Redesigning routine antenatal care in low-resource settings during the COVID-19 pandemic

Rinchen Zangmo, Archana Kumari, Deepali Garg, K Aparna Sharma
Department of Obstetrics and Gynaecology, All India Institute of Medical Sciences, New Delhi, India
Correspondence to: Dr Archana Kumari (drarchanaiims0312@gmail.com)

Abstract
Obstetric care, because of the unique and varying needs specific to different patients, requires special consideration in times of a pandemic such as the coronavirus disease 2019 (COVID-19) pandemic. Health care facilities providing obstetric care need to develop contingency plans for minimizing antenatal visits to limit the exposure of both healthy pregnant women and care providers to the virus. However, to mitigate any potential adverse effects of reduced antenatal visits, intelligent use of evolving telemedicine capabilities can protect the continuum of care despite the overwhelming burden caused by the pandemic. A collaborative work model involving health workers in the community and regional-level health centres also has the potential to prevent the catastrophic collapse of obstetric care services during a pandemic such as the COVID-19 pandemic.

Keywords: antenatal care, COVID-19, obstetrics, pandemic, telemedicine

Introduction
Coronavirus disease 2019 (COVID-19) reached pandemic proportions in a short period, recognizing no boundaries of geography, economy or religion. The functioning of the Indian health system, which historically has been built on in-person interaction between patients and health care providers, is severely affected as the global pandemic grips the globe. Pregnant women, as a result of physiological alterations in the immune and cardiorespiratory systems, may be at increased risk of severe disease if infected with the respiratory virus. In addition, the risk of contracting the disease from infected pregnant women poses unique challenges to obstetricians in providing antenatal care. It has become extremely difficult to achieve the goal of a positive pregnancy experience for all women in the time of COVID-19.

The usual prenatal care schedule is based on the World Health Organization (WHO) 2016 recommendations, which prioritize person-centred health care for positive perinatal and maternal outcomes by increasing the number of contacts of a pregnant woman with health providers from four to eight. Pregnant women make the first contact in the first trimester, with a subsequent two contacts at 20 and 26 weeks’ gestation and the next five contacts in the third trimester at 30, 34, 36, 38 and 40 weeks. The interventions recommended for improving the quality of antenatal care are nutrition education, assessment of mother and fetus, preventive measures, management of common physiological pregnancy symptoms and health system-level interventions. However, in the current scenario of a global pandemic that has placed unprecedented demands on our health systems, health facilities and workforces may be inundated by a plethora of activities related to controlling the pandemic. Hence, non-emergency yet essential health services, such as antenatal services, may be compromised. Furthermore, the fear of getting infected as well as countrywide lockdowns, with travel restrictions and social distancing norms, may deter pregnant women from seeking health care.

Antenatal care during a pandemic: some important considerations
During the COVID-19 pandemic, it is imperative to reorganize antenatal visits, not only to reduce the possibility of exposure of a healthy pregnant woman to infected individuals but also to minimize health care workers’ exposure to prenatal patients who may be infected but are asymptomatic. Such reorganization may be helpful in creating the capacity to provide face-to-face consultations for high-risk patients who require more visits and also prove to be beneficial for all maternity care providers offering care, given the potential for reduced health care workers as the pandemic affects all members of the community.

Routine antenatal outpatient departments may be closed due to lockdown, and most of the government hospitals have been reorganized for the management of patients affected by the pandemic. This may prevent pregnant women from approaching hospitals due to fear of getting infected. Even if they visit hospitals, they may not be able to communicate properly with an unfamiliar health care provider in unfamiliar surroundings.
Routine laboratory and sonography services may be suspended during a pandemic, further affecting regular antenatal care. This may delay the recognition of high-risk conditions such as anaemia, diabetes and asymptomatic bacteriuria, and also timely interventions based on tests for these. A lack of sonography services presents challenges for early diagnosis and dating of pregnancy as well as ensuring fetal health.

Screening for genetic disease also becomes difficult in these times, as it may be considered non-essential. This may, however, have a serious impact on the outcome of pregnancies in women who have been previously affected by any genetic or metabolic disorder. Because of the extensive reorganization of the health system and resources, invasive fetal diagnostic procedures may not be performed routinely, further jeopardizing obstetric services. Even fetal therapeutic procedures such as intrauterine transfusions will be affected when routine fetal monitoring is suspended.

Antenatal visits allow physical examination, which helps in detecting complications such as pre-eclampsia (by checking blood pressure and noting the presence of swelling of feet or generalized oedema), anaemia or jaundice (by noting the presence of pallor or icterus), intrauterine growth restriction (by abdominal examination), weight gain, any breast problems or any worsening of an underlying medical disorder such as heart disease. Abdominal examination to assess fetal position and presentation and the amount of amniotic fluid at term also helps in making an individualized care plan for the patient.

Nationwide lockdowns can have severe implications for maternal and perinatal health if alternative ways of providing antenatal care are not developed.

Assessment of mental well-being can also be difficult in the absence of face-to-face consultations. Opportunities for health education (regarding nutrition, breastfeeding, contraception), promoting healthy behaviours, ensuring birth preparedness and alleviating the anxiety of antenatal women may be squandered during a pandemic.

Although there is ample published literature regarding the management of pregnant women affected by prior pandemics, there is limited literature on how routine antenatal care was reorganized during those times. Even for the severe acute respiratory syndrome (SARS) pandemic of 2003, researchers have reported only how they handled complicated issues.

In Toronto, obstetric services for patients with suspected SARS were shifted to a separate building with different entrances, elevators and air-handling systems. All patients and health care providers were screened at the hospital entrance for SARS symptoms. All caregivers wore N95 respirator masks, face shields or eye protection, gowns and non-latex gloves, while the patients wore N95 respirator masks. Frequent hand washing with ethanol-based gels was implemented. Patients’ attendants were limited to the minimum. After early discharge, women were instructed to stay at home under quarantine for 10 days, and a nurse visited them on their third day postpartum. Health care workers were asked to observe work quarantine.

In Hong Kong, obstetric services were provided in a separate area from where SARS cases were managed. There was a tendency to discharge patients in the early postpartum period, and all non-essential obstetric services (e.g. routine ultrasonography and prenatal diagnosis) were temporarily suspended.

### Strategies to overcome challenges during a pandemic

Some of the strategies that can be used by primary care physicians to overcome difficulties in providing routine antenatal care during the pandemic are summarized in Box 1 and are discussed below in detail.

#### Box 1. Practice points for primary care physicians

- Inform local authority about suspected cases and facilitate testing.
- Promote social distancing signage at clinics asking patients to self-identify if they are having flu-like symptoms, have travelled abroad or have come into close contact with someone who has tested positive.
- Screen patients over the phone before visiting the clinic.
- Reduce in-person antenatal care services.
- Promote teleconsultations.
- Be aware of the levels of personal protective equipment to be used when a patient is under investigation and examine patients only with all precautions.
- Report all patients with fever.
- Promote social distancing and hand hygiene at each visit.

#### Reducing the number of routine antenatal visits to those who require in-person services (such as ultrasounds and lab tests)

Usual antenatal care includes eight visits, as recommended by WHO. However, during a pandemic, consideration should be given to reducing the number of recommended prenatal visits for low-risk pregnancies.

The optimal frequency, timing and content of visits should be determined according to the needs and risk status of each pregnant woman and her fetus, as well as the risk of contracting infection when a pandemic such as the COVID-19 one sets in.

Prior to the WHO’s 2016 recommendations, a focused antenatal care model was recommended by WHO in 2002, particularly in low- and middle-income countries. It suggested four antenatal care visits, first between 8 and 12 weeks, then between 24 and 26 weeks, third at 32 weeks and last between 36 and 38 weeks. Villar et al., through a multi-centre randomized controlled trial, established that there were no disadvantages of fewer visits.

Focused antenatal care is evidence based and has been the best approach for resource-limited countries with few health professionals and limited infrastructure, as may be the case in a pandemic due to quarantine of exposed health care providers. Focused antenatal care has already proved its effectiveness in terms of reducing maternal and perinatal mortality and morbidity.

Hence this model can be used for routine antenatal care in times of pandemic when the health system is already overwhelmed and the risk of getting infected concerns both pregnant women and health care providers. Recently, global interim guidance on COVID-19 during pregnancy and puerperium from the International Federation of Gynecology and Obstetrics and allied partners advocated for a reduced
number of antenatal visits for low-risk, uncomplicated pregnancies to minimize the risk of cross-infection.

The most important evidence-based intervention that requires in-person prenatal visits is checking blood pressure to diagnose and treat pre-eclampsia, a leading cause of maternal mortality. However, this can be done at home and supervised through telemedicine. Measuring weight beyond the first prenatal visit has not been shown to improve outcomes. Listening to fetal heart tones has also not been shown to change pregnancy outcomes. There is insufficient evidence that abdominal palpation or measuring symphysis fundal height improves pregnancy outcomes. However, of late Turrentine et al. have proposed a drive-through prenatal care model where blood pressure measurement, fetal heart rate assessment and selected ultrasound-based observations along with face-to-face doctor–patient interaction can occur, with the pregnant woman remaining in her private vehicle. This model also has the potential to reduce patient anxiety due to restricted antenatal visits.

During the COVID-19 pandemic, some Australian hospitals have decided to reduce in-person antenatal visits to only three for low-risk women throughout their entire pregnancy. Those visits are linked to key immunizations:

- the first antenatal visit to coincide with the delivery of the influenza vaccine;
- the second appointment at 28 weeks to include the pertussis vaccine;
- the third appointment between 34 and 37 weeks to include an ultrasound for fetal position and biometry.

Similarly, because of the COVID-19 pandemic, in-person prenatal care at an American hospital has now been reduced to an initial prenatal visit, an anatomy ultrasound, and 28-, 36- and 39-week visits. All lab tests are to be conducted during these visits, rather than in separate appointments.

Home monitoring of blood pressure, weight, urine protein and glucose can be an alternative to some antenatal visits in low-risk patients. Pregnant women can also measure their fundal height starting at 20 weeks, when the fundus should be at the level of the umbilicus. They can even mark their fundus after passing urine and send photos so that their doctor can see the progression.

The usual antenatal blood tests can be done normally at one of the antenatal visits, except for testing for gestational diabetes mellitus. An oral glucose tolerance test (OGTT), usually done between 24 and 28 weeks’ gestation, involves a follow-up blood test 2 hours after the fasting sample. However, this waiting period is not ideal in the time of a pandemic. Hence, low-risk women can have a fasting blood sugar level test performed at the 26- to 28-week antenatal visit while high-risk women can have a glycosylated haemoglobin (HbA1C) test instead of an OGTT during the first trimester.

Health care providers can schedule a telehealth appointment for the day before a face-to-face visit. These telehealth appointments can cover the majority of what needs to be discussed, thus limiting the time required for the follow-up face-to-face interaction to less than 15 minutes.

For the care of pregnant women at high risk, including obstetric risks, fetal risks, medical comorbidities or psychosocial issues, an individualized care plan should be created to determine the schedule of visits. All the visits need not be face-to-face consultations. A schedule for antenatal care during the COVID-19 pandemic is proposed, as shown in Fig. 1.

Remote and distanced care with telemedicine

Telemedicine can play a vital role in adapting health care systems during a surge in COVID-19 cases. The Medical Council of India, in partnership with the Government of India, recently released telemedicine practice guidelines to enable any registered medical practitioner to practice telemedicine safely. Although digital technologies have existed for decades

Fig. 1. A proposed schedule for antenatal care in low-risk women during the COVID-19 pandemic

<table>
<thead>
<tr>
<th>Low risk</th>
<th>High risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st prenatal visit at 11–13 weeks</td>
<td>2nd prenatal visit at 18–20 weeks</td>
</tr>
<tr>
<td>2nd prenatal visit at 28 weeks</td>
<td>Level II ultrasonography</td>
</tr>
<tr>
<td>3rd prenatal visit at 28 weeks</td>
<td>4th prenatal visit at 36 weeks</td>
</tr>
<tr>
<td>4th prenatal visit at 36 weeks</td>
<td>Individualized care plan</td>
</tr>
</tbody>
</table>

- Teleconsultation once pregnancy is diagnosed
- Start folic acid tablets if not taking already
- Assess whether high risk or low risk
- Dating and NT/NB screening and double marker test
- All routine antenatal care investigations
- Complete history and risk assessment
- Anti-D injection if ICT negative in Rh-negative pregnancy
- DTP vaccine
- Fasting blood sugar test
- Provide instructions on home blood pressure measurement and DFMC
- Review fetal movements
- Blood pressure and obstetric examination
- Obstetric ultrasonography (if needed)
- Discuss birth plan

- Virtual visits at 16 weeks, 34 weeks and 38 weeks or any time in the presence of complaints
- Defer in-person visit for at least 14 days if the pregnant woman is COVID-19 positive but having no or mild symptoms
- If a COVID-19-positive woman requires admission for any indication (obstetric or moderate to severe COVID-19), she should be treated in a dedicated COVID-19 hospital

anti-D: antibody against D antigen; DFMC: daily fetal movement count; DTP: diphtheria, tetanus and pertussis; ICT: indirect Coombs test; NB: nasal bone; NT: nuchal translucency.
and are already at advanced stages of adoption in medical sciences such as radiology, pathology and ophthalmology, they have been minimally explored for obstetric care. Online antenatal education resources and real-time synchronous telecommunication through various tools of telemedicine such as video technology, audio technology or chat-based platforms such as WhatsApp and Google Hangouts can be utilized to provide support from experienced health care providers well trained in communication skills.14 In the context of countrywide lockdowns to contain the spread of a pandemic, information on antenatal care can also be accessed through trusted official hospital websites.

Digital health apps can play a role in the care of pregnant women. A mobile health app can enable the provision of prenatal care and its integration with other aspects of family and professional life. Furthermore, the majority of prenatal care visits are scheduled to exchange educational information with the patient; pregnant women may be more receptive to educational programmes that can be delivered through a mobile health app. In-person visits for weight and blood pressure measurement can also be replaced by communication via mobile technology or remote monitoring. Marko et al. tested a mobile app for antenatal care and found that it resulted in fewer in-person visits without affecting patient satisfaction.15

Telemedicine can also be used to educate pregnant women about preventive measures during a pandemic, such as isolation of ill people, voluntary quarantine of households with ill people and social distancing techniques to limit exposure to infected people. These measures can present unique challenges for pregnant women, who can be guided through telemedicine on how to protect themselves from becoming infected if they are quarantined with or directly providing care for ill people. Furthermore, they can be reassured through telemedicine that COVID-19 infection is not necessarily an indication for delivery, as vertical transmission has not been proven.

**Telephone triage**

Telephone triage can be utilized to prevent women from visiting hospitals unnecessarily. The services of senior, experienced, trustworthy health care providers with excellent communication skills may be more effective in reassuring patients and reducing the number of unnecessary patient visits than those of other providers. Virtual triage also allows us to obtain more history, trace contacts and discuss recent travel. If a pregnant woman requires a COVID-19 test for COVID-19 infection, the triage facility may aid her in getting to the right location and also allow time for the infection prevention team to prepare at the facility. It can also be utilized to defer prenatal care for at least 2 weeks if a pregnant woman tests positive.

**Utilization of the private sector**

If government hospitals are redeployed to provide care to ill people during a pandemic, routine antenatal care services can be provided by the private sector utilizing telemedicine. However, private sector providers should adhere to all the recommendations listed in national telemedicine practice guidelines, both to maintain the privacy and confidentiality of the patient and to ensure that they remain within the law.

Online help groups can be created, in which women can act as peer mentors and share their lived experiences with other pregnant women. These mentors, besides helping group members with home monitoring of their pregnancy, can also guide them to recognize any danger signs. Such online groups can not only prove to be instrumental during periods of lockdown but also contribute outside a pandemic by providing extra support and reassurance to pregnant women.

**Utilization of outreach facilities for antenatal care**

In countries where health care delivery is based on the provision of outreach services by accredited social health activists (ASHAs) or auxiliary nurse midwives (ANMs), routine antenatal care can be provided without any difficulty. ASHAs or ANMs can allocate fixed-day services in their area while ensuring adherence to social distancing norms. They can create awareness in their community about the need to reduce the number of antenatal visits and mobilize women only in small groups of three or four to peripheral health centres to avoid overcrowding. They can also list and follow up on high-risk pregnancies to ensure early detection of complications, referral and further follow-up. Each pregnant woman, with the help of an ASHA or ANM, can be linked with the appropriate health facility for delivery. All districts should identify and communicate to peripheral facilities a list of functional and adequately staffed centres where high-risk pregnant women and women who develop complications can be treated.

Antenatal care during the last trimester requires prioritization. Telephone contact should be made by ASHAs or ANMs with high-risk pregnant women during the last trimester to ascertain their status and organize home-based follow-up if necessary. Home visits by ASHAs or ANMs, with all protective measures, may also provide them with the opportunity to distribute iron, folic acid and calcium tablets to pregnant women. In the case of a home delivery, an immediate visit can be made by an ASHA or ANM to assess the health of the woman and newborn.

**Conclusion**

Outbreaks of infectious diseases pose unique challenges for obstetric care facilities. Denying essential health services such as outpatient antenatal care and inpatient delivery services during a pandemic can have severe implications for maternal and fetal health. Social distancing and countrywide lockdowns have proven their role in slowing down viral transmission, giving time to adapt health systems to the pandemic. Health care facilities need to develop plans to minimize the exposure of healthy pregnant women while continuing to provide both routine and emergency obstetric care. A strategy to reduce the number of antenatal visits and different places for care and delivery of pregnant women with confirmed COVID-19 or recent exposure and healthy pregnant women may minimize the risk of infection. Intelligent use of technology such as telemedicine, which has been used in managing chronic illness for a long time, can be incorporated into obstetric care. Furthermore, triaging of pregnant women based on their period of gestation and their symptoms has the potential to avoid the risk of exposure while ensuring that the pregnant women most in need of attention receive care. Lastly, a collaborative work model involving health workers in the community and regional-level health centres also has the potential to prevent the catastrophic collapse of obstetric care services during a pandemic such as the COVID-19 pandemic.

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References

13. Telemedicine practice guidelines enabling registered medical practitioners to provide healthcare using telemedicine. New Delhi: Board of Governors in supersession of the Medical Council of India; 2020.