CLINICAL MANAGEMENT OF SUSPECTED OR CONFIRMED COVID-19 / SARS-CoV-2 INFECTION IN CHILDREN IN THE WESTERN CAPE

Version 2: 27/07/2020

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Acknowledgement: This guideline was originally adapted from the KZN DOH provincial plan for the management of children with COVID-19

OUTLINE:

1. Introduction & epidemiology
2. Challenges
3. Clinical manifestations (including laboratory & imaging features)
4. Case definition
5. Testing for SARS-CoV-2
6. Case classification & disease severity
7. Organisation of health care facilities for children with suspected & confirmed COVID-19
8. Emergency medical services (EMS) transport of suspected & confirmed COVID-19 paediatric & neonatal patients
9. Management of suspected & confirmed cases
10. Personal protective equipment
11. De-isolation
12. Appendices 1-7

1. INTRODUCTION & EPIDEMIOLOGY

Our current understanding of the SARS-CoV-2 infection resulting in coronavirus disease-2019 (COVID-19) is that the vast majority of individuals with severe disease that need hospitalization and intensive care are adults. The Department of Health's response is focused on preventing primary infection and strengthening adult and critical care services. The evidence regarding the disease in children is rapidly evolving. Children have accounted for less disease and less disease severity compared to adults but asymptomatic or mildly symptomatic children are likely to contribute to transmission of infection to others.

Clinicians and policymakers working with children must support this effort to expand adult healthcare services but, in addition, we need to make adequate provision for the care of SARS-CoV-2 exposed and infected newborn babies and children while maintaining optimal routine care for all children.

- Children account for far fewer persons diagnosed with SARS-CoV-2 infection than adults:
  - Up until 7 June 2020, 6% of laboratory-confirmed cases notified in SA were <18 years of age (median age 11.4 years, interquartile range 5.7-15.6 years).

- Children have less severe COVID-19 than adults:
  - The majority of children are either asymptomatic or have mild disease
  - Up until 7 June 2020, individuals <18 years of age accounted for 3.3% (230/6353) of hospitalisations in SA although with significant variation between provinces.
  - Up until 19 June 2020, only 4 individuals <20 years of age are reported to have been admitted to an intensive care unit in the Western Cape
  - Deaths are rare
  - A paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 infection (PIMS-TS), also known as multisystem inflammatory syndrome in children (MIS-C), and including severe Kawasaki-like disease, toxic shock syndrome or mycocarditis, has been described.

- Children appear to be predominantly infected at home and early post-partum mother-to-child transmission can occur
  - The majority of infected children report a household contact

Plans for the management of COVID-19 in children therefore need to provide guidance on inpatient outpatient, intensive care management and transport of:

- babies born to mothers with COVID-19 or asymptomatic SARS-CoV-2 infection
- children with suspected COVID-19
- children with confirmed COVID-19 / SARS-CoV-2 infection
- children living with adults with COVID-19 / SARS-CoV-2 infection

2. CHALLENGES

There are at least 5 significant challenges in developing a response to COVID-19 in children:

1. Unknown number of infected children: there is no certainty regarding how many children will be infected or, more importantly, how many will have moderate or severe disease requiring admission to hospital or critical care services. Services therefore need to be developed with the worst-case scenario in mind.

2. Delay in diagnostic confirmation of COVID-19: There is both limited laboratory capacity and a substantial turnaround time to receive the results, this time may increase significantly for rural

hospital where delays in delivering specimens may contribute further to this lag. A significant number of children with suspected infection will need to be managed as though they are infected.

3. Emergency Medical Services (EMS): There are a finite number of ambulances with a limited capacity to transport children between healthcare facilities. In addition, children with COVID-19 may present particular infection prevention and control challenges to EMS. Services to manage COVID-19 in children need to be created in all healthcare facilities and EMS capacity should be reserved for the transfer of sicker children to higher levels of care.

4. Home isolation: The living circumstances of most children in the province are poor and the ability to implement safe or effective home isolation is extremely limited. As a result, a large proportion of children with suspected, asymptomatic or mild disease will not be able to self-isolate at home and provincial health departments will need to create safe spaces for families to self-isolate together.

5. Imminent seasonal respiratory syncytial virus (RSV) and influenza: Winter is associated with RSV and influenza season amongst children. Increased admission rates for lower respiratory tract infection due to one or both of these organisms is likely to increase the requirement for COVID-19 testing.

3. CLINICAL MANIFESTATIONS (INCLUDING LABORATORY & IMAGING FEATURES)

- **Clinical pattern**
  - May be asymptomatic.
  - General features: fever, poor feeding, fatigue, headache.
  - Respiratory features: pharyngitis, cough, rhinitis, shortness of breath.
  - Gastrointestinal features: diarrhoea, vomiting.

  - **Unusual presentations (not fulfilling the NICD COVID-19 case definition):**
    Paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 infection (PIMS-TS) / multisystem inflammatory syndrome in children (MIS-C) may manifest several weeks following diagnosed or undiagnosed SARS-CoV-2 infection. Symptoms and signs include persistent fever, abdominal pain, confusion, conjunctivitis, cough, diarrhoea, headache, lymphadenopathy, mucous membrane changes, neck swelling, rash, respiratory symptoms, sore throat, swollen hands and feet, syncope, vomiting. Hypotension and an oxygen requirement may be present

- **Special investigations**
  Special investigations and imaging should not be done if there is no specific indication, particularly in mild disease. In moderate and severe disease, investigations to identify or exclude alternative causes of respiratory illness may be needed and include, but are not limited to, respiratory viral PCR panel, blood culture, HIV testing, GeneXpert and culture for TB.

Full blood count & differential count	White cell count & differential count	normal or reduced with reduced neutrophil & lymphocyte counts

	Platelet count	may be reduced
Inflammatory biomarkers	CRP	normal / low except in severe disease
	PCT	normal / low
Liver enzymes	LDH	may be abnormal in severe disease
Clotting	D-dimers	increased in severe disease
Imaging	Chest X-ray	bilateral patchy nodular / speckled ground-glass opacities

In children with symptoms and signs compatible with PIMS-TS, special investigations include:

- Imaging and ECG: chest X-ray (patchy symmetrical infiltrates, pleural effusion), abdominal ultrasound (colitis, ileitis, lymphadenopathy, ascites, hepatosplenomegaly), echocardiogram (myocarditis, valvulitis, pericardial effusion, coronary artery dilatation), ECG, CT chest
- Laboratory: Commonly - abnormal fibrinogen, absence of other potential causative organisms, high CRP, high D-Dimers, high ferritin, hypoalbuminaemia, lymphopaenia, neutrophilia. In some patients – acute kidney injury, anaemia, coagulopathy, proteinuria, raised CK, raised LDH, raised triglycerides, raised troponin, thrombocytopaenia, transaminitis

4. CASE DEFINITION

Clinical case definitions of COVID-19 were initially developed for the purposes of deciding who should be tested and have changed over time as the epidemic has progressed. Children have frequently been diagnosed with SARS-CoV-2 infection despite meeting few or none of the clinical criteria in the suspected COVID-19 case definition which is largely based on the presenting features in adults.

Suspected COVID-19 case definition (NICD, 25 May 2020):

Any person presenting with **an acute** (≤14 days) **respiratory tract infection** or other clinical illness compatible with COVID-19, or an asymptomatic person who is a close contact[1] of a confirmed case[2].

- Symptoms include ANY of the following respiratory symptoms: cough, sore throat, shortness of breath, anosmia (loss of sense of smell) or dysgeusia (alteration of the sense of taste), with or without other symptoms (which may include fever, weakness, myalgia, or diarrhoea)
- **Note:** asymptomatic close contacts should not be routinely tested despite meeting the suspected case definition. However, testing may be indicated in certain circumstances (e.g. institutions such as care homes)

[1] Close contact: A person having had face-to-face contact (≤1 metre) or been in a closed space with a confirmed case for at least 15 minutes. This includes, amongst others, all persons living in the same household as a case, and people working closely in the same environment as a case. Healthcare workers or other people providing direct care for a case, while not wearing recommended personal protective equipment or PPE (e.g. gowns, gloves, N95 respirator, eye protection). A contact in an aircraft sitting within two seats (in any direction) of the case, ravel companions or persons providing care, and crew members serving in the section of the aircraft where the case was seated.

[2] Confirmed case: a person with laboratory confirmation of SARS-CoV-2 infection (using RT-PCR assay), irrespective of clinical signs and symptoms. Symptomatic cases are considered infectious from 2-3 days before symptom onset to 14 days after symptom onset.

More recently, the W Cape moved to a targeted testing policy mostly as a result of constrained laboratory testing capacity, focusing on high-risk symptomatic individuals, patients requiring admission to hospital, and healthcare workers who are symptomatic and/or have close contact with a confirmed COVID-19 case. Laboratory testing turnaround times have subsequently improved.

Case definitions of the paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 (PIMS-TS) / multisystem inflammatory syndrome in children (MIS-C) have been developed by WHO, CDC and the Royal College of Paediatrics and Child Health in the United Kingdom.

The NICD has included PIMS-TS/MIS-C as a notifiable medical condition (NMC) using a modified version of the WHO preliminary case definition:

All 6 criteria must be met:

1. Age 0 to 19 years
2. Fever for ≥3 days
3. Clinical signs of multisystem involvement (**at least 2** of the following):
   - Rash, bilateral non-purulent conjunctivitis, or mucocutaneous inflammation signs (oral, hands, or feet),
   - Hypotension or shock,
   - Cardiac dysfunction, pericarditis, valvulitis, or coronary abnormalities (including echocardiographic findings or elevated troponin/BNP),
   - Evidence of coagulopathy (prolonged PT or PTT; elevated D-dimer),
   - Acute gastrointestinal symptoms (diarrhea, vomiting, or abdominal pain
4. Elevated markers of inflammation (e.g., ESR, CRP, or procalcitonin)
5. No other obvious microbial cause of inflammation, including bacterial sepsis and staphylococcal/streptococcal toxic shock syndromes
6. Evidence of SARS-CoV-2 infection
   Any of the following:
   - Positive SARS-CoV-2 RT-PCR;
   - Positive serology;
   - Positive antigen test;
   - Contact with an individual with COVID-19

The WHO preliminary case definition is available via:
https://www.who.int/publications/i/item/multisystem-inflammatory-syndrome-in-children-and-adolescents-with-covid-19

A provincial consensus PIMS-TS/MIS-C guideline including clinical features and proposed management to be discussed with is available via the following link:
https://docs.google.com/document/d/1N0dZi6UBpwWhWkpBBL9sMPU8SilKwLFvxiNqhLV5Zsc/edit?usp=sharing. Cases should be discussed with a paediatric rheumatologist, immunologist or infectious diseases specialist.

5. TESTING FOR SARS-CoV-2

The testing strategy within regions will vary according to the stage of the pandemic and laboratory testing capacity.

Refer to **Appendix 1** for details on collection of various respiratory samples used for testing, transportation of samples to the virology laboratory and forms that must be completed and accompany the sample to the virology laboratory.

It is essential that the person collecting respiratory samples makes use of appropriate personal protective equipment (PPE) and has been trained in the correct process for putting on ("donning") and taking off ("doffing") PPE. Refer to **Appendix 2** for details, including a video demonstration link.

6. CASE CLASSIFICATION AND DISEASE SEVERITY OF RESIRATORY DISEASE

Simplistically, there are six categories of children infected or affected by COVID-19:

1. Uninfected
2. Suspected infection
3. Newborns of SARS-CoV-2 infected mothers (suspected or confirmed)
4. Asymptomatic / mild disease
5. Moderate disease
6. Severe disease.
7. COVID-19-associated inflammatory illnesses

Table 1. Criteria for the classification of the severity of respiratory disease (not all criteria are required in order to be classified in a certain category)

	Mild	**Moderate**	**Severe**
Mental status	Normal	Restless	Irritable/lethargic
Feeding	Finishes feed	Does not finish feed	Unable to feed
Talking	Full sentence	Interrupted sentence	Unable to talk
Respiratory rate (breaths/min)	<40 if under 1yr <30 if 1 – 5 years <20 if over 5 years	40-60 if under 2 months 40-50 if 2 – 12 months 30-40 if 1 – 5 year 20-30 if over 5 years	>60 if under 2 months >50 if 2 – 12 months >40 if 1 – 5 year >30 if over 5 years
Respiratory signs	No distress	Lower chest wall indrawing	Grunting and/or severe lower chest wall indrawing
Pulse oximetry	≥92% in room air	<92% in room air	<92% in room air Central cyanosis

Visualisation of the upper airway (routine ENT examination) should be avoided, and if required (e.g. upper airway obstruction suspected to be due to adeno-tonsillar hypertrophy or suppurative conditions including retropharyngeal or peritonsillar abscess) should preferably be performed by an ENT specialist or senior paediatric staff member with full PPE including a N95 respirator and eye protection (Refer to **Appendix 2**).

Information on the classification and disease severity of COVID-19-associated inflammatory illnesses is available via the following link to a provincial consensus guideline: https://docs.google.com/document/d/1N0dZi6UBpwWhWkpBBL9sMPU8SilKwLFvxiNqhLV5Zsc/edit?usp=sharing

7. ORGANISATION OF HEALTH CARE FACILITIES FOR CHILDREN WITH SUSPECTED & CONFIRMED COVID-19

SARS-CoV-2 can spread in the healthcare setting affecting other patients, adult caregivers and staff. It is important to provide daily screening of staff and adult caregivers who are in hospital with any child with a COVID-19 symptom questionnaire and temperature screen using a thermal scan. Adults accompanying children with COVID-19 should preferably not be elderly or have significant co-morbid illness.

In order to prevent hospital transmission patients should be isolated and cohorted and PPE used appropriately. Refer to Appendix 3 for an overall management algorithm taking account cohorting and severity of disease.

As there are three broad groups of children, each hospital needs to create THREE in-patient areas, one for each category:

1. **Non-COVID-19 children**
2. **Suspected COVID-19 children (patients under investigation, PUI's)**
3. **Confirmed COVID-19 children**

Surveillance testing: when community transmission is widespread, surveillance testing of all pre-surgical or all hospital admissions may occur. Consider allocation of an area for children whose status is not known yet, and who are not suspected cases, within non-COVID areas (separate from areas of other PUI's/suspected cases to avoid risk of transmission).

Each area needs to be totally separate and enclosed with its own equipment and staff. Ablutions should ideally be separate, or bed pans used if separation is not possible.

Where children and adults will be screened and/or PUI's cohorted together in the same area, provision should be made for appropriate paediatric emergency equipment and staffing in the screening area. Consideration should also be given to the provision of high-care for very sick children that could be in any of the three categories (i.e. hospitals providing high-care to children will need to have high-care beds in each of the three categories).

Options for creating three areas include:

- Dedicated cubicles in a children's ward – if the ward has cubicles.
- Dedicated children's wards – if the hospital has 2 or more children's wards.
  If there are 2 children's ward it is suggested that one is used as a non COVID-19 ward and the other as a COVID-19 ward split into two sections – suspected and confirmed.
- Dedicated hospital COVID-19 wards for both adults and children

In this circumstance it is important that:

- Children are preferably placed IN THE SAME ROOM AS A PARENT in a female ward or
- Are accommodated together in a single cubicle/corner/section of the ward.

The relative size and number of beds in each area will change as the South African epidemic evolves. The preferred option will therefore be dictated by the structures of the facility and the number of children needing accommodation.

In light of the imminent RSV and influenza season the number of suspected paediatric cases is expected to be high and any impulse to use underutilized children's wards for adult services should be avoided.

1. **Uninfected**

   Children requiring admission for any non-respiratory illness MUST be kept apart from children with suspected or confirmed SARS-CoV-2 infection unless they have a strong epidemiological risk factor e.g. close contact of a confirmed COVID-19 case, in which case they may be an asymptomatic carrier and should be cohorted separately or with other PUIs.

2. **Suspected infection (PUI)**

   Every child with an acute respiratory infection;
   Apply a face cover, preferably a surgical mask, to the child and caregiver to cover the nose and mouth;
   Place in an isolation room / separate area in OPD / A&E. If none is available keep apart from other patients;
   Assess severity of disease (mild, moderate or severe as per Table 1 above);
   Test for SARS-CoV-2 infection – wearing PPE and with appropriate precautions (Refer to **Appendices 1 and 2**);
   Manage according to severity of disease and level of health care system (**Appendices 3 and 4**):

   - Asymptomatic or mild disease can self-isolate at home when home circumstances allow, if not then they must be admitted to the "suspected COVID-19" area in the children's ward.
   - Children with moderate or severe disease need to be admitted to the "suspected COVID-19" area of the children's ward.
   - If the child needs transferring to another facility for further investigation or care – see Emergency Medical Services (EMS) Section 8

   Systems must be established to fast-track the processing of tests by the laboratory of hospitalized children with suspected COVID-19.

   Make sure that arrangements are made to check results and provide these to the child's family.

   - Children with confirmed SARS-CoV-2 infection can be moved to the "confirmed COVID-19" area.

- Children who test negative for COVID-19 may have been infected during their stay in hospital. If any child with whom they were cohorted had a positive COVID-19 test or test results are outstanding, then they:
    - Must remain in the "suspected COVID-19 / PUI" area of the ward until discharge.
    - On discharge, must be quarantined for two weeks and perform self-monitoring within their household

3. Newborn babies born to SARS-CoV-2 infected women (suspected or confirmed infection)

Provision must be made in the maternity unit and nursery for the care of pregnant women with COVID-19 and their babies. Nurseries should screen mothers for symptoms. Access to the nursery MUST be restricted and the following people must be excluded: all visitors and non-nursery staff. Mothers with COVID-19 must be accommodated in a safe area. The safety of EMS staff performing transfers of mothers and babies must also be considered and they must be informed about the COVID-19 status of the mother and baby.

There are 3 scenarios that hospitals must prepare for:

- **Delivery and resuscitation;**
- **Well baby of mother with suspected or confirmed COVID-19;**
- **Sick or small baby of mothers with COVID-19**

1. Delivery and resuscitation

Maternity units must establish a dedicated delivery room / suite with a neonatal resuscitaire, access to oxygen (wall outlet or cylinder) and vacuum (wall outlet or portable) and neonatal resuscitation pack including commonly used resuscitation equipment and a pulse oximeter.

Deliveries that are high-risk for obstetric reasons, should be attended by a senior clinician wearing appropriate PPE (Refer to **Appendix 2**). Management of the baby should be in line with normal neonatal care. The first examination should occur in the delivery room / suite. If the baby needs to be moved to any other unit in the hospital this MUST be done with the baby in a closed incubator.

2. Well baby

All well babies MUST remain with their mother. If mom is unable to care for the baby, he/she should room-in in a closed incubator. Breast feeding is safe and must be encouraged.
Mom must wear a face cover, preferably surgical mask, and follow strict hand hygiene when holding or feeding her baby.

When it is not possible for the baby to remain with his/her mother they should be admitted to a closed incubator in a side ward of the nursery and treated as an infected individual with appropriate staff PPE.

Well babies do NOT require routine COVID-19 tests.

Baby should be discharged as soon as possible – preferably with mom but if this is not possible then to a family member.

3. Sick or small baby

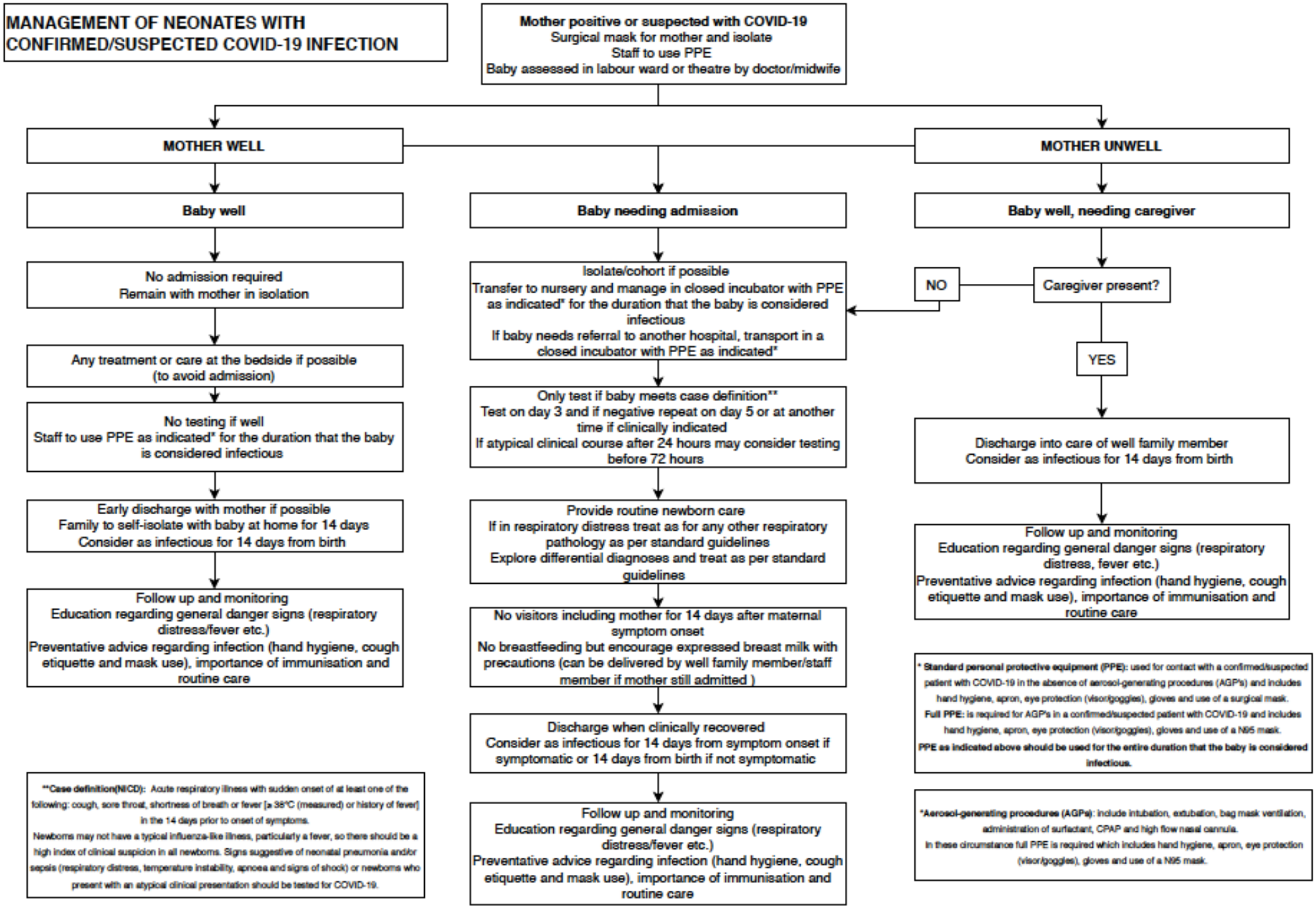
Avoid admission to the nursery as far as possible so try to give routine additional care (IVI, antibiotics, observations) in the postnatal ward, in a separate room.

If this is not possible then the baby must be treated as an infected individual:

- Admitted to an isolation cubicle, side ward or smallest cubicle in the nursery;
- If the baby and/or mother need to be transferred to another facility, refer to the EMS section for guidance on how to book and prepare for transfer.
- Perform COVID-19 testing for all sick newborns at 72 hours of age (Refer to **Appendix 1**);
- Nursed in a closed incubator at ALL times;
- Designated staff must attend to the baby and they MUST wear PPE at all times (Refer to **Appendix 2**).

Neonatal management, discharge and follow up must be in line with normal protocols.

MANAGEMENT OF NEONATES WITH CONFIRMED/SUSPECTED COVID-19 INFECTION



**Case definition(NICD): Acute respiratory illness with sudden onset of at least one of the following: cough, sore throat, shortness of breath or fever [≥ 38°C (measured) or history of fever] in the 14 days prior to onset of symptoms.
Newborns may not have a typical influenza-like illness, particularly a fever, so there should be a high index of clinical suspicion in all newborns. Signs suggestive of neonatal pneumonia and/or sepsis (respiratory distress, temperature instability, apnoea and signs of shock) or newborns who present with an atypical clinical presentation should be tested for COVID-19.

* **Standard personal protective equipment (PPE):** used for contact with a confirmed/suspected patient with COVID-19 in the absence of aerosol-generating procedures (AGP's) and includes hand hygiene, apron, eye protection (visor/goggles), gloves and use of a surgical mask.
Full PPE: is required for AGP's in a confirmed/suspected patient with COVID-19 and includes hand hygiene, apron, eye protection (visor/goggles), gloves and use of a N95 mask.
PPE as indicated above should be used for the entire duration that the baby is considered infectious.

*Aerosol-generating procedures (AGPs): include intubation, extubation, bag mask ventilation, administration of surfactant, CPAP and high flow nasal cannula.
In these circumstance full PPE is required which includes hand hygiene, apron, eye protection (visor/goggles), gloves and use of a N95 mask.

8. EMERGENCY MEDICAL SERVICES (EMS) TRANSPORT OF SUSPECTED & CONFIRMED COVID-19 PAEDIATRIC & NEONATAL PATIENTS

- **Stable patients 021-937-0500 (normal operational ambulance)**
- **Critically ill patients 021-937-0300 (SPRINT) – all intubated, CPAP, severe cases**

Booking transport – 5-Step Process

When booking transport give EMS control centre the following information:

1. Tell them clearly that the child is a confirmed or suspected Covid-19 patient
2. State if the parent or carer who is accompanying the child is also a confirmed or suspected Covid-19 person
3. Classify into:
    a. Clinically stable – will not require interventions during transport
    b. Clinically unstable – may require interventions during transport

    If you are unsure of how to classify – please discuss with the EMS control centre staff – this may result in a discussion with the EMS doctor on call – who will ascertain risk-level based on potential interventions required during transport
4. Advise of medical equipment requirements e.g. oxygen, route of administration of oxygen, monitoring, syringe driver, infusion pumps, incubator, CPAP, ventilator etc.
5. Give the name and mobile phone number of the healthcare contact person at the facility, who will be able to answer any further questions EMS may have, and who will be notified of arrival time of EMS crew

Receiving EMS & escorting them out of the facility

- Parking must be cleared at the nearest entrance to the patient location
- Ensure the route to & from the patient location is cleared of obstacles
- If a lift is needed to get to the patient – have someone hold the lift and clear other people from the lift area

Preparing the patient & carer

- Patient must be wearing patient ID bracelet
- Place a facemask (or other suitable covering) over the nose and mouth of the patient
- Carer should be informed that EMS in full PPE will be transporting the child
- Carer must be given a facemask to wear during transport
- Ensure all the patient paperwork is ready to go – including referral letter & results
- Have any infusions needed drawn up – with labels on syringes detailing contents and concentration. In addition, please ensure the details (drug name, how many micrograms/milligrams/grams , volume of diluent) of all infusions needed during transfer, are clearly documented in the transfer letter
- If on CPAP place a HME filter on the expiratory limb of the circuit
- If a HME filter has been used on a self-inflating bag, during intubation or resuscitation, for this patient then give the HME filter to EMS to put on their bag

Preparing the receiving facility

- Whenever possible, the receiving facility should have advance warning of the patient's arrival, and should be ready to direct the patient straight to the suspected COVID-19 testing area or suspected/confirmed COVID-19 ward

9. MANAGEMENT OF SUSPECTED AND CONFIRMED CASES

Appropriate supportive management, especially oxygen, improves the outcome of all children with pneumonia. Prompt recognition of pneumonia and supportive care as well as testing for SARS-CoV-2 will allow for appropriate additional care and improve guidance on self-isolation and appropriate use of PPE to ensure staff safety. If the patient needs to be transferred to another facility, refer to the EMS section for guidance on how to book and prepare for transfer.

Mild disease

1. Home care and self-isolation for all children is preferred but if not possible, alternatives outside of the hospital should be considered and as a last resort hospitalization
   Requirements for self-isolation at home include:
   - The whole household should self-isolate
   - Household must practice strict hand hygiene;
   - All high-touch surfaces should be cleaned frequently – at least twice a day
   - Child must be assisted to cover coughing and sneezing
   - Cloth masks should be worn by all family members
   - Child must have own / dedicated household items (cup; eating utensils)
   - Other children and adults must keep a distance of 1.5-2 metres as much as possible, if possible, use a separate bedroom
   - Use the bathroom last after everyone else, and the toilet (including the outside of the toilet) should be cleaned after use. Flush toilet with the lid down, if possible, use a separate bathroom

2. Supportive care / symptomatic treatment:
   Paracetamol for symptomatic relief of fever or pain rather than nonsteroidal anti-inflammatory drugs (NSAIDs)
   Maintenance fluids and feeds with additional oral rehydration solution (ORS) if child has diarrhoea.
   If necessary, use a metered-dose inhaler (MDI) with a spacer to provide B2-agonists.

3. Caregiver must be given:
   Appropriate information so that they can detect deterioration in the condition of their child;
   Details of whom to contact / how to respond should the child's condition deteriorate;
   A patient information sheet on home care and preventing transmission of SARS-CoV-2 (**Appendix 6**).

Moderate disease

Children with moderate disease MUST be admitted for in-patient care.

1. Supportive care:

Monitor 3 - 4 hourly for respiratory deterioration; reduce frequency once child improving.
Supplementary oxygen using nasal prong oxygen at 1-2 L/min to keep SpO_2 >92%.

Progress as required from nasal cannula to face mask to face mask with reservoir bag.
If unable to keep SpO_2 > 92% on face mask with reservoir bag re-classify as severe and contact the designated nearest paediatric high-care unit (HCU) or paediatric intensive care unit (PICU).

Maintenance intravenous fluids: 5% dextrose / 0.9% saline at two-thirds of normal requirements.
Normal maintenance fluids and feeds with additional ORS if child has diarrhoea.
Provide symptomatic relief with paracetamol.
If wheezing, provide B2-agonist with an MDI and spacer, assess response, stop if not responding

2. Procedures / interventions

Try to minimise procedures or interventions that may result in crying or coughing which may increase aerosolization of respiratory secretions. Where possible, try to bundle procedures together e.g. insert nasogastric tube, intravenous cannula and take blood samples at same time as taking respiratory samples for COVID-19 testing while using appropriate PPE (**Appendix 2**). Blood tests only as needed, including arterial blood gases. Capillary gases and pulse oximetry can be used to monitor severity. Avoid nebulization where possible, use metered dose inhaler (MDI) and spacer. Do not share spacers between patients.

3. Treatment:

Antibiotics as per community-acquired pneumonia guidelines.
Amoxicillin 45 mg/kg/dose 12 hourly orally for 5 days; OR
Ampicillin 50 mg/kg/dose intravenously 6 hourly AND Gentamicin 6 mg/kg intravenously daily for 5–10 days.

Routine use of corticosteroids is not recommended.

Severe disease and intensive care for children with severe disease

The same principles regarding supportive care treatment and procedures/interventions described above apply to children with severe disease.
Children with severe disease should be admitted to a paediatric HCU or PICU. Regional HCU/PICU bed occupancy should be monitored to allocate beds as needed.
Children with suspected or confirmed COVID-19 MUST be accommodated apart from those without the infection.

1. Non-invasive respiratory support in children with severe disease (high-flow nasal cannula (HFNC) oxygen and nasal continuous positive airway pressure (NCPAP)

Both HFNC oxygen and NCPAP are considered to be aerosol-generating and as such represent a potential high-risk for transmission of SARS-CoV-2 to health care workers. The indication for HFNC / NCPAP should be carefully considered and initiated only after discussion with a specialist.
All staff working with these patients should wear full protection against airborne transmission (Appendix 2)

Consider incorporating other measures to mitigate the risk of transmission such as placing an HME filter on the expiratory limb of the CPAP circuit, using the lowest possible flow rate with HFNC

oxygen therapy to achieve clinical effect, placing a mask or cloth over the high-flow prongs if tolerated, and isolating the child in a negative pressure / single room where possible.

2. **Intubation** (refer to **Appendix 5**):

Must be undertaken by the most senior member of staff on site;
Full airborne precaution PPE with N95 respirators and eye protection must be worn (Refer to **Appendix 2**);
A modified rapid sequence intubation is preferred: Pre-oxygenate with nasal prong O2 and face mask with reservoir – try to minimize/avoid bag mask ventilation
If possible, this should occur under a plastic sheet

Cuffed tubes should be used;
AVOID or minimize suctioning before or after intubation
Use in-line suctioning to limit aerosolization

IV fluids should be restricted to ⅔ of maintenance requirements.

Further ICU management is similar to that for any other child with severe pneumonia.

Management of paediatric inflammatory multisystem syndrome / multisystem inflammatory syndrome in children

A provincial consensus management guideline is available via the following link and is likely to be updated as more clinical experience and evidence becomes available:
https://docs.google.com/document/d/1N0dZi6UBpwWhWkpBBL9sMPU8SilKwLFvxiNqhLV5Zsc/edit?usp=sharing

Discussion with paediatric rheumatology, immunology or infectious diseases specialists is strongly recommended prior to initiating treatment.

10. USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE) (Appendix 2)

Appropriate use of PPE should follow institutional/provincial policy.
Each institution should have a detailed plan for the appropriate use and provision of PPE in order to ensure that staff are always adequately protected for the duration of the pandemic.

Many aspects of routine care in children could be considered to be potentially aerosol-generating (see Appendix 2). There is very limited evidence to quantify the risk of viral transmission associated with various procedures/interventions. Risk for an individual procedure is likely to be affected by a number of factors.

As a minimum, all medical, nursing and assistant staff working in suspected or confirmed COVID areas should wear a surgical mask, eye protection, gloves and apron. Face shields which cover the eyes and mask are ideal, as they reduce potential contamination of the mask.

In addition to this, staff working in higher risk areas e.g. on HFNC/CPAP or where multiple aerosol-generating procedures are performed, should don an N95 respirator (in addition to eye protection, gloves and apron or gown) when going into the room/cubicle.

Good hand hygiene and regular environmental cleaning are key aspects in reducing risk of transmission.

11. DE-ISOLATION

Most patients with mild COVID-19 continue to shed virus from their upper airways for approximately 7-12 days but it is important to appreciate that the presence of detectable virus does not necessarily imply infectiousness. Virus cultures have been shown to be positive for 8-9 days after the onset of symptoms.

Patients with more severe COVID-19 may continue to shed virus at higher levels for longer periods that patients with mild disease and the duration of infectiousness is less well established. Revised guidelines on de-isolation of patients who have tested positive for SARS-CoV-2, recommend the following:

- Asymptomatic patient: 10 days from date of positive test
- Mild disease: 10 days from date of onset of symptoms
- Severe disease: 10 days from date of being clinically stable (no longer requiring supplemental oxygen).

Children admitted to hospital can complete their isolation at home once they are well enough to be discharged provided their home circumstances support self-isolation (Refer to **Appendices 3-6**).

APPENDIX 1: TESTING FOR SARS-CoV-2

Principles

- This is an aerosol-generating procedure so use appropriate PPE
- Be calm and gentle, children will be frightened by the process
- Make use of an assistant, preferably the adult that came with the child
- Consider covering the mouth with a mask
- Explain what will happen to care giver and child where appropriate
- Be calm and reassuring, it is not necessary to sedate the child

Types of samples:

- **Mid-turbinate nasal swab (MTNS)** - this is preferred, particularly for younger children
- Nasopharyngeal swab (NPS) or nasopharyngeal aspirate (NPA)
- Sputum
- For intubated patients: tracheal aspirate (TA) or bronchoalveolar lavage (BAL)

Types of swab:

- Flocked (thin plastic or wire) are preferable but often unavailable
- Normal dry pus swab (asses the nostril size): tip to be cut off or broken off and placed into tube with viral transport medium or if unavailable into a dry sterile container e.g. CSF tube (not the gel-containing tube)
- Sputum, NPS, NPA, TA and BAL do not require viral transport medium and may be submitted to the laboratory in a sterile container

Procedure

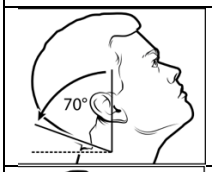
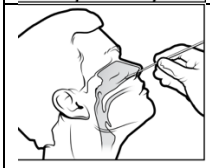
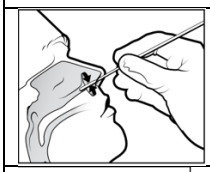
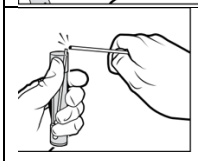
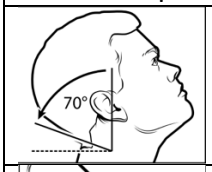
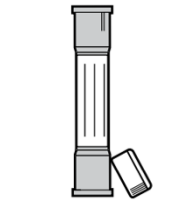
- Apart from the normal equipment you need a chair with a back for the adult assistant
- If you are going to do an NPA you also need a nasogastric tube and a syringe
- Ask the adult with the child to wipe excessive nasal secretions away with a tissue and have them discard the tissue into contaminated waste bin.
- The adult accompanying the child should sit on the chair facing the examiner leaning back into the back of the chair
- A small child should sit on the adult's lap, older children can stand between the legs of the adult.
- The legs of the child are held in-between the thighs of the seated adult.
- One hand of the assistant holds the child's hands across his chest while the other hand stabilises the child's head against their chest (as for throat examination of the uncooperative child)
- Refer to next page or watch https://www.youtube.com/watch?v=lTyBvZhLL04 for a video demonstrating how MTNS samples should be collected.

Sample transportation to the virology laboratory

- Once the sample has been collected, it must be "double-bagged", preferably using a biohazard bag, to enable easy identification by laboratory staff and to help prevent an inadvertent laboratory exposure

Forms to be completed by the clinician collecting the sample

- This may vary between institutions therefore check with the local testing centre and laboratory
- NHLS Clinical Pathology request form to accompany specimen to laboratory (refer to picture of sample completed form)
- NICD PUI form for coronavirus disease 2019 (COVID-19) and contact line list (may be kept in patient's folder for actioning if test result is positive)
- Results of tests are made available on TrakCare and positive results will be communicated from the laboratory to the Department of Health

Mid-turbinate nasal swab	
	Hold head against the chest of the assistant and have the assistant lean into the chair back. Tilt the head back to approximately 70 degrees The assistant should keep the head in place
	While rotating gently insert the swab until you meet resistance Note the direction of insertion in this picture – the swab should be inserted in the direction of the tragus of the ear on the same side and NOT towards the upper teeth Older children can be asked to breathe through their mouth
	Rotate the swab against the nasal wall The same swab may be used to swab the other nostril
	Break the swab off in the viral transport medium OR if not available in a **sterile DRY container** (e.g. a CSF tube)
Nasopharyngeal aspirate 5 or 8F catheter and 5 cc syringe attached Measure the distance from the nostril to the opening of the ear – with the catheter. This is how deep it should go	
	Hold head against the chest of the assistant and have the assistant lean into the chair back. Tilt the head back to approximately 70 degrees The assistant should keep the head in place
	Gently insert the catheter until you meet resistance Note the direction of insertion in this picture –inserted in the direction of the tragus of the ear on the same side and NOT towards the upper teeth Older children can be asked to breathe through their mouth
	While rotating and suctioning remove the catheter If no aspirate, repeat in the other nostril using the same catheter
	Draw up a small amount of transport medium or saline via the catheter and eject it into the tube

NATIONAL HEALTH LABORATORY SERVICE

CLINICAL PATHOLOGY

SAMPLE SAMPLE FOR LAB LABELS

PLEASE PRINT IN BLOCKS AND (X) THE APPLICABLE BOXES

MARK IF URGENT ☒ 1. THEATRE 2. INPATIENT Patient I.D. Number

LOCATION

HOSPITAL / CLINIC

*Ward

Cost Centre

CLINICAL / SPECIMEN DETAILS

Diagnosis / reason for request SUSPECTED COVID19

CLINICAL PRESENTATION + SEVERITY

Medication Warf Hep

Type of specimen MID TURBINATE NASAL SWAB

Taken on DATE at TIME

Taken by DOCTOR

CONTACT DETAILS OF RESPONSIBLE PRACTITIONER

NAME (Prof (Dr) / Sr) STAMP

Persal or Practice No MP NUMBER

*Cell No Bleep

Tel(0) Fax (0)

Signature #

PATIENT INFORMATION

Patient Hosp./ Clinic Number Fee class

Surname PATIENT

First name

Address PATIENT STICKER

Postal Code

*Tel/Cell Sex M F

D.O.B. D D M M Y Y Y Y Age

PRIVATE PATIENTS ONLY

ICD10 diagnosis codes:

Medical Aid: Plan:

Medical Aid No: Employer:

Authorisation No: Dep code:

Account to / Principal Member:

Member address: Postal Code

Member Tel. No. (H/Cell): (W):

Member I.D. number:

CHEMICAL PATHOLOGY

General:		Rands
HS*	Blood gases	45
Y	Sodium	25
Y	Potassium	25
Y	Chloride	15
Y	Urea	25
Y	Creatinine	25
Y	Calcium	25
Y	Magnesium	25
Y	Inorganic phosph	25
Y	Uric acid	27
Y	Total protein	25
Y	Albumin	34
Y	Total bilirubin	29
Y	Conj. bilirubin	22
Y	ALP	35
Y	GGT	38
Y	ALT	38
Y	AST	38
Y	LDH	38
Y	Amylase	36
Y	Lipase	36
Cardiac:		
Y	CK	40
Y	CK-MB	38
◑	Troponin	141
Diabetes / metabolic:		
Grey	Glucose - fast	25
Grey	Glucose - rand	25
P	HbA1c	71
Grey*	Lactate	173
Lipids:		
Y	Triglycerride	56
Y	Total cholesterol	38
Y	HDL-cholesterol	49
Anaemia:		
Y	HDL-cholesterol	59
Y	Transferrin	83
Y	Ferritin	93
Y	Vitamin B12	93
P*	Folate - red cell	131

Endocrinology:		Rands
Y	TSH	146
Y	Free T4	123
Y	Free T3	123
Y	bHCG	87
Y	FSH	93
Y	LH	93
Y	Estradiol	93
Y	Progesterone	96
Y	Prolactin	93
Y	Testosterone	93
Y	SHBG	93
◑	PTH	127
Y	Cortisol	93
Y	Insulin	93
Y	AFP	93
Cerebrospinal fluid:		
Grey	CSF glucose	25
	CSF chloride	18
	CSF protein	22

DRUGS

Y	Paracetamol	80
Y	Salicylate	80
Y	Lithium	39
Y	Methotrexate	80
Y	Tricyclics	80
Y	Phenytoin	80
Y	Phenobarbitone	80
Y	Epilim / Na valpr	80
Y	Carbamezepine	80
Y	Digoxin	92
Y	Theophylline	80
	Urine mandrax	80
	trough peak	
P	Cyclosporin	154
Y	Amikacin	88
Y	Gentamycin	88
Y	Vancomycin	88

Time of dose :

HAEMATOLOGY

General:		Rands
P	FBC	48
P	Differential count	26
P	Film (morph)	26
P	Haemoglobin	15
P	White cell count	15
P	Platelet count	18
P	Reticulocytes	24
P	Malaria screen	43
◑	ESR	24
Coagulation:		
B	INR	39
B	PTT	44
B	Fibrinogen	28
B	D-dimers	216
B	Thrombin time	56
B	Antithrombin III	173
B	Lupus anticoag	197
B	Protein C	238
B	Protein S	293
B	APC Resist	205
Other:		
P	Coombs	29
©	CSF/Fld cytosp	52

VIROLOGY

HIV testing:		Rands
Y	HIV serology	97
PP	HIV viral load	318
P	PCR : HIV	387
Hepatitis serology:		
Y	Clinical hepatitis:	105 ea
	A B C	
Y	Hepatitis immunity:	
	A B	

Other serology:	IgM	IgG
	102	94
Y CMV		
Y EBV		
Y HSV		
Y VZV		
Y Rubella		
Y Measles		
Y Mumps		

Viral isolation:		
P	CMV pp65 Ag	323
	Rapid RSV	87 ea
	Rap. rota/adeno	169
	Culture (specify)	87
	PCR (specify)	var

IMMUNOLOGY

P	CD4 (PLG)	64
Y	CRP	60
Y	IgG, IgA, IgM	55 ea
Y	Total compl	97
Y	Syphilis Serology	16
Y	ASOT / DNase B	87
Y	Toxoplasma	94
Y	ANF	116
Y	Anti ds-DNA	116
Y	Anti cardiolipin	93
Y	ANCA	232
Y	RF	61
Y	ENA	115 ea

MICROBIOLOGY

Specimen site:

General:		
Y	Routine MC&S	≥81
Y	CSF cell count, microscopy & culture	≥141
Y	Fungal M&C	≥67
Y	Blood culture	≥101
Y	Parasites	≥57
TB investigation:		
	Microscopy	32
	Culture	≥101
	Sensitivity	≥190
Antigen detection:		
	Cryptococcal Ag	40
	Pneumocystis	87
	Chlamydia	116
	C. difficile toxin	217

OTHER TESTS (ALL DISCIPLINES)

For full repertoire of tests, consult laboratory handbook

COVID19 PCR

RISK FACTORS:

1. CONTACT WITH COVID19
2. RELEVANT TRAVEL HISTORY
3. ADMISSION TO COVID19 FACILITY

RECEIVED IN LAB

* MUST BE FILLED in.

*IF URGENT INDICATE
1. THEATRE
2. INPATIENT ADMISSION

PROVINCIAL REQUIREMENTS :

Specimens may be rejected if Patient name and number, Practitioner name, signature and Persal / Practice number, or Hospital / clinic / ward are omitted.

Signature & PERSAL No. of Consultant:

I hereby certify that I have considered the repertoire of tests requested as well as previous

SORT	LABEL

APPENDIX 2: PERSONAL PROTECTIVE EQUIPMENT (PPE)

TYPE OF PPE	CLINICAL STAFF (nurses, doctors, EMS) Providing direct care to COVID-19 patients or patients with respiratory symptoms	NON-CLINICAL STAFF (admin staff, catering staff) Coming into distant contact with COVID-19 patients and contaminated surfaces	NON-CLINICAL STAFF (cleaners) Coming into distant contact with COVID-19 patients and contaminated surfaces	PATIENTS with or without RESPIRATORY symptoms
Gloves	Non-sterile gloves. Change between patients	Non-sterile gloves. Change when leaving COVID-19 area	Reusable long rubber utility cleaning gloves (ideally up to elbow) Change after completed cleaning contaminated area	None
Face cover type	**Surgical Mask** for general care of COVID-19 patients **N95 respirator** for aerosol generating procedures* on COVID-19 suspects/cases**	**Surgical mask** when within <1m of a patient with respiratory symptoms (one per shift, if integrity maintained)	**Surgical mask** when within <1m of a patient with respiratory symptoms	**Surgical mask** worn when in contact with others
Aprons or gowns	Change between patients	Change when leaving COVID-19 area	After each work session (in absence of clinical contact)	None
Face shields, or visors, or goggles, or other eye covers	Wash clean, disinfect and reuse	None	Wash clean, disinfect and reuse	None

* Aerosol-generating procedures in children include: collection of nasopharyngeal and oropharyngeal swabs for SARS-CoV-2 testing, clinical examination of the pharynx, nebulization, nasal/oral/tracheostomy suctioning, insertion of a nasogastric tube, blood-taking & intravenous cannula placement in young children, chest physiotherapy, non-invasive CPAP or HFNC ventilation, manual bag-mask ventilation, endotracheal intubation, tracheal aspirate, bronchoalveolar lavage, bronchoscopy, endoscopy, ENT procedures, dental procedures, maxillo-facial procedures and cardiopulmonary resuscitation.

** N95 respirator must still be used for all other non-COVID-19 indications (e.g. when attending to a patient with confirmed or suspected TB)

GUIDELINES FOR USE OF A N95 RESPIRATOR FOR COVID-19

FOR AER0SOL GENERATING-PROCEDURES ONLY

- Seal tests should be performed each time a N95 respirator is used (i.e. when it is first put on)



Perform the seal test with every use to ensure the respirator fits properly around the face and nose

Negative seal check
Cone-shape: cup hands over respirator lightly. Breathe in sharply. No air should leak in around the face. to- Duck-bill + V-flex: Breathe in sharply. The respirator should collapse inwards

Positive seal check
Cone-shape: Cup hands over respirator. Blow out. A build-up of air should be felt with no air leaks.
Duck-bill + V-flex: Breathe out forcefully; the respirator should expand on the exhale.

How to wear a N-95 respirator:



- The N95 respirators should ideally be used once only and should be discarded once safely removed. However, as there is a global shortage of N95 respirators, reuse is strongly encouraged and is preferable to having no respirator.
- If HCWs are performing aerosol-generating procedures (e.g. sample collection) on several COVID-19 patients sequentially, they may use the same N95 respirator and eye protection for the session; **they must however change apron and gloves between patients.**
- As the outside surface of the N95 respirator will become heavily contaminated with the virus during aerosol-producing procedures, HCWs should take great care not to touch the outside surface and must perform careful hand hygiene after removing it.
- For reuse, carefully remove the N95 respirator using a clean paper towel and store the respirator in a clean paper bag. The paper bag must be labelled with the staff member's name. Do not crush or crumple. It can be reused for up to 1 week.
- Do NOT attempt to disinfect the N95 respirator as that destroys its integrity.
- Note that obviously damaged and visibly contaminated respirators cannot be reused.

GUIDELINES FOR SURGICAL MASK USE FOR COVID-19

- At any time if surgical masks are touched by unwashed hands, get wet, are soiled, or are removed from the face, they will become contaminated and will no longer provide effective protection. They should then be discarded.
- Masks that are not wet, were not touched by unwashed hands and were not removed from the face, can be worn for up to 8 hours.
- COVID-19 patients when inside a dedicated COVID-19 ward, where staff are wearing PPE, do not need to wear masks.
- COVID-19 patients when outside a dedicated COVID-19 ward must always wear a surgical mask. The mask can be used for up to 8 hours.

FOR HOW LONG CAN PPE BE USED?

TYPE OF PPE	CLINICAL HCW	NON-CLINICAL HCW	SYMPTOMATIC PATIENTS
Gloves	Change after each clinical contact	End of work session	N/A
Surgical Face Masks	Mask can be used up to the end of a shift if it remains dry and has not been removed from the face.	Mask can be used up to the end of a shift if it remains dry and has not been removed from the face.	When in contact with others
N95 respirator	As long as integrity is maintained and it is safely stored, it can be reused for up to 1 week.	N/A	N/A
Aprons	Change after each clinical contact	After each work session (in absence of clinical contact)	N/A
Face shields/ visors	Clean and disinfect before reuse	N/A	N/A
Goggles	Clean and disinfect before reuse	Cleaners may use same googles for each work session. Clean and disinfect before reuse	N/A

VIDEO DEMONSTRATION OF DONNING AND DOFFING OF PPE

A demonstration video for safely putting on and taking off PPE (donning and doffing of PPE) is available at:
https://player.vimeo.com/external/400607941.hd.mp4?s=af075e8c9647a23114424834c1e73f866a73e5f7&profile_id=174

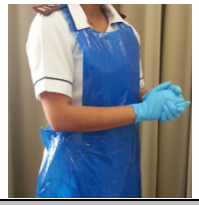
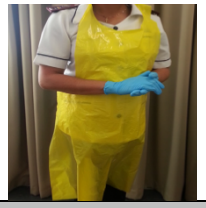
INSTRUCTIONS FOR PUTTING ON AND TAKING OFF PPE (DONNING AND DOFFING PPE)

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (DONNING)

Wash your hands before putting on the PPE. PPE should be put on in an order that minimises contamination. The apron, mask, goggles and gloves must be put on in that order. See guidance on each below.

Apron

- ***Wash hands***
- Slip it over the head and tie the stings behind the back

Mask or N95 Respirator

- Secure each tie or elastic at the middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator by blowing into it (air should not leak out)



Goggles or Visor

- Place over face and eyes
- Adjust band to fit comfortably



Gloves

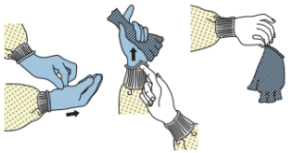
- Hold the edge of the glove as you pull it over your hand
- Extend to cover wrist
- Once gloved, do not touch other surfaces

SEQUENCE FOR TAKING OFF PERSONAL PROTECTIVE EQUIPMENT (DOFFING)

Wash your hands before taking off the PPE. PPE should be removed in an order that minimises contamination. The gloves, apron, goggles/visor, and mask must be removed in that order.* **Wash your hands after taking off the PPE.** Discard PPE in infectious waste container. See guidance below.

Gloves

- ***Wash hands***
- Securely grasp the outside of glove with the gloved hand; peel off; discard as infectious
- Slide the fingers of the un-gloved hand under the remaining glove at the wrist; peel off; discard as waste



opposite

waste

infectious

Apron or Gown* (See Note)

- ***Wash hands***
- Unfasten or break apron/gown ties
- Pull the apron away from the neck and shoulders, touching the inside of the apron bring it forward and over the head
- Turn the apron inside out, fold or roll into a and discard as infectious waste



only and

bundle

Goggles or Visor* (See Note)

- Remove goggles/visor from the back by head band or ear pieces
- Place in designated receptacle for disinfecting



lifting

Mask or N95 Respirator

- Untie or break bottom ties, followed by or elastic.
- Remove by handling the ties only and as infectious waste.
- ***Wash hands***



top ties

discard

***Note.** When it is practically difficult to remove the apron/gown before the visor/goggles, then the visor/goggles may be removed before the apron/gown.

Dispose of all PPE in an infectious waste container.

WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITISER AFTER REMOVING GLOVES AND AFTER REMOVING ALL PPE

6. How to transition between home and work

- Follow these principles to protect yourself at work and to protect your family by not bringing COVID-19 home.

What must I do before leaving home and arriving at work?



Clothes

- Wear dedicated simple clothing (like short-sleeved t-shirt and pants) and cheap/old, dedicated work shoes. If long sleeves, keep them rolled up.
- Hot wash and dry clothes daily (or alternate 2 sets if unable to dry daily).
- Avoid wearing a belt, jewellery and a lanyard.
- Avoid a cloth surgical cap, use a disposable cap instead.



Phone, wallet and keys



- Leave wallet at home – bring essentials (like access card, drivers licence, bank card) in sealable plastic (Ziploc) bag.
- Remove protective case from phone. Consider keeping phone in closed, sealable plastic (Ziploc) bag and change this daily.
- Keep your phone in your pocket/bag, avoid placing it on work surfaces. Leave it on loud volume.
- If able, wipe phone down between each patient.
- Keep your keys in your pocket/bag and do not remove until after you have washed hands when leaving work.

Food and drink



- Bring lunch from home in reusable fabric shopping bag, avoid bought lunches from canteen/tearoom.
- Use own water bottle, avoid water coolers, kitchens and bought drinks.

What can I do to protect my family when leaving work and arriving home?

- Leave pen at work. Frequently coat it with alcohol hand rub throughout the day.

When leaving work:

- Remove work clothes and place in plastic bag to take home.
- Perform thorough hand and arm wash.





- Keep alcohol hand rub in car/bag and use to clean hands.

When you arrive home:

- Remove shoes and leave outside before entering home.



- If not already changed, remove work clothes at front door. Put these (or clothes in bag if changed already) straight into a hot wash, along with reusable fabric shopping bag. Then thoroughly wash hands.



- Immediately have hot shower/ bath/wash.
- Avoid hugs, kisses and direct contact with family members until after shower/bath/wash.



APPENDIX 3: OVERALL MANAGEMENT PROCESS AT PRIMARY CARE LEVEL

SCREEN**

1. Every child entering a health facility
2. Ask about symptoms

RISK: **

to COVID stream

Any person presenting with an acute (≤14 days) respiratory tract infection or other clinical illness compatible with COVID 19,
or an asymptomatic person who is a close contact to a confirmed case.
In the context of COVID-19, the key respiratory syndrome consists of ANY of:

- Cough
- Sore throat
- Shortness of breath
- Anosmia or dysgeusia

… with or without other symptoms
(which may include fever, weakness, myalgia, or diarrhoea).

NO RISK:

to NON COVID stream

Implement protective measures

- Hand hygiene
- Social distancing
- Environmental cleaning

ASSESS DISEASE SEVERITY USING IMCI

Assess the following: - **Danger signs (see box below)** - **Respiratory rate** - **Stridor** - **Chest-indrawing** - **Wheeze** - **Pulse oximetry (if available)**	**Classify Cough or Difficulty breathing**	ANY General DANGER SIGN OR Chest indrawing OR Stridor in calm child OR Oxygen sats <92% in RA	**SEVERE PNEUMONIA OR VERY SEVERE DISEASE** ***POSSIBILITY OF COVID-19 High***	Manage as per pg 26 of IMCI chart book Give Oxygen, First dose of Ceftriaxone, check Glucose, Keep warm If wheezing give Salbutamol via MDI + spacer and repeat after 15 mins# If Stridor, give ADRENALINE NEBS **REFER TO HOSPITAL** ***SARS-CoV-2 PCR to be done at Hospital**
		Fast Breathing	**PNEUMONIA** ***POSSIBILITY OF COVID-19***	Manage as per pg 26 of IMCI chartbook Treat with Amoxil Advise caregiver when to return immediately Follow up in 2 days **Home isolation for 14 days**
		NO signs of pneumonia or severe disease	**COUGH OR COLD** ***POSSIBILITY OF COVID-19***	Manage as per pg 26 of IMCI chartbook. **Home isolation for 14 days**
	Classify wheeze	Any history of wheeze, cough at night, Wheeze for 7 days, on treatment for Asthma	**RECURRENT WHEEZE** ***POSSIBILITY OF COVID-19***	Manage as per pg 26 of IMCI Use MDI + spacer instead of nebuliser# **Home isolation for 14 days**
		Any other wheeze	**FIRST EPISODE WHEEZE** ***POSSIBILITY OF COVID-19***	Manage as per pg 26 of IMCI chartbook **Home isolation for 14 days**

**** in accordance with the current NICD Case Definition which changes with time**
# see table below re nebulisation
*Swab for SARS-CoV-2 only done at hospital for admissions

GENERAL DANGER SIGNS:

- **Inability to drink or Breastfeed**
- **Vomiting everything**
- **Lethargic or unconscious**
- **History of convulsions during this illness or currently convulsing**

FAST BREATHING	If the child is < 2months	= >60
	If child 2mo – 12mo	= >50
	If child older than 12mo- 5yr	= >40
	If child older than 5 yr	= >30

AVOID the following in children with COVID-19 or suspected COVID-19

1. Routine examination of the mouth and throat:
   If sore throat, treat with oral Penicillin or Amoxicillin
   (see page 30 of the IMCI chart book)
   Follow up in 5 days if symptoms worse or not resolving- then refer to hospital.
   If examination of the mouth and throat cannot be avoided, wear a mask, visor, gloves and apron

2. Nebuliser:
   For ***wheeze***, give Salbutamol via MDI and spacer 4-8 puffs. Allow 4-5 breaths per puff. Use a facemask onto the spacer for those children younger than 4 years
   If still wheezing repeat every 15 mins in the first hour.
   If no improvement, discuss with Dr. and reclassify as severe disease

   If improvement continue 2- 4 hourly.
   *For **stridor,** continue with nebulised adrenaline*

3. NSAID's and oral steroids
   Give paracetamol 15mg/kg for fever and pain
   Oral steroids are still indicated in those with known Asthma

4. Nasal or oral suctioning, Bag mask ventilation and CPAP
   Use full PPE for resuscitation

APPENDIX 4: OVERALL MANAGEMENT PROCESS AT HOSPITAL LEVEL

Management of Children with Suspected / Confirmed COVID-19

Suspected COVID-19 case definition (NICD, 25 May 2020):
Any person presenting with **an acute** (≤14 days) **respiratory tract infection** or other clinical illness compatible with COVID-19, or an asymptomatic person who is a close contact[1] of a confirmed case[2]

- Symptoms include ANY of the following respiratory symptoms: cough, sore throat, shortness of breath, anosmia (loss of sense of smell) or dysgeusia (alteration of the sense of taste), with or without other symptoms (which may include fever, weakness, myalgia, or diarrhoea)

- **Note:** asymptomatic close contacts should not be routinely tested despite meeting the suspected case definition. However, testing may be indicated in certain circumstances (e.g. institutions such as care homes)

[1] Close contact: A person having had face-to-face contact (≤1 metre) or been in a closed space with a confirmed case for at least 15 minutes. This includes, amongst others, all persons living in the same household as a case, and people working closely in the same environment as a case.

[2] Confirmed case: a person with laboratory confirmation of SARS-CoV-2 infection (using RT-PCR assay), irrespective of clinical signs and symptoms. Symptomatic cases are considered infectious from 2-3 days before symptom onset to 14 days after symptom onset.

Test and Assess
- Apply surgical masks to child (if >2 yrs) & caregiver and isolate
- Perform COVID-19 test
- Assess severity of disease
- Consider alternative diagnoses including HIV testing, TB screening, nutritional assessment, immunisation
- COVID-19 test result:
  - if positive, notify
  - If negative & at home, de-isolate & monitor for 14 days
  - If negative & admitted, keep isolated

Mild disease
- Treat at home
- Admit to hospital or isolation facility if self-isolation at home is not feasible

Home treatment
- Paracetamol
- Nutritional support
- Alert to danger signs
- Home isolation

De-isolation
- 14 days from onset of symptoms

Moderate disease
- Admit to hospital
- Cohort with respiratory / COVID-19 cases

Hospital treatment
- Oxygen
- Paracetamol
- 3 – 4 hourly review
- Nutritional support
- Empiric antibiotics

De-isolation
- 14 days after stable –no longer need oxygen
- Continue treatment at home

Severe disease
- Admit to hospital
- Discuss with nearest high-care unit (HCU) / paediatric intensive care unit (PICU)

HCU / PICU admission
- General respiratory supportive measures (e.g. oxygen, stop feeds, consider proning)
- Manage as for severe pneumonia according to local unit protocols

De-isolation
- 14 days after stable –no longer need oxygen
- Continue treatment at home

Assessment of severity

	Mild	Moderate	Severe
Mental status	Normal	Restless	Irritable/lethargic
Feeding	Finishes feed	Does not finish feed	Unable to feed
Talking	Full sentence	Interrupted sentence	Unable to talk
Respiratory rate (breaths/min.)	<40 if under 1yr <30 if 1 – 5 years <20 if over 5 years	40-60 if under 2 months 40-50 if 2 – 12 months 30-40 if 1 – 5 year 20-30 if over 5 years	>60 if under 2 months >50 if 2 – 12 months >40 if 1 – 5 year >30 if over 5 years
Respiratory signs	No distress	Lower chest wall indrawing	Grunting and/or severe lower chest wall indrawing
Pulse oximetry (SpO_2)	≥92% in room air	<92% in room air	<92% in room air Central cyanosis

Whenever possible, avoid the following in children with COVID-19

- Routine oropharyngeal examination unless wearing full personal protective equipment (PPE, including N95 respirator and eye protection)
- Nebulisers – rather use a metered-dose inhaler (MDI) with spacer
- Non-steroidal anti-inflammatory drugs (NSAIDs) & oral steroids
- High-flow nasal cannula (HFNC) oxygen therapy
- Minimise nasal or oral suctioning and bag-mask ventilation

- If required, non-invasive continuous positive airway pressure (CPAP) or bilevel positive airway pressure (BiPAP) should preferably be delivered in a negative pressure PICU or high-care isolation cubicle by staff with full PPE (including N95 respirator and eye protection)

APPENDIX 5: INTUBATION OF A SUSPECTED/CONFIRMED COVID-19 PATIENT

Plan and Prepare

- Your personal protection is the priority
- Identify isolation precautions AND PPE (N95 mask, surgical gown, gloves, cap and eye protection, visors if available)
- Pay close attention to avoid self-contamination
- Go through Intubation checklist / identify senior personnel / allocate roles
- Communicate well to the team inside the room and the team outside. Limit personnel in room.
- Extra items to remember:
    - filters, cuffed ETT, plastic to cover patient
    - video laryngoscope where available
    - in-line suctioning
- All extra ETT/suction catheters that are not opened/used should be kept in a clear plastic bag on the trolley to avoid contamination

Allocation of roles:

- Doctor A: Most experienced person to perform intubation
- Doctor B: Help with bagging, connection to ventilator, confirm ETT position and inflate ETT cuff
- Nurse A: Gives induction drugs and help with monitoring
- Nurse B: Should be outside the isolation room in PPE with red resuscitation trolley to pass any other equipment if needed (This is to avoid contamination of red trolley)

Intubation:

- Must have NGT in place, to empty stomach
- Most experienced person available to perform intubation
- Most children can be intubated with Ketamine and Rocuronium
- Preoxygenate with 100% O2 to avoid manual ventilation – this can be done on CPAP/NPO2 whatever was used prior to intubation
- Cuffed ETT with in-line suction connected and manometer to inflate cuff
- Use video laryngoscopy if available
- Plan for modified rapid sequence induction with skilled assistant
- Consider using a two-person bag-mask technique to get a good seal
- Use plastic bag to intubate under to limit droplet spread
- Intubate and connect ventilator and in-line suctioning immediately
- Avoid bagging patient
- Confirm ETT position: use EtCO2 and check chest rise and auscultate for equal air entry
- Try not to disconnect the ventilator if the patient desaturates
- Higher ventilator pressure may be needed initially/temporarily to recruit the lung and maintain saturations
- *If Intubation attempt unsuccessful or patient desaturates during the intubation attempt*: Start Bag-mask ventilation using small tidal volumes. Ensure filter between face mask and bag, if you use a T-piece – a filter is crucial
- Attempt intubation again once patient adequately oxygenated.

Post intubation:

- After leaving isolation area – to wipe down the surfaces and non-disposable items
- Correct PPE doffing procedure
  Disposable equipment should be placed in disposable plastic bag at end of procedure and disposed of in the red bins inside the isolation room.

APPENDIX 6: GUIDELINES FOR MOTHERS/CAREGIVERS OF CHILDREN WITH SUSPECTED COVID-19

Self-isolation

- You should quarantine yourself with the child at home. Don't go to work, avoid unnecessary travel, and as far as possible avoid close interactions with other people.
- You should clean your hands and the child's hands with soap and water frequently.
- Do not have visitors in your home, including family who do not live with you, or have other children to play. Only those who live in your home should be allowed to stay.
- You and the child should wear facemasks when in the same room as other people in the house (or if you must go out especially in a vehicle).
- At home, you should stay in a specific room with the child with the door closed and window open, only coming out when necessary, wearing a facemask. You and the child should use your own bathroom (if possible), or the bathroom should be fully cleaned before others use it and the windows opened. Disposable nappies must be put in a plastic bag and carefully sealed before throwing them away.
- You should practice good cough and sneeze hygiene and teach the child or help the child to do the same, by coughing or sneezing into a tissue, discarding the tissue immediately afterwards in a lined trash can, and then wash hands immediately. If you do not have tissues, you should cough or sneeze into your elbow
- You should avoid sharing household items like dishes, cups, eating utensils and towels. After using any of these, the items should be thoroughly washed with soap and water.
- All surfaces like table-tops, counters, toilets, that you may have touched or that you touch frequently should be appropriately and frequently cleaned, with soapy water or disinfectant. This includes carefully cleaning phones, computers, etc. if others will touch them.
- All used and dirty laundry (sheets, clothes) must be washed at the highest temperature possible using laundry detergent. (This should be above 60° C, If possible). Clean all surfaces and the area around the washing machine. Wash your hands thoroughly with soap and water after handling dirty laundry.
- Dry clothes in the sun (or tumble dry) and iron everything well using the highest setting you can.
- Monitor your symptoms and those of the child - Seek prompt medical attention if your illness is worsening, for example, if you have difficulty breathing, or if the person you are caring for symptoms are worsening. If it's not an emergency, call your doctor or healthcare facility at the number below. If it is an emergency and you need to call an ambulance, inform the call handler or operator that you are being tested for SARS-CoV-2.

Breastfeeding: women who are breastfeeding should continue to do so regardless of COVID 19 status

- Wear a mask during breastfeeding. Where medical masks are not available, wear a home-made mask. Wash the mask in soapy water after every feed and dry in sunshine
- Wash hands with soap and water before feeding
- Keep breasts and nipples clean by washing with soap and water
- Disinfect all surfaces they have touched with 4 teaspoons of bleach in 1 litre of water

Child-care in general:

- **Do:**
  - Wash children's hands frequently with soap and water
  - Eye contact and smiling and games from a safe distance of 1.5-2 meters will help to keep contact with children

        - Wear a face mask when in contact with a child (i.e. less than 1.5-2m) especially if you have a cough, and if you are together in a small closed room
        - Keep windows or doors open as much as possible to keep the air clean and fresh
    - **Don't:**
        - Don't use hand sanitizer on babies and children's hands
        - Don't kiss babies and children
        - Don't touch the child's eyes, put fingers into child's mouth or blow in child's face

Feeding guidelines

- continue usual feeding practices, encourage child to eat in spite of anorexia
- ensure food utensils are clean and not shared

Watch for Symptoms: explain to parents/caregivers about the symptoms

- Symptoms of COVID-19 similar in children and adults - Cold- like symptoms such as fever, runny nose and cough. Sometimes vomiting and diarrhoea
- Check for danger signs such as fast breathing, not eating, vomiting everything, fever, shaking/fits, swollen ankles
- Extra care must be taken with children who have chronic health conditions and low immunity

What to do when your child has symptoms: advise parents/caregivers to contact or attend their health facility or doctor or helpline for advice and inform them they have been in contact with someone with COVID-19.

APPENDIX 7: SIMPLE TERMINOLOGY / CONCEPTS

There are a variety of terms or concepts that patients and their family need to understand in dealing with COVID-19.

CLOSE CONTACT

Contact with a person with confirmed or suspected COVID-19 in the following context:

- Face-to-face contact (within 1 metre) or in a closed environment for more than 15 minutes;
- Living in the same household;
- Working closely together;
- Any healthcare worker not wearing PPE.

HAND HYGIENE

This is a preventive and protective measure. There are 2 modalities of hand hygiene:

- Hand washing:
    - Washing with soap and running water;
    - For 20 seconds;
    - Both surfaces of hands and forearms and between all fingers;
    - At least twice daily; when soiled; before preparing food; before eating; after using the toilet.
    - Fingernails should be kept short
- Sanitising with alcohol-based hand rub (at least 60% alcohol):
    - When unable to wash with soap and water;
    - After contact with frequently touched surfaces.

SOCIAL DISTANCING (PHYSICAL DISTANCING)

This is a preventive and protective measure.

- Staying at home as much as possible;
- Staying at least 1.5 – 2 metres from other people;
- NOT hugging, kissing or shaking hands;
- Avoiding groups
- Avoiding contact with frequently touched surfaces such as door-knobs.

SELF-QUARANTINE

Applies to a person who has had close contact with another person with suspected or confirmed COVID-19.
This entails the following:

- Staying at home for 14 days
- Minimising contact with other household members
- Not sharing household items

SELF-MONITOR

Applies to a person who has had close contact with another person with suspected or confirmed COVID-19 and is in self-quarantine. It involves looking out for early signs of COVID-19:

- Check temperature twice a day or monitor for feeling feverish
- Watch for symptoms:
    - Respiratory illness – cough, shortness of breath;
    - General ill health – excessive tiredness, muscle aches and pains.

SELF-ISOLATION

This applies to an individual with confirmed COVID-19 and entails the following:

- Staying at home for 14 days;
- As far as possible, using separate bedroom and bathroom;
- Minimising contact with other household members;
- Not sharing any household items.