mechanical ventilation but no maternal mortality was recorded in this study, although 1 neonatal death occurred due to severe maternal hypoxia.

### Delivery of COVID-19 Pregnant Woman

Women need to be delivered in an isolated delivery suite with aim to provide optimal care and protect the newborn and the HCW from the infection.<sup>4</sup> All personnel present need to wear full PPE with N95 masks and face shields all the time while monitoring and delivering a woman with COVID-19. There needs to be a proper donning room for all health workers to wear the PPE and subsequent doffing area attached to the delivery suite. There needs to be a separate area for the neonatal resuscitation. Now reports are available where women have delivered vaginally who were having mild symptoms but there may be logistic issues in monitoring a woman in labor like increasing the risk to HCW; however, there is no contraindication to vaginal delivery. Early cord clamping has been suggested after delivery of the baby. Induction of labor should not be considered as this can prolong labor; however, cases may need to be individualized. If available continuous fetal heart monitoring is needed during labor. If there is maternal exhaustion or hypoxia then the mode of delivery may be changed to operative or effort to cut short the second stage of labor.<sup>2</sup> The studies have suggested that the vaginal secretions do not contain the virus. During the delivery, an attendant wearing full PPE may be allowed with consent but is not considered preferable.

Epidural anesthesia may be offered considering that analgesia may prevent maternal exhaustion or if the woman desires.

### Performing Cesarean Section

All women who are having severe illness, especially having respiratory symptoms or who are already intubated on mechanical ventilation and have a live fetus with good probability of survival may be considered for cesarean delivery. Also, all women with any obstetric indication of cesarean would need cesarean delivery. Cesarean section may be needed for improving maternal ventilation in cases of hypoxia due to severe illness where a risk vs benefit assessment by the managing critical care physician and the obstetric team must be undertaken.

There should be appropriate operating room with isolated transport pathway to the theater. The operation room (OR) should have preplanned designated area for donning and doffing with the availability of appropriate PPE and a trained buddy to assist these. The trained theater nurse to assist and the neonatal team should be prepared with immediate isolation from the mother after delivery and testing of the baby. The theater should have negative pressure if it is possible and air ducts should be separate. The surgical practice guidelines for performing surgical procedure in a COVID-19-infected person should be followed as per institutional protocol.

In the United Kingdom Obstetric Surveillance System (UKOSS) study, among the women who delivered, cesarean delivery was performed in 59% women for either maternal or fetal compromise, the remaining has cesareans for failed progress of labor, having a previous cesarean section or on maternal request.<sup>10</sup> In the study from China performed by Yan et al., the overall mode of delivery was cesarean section in 85% women.<sup>11</sup> In the other published data up to 93%, cesarean section rate has been reported in China-based data.<sup>12</sup>

### Anesthesia for Cesarean Section

It is preferred that regional or spinal anesthesia is used for cesarean section; however, in some cases, the patient may be critical and already intubated requiring ventilatory support. Overall general anesthesia should be avoided as it is aerosol-generating procedure.

### Care of the Newborn

Till date, there are conflicting data to support direct transfer of the virus from the mother to the baby.<sup>13,14</sup> It is pertinent to separate the newborn after birth and the data do not show any evidence of breast milk containing virus and if the maternal condition is stable then it can be discussed with mother about the options of breastfeeding following strict hand hygiene and mother to use appropriate mask like N95 mask if she chooses to feed the baby. Even if the baby gets infected the morbidity is low and mortality is not reported till now.

The other option would be to keep the baby in adjoining room separated by glass so that she can see the newborn.

In case there is lack of space and facility for separate care then "rooming in" with physical distancing of mother and baby along with proper hand hygiene and usage of mask should be followed. Such situations may arise due to stigma of this disease that positive mother may have to take care of her own baby leaving no option, but the baby may be responsibility of the neonatologist or the mother.

In a retrospective study, vertical transmission was studied by testing for SARS-CoV-2 in amniotic fluid, cord blood, and neonatal pharyngeal swab samples of the babies delivered to COVID-19 mothers. All the tests were found to be negative for viral infection. The vaginal secretion swabs collected from the lower third of the vagina were also found to be negative.<sup>11</sup>

All neonates were tested within 72 hours of birth and were reported to be negative except one in the systematic review by Della Gatta et al.<sup>9</sup> There was 1 still birth and 1 neonatal death in 2 women who had serious illness in this study which included 51 women. In the UKOSS cohort, six babies born had tested positive within first 12 hours of birth contrary to other reports where negligible vertical transmission was suggested.<sup>2,10</sup>

In another published paper, the presence of IgM and IgG antibodies has been detected without having SARS-CoV-2 detected in nasopharyngeal swabs tested by real-time quantitative PCR (qRT-PCR) in the newborn suggesting the presence of activation of immune response *in utero* and indicators of *in utero* infection but more support is needed to confirm this.<sup>15,16</sup>

### Breastfeeding the Newborn

Expressed breast milk can be given to the baby provided the sanitization can be maintained using face mask, proper cleaning of hands and breast, and using a sterilized breast pump for collection and transferring to baby with full caution to prevent infection from mother to baby or the attendants.

The breast milk has not shown to contain the virus as seen in a systematic review published by Rodrigues et al.<sup>17</sup>

### Maternal Deaths in COVID-19

The initial reports suggested that the outcome and survival was good in women with COVID-19 as most reports were published when women were still admitted in the intensive care; however, the recent publications report maternal deaths due to COVID-19.<sup>18,19</sup>

Nine pregnant women with SARS-CoV-2 were admitted in Iran in various institutes as reported by Hantoushzadeh et al. and seven of these died due to COVID-19. Five of these women were uncomplicated pregnancies with no maternal illness suggesting that these women could have higher risk and fatal consequences from SARS-CoV-2 infection.<sup>18</sup>

Elsafeey et al. reported that among 385 pregnant women 17 needed intensive care treatment and 6 needed ventilatory support and 1 death was reported by him.<sup>19</sup>

In the systematic review published by Della Gatta et al., two women were critical and on mechanical ventilation whose outcome was not published.<sup>9</sup>

The UKOSS study includes 427 pregnant women admitted with COVID-19 either due to severity of symptoms (9%) or they needed intervention like delivery.<sup>2</sup> Less than 1% needed extracorporeal membrane oxygenation and overall case fatality rate was reported to be 1.2%. The maternal mortality rate was 5.6 per 100,000 delivered women.

### Associated Problems Due to Pandemic

The pandemic poses a lot of insecurity among women related to availability of healthcare at time of emergency, being away from ideal family conditions, such as members of family being separated, staying alone, diet issues, and non-availability of food either due to lockdowns or financial fallouts. Non-availability of helper to assist in daily chores, due to rising instability in jobs and loss of jobs, money crunch, and non-affordability which affect the physical as well as mental health directly, these issues are not addressed anywhere. There is increase in domestic violence as per reports published in the media having an impact on pregnancy and such history should be taken from pregnant women. Overall, there may be increased incidence of depression due to changed circumstances in some families. The overall workload may be increased for women in certain households for women as the families are confined to homes.

The situation may be different for working women as there are no guidelines for providing leave to women working in public offices for pregnant women, especially for the doctors and the police officials. It would be considered ideal if these women could work in places less exposed to public or crowded places once they enter third trimester of their pregnancy. Such maternal requests should be considered as maternal death have been reported in frontline health worker working in COVID-19 unit.

### CONCLUSION

Till date, the evidence regarding the management of pregnancy in a woman with coronavirus infection is limited and evolving. The pandemic has changed the clinical practices globally, where teleconsultation and telemedicine have found a significant role in healthcare. The guidelines are changing and there is a need to keep oneself informed about the development in COVID-19 and its impact on pregnancy and newborn.

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