



MINISTRY OF
**HEALTH &
WELLNESS**

Guideline for the management of Pregnancy during the COVID-19 Pandemic

Maternal Health Guideline No. 14

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Purpose and Scope of Maternal Health Guidelines

This is the first edition of this guideline. The guideline was developed by the National Guideline Development Committee for Maternal Health under the direction of the Family Health services at the authority of the Ministry of Health & Wellness, Jamaica. The committee consist of experts from across the island of Jamaica and the composition of the team varies based on the multidisciplinary requirements of the topic under consideration.

The information contained herein is designed to aid practitioners in making decisions about appropriate obstetric care. The guideline takes into consideration the unique challenges that may exist in the context of medical practice in developing countries.

Recommendations are based on the best evidence available at the time of writing, and the guidance will be kept under regular review as new evidence emerges. Please be aware that the evidence relating to COVID-19 and pregnancy is developing rapidly, and the latest data may not yet be incorporated into the current version of this document.

Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations of an institution.

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Contents	Page
Basic scientific and epidemiological information	
What is COVID-19?	6
What are the clinicopathological features of this disease?	7
Why is COVID-19 important?	9
What measures should each woman practice to reduce risk of transmission?	11
Outpatient Services	
How should Hospital outpatient antenatal services be adjusted in order to reduce transmission?	13
What interventions can be instituted to reduce the patient burden at hospital outpatient departments?	15
How should midwife led community antenatal clinics and services be adjusted in order to reduce transmission?	18
Table 1. Proposed schedule of antenatal visit for low risk gravida	19
How should primary care providers in the public sector alter their approach to management in order to reduce spread?	20
How should Obstetricians and primary care providers of obstetric services in the private sector alter their approach to management in order to reduce spread?	21
How should private practitioners and facilities approach the intrapartum management of women with suspected or confirmed COVID-19?	23
Screening, Diagnosis and Isolation	
What measures should be taken for containment at an institutional level?	24
Figure 1. Algorithm for proposed approach to screening and containment of person entering health facilities	26
What are the requirements for isolation of women with suspected, probable or confirmed COVID-19?	27
How should testing be conducted?	29
Therapeutic Management, Infection Prevention and Control	
Management of a pregnant women with suspected or confirmed COVID-19	30
How should the woman with mild or asymptomatic disease be managed?	31
What are the considerations for women with moderate to severe disease?	32
What are the specific management considerations for the pregnant patient with severe or critical disease (COVID-19) requiring intensive care?	34
What are the general management considerations for the pregnant patient with severe or critical disease (COVID-19) requiring intensive care?	38
Table 2. Prevention of complications associated with critical illness	
What are the available specific drug therapies that should be instituted in women with severe disease?	39
What are the specific intrapartum concerns in the management of the pregnant woman with suspected or confirmed COVID-19?	42
Is COVID-19 associated with vertical transmission intrapartum?	42

Where should women with suspected or confirmed COVID-19 be delivered?	42
What level of foetal monitoring should women with suspected or confirmed COVID-19 receive?	43
What level of maternal support and monitoring will be required for women with COVID-19?	45
What should be the approach to determining the mode of delivery?	47
What are the general considerations for women undergoing abdominal Delivery?	48
How should the spouse of the labouring woman with suspected or confirmed COVID-19 be directed?	49
What are the considerations for imaging investigation in pregnant women with suspected or confirmed COVID-19 be directed?	50

Neonatal Care, Infection Prevention and Control

What are the considerations for management of the neonate of the woman with suspected or confirmed COVID-19 in the early neonatal period?	52
Should neonates of women suspected or confirmed to have COVID-19 be separated from their mother?	53
Management of Mothers and Neonates	55
▪ Unwell mother with a well-baby	
▪ Unwell mother with unwell baby	
▪ Well mother with well-baby	
▪ Well mother with unwell baby	
What are the options for feeding neonates of mothers with suspected or confirmed COVID-19?	58
What should be the discharge plan for neonates of mothers with suspected or confirmed COVID-19?	59
What are the recommendations for reduction of transmission risk to caregivers caring for women with suspected, probable or confirmed COVID-19?	60
What interventions that can be utilized in circumstances where there is a shortage of PPE?	60
What should be the approach to preparation of support staff?	61
Recommendations for Audit	62
References	63

What is COVID-19?

Coronaviruses are enveloped RNA viruses that are found in nature in several animal species including birds, reptiles, bats, and other small mammals (1). Several species have the capacity to breach their host species boundaries and cause zoonotic respiratory tract disease in human beings who come in contact with these animals (1,2). The first descriptions of members of the Coronaviridae family of viruses causing human infections was made in the 1960's when they were noted to be agents of the common cold (1,2). The diseases caused by these viruses now range from the common cold to those of epidemic or outbreak proportions such as Severe Acute Respiratory Syndrome (caused by SARS-COV in 2003; which was associated with contact with civets) to Middle Eastern Respiratory Syndrome (caused by MERS-COV in 2012; associated with contact with dromedary camels) (1-3).

COVID-19 refers to the disease process caused by a novel Coronavirus that arose in late December of 2019 (4). The disease was first described in patients from Wuhan in the Hubei province of China. As such most of the data related to the disease process and outcomes come from the patients who were affected in China. Originally referred to as the 2019 novel Coronavirus, the agent was officially named SARS-CoV2 due to its shared genetic and clinical characteristics with SARS-CoV (3,4).

What are the clinicopathological features of this disease?

Both these viruses target ACE 2 receptors in the lung, which normally provide a protective role against lung disease and as such this has been theorized to be a reason why the disease severity from these infections is so high (6). The actual zoonotic vehicle that introduced SARS-CoV 2 to the human populace is yet to be confirmed but it is thought the virus originated in bats (6). This prompted attempts to mitigate further zoonotic transmission by advising against the practices of visiting “wet markets” and limiting contact with or consumption of exotic animals (8,9). Human to human spread has since been the driving force of transmission via contamination with respiratory secretions shed during coughing, sneezing or talking (7,8,9,10). Studies of disease progression in China has provided an apt clinical picture (7,10). Following an incubation period of 1-14 days, (average 5-6 days) infected patients may present with fever, sore throat or dry cough and the severity is categorized as:

1. Mild disease (81% of patients)
2. Severe disease – pneumonia (14% of patients)
3. Critical disease– multiorgan dysfunction (5% of patients)

Patients that developed pneumonia typically had fever (99%), dry cough (59%), dyspnoea (31%), sputum (27%), changes on X-ray / CT. Other symptoms include fatigue (70%), anorexia (40%) and myalgia (35%) (10, 11). Gastrointestinal symptoms, though uncommon, include nausea, and diarrhoea as initial symptoms. In fact, diarrhoea was noted in 17% of cases in Singapore and approximately half of patients with viral RNA in their stool had diarrhoea as a part of their symptomatology (12).

The recovery time is approximately 2 weeks in mild cases, and 3-6 weeks in severe cases. In severe disease, the median time between symptom onset (before admission) to discharge is approximately 22 days (8). Median time to need of ventilatory support is 14.5 days (ranges from 12-19 days) whilst the median time to death is approximately 18.5 days (range 15-22 days). The case fatality rate is approximately 3.8% but varies with each country (8). For example; the case fatality

rate in all of China was 0.9% while for Wuhan China and Italy rates were as high as 5.8% in mid-March 2020 (10,11). Majority of severe and critical disease is seen in patients over the age of 65 years with underlying comorbidities and a male predilection. The median age for contracting the infection is 49-56 year and symptomatic infections in children tends to be mild (8,9).

Why is COVID-19 important?

SARS CoV-2 is a novel virus. This means it is new to the human population who are therefore naïve hosts and are thus susceptible to infection. Humans therefore having never been exposed, have no immunity to the organism which freely sets up infection. As the organism affects the respiratory system, transmission is likely through respiratory droplets released during speaking, coughing or sneezing, which if reaches the mucous membranes of other hosts, sets up infection in the upper respiratory tract and later, the lower tract (13). Shedding of virus through these mechanisms from the upper respiratory tract is highest during the first week of symptoms (10,11).

Respiratory droplets that land on fomites can be transmitted to others through contact with these surfaces. The virus can remain viable in aerosols for up to three hours post aerosolization (14). The viability differs based on the nature of the fomite/ material it has landed on (14) If the surface is made of copper, the organism remains viable for up to four hours, on cardboard for up to 24 hours, and on surfaces of plastic or stainless steel for up to 2-3 days (14).

There is also risk of transmission to others from asymptomatic patients or those in the incubation period to patients at higher risk of serious disease (15). Viral shedding has also been noted to continue post recovery of patients. (Shedding continues for an average of 20 days (range 8-37days) from time of initiation of symptoms in survivors and up to the time of death in non-survivors) (7). This shedding occurs from both the upper tract and sputum. This poses continued infection control challenges for hospitalized patients and may indicate need for continued isolation post recovery from symptoms (9). Although stool samples remain SARS-CoV2 positive for long periods post resolution of symptoms, it is thought that inactivation by the gut environment may render spread through faecal contamination less likely (9). Airborne precautions are reserved for high risk procedures during hospital management.

The mortality rate from this infection is an important factor but just as important is the velocity of the virus, i.e. time to infection of first 1000 patients (16). While SARS had a

mortality rate of 10% and MERS-COV of 35%, the velocity of those viruses was 130 days and 2.5 years respectively (16). With an average mortality rate of 3.8%, SARS-CoV-2 has a velocity of 48 days (16). This speaks to its highly transmissible nature.

What measures should each woman practice to reduce risk of transmission?

All women should be advised to pay meticulous attention to hand and respiratory hygiene.

A

It is important that patients and their family are made aware that they have a critical role in controlling the spread of COVID-19 or any other viral illness.

All women presenting for care should be given the following advice in an effort to reduce transmission:

1. Clean your hands frequently with an alcohol (>60%)-based hand rub or wash them with soap and water, especially before and after certain tasks.
 - a. Before and after caring for someone at home who is sick
 - b. Before, during, and after preparing food
 - c. Before eating food
 - d. Before and after treating a cut or wound
 - e. After using the toilet
 - f. After changing diapers or cleaning up a child who has used the toilet
 - g. After blowing your nose, coughing, or sneezing
 - h. After touching an animal, animal feed, or animal waste
 - i. After handling pet food or pet treats
 - j. After touching garbage
2. Maintain social distancing at least 1-2 metre (3-6 feet) distance between yourself and others.
3. Avoid touching eyes, nose and mouth
4. Practice respiratory hygiene.
 - a. This means covering your mouth and nose with your bent elbow or tissue when you cough or sneeze. Then dispose of the used tissue immediately.
5. If you have a fever, cough and difficulty breathing, seek medical attention but call in advance.

6. Follow the directions of your local health authority, which at this time, includes calling one of the MOHW's public contact number, or visiting a health facility designated for persons at particular risk for COVID-19, e.g. Communities quarantined for COVID-19 observation.
 - 888-ONE-LOVE (888-663-56883), and
 - 888-754-7792.
7. Stay informed and follow advice given by your healthcare provider

OUTPATIENT SERVICES

How should Hospital outpatient antenatal services be adjusted in order to reduce transmission?

Interventions should be instituted to reduce the number of patients congregating at clinics at any given time so as to maintain social distancing and reduce risk of transmission.

B

While the approach taken generally has been to cancel many outpatient services in the non-pregnant population, such an approach may prove dangerous in the context of pregnancy. Maternal mortality remains a major concern in Jamaica and it is imperative that any public health strategy that is to be undertaken, to combat the threat of COVID-19 should not unduly compromise the ability of the health system to appropriately screen for and mitigate complications of pregnancy. This consideration is important so that while trying to mitigate one public health problem, with the current epidemic, we do not exacerbate another in maternal mortality.

The goal of interventions should be to reduce the patient burden at any one facility so as to reduce the number of patients congregating. This reduces the potential risk of transmission by:

- i. reducing number of women that could be exposed at any given time, and
- ii. allowing for greater ease of compliance with social distancing.

Every effort should be made to manage clinics in such a way as to ensure that no greater than twenty persons are confined to any enclosed space at a time. More important than the absolute number is the fact that patients should have adequate space to maintain requirements of social distancing.

Interventions for reducing the number of patients attending antenatal health facilities for outpatient services include:

1. Strict adherence to risk stratification such that only high-risk patients, in need of obstetrician led care are managed at hospital clinics.
2. Limit the number of antenatal clinic visits for low risk gravida.
3. Utilization of technology-based strategies such as telemedicine to reduce number of women attending clinics
4. Reduce waiting time for prescription services by utilizing scheduled pick-up of medications.

What interventions can be instituted to reduce the patient burden at hospital outpatient departments?

Clinicians and administrators should ensure appropriate risk stratification for patients attending clinic and consider interventions that may allow for women to receive care remotely between antenatal visits.

D

All low risk gravida should be directed to receive care at their community clinic.

D

Interventions that should be considered include:

1. Redirecting of all low risk patients to the community health services
 - a. This is particularly important so as to reduce risk of transmission across communities. This may happen when women from different communities come in contact with each other at regional hospital clinics
2. Utilize Telemedicine ('Phone Call Clinics') where possible
 - a. Utilization of telemedicine will allow for women to receive care remotely from the safety and comfort of their own home. In so doing the risk of transmission can be reduced.

Telemedicine in managing patients

Phone Call Clinics

- Where possible stable patients with chronic illnesses who are able to comply with such arrangements should be managed remotely at home. This approach can be applied for high risk patients with a stable condition.

Clinical examples:

Diabetes in pregnancy

- A patient with Diabetes in pregnancy should be encouraged to record her daily glucose profiles utilizing a glucometer. A medical officer can be assigned to call such women on their appointed clinic day. The woman is asked a series of screening questions to determine whether she has developed any

complications of her diabetes or pregnancy, and she is given advice as to how to adjust the dose of medications as well as her diet if necessary.

Hypertension in pregnancy

A similar strategy can be used for patients with chronic hypertension in pregnancy and mild gestational hypertension.

- A patient with Hypertension in pregnancy should be encouraged to record her blood pressure utilizing an automated (electronic) device and her weight using a home scale. A medical officer can be assigned to call such women on their appointed clinic day. The woman is asked a series of screening questions to determine whether she has developed any complications of her hypertension or her pregnancy and she is given advice as to how to adjust the dose of medications as well as her diet if necessary.
- If possible women could be taught how to utilize dipstick for assessment of proteinuria.
- This approach can theoretically be utilized for any pregnant patient with a stable medical or obstetric condition.
- Patients with evidence of complicated disease requiring inpatient intervention should be asked to present to hospital.
- The goal of utilizing telemedicine is to reduce the number of visits to the antenatal clinic. It should not be used to replace routine antenatal care
- The prescription can be written up and forwarded to the outpatient pharmacy for preparation. Once prepared the patient can be informed to come in to collect same.
- Telephone calls, instant messaging: instructions re pick-up times for prescriptions can be sent via instant messaging. Information e.g. diet sheets can be sent via central email.

- Each clinic should be equipped with a dedicated mechanism to facilitate communication (e.g. closed user group phone, a direct land line, phone credit, magic jack)

Each consultant should make a decision as to whether the possibility of telemedicine is feasible for his/her clinical situation.

D

How should midwife led community antenatal clinics and services be adjusted in order to reduce transmission?

Interventions should be instituted to reduce the number of women congregating at clinics at any given time so as to maintain social distancing and prevent spread.

C

Interventions include:

1. Institute strict appointment schedules with staggered arrival times for women
2. Instituting a more efficient approach to scheduling of antenatal visits

The typical schedule of antenatal visits involves four weekly visits from booking until 28 weeks after which visits are scheduled two weekly until 36 weeks at which point visits are scheduled weekly until delivery. A woman booking at 8 weeks' gestation would therefore have between 12 and 14 visits over the course of her pregnancy. Such an approach to care though meticulous would contribute to an unacceptably high number of women attending for care at community clinics in the context of the current pandemic.

Efforts should be made to limit the number of visits for low risk women and in so doing reduce the number of women coming for appointments at any one time. Reducing the number of visits should reduce the risk of exposure for the low risk patient to COVID-19 and reduce spread.

The WHO recommends at least eight antenatal visits to reduce the risk of maternal and fetal morbidity and mortality (17). The available evidence suggests that the application of an antenatal care schedule with as low as four total visits throughout the pregnancy is not associated with any significant difference in adverse outcomes (18).

Carter et al in evaluation of a retrospective cohort of 12,092 consecutive, uncomplicated term births found that low-risk women with ≥ 10 antenatal clinic visits had higher rates of pregnancy interventions without improvement in neonatal outcomes (19).

Based on the available evidence it seems safe and appropriate that a policy of limited antenatal visits be undertaken for low risk gravida at this time.

Table 1. Proposed schedule of antenatal visit for low risk gravida

Visit	Gestational age	Intervention*
1	Booking	Antenatal screen
2	20 weeks	Ultrasound- confirm dates and screen for anomalies, request for glycaemic screening (OST) to be done at 24 weeks,
3	28 weeks	Growth scan if SFH not appropriate
4	34 weeks	clinical assessment of presentation, delivery plan
5	37weeks	
6	40weeks	if undelivered- consider stripping of membranes and scheduling for delivery if undelivered by >40 weeks
*It is expected that, if possible, Blood pressure, urinalysis, weight, symphisiofundal height and foetal heart rate be measured at each visit.		
In the event of any deviation from normal the patient should be referred for management in a high-risk clinic.		

A consideration should be given to a 'check-on' phone call to assess how well the patient is coping with pregnancy and provide advice and direction in between visits.

Women should be provided with clear education and counselling and advised to contact their caregiver by phone should concerns or complications arise prior to their scheduled visits.

Women should be advised to familiarize themselves with the information provided them in their antenatal record book.

D

How should primary care providers in the public sector alter their approach to management in order to reduce spread?

Various approaches are prescribed, depending on the stage of the outbreak and the strategic direction of the MOHW. Generally, primary care providers in the public sector should strengthen standard precautions for Infection Prevention and Control, including, infrastructural strategies (handwashing stations), procedural strategies (hand hygiene, social distancing, appropriate PPE use, injection practices), equipment and supply optimization (e.g., sharps box), environmental controls, and cleaning and disinfection of surfaces (see National Infection Prevent and Control Policy and Procedure Manual).

Persons with respiratory symptoms attending for care should be given a surgical mask. They should be immediately isolated, assessed and managed appropriately. Specifically, the MOHW has instructed, at this stage of the response, to have designated areas for holding, counselling and further management of suspected and confirmed cases.

How should Obstetricians and primary care providers of obstetric services in the private sector alter their approach to management in order to reduce spread?

The role of private primary care practitioners remains critical to the nation at this time as many of the nation's women obtain care at private facilities. It is imperative that these facilities remain functional in the routine management of low risk gravida to prevent inundation and overcrowding of public facilities.

Private practitioners should seek to:

1. Limit the numbers of patients attending for care at any given time
 - a. Measures to achieve this include:
 - i. Utilizing strict appointment schedules so as to ensure that waiting rooms are not crowded. Numbers should not exceed that which can be facilitated while allowing for recommendations for social distancing
 - ii. Adopting recommendations outlined above for scheduled antenatal visits for low risk women
2. Implement effective screening practices at their facilities to limit the likelihood of infected sources being managed at their facilities.
 - a. Screening should at minimum involve questioning as to:
 - i. the presence of symptoms of viral respiratory infection (e.g. cough, fever, etc.)
 - ii. contact with any person suspected or confirmed to have COVID-19
 - iii. History of travel in the last 14-21 days
3. Maintain appropriate infection prevention and control procedure as it relates to cleaning of facilities and hand hygiene.

At this time private practitioners should be advised against caring for women with symptoms that could be attributable to COVID-19 in their private offices. If such a

case is encountered the practitioner should offer a surgical mask, isolate the patient from other patients and call the MOHW for further instruction.

Contact Number to be used by physicians only are:

- (876) 542-6452, (876) 542-6458, Straight line (876) 754-7792

How should private practitioners and facilities approach the intrapartum management of women with suspected or confirmed COVID-19?

Private practitioners should not undertake delivery of women with suspected or confirmed COVID-19 at private facilities. Given that all women are at risk all patients should be advised as to what steps to take and where to go should they develop symptoms potentially attributable to COVID-19 during or after the peripartum period. Patients with symptoms related to the COVID-19 who are in labor will need to be managed in facilities that are equipped to provide quarantine and supportive care during and after delivery.

Clinicians should ensure that women attending for care have an antenatal record card/booklet which is updated with the results of relevant investigations and details of care at each visit. Patients should be advised that this record should be carried with them at all times so that in the event of an emergency or complication requiring presentation for care at another institution the relevant information will be available to caregivers.

SCREENING, DIAGNOSIS AND ISOLATION

What measures should be taken for containment at an institutional level?

In the absence of specific testing it is impossible to accurately distinguish COVID-19 from other respiratory infections. In the context of the current pandemic, any pregnant patient with a history of fever and new onset cough (and/or other significant respiratory symptoms) should be managed as a suspected case of COVID-19. Interventions will need to be applied broadly and not limited to patients with confirmed COVID-19.

Institution should seek to reduce the possibility of transmission of COVID-19 among staff and patients by implementing the following interventions.

- (I) Limit access or entry points to the institution
 - Ideally access to each institution should be reduced to one entry point. For larger institutions with a larger staff population consideration should be given to having two entry points. One for staff and the other for patients.
- (II) Ensure screening of all persons including staff entering the facility
 - Screening should at minimum involve questioning as to:
 - the presence of symptoms of viral respiratory infection (e.g. cough, fever, etc.)
 - contact with any person suspected or confirmed to have COVID
 - Where available the use of infrared thermometers may augment screening without resulting in undue delay in processing.
- (III) Provide simple face masks (e.g. surgical masks) for any person(s) who is symptomatic.
 - The use of face mask will limit aerosolization and droplet spread from an infected individual.
- (IV) Early identification and isolation of all persons requiring inpatient care.

- Persons screened positive should be separated and taken to a pre-assigned holding area for assessment as to whether inpatient care is required. Persons requiring inpatient care should be transferred directly to a designated isolation area for continuation of care.

(V) Early identification and separation of all persons not requiring inpatient care and expediting disposal to home quarantine.

- Persons screened positive should be separated and taken to a pre-assigned holding area for assessment as to whether inpatient care is required. Persons not requiring inpatient care should be sent home for quarantine at home. It is important that arrangements be put in place to ensure that such persons do not utilize public transport and that they go directly from the health facility to their home.

(VI) Discourage visitors from entering medical facilities unless by invitation

- It is important that the traffic through health facilities be tightly regulated. Ideally access to the institution should be on a 'need to access basis'.
- Access should be restricted to special circumstances such as relatives initially accompanying a patient who may be needed to provide information to health workers, or cases where next of kin may be required for consent by proxy, or in the context of end of life care. Once the need has expired visitors should be encouraged to leave the institution.
- Patients and their caregivers should be encouraged to and offered the option of communicating by phone and/or social media. Public health announcement through the media should be utilized in dissemination of this information.

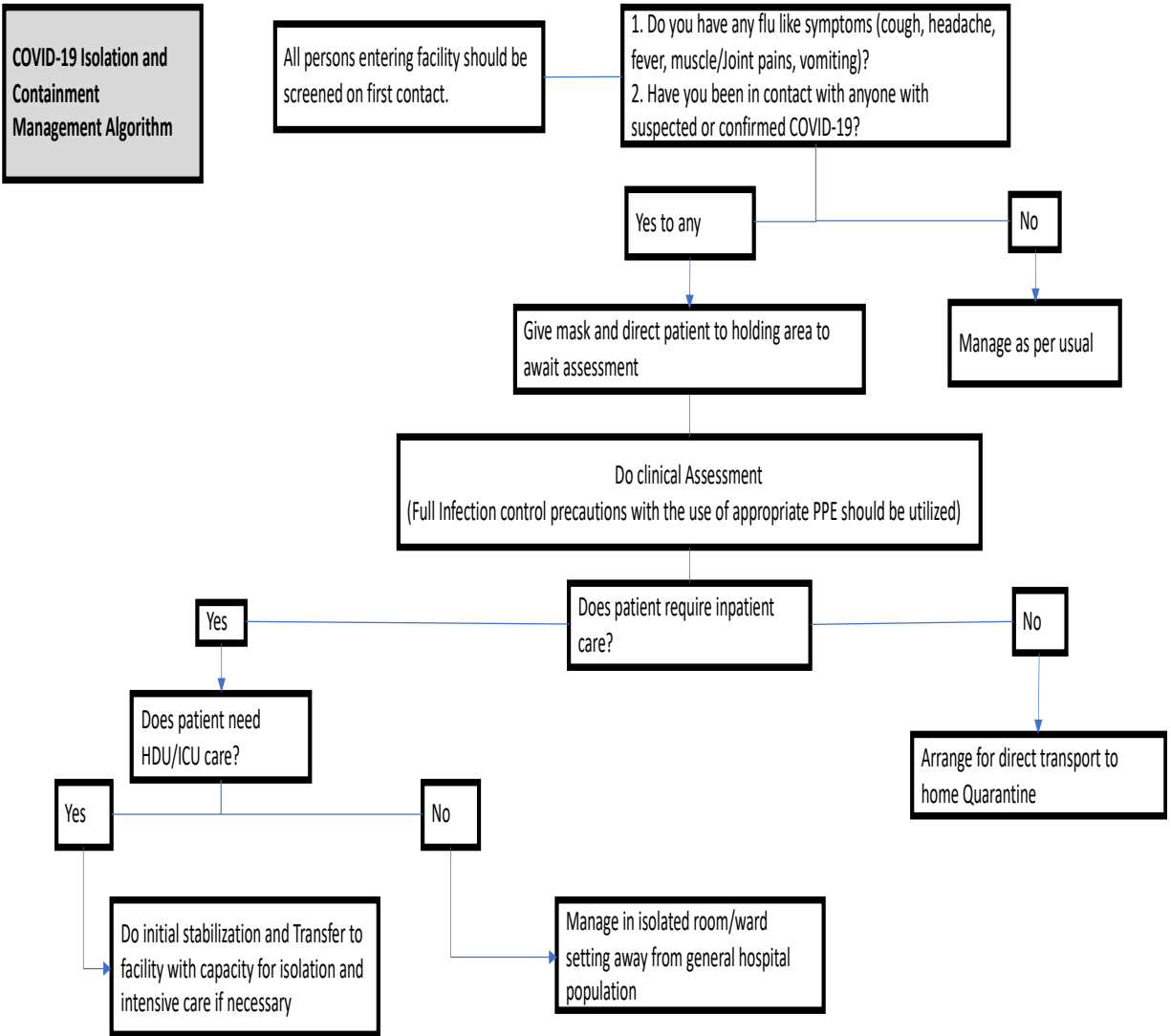


Figure 1. Algorithm for proposed approach to screening and containment of person entering health facilities

What are the requirements for isolation of women with suspected, probable or confirmed COVID-19?

Patients with suspected, probable or confirmed disease, who are in the community should remain in isolation at home and wear a mask should they need to seek medical attention (20). Individuals caring for these patients in the community should wear a well fitted mask when in close contact with the patient and practice appropriate hand hygiene and sanitization of high touch surfaces in the home (20). Those who are hospitalized should be placed in isolation with droplet precautions in place and PPE such as gloves, impermeable gowns, masks and face shields/ goggles used by the healthcare personnel seeing this patient (20,21). Single occupancy rooms with dedicated bathrooms and closed doors are desirable for patients with mild disease (20). This is not always probable and as such these patients can be cohorted and housed in a dedicated isolation ward with the beds 3-6 feet apart (21).

Negative pressure rooms would also be ideal but are often not practical in resource limited settings. Those with severe or critical disease may require care in the HDU/ICU setting for ventilatory support. If there are to be aerosol generating procedures (e.g. tracheal intubation, non-invasive ventilation, cardiopulmonary resuscitation, upper endoscopy, bronchoscopy, etc.) to be done, airborne precautions are suggested with healthcare workers using N95 respirators versus surgical masks. (21). If possible, these aerosol generating procedures should be done in a negative pressure room (21,22).

Discontinuation of precautions should be done on a case by case basis. Clinical symptoms should be resolved, and considering that the patients may continue to shed virus after resolution, repeat tests for the virus should also be negative (two sequential paired nasopharyngeal and throat specimens (i.e., four specimens total, each handled separately), with each pair collected ≥ 24 hours apart) (20,22).

Environmental decontamination is also important both in the community and especially in the hospital setting to limit the spread of the infection (22). Being an enveloped virus, routine cleaning and disinfection procedures remain appropriate for removing the SARS-COV-19 virus from the environment (22).

How should testing be conducted?

Several kits are currently on the market for diagnosis of COVID-19 infection. The WHO through PAHO has supplied kits for testing to be conducted at the National Influenza Centre at the Department of Microbiology at the University of the West Indies. Testing is generally reserved for patients who fit the criteria for CoVid-19 infection put forward by the Ministry of Health and Wellness. Samples from a patient under investigation (PUI), is tested in government designated laboratories which have the specialized instruments and technical training for same (24).

The collection of samples should be done with health care workers wearing appropriate personal protective equipment (PPE). Collected samples are to be placed in biohazard bags with the requisite forms placed in the outside pocket of the bag. The forms should be clearly filled out and include the diagnosis in question. All samples should also be appropriately labelled with patient name, ID number, date of collection (24,25).

The samples should then be transported on ice to the laboratory, which should be alerted to as to the sample's arrival. Samples that cannot be immediately transported to the laboratory should be stored at 2-80C for up to 72 hours, then transported as soon as possible on ice. For longer delays, store at -700C or below (24,25).

Current protocols stipulate that all PUIs are referred to the Ministry of Health and Wellness who will indicate if the sample should be tested. The Ministry of Health and Wellness is also responsible for the dissemination of test results.

THERAPEUTIC MANAGEMENT, INFECTION PREVENTION AND CONTROL

Management of a pregnant women with suspected or confirmed COVID-19

In the absence of specific testing it is impossible to accurately distinguish COVID-19 from other respiratory infections. In the context of the current pandemic, any pregnant patient with a history of fever and new onset cough (and/or other significant respiratory symptoms) should be managed as a suspected case of COVID-19. Interventions will need to be applied broadly and not limited to patients with confirmed COVID-19.

As of the time of this writing, pregnant patients with COVID-19 seem to behave similarly to age matched non-pregnant women, and there has been no documented maternal mortality as a consequence of this disease. In contrast, other viral LRTIs (such as Influenza A) have comparable morbidity, but significant associated mortality.

How should the woman with mild or asymptomatic disease be managed?

Pregnant women with mild respiratory complaints such as dry cough, low grade fever, fatigue, sore throat and nasal congestion should practice home isolation. Due to the known high transmissibility of the virus, home isolation should be practiced regardless of perceived risk of exposure to COVID-19.

Preferred medications for symptomatic relief include acetaminophen, cetirizine, levocetirizine and loratadine.

Home isolation should ideally be practiced in a setting where the afflicted patient can maintain separate bedroom and bathroom from other household occupants. However, due to the high prevalence of asymptomatic disease and heightened infectivity—all household contacts should be presumed to be infected and should also adhere to home isolation for a period of 14 days.

B

What are the considerations for women with moderate to severe disease?

The treatment of women with moderate to severe disease is primarily supportive. The role of caregivers is to support organ function until the virus can be cleared by the patient's immune mechanisms while minimizing risk of infection to others including clinical and paramedical staff.

Pregnant women with moderate to severe disease should be admitted and undergo SARS-CoV-2 sampling via nasopharyngeal and oropharyngeal swabbing. Only nasopharyngeal and oropharyngeal swabs should be sent for non-ventilated patients. Trapped sputum may be utilized for ventilated patients. Expecterated sputum samples should NOT be collected due to increased risk for nosocomial transmission without increased sensitivity.

Usual contact with patients within 1-2 metres will require use of surgical mask, face shield, impervious gown and disposable gloves. Fit-tested N95 respirators are required when aerosol generating procedures are being performed such as nebulization, collection of pharyngeal swabs, cardiopulmonary resuscitation, chest physiotherapy, suctioning, upper airway endoscopy, certain dental and faciomaxillary procedures, intubation and mechanical ventilation.

Patients should receive supplemental oxygen via nasal cannula or face mask and adequate hydration. Overhydration should be avoided due to the heightened antecedent risk of worsened hypoxemia.

Non-invasive positive pressure ventilation i.e. continuous positive airway pressure (CPAP) and bilevel positive airway pressure (BiPAP) should be avoided due to increased risk of aerosolization and airborne nosocomial transmission without reduction in need for intubation and mechanical ventilation

B (IIa).

Nebulization should be avoided due to the risk of aerosolization of virions and nosocomial airborne transmission. Salbutamol, if required, should be administered by spacer delivering 4-8 puffs at the usual dosing intervals for prescribed nebulisations. Chest physiotherapy should also be avoided due to limited proven benefit and increased risk for nosocomial airborne transmission.

B (IIa).

B (IIa).

Pregnant and lactating women with respiratory failure should ideally receive intubation and mechanical ventilation in a negative pressure isolation room. Rapid sequence intubation should be performed and preoxygenation via manual ventilations (bag-valve mask) avoided due to the risk of aerosolization and resultant nosocomial airborne transmission. Healthcare workers must don appropriate PPE including fit-tested N95 respirator and face shield during intubation and mechanical ventilation.

What are the specific management considerations for the pregnant patient with severe or critical disease (COVID-19) requiring intensive care?

A designated area in hospital should be identified to facilitate isolation and management of critically ill patients with suspected or confirmed COVID-19 infection. Patients should ideally be managed in separate rooms with negative pressure.

Rooms should be equipped with oxygen, suction and capacity for mechanical ventilation. Patients with confirmed infection may be managed in a shared area (27).

Screen and triage all patients with SARI to facilitate initiation of appropriate infection control measures as well as early assessment of disease severity allowing for timely referral (28).

D

Referral and admission to ICU/HDU:

Referral should be made by senior member of the obstetric managing team. Patient should then be assessed by senior member of the ICU team to determine if criteria for admission to ICU/HDU are met.

Criteria for admission to dedicated ICU/HDU include:

(I) Confirmed or suspected COVID-19 infection (based on case definition).
(II) Acute and potentially reversible organ dysfunction poorly responsive to initial therapy.

- Hypoxemia and respiratory distress (RR>30/min) despite oxygen therapy.
- Respiratory failure requiring intubation and mechanical ventilatory support.
- Refractory circulatory shock (SBP<90mmHg/Lactate>4) requiring vasopressor therapy.
- More than a single organ failure.

The referring team shall maintain primary responsibility for the patient with a multidisciplinary team approach to patient management (29).

Implementation of appropriate infection control and prevention measures:

- (I) Standard precautions should routinely be applied in the management of all suspected/confirmed cases of COVID-19 infection. This includes:
 - Hand hygiene
 - Use of appropriate personal protective equipment (PPE) such as surgical masks, gowns, gloves and face shields or goggles for eye protection (28).
- (II) For all health care workers performing aerosol generating procedures (endotracheal intubation, open suctioning, manual ventilation, nebulization, disconnecting from ventilator, bronchoscopy, non-invasive ventilation, cardiopulmonary resuscitation, proning) on patients with suspected/confirmed COVID-19 infection, use of fit tested respirator masks (N95 or equivalent) instead of surgical masks is strongly recommended in addition to other PPE (30).
- (III) For health care workers providing usual care for non-ventilated patients or performing non-aerosol generating procedures on mechanically ventilated (closed circuit) patients with suspected/confirmed COVID-19 infection, surgical masks may be used in addition to other PPE (30).

Institution of early supportive therapy:

- (I) Supplemental oxygen should be administered to all pregnant patients with SARI to maintain $SPO_2 > 92-95\%$ (29)
- (II) If patient remains in respiratory distress with increased work of breathing, hypoxemic or in refractory shock, early intubation is advised over a trial of high flow oxygen therapy or non-invasive ventilation (29).
- (III) For patients requiring intubation, procedure should be done by a competent member of the team experienced in airway management using a Rapid Sequence Induction technique (video laryngoscopy preferable if available) to minimize number of attempts and risk of transmission (30).
- (IV) Prompt intravenous access should be established for any evidence of haemodynamic compromise (hypotension, oliguria, elevated lactate) and resuscitation commenced with crystalloids over colloids (dextrans, gelatins, hydroxyethyl starches, albumin) (30).

- (V) Consider early vasopressor therapy with noradrenaline as first line therapy to achieve MAP's >65mmHg. If unavailable adrenaline or vasopressin may be used (30).
- (VI) Conservative fluid management is advised to minimize the worsening effect on respiratory function (30).
- (VII) For critically ill intubated patients with suspected COVID-19 infection endotracheal aspirate sampling is preferred for diagnostic PCR testing to confirm infection (30).
- (VIII) Consider early empirical broad spectrum antibiotic therapy in patients with possible COVID-19 infection with signs of sepsis (28).

Specific Management

Critically ill patients with COVID 19 infection are broadly categorized as Acute Respiratory Distress Syndrome (ARDS) or sepsis/septic shock depending on the predominant physiological derangement. In most cases, however, these conditions coexist with progression to multi organ dysfunction syndrome.

Diagnostic criteria for ARDS include:

- Onset within 1 week of illness.
- Bilateral patchy opacification on chest CT or radiograph
- pAO_2/FiO_2 ratio ≤ 300 mmHg
- Absence of evidence of cardiac failure/fluid overload.

Classification of ARDS:

- Mild: $200 < pAO_2/FiO_2 \leq 300$ mmHg
- Moderate: $100 < pAO_2/FiO_2 \leq 200$ mmHg
- Severe: $pAO_2/FiO_2 \leq 100$ mmHg

- (I) For patients with ARDS lung protective ventilator strategy remains the mainstay of therapy:
- Tidal volumes 6-8mls/kg

- Higher levels of PEEP titrated to FiO_2
- Plateau pressures $<30\text{cmH}_2\text{O}$
- Maintaining $\text{sPO}_2 \geq 92\%$
- Permissive hypercapnia to maintain $\text{pH} > 7.25$
- Deep sedation to reduce ventilator dyssynchrony
- Intermittent neuromuscular to facilitate lung protective ventilation
- Use of prone ventilation recommended in severe cases, if not available intermittent lateral tilt.

Sepsis denotes the predominant failure in perfusion associated with a dysregulated host response to infection leading to life threatening organ dysfunction. Septic shock refers to persistent hypotension ($\text{MAP}'s < 65\text{mmHg}$ /serum lactate $> 2\text{mMol/L}$) despite adequate fluid resuscitation (29).

- (II) For patients with evidence of cardiac dysfunction and persistent hypotension refractory to fluid resuscitation and vasopressor therapy consider adding dobutamine (30).
- (III) For patients in refractory shock unresponsive to vasopressor/inotropic support, consider the use of low dose corticosteroid therapy (30).
- (IV) Empirical broad-spectrum antimicrobial therapy is strongly recommended for mechanically ventilated patients with COVID 19 infection due to the high risk of coinfection (30).
- (V) Presence of fever in critically ill patients may be treated with acetaminophen (paracetamol) (30).
- (VI) Early enteral feeding is recommended unless patient on high dose inotropic support with glycaemic controls targeting $140\text{-}180\text{mg/dl}$ (30).
- (VII) Currently there is no evidence to support the use of specific anti-COVID treatments for patients with COVID 19 disease in pregnancy or the general population (28).

What are the general management considerations for the pregnant patient with severe or critical disease (COVID-19) requiring intensive care?

It is important that intensive care management is delivered in such a way as to reduce the attendant risk related to the care of the critically ill patient as the development of additional complications is likely to contribute to an already elevated risk of mortality. Interventions that should be considered are summarized in table 2 below.

Table 2. Prevention of complications associated with critical illness	
(I) Reduce days of invasive mechanical ventilation	<ul style="list-style-type: none"> - Weaning protocols that include spontaneous breathing trials - Minimize sedation/neuromuscular blockade - Physiotherapy
(II) Reduce incidence of ventilator associated pneumonia	<ul style="list-style-type: none"> - Oral intubation preferred over nasal intubation - Semi recumbent position (head of bed 30-45 degrees) - Use of closed-circuit suctioning system - Routinely replace soiled ventilator circuits and heat moisture exchangers.
(III) Reduce incidence of catheter related infections	<ul style="list-style-type: none"> - Sterile insertion of catheters - Prompt removal when no longer needed.
(IV) Reduce incidence of venous thromboembolism	<ul style="list-style-type: none"> - Employ use of pharmacological and/or mechanical prophylaxis
(V) Reduce incidence of pressure ulcers	<ul style="list-style-type: none"> - Turn patients every 2 hours
(VI) Reduce incidence of stress ulcers/gastrointestinal bleeding	<ul style="list-style-type: none"> - Early enteral nutrition - Pharmacological prophylaxis
(VII) Reduce incidence of ICU related weakness.	<ul style="list-style-type: none"> - Weaning protocols to include spontaneous ventilation - Minimize use of neuromuscular blockade - Early mobilization of patients - Physiotherapy

What are the available specific drug therapies that should be instituted in women with severe disease?

Bacterial pathogens often coexist with viruses and there is no current diagnostic test accurate enough or fast enough to determine that pneumonia is due solely to a virus at the time of presentation.

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Initially treatment should empirically cover for possible bacterial infection or coinfection. Initial treatment should be with combination therapy with a β -lactam (ampicillin/sulbactam 1.5–3 g every 6 h, ceftriaxone 1–2 g daily) and a macrolide (azithromycin 500 mg once daily or clarithromycin 500 mg twice daily) (31,32).

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Due to significant overlap in clinical presentation with influenza consideration should be given to the administration of oseltamivir (Tamiflu®) in women with severe disease unless virologic studies are forthcoming confirming diagnosis.

C

Investigational agents

Certain investigational agents have been described in observational series or are being used anecdotally based on in vitro or extrapolated evidence.

None of these drugs have been approved for use in the context of COVID-19 by the MOHW at this time.

These include the following:

Remdesivir

Several randomized trials are underway to evaluate the efficacy of remdesivir for moderate or severe COVID-19 (33). Remdesivir is a novel nucleotide analogue that has activity against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in vitro and related coronaviruses (including SARS and MERS-CoV) both in vitro and in animal studies (34,35). The compassionate use of remdesivir through an investigational new drug application was described in a case report of one of the first patients with COVID-19 in the United States (36). Any clinical impact of remdesivir on COVID-19 remains unknown.

Chloroquine/hydroxychloroquine

Both chloroquine and hydroxychloroquine have been reported to inhibit SARS-CoV-2 in vitro, although hydroxychloroquine appears to have more potent antiviral activity (34).

Use of chloroquine is included in treatment guidelines from China's National Health Commission and was reportedly associated with reduced progression of disease and decreased duration of symptoms [35,36]. However, primary data supporting these claims have not been published.

Other published clinical data on either of these agents are limited. In an open-label study of 36 patients with COVID-19, use of hydroxychloroquine (200 mg three times per day for 10 days) was associated with a higher rate of undetectable SARS-CoV-2 RNA on nasopharyngeal specimens at day 6 compared with no specific treatment (70 versus 12.5 percent) (37). The use of azithromycin along with hydroxychloroquine appeared to have additional benefit, but there are methodologic concerns about the control groups for the study, and the biologic basis for using azithromycin in this setting is unclear.

Various regimens are being used, including 400 mg twice daily on day 1 then daily for five days, 400 mg twice daily on day 1 then 200 mg twice daily for four days, and 600 mg twice daily on day 1 then 400 mg daily for four days (38).

Tocilizumab

Treatment guidelines from China's National Health Commission include the IL-6 inhibitor tocilizumab for patients with severe COVID-19 and elevated IL-6 levels; the agent is being evaluated in a clinical trial (39).

Lopinavir-ritonavir

Lopinavir-ritonavir appears to have little to no role in the treatment of SARS-CoV-2 infection. This combined protease inhibitor, which has primarily been used for HIV

infection, has in vitro activity against the SARS-CoV (40) and appears to have some activity against MERS-CoV in animal studies (41). However, there was no difference in time to clinical improvement or mortality at 28 days in a randomized trial of 199 patients with severe COVID-19 given lopinavir-ritonavir (400/100 mg) twice daily for 14 days in addition to standard care versus those who received standard of care alone (42).

It is important to acknowledge that there are no data from well controlled studies supporting the use of any of these agents, and their efficacy for COVID-19 cannot be stated with confidence. The use of any investigational agent should only be after careful consideration by the multidisciplinary team in weighing risk versus benefit for mother and foetus, ethical consideration and after discussion with the patient and/or her proxy.

Please be reminded that none of these drugs have been approved for use in the context of COVID-19 by the MOHW at this time.

D

What are the specific intrapartum concerns in the management of the pregnant woman with suspected or confirmed COVID-19?

Specific concerns include:

- timing of delivery, mode of delivery, reduction of horizontal transmission to staff or other patients, reduction of vertical transmission to neonate during the delivery process.

Is COVID-19 associated with vertical transmission intrapartum?

Case reports from China seem to suggest that there is no evidence of antepartum or intrapartum transmission (43-48). A case series published by Chen et al tested amniotic fluid, cord blood, neonatal throat swabs and breastmilk samples from COVID-19 infected mothers and all samples tested negative for the virus (43). Furthermore, in a different paper by Chen et al, three placentas of infected mothers were swabbed and tested negative for the virus [20]. In another case series by the same team, of three infants born to symptomatic mothers tested for the coronavirus, none had positive tests (44). The current evidence also suggests that the virus is not present in genital fluid (48).

Where should women with suspected or confirmed COVID-19 be delivered?

Intrapartum management of patients with suspected or confirmed COVID-19 should take place in an area isolated from the general patient population. Ideally this should occur in an isolation room. Most public institutions locally would not be able to provide individual rooms for all patients. In such cases a minimum consideration should be that patients should be managed in a ward setting arranged specifically and designated for patients suspected or confirmed to have COVID-19.

What level of foetal monitoring should women with suspected or confirmed COVID-19 receive?

In two Chinese case series, including a total of 18 pregnant women infected with COVID-19 and 19 babies (one set of twins), there were 8 reported cases of foetal compromise (43,46).

When the details of both small case series are examined, the following information is further observed:

- Series 1 (Chen et al, The Lancet) had 9 mothers and 9 babies, all of which were > 36 weeks, all of which were delivered abdominally, and only 2 of which had foetal distress. All 9 mothers were febrile and had radiological evidence of COVID-19 pneumonia. All nine livebirths had a 1-min Apgar score of 8–9 and a 5-min Apgar score of 9–10. All 9 infants tested negative for the virus.
- Series 2 (Zhu et al, Translational Paediatrics) had 9 mothers and 10 babies (1 set twins). They report 6 cases of foetal distress, but half of these mothers became symptomatic post-partum. 8 out of 9 mothers were febrile and all had radiological evidence of COVID-19 pneumonia. All infants tested negative for the virus.

It is reasonable to conclude that the foetal distress noted in these cases seems to be more likely secondary to maternal illness than to direct coronavirus disease, as they were all negative after birth.

Given this relatively high rate of foetal compromise, continuous electronic foetal monitoring, where available, should be offered in labour for all women with COVID-19.

Where electronic foetal monitoring is not universally available, a 1:1 ratio of patient to staff should be considered to facilitate monitoring of foetal heart rate intermittently every 15 minutes in the first stage and every 5 minutes in the second stage.

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Foetal heart rate should be monitored utilizing handheld doppler so as to allow as much social distancing as possible.

What level of maternal support and monitoring will be required for women with COVID-19?

Normal labour and delivery entail close contact with medical staff, often over many hours. Labour, including pushing, does generate increased droplet spread, so personal protective equipment is required to protect against this, and should include at minimum: gloves, apron, and a fluid resistant surgical mask with visor to protect the eyes. The parturient should also be wearing a mask.

Maternal monitoring of women with mild symptoms should follow normal standards with serial general assessment including full vitals (temperature, respiratory rate, pulse and blood pressure, and oxygen saturations).

Women with more severe symptoms will require multidisciplinary care with input from the intensivist and internist. More frequent assessment of vitals will be required. Supplemental oxygen should be titrated to keep saturation at or above 95% and maintain patient comfort if possible. If O₂ saturations are consistently < 90% on room air, chest imaging should be performed and an arterial blood gas (ABG) should be done.

Efforts should be made to minimise the number of staff members entering the area, and units should develop a local policy specifying essential personnel for emergency scenarios.

Epidural or spinal analgesia or anaesthesia is preferred to general anaesthesia as these methods are associated with reduced aerosolization and exposure of anaesthetic staff. Epidural analgesia should therefore be recommended (if available) before, or early in labour to women with suspected/confirmed COVID-19 to minimise the need for general anaesthesia if urgent delivery is needed.

NOTE: *In the event of a pregnant woman presenting with an obstetric emergency and being suspected or confirmed to have COVID-19, maternity staff must first follow infection prevention guidelines. This includes transferring the woman to an isolation room and donning appropriate PPE. This can be time consuming and stressful for patients and health professionals. Once infection prevention 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.*

What should be the approach to determining the mode of delivery?

Mode of birth should not be influenced by the presence of COVID-19, unless the woman's respiratory condition demands urgent delivery.

The decision to shorten the length of the second stage of labour with elective instrumental birth in a symptomatic woman who is becoming exhausted or hypoxic should be made on a case by case basis. Shortening the second stage by operative vaginal delivery can be considered, as active pushing while wearing a surgical mask may be difficult for the woman to achieve.

Likewise, if the patient's clinical status is deteriorating, assessment regarding the risks and benefits of continuing the labour versus proceeding to emergency caesarean delivery should be made on a case by case basis.

What are the general considerations for women undergoing abdominal Delivery?

Where women with suspected or confirmed symptoms of COVID-19, or confirmed COVID-19 have scheduled appointments for pre-operative care and elective caesarean birth, an individual assessment should be made to determine whether it is safe to delay the appointment to minimise the risk of infectious transmission to other women, healthcare workers and, postnatally, to her infant.

For abdominal delivery where regional anaesthesia is appropriate (i.e. elective, scheduled and some urgent cases), the risk of requiring GA is very small, as there is usually enough time to administer a regional anaesthetic (spinal or epidural). In this situation, all staff not required for siting of the regional anaesthetic should stay outside theatre until the block is effective. All staff should then put on their personal protective equipment, including a fluid-resistant surgical mask (FRSM) and eye protection.

Where general anaesthesia is necessary, please note that endotracheal intubation is an aerosol generating procedure and that this significantly increases the risk of transmission of coronavirus to the attending staff. The scrub team should scrub and don personal protective equipment before the GA is commenced.

Elective procedures should be scheduled at the end of the operating list.

Non-elective procedures should be carried out in a second obstetric theatre, where available, allowing time for a complete post-operative theatre cleaning to be done in between cases.

The number of staff in the operating theatre should be kept to a minimum, and all must wear appropriate PPE

How should the spouse of the labouring woman with suspected or confirmed COVID-19 be directed?

Local institutions, which generally facilitate spouses in the delivery room, should observe the following recommendations:

1. Asymptomatic spouses should be treated as possibly infected and asked to wear a mask and wash their hands frequently.
2. Symptomatic spouses, should remain in self-isolation and not attend the unit

What are the considerations for imaging investigation in pregnant women with suspected or confirmed COVID-19?

Ultrasound

- A bedside scan is preferred
- If the patient needs to be scanned in a clinic setting, this should be done at the end of the list, as the room and equipment will subsequently require a deep clean.
- Following ultrasound examination, ensure surfaces of transducers are cleaned and disinfected according to manufacturer specifications (49)
- Use protective covers for probes and cables, where body fluid contact may occur eg when there are infected skin lesions, secretions on the skin or when a transvaginal scan is necessary.

Radiographic Imaging

Chest imaging is an important component of the management of patients with suspected or confirmed COVID-19. Chest CT scanning, in particular, has high sensitivity for diagnosis of COVID-19 and is essential for evaluation of the clinical condition of a pregnant woman with COVID-19 infection (50-52).

There is often hesitancy on the part of physicians in requesting a CT-chest due to concerns about the foetal effects of radiation. Foetal growth restriction (FGR), microcephaly and intellectual disability are the most common adverse effects from radiation exposure. These effects typical occur with high-dose radiation (> 610 mGy) (53-55). According to data from the American College of Radiology and American College of Obstetricians and Gynaecologists, when a pregnant woman undergoes a single chest X-ray examination, the radiation dose to the foetus is 0.0005–0.01 mGy, which is negligible, while the radiation dose to the foetus is 0.01–0.66 mGy from a single chest CT or CT pulmonary angiogram (56-58). As such CT chest should not be withheld if clinically indicated.

Chest CT scan has been utilized to good effect (sensitivity of 97%) as a primary tool for the detection of COVID-19 in pregnant women in some epidemic areas (52).

Ila

CT-scan should be considered for women with severe symptoms especially given its usefulness in ruling out other differential pathologies such as pulmonary embolism. Informed consent should be acquired (shared decision-making) and a radiation shield be applied over the gravid uterus.

B

B

What are the considerations for management of the neonate of the woman with suspected or confirmed COVID-19 in the early neonatal period?

The objectives of management are to:

1. Reduce risk of vertical transmission to the neonate in the postpartum period
2. Reduce risk of horizontal transmission to other neonates in the special care nursery
3. Identify and treat neonates who demonstrate signs of infection

It is likely that the results of specific testing for COVID-19 may not be available in all cases and as such the main factor to be considered in deciding on the management of the neonate is the clinical status of mother and neonate. The clinical picture may vary from women with mild to moderate symptoms who may have the capacity to care for their neonate to unwell women with severe symptoms who may be unable to care for their neonate.

Four clinical scenarios are likely to present:

1. Unwell mother with a well-baby
2. Unwell mother with unwell baby
3. Well mother with well-baby
4. Well mother with unwell baby

Should neonates of women suspected or confirmed to have COVID-19 be separated from their mother?

Well mothers with well babies should not be separated.

D

The decision as to whether to nurse babies who are otherwise well in the same room as their mother should take into consideration a multiplicity of factors including the potential benefits of skin to skin contact for good neurodevelopmental outcome (59,60). These benefits must be weighed against the potential theoretical benefit of risk reduction of infection that may be obtained from separating mother and baby.

The National Health Commission of the People's Republic of China recommends that “infants should be separated from their lactating mothers during the period of hospitalization regardless of COVID-19 status due to heightened risk for nosocomial infection in the infant’s naïve immune system as well as increased risks for healthcare workers handling the infant. If the mother is able to express breastmilk, same can be provided for the COVID-19 positive infant. If the infant is COVID-19 negative, breastfeeding should be interrupted” (61).

While a policy of separating mother from baby may prove acceptable in a low patient volume or high resource setting, such an arrangement may be precluded in institutions with large volumes of patients and limited space for isolation. This approach will also place increased demands on human resources as separate staff will be required to care for and monitor these neonates. The effect of increase human sources is the increased consumption of PPE which are already at a premium. An additional concern is that suboptimal arrangements for isolation of neonates may potentially pose a risk to other unexposed neonates as well as staff thus compromising public wellbeing.

A policy of isolating mother and baby together may prove to be the most acceptable arrangement for most public institutions, given the constraints for space and resources that are likely to develop with the progression of the epidemic. Well

mothers may be able to help with the care of their neonates thus reducing the burden on staff that will likely be already burdened by the demands of the epidemic.

Management of Mothers and Neonates

Unwell mother with a well-baby

If the mother is unwell and the neonate is well the neonate should be cared for separately from mother. This is to facilitate limited interference with maternal care while reducing the risk of vertical transmission. In order to reduce horizontal transmission to other babies the neonate should be cared for in an area separate from the general nursery population with strict adherence to droplet and contact precautions.

The neonate should be monitored for a minimum period of 48-72hours in hospital. Minimum requirements for monitoring will include: temperature, pulse rate, respiratory rate and Oxygen saturation. These should be recorded 4-hourly.

Unwell mother with unwell baby

If the mother is unwell and the neonate is also unwell the neonate should be cared for separately from mother and admitted to the special care nursery.

In order to reduce horizontal transmission to other babies the neonate should be cared for in an isolated area separate from the general nursery population with strict adherence to droplet and contact precautions. Isolation should ideally be done in a negative pressure room in order to reduce dispersal of viral particles during aerosol generating procedures with strict adherence to airborne/droplet and contact precautions.

Investigation should be guided by clinical status. The following should, however, be considered:

1. CBC
2. CRP
3. BLOOD CULTURE
4. SARI panel PCR COVID-19 (NP SWAB), INFLUENZA, PARAINFLUENZA, RSV-NP swab.

5. CHEST X-RAY
6. ABDOMINAL XRAY AND LFT AS NEEDED

Well mother with well-baby

If the mother is well and the neonate is well the neonate should be isolated together with mother. This is to facilitate a reduced risk of horizontal transmission to other babies. Care should be administered with strict adherence to droplet and contact precautions.

The neonate should be monitored for a minimum period of 48-72 hours in hospital. Minimum requirements for monitoring will include: temperature, pulse rate, respiratory rate and Oxygen saturation. These should be recorded 4-hourly.

Well mother with unwell baby

If the mother is well and the neonate is also unwell the neonate should be cared for separately from mother and admitted to the special care nursery.

In order to reduce horizontal transmission to other babies the neonate should be cared for in an isolated area separate from the general nursery population with strict adherence to droplet and contact precautions. Isolation should ideally be done in a negative pressure room in order to reduce dispersal of viral particles during aerosol generating procedures with strict adherence to airborne/droplet and contact precautions.

Investigation should be guided by clinical status. The following should, however, be considered:

1. CBC
2. CRP
3. BLOOD CULTURE
4. SARI panel PCR COVID-19 (NP SWAB), INFLUENZA, PARAINFLUENZA, RSV-NP swab.

5. CHEST X-RAY

6. ABDOMINAL XRAY AND LFT AS NEEDED

Visits by Mothers suspected of having COVID-19 should be restricted if in the judgement of the caregiver this poses a potential risk to other neonates and or clinical staff. Consideration should, however, be given to the medicolegal and psychological implications of separation of mother from baby in making this decision.

What are the options for feeding neonates of mothers with suspected or confirmed COVID-19?

Well women with well babies should be allowed to breastfeed as long as they are able to observe appropriate precautions.

D

Breast milk is the best source of nutrition for most infants. There remain however many unknowns about COVID-19. For that reason, families should participate in the decision to use breastmilk for infant feeding with the support of the healthcare providers.

The feeding options are:

1. Breastfeeding

A symptomatic mother with confirmed or suspected infection should take all possible precautions to avoid spreading the virus to her infant, including washing her hands before touching the infant and wearing a face mask, if possible, while feeding at the breast. If a mother and newborn do room-in and the mother wishes to feed at the breast, she should put on a facemask and practice hand hygiene before each feeding.

2. Feeding expressed breastmilk

If expressing breast milk, the mother should wash her hands before touching any pump or bottle parts and follow recommendations for proper pump cleaning after each use. If possible, consider having someone who is well feed the expressed breast milk to the infant.

3. Feeding infant formula

This will be an option for mothers who are too unwell to breastfeed or to express breastmilk.

What should be the discharge plan for neonates of mothers?

Well Neonates can be allowed home to isolate after 48-72 hrs of monitoring in hospital. Neonates, however, should be monitored for a minimum of 5 days for signs of infection.

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Well Neonates will need to be monitored for a minimum of 5 days for signs of infection. For the first 48-72 hrs of life neonates should be monitored in hospital. After discharge Mothers/caregivers should be advised to monitor for signs of infection.

Women should be specifically advised about the following signs prior to discharge:

1. Fever
2. Poor feeding
3. Irritability
4. Lethargy
5. Respiratory distress
6. Choking

Consideration should be given to assigning health workers to monitor women to ensure compliance with requirements of quarantine as well as to check on neonatal well-being.

Unwell neonates who have been exposed to COVID-19 should be managed at their local institution.

D

Efforts should be made to contain infections for at risk neonates within the institution of delivery so as to limit regional and trans-regional spread. All Infant resuscitation/ Assessment should occur in the location where the infant is born. External transfer should be avoided unless respiratory distress fails to respond to non-invasive interventions and ventilator support is required.

Given the many permutations of neonatal care, decisions regarding transfer should be assessed on a case by case basis weighing the risks versus potential benefits. Parents should be kept updated as to the progress of their baby. In the case of transfers parents should be aware that they may not be permitted to accompany the neonate if there are infectious concerns.

What are the recommendations for reduction of transmission risk to caregivers caring for women with suspected, probable or confirmed COVID-19?

- STRICT adherence to hand and nasal hygiene practices
- Basic requirements for hand hygiene should be available to all staff working in health facilities
- Staff members should strictly follow basic infection control practices between patients (e.g., hand hygiene, cleaning and disinfecting shared equipment).
- Appropriate use of PPE should be available to caregivers working with isolated, suspected or confirmed patients
- Staff should be fit tested for N95 respirators to ensure that appropriately sized masks are chosen for use when necessary.
- Staff should be trained in the appropriate use of PPEs
- Specific teams should be identified and trained to work in isolation areas.

What interventions that can be utilized in circumstances where there is a shortage of PPE?

- During times of limited access to respirators or facemasks, facilities could consider having staff members remove only gloves and gowns (if used) and perform hand hygiene between patients (e.g., confirmed COVID-19) while continuing to wear the same eye protection and respirator or facemask (i.e., extended use).
 - Risk of transmission from eye protection and facemasks during extended use is expected to be very low.

Limit transport and movement of the patient outside of the room. Consider providing portable x-ray equipment in patient cohort areas to reduce the need for patient transport. To the extent possible, patients with known or suspected COVID-19 should be housed in the same room for the duration of their stay in the facility (e.g., minimize room transfers).

What should be the approach to preparation of support staff?

Nurse aids, patient care assistants, community aids and other support staff (e.g. orderlies, janitors) are critical to the operation and effective function of any health institution. It is critical that a plan is in place at each institution for the preparation of such individuals.

Education, training and support should include:

1. Information delivered in a way that is easily understood
2. Comprehensive and ongoing information about the disease as well as principles of infection control
3. Clarification of any misconceptions or myths that may exist
4. Promotion of staff involvement and engendering of trust
5. Provision of appropriate PPEs

It is important that support staff are aware of the institutional Operational Plan and held accountable for the execution of same.

It is important that lines of communication are made available for all levels of staff. Staff may make observations during the course of performing their duties from which they may derive recommendations. Mechanisms should be in place to ensure that these contributions and recommendations can be communicated and that these are considered in the refinement of plans.

Additionally, a common network for information sharing should be formulated and circulated to all levels of staff; including an emergency contact listing. Note carefully, periodic updates may be necessary due to how dynamic the situation is likely to be.

Recommendations for Audit

1. Hand Hygiene
2. PPE usage (donning and doffing)

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