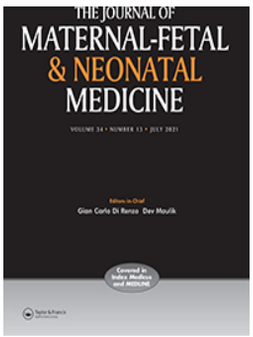

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Management of covid-19: a practical guideline for maternal and newborn health care providers in Sub-Saharan Africa

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Management of covid-19: a practical guideline for maternal and newborn health care providers in Sub-Saharan Africa

B. N. Ezenwa[a], I. B. Fajolu[a], O. R. Akinajo[b], C. C. Makwe[b], A. A. Oluwole[b], I. E. Akase[c], B. B. Afolabi[b] and V. C. Ezeaka[a]

[a]Neonatology Unit, Department of Pediatrics, College of Medicine, University of Lagos, Nigeria; [b]Department of Obstetrics & Gynecology, College of Medicine, University of Lagos, Nigeria; [c]Infectious Diseases Unit, Department of Medicine, Lagos University Teaching Hospital, Lagos, Nigeria

ABSTRACT

COVID-19 is a pandemic that is currently ravaging the world. Infection rate is steadily increasing in Sub-Saharan Africa. Pregnant women and their infants may suffer severe illnesses due to their lower immunity. This guideline prepares and equips clinicians working in the maternal and newborn sections in the sub-region to manage COVID-19 during pregnancy and childbirth.

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COVID-19; pregnant women; labor; newborn; Nigeria

Introduction

COVID-19, an acronym given by World Health Organization (WHO) that stands for coronavirus disease of 2019 is a disease caused by the SARS-CoV-2 virus a novel strain of coronavirus that causes severe acute respiratory syndrome (SARS). The disease was first described in Wuhan China in December 2019. By March 2020 WHO characterized the outbreak as a pandemic due to its rapid spread and the severity of the disease [1]. Since it was declared a pandemic, it has caused more than one million infections with thousands of mortalities across the world [2].

Nigeria recorded its first case of Coronavirus (COVID-19) patient on the 27th of February 2020 [3], and its first mortality from the disease on 23rd of March 2020 [4]. The index case of the virus was an Italian citizen who returned to Nigeria from a business trip to Milan, Italy [3]. As reported in many other countries, imported cases soon gave way to local transmission of the virus. As at 9.00 pm on the 9th of April 2020, 288 confirmed cases of COVID-19 had been identified with 7 deaths and more than 2000 contacts under quarantine and being followed up. Lagos – the commercial nerve center of Nigeria and Abuja – the seat of Government, have been the most hit by the pandemic in Nigeria. As usual, misinformation is rife on the management and prevention of COVID-19 even among health care providers.

So far, there has been no confirmed obstetric case of COVID-19 in Nigeria as at the time of writing this guideline. The only confirmed case of COVID-19 in a child in Nigeria is a 6-week old infant who just returned from the UK with the mother, though reports from other climes indicate that neonates can indeed be infected and are considered high risk due to their immunoplegic status [5,6]. Infection in pregnant women has not been documented in Nigeria. However, reports from other countries indicate the disease severity may not be different from what obtains in non-pregnant individuals with the added risk of premature deliveries and other birth complications [7]. This is in contrast to what was known of other coronaviruses –SARS and the Middle East Respiratory Syndrome (MERS) in the past in which pregnant women affectation may cause more severe disease with risk of premature delivery or fetal loss [8,9]. With the way the disease has spread in other countries, it is likely to be replicated in Nigeria and other African countries, and pregnant women will start getting infected as a result. Pregnant women due to their peculiarities, when they fall into labor, will have to be attended to in facilities which are usually different from the COVID-19 isolation centers in the

CONTACT Beatrice Ezenwa beatriceezenwa@yahoo.com Department of Pediatrics, College of Medicine University of Lagos, Lagos, Nigeria
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country. Therefore, the clinicians need to arm themselves adequately with a guideline on how to receive and subsequently manage these mothers and their newborns when they arrive.

COVID-19 is a respiratory disease that manifests with fever, cough, and acute respiratory distress symptoms in adults and older children. In pregnant women, the symptoms that have been reported are not different from other adults [10]. Like other neonatal infections, manifestations of neonatal COVID-19 may be nonspecific. It may present with temperature instability instead of the classical fever, respiratory distress, lethargy, hypotension and feeding intolerance. Following the destruction of the lung parenchyma by the virus, the child may present with features akin to respiratory distress syndrome [11].

Studies so far had shown that COVID-19 like other respiratory diseases can be transmitted *via* three mechanisms: airborne droplets, person to person contact and contact with fomites [12–14]. Vertical transmission from mother to fetus has not been documented for COVID-19 [15]. A case report of seven cases from China showed no evidence of vertical transmission [9]. Likewise, there was no report of complications in the COVID-19 positive woman who delivered vaginally in the United States [16].

To prepare for the likely event of pregnant women and their newborn presenting with COVID-19 infection and being a foremost tertiary institution in Lagos State, which is the epicenter of the pandemic in Nigeria, there is an urgent need to take the lead and come out with a workable standard operating procedure that can be utilized by all facilities that may be involved in maternal and newborn care. The Obstetric and Neonatology team of the Lagos University Teaching Hospital, Lagos hereby present this practical guideline to aid clinicians working in the maternal and newborn sections in Nigeria during the COVID-19 pandemic. These recommendations are in accordance 'with the WHO guidelines on the "Interim Clinical Guidance for Management of Patients With Confirmed 2019 Novel Coronavirus (2019-nCoV) infection" [17]; the American Academy of Pediatrics Committee on Fetus and Newborn "Initial Guidance on Management of Infants Born to Mothers with COVID-19 [5]; the SOGON and the RCOG, UK guidelines" [18,19]. This guideline will continue to evolve as newer information emerge concerning COVID-19 in maternal and newborn care.

In line with the WHO COVID-19 management objectives, our goals are to:

- Identify, resuscitate, isolate and care for exposed newborns early, including providing optimized care for infected patients
- Interrupt human-to-human transmission including reducing secondary infections among close contacts and health care workers
- Establish and maintain maternal-infant bonding as much as possible

General guidelines in the management of obstetric patients to reduce the risk of transmission of/exposure to covid-19

Obstetric clinics

- Scale down on antenatal care (ANC) visits by adapting the initial WHO focused ANC of four visits [20] (<16 weeks, 28-, 32- and 38- weeks visit) and modifying as appropriate e.g. weekly visits from 36 weeks. This will be for low-risk patients.
- Overcrowding in the antenatal clinics should be avoided by making sure the patients' appointments are spaced out.
- During consultations, health officials should keep a safe distance from the patients and between patients.
- Application of universal precautions for all infectious diseases should be observed at any point in time when health workers come close to patients.
- Before and after each consultation all health personnel should practice hand washing with soap or use of hand sanitizers.
- While screening patients in the antenatal clinic, pertinent questions like a history of recent travel or return from high-risk countries, presence of symptoms (fever, cough, shortness of breath among others) should be asked. In the presence of reasonable risk factors or suspicion, further evaluation should be done in a separate designated area of the clinic to prevent exposure of other screened patients.
- Medical consultations and advice over the telephone should be instituted for non- emergencies to prevent unnecessary hospital visits.
- Any patient with serious complaints should present as an emergency to the accident and emergency, regardless of their gestational age or booking status. This is so that they can be triaged appropriately.
- Elective Cesarean sections and cervical cerclage to continue with the support and commitment from the Department of Anesthesia and the Neonatology Unit.

Flow of patients: All patients (booked or unbooked) will be screened at the Accident and Emergency (A&E)

Table 1. Checklist for assessing risk of COVID-19 among patients presenting at A&E.

Patient's name		Date		
	Question	Yes	No	Sum
1	Cough	1	0	
2	Catarrh/running nose	1	0	
3	Sore throat	1	0	
4	Diarrhea	1	0	
5	Body pains	1	0	
6	Headaches	1	0	
7	Fever	1	0	
8	Difficulty in breathing	2	0	
9	Easy fatigability	2	0	
10	Any travel during the past 14 days	3	0	
11	History of travel to COVID-19 infected area	3	0	
12	Contact with an individual who tested positive to COVID-19	3	0	
		Total		

Adapted from the Lagos University Teaching Hospital COVID-19 screening instrument for triage, April 2020.
Score 0–2 = No action required. Admit patient into A&E.
3–5 = Admit into A&E. Re-administer checklist after 6 h in A&E.

- If score remain 3–5
  a. If patient has no cough or breathlessness. No additional action required
  b. If patient has either cough or breathlessness. For chest CT Scan

Score >5: Invite Infectious Disease Unit to review
6–24 = Invite Infectious Disease Unit to review.

by the triage team before being directed to their respective destination (A&E, Clinic or Labor ward) depending on the results of their screening. Patients should also be screened at the point of entry into the clinics and the Labor Ward in order not to miss cases.

A/E. Triage: The A/E triage staff should call the Infectious Disease Unit (IDU) for any patient with suspicious symptoms or contact positive responses, whilst still at triage (Table 1). This screening and triage include infants that present at the Children Emergency Centers.

Labor wards *[21]*

- There should be a screening table at the entrance to the labor ward to detect suspicious cases if patients come directly to the labor ward as opposed to the Accident and Emergency department (which is recommended).
- Patients with suspicious symptoms or positive answer to screening (contact) questions should be escorted into the labor ward from the entrance by staff wearing appropriate Personal Protective Equipment (PPE). The patient should be provided with a surgical face mask (not a filtering facepiece level 3 (FFP3) mask).
- The face mask should not be removed until the woman is isolated in a designated room or bay suitable for all necessary care during her hospital visit or stay.
- Once the patient is secured in the isolation room, IDU team should be invited for urgent review.
- Isolation rooms or ward bays should ideally have a defined area for staff to put on and remove PPE with available ensuite bathroom facilities.
- Only the managing team should enter the bay with visitors kept to a minimum.
- All non-essential items should be removed from the room before the arrival of the woman.
- All clinical areas used should be cleaned after use as per health protection guidance.
- As obstetric patients are peculiar and cannot be managed in the current designated state isolation centers (Biosecurity facilities), they have to be managed in the designated labor room for COVID-19 patients and the designated theaters of the hospitals as appropriate.
- The minimum PPE to attend to any suspected or confirmed COVID-19 patient should consist of a full water-resistant disposable gown, sterile gloves and surgical masks with visors for labor cases; and for any surgeries, the above-elbow length gloves, N-95 face masks and surgical eye shields will be required (Table 2). Not all of these items will be required for each patient. However, they should be available as labor can end up as an emergency cesarean section at any time and also if one set becomes damaged and another is needed.

Obstetric management of suspected and confirmed covid-19 patients

Suspected and confirmed COVID 19 patients

1. Obstetric cases should be managed by the most senior doctor on duty, and the most senior midwife. According to the guideline on COVID-19 released by the Society of Gynecology and Obstetrics of Nigeria [18], there is no need to interfere with labor or the management of pregnant women in labor and the puerperium. Infectious Disease Unit (IDU) or the designated response team in each hospital should be notified as soon as the patient is admitted.
2. The hospital questionnaire for case identification should be utilized for all patients. (Table 1) Once marked as high risk, the patient will be admitted into the designated room for suspected cases.
3. All those caring for suspected cases should wear full PPE and care for the patient continuously. The patient should be nursed in the appropriate

Table 2. COVID-19 critical items list for care of confirmed cases during labor and childbirth.

PPE	OBGYN	MIDWIVES	NNU	ANAESTHETISTS	TOTAL
Gloves, examination					1 Packet (100 pcs)
Gloves, surgical	4	4	4	4	16
Goggles, protective*	2	2	2	3	9
Face shield*	2	2	2	3	9
Mask, surgical*	2	2	2	3	9
Mask, surgical with visor*	2	2	2	3	9
Mask, particulate respirator (N 95 face masks)	2	2	2	3	9
Gown, protective (waterproof disposable)	2	2	2	3	9
Clinical care equipment					
Pulse oximeter**			1	1	2
Infrared thermometer**					1
Nasal oxygen cannula, with prongs			1	1	2
High-flow nasal cannula (HFNC)					1
Oxygen face mask				1	1
Self-inflating bag and masks (preterm and term sizes)**			1		1
CPAP, with tubing for pediatric			1		1
Heat and moisture exchanger with filter				1	1
Suction pump, mechanical (closed system)**	1		1		2
Diagnostic equipment					
Swab and Viral transport medium for neonate					

*Substitutes/alternatives in certain clinical scenarios/situation; **Equipment not disposable. PPE: personal protective equipment; NNU: neonatology unit; CPAP: continuous positive airway pressure; pcs: pieces.
The quantity of surgical gloves (including arm/elbow length) required for each case of vaginal delivery is not significantly different from the cesarean section because of multiple/repeated vaginal examination during labor and delivery.

nursing bay in labor ward if in labor. If not in labor but pregnant, to stay in triage while Consultant is called and makes a decision to send home or stay after discussing with IDU.

4. If the patient stays, to be nursed in isolation bay until delivery. As much as possible, suspicious patients that are not in labor should be managed as an outpatient if possible. Consultant should make the decision following confirmatory tests of such patients with a negative result.
5. If the patient is confirmed to have COVID-19, they will be moved to a separate designated ward. If found to be negative, they will go to the main ward [21].
6. Elective and emergency Cesarean Sections will continue as scheduled and must be done with full PPE as above, plus N95 face masks.
7. Mothers (and their babies), if confirmed to be positive for COVID-19, will be discharged to a separate designated ward (as above) as soon as possible after delivery.
8. It should be noted that pregnant women with an isolated fever should be investigated and treated according to the unit protocol while maintaining safety precautions. Part of the treatment will include a full blood count. If lymphopenia is identified on the full blood count, testing for COVID-19 should be arranged.
9. All residents will work in shifts as rostered. Any exposed doctor or nurse should call the IDU team for advice.

Guidelines for covid-19 newborn care and management

Delivery room preparation and precautions

- *Universal precautions should be practiced at ALL times*
- When consult for delivery is received for an infected or suspected COVID-19 woman, the most senior person on duty should notify the whole unit including the Consultants. All health workers that attend any delivery must wear the minimum protective gadgets (PPE). Minimum PPE includes: a mask (N95 preferably), hand gloves, eye protection and a gown. All parts of the body must be covered.
- BE CAREFUL NOT TO CONTAMINATE YOURSELF AND THE SURROUNDINGS WITH INFECTED SECRETIONS

Delivery room care and resuscitation

1. LIMIT NUMBER OF PEOPLE IN THE DELIVERY ROOM TO THE BAREST MINIMUM TO AVOID UNDUE EXPOSURE.
2. Routine delivery room care should be provided for the infants at birth as usual: dry, stimulate and keep warm with mother and commence breastfeeding as soon as possible.
3. Routine newborn care should be carried out.
4. Routine neonatal resuscitation should be undertaken when indicated.

5. Suction only when necessary.
6. Intubations should be with utmost caution and by the most senior person at the delivery. Several attempts at intubation is discouraged.
7. Remember **suctioning, manual ventilation, intubation, noninvasive positive-pressure ventilation, cardiopulmonary resuscitation, connecting/disconnecting a patient to or from a ventilator can ALL result in aerosolization**.

Newborns presenting at the children emergency center

- Outborn babies referred to the facility usually present at the Children Emergency Center. The screening questionnaire employed by the adult A&E (Table 1) should be used to screen the mothers. If the mother did not accompany the infant from the referral hospital (which is usually the case), efforts should be made to get as much information as possible on the mother's condition.
- Practice universal precautions at all times.
- Suspected COVID-19 exposed infants should be admitted in the designated COVID-19 ward and the Infectious Disease Unit notified. Subsequent management should be as per unit protocol for the particular neonatal condition.

Lying-in wards

Apparently healthy babies $\geq$34 weeks gestation should be nursed with the mother and both can be transferred to the Infectious Disease Hospital or the designated ward. Co-location of mother and infant is advocated if the mother shows no symptoms to minimize strain on resources and also to ensure mother and child bonding and adequate breastfeeding [22]. Mother should wear a mask around the infant and perform hand hygiene before carrying or feeding the baby.

Neonates requiring NICU admission

Newborns $<$34 weeks gestation or $<$1500 g should be nursed in an incubator (in a previously designated place in the hospital). All exposed infants to COVID-19 requiring admission should be admitted into the designated isolation ward. Babies with confirmed infection should be transferred and nursed in a separate designated ward. Subsequent care should be provided for all infants as per unit protocol for the particular neonatal condition. Healthcare worker interaction should be under full PPE and must follow the hospital's policy on COVID-19. Minimal number of staff should be allowed in the isolation ward and all must be in full PPE at all times.

Referred Babies: Outborn babies referred to the hospital who were exposed and suspected or confirmed to have COVID-19 will be managed in the same isolation ward as the inborn babies. They should also have similar management protocol. Infants who were already in the normal newborn wards before they or their mothers were suspected of having COVID-19 should promptly be transferred to the isolation ward to continue clinical management.

Newborn nutrition and COVID 19

There is currently no evidence that COVID-19 can be transmitted through breast milk, therefore, there is no justification to deny both mother and baby the benefits of breastfeeding [22,23], if there are no other contraindications to breastfeeding. The practice to support, promote and protect breastfeeding will continue until there is enough evidence to advise otherwise. Cases should be individualized. Asymptomatic mothers and those with mild symptoms can breastfeed. Mothers must observe hand hygiene with soap and water or alcohol hand rub before touching the baby and must wear a mask while breastfeeding. Frequency of direct breastfeeding should be reduced to one to two times daily and other feeds should be expressed breast milk (EBM) fed by cup. This is to limit contact and improve lactation. Mothers should maintain appropriate social distancing when not caring for the baby. Infants of critically ill mothers should receive an appropriate infant formula.

COVID-19 testing in newborns

- At birth, all exposed babies should have samples for COVID-19 taken from skin surface swabs or the amniotic fluid. Blood, urine or stool samples should also be collected and send for testing though yield for COVID-19 is said not to be high compared to nasopharyngeal swabs [2].
- Testing of nasopharyngeal swabs should be done after 24 h of life as yield is better [2,9].
- Babies with positive results who are symptomatic should be transferred to the designated neonatal ward for COVID-19 patients.
- Positive asymptomatic infants can be nursed and co-located with their asymptomatic mothers who

should be educated on infection prevention methods. They should be observed and then retested after 14 days.
- Symptomatic infants should be retested after being afebrile for >3days or when symptoms improve or after 14 days (whichever is later).

Infants that tested negative at birth can be managed in three ways:

1. The infant can be separated from mother and nursed in a separate location by another caregiver (hospital staff if available or family designated) while mother expresses breast milk for feeding the baby if she is stable enough to do this.
2. If the mother is asymptomatic and does not want to be separated from the baby, she should be counseled on the modes of transmission and baby can be co-located with mother but she must wear a mask for any interaction with the baby and observe hand hygiene and social distancing when appropriate.
3. If the mother is symptomatic, the baby should be discharged home to a family designated caregiver who should be counseled on hygiene and care of the baby. Baby should be fed on an appropriate infant formula.

When to discharge

Newborns should be discharged following the unit protocol.

Positive asymptomatic infants can be discharged after at least two consecutive test results at >24-h sampling interval are negative [24].

Symptomatic infants can be discharged after symptoms have abated, have been afebrile for >3 days and at least two consecutive test results at >24-h sampling interval are negative [5,24].

All discharged newborns should be closely followed up following the unit protocol for discharged newborns.

Equipment disinfection

Provision of PPE for housekeepers/cleaners should be made for proper disinfection of the isolation unit of the labor ward, labor ward theater and the isolation wards.

All work surfaces, equipment and instruments used at the delivery must be promptly disinfected using the method of wiping and or soaking in chemical disinfectants such as chlorine or by Autoclaving. Used PPEs must be properly removed and carefully disposed of following the hospital protocol [21].

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

B. N. Ezenwa http://orcid.org/0000-0001-7437-3211

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