Republic of Botswana

MINISTRY OF HEALTH & WELLNESS

Botswana COVID-19 Guideline 9:

Interim Clinical Guidance for the management of Paediatric patients with Coronavirus Disease 2019 (COVID-19) in Botswana

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Foreword

Corona Virus Disease 2019 (COVID-19) is caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2). Data continues to emerge about the disease and guidelines will be reviewed as the situation changes.

This document aims to provide guidance for standardized care of paediatric patients for best outcomes. Data from China, Europe and America has shown that children are less affected by SARS-CoV-2 both in numbers and severity. A significant percentage of children have asymptomatic or subclinical disease, while most will have mild disease. Critical illness with SARS-CoV-2 in children is rare but occurs.

At present, (May 6, 2020), Botswana has no confirmed paediatric cases of COVID 19.

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1 Background

On March 11, 2020, the World Health Organization (WHO) declared the novel Corona Virus Disease a global pandemic. The WHO had been notified of a cluster of severe pneumonia of unknown aetiology in Wuhan City China on January 30, 2020. The virus was subsequently isolated from lower respiratory tract samples of patients and was named severe acute respiratory syndrome coronavirus-2 (SARS CoV-2) by the WHO. The disease caused by SARS CoV-2 is known as corona virus disease 19 (COVID-19).

To date (May 6, 2020), the virus has spread to almost every country in the world, with over 3.8 million people infected and over 260,000 deaths worldwide. Currently, there are 23 confirmed cases of COVID-19 in Botswana with one confirmed death.

2 Epidemiology

Emerging data suggest SARS CoV-2 affects children less often than adults, and causes less severe disease. Recently published case series of paediatric COVID-19 cases have noted that relatively few children with COVID-19 are hospitalized, and children experience less fever, cough, or shortness of breath than adults[1,2]. According to reports from the Chinese Centre of Disease Control and Prevention, including a case series of 2143 paediatric patients (731 cases lab-confirmed), COVID-19 affects children of all ages but case fatality is low (<0.1%)[3,4]. Most cases in children (94.6%) were reported as being mild or asymptomatic[4].

Specific risk factors for severe disease among children with COVID-19 have not yet been elucidated, but in another study of 1391 children with suspected COVID-19 (12.3% lab confirmed) treated at Wuhan Children's hospital from January 26 to February 28, 2020, only 3 children had severe or critical illness, and all three had comorbid conditions. Only one of those children died[5].

More recent reports from Italy and the United States describe similar findings of an overall lower attack-rate and lower case-fatality rate among children[6].

Paediatric transmission of COVID-19 remains an area of concern. Young children are generally more effective at transmitting infections because of increased hand-to-mouth behaviors and inability to adhere to appropriate cough etiquette. Thus, mild or asymptomatic infection with COVID-19 in children has raised the concern that children may be important links in the chain of community transmission[7].

3 Clinical Characteristics and Case Definitions

3.1 Clinical features

A significant number of children have been SARS-CoV-2 positive without symptoms[5]. Fever is the most common presenting symptom[5,8] followed by cough and sore throat. The most common radiographic finding was bilateral ground glass opacities, although many children did not have any radiologic findings[5].

3.2 Case Definitions

Table 1: Paediatric COVID-19 case definitions. Adapted from the World Health Organisation[9].

Suspect case i. An infant or child with acute respiratory illness (sudden onset of at least one of the following: cough, sore throat, shortness of breath or fever) AND a history of any travel outside of Botswana or to a location within Botswana reporting community transmission of COVID-19* during the 14 days prior to symptom onset OR ii. An infant or child with any acute respiratory illness (sudden onset of at least one of the following: cough, sore throat, shortness of breath or fever) AND having been in contact with a suspected, probable or confirmed COVID-19 case (see definition of contact) in the last 14 days prior to symptom onset OR iii. An infant or child who is hospitalised with a severe acute respiratory illness (sudden onset of at least one of the following: cough, sore throat, shortness of breath or fever) AND in the absence of an alternative diagnosis that fully explains the clinical presentation.
Probable case i. A suspect case for whom testing for the COVID-19 virus is reported by the laboratory as inconclusive OR ii. A suspect case for whom testing could not be performed for any reason.
Confirmed case An infant or child with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms.

Contact

A close contact is a person who experienced any one of the following exposures during the 4 days before and the 14 days after the onset of symptoms of a probable or confirmed case:

1. Face-to-face contact with a suspected, probable or confirmed case within 2 metres and for more than 15 minutes;
2. Direct physical contact with a suspected, probable or confirmed case;
3. In a closed environment (e.g. household, classroom, meeting room, hospital waiting room) with a COVID-19 case for more than 15 minutes;
4. Direct care for a patient with suspected, probable or confirmed COVID-19 disease without using proper personal protective equipment;
5. In the same hospital room when aerosol generating procedure is undertaken on a probable or confirmed COVID-19 case without recommended PPE;
6. In an aircraft or any other mode of conveyance sitting within two seats (in any direction) of a suspected, probable or confirmed COVID-19 case, travel companions or persons providing care, and crew members serving in the section of the aircraft where a COVID-19 case was seated.

A casual contact is a person who experienced any one of the following exposures during the 4 days before and the 14 days after the onset of symptoms of a probable or confirmed case:

1. Face-to-face contact with a suspected, probable or confirmed COVID-19 case within 2 metres for less than 15 minutes;
2. In a in a closed environment with a COVID-19 case for less than 15 minutes.

Note: for confirmed asymptomatic cases, the period of contact is measured as the 4 days before through the 14 days after the date on which the sample was taken which led to confirmation.

*Locations within Botswana reporting community transmission of COVID-19 will change as the epidemic evolves. Updates will be provided by the Ministry of Health and Wellness. At present, given the uncertain epidemiology of COVID-19 transmission in Botswana, all regions are considered to have possible community transmission.

ALL SUSPECTED CASES MUST BE NOTIFIED IMMEDIATELY TO THE DHMT SO THAT RAPID CONTACT TRACING CAN TAKE PLACE TO STOP ONWARD TRANSMISSION OF COVID-19. SEE GUIDELINE 6: CONTACT TRACING FOR MORE DETAIL.

4 Triage and initial assessment

4.1 Screening and Triage

a) In line with Guideline 3: Preparing a healthcare facility in Botswana for COVID-19, all individuals entering a healthcare facility should be screened for COVID-19 at the first point of entry. For paediatric patients this may at the Accident and Emergency (A&E) Department in hospitals, or at the entrance to the hospital.

b) Those who are identified as potential suspects that need further assessment should be immediately given a surgical mask.

c) Each facility should set up a separate triage or isolation area where children with suspected COVID-19 will be directed from the point of screening and undergo further assessment.

d) At triage

   i. Determine if the child truly meets case definition for suspected COVID-19 and ensure they continue to be cared for in a suspected COVID-19 cohort area.

   ii. Those who do not meet the case definition can be directed to a non-COVID-19 area

   iii. Maintain at least 2m distance between patients in all areas

4.2 Initial assessment of suspected paediatric cases

a) Do appropriate hand washing with soap and water or alcohol-based hand sanitizer for at least 20 seconds as per WHO/MOHW guidelines on hand washing.

b) Disinfect stethoscopes and other clinical equipment between patients.

c) DO NOT ASSESS A SUSPECTED PAEDIATRIC CASE WITHOUT APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPE)

i. See Guideline 2: Personal Protective Equipment

d) Primary assessment should be rapid and include simultaneous life-saving interventions where necessary

i. Paediatric rapid assessment

- **Consciousness**
- **Colour**
- **Breathing**

ii. **A**irway and cervical spine precautions

iii. **B**reathing and ventilation

iv. **C**irculation

v. **D**isability/neurologic status

vi. **E**xposure/environment

e) Secondary assessment follows primary assessment and is rapid and systematic

i. **F**ull set of vital signs and Paediatric Early Warning Score (PEWS) [See below]

ii. **G**et monitoring devices and give comfort (using **LMNOP** mnemonic described below)

- **L**aboratory studies: (RBS, ABG, FBC, U&E, BMCS, UMCS, CSF analysis, etc)
- **M**onitoring: Continuous cardiopulmonary monitoring, pulse oximetry
- **N**asogastric or Orogastric Tube: Insert gastric tube

- **O**xygenation and ventilation: Give supplemental oxygen and assess ventilation if not previously done
- **P**ain assessment and management: Assess for pain using appropriate pain score and manage appropriately

iii. **H**istory (using SAMPLE mnemonic described below)

- **S**igns and symptoms
- **A**llergies
- **M**edications
- **P**ast medical and surgical history
- **L**ast oral intake
- **E**vents regarding current illness (don't forget travel and contact history)

iv. **H**ead-to-toe assessment: perform a full physical examination of the child, paying attention to the following

- ENT: **Do not perform without PPE that includes an N95 mask**
- Chest: signs of increased work of breathing, auscultation for breath sounds and heart sounds.

4.3 Vital signs monitoring and Paediatric Early Warning Score (PEWS)

Paediatric vital signs are age dependent and PEWS are being used around the world to assess children for critical disease leading to early intervention[10]. Below are tables of normal range of paediatric vital signs, PEWS chart, and interpretation and response to PEWS scores.

Table 2: **Normal ranges of paediatric vital signs**.

Age Group	*Heart Rate (beats per minute)*	*Respirations (breaths per minute)*	*Systolic BP (mmHg)*
Preterm	120 – 180	50 – 70	40 – 60
Newborn	100 – 160	35 – 55	50 – 70
Infant (1 to 12 months)	80 – 140	30 – 40	70 – 100
Toddler (1 to 3 years)	80 – 130	20 – 30	70 – 110
Preschool (3 to 6 years)	80 – 110	20 – 30	80 – 110
School Age (6 to 12 years)	70 – 100	18 – 24	80 – 120
Adolescents (12 + years)	60 – 90	14 – 22	100 – 120

Table 3: Paediatric Early Warning Score.

	0	1	2	3	Score
Cardiovascular	Pink or capillary refill 1-2 seconds	Pale or capillary refill 3 seconds	Grey or capillary refill 4 seconds. Tachycardia of 20 above normal rate.	Grey and mottled or capillary refill ≥ 5 seconds. Tachycardia of 30 above normal rate or bradycardia	
Respiratory	Within established baseline. No retractions. Room air.	≥ 10 above established baseline. Mild retractions*. Up to 2L/min or 30% FiO_2.	≥ 20 above established baseline. Moderate retractions*. Up to 4L/min or 40% FiO_2.	≥ 30 above established baseline. Severe retractions*. Grunting. Up to 5L/min or 50% FiO_2.	
Behaviour	Playing/Appropriate or sleeping. Alert.	Irritable, but consolable. Response to voice.	Irritable and inconsolable. Response to Pain.	Lethargic or confused. Reduced response to voice or pain.	
Score an additional 2 points for nebulizer use, suctioning, or persistent vomiting after surgery.					
				Total	

*Retractions severity

Mild	Moderate	Severe
Subcostal or substernal.	Intercostal or supraclavicular.	Suprasternal or sternal.

Table 4: Paediatric Early Warning Score Response and Escalation.

Score	Action
0-2	Routine monitoring. Standard vital signs. Notify doctor within 1 hr.
3-5	Vitals q 1-2 hours. Notify doctor within 30 minutes.
Above 6 or single value of 3	Vitals q 15 - 30min. Notify doctor immediately.

5 Management of paediatric patients with suspected and confirmed COVID-19

An algorithm for managing paediatric patients with suspected and confirmed COVID-19 is presented in Figure 1. Following initial assessment, children should be classified as either having mild illness, non-severe pneumonia, severe pneumonia or ARDS.

5.1 Management of specific clinical syndromes in children with COVID-19

5.1.1 Mild Illness

Most children with COVID 19 will have either asymptomatic or mild disease. Children may present with fever and cough without signs of lower respiratory tract infection. These cases do not need to managed as inpatients, but require isolation to contain the spread of the virus[11]. While resources allow, patients can be admitted for monitoring or transferred to an isolation facility.

5.1.2 Non-severe pneumonia

The 2013 WHO guidelines for a child 2-59 months with respiratory symptoms classify a child with non-severe pneumonia as one with cough, difficulty breathing, lower chest indrawing and fast breathing[12]. These patients can be treated with oral amoxicillin and taken care of at home. For patients with COVID-19 in whom a superimposed bacterial pneumonia is suspected, oral amoxicillin can be given. If child is not tolerating oral antibiotics, ampicillin and gentamicin IV can be given.

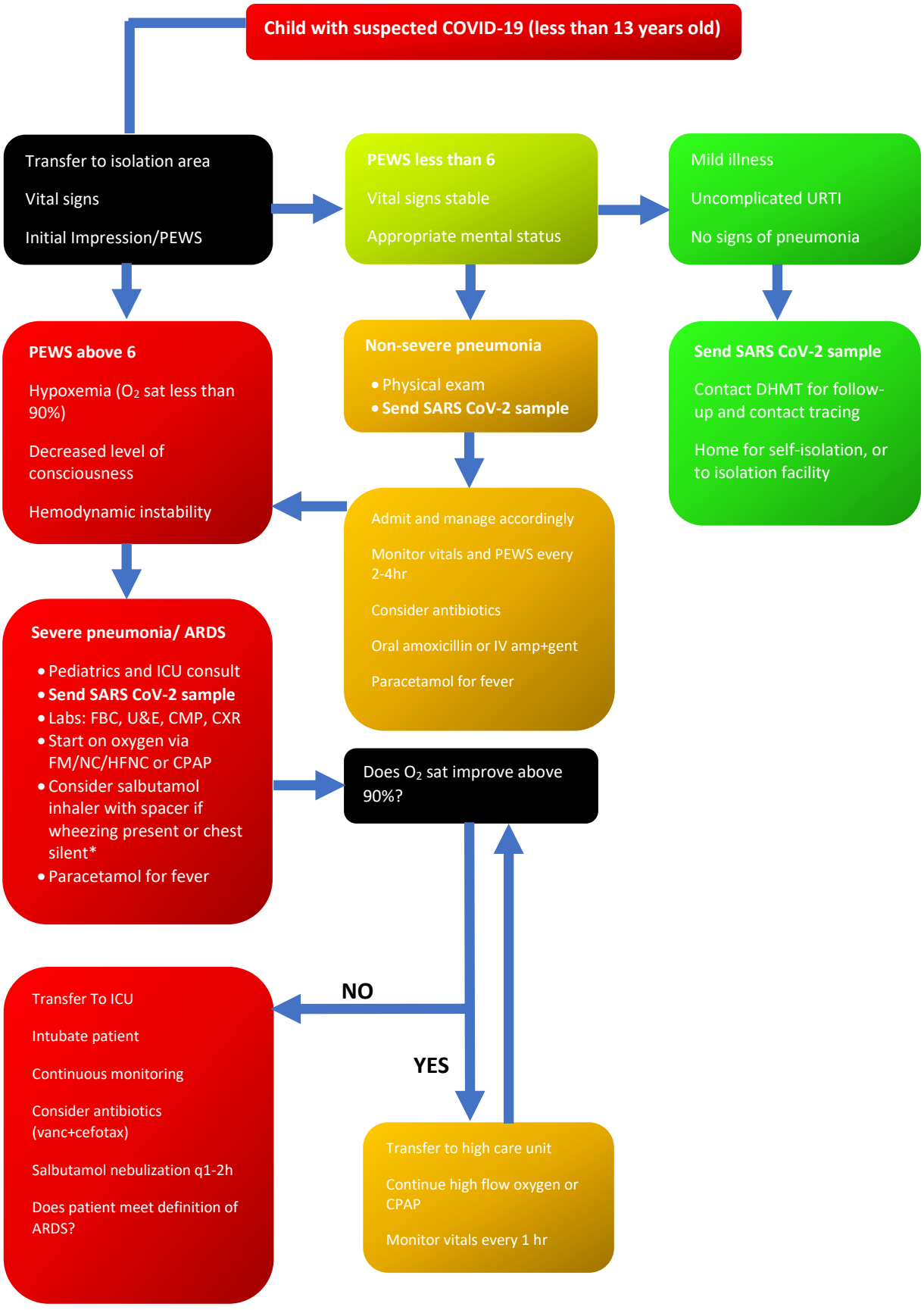

Figure 1. A colour coded algorithm for managing suspected and confirmed paediatric COVID-19 cases based on clinical severity. *Salbutamol nebulization is not an aerosol generating procedure and could be used in place of salbutamol inhaler with spacer.

5.1.3 Severe pneumonia

- The WHO guidelines define a child 2-59 months with respiratory symptoms as severe pneumonia if they have cough, difficulty breathing, and any one of[12]:
    - hypoxemia (oxygen saturation less than 90%)
    - central cyanosis
    - severe respiratory distress
    - inability to drink or breastfeed,
    - vomiting
    - altered consciousness
    - convulsions.
- These children require immediate intervention with oxygen therapy and airway management targeting oxygen saturation above 94%.
- Low flow nasal cannula or facemask can be used initially to deliver oxygen.
- Patients can be escalated to high flow nasal cannula or continuous positive airway pressure if saturations do not improve above 90%.
- **Please note that high flow nasal cannula treatment is an aerosol generating intervention and should not be used routinely for patients whose oxygen saturations can be improved with low flow nasal cannula[13].**
- Judicious use of fluid for hemodynamic instability should be considered.

5.1.4 Acute Respiratory Distress Syndrome (ARDS)

- Some children may fail standard oxygen therapy by facemask or high flow nasal cannula and experience severe hypoxemic respiratory failure caused by ARDS.
- ARDS is an acute, diffuse, inflammatory lung injury caused by diverse pulmonary and non-pulmonary etiologies[14].
- The 2015 definitions for paediatric ARDS from the Pediatric Acute Lung Injury Consensus Conference Group are summarized in Figure 2 below.
- Children with ARDS may require ventilatory support and management in an intensive care unit (ICU).
- **Endotracheal intubation should be performed by an experienced practitioner donning full PPE with airborne precautions (N95/FFP2)[11].**
- The ICU management of paediatric ARDS is summarized in Table 5 below.

Figure 2: Paediatric ARDS definition. PF ratio = PaO_2/FiO_2. SF ratio = SpO_2/FiO_2. OI = (FiO_2 x mean airway pressure x 100)/PaO_2. OSI = (FiO_2 x mean airway pressure x 100)/FiO_2.[15]

Age	Exclude patients with peri-natal related lung disease			
Timing	Within 7 days of known clinical insult			
Origin of Edema	Respiratory failure not fully explained by cardiac failure or fluid overload			
Chest Imaging	Chest imaging findings of new infiltrate(s) consistent with acute pulmonary parenchymal disease			
Oxygenation	**Non Invasive mechanical ventilation**	**Invasive mechanical ventilation**		
	PARDS (No severity stratification)	Mild	Moderate	Severe
	Full face-mask bi-level ventilation or CPAP ≥5 cm H_20 [2] PF ratio ≤ 300 SF ratio ≤ 264 [1]	4 ≤ OI < 8 5 ≤ OSI < 7.5[1]	8 ≤ OI < 16 7.5 ≤ OSI < 12.3[1]	OI ≥ 16 OSI ≥ 12.3[1]
Special Populations				
Cyanotic Heart Disease	Standard Criteria above for age, timing, origin of edema and chest imaging with an acute deterioration in oxygenation not explained by underlying cardiac disease. [3]			
Chronic Lung Disease	Standard Criteria above for age, timing, and origin of edema with chest imaging consistent with new infiltrate and acute deterioration in oxygenation from baseline which meet oxygenation criteria above.[3]			
Left Ventricular dysfunction	Standard Criteria for age, timing and origin of edema with chest imaging changes consistent with new infiltrate and acute deterioration in oxygenation which meet criteria above not explained by left ventricular dysfunction.			

Table 5: Intensive care unit (ICU) management of children with ARDS. Adapted from Paediatric Acute Respiratory Distress Syndrome: Consensus Recommendations From the Paediatric Acute Lung Injury Consensus Conference.[15]

Ventilatory Management	Endotracheal Tubes (ETT)	• Use cuffed ETTs for conventional mechanical ventilation. • Use uncuffed ETTs for High Frequency Oscillatory Ventilation (HFOV) to augment ventilation.
	Ventilatory Modes	• There is no recommended mode of conventional ventilation. • Clinicians should use whichever mode they are most comfortable with.
	Tidal volumes/Plateau pressure limitations	• Use tidal volumes of 3 - 6 ml/kg for patients with poor lung compliance. • Use tidal volumes of 5 – 8 ml/kg for patients with close to normal respiratory compliance. • Limit inspiratory plateau pressures to 28 cmH_2O. • Allow for slightly higher plateau pressures (up to 32 cmH_2O for patients with poor chest wall compliance.
	PEEP/Lung Recruitment	• Use moderately elevated PEEP (10 – 15 cmH_2O). • Higher PEEP may be needed for patients with severe ARDS. Take care to limit plateau pressures. • Monitor markers of oxygen delivery, respiratory system compliance and haemodynamic status while increasing PEEP.
	High Frequency Ventilation	• High frequency oscillatory ventilation (HFOV) may be considered in patients with moderate to severe ARDS who fail conventional mechanical ventilation strategies. • Stepwise adjustments of the airway pressure (Paw) should be made under continuous monitoring of markers of oxygenation, ventilation and haemodynamic status, to achieve optimal lung volume.
	Gas Exchange Aims	• For patients with mild ARDS requiring PEEP less than 10 cmH_2O, aim for SpO_2 between 92 – 97%. • Accept lower SpO_2 (88 – 92%) for patients requiring PEEP higher than 10 cmH_2O, after optimizing their PEEP. • Monitor central venous saturations ($S_{cv}O_2$) and markers of oxygen delivery when accepting SpO_2 less than 92%. • Use the permissive hypercapnia ventilation strategy for patients with moderate to severe ARDS. Accept pH between 7.15 – 7.30.
Non-Ventilatory Management	Sedation	• Patients should receive minimal but effective sedation to facilitate tolerance of, and achieve effective, mechanical ventilation.
	Neuromuscular blockade	• Consider neuromuscular blockade if sedation alone is inadequate to achieve effective mechanical ventilation.
	Nutrition	• All patients with ARDS should have a nutrition plan formulated in consultation with a dietitian.

		• Enteral feeds, if tolerated and not contraindicated, should be used. • Parenteral nutrition should be considered when enteral feeds are not tolerated or are contraindicated.
	Fluid Management	• Total daily fluid intake should maintain intravascular volume and end organ perfusion without compromising oxygen delivery • Enteral nutrition, when tolerated, should be used preferentially • Initial fluid resuscitation for hemodynamic instability should be isotonic fluid [Ringer's Lactate (RL) or normal saline (NS)] with goals of improving heart rate and perfusion. • Strictly monitor input and output and avoid positive fluid balance. Target urine output should be 1ml/kg/hr • Acceptable maintenance IV fluids include RL, dextrose NS, and ½-Darrows-Dextrose. These can be administered at 60-80ml/kg/day when hemodynamically stable • Maintenance fluid should be directed by renal function, electrolyte balance and fluid status.
	Transfusion	• Consider red blood cell transfusion only if haemoglobin is less than 7 mg/dL in stable patients with adequate oxygen delivery. • Consider red blood cell transfusion only if haemoglobin is less than 10 mg/dL in unstable patients with evidence of poor oxygen delivery despite optimum mechanical ventilation.

- **Extubation readiness and weaning from the ventilator:**
  - No uniform guideline is available for assessing extubation readiness. Generally, ventilator settings should be lower than prescribed in the above table, and the patient must have spontaneous breaths and be hemodynamically stable.
- **Withdrawal of care:**
  - The laws in Botswana are silent on the withdrawal of care for patients in ICU in whom care is deemed medically futile. As such, legal counsel will be sought as such matters arise, and families will be involved in all decision making in situations where continued medical intervention becomes futile.

- **Discharging patients:**
    - Discharging of patients should be based on reversal of the disease process or improvement of the underlying physiologic condition which led to ICU admission. Patients must be extubated, with patent airway, minimum oxygen requirements and stable blood gas. They must be hemodynamically and neurologically stable with no requirement for inotropic support or continuous antiseizure medications. The family should be counselled, and a plan of care clearly laid out for the medical ward[16].
- **Release from isolation:**
    - Some patients may be well enough to be discharged from hospital but still need to remain in isolation until they meet the below de-isolation criteria. These individuals may continue to be isolated at a facility or at home, dependent upon current operational guidance. For more information please refer to Guideline 5: Quarantine and Isolation.
    - Patients with confirmed COVID-19 can only be released from isolation (de-isolated) when they have two consecutive negative RT-PCR tests which were taken at least 24 hours apart. After receiving two consecutive negative tests the patient has recovered.
    - The approach to testing for recovery and de-isolation depends upon whether the patient was symptomatic with COVID-19:
        - **Asymptomatic cases** – Send first repeat test 7 days after the first positive test was collected.
        - **Symptomatic cases** – Send first repeat test at least 14 days after symptom onset and 72 hours after resolution of fever and improvement in respiratory symptoms (whichever is later).
    - On the day that a repeat test is reported, send another test that same day and continue this process until two negative results are received.
    - When a patient is de-isolated they are able to return home (if not already isolating at home) but are advised to minimise contact with other people for a further 14 days.

5.2 Important notes on management

- Suspected COVID-19 patients' beds should be at least 2 m apart.
- Perform appropriate hand hygiene before, after and in-between patient contact.
- Ideally, no visitors should be allowed.

- Caregivers (one parent) allowed with face masks and instructed on hand hygiene and social distancing**.**

6 Neonatal Health in the COVID-19 Era

6.1 COVID-19 among neonates

Reports of COVID-19 among neonates are rare. One cohort study of 33 neonates born to mothers with confirmed COVID-19, reported that 3 neonates experienced symptomatic COVID-19. One neonate was seriously ill, likely due to concurrent prematurity, asphyxia, and sepsis, rather than SARS-CoV-2 infection[17].

6.2 Attending deliveries of mothers with suspected/confirmed COVID-19

- There should be one designated doctor and/or midwife assigned to attend to the newborn at deliveries of suspected or confirmed COVID-19 patients per shift[18].
- Use of PPE for contact, droplet and airborne precautions is mandatory during delivery and the post-partum period of mothers who are COVID-19 suspects or confirmed cases[19].
- Where neonatal resuscitation is required or anticipated, PPE for contact, droplet and airborne precautions should be worn[20,21]. Neonatal resuscitation includes aerosol generating procedures such as,
    - Suction: **DO NOT** routinely suction the airway of newly-born infants with clear or meconium stained amniotic fluid[21].
    - Endotracheal medication administration: Avoid endotracheal administration of adrenaline. Administer via an umbilical venous catheter[21].
- Newborns requiring respiratory support should be transferred to the NICU and cared for in a closed incubator[18,21].

6.3 Disposition of neonates after delivery

6.3.1 Testing of infants born to mothers with COVID-19

- Vertical transmission of SARS-CoV-2 from maternal infection during pregnancy is thought not to occur, or be very unlikely[26].

- All infants born to women with probable or confirmed COVID-19 should undergo PCR testing of nasopharyngeal and oropharyngeal samples within 24 hours of life[22,24.]
- PCR testing should be repeated at 48 to 72 hours of life if the initial sample was negative[22,24].
- Infants who initially test positive should have follow-up PCR testing at 72-hour intervals until there are two consecutive negative tests[24].

6.3.2 Well babies

- Well term or preterm babies weighing more than 1800 grams who require minimal or no additional care should remain with their mothers, in accordance with local guidelines.
- Mother and baby should be in a separate isolation room/area[22].
- Mothers should practice respiratory and hand hygiene by wearing a mask and washing their hands with water and soap frequently.
- Sick mothers should be assisted by midwives in caring for their babies[23].

6.3.3 Sick babies

- Neonates requiring admission should be assessed by a doctor (wearing appropriate PPE) to determine the required level of care[18].
- There should be a designated area where neonates requiring admission (whether from the labour ward, home, or a referring facility) will be assessed.

6.4 Inpatient Management

- Infants of mothers with suspected or confirmed COVID-19 should be managed as a cohort in a separate isolation area[22], with 2 meters between cots[24].
- Clinical investigations and procedures should be minimised in consultation with the paediatrician, while maintaining standards of care[18].
- Newborns requiring respiratory support should be cared for in a closed incubator[18,21] or in separate isolation rooms[22].
- Unnecessary endotracheal suction should be avoided, and where available, in-line suction of endotracheal tubes should be used[18].

- PPE that includes airborne precautions should be worn wherever aerosol generating procedures and therapies are given, including endotracheal intubation and suctioning, CPAP, nebulizer treatments, and high flow oxygen[18,20,22].

6.5 Breastfeeding

- SARS-CoV-2 has not yet been detected in the breastmilk of confirmed COVID-19 patients[25].
- Women should be encouraged to continue breastfeeding if they wish to do so, while practising respiratory hygiene and wearing a face mask[23].
- Women who are too unwell to care for their babies should be assisted to express breastmilk[23,24].

References

1. Choi, S.-H., Kim, H. W., Kang, J.-M., Kim, D. H. & Cho, E. Y. Epidemiology and Clinical Features of Coronavirus disease 2019 in Children. *Clin. Exp. Pediatr.* (2020) doi:10.3345/cep.2020.00535.
2. Bialek, S. *et al.* Coronavirus Disease 2019 in Children — United States, February 12–April 2, 2020. *MMWR. Morb. Mortal. Wkly. Rep.* **69**, 422–426 (2020).
3. Wu, Z. & McGoogan, J. M. Characteristics of and Important Lessons from the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72314 Cases from the Chinese Center for Disease Control and Prevention. *JAMA - J. Am. Med. Assoc.* **323**, 1239–1242 (2020).
4. Dong, Y. *et al.* Epidemiological Characteristics of 2143 Pediatric Patients With 2019 Coronavirus Disease in China. *Pediatrics* e20200702 (2020) doi:10.1542/peds.2020-0702.
5. Lu, X. *et al.* SARS-CoV-2 Infection in Children. *N. Engl. J. Med.* (2020) doi:10.1056/nejmc2005073.
6. Balduzzi, A. *et al.* Lessons After the Early Management of the COVID-19 Outbreak in a Pediatric Transplant and Hemato-Oncology Center Embedded within a COVID-19 Dedicated Hospital in Lombardia, Italy. *Estote Parati.* (Be Ready.). *SSRN Electron. J.* (2020) doi:10.2139/ssrn.3559560.
7. Kelvin, A. A. & Halperin, S. COVID-19 in children: the link in the transmission chain. *Lancet Infect. Dis.* **0**, (2020).
8. Qiu, H. *et al.* Clinical and epidemiological features of 36 children with coronavirus disease 2019 (COVID-19) in Zhejiang, China: an observational cohort study. *Lancet Infect. Dis.* **0**, (2020).
9. WHO. World Health Organization. *Global Surveillance for human infection with coronavirus disease (COVID-19)*. *Interim Guidance* (2020).
10. Gold, D. L., Mihalov, L. K. & Cohen, D. M. Evaluating the pediatric early warning score (PEWS) system for admitted patients in the pediatric emergency department. *Acad. Emerg. Med.* **21**, 1249–1256 (2014).
11. WHO. *Clinical management of severe acute respiratory infection when COVID-19 is suspected (v1.2)*. (WHO Press, 2020).
12. WHO. *Revised WHO Classification and Treatment of Childhood Pneumonia at Health Facilities: Evidence Summaries*. *World Health Organization* (WHO Press, 2014).
13. Tran, K., Cimon, K., Severn, M., Pessoa-Silva, C. L. & Conly, J. Aerosol Generating Procedures and Risk of Transmission of Acute Respiratory Infections to Healthcare Workers: A Systematic Review. *PLoS One* **7**, e35797 (2012).
14. Purohit, P. Pediatric Acute Respiratory Distress Syndrome: Practice Essentials, Background, Pathophysiology. https://emedicine.medscape.com/article/803573-overview.
15. Jouvet, P. *et al.* Pediatric Acute Respiratory Distress Syndrome: Consensus Recommendations from the Pediatric Acute Lung Injury Consensus Conference. in *Pediatric Critical Care Medicine* vol. 16 428–439 (Lippincott Williams and Wilkins, 2015).

16. Schaeffer, H. A. *et al.* Guidelines for developing admission and discharge policies for the pediatric intensive care unit. *Pediatrics* vol. 103 840–842 (1999).
17. Zeng, L. *et al.* Neonatal Early-Onset Infection with SARS-CoV-2 in 33 Neonates Born to Mothers with COVID-19 in Wuhan, China. *JAMA Pediatrics* (2020) doi:10.1001/jamapediatrics.2020.0878.
18. COVID-19 - guidance for neonatal settings | RCPCH. https://www.rcpch.ac.uk/resources/covid-19-guidance-neonatal-settings.
19. Poon, L. C. *et al.* Global interim guidance on coronavirus disease 2019 (COVID-19) during pregnancy and puerperium from FIGO and allied partners: Information for healthcare professionals. *Int. J. Gynecol. Obstet.* (2020) doi:10.1002/ijgo.13156.
20. World Health Organization (WHO). Rational use of personal protective equipment for coronavirus disease 2019 (COVID-19). *Who* **2019**, 1–7 (2020).
21. Edelson, D. P. *et al.* Interim Guidance for Basic and Advanced Life Support in Adults, Children, and Neonates With Suspected or Confirmed COVID-19: From the Emergency Cardiovascular Care Committee and Get With the Guidelines®-Resuscitation Adult and Pediatric Task Forces of the. *Circulation* (2020) doi:10.1161/CIRCULATIONAHA.120.047463.
22. Chawla, D. *et al.* Perinatal-Neonatal Management of COVID-19 Infection - Guidelines of the Federation of Obstetric and Gynecological Societies of India (FOGSI), National Neonatology Forum of India (NNF), and Indian Academy of Pediatrics (IAP). *Indian Pediatr.* (2020).
23. Q&A on COVID-19, pregnancy, childbirth and breastfeeding. https://www.who.int/news-room/q-a-detail/q-a-on-covid-19-pregnancy-childbirth-and-breastfeeding.
24. Karen M. Puopolo, M.D. Ph.D., Mark L. Hudak, M.D., David W. Kimberlin, M.D., James Cummings, M. D. INITIAL GUIDANCE: Management of Infants Born to Mothers with COVID-19. *Am. Acad. Pediatr. Comm. Fetus Newborn, Sect. Neonatal Perinat. Med. Comm. Infect. Dis.* 1–13 (2020).
25. Huang, C. *et al.* Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* **395**, 497–506 (2020).
26. Mimouni, F. *et al.* Perinatal aspects on the covid-19 pandemic: a practical resource for perinatal-neonatal specialists. *J. Perinatol.* **40**, 820–826 (2020).