7 April 2020

KZN PROVINCIAL PLAN FOR THE MANAGEMENT OF CHILDREN WITH COVID-19 INFECTION

INTRODUCTION & EPIDEMIOLOGY

Given our current understanding of the SARS-CoV-2 infection resulting in Coronavirus disease – 2019 (COVID-19) in which the vast majority of infected individuals are adults the Department of Health's response to the epidemic is understandably focused on preventing primary infection and strengthening adult and critical care services.

In this context it is important to make sure that the needs of children are not forgotten and that adequate provision is made to care for COVID-19 exposed and infected newborn babies and children while maintaining optimal routine care of children.

Based on various reviews of the Chinese experience it appears that:

- Children account for fewer COVID-19 infections than adults:
  - 2% of infected individuals are < 19 years of age;
  - <1% of infected individuals are < 10 years of age.

- Children have less severe disease than adults and current data suggest that:
  - 4% are asymptomatic;
  - 51% have mild disease;
  - 39% have moderate disease;
  - 5% have severe disease;
  - <1% have critical disease requiring ventilation;
  - Up to 8 March 2020 only 1 child had died of COVID-19 infection.

- Children are infected at home:
  - 82 – 90% of infected children report a household contact.

Plans for the management of COVID-19 infected children therefore need to provide guidance on:

- The care of babies born to COVID-19 infected women;
- The care of children with suspected COVID-19 infection;
- Home care;
- In-patient care;
- ICU care.

CHALLENGES

There are 5 significant challenges in developing a response to COVID-19 infections 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 infection: The reality is that there is both limited laboratory capacity and more importantly substantial delays in delivering specimens from more rural hospitals to laboratories able to perform the necessary test. Until this issue is addressed there will be a significant number of children with suspected infection who need to be managed as though they are infected.

3. Emergency Medical Services (EMS): There are a finite number of ambulances in the province with a limited capacity to transport sick children between health facilities. This means that services need to be created in all facilities and the 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 will required hospitalization.

5. Imminent RSV season: Winter is associated with RSV season amongst children. The clinical picture of these two conditions is similar and every child with RSV infection will need to be managed as a suspected COVID-19 infection.

CLINICAL MANIFESTATIONS

The clinical manifestations and management of COVID-19 in children are very similar to that in adults.

Clinical pattern

Clinical:

- Asymptomatic.
- General features:
  - Fever (42 – 50%);
  - Poor feeding;
  - Fatigue;
  - Headache.
- Respiratory:
  - Pharyngitis (45%);
  - Cough (38 – 48%);
  - Rhinitis;
  - Shortness of breath.

Gastrointestinal:

Diarrhoea (9%);
Vomiting (6%).

Special investigations in COVID-19:

FBC:	WCC	normal or reduced with reduced neutrophil and lymphocyte counts.
	Platelets	reduced.
CRP / PCT		normal.
LDH		increased.
LFTs		abnormal in severe disease.
CXR		bilateral patchy nodular/speckled ground glass opacities.

Investigations to exclude alternate caused of acute respiratory infection – blood culture, HIV test; GeneXpert for TB.

Definition

The definition of COVID-19 disease is likely to change over time as the epidemic progresses.

<u>Recommended KZN paediatric definition</u>

Any child with acute respiratory infection with sudden onset of at least one of the following – cough, sore throat, shortness of breath or fever (>38^{o}C – measured) or history of fever (subjective) should be considered at risk of COVID-19 infection.

<u>WHO definitions</u>

1. **Suspected case**
   A. A patient with acute respiratory (fever and at least one sign/symptom of respiratory disease eg cough, shortness of breath), AND a history of travel to or residence in a location reporting community transmission of COVID-19 disease during the 14 days prior to symptom onset.
   OR
   B. A patient with any acute respiratory illness AND having been in contact with a confirmed of probable COVID-19 case (see definition of contact) in the last 14 days prior to symptom onset;
   OR
   C. A patient with severe acute respiratory illness (fever and at least one sign/symptom of respiratory disease eg cough, shortness of breath; AND requiring hospitalization) AND in the absence of an alternative diagnosis that fully explains the clinical presentation.

2. **Probable case**
   A. A suspect case for whom testing for the COVID-19 virus is inconclusive.
   Inconclusive test being the result of the test reported by the laboratory.
   OR
   B. A suspect case for whom testing could not be performed for any reason.

3. **Confirmed case**

A person with laboratory confirmed COVID-19 infection, irrespective of signs and symptoms.

Real time PCR (RT-PCR) performed on a naso- or oropharyngeal swab.

Definition of contact

A contact is a person who experienced any one of the following exposures during the 2 days before and 14 days after the onset of symptoms of a probable or confirmed case:

1. Face-to-face contact with a probable or confirmed case within 1 meter and for more than 15 minutes;
2. Direct physical contact with a probable or confirmed case;
3. Direct care of a patient with probable or confirmed COVID-19 disease without using proper personal protective equipment; OR
4. Other situations as indicated by local risk assessment.

Classification

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

Uninfected;
Suspected infection;
Newborns of suspected or confirmed COVID-19 infected women;
Asymptomatic / Mild disease;
Moderate disease;
Severe disease.

As local transmission of COVID-19 infection is prevalent in KZN the epidemiologic risk factors no longer apply and all children in the province should be considered to have been exposed.

Children with suspected infection are therefore ALL children who meet the above definition.

Criteria for the classification of the severity of disease are provided in the following table (Appendix 2):

	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	 <40 under 1yr <30 1 – 5 years <20 over 5 years	40-60 under 2 months 40-50 2 – 12 months 30-40 1 – 5 year 20-30 over 5 years	>60 under 2 months >50 2 – 12 months >40 1 – 5 year >30 over 5 years
Respiratory signs	No distress	Lower wall indrawing	Grunting Lower wall indrawing
SpO_2	≥95% in room air	<92% in room air	< 92% in room air

MANAGEMENT

NB Early diagnosis and appropriate support management, especially oxygen, improves the outcome of COVID-19 infected individual
Early testing is therefore essential and a low threshold for testing all children with pneumonia is required.

Visualisation of the upper airway (routine ENT examination) should be minimized, and if required must performed with full PPE.

Facilities for children

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

Non-COVID children
Suspected COVID-19 children
Confirmed COVID-19 children

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 not possible.

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 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 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 COVID-19 infection.

2. **Suspected infection**
   Every child with an acute respiratory infection;
   Apply a surgical mask;

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 above and Appendix 2);
Test for COVID-19 infection – wearing PPE and with appropriate precautions;
Manage as a confirmed case and according to severity of disease:

- 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 diseases need to be admitted to the "suspected COVID-19" area of the children's ward.

Systems must be established to fast track the processing of tests by the laboratory of children with suspected COVID-19 who are classified as having severe disease.

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

- Children with confirmed COVID-19 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 / adult with whom they were cohorted had a COVID-19 test then they:
  - Must remain in the "suspected CODIV-19" area of the ward until discharge.
  - On discharge must be quarantined and perform self-monitoring

3. Newborn babies born to women with COVID-19 infection

Provision must be made in the maternity unit and nursery for the care of pregnant women with COVID-19 infection and their babies.

There are 3 scenarios that hospitals must prepare for:

- Delivery and resuscitation;
- Well baby of COVID-19 infected mother;
- Sick or small baby of COVID-19 infected mother.

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.

   High risk deliveries should be attended by a senior clinician wearing FULL PPE.
   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 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.

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.

   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;
   - Perform COVID-19 test for all sick newborns;
   - Nursed in a closed incubator at ALL times;
   - Designated staff must attend to the baby and they MUST wear PPE at all times.

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

   NB Access to the nursery MUST be restricted and the following people must be excluded:
   - All visitors;
   - COVID-19 infected mothers;
   - Non-nursery staff.

4. Mild disease

Consider home care and self-isolation for all children with mild disease.
Requirements for self-isolation at home include:

Facilities and capacity allow for self-isolation:

Cohort all exposed household members;
If possible - separate bedroom and bathroom;
If not possible – occupancy must be restricted to household members only;
occupants must maintain a 1 – 2 meter distance from child;
child MUST wear a face mask.
Child must have own/dedicated household items (cup; eating utensils et);
Household must practice strict hand hygiene;
All high touch surfaces should be cleaned frequently – at least twice a day.

Family has means to contact or return to health facility if the child deteriorates

NB if home circumstances do not support self-isolation then the child must be admitted.

Supportive care / symptomatic treatment:

Paracetemol;
Maintenance fluids and feeds with additional sorol if child has diarrhoea.

AVOID: Brufen
Nebulising – if necessary use a MDI with a spacer.

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 COVID-19 (Appendix 4).

5. Moderate disease

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

Supportive care:

Monitor 3 - 4 hourly for respiratory deterioration; reduce frequency once child improving.
Supplementary oxygen 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 contact nearest PICU.
Normal maintenance fluids and feeds with additional sorol if child has diarrhoea.

Treatment:

There is no specific treatment for COVID-19.
Provide symptomatic relief - Paracetemol.
Treat suspected co-infection:
Amoxicillin 45 mg/kg/dose 12 hourly per os for 5 days;
OR
Ampicillin 50 mg/kg/dose IVI 6 hourly AND Gentamicin 6 mg/kg IVI daily for 5–10 days.

DO NOT give Corticosteroids;
Nebuliser – if necessary use a MDI with a spacer.

AVOID Brufen;
High Flow Humidified oxygen and nCPAP / BiPAP (the risk from aerosolisation to staff outweighs the potential benefit to the individual patient);
Intubation;
Bagging with a mask.

6. ICU care for children with severe disease

Children with severe disease are eligible for possible admission to ICU.

There are just 4 paediatric ICUs (PICU) and 4 paediatric resuscitation units (PRUs) in KwaZulu-Natal with a combined 38 ICU and 39 high care beds. In addition, many regional hospitals are able to provide short term interim ventilation for 1 or 2 children pending transfer to a PICU.

As children with COVID-19 infection:

- MUST be accommodated apart from those without the infection; and
- ICU services need to be provided for children without COVID-19 infection

these existing ICUs have been configured as follows to cater for both:

- Mixed PICU with separate facilities for both categories of children:
  Inkosi Albert Luthuli Central Hospital
  Grey's Hospital
  Queen Nandi Hospital

- Dedicated non-COVID-19 PICU/PRU:
  Edendale Hospital
  General Justice Gizenga Mpanza Hospital
  King Edward VIII Hospital
  Port Shepstone Hospital
  Prince Mshiyeni Memorial Hospital

- Holding units for short term ventilation
  Most regional hospitals have established small holding units for short term ventilation pending transfer of the child to a PICU.

A PICU bed manager is required to monitor the use and availability of ICU beds for children across the province.

Any hospitals with a child who is considered eligible for admission to a PICU needs to:

1. Contact the provincial PICU bed manager to establish the availability of an ICU, high care or holding bed;
2. Contact the nearest hospital with an available bed to discuss the specific case;
   a. If a bed is available - arrange transport;
   b. If no bed is available – provide supporting or palliative care whichever is most appropriate.

NB Intubation
This must be undertaken by the most senior member of staff on site;
Full PPE with visors must be worn;
If possible this should occur in a perspex box or under plastic sheet;
Rapid sequence intubation is preferred;
Cuffed tubes should be used;
Oro-tracheal rather than naso-tracheal placement.

IV fluids should be restricted to ⅔ of maintenance requirements.

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

To ensure maximal benefit from the few available paediatric ICU beds in the province the withdrawal of support will be considered in any child whose condition is deteriorating. Criteria for this assessment are being developed and will be available to all PICUs / PRUs.

De-isolation

Adults with COVID-19 continue to shed SARS-CoV-2 from their upper airways for 8 – 37 days depending on the severity of their disease – the more severe the disease the longer the period of viral shedding.

Children need to be isolated until they are no longer likely to be shedding virus:

- Asymptomatic children 14 days from initial +ve test
- Mild disease 14 days from onset of symptoms
- Moderate / severe disease 14 days after they are clinically stable ie cessation of oxygen.

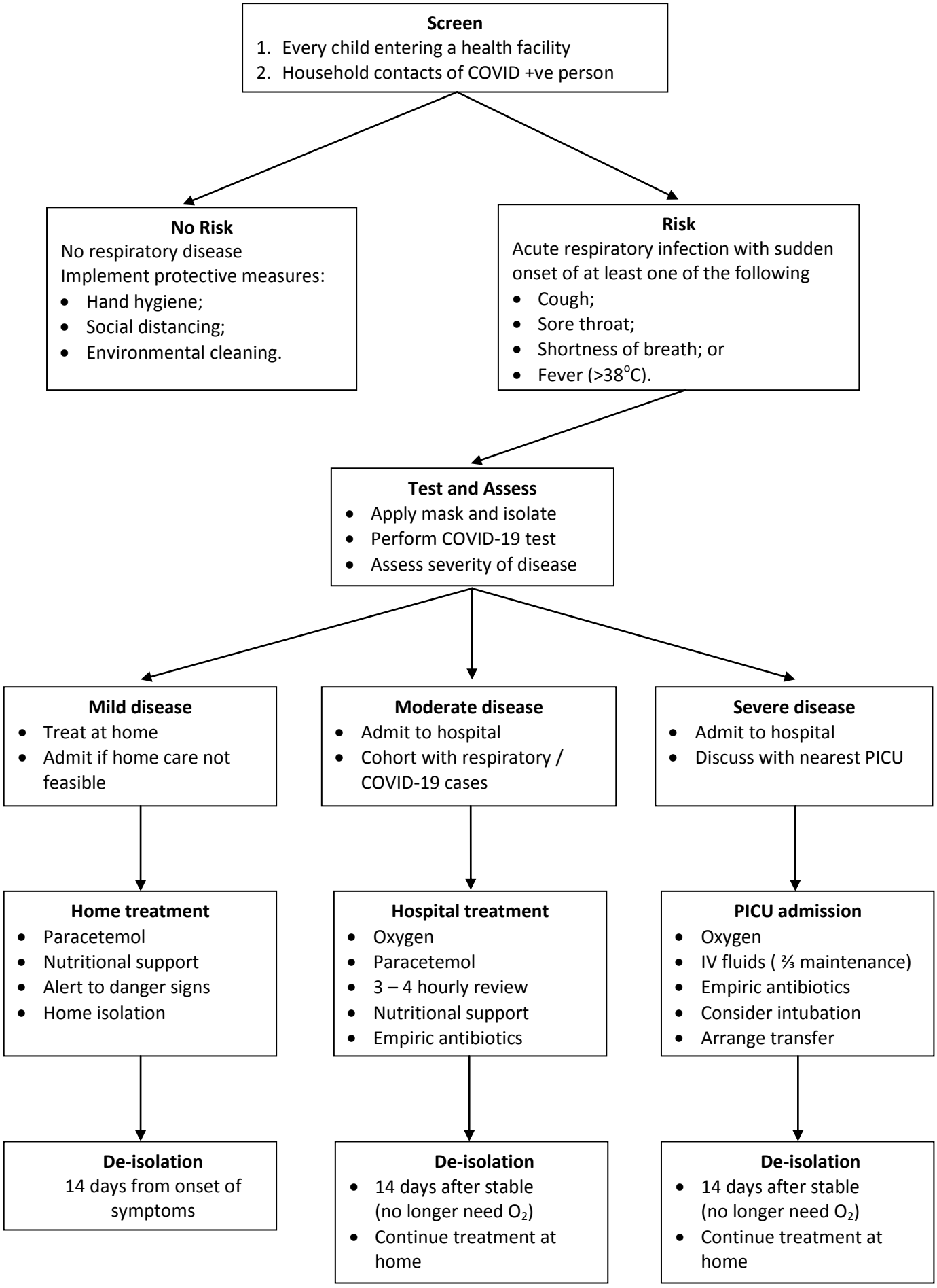
Children admitted to hospital can complete their isolation at home once they are well enough to be discharged provided their home circumstances support self-isolation.

RECORDING AND REPORTING

There are a variety of different forms to record and report cases of COVID-19 infection.
All forms are available from www.nicd.ac.za

Tool	When to complete	Comment
Person of interest form	For all individuals suspected of COVID-19 disease and have a specimen taken	
NMC case notification	For all cases who meet the case definition for COVID-19	Can be completed online using NICD NMC mobile or web based app
Admission form (for in-patients)	For all confirmed patients admitted to a health care facility at admission or as soon as possible after admission	Documents co-morbidities and severity of illness on admission
Daily monitoring forms (separate for in- and outpatients)	For all confirmed patients each day until they are considered cured (by PCR criteria)	Documents daily symptoms, signs and severity of disease during admission
Discharge forms (different for in- and outpatients	For all confirmed patients	Documents patient outcomes such death, transfer or discharge
Homecare form (for outpatients)	For all confirmed patients admitted with mild disease managed at home	Documents co-morbidities and severity of illness on admission

APPENDIX 1: MANAGEMENT ALGORITHM



APPENDIX 2: SEVERITY OF RESPIRATORY DISEASE

Criteria for the classification of the severity of disease in children are:

	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	<40 under 1yr <30 1 – 5 years <20 over 5 years	40-60 under 2 months 40-50 2 – 12 months 30-40 1 – 5 year 20-30 over 5 years	>60 under 2 months >50 2 – 12 months >40 1 – 5 year >30 over 5 years
Respiratory signs	No distress	Lower wall indrawing	Grunting Lower wall indrawing
SpO_2	≥95% in room air	<92% in room air	< 92% in room air

APPENDIX 3: ACCOMMODATION OF CHILD AND CAREGIVER

The principles to be considered when deciding on where to place children and their mothers are:

- As far as possible every child should be admitted with his/her mother or primary caregiver;
- Children acquire COVID-19 infections at home so if child and mother or caregiver live together then they are likely to both be infected;
- When keeping mother or primary caregiver and child together in hospital this needs to occur in a fashion that does not:
    - Place the mother or primary caregiver at unnecessary risk; OR
    - Expose other mothers or caregivers to possible COVID-19 infection.

CHILD	MOTHER / CAREGIVER	PLACEMENT
Well or mild with Suspected or confirmed	Well	Home isolation
	Infected but well	Home isolation – cohort mother and child
	Admitted	Home isolation with alternate caregiver
Moderate: Suspected or confirmed	Well	Mother to room in with child NOT mother's lodge*
	Infected but well	Mother to room in with child NOT mother's lodge
	Admitted	Option for alternate caregiver to stay with child*
Severe**: Suspected or confirmed	Well	Mother to room in with child NOT mother's lodge*
	Infected but well	Mother to room in with child NOT mother's lodge
	Admitted	Option for alternate caregiver to stay with child*

* Provide an indemnity form, about the risk of COVID-19, for the mother / alternate caregiver to sign.

** When considering accommodating mothers in the PICU bear in mind that:

These children are critically ill;
The mother is unlikely to be able to support her child but needs to be present;
Health care workers may need urgent access to the mother or family;
Health care workers require complete access to the child at any time.

So…. Explore whatever option to accommodate mothers that works in your ICU without compromising the care of children.

APPENDIX 4: PATIENT INFORMATION – PREVENTION OF COVID-19 INFECTION

While awaiting test results for COVID-19 (the novel coronavirus), you have been assessed as being medically well enough to be managed at home.

However, please consider yourself as potentially infectious until the final results are available. You will need to abide by the following:

- You should quarantine yourself 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 with soap and water frequently. Alcohol-based sanitizers may also be used, provided they contain at least 60% alcohol.
- Do not have visitors in your home. Only those who live in your home should be allowed to stay. If it is urgent to speak to someone who is not a member of your household, do this over the phone.
- You should wear a facemask when in the same room (or vehicle) as other people.
- At home, you should stay in a specific room and use your own bathroom (if possible). If you live in shared accommodation (university halls of residence or similar) with a communal kitchen, bathroom(s) and living area, you should stay in your room with the door closed, only coming out when necessary, wearing a facemask if one has been issued to you.
- You should practice good cough and sneeze hygiene by coughing or sneezing into a tissue, discarding the tissue immediately afterwards in a lined trash can, and then wash your hands immediately.
- If you need to wash the laundry at home before the results are available, then wash all laundry at the highest temperature compatible for the fabric using laundry detergent. This should be above 60° C. If possible, tumble dry and iron using the highest setting compatible with the fabric. Wear disposable gloves and a plastic apron when handling soiled materials if possible and clean all surfaces and the area around the washing machine. Do not take laundry to a laundrette. Wash your hands thoroughly with soap and water after handling dirty laundry (remove gloves first if used).
- 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 high-touch surfaces like table tops, counters, toilets, phones, computers, etc. that you may have touched should be appropriately and frequently cleaned.
- Monitor your symptoms - 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.

While awaiting the results, if your symptoms worsen:

- Call:

- Or come to:

For more information on COVID-19, see the NICD's FAQ page:
http://www.nicd.ac.za/diseases-a-z-index/covid-19/frequently-asked-questions/

Standard precautions to prevent transmission of COVID-19

Keep your hands clean

When?
- After visiting the bathroom
- Before and after eating
- After blowing your nose
- Whenever you think your hands are dirty

How? Use alcohol hand rub or wash hands with soap and water

Caution Never touch your eyes, nose or mouth with unwashed hands

Cough etiquette
- Keep a distance of 2 meters between you and a person with a cough
- Cover your own cough or sneeze with a tissue
- Once used, throw the tissue away in a closed container
- Clean your hands afterwards

- **Do not share items with other people** (clothing, blankets, pillows, towels, mobile phones, uncovered food, magazines, books)
- **Do not keep the toilet lid up when you flush the toilet** (you can transmit the virus from all body excretions)

Keep your immediate environment clean
- Wipe frequently-touched areas regularly with a disinfectant cloth
- Discard all waste immediately

APPENDIX 5: SIMPLE TERMINOLOGY / CONCEPTS

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

These include:

CLOSE CONTACT

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

- Face-to-face contact (within 2 meters) 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 hot 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.
- 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

This is a preventive and protective measure.
Maintaining sufficient space from potential sources of COVID-19 infection by:

- Staying at home as much as possible;
- Staying at least 1 – 2 meters 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 COVID-19 exposed person or person with suspected infection.
This entails the following:

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

SELF MONITOR

Applies to COVID-19 exposed individual in quarantine.

Involves looking out for early signs of COVID-19 infection:

- Check temperature twice a day
- Watch for symptoms:
    - Respiratory illness – rhinitis; cough; sore throat; shortness of breath;
    - General ill health – fatigue; muscle aches and pains; diarrhea.

SELF ISOLATION

This applies to an individual with confirmed COVID-19 infection.

This 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.