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Managing the pregnant woman during the COVID-19 pandemic in South Africa: A clinical guide for health workers and clinical managers

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FOREWORD

"The World Health Organisation (WHO) declared COVID-19 a global pandemic on 11th March 2020. The first case was diagnosed in South Africa on 5th March 2020. South Africa faces a particular challenge given the large vulnerable immunocompromised population living in overcrowded conditions.

These guidelines provide guidance to healthcare workers and managers for the management and treatment of pregnant women in the context of COVID-19. They should be read in conjunction with the current Maternal and Neonatal health Guidelines and the Guidelines for Clinical Management of suspected or confirmed COVID-19 disease.

These guidelines are likely to change as knowledge regarding strategies to address COVID-19 develop globally and in South Africa. The guidelines will be updated regularly based on emerging evidence and WHO recommendations.

The National Department of Health would like to thank the clinical and academic experts from different settings who contributed to the development of this guidelines

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Introduction

This summary is based on a combination of available evidence and expert opinion. This is an evolving situation and this summary is a living document that may be updated if or when new information becomes available.

1. COVID-19 and Pregnancy

Coronavirus disease 2019 (COVID-19) is a respiratory tract infection caused by a newly emergent coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), that was first recognized in Wuhan, China, in December 2019.

Pregnant and recently pregnant women with suspected or confirmed COVID-19 should be managed with supportive care, taking into account the immunologic and physiologic adaptations during and after pregnancy.

2. The Biology

Coronaviruses are enveloped, non-segmented, positive- sense ribonucleic acid (RNA) viruses belonging to the family Coronaviridae. SARS-CoV-2 belongs to the same β-coronavirus subgroup as the SARS-CoV and the Middle East respiratory syndrome coronavirus (MERS-CoV), with which it has genome similarity of 80% and 50% with respectively.

3. Epidemiology in Pregnancy

The virus appears to have originated in Hubei Province in China towards the end of 2019.

Pregnancy is a physiological state that predisposes women to respiratory complications of viral infection. Due to the physiological changes in their immune and cardiopulmonary systems, pregnant women are more likely to develop severe illness after infection with respiratory viruses. However, pregnant women do not appear to be more susceptible to the consequences of COVID-19 than the general population. Unlike Influenza and other respiratory illnesses, based on a limited number of confirmed COVID-19 cases, pregnant women do not appear to be at increased risk for severe disease. Current data is limited and diligence in evaluating and treating pregnant women is warranted. Special consideration should be given to pregnant women with comorbid medical conditions and COVID-19 until the evidence base provides clearer information. There are no reported deaths in pregnant women yet.

Over and above the impact of COVID-19 on a pregnant woman, there are concerns relating to the potential effect on fetal and neonatal outcome; therefore, pregnant women require special attention in relation to prevention, diagnosis and management. (To date, no cases of vertical transmission)

4. Transmission

Most cases of COVID-19 globally have evidence of human-to-human transmission. Respiratory droplets and direct contact spread COVID-19. However, there are recent cases that have appeared

where there is no evidence of contact with infected people. The virus appears to spread readily, through respiratory, fomite or faecal routes.

No vertical transmission has been documented. The virus has not been isolated from cord blood or amniotic fluid. Expert opinion is that the fetus is unlikely to be exposed during pregnancy. Any transmission to the neonate is therefore most likely to be after delivery, through close contact with the mother or other infected people. The virus has not been found in the breastmilk of mothers with COVID-19 infection, so for now breastfeeding is not thought to be a route of transmission

5. Presentation in pregnancy

There is currently no known difference between the clinical manifestations of COVID-19 in pregnant and non-pregnant women or adults of reproductive age.

Effect on the Mother: The majority of women will experience only mild or moderate cold/flu like symptoms. Cough (67.8%), fever (43.8% of cases on admission and 88.7% during hospitalization), and shortness of breath are other relevant symptoms (diarrhoea is uncommon (3.8%).

More severe symptoms such as pneumonia and marked hypoxia are widely described with COVID-19 in older people, the immunosuppressed and those with chronic medical conditions such as diabetes, hypertension, cancer and chronic lung and heart disease. Within the general population there is evolving evidence that there could be a cohort of asymptomatic individuals or those with very minor symptoms that are carrying the virus, although the incidence is unknown.

Effect on the Foetus*:* There is currently no data suggesting an increased risk of miscarriage or early pregnancy loss in relation to COVID-19. As there is no evidence of intrauterine fetal infection with COVID-19 it is currently considered unlikely that there will be congenital effects of the virus on fetal development.

There are case reports of preterm birth in women with COVID-19, but it is unclear whether the preterm birth was iatrogenic, or whether some were spontaneous. Iatrogenic delivery was predominantly for maternal indications related to the infection. There were a few reports of fetal compromise and pre-labour premature rupture of membranes.

Fever is common in COVID-19-infected patients. Previous data from other studies have demonstrated that maternal fever in early pregnancy can cause congenital structural abnormalities. However, a recent study in non-COVID-19 women, reported that the rate of fever in early pregnancy was 10%, and the incidence of fetal malformation in this group was 3.7%. Previous studies have reported no evidence of congenital infection with SARS-CoV, and currently there are no data on the risk of congenital malformation when COVID-19 infection is acquired during the first or early second trimester of pregnancy.

6. Investigation and Diagnosis

The process of COVID-19 testing and diagnosis is changing rapidly. Pregnancy does not alter the criteria for testing. Pregnant women should be investigated and diagnosed as per local criteria: www.nicd.ac.za and www.ndoh.gov.za

7. Prevention

Currently, there are no effective drugs or vaccines to prevent COVID-19. There are however several interventions that can prevent spread of the virus and confer protection from acquiring the virus.

- Any person with symptoms suggestive of the disease should be advised to and should take responsibility to isolate themselves from others. They should additionally wear a face mask. They should phone their local health facility or the National COVID-19 helpline (0800 029 999) to enquire about whether they should be tested for COVID.
- Maintain good personal hygiene: Wash hands and/or use hand sanitizer frequently. Avoid touching face (particularly eyes) with hands or fingers unless the hands have just been washed. This advice is applicable to everyone, and most especially to health workers on duty.
- Personal protective equipment (PPE) must be used by those working in the health care environment according to local guidelines.
- Citizens must abide by National "lock down" regulations. For those such as health workers who have to be at work despite the lock down, they must consciously avoid unnecessary close contact with others, such as greeting with handshakes, hugs and kisses. Any essential meetings that cannot be conducted remotely must ensure that participants maintain a 1.5 meter distance between each other.

8. Notes on Clinical Management

For pregnant women the same infection prevention, investigation and diagnostic guidance applies, as for non-pregnant adults.

- COVID-19 infection is not an indication for delivery, unless delivery is required as part of maternal resuscitation to improve maternal oxygenation, or to restore haemodynamic stability.
- COVID-19 infection is not an indication for caesarean delivery. Women with COVID 19 infection should be allowed to deliver vaginally, unless there are clear obstetric indications for caesarean section. (WHO recommends that caesarean section should ideally be undertaken only when medically justified).
- Shortening the second stage by assisted vaginal delivery can be considered if the woman is exhausted or has respiratory distress.
- For suspected and confirmed cases of COVID-19 infection, intrapartum care, delivery and immediate postnatal care should be conducted in an appropriate isolation room. There must be dedicated midwives allocated to care for the woman and her newborn. These midwives

must not be involved with managing other women in labour on the same shift. Appropriate personal protective equipment (PPE) must be worn by the midwives caring for the COVID 19 patient.

- Induction of labour is not routinely indicated for women with COVID 19, but should be performed for appropriate obstetric indications.
- Where preterm delivery is anticipated, there is a need for caution with the use of antenatal corticosteroids for fetal lung maturation in a critically ill patient, because steroids could potentially worsen the mother's clinical condition. The use of antenatal steroids should be considered in discussion with a multidisciplinary team (infectious disease specialists (where available), specialist physician, specialist obstetrician, maternal-fetal-medicine specialists (where available) and neonatologists). WHO- in cases where the woman presents with mild COVID-19, the clinical benefits of antenatal corticosteroid might outweigh the risks of potential harm to the mother. In this situation, the balance of benefits and harms for the woman and the preterm newborn should be discussed with the woman to ensure an informed decision, as this may vary depending on the woman's clinical condition, her wishes and that of her family, and available health care resources.
- In the case of an infected woman presenting with spontaneous preterm labour, tocolysis should not be used in an attempt to delay delivery in order to administer antenatal corticosteroids.
- Products of conception from miscarriages or terminations of pregnancy and placentas of COVID-19-infected pregnant women should be treated as infectious tissues and they should be disposed of appropriately.
- Delayed cord clamping is still recommended following birth, provided there are no other contraindications. The baby can be cleaned and dried as normal, while the cord is still intact. COVID-19 has not been isolated from cord blood.
- Newborns to mothers with suspected or confirmed COVID-19 should routinely be kept together with the mother for bonding and breastfeeding, with the mother applying necessary precautions for IPC (the mother should wear a mask and wash or sanitize her hands frequently). If possible, the mother/baby pair should continue to occupy the same isolation room used by the mother during labour. Otherwise, they may need to be transferred to an alternative isolation ward, but will still require appropriate postnatal/neonatal care.
- For women expressing breast milk, hands must be washed before expressing. A dedicated breast pump/milk cups should be used. Follow recommendations for breast pump cleaning after each use (Rinse all expressing equipment in clean, running water before sterilizing). Consider asking someone who is well to feed expressed milk to the baby (Mother can decant milk from her container into a clean container held by a healthy person to prevent transmission via the containers surface).
- All newborn of women with suspected or confirmed COVID-19 need careful assessment at birth and monitoring, with referral to or consultation with the next level of expertise in selected cases. All babies will need neonatal follow-up and ongoing surveillance after discharge.

- Routine neonatal criteria for admission to the neonatal nursery/NICU will apply. Expressed breast milk would be ideal for the baby in this situation, if the mother is not able to enter the neonatal nursery due to infection concerns.
- If the mother is unwilling to breastfeed the baby or is unable to breastfeed the baby because she is critically ill, then arrangements for the baby to be taken home for care by the family should be investigated.
- When mother with COVID-19 and baby are both fit for discharge, they can be discharged home as long as home circumstances will allow self-isolation of the mother/baby pair. If this is not possible, referral to an alternative isolation/quarantine unit may be necessary.
- For PUIs, every attempt must be made to obtain a COVID-19 test result before discharge to clarify isolation requirements post-discharge.
- The postnatal visit schedule must be arranged before discharge. Discharge must be authorized by a senior team member. On discharge, the mother with COVID-19 must be provided with contact details of the relevant postnatal/neonatal care team member to call if she has any concerns before her next scheduled visit. The postnatal/neonatal team should also obtain contact numbers for the mother, so that telephonic follow-up can be conducted if required.
- For symptomatic relief or fever or headache, paracetamol is recommended. There are some concerns (not proven) that non-steroidal anti-inflammatory drugs, specifically ibuprofen, may worsen the course of COVID-19, and they should therefore not be used as first-line treatment for symptomatic relief.

9. Common Scenarios related to COVID-19 in pregnancy

Patient Scenario	Management advice (Adapted for RSA from RCOG, ACOG, WHO and SASA recommendations)
1. Pregnant woman phones the health facility and asks if she must attend for her antenatal or postnatal visit. She has no symptoms suggestive of COVID-19	Ask the woman if she would prefer to be called back to save her airtime. Take a detailed history on the phone, asking about travel history, symptoms and contact with anyone who has COVID. Ask if she has been tested for COVID. Ask about any other problems or concerns she has regarding the pregnancy. If the history confirms that she has not recently returned from travel to a high-risk country for COVID, that she does not have COVID symptoms and that she does not have a COVID contact, then she should be advised to attend antenatal care or postnatal care as usual. Advise her that she should expect to be screened for COVID on arrival at the facility, before joining the antenatal or postnatal clinic queue.

	Take the opportunity to re-emphasize general preventative measures for COVID including handwashing and social distancing.
2. Pregnant woman phones the health facility and reports that she has symptoms suggestive of COVID-19	• Ask the woman if she would prefer to be called back to save her airtime. • Take a detailed history on the phone, asking about travel history, symptoms and contact with anyone who has COVID. Ask if she has been tested for COVID. • Assess severity of symptoms, including whether there is shortness of breath, whether she is able to eat and drink, whether she is able to do her normal household activities. • Ask about any other problems or concerns she has regarding the pregnancy. • Ask about her home circumstances • Consider calling another household member to get further information on the woman's condition and home circumstances. • If the woman meets the criteria for testing, make a plan for testing her for COVID, either through an outreach visit to her, or through her making a visit to the health facility. • If the woman is well (not short of breath and can conduct her normal household activities), and home circumstances allow, a plan can be made for her to self-isolate herself at home, until her test result comes back negative, or if positive, until 14 days after the onset of symptoms. For women who are advised to self-isolate, the guidance currently recommends to: • Not go to school, work, or public areas • Not use public transport • Stay at home and not allow visitors • Ventilate the rooms by opening a window • Separate themselves from other members of their household as far as possible, using their own towels, crockery and utensils and eating at different times • Use friends, family or delivery services to run errands, but advise them to leave items outside. If home circumstances do not allow self-isolation at home, contact the local quarantine/isolation centre to discuss admission for isolation She can resume her routine antenatal visits after the isolation period

	has been completed. If there is any concern that she may have severe COVID-19, or if she has other obstetric problems requiring urgent assessment, a plan must be made for her to come for assessment at the health facility, where she must be attended to in isolation Transport to the health facility will in such cases usually be by ambulance, unless the woman has access to suitable private transport. The woman must ideally wear a face mask throughout the transfer period.
3. Pregnant woman phones the health facility and reports that she has no symptoms of COVID-19, but a close contact of hers has just been diagnosed with COVID	• Ask the woman if she would prefer to be called back to save her airtime. • Take a detailed history on the phone, asking about travel history, symptoms and details of the contact history. Ask if she has been tested for COVID. • Ask about any other problems or concerns she has regarding the pregnancy. • Ask about her home circumstances. • If the woman meets the criteria for testing, make a plan for testing her for COVID, either through an outreach visit to her, or through her making a visit to the health facility. • If the contact history is confirmed, and the woman remains well (not short of breath and can conduct her normal household activities), and home circumstances allow, a plan can be made for her to self-isolate herself at home, until 14 days after the last date of the contact • If home circumstances do not allow self-isolation at home, contact the local quarantine center to discuss admission for isolation.
4. General advice for a facility providing care to pregnant or postpartum women with suspected or confirmed COVID-19, in whom hospital attendance becomes necessary because of obstetric reasons	• The woman should be advised to attend via private transport where possible (e.g. by private car or on foot; not by meter taxi/uber etc). All feasible precautions should be taken to protect any accompanying person from infection (the patient should wear a mask and maintain a distance of over 1m from others). • If the woman has no access to private transport, or if her current condition makes private transport inappropriate, then she should call for an ambulance. When calling for the ambulance the call centre must be informed that the woman is currently in self-isolation for COVID- 19 or possible COVID-19.

	• The woman should if possible call the facility in advance to alert them that she will be coming. If the woman is being brought by ambulance, then the EMS must inform the receiving facility that the patient they are bringing is a COVID case, or a PUI. • On arrival at the health facility, the woman must, without joining any queue, immediately report to a staff member that she has COVID or is a PUI, and explain the reason for her attendance. This should be done on the facility premises, but prior to entering thefacility building. • All staff providing care should take personal protective equipment (PPE) precautions as per local guidance. If the woman is not already wearing a face mask, then she must be provided with one on arrival to the facility. • The woman should be met at the maternity unit entrance by staff wearing appropriate PPE and provided with a surgical face mask. • The woman should immediately be escorted to an isolation room, suitable for the majority of care during her hospital visit or stay- For overnight stays, isolation rooms should ideally have an ante-chamber for donning and doffing PPE, and en-suite bathroom facilities. • Only essential staff should enter the room and visitors should be kept to a minimum. • Remove non-essential items from a clinic/ultrasound room prior to consultation. • All clinical areas used will need to be cleaned after use as per local guidance and IPC.
5. Woman presenting for care with unconfirmed COVID-19 but symptoms suggestive of possible infection	All health facilities including maternity departments with direct entry for patients and the public should have in place a system for identification of potential cases (screening for COVID on arrival to the facility) as soon as possible to prevent potential transmission to other patients and staff. This should be at first point of contact (either near the entrance or at reception) to ensure early recognition and infection prevention control. All women must be screened before sitting in the maternity waiting area. If woman shows symptoms suggestive of COVID-19 infection (cough or fever above 37.8 degrees) they should be tested. Until test results are available, they should be treated as though they have confirmed COVID-19, immediately isolated from other patients, and attended to by health workers using PPE

	Pregnant women may attend for pregnancy reasons and be found on screening to have coincidental symptoms meeting current COVID-19 case definition. There are some situations where overlap between pregnancy symptoms and COVID-19 symptoms may cause confusion (e.g. fever with ruptured membranes/other systemic infection). A thorough examination is required. In cases of uncertainty seek additional advice or in case of emergency investigate and treat as COVID-19 until proven otherwise. In the event of a pregnant woman attending with an obstetric emergency and being suspected or confirmed to have COVID-19, maternity staff must first follow IPC guidance. This includes transferring the woman to an isolation room and donning appropriate PPE. Once IPC measures are in place the obstetric emergency should be dealt with as the priority. Do not delay obstetric management in order to test for COVID-19. Further care, in all cases, should continue as for a woman with confirmed COVID-19, until a negative test result is obtained.
6. Attendance for routine antenatal care in a woman with suspected or confirmed COVID-19	Routine appointments for women with suspected or confirmed COVID-19 should be delayed until after the recommended period of isolation. Advice to attend more urgent pre-arranged appointments (fetal medicine, high risk clinic) will require a senior decision on urgency and potential risks/benefits. If it is deemed that obstetric or midwifery care cannot be delayed until after the recommended period of isolation, infection prevention and control measures should be arranged locally to facilitate care. All facilities providing maternity care must arrange local, robust communication pathways for senior maternity staff members to screen and coordinate appointments missed due to suspected or confirmed COVID-19. All women attending antenatal or postnatal care (ANC/PNC), not only those with COVID, must be provided with a phone/sms/WhatsApp number through which they can liaise with a senior staff member at their ANC/PNC facility, to report symptoms, plan suitable dates for appointments, report transport difficulties preventing attendance etc. Furthermore, reliable contact details of any COVID case or PUI must be obtained so that in cases where the woman will be managed through self-isolation at home, or in an isolation/quarantine facility, telephonic follow-up can be conducted by the ANC/PNC staff, to plan ongoing management.
7. Woman who develops new symptoms during admission	The estimated incubation period of the virus is 0-14 days (mean 5-6 days); some woman may present asymptomatically, developing symptoms later during an admission. It is also possible that people may be infectious for one or two days before symptoms appear.

(antenatal, intrapartum or postnatal)	Health professionals should be aware of this possibility (particularly those who regularly measure patient vital signs), and maintain standard infection prevention control measures for all patients (e.g. sanitiser or washing hands in between all patient contact. As soon as symptoms of COVID become apparent, isolation of the patient must be arranged at the facility where she is admitted. Local guidance should be available on whom to contact for further assessment of the patient in the event of new onset respiratory symptoms or unexplained fever of or above 37.8 degrees.
8. Woman attending for intrapartum care with suspected/confirmed COVID-19 and no/mild symptoms Attendance in labour	All women who have attended antenatal care should have made a plan with the health care provider about the appropriate birthing site according to obstetric risk factors. At the time when the woman goes into labour, if she now has COVID or suspects she may have COVID, then she should contact her maternity care facility to confirm where she must attend for labour and to discuss transport arrangements. Every woman should during antenatal care have been provided with a phone number to call in such situations (see box 6 above). If the woman is unable to contact her local facility, she should call the SA COVID helpline 0800 029 999. If the woman cannot make a call or get through to the relevant number, she must just attend her planned birthing facility. All designated birthing facilities should have a plan in place to manage women with COVID in labour. However, particularly if the woman has significant respiratory symptoms or is critically ill, then arrangements should be made for the woman to attend for labour at a specialised COVID centre where she will have access to a multi-disciplinary specialist team. When a woman in labour who is a COVID case or a PUI presents to the maternity unit, general recommendations about hospital attendance apply (see box 4). Once settled in an isolation room, a full maternal and fetal assessment should be conducted to include: • Maternal observations including temperature, pulse, blood pressure, respiratory rate and oxygen saturation (if saturation is monitor available), in order to assess the severity of COVID-19. • Confirmation of the onset of labour, as per standard care. • Fetal monitoring as per standard guidelines according to the obstetric risk factors. Not for fetal monitoring if the mother is unstable. • If the woman has signs of sepsis, investigate and treat as per local guidelines on sepsis in pregnancy, but also consider COVID-19 as a cause of sepsis and investigate accordingly. (Look

	out for other co-infections) • Once a full assessment has been made, decide whether referral to a designated specialised COVID centre is necessary. Consult the doctor at the specialised centre as required. • If COVID not confirmed, test for COVID after attending to any obstetric emergency. If labour is confirmed, then care in labour should ideally continue in the same isolation room. If spontaneous preterm labour, tocolysis should not be used in an attempt to delay delivery in order to administer antenatal steroids.
9. Care in labour- Severe COVID; considerations apply to woman in spontaneous or induced labour:	A pregnant woman in labour with evidence of severe COVID (e.g. breathing difficulties, decreased level of consciousness, with no other obvious cause after thorough history and examination) should be taken ideally by ambulance straight to a specialised COVID centre. This is irrespective of whether the COVID has been confirmed yet or not. When the woman is admitted to the designated labour ward, members of the multi-disciplinary team should be informed: specialist obstetrician, specialist anaesthetist, specialist physician, midwife-in-charge, specialist neonatologist and neonatal nurse in charge and infectious disease specialist if available,etc. Efforts should be made to minimise the number of staff members entering the room and units/facilities should develop a local policy specifying essential personnel for emergency scenarios. Maternal observations and assessment should be continued as per standard practice, with the addition of hourly oxygen saturations. (Aim to keep oxygen saturation >94%, titrating oxygen therapy accordingly). Fetal monitoring is not recommended until the mother's condition has been stabilised. Mode of birth should not be influenced by the presence of COVID-19, unless the woman's respiratory or haemodynamic condition demands urgent delivery to improve oxygenation. There is no evidence that epidural or spinal analgesia or anaesthesia is contraindicated in the presence of corona viruses. When caesarean delivery or other operative procedure is advised, follow IPC guidance. (PPE may impact on the decision to delivery

	interval but it must be done. Women and their families should be told about this possible delay). An individualised decision should be made regarding shortening the length of the second stage of labour with instrumental delivery in a symptomatic woman who is becoming exhausted or has respiratory distress. Delayed cord clamping is still recommended following birth, provided there are no other contraindications.
10. Woman Planned induction of labour	As for elective caesarean delivery, an individual assessment should be made regarding the urgency of planned induction of labour for women with mild symptoms and suspected or confirmed COVID-19. If induction of labour cannot safely be delayed, the general advice for services providing care to women admitted to hospital when affected by suspected/confirmed COVID-19 should be followed. Women should be admitted into an isolation room, in which they should ideally be cared for the entirety of their hospital stay.
11. Additional considerations for women with confirmed COVID-19 and moderate/severe symptoms The following recommendations apply in addition to those specified for women with no/mild symptoms. ***Women admitted during pregnancy (not in labour)***	Where pregnant women are admitted to hospital with deterioration in symptoms and suspected or confirmed COVID-19 infection, the following recommendations apply: • Admit/refer to a specialized COVID 19 hospital. A multidisciplinary team (MDT) – involving a specialist physician (infectious disease specialist where available), specialist obstetrician, midwife-in-charge, specialist neonatologist, neonatal-nurse in charge, virologist/microbiologist (where available) and specialist anaesthetist responsible for obstetric care should be arranged as soon as possible following admission. (The discussion and its conclusions should be discussed with the woman). The following should be discussed: ***Key priorities for medical care of the woman:*** • Most appropriate location of care (e.g. intensive care unit, isolation room in infectious disease/labour ward or other suitable isolation room) and lead specialty. (Covid19 designated hospitals for severely ill women) • Concerns amongst the team regarding special considerations in pregnancy and newborns. • The priority for medical care should be to stabilise the woman's condition with standard supportive care therapies. ***Considerations for the pregnancy:*** • Radiographic investigations should be performed as indicated for the non-pregnant adult; this includes chest X-ray and/or CT of the chest. (Reasonable efforts to protect the fetus from radioactive exposure should be made, as per usual protocol).

	• The frequency and suitability of fetal heart rate monitoring should be considered on an individual basis, taking into consideration the gestational age of the fetus and the maternal condition. • Do not monitor the fetal condition in a woman with severe COVID-19. The presence of the fetal heart can be checked intermittently in such cases. • If urgent delivery is indicated for fetal reasons, birth should be expedited as normal, as long as the maternal condition is stable. • If maternal stabilization is required before delivery, this is the priority, as it is in other obstetric emergencies. An individualised assessment of the woman should be made by the MDT team to decide whether urgent delivery of the baby is indicated, either to assist efforts in maternal resuscitation or where there are serious concerns regarding the fetal condition. Individual assessment should consider the maternal condition, the fetal condition, the potential for improvement following elective delivery and the gestation of the pregnancy. The priority is stabilizing the mother's condition. **Preterms:** Women presenting with moderately severe COVID-19, it is not clear whether the clinical benefits of antenatal corticosteroids might outweigh the risks of potential harm to the mother. The balance of benefits and harms for the woman and the preterm newborn should be discussed. (informed decision, woman's clinical condition, woman's wishes, family wishes, available health care resources). (For critically ill women corticosteroids are contraindicated) If spontaneous preterm labour occurs, tocolysis should not be used in an attempt to delay delivery in order to administer antenatal corticosteroids.
12. General advice for obstetric theatre	All staff (including maternity, neonatal and theatre) should have been trained in the use of PPE. The number of staff in the operating theatre should be kept to a minimum, all of whom must wear appropriate PPE. Any elective surgery, including elective caesarean section, should be postponed in women with COVID until the infectious period has passed (usually 14 days after the onset of symptoms). For pregnant women who are PUIs, the surgery should be postponed either until the test result comes back as negative or if, the test result is positive, until the infectious period has passed.

	In cases where elective caesarean delivery cannot safely be delayed (i.e. there is now an urgent or emergency need for caesarean section), the general advice for services providing care to women admitted when affected by suspected/confirmed COVID-19 should be followed.
13. When caesarean section (CS) is required for the woman with COVID-19.	**The following guidelines apply:** • Birth partners should not accompany the patient in the theatre complex • Platelet count should always be checked in preparing for the caesarean section. NOTE: Approximately one third of patients in a case series from Wuhan developed thrombocytopaenia (platelet count <150). This may have implications both for the anesthetic and for the surgery. • Early warning for the senior anaesthetist of an impending caesarean section is essential in order to facilitate preparation of theatre and PPE. • Where possible, a senior anaesthetist should administer the anaesthesia. This is aimed at reducing theatre time, reducing the incidence of failed spinal anaesthesia and potentially reducing aerosol generation during intubation, if required. • The surgeon should also be at senior level in order to reduce the risk of operative complications and prolonged surgery, and thereby reducing the incidence of conversion of spinal anaesthesia to general anaesthesia. • The surgeon, surgical assistant, scrub nurse and midwife (receiving baby) must wear full PPE, including an N95 mask and goggles or visor. • Anaesthesia for these patients may be either regional or general anaesthesia (GA), as for non-COVID-19 patients. However, GA, which for CS requires endotracheal intubation, creates a greater risk for virus transmission to staff in theatre and for viral contamination of the theatre. If the anaesthesia machine is used either for a GA or for administration of supplemental oxygen, a hydrophobic filter must be used to prevent the machine being contaminated with the virus (≤ 0.05µm pore size). • Spinal anaesthesia remains the anaesthetic of choice in the absence of contra-indications. The patient should be

	wearing a surgical facemask for the duration of the perioperative period. • Where spinal anaesthesia is used, the airway theatre trolley should be prepared as for a GA. Two sets of intubation PPE: N95 mask, goggles or visor and two pairs of non-sterile gloves should be available on the trolley. An alcohol based hand sanitizer should be available. In the event of a "stable" conversion to GA, the anaesthetist should don full PPE for intubation whilst the assistant monitors the patient. The anaesthetist should return in full PPE and the assistant should then don PPE. Before proceeding, ensure all staff in the operating theatre are wearing PPE. Induction of anaesthesia should be performed and surgery commence/ restart after the airway is secured. In patients at high risk for GA conversion, PPE should be donned before the initiation of spinal anaesthesia. • Donning PPE is mandatory for tracheal intubation; double glove if intubating the patient and remove the outer gloves once the endotracheal tube is secured. See SASA guidelines: https://sasacovid19.com. • Tracheal intubation is a high-risk procedure for staff, irrespective of the clinical severity of the disease. Where possible, video-laryngoscopy should be used as first-line. Avoid face mask ventilation unless needed. **Failed spinal guidelines:** • i) Senior anaesthetic advice should be sought in the event of a failed spinal. If the clinical circumstances permit, a second attempt at spinal anaesthesia is preferred within current ESMOE guidelines. These state that if there are no effects of the failed spinal within 20 minutes, a repeat spinal anaesthetic may be administered. In the event of partial effects, surgery should either be delayed for six hours (depending on indications for CS) or converted to GA. If delayed surgery is chosen, a repeat failed spinal anaesthetic should be converted to GA. Conversions to GA should be done within the current SASA guidelines for GA in the COVID-19 positive patient. • ii) Where the need to deliver the baby is very urgent, either for fetal or maternal reasons, the perioperative team may make a decision to proceed straight to an urgent GA. In this event, the assistant and anaesthetist should remove gloves

	and sterilize hands with alcohol. N95 should be applied along with double gloves. Induction and intubation should proceed with all due speed. • **No induction should occur without all staff in the theatre having first donned PPE.** *Neonatal Resuscitation post CS:* Consider neonatal resuscitation outside the operating theatre where possible. This may reduce exposure of the baby and staff resuscitating the baby to aerosols, and potentially minimize the unnecessary use of PPE. *Post operative pain considerations:* A combination of paracetamol and an opiate should be routinely used as first-line for post-operative pain relief in the woman with COVID-19. Local anaesthetic around the incision is an additional option. Concerns regarding the use of NSAIDs in the Covid-19 positive patient are not yet proven by clinical data. Accordingly, NSAIDs may be used with caution in the absence of other contraindications, on an individual patient basis.

10. Notes on Clinical Management

- The COVID-19 pandemic places most pregnant and postnatal mothers and their families under considerable social, economic and psychological strain. Many women will be at increased risk for food insecurity and domestic violence. Although staff too are likely to be highly stressed and deserve care, their engagement with mothers should always be respectful and empathic.
- For pregnant women the same infection prevention and COVID-19 investigation/ diagnostic guidance applies, as for non-pregnant adults.
- For staff attending to pregnant woman with COVID-19 or PUIs, the same personal protective equipment (PPE) requirements apply as when attending non-pregnant adults with COVID-19. As with all pregnancies, irrespective of COVID-19 status, particularly during labour, there are risks of staff exposure to blood, urine, faeces and amniotic fluid. Routine infection control measures as required for managing all

pregnancies and deliveries must therefore be strictly adhered to. However, staff can be reassured that the virus has not so far been detected in amniotic fluid or in breastmilk.

- For symptomatic relief or fever or headache, paracetamol is recommended. There are some concerns (not proven) that non-steroidal anti-inflammatory drugs, specifically ibuprofen, may worsen the course of COVID-19, and they should therefore not be used as first-line treatment for symptomatic relief.
- COVID-19 is not an indication for delivery, unless it is felt that delivery is required as part of maternal resuscitation to improve maternal oxygenation, or to restore haemodynamic stability.
- COVID-19 is not an indication for caesarean delivery. Women with COVID-19 should be allowed to deliver vaginally, unless there are clear obstetric indications for caesarean section.
- Shortening the second stage by assisted vaginal delivery can be considered if the woman is having respiratory distress.
- Do not monitor the fetal condition in a woman with severe COVID-19. The priority is stabilizing the mother's condition. The presence of the fetal heart can be checked intermittently in such cases.
- For asymptomatic women or those with mild disease, standard fetal monitoring guidelines apply, taking into consideration any obstetric risk factors
- Induction of labour (IOL) is not routinely indicated for women with COVID-19, but should be performed for appropriate obstetric indications. The decision for IOL should involve an experienced obstetric doctor, to ensure that the IOL is definitely indicated. Where possible, it would be better to avoid labour and delivery until the woman has recovered from the COVID-19
- Women scheduled for elective caesarean sections, who have contracted COVID-19 should if possible have the caesarean section postponed until 14 days after the onset of COVID-19 symptoms. PUIs should wait for the test result before a decision is made on the timing of the caesarean section. The postponing of elective caesarean sections should be overseen by an experienced obstetric doctor, to ensure that it is safe to do

so, and to determine an appropriate monitoring/review schedule for the mother while awaiting the new date.

- For suspected COVID-19 cases (including recent contacts of a confirmed COVID-19 case) and confirmed cases of COVID-19, intrapartum care, delivery and immediate post-natal care should be conducted in an appropriate isolation room. There should ideally be two dedicated midwives allocated to care for such a woman and her newborn (if this is not possible, then at least one midwife and a nurse), and these midwives must not be involved with managing other women in labour on the same shift. Appropriate personal protective equipment (PPE) must be worn by the midwives and nurses caring for the COVID-19 patient.
- Where preterm delivery is anticipated, there is a need for caution regarding the use of antenatal corticosteroids for fetal lung maturation in a critically ill patient, because steroids could potentially worsen the mother's clinical condition. Ideally the use of antenatal steroids should be considered in discussion with a multidisciplinary team (infectious disease specialists, maternal-fetal-medicine specialists and neonatologists). A general guide is that a course of steroids can be given where there is mild COVID-19, but should be avoided when there is severe COVID-19
- In the case of woman with COVID-19 presenting with spontaneous preterm labour, tocolysis should not be used in an attempt to delay delivery in order to administer antenatal steroids.
- Although the virus has not been isolated from umbilical cord blood or amniotic fluid of pregnancies where the mother has COVID-19, products of conception from miscarriages or terminations of pregnancy and placentae of women with COVID-19 should nonetheless be treated as infectious tissues and be disposed of using appropriate infection control practices
- The COVID-19 virus has not been isolated from cord blood. Delayed cord clamping is still recommended following birth. The baby can be cleaned and dried as normal, while the cord is still intact.

11. When caesarean section (CS) is required for the woman with COVID-19, the following guidelines apply:

- Birth partners should not accompany the patient in the theatre complex

- Platelet count should always be checked in preparing for the CS. NOTE: Approximately one third of patients in a case series from Wuhan developed thrombocytopaenia (platelet count <150). This may have implications both for the anesthetic and for the surgery
- Early warning for the senior anaesthetist of an impending caesarean section is essential in order to facilitate preparation of theatre and PPE.
- Where possible, a senior anaesthetist should administer the anaesthesia. This is aimed at reducing theatre time, reducing the incidence of failed spinal anaesthesia and potentially reducing aerosol generation during intubation, if required.
- The surgeon should also be at senior level in order to reduce the risk of operative complications and prolonged surgery, and thereby reducing the incidence of conversion of spinal anaesthesia to general anaesthesia.
- The surgeon, surgical assistant, scrub nurse and midwife (receiving baby) must wear full PPE, including an N95 mask and goggles or visor.
- Anaesthesia for these patients may be either regional or general anaesthesia (GA), as for non-COVID-19 patients. However, GA, which for CS requires endotracheal intubation, creates a greater risk for virus transmission to staff in theatre and for viral contamination of the theatre. If the anaesthesia machine is used either for a GA or for administration of supplemental oxygen, a hydrophobic filter must be used to prevent the machine being contaminated with the virus (≤ 0.05µm pore size).
- Spinal anaesthesia remains the anaesthetic of choice in the absence of contra-indications. The patient should be wearing a surgical facemask for the duration of the perioperative period.
- Where spinal anaesthesia is used the airway theatre trolley should be prepared as for a GA. Two sets of intubation PPE: N95 mask, goggles or visor and two pairs of non-sterile gloves should be available on the trolley. An alcohol based hand sanitizer should be available. In the event of a “stable” conversion to GA, the anaesthetist should don full PPE for intubation whilst the assistant monitors the patient. The anaesthetist should return in full PPE and the assistant should then don PPE. Before proceeding, ensure all staff in the operating theatre are wearing PPE. Induction of anaesthesia should be performed and surgery commence/ restart after the airway is secured. In

patients at high risk for GA conversion, PPE should be donned before the initiation of spinal anaesthesia.

- Donning PPE is mandatory for tracheal intubation; double glove if intubating the patient and remove the outer gloves once the endotracheal tube is secured. See SASA guidelines: https://sasacovid19.com.
- Tracheal intubation is a high-risk procedure for staff, irrespective of the clinical severity of the disease. Where possible, video-laryngoscopy should be used as first-line. Avoid face mask ventilation unless needed.

12. Failed spinal guidelines:

- Senior anaesthetic advice should be sought in the event of a failed spinal. If the clinical circumstances permit, a second attempt at spinal anaesthesia is preferred within current ESMOE guidelines. These state that if there are no effects of the failed spinal within 20 minutes, a repeat spinal anaesthetic may be administered. In the event of partial effects, surgery should either be delayed for six hours or converted to GA. If delayed surgery is chosen, a repeat failed spinal anaesthetic should be converted to GA. Conversions to GA should be done within the current SASA guidelines for GA in the COVID-19 positive patient. ii) Where the need to deliver the baby is very urgent, either for fetal or maternal reasons, the perioperative team may make a decision to proceed straight to an urgent GA. In this event, the assistant and anaesthetist should remove gloves and sterilize hands with alcohol. N95 should be applied along with double gloves. Induction and intubation should proceed with all due speed. No induction should occur without all staff in the theatre having first donned PPE.
- Consider neonatal resuscitation outside the operating theatre where possible. This may reduce exposure of the baby and staff resuscitating the baby to aerosols, and potentially minimize the unnecessary use of PPE.
- A combination of paracetamol and an opiate should be routinely used as first-line for post-operative pain relief in the woman with COVID-19. Local anaesthetic around the incision is an additional option. Concerns regarding the use of NSAIDs in the Covid-19

positive patient are not yet proven by clinical data. Accordingly, NSAIDs may be used with caution in the absence of other contraindications, on an individual patient basis

- Well newborns of mothers with suspected or confirmed COVID-19 should routinely be kept together with the mother for bonding and breastfeeding, with the mother applying necessary precautions for IPC (mother should wear a mask and wash or sanitize her hands frequently.)
- For PUIs, every attempt must be made to obtain a COVID-19 test result before discharge to clarify isolation requirements post-discharge. The postnatal visit schedule must be arranged before discharge. On discharge, the mother with COVID-19 must be provided with contact details of the relevant postnatal/neonatal care team member to call if she has any concerns before her next scheduled visit. The postnatal/neonatal team should also obtain contact numbers for the mother, so that telephonic follow-up can be conducted if required
- Routine neonatal criteria for admission to the neonatal nursery/NICU will apply when the mother has COVID-19. Expressed breast milk will be important for the baby in this situation, if the mother is not be allowed to enter the neonatal nursery, due to infection control restrictions
- If the mother is unwilling to breast feed the baby or is unable to breast feed the baby because she is critically ill, then arrangements for the baby to be taken home for care by the family should be investigated.
- If the mother is unable to breastfeed the baby because she is critically ill, sourcing donor breast milk for the baby should be attempted.

13. Summary of key considerations:

- All health facilities must have a process of screening all outpatients for COVID-19 before or as they arrive at the facility. The facility must be able to provide surgical face masks for patients who screen positive, to be worn during all further interactions at the facility.
- Pregnant women with confirmed COVID-19 infection should be managed at the appropriate level of care. All designated birthing sites should be able to identify potential COVID-19 cases, test for COVID-19, identify women with severe COVID-19 disease and be able to manage deliveries with mild COVID-19 disease.

- Outpatient examination and all inpatient management of pregnant women with COVID-19 should be carried out in an appropriate isolation room. Human traffic around this room should be limited to the necessary personnel.
- Birthing sites must set up an isolation room(s) for safe labour and delivery and neonatal care.
- Chest imaging and CT scan, when clinically indicated should be included in the work-up of pregnant women with suspected, probable or confirmed COVID-19 infection.
- All medical staff involved in management of infected women should don PPE as required.
- A specialist multidisciplinary team (midwives, obstetrician, physician, anesthetist, intensivist, virologist, neonatologist, etc as available) should undertake management of COVID-19-infected pregnant women with severe disease at specialized COVID-19 management centers.
- Timing and mode of delivery should be individualized, depending on both obstetric and medical factors
- Safety of breastfeeding and the need for mother – baby separation: If either the mother or the baby is severely ill, separation may sometimes be necessary, with expressed breastmilk or donor breast milk feeding. In general, for the baby whose mother has COVID, breastfeeding and rooming-in is recommended.

Healthcare professionals engaged in obstetric care including those who perform CT or ultrasound examinations should be trained in IPC measures related to COVID-19 and provided with appropriate PPE. This includes appropriate disinfection of equipment such as ultrasound probes, and CT scan equipment, according to manufacturer specifications

14. General Advice for Healthcare providers

- The COVID-19 pandemic places most pregnant and postnatal mothers and their families under considerable social, economic and psychological strain. Many women will be at increased risk for food insecurity and domestic violence. Although staff too are likely to be highly stressed and deserve care, their engagement with mothers should always be respectful and empathic.
- During the pandemic, health care staff should not be working if they have any COVID-19 symptoms. They must be thoroughly assessed and if appropriate tested for COVID-19

and managed accordingly.

- Health care staff who have been exposed unexpectedly, while without PPE to a COVID-19-infected patient, should be thoroughly assessed regarding exposure history, and if appropriate tested for COVID-19 and kept in quarantine or self-isolation for 14 days from the time of the contact.
- For staff attending to pregnant woman with COVID-19 or PUIs, the same PPE requirements apply as when attending non-pregnant adults with COVID-19. As with all pregnancies, irrespective of COVID-19 status, particularly during labour, there are risks of staff exposure to blood, urine, faeces and amniotic fluid. Routine IPC measures as required for managing all pregnancies and deliveries must therefore be strictly adhered to. However, staff can be reassured that the virus has not so far been detected in amniotic fluid or in breastmilk.