



Republic of Rwanda
Ministry of Health



COVID-19 CLINICAL MANAGEMENT GUIDELINES

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1. FOREWORD

On 30th January 2020, World Health Organization (WHO) through its International Health Regulations Emergency Committee declared the Coronavirus disease-19 (Covid-19) a Public Health Emergency of International Concern (PHEIC). The outbreak was first reported in Wuhan, Hubei Province, in the People's Republic of China. Rwanda registered the first individual positive for Covid-19 on 14th March 2020.

In response to the geographical spread of the infection outside China, the Government of Rwanda established the Covid-19 National Steering Committee with a Joint Task Force coordination mechanism. A treatment site was established in Kanyinya, hand hygiene was promoted across the country and screening took place at airport and borders. Protocols and guidelines were issued to implement the National Preparedness and Response Plan. A first edition of Covid-19 infection treatment guidelines for Rwanda was approved on 20th March 2020 and paved the way for adequate case management of Covid-19 cases in Rwanda.

This second edition of the Covid-19 infection treatment guidelines has been developed following recent research developments, new knowledge availability and experience in the case management in Rwanda. It has been developed for clinicians at the treatment center and site managers of Covid-19 isolation and treatment centers. It provides clear definition for contacts, suspects and confirmed cases. It presents practical guidelines for case management for both pediatric and adult Covid-19 patients including pregnant women.

As for all guidelines, and considering that there is still so much knowledge to gain on the pathogenesis, immunology and therapeutics of Covid-19, these guidelines will evolve in line with new relevant knowledge and progress in the effective management of Covid-19 patients.

I am delighted to present these updated guidelines and highly recommend their use particularly in the Covid-19 treatment centers.



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2. ACKNOWLEDGEMENTS

The second version of the Covid-19 infection treatment guidelines for Rwanda is a step forward towards ensuring common understanding and references for the management of Covid-19 suspects, contacts and cases.

Since this pandemic is fairly recent, we do not have yet a full understanding of the virus pathogenicity and how to adequately respond to it. Diagnostic tools are still based on Antigen tests and serology tests are much needed for epidemiological surveillance and to better manage contacts and patients and control the epidemic. Specific therapeutics are still under research and numerous trials are implemented all over the world. Rwanda is expected to join these efforts in contributing to better knowledge in full respect of patients' rights and professional quality care.

The Ministry of health and Rwandan Biomedical Center wish to acknowledge all health workers and support staff who are working tirelessly in the fight to control this epidemic in Rwanda. Efforts made by the community are also much appreciated and encouraged. Special thanks and recognition to the case management team, partners and other stakeholders who have contributed to the development of this second version of Covid-19 infection treatment guidelines



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3. BACKGROUND

Coronavirus disease 2019 (COVID-19) is a respiratory tract infection caused by a newly emergent coronavirus that was first recognized in Wuhan, China, in December 2019. Genetic sequencing of the virus suggests that it is a betacoronavirus closely linked to the SARS virus and it is why it is called SARS-CoV-2 by the International Committee of Taxonomy of Viruses (1).

Since it was first identified in Wuhan, thousands of infection cases have been reported, first in China then in many other countries across the 5 continents, either as imported cases or as result of autochthonous transmission. Since 31 December 2019 and as of 08 April 2020, 3,052,370 cases of COVID-19 (in accordance with the applied case definitions and testing strategies in the affected countries) have been reported of which 34,934 in Africa, including 216,563 deaths (1,525 in Africa) (<https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases-on-29th-April-2020>).

The disease spread rapidly across the world and according to current evidence, COVID-19 virus is primarily human to human transmitted by (i) direct contact through respiratory droplets and aerosols transmission that occurs when a person is in close contact with someone who has respiratory symptoms (e.g., coughing or sneezing) and by (ii) indirect contact with surfaces in the immediate environment or with objects used on the infected person (2). The current estimated basic reproductive number (R_0) is 2.2 (95% CI, 1.4 to 3.9) (3).

Concerning the transmission period, the virus has been identified in respiratory tract specimens 1–2 days before the onset of symptoms, and it can persist up to 2 weeks or even longer; the high viral load close to symptom onset suggests that the virus can be easily transmissible at an early stage of infection (3). Although transmission of SARS-CoV-2 from asymptomatic or pre-symptomatic persons has been reported, risk of transmission is thought to be greatest when patients are symptomatic (4,5).

The median incubation period is reported to be from five to six days for COVID-19 with a range from 1 to 14 days; a recent modelling study confirmed that it remains prudent to consider the incubation period of at least 14 days (3).

The infection can remain asymptomatic at time of laboratory confirmation and even a large proportion of these cases developed some symptoms at a later stage of infection, there are reports of cases remaining asymptomatic throughout the whole duration of laboratory and clinical monitoring (3).

The symptomatic people have been classified in 4 categories with increasing order of severity that will determine the type of care and management to be provided: mild, moderate, severe and critical (5, 6). Based on the largest patient cohort to date, from asymptomatic cases with COVID-19, about 80 to 81% have mild or moderate disease, 15% have severe disease and 5% develop critical conditions. Vulnerable groups more at risk to present with critical conditions are elderly people above 70 years of age, and people with underlying conditions such as hypertension, diabetes, cardiovascular disease,

chronic respiratory disease, chronic kidney disease and cancer (1,3). Chronic obstructive pulmonary disease (COPD), cardiovascular diseases, and hypertension have been identified as strong predictors for ICU admission (3).

Concerning the Case Fatality Rate (CFR), in the largest cohort of >44,000 persons with COVID-19 from China, all deaths occurred among patients with critical conditions and the overall case fatality rate was 2.3% but the case fatality rate among patients with risk factor (vulnerable) was 49% (5). Globally, the mortality among patients admitted to the ICU ranges from 39% to 72% depending on the study (5).

The number of cases in Africa reported the 07th of May was 51,677; the five countries reporting most cases are South Africa (7,808), Egypt (7,588), Morocco (5,408), Algeria (4,998) and Nigeria (3,145). Overall 2,011 deaths were reported. (<https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases>). In Rwanda the total confirmed cases on 19th of April was 147 of which 88 'imported', 76 were declared cured, no severe or critical case and no death.

Considering the present situation where COVID-19 is rapidly spreading in many countries, the risk of occurrence of widespread national community transmission of COVID-19 in Rwanda in the coming weeks could be reduced and be mild to moderate if effective mitigation measures and good management of contacts and cases are in place. At contrary the risk could be very high with in addition the risk of health care system capacity being exceeded if insufficient mitigation measures are in place. Therefore, all measures in must be aimed at the containment and mitigation of further transmission of the virus.

Against this background, the Government of Rwanda through the Ministry of Health developed a six months National Covid-19 Preparedness and Response Plan (March-August 2020). The proposed interventions are expected to prepare the country to prevent, detect and respond effectively and efficiently to any potential Covid-19 outbreak.

Building on evidence-informed guidelines developed by a multidisciplinary panel of health care providers with experience in the clinical management of patients with COVID-19 and other viral infections, including SARS and MERS, as well as sepsis and ARDS, this guideline should serve as a foundation for optimized supportive management of contacts and supportive management and care of confirmed cases COVID-19.

4. CASE AND CONTACT DEFINITIONS

Case and contact definitions are based on the current available information and are regularly revised as new information accumulates. Rwanda may need to adapt case definitions depending on its local epidemiological situation and other factors (7).

1. SUSPECT CASE (7)

1. A patient presenting an acute respiratory illness with fever ($T > 38.0$) and respiratory symptoms at least one sign/symptom of respiratory disease, e.g., cough, shortness of breath,

AND a history of travel to or residence in a location reporting confirmed case(s) of COVID-19 disease during the 14 days prior to symptom onset;

OR

2. A patient with any acute respiratory illness (fever and at least one sign/symptom of respiratory disease, e.g., cough, shortness of breath, etc)

AND having been in contact with a confirmed or probable COVID-19 case (see definition of contact) in the last 14 days prior to symptom onset;

OR

3. A patient with severe acute respiratory illness (fever and at least one sign/symptom of respiratory disease, e.g., cough, shortness of breath, anosmia, dysgeusia, etc;

AND in the absence of an alternative diagnosis that fully explains the clinical presentation

2. PROBABLE CASE (or presumptive positive as per lab result) (7).

1. A suspect case for whom testing for the COVID-19 virus is presumptive (presumptive being the result of the test reported by the laboratory)

OR

2. A suspect case for whom testing could not be performed for any reason.

CONFIRMED CASE (7)

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

CONTACT (4)

A contact of a COVID-19 case is any person who had contact with a COVID-19 case within a timeframe ranging from 72 hours before the onset of symptoms of the case to 14 days after the onset of symptoms.

If the case had no symptoms: a contact person is defined as someone who had contact with the case within a timeframe ranging from 72 hours before the sample which led to confirmation was taken to 14 days after the sample was taken.

The associated risk of infection depends on the level of exposure, which will, in turn, determine the type of management and monitoring

Close contact with High risk exposure (red-orange ring)

Any person who has one of the following:

- Having had unprotected face-to-face or one-to-one contact with a COVID-19 case within 2 meters for more than 15 minutes
- Having had physical contact with a COVID-19 case
- Having unprotected direct contact with infectious secretions of a COVID-19 case (e.g. being coughed on)
- Having been in a closed environment (e.g. household members (including cleaners, security guards, drivers), classroom, meeting room, hospital waiting room, etc.) with a COVID-19 case for more than 15 minutes
- Having been in an aircraft, sitting within two seats (in any direction) of the COVID-19 case, travel companions or persons providing care, and crew members serving in the section of the aircraft where the index case was seated
- A healthcare worker or other person providing care to a COVID-19 case, or reception staff at health facility, or laboratory workers handling specimens from a COVID-19 case, without recommended PPE or with a possible breach of PPE,
- Travelling together with a COVID-19 case in any mode of transport (car, taxi, bus, etc) without protective masks
- Other situations as indicated by local risk assessments.

Contact with Low-risk exposure (yellow ring)

Any person who has one of the following:

- Having had face-to-face contact with a COVID-19 case within 2 meters for less than 15 minutes
- Having had face-to-face contact with a COVID-19 case within 2 meters for any duration of time while wearing any type of mask
- Who was in a closed environment with a COVID-19 case for less than 15 minutes
- Travelling together with a known COVID-19 case in any mode of transport while wearing protective mask
- Direct care for a patient with probable or confirmed COVID-19 disease while wearing proper personal protective equipment.

5. CONTACTS' MANAGEMENT

GENERAL CONSIDERATION - CONTINUUM OF CARE AND TRIAGE SCREENING AT ALL FACILITIES

People with and without COVID-19 will initially access the health system in the same way. Since people present prior to having a diagnosis, there is overlap in patient flow for services directed to COVID-19 and for other essential services. Basic infection-prevention measures (hand hygiene, respiratory etiquette, physical distancing) should be promoted universally. Frontline care sites—including primary health centers, clinics, and hospital emergency units, as well as ad-hoc community settings (schools, etc) that have been designated as care sites—will need to expand their capacity for screening, isolation and triage, including with designated physical areas and appropriate security. All frontline sites will need to be ready to assess and refer patients appropriately and safely to reduce transmission and ensure rational use of scarce advanced care resources. In some settings, specific facilities may be designated for the care of patients affected by COVID-19. In other settings, there may only be one hospital. Instituting targeted referral and counter-referral criteria and processes will be crucial to keep the system from becoming overwhelmed.

Triage must be done immediately upon arrival of patients to a health facility

1. At each point of entry into the healthcare facility (emergency department, out-patient clinic, antenatal clinic, etc.), identify space where a triage station may be placed.
2. Patients who have COVID-19 symptoms should be placed in a separated seated area from patients who are not symptomatic. Their seats should be at least 1-meter apart.
3. An isolation space, close to triage, ideally attached to the triage area, should be established to separate suspected COVID-19 cases from others.
4. Two pathways (one for suspects who should be isolated and one for other patients who were screened and deemed not suspects) should be established.

1. CONTACT IDENTIFICATION AND LISTING

Immediately after a confirmed or probable case has been identified, the next steps as regards contact tracing for the public health authorities include (4):

- Interviewing the case to collect information on clinical history and possible contacts from two days before onset of symptoms or 2 days from before test sample was taken.
- Tracing the contacts and classifying them into high-risk exposure ('close contact') or low-risk exposure, as described above
- Tracing, and communicating with, the identified contacts and providing information about suitable infection control measures, symptom monitoring and other precautionary measures such as the need for quarantine
- Based on national Rwanda strategies, arranging for testing of contacts for SARS-CoV-2 in the timelines based on risk exposure

2. CONTACT FOLLOW-UP

All close contacts are tested for SARS-COV2. If positive, they are admitted at the treatment center. If negative, refer to table 1 below.

Table 1: Key actions for management of Travellers to Rwanda and the local contacts of COVID-19 patients.

CATEGORY 1	
COMPOSITION	All arrivals by air or from a high risk border point are classified HIGH RISK and will be immediately quarantined with a test upon arrival
QUARANTINE/ISOLATION LOCATION	Designated facilities
NUMBER OF TESTS	2 tests: 1st test is done on Day 0 (upon arrival); sample for 2nd test is taken at least from Day 5 or Day 6 with expectation to be released by Day 7 if all tests are negative.
EXPECTED DISCHARGE TIME (IF NEGATIVE FOR COVID-19)	Within 7 days.

Any positive test will be followed by immediate evacuation to treatment center

CATEGORY 2	
COMPOSITION	All arrivals by land or water from all other borders entry are classified " MEDIUM RISK " and will be immediately isolated
QUARANTINE/ISOLATION LOCATION	Designated facilities
NUMBER OF TESTS	1 test: done on Day 5 counting from the day of arrival at the facility. If the test is negative, the individual can leave on Day 7.
EXPECTED DISCHARGE TIME (IF NEGATIVE FOR COVID-19)	Within 7 days.

CATEGORY 3	
COMPOSITION	All contacts of COVID-19 patients in the community
QUARANTINE/ISOLATION LOCATION	Home/ Compound/ Cluster/ Estate or Village- based.
NUMBER OF TESTS	1 test: tested immediately. If negative: advised to follow self isolation for 14 days. If positive: immediately evacuated to treatment center
EXPECTED DISCHARGE TIME (IF NEGATIVE FOR COVID-19)	Within 7 days.

The contacts of COVID-19 patients will only be allowed to resume unrestricted movement upon results availability, if they are negative for COVID-19.

During the waiting time for results, the area will be controlled to ensure that no people are moving to/from the isolated/quarantined Home/ Compound/ Cluster/ Estate or Village.

Self-quarantine or self-isolation at home can be permitted in rare cases. This will be based on a case by case evaluation and follow strict conditions.

Contact tracing can be resource intensive. The contact tracing intensity will be adapted to the local epidemiological situation and according to available resources. These resources may be strengthened by recruiting non-medical staff, including volunteers, if sufficient data protection safeguards, training, and supervision can be provided. The National Joint Task Force may decide upon measures that may help save resources such as switching to self-quarantine at home and self-monitoring for close contacts instead of supervised quarantine in an institution. To enable scaling up contact tracing, contacts could also be contacted and informed through text messages instead of phone calls.

6. LABORATORY TESTING

1. LABORATORY TESTING GUIDING PRINCIPLES FOR PATIENTS IN RWANDA

Patients who meet the following criteria should be tested for SARS-COV2:

- Suspect case definition
- Had close contact with a COVID-19 cases, even if they are asymptomatic if resource allowed or if they had low exposure with a COVID-19 but developed COVID-19-compatible symptoms, including fever of any grade, cough, fatigue or difficulty breathing symptoms, anosmia, dysgeusia, etc.
- Special categories: cross borders truck drivers, joint task force personnel, exposed health care workers and support staff,

Suspected cases or contact should be screened for the virus with nucleic acid amplification tests (NAAT), such as RT-PCR.

2. SPECIMEN COLLECTION - REFER TO LAB GUIDE AND SOP

Any testing for the presence of 2019-nCoV or clinical specimens from patient meeting the suspect case definition should be performed in appropriately equipped laboratories by staff trained in the relevant technical and safety procedures. National guidelines on the laboratory biosafety should be followed in all circumstances (8).

All technical procedures should be performed in a way that minimizes the generation of aerosols and droplets and appropriate personal protective equipment (PPE), should be worn by all laboratory personnel handling these specimens.

Specimens to be collected (9)

Upper respiratory specimens: nasopharyngeal and oropharyngeal swab or wash in ambulatory patients

Packaging and shipment of clinical specimens (9)

Specimens for virus detection should reach the laboratory as soon as possible after collection. Correct handling of specimens during transportation is essential. Specimens that can be delivered promptly to the laboratory can be stored and shipped at 2-8°C. When it is likely that there will be a delay in specimens reaching the laboratory, the use of viral transport medium is strongly recommended. Specimens may be frozen to -20°C or ideally -70°C and shipped on dry ice if further delays are expected. It is important to avoid repeated freezing and thawing of specimens. Alerting the laboratory before sending specimens encourages proper and timely processing of samples and timely reporting. Specimens should be correctly labelled and accompanied by a diagnostic request form.

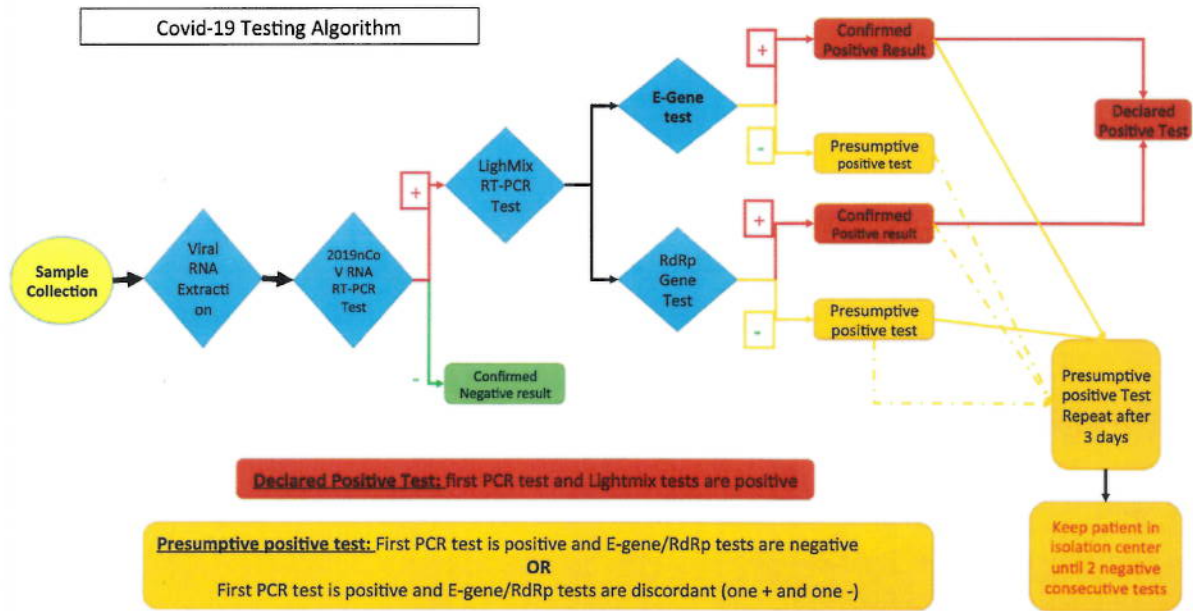
3. LABORATORY TESTING FOR COVID-19 VIRUS (9)

Nucleic acid amplification tests (NAAT) for COVID-19 virus.

Routine confirmation of cases of COVID-19 is based on detection of unique sequences of virus RNA by NAAT such as real-time reverse-transcription polymerase chain reaction (RT-PCR) with confirmation by nucleic acid sequencing when necessary. The viral genes targeted so far include the N, E, S and RdRp genes. RNA extraction should be done in a biosafety cabinet in a BSL-2 or equivalent facility. Heat treatment of samples before RNA extraction is not recommended.

Negative result means CT value >40 cycles while positive result has CT value <40 cycles.

Figure 2: Covid-19 testing algorithm in Rwanda



AT THE END OF THE 14 DAYS:

There is no need to perform the two consecutive PCR tests before patient discharge: only the Light Mix RT-PCR test will be performed (for E-gene and RdRp genes) to assess whether the patients is negative and can be discharged (see section 7: discharge of patients)

4. MANAGEMENT OF PRESUMPTIVE TEST RESULTS

Presumptive test results includes a small category of results whereby either:

1. First PCR Test is positive AND Confirmatory PCR Test is negative (both E-gene and RdRp negative)
2. First PCR Test is positive AND Confirmatory PCR Test is discordant (E-gene positive and RdRp negative or E-gene negative and RdRp positive)

Initial laboratory data indicates that 70% of the presumptive positive results are negative ≥ 72hrs while 30% are confirmed positive.

It is therefore recommended that presumptive positive results be retested after 72hrs to confirm their status.

While waiting for the confirmatory test, the patient should preferably remain in isolation center in a

dedicated wing (not mixed with cases) until the confirmation test result is known.

- If positive, the patient is transferred to the treatment case
- if the confirmation test is negative, a second test is repeated after 24hrs for confirmation. If the repeat test is also negative, the person is discharged home in self-quarantine until completing 14 days monitoring and further repeat test after 14 days. If the repeat test is positive, the patient is transferred to the treatment center.

Table 2: Summary table for laboratory interpretation and management of results

FIRST PCR	SECOND PCR		RESULT	REPEAT 2D PCR after 72 hours		REPEAT PCR	
	E Gene	RdRp		E Gene	RdRp	E Gene	RdRp
NEG			RESULT IS NEGATIVE				
POS	POS	POS	RESULT POSITIVE			RETEST AT DAY 14	
POS	NEG	NEG	PRESUMPTIVE POS	POS	POS	RESULT POSITIVE	
POS	NEG	NEG	PRESUMPTIVE POS	NEG	NEG	Home self quarantine RETEST AT DAY 14	
POS	POS	NEG	PRESUMPTIVE POS	NEG	NEG	RETEST AFTER 72H	
POS	NEG	POS	ERROR IN LAB	NEG	POS	REPEAT TEST	

NB For Presumptive results, 2 successive negative tests must be performed prior to discharging the patient

5. REPORTING OF CASES AND TEST RESULTS

Laboratories should follow national reporting requirements. In general, all test results, positive or negative, should be immediately reported to national authorities and to the patients or contacts.

7. CONFIRMED CASES COVID-19 MANAGEMENT

1. SCREENING AND TRIAGE ON ADMISSION

Early diagnosis, treatment and isolation should be carried out whenever possible.

On admission, the physician at the treatment center must classify the patient based on the following clinical symptoms, clinical examination and additional examination. It should be noted that there are reports of cases remaining asymptomatic throughout the whole duration of laboratory and clinical monitoring (3).

The most common symptoms are non-specific: fever, cough, fatigue, and dyspnea but many other symptoms are reported: anorexia sputum production, myalgia, headache, confusion, rhinorrhea, sore throat, hemoptysis, vomiting, and diarrhea have been reported including anosmia and dysgeusia (5, 11, 13), hypoxemia without respiratory distress.

The median time from symptom onset to the development of pneumonia is approximately 5 days and the median time from symptom onset to severe hypoxemia and ICU admission is approximately 7–12 days (5, 11).

Most patients have bilateral peripheral ill-defined opacities on chest radiograph and common CT findings are ground glass opacities and consolidation (11, 12) ([https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(20\)30086-4/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30086-4/fulltext)). Acute hypoxemic respiratory failure from acute respiratory distress syndrome (ARDS) is the most common complication (in 60–70% of patients admitted to the ICU), followed by shock (30%), myocardial dysfunction (20–30%), and acute kidney injury (10–30%) (11). Elderly patients might develop hypoxemia without respiratory distress and arrhythmia are also reported in ICU patients (11).

COVID-19 may lead to thromboembolism especially pulmonary embolism (12) (PE) and deep vein thrombosis (DVT), this is due to excessive inflammation, hypoxia, immobilization and diffuse intravascular coagulation. Reports on endothelitis or vasculitis also call for attention and attentive management.

Upon admission of a confirmed Covid-19 case, pay attention to the following comorbidities:

- Chronic lung diseases or moderate to severe asthma
- Cardiovascular diseases and serious heart conditions
- Immunocompromised patients (cancer treatment, smoking, organ transplantation, immune deficiencies, uncontrolled HIV/AIDS, prolonged use of corticosteroids)
- Severe obesity (BMI \geq 40)
- Diabetes
- Chronic Kidney Disease (requiring dialysis)
- Liver disease

Note that patients over 65 years old are also at risk of severe illness from Covid-19 and need to be monitored with attentive care

Table 3: Case classification according to clinical and imaging picture

Stage of the Severity	Main symptoms and Imaging (1,3,10)	Laboratory and imaging investigations
Asymptomatic	The infection can remain asymptomatic at time of laboratory confirmation but a large proportion of these cases developed some symptoms at a later stage of infection	For all confirmed cases at Baseline at admission <ul style="list-style-type: none"> ○ FBC ○ Liver function: AST, ALT, Total bilirubin ○ Kidney function: blood urea and creatinine ○ If high fever: malaria test Add chest X-ray if symptomatic
Mild	Mild symptoms, non-specific: Fever, cough, fatigue, anorexia, myalgia, headache, rhinorrhea, sore throat, vomiting, diarrhea, smell and taste disorders. No sign of pneumonia on imaging – normal chest imaging	
Moderate	Fever and/or respiratory symptoms, no signs of sepsis or shortness of breath. Sign of mild pneumonia on imaging (reticular opacities and nodules are appreciable on standard CXR). COVID-19 at the early stage often presents with multifocal patchy shadows or ground glass opacities located in the lung periphery, subpleural area, and both lower lobes on chest CTscans(10). -Abnormal chest imaging	Chest X-ray/ Chest CT Monitoring FBC, LFT, RFT Blood culture if high fever Consider checking coagulation D-dimers

<p>Severe</p>	<p>Adult: Fever and dyspnea and/or Hypoxia ($SpO_2 \leq 93\%$) and/or <u>For adult:</u> RR $\geq 30/\text{min}$ <u>Children</u> 1-5 years: ≥ 40, 2-11 months: ≥ 50 and < 2 months: ≥ 60 ; look for central cyanosis in children $SpO_2 \leq 90\%$ for children Arterial partial pressure of oxygen (PaO_2)/oxygen concentration (FiO_2) ≤ 300 mmHg Patients with $> 50\%$ lesions progression within 24 to 48 hours in lung imaging; disease progression shows enlarged and increased density of the lesions compared with previous images, and consolidated lesions with air bronchogram sign.</p>	<p>As above (FBC, LFT, Renal Blood gases Consider monitoring coagulation D-dimers, sepsis, echocardiography and as required case by case</p>
<p>Critical</p>	<p>Respiratory failure and/or Sepsis with signs of (multi)organ dysfunction including altered mental status, difficult or fast breathing, low oxygen saturation, reduced urine output, fast heart rate, weak pulse, cold extremities or low blood pressure, skin mottling, coagulopathy and/or Shock with persisting hypotension despite volume resuscitation, requiring vasopressors to maintain and/or Multiorgan system dysfunction There are three stages according to the oxygenation index: - Mild Acute respiratory Distress Syndrome (ARDS): - $PaO_2/FiO_2 \leq 300$ mm Hg - Moderate Acute respiratory Distress Syndrome (ARDS): - $PaO_2/FiO_2 \leq 200$ mm Hg - Severe Acute respiratory Distress Syndrome (ARDS): - $PaO_2/FiO_2 \leq 100$ mm Hg</p>	<p>As above monitoring coagulation, sepsis, and as required case by case</p>

2. TREATMENT

General Management

- It is crucial to identify severe cases and start supportive treatment without delay but also applying strict IPC measures. Co-morbidities should be identified quickly and supplemental oxygen initiated for patients with low oxygen.

-Although most infections are not severe, some patient can quickly develop critical diseases requiring admission to an intensive Care Unit. Close monitoring is therefore essential to be able to react accordingly, especially for vulnerable groups more at risk to be admitted in ICU (above 70 years of age, people with underlying conditions such as hypertension, diabetes, cardiovascular disease, chronic respiratory disease, chronic kidney disease and cancer) (1,3). Chronic obstructive pulmonary disease (COPD), cardiovascular diseases, and hypertension have been identified as strong predictors for ICU admission (3). Pulmonary embolism, deep vein thrombosis and vasculitis are not uncommon and need to be prevented or treated as per national guidelines. Dynamic monitoring of lung imaging and oxygenation index are helpful for early identification of patients who may develop into severe and critical cases.

While the guidelines below provide management guidance, severe and critically ill patients will require the presence of senior internal medicine specialists and intensivist

Table 4: Covid-19 case management in Rwanda (on basis of stage of disease)

Stage of the disease	Management (3, 10)
Asymptomatic	<ul style="list-style-type: none"> - Isolation –at dedicated monitored institutions according to the resource available - Should be daily monitored for temperature - Should be daily monitored for COVID-19-compatible symptoms, including fever of any grade, cough, fatigue or difficulty breathing - Should implement rigorous hand hygiene and respiratory etiquette measures (refers to covering the mouth and nose when coughing and sneezing using a disposable paper tissue properly disposed of immediately after the use) - Should wear a mask when in the same room of other people

<p>Mild and moderate</p>	<ul style="list-style-type: none"> - Isolation – at dedicated monitored institutions according to the resource available - Should be daily monitored for temperature - Should be daily monitored to detect any sign of aggravation - Should implement rigorous hand hygiene and respiratory etiquette measures (refers to covering the mouth and nose when coughing and sneezing using a disposable paper tissue properly disposed of immediately after the use) - Should wear a mask when in the same room of other people - Can benefit of symptomatic treatment if necessary: hydration, antipyretic, analgesic: Adult: paracetamol 1gm PO every 6-8hrs (max (4g/24h), 15mg/kg in children, avoid ibuprofen and Aspirin <ul style="list-style-type: none"> - If confirmed, pneumonia will be treated with empiric antibiotics: Eg.: Amoxicillin 500mg PO tds or Amoxicillin +clavulanic 1gm PO bid or 625mg TDS for 7 days or ceftriaxone 1-2g IV or IM/doxycycline 100mg PO bid) Other antibiotics can be given after assessment and approval of Clinicians. - Do not give ant inflammatory like ibuprofen or aspirin - Other therapeutic drugs as per agreed upon Rwandan therapeutic regimen (trial protocol)
<p>Severe</p>	<ul style="list-style-type: none"> - Isolation at treatment center - If Saturation O₂ ≤ 92%: Oxygen therapy to maintain the oxygen saturation (Sp O₂) at 93%-96% for patients without chronic pulmonary disease and at 88%-92% for patients with chronic respiratory failure or severe obesity; with continual oxygen saturation monitoring. Oxygen therapy should be initiated at 5L/min and titrate flow rate or use a Non rebreathing mask (10-15L) in more severe cases. - High-flow nasal cannula (HFNC) oxygen therapy can be proposed - Infection transmission prevention measures - Discuss case by case the use of corticotherapy - Provide prevention of secondary pulmonary infection: antibiotics can be used with discretion in patients who have the following conditions: extensive lung lesions; excess bronchial secretions; chronic airway diseases with a history of pathogen colonization in the lower respiratory tract; The options of antibiotics include Augmentin IV or ceftriaxone/doxycycline IV, ceftazidim, vancomycin... - Infection transmission prevention - Other therapeutic drugs as per agreed upon Rwandan therapeutic regimen (trial protocol)

Critical	<ul style="list-style-type: none"> - As above plus Mechanical ventilation if HFNC treatment fail as some severe patients progress to ARDS rapidly - Infection transmission prevention measures - Non-invasive Ventilation (NIV); if performed in a negative pressure room or through a helmet. A virus filter should be installed between the mask and the exhalation valve when applying NIV with a single tube. Suitable masks (according to size and age) should be chosen to reduce the risk of virus spread through air leakage - Invasive Mechanical Ventilation with prone ventilation wherever possible - Nutrition support - Vasopressor support (consider norepinephrine as protocol) - Anticoagulants to be discussed as per national protocol (Enoxaparin 40mg OD) - Other drugs as per agreed upon Rwandan therapeutic regimen (trial protocol)
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Note on specific therapeutics: There is currently no treatment for Covid-19. Following evidence and based on collegial peer discussion, specific therapeutics may be used and the protocol will be developed and disseminated for implementation

3. INFECTION PREVENTION MEASURES

(11, 13, 14)(also refer to IPC guidelines and SoP)

Isolation of the patient COVID-19

To protect other patients and health-care workers, patients with suspected or confirmed COVID-19 should ideally be admitted to an airborne infection isolation room (AIIR) that is at negative pressure relative to surrounding areas, with accessible sinks and alcohol hand gel dispensers (figure 1), especially if aerosol-generating procedures are done. Of course, very few institutions have this AIIR available. If AIIRs are unavailable, patients can be placed in an adequately ventilated single rooms with the doors closed and with its own bathroom, as recommended by WHO. Where single ICU rooms are unavailable, cohorting of cases in shared rooms with dedicated staff is an alternative, with beds spaced apart. Although the current evidence points towards droplet rather than airborne transmission of COVID-19, concerns of nosocomial transmission in shared rooms remain, especially when aerosol-generating procedures are performed. Thus, PPE should be considered for patients in shared rooms. Oxygen masks with HEPA filters might provide some protection for non-intubated patients.

The patient should wear a surgical mask.

The duration of infectivity for COVID-19 patients is currently not known definitely. COVID-19 virus can be initially detected in upper respiratory samples 1 to 2 days before the onset of symptoms and persist for 7 to 12 days in moderate cases, and up to two weeks in severe cases. In feces, viral RNA has been detected in up to 30% of patients from day 5 after onset and up to 4 to 5 weeks.

For health-care workers providing direct care to patients with COVID-19

Medical masks, full PPE jacket, gloves, eye protection with goggles or face shields and gumboots
Facemasks (surgical masks) mainly protect from exhaled droplets. Their use is recommended if there is a shortage of respirators and on a case-by-case assessment but should not be used in case of aerosol-generating procedures.

For aerosol-generating procedures (tracheal intubation, NIV, tracheostomy, cardiopulmonary resuscitation, bag-mask ventilation, and bronchoscopy) » masks should be N95 or FFP2-equivalent respirators, and gowns or aprons should be fluid resistant (11). Non-N95 reusable masks with high-efficiency particulate air (HEPA) filters that do not require fit testing might be considered (11).

In order to *maximize the use of mask respirators* in the event of shortages, it is acceptable for staff to wear the same respirator while caring for multiple patients with the same diagnosis without removing the respirator if the respirator is not damaged, soiled or contaminated. This reduces consumption of PPE. The maximum time a respirator can be worn is 4 hours, as long as it is not removed between patients or contraindicated by the manufacturer.

Healthcare workers should *strictly follow the procedures for the wearing (donning) and the safe removal (doffing)* of PPE in correct sequence (see IPC and SoP). Active assistance during donning and doffing is a valid option for minimizing the risk of accidental contamination. Hand hygiene should be performed immediately after removing PPE. It is essential to ensure that staff assigned to treat COVID-19 patients are trained in the proper use of PPE. Quality assurance should be promoted through appropriate systems before assigning staff to COVID-19 patient care; for example, hospitals could require documented participation in a training course to ensure a staff member's competency in the correct use of PPE.

For Staff engaged in environmental cleaning and waste management (refer to IPC guidelines)

Staff engaged in environmental cleaning and waste management should wear appropriate PPE. If there is an insufficient stock of respirators, then a surgical mask may be worn, as well as gloves, goggles, gumboots and gown. In addition, the use of heavy-duty gloves and boots should be considered.

Environmental measures

It refers to routine cleaning of frequently used surfaces, clothes and objects, minimizing the sharing of objects, and ensuring appropriate ventilation.

Surface decontamination is a key to infection prevention because viable SARS-CoV-2 persists on inanimate surfaces such as plastic and stainless steel for up to 72 hours (11).

Mobile phone, tablets might be contaminated with common viral pathogens, these should be cleaned regularly or wrapped with specimen bags that are discarded after contact with patients.

Environmental contamination by SARS-CoV-2 was detected on furniture and equipment in patient's rooms (doorknobs, bed guardrails, air exhaust dampers, etc.).

Regular cleaning followed by disinfection is recommended, using hospital disinfectants active against viruses; cleaning inpatient rooms is particularly important for frequently touched surfaces. If there is a shortage of hospital disinfectants, decontamination may be performed with 0.1% sodium hypochlorite (dilution 1:50 if household bleach at an initial concentration of 5% is used) after cleaning with a neutral detergent, although no data are available for the effectiveness of this approach against SARS-CoV-2 (13). Surfaces that may become damaged by sodium hypochlorite may be cleaned with a neutral detergent, followed by a 70% concentration of ethanol.

Waste should be treated as infectious clinical waste Category B (UN3291) and handled in accordance with healthcare facility policies and local regulations.

Visits

It should be restricted or banned to prevent further transmission, except perhaps for the imminently dying. Where feasible, video conferencing via mobile phones or other interfaces can be used for communication between family members and patients or health-care workers. Physical contacts between visitors and patients should be strongly discouraged.

Hand hygiene

The risk of transmitting or acquiring 2019-nCoV infection can be reduced by the correct application of hand hygiene. Hand hygiene refers to the frequent washing of hands with soap and water or cleaning of hands with alcoholic solutions, gels or tissues. Hands should be washed regularly using soap and water for 40–60 seconds. Alcohol-based hand sanitizers provide limited added benefit over soap and water in community settings, and if used should contain 60–85% alcohol [8,9]. If hands are soiled, soap and water should precede the use of alcohol-based hand sanitizers. Since the 2019-nCoV virus can be transmitted by direct contact through droplets or indirectly through hand-mediated transfer of respiratory or possibly other secretions, we recommend applying hand-hygiene measures in all settings during all phases of the epidemic. Proper hand hygiene would also prevent the transmission of other communicable diseases. In healthcare settings, proper hand hygiene will need to be performed immediately before and after contact with a patient, before wearing or removing personal protective equipment (PPE) and after contact with potentially infectious material, such as respiratory or other secretions. The same applies to patients or people caring for patients at home. Recommending hand hygiene is considered to be a rational precaution, involving limited costs and no significant associated risks. Its effectiveness is likely to increase in combination with other measures (e.g. facemasks used in healthcare settings). The effectiveness of hand hygiene depends on the ability to ensure that people comply, through appropriate and repeated training and an adequate and regular supply of soap, tissues and alcohol-based hand sanitizers.

Cough etiquette

Cough etiquette refers to covering the mouth and nose when coughing and sneezing (e.g. using a paper tissue or cloth handkerchief) with the aim of reducing person-to-person transmission through droplets which are a known mode of transmission for coronaviruses. Cough etiquette is widely recommended in public health guidelines for all settings at all times. Supply of materials (e.g. tissues, no-touch waste bins, etc.) needs to be ensured. It is important that tissues are properly disposed of immediately after the use and hands are then washed with soap and water, as described in the hand hygiene section. If Tissue is not available it is recommended to cough or sneeze in his elbow then wash hands.

As many cases of shortage in PPE equipment has been reported, some recommendations were provided to reduced access to personal protective equipment (PPE) and hand hygiene materials with priority for healthcare workers and patients. These recommendations are extracted from ECDC document "Infection prevention and control for COVID-19 in healthcare settings - first update - 12 March 2020 - European Centre for Disease Prevention and Control" and presented in the Figure 3.

4. SUPPORTIVE MANAGEMENT AND PSYCHO-SOCIAL SUPPORT (18, 19, 20, 21, 22, 23)

During this time of crisis that is generating stress, anxiety and fear in the population, attention must be given to providing adequate context and culture related information and messages. This information needs to be adjusted according to target groups: general population, health professionals, contacts of cases, confirmed cases, older people as well as children. This guideline will concentrate on psychosocial support for people admitted in isolation and treatment centers.

Table 5: What to expect: Typical Reactions for people in isolation centers (adapted from SAMHSA)

Everyone reacts differently to stressful situations such as an infectious disease outbreak that requires social distancing, quarantine, or isolation.

People may feel

Anxiety, worry, or fear related to:

- Their own health status
- The health status of others whom they may have exposed to the disease
- The resentment that their friends and family may feel if they need to go into quarantine as a result of contact with them
- The experience of monitoring themselves, or being monitored by others for signs and symptoms of the disease
- Time taken off from work and the potential loss of income and job security
- The challenges of securing things they need, such as groceries and personal care items

Concern about being able to effectively care for children or others in your care

Uncertainty or frustration due to lack of information about how long you will need to remain in this

situation, and uncertainty about the future

Loneliness associated with feeling cut off from the world and from loved ones

Anger if you think you were exposed to the disease because of others' negligence

Boredom and frustration because you may not be able to work or engage in regular day-to-day activities

Uncertainty or ambivalence about the situation

A desire to use alcohol or drugs to cope

Symptoms of depression, such as feelings of hopelessness, changes in appetite, or sleeping too little or too much

Symptoms of post-traumatic stress disorder (PTSD), such as intrusive distressing memories, flashbacks (reliving the event), nightmares, changes in thoughts and mood, and being easily startled If you or a loved one experience any of these reactions for 2 to 4 weeks or more, contact your health care provider or one of the resources at the end of this tip sheet

Promoting Psychological Wellbeing During Quarantine - What to advise the patients

- 1. Use communication as an intervention.** Clear, understandable, and practical communication can reduce adverse psychological responses and increase behavioral adherence. Provide rapid, repeated, and developmentally and culturally appropriate communications about the nature of the disease, the reasons for quarantine, and other essential information.
- 2. Facilitate communication with loved ones.** Knowledge of loved ones' conditions can have a powerful impact on the emotional health of quarantined individuals and improve adherence to recommended quarantine. For example, knowing that loved ones are safe, healthy, and well-cared for can reduce stress, while increased stress should be anticipated when information is lacking or in cases of worrisome news. Before quarantine, allow sufficient time (within the limits of public health concerns) for patients to make arrangements, reassure their loved ones, and say goodbye. During quarantine, facilitate the use of technology (e.g., phone and video calls, social media) to keep loved ones in contact with each other.
- 3. Reduce boredom and isolation.** Planning for activities during quarantine can help reduce boredom and lessen the focus on symptoms and feelings of being isolated from family and friends. As above, facilitating access to the internet and social media is important to maintaining social networks and remote communication while in quarantine. However, media exposure should be monitored, as too much exposure and exposure to unreliable sources can increase stress.
- 4. Talk about your worries:** It is quite common to feel worried, scared or helpless about the current situation. Remember that this is a difficult time for everyone and sharing how you are feeling and the things you are doing to cope with family and friends can help them too. If you don't feel able to do that, there are people you can speak to via NHS recommended helplines or you could find support groups online to connect with.

- 5. Take care of your body**– Try to eat healthy well-balanced meals, exercise regularly, and get plenty of sleep. Avoid alcohol, tobacco, and other drugs. Learn more about wellness strategies for mental health ie Physical exercise (e.g. yoga, tai chi, stretching), Cognitive exercises, Relaxation exercises (e.g. breathing, meditation, mindfulness), Reading books and magazines.
- 6. Connect with others**– Share your concerns and how you are feeling with a friend or family member. Maintain healthy relationships, and build a strong support system.
- 7. Take breaks**– Make time to unwind and remind yourself that strong feelings will fade. Try taking in deep breaths. Try to do activities you usually enjoy.
- 8. Stay informed**– When you feel that you are missing information, you may become more stressed or nervous. Watch, listen to, or read the news for updates from officials. Be aware that there may be rumors during a crisis, especially on social media. Always check your sources and turn to reliable sources of information like your local government authorities.
- 9. Avoid too much exposure to news**– Take breaks from watching, reading, or listening to news stories. It can be upsetting to hear about the crisis and see images repeatedly. Try to do enjoyable activities and return to normal life as much as possible and check for updates between breaks.
- 10. Seek help when needed**– If distress impacts activities of your daily life, talk to a counselor, or doctor, or contact the psychologist at the treatment center

Clinicians and psychologists to look out for these common signs of distress:

- Feelings of numbness, disbelief, anxiety or fear.
- Changes in appetite, energy, and activity levels.
- Difficulty concentrating.
- Difficulty sleeping or nightmares and upsetting thoughts and images.
- Physical reactions, such as headaches, body pains, stomach problems, and skin rashes.
- Worsening of chronic health problems.
- Anger or short-temper.
- Increased use of alcohol, tobacco, or other drugs.

Managers should protect staff from stress

Take care of staff. Healthcare providers are also vulnerable to experiencing the psychological effects of quarantine, and this can be compounded by the stress of caring for sick and distressed patients. Get regular one to one and clinical supervision/mentorship in order to maintain the best standards of care. Make sure your own basic needs are met, including: eating, drinking, and sleeping; taking breaks at predetermined intervals; checking in with colleagues and loved ones; and ensuring that your family and organization are safe and have a plan in place for possible quarantine. If you are likely to work with infected individuals, have frank discussions with your family about the risk to you and to them and steps being taken to minimize that risk. Plan for the possibility that you may be quarantined separately from them if they are not exposed.

Keeping all staff protected from chronic stress and poor mental health during this response means that they will have a better capacity to fulfil their roles whether health workers or in allied supporting roles. So a manager should:

- 1. Encourage healthcare providers to share** their thoughts, feelings, emotions, behavior, attitudes toward COVID-19 with their supervisor, managers, employers and mental health professionals
1. Regularly and supportively, **monitor the staff for their well-being** and foster an environment, which promotes staff speaking with him/her if their mental well-being deteriorates
2. Ensure that good communication and accurate information updates are provided to all staff
3. Consider if there is any capacity to ensure the staff get the rest and recuperation they need
4. Provide brief and regular forums to allow workers to express their concerns and ask questions
5. Encourage peer-support amongst colleagues
6. Pay particular attention to any staff who may be experiencing difficulties in their personal life, previously experiencing poor mental health or who are lacking social support
7. Ensure that staff are aware of where and how they can access mental health and psychosocial support
8. Ensure that staff are aware of where and how they can access mental health and psychosocial support

Psychosocial monitoring of patients in treatment center

Table 6 Daily checklist to be filled by the clinician. This checklist will allow the clinician to identify patients who may need specific psychosocial support from the mental healthcare provider at the center

Mental health and psychosocial support pillar I		Activity (assess how the elements below are met)	Findings (write down how every element is met)	Action to be taken	Action taken (tick the corresponding number/s)	Recommendation
Basic services and security	Feeding			1. No action required 2. Reassure the patient/ respondent that you will do the advocacy or report to relevant authorities 3. Explain to the In-charge or relevant authority the impact that this may have on the individual's mental health 4. Do advocacy for change	1 .	
	Treatment				2 .	
	Hygiene				3 .	
	Respect of diversity				4 .	
	Hazard free environment					
	Additional elements (to brainstorm)					
Mental health and psychosocial support pillar II	Activity (assess if the following conditions are met)	Findings (write down how every element is met)	Action to be taken	Action taken (tick the corresponding number/s)	Recommendation	
Community and family support	Connection with the family/friends via telephone, internet, ...		1. No action required 2. Reassure the patient/ respondent that you will do the advocacy or report to relevant authorities 3. Explain to the In-charge or relevant authority the impact that this may have on the individual's mental health 4. Do advocacy for change	1 .		
	Children are not separated from their caregivers when considered safe			2 .		
	Additional elements (to brainstorm)			3 .		
				4 .		

Focused non-specialized support	Screening for stress, anxiety and depression using DASS-21 and any other underlying mental health condition.	Normal	No action required		Recommendation
		Mild	First aid psychological support/psychological counselling		
		Moderate and beyond	Requesting for a consult for psychiatric review		
Psychosocial support pillar IV	Activity	Underlying mental health condition	Requesting for a consult for psychiatric review		Recommendation
		Findings (write down the diagnosis)	Action to be taken	Action taken (Yes/No)	
Specialized services	Psychiatric evaluation to establish the diagnosis.		Psychotherapy		
			Pharmacotherapy		
			Combined therapy		

Psychosocial support to people with special needs (see also next pages):

Children

During stressful time, it is normal for children to seek more attachment and be more demanding.

1. Keep children closer to their parents and family if considered safe
2. Avoid separating children and their parents as much as possible
3. Help children find positive ways to express feelings such as fear and sadness

Older adults

Older adults or those with chronic mental disorders or cognitive decline may become more anxious, angry, stressed, agitated or withdrawn during quarantine or stay in a treatment center. Healthcare providers are advised to:

1. Share simple facts about what is going on
2. Regularly monitor their general health status
3. Check on comorbidities they may have and ensure they are provided with drug supply

5. PARTICULAR CASES

Pregnant women and neonate (3, 16)

To date, there is limited data on clinical presentation and perinatal outcomes after COVID-19 infection during pregnancy or the puerperium. There is no evidence that pregnant women present with different signs and/or symptoms or are at higher risk of severe illness. So far, there is no evidence on mother-to-child transmission when infection manifests in the third trimester, based on negative samples from amniotic fluid, cord blood, vaginal discharge, neonatal throat swabs or breastmilk. Similarly, evidence of increased severe maternal or neonatal outcomes is uncertain, and limited to infection in the third trimester, with some cases of premature rupture of membranes, fetal distress and preterm birth reported.

In this context, the routine facilities activities should continue to be provided to clients in need with the consideration of potential contamination, therefore measures should be taken so that both HCW and client are protected and quality of care is respected and centered. The following recommendations are given with the assumption that newborns and children with COVID-19 will be hospitalized in center that are fully equipped to the level of a referral hospital (see list of equipment, materials and medications in "Managing children and neonates with COVID-19 in Rwanda"). The center should have a senior pediatrician with expertise in child intensive care. If the treatment center is not equipped with the materials and staff of a referral hospital level, then criteria for transfer and safe transport mechanisms to higher level of care should be developed that are specific for children and newborns with confirmed COVID-19.

Pregnancy Management

Because coronavirus disease 2019 might increase the risk for pregnancy complications, management should optimally be in a health care facility with close maternal and fetal monitoring. Therefore, to maintain and optimize the continuity of essential maternal and newborn care services, effort should be put on services and supplies related to reproductive health, nutrition, including care during pregnancy; delivery, and postnatal care. Basic Comprehensive Emergency Obstetric and Newborn Care, Family planning services, Safe abortion/Post abortion care as per the law and legal framework of the country, management of Gender Based Violence and referral linkage should continue to be available and strengthened.

All pregnant women with a suspected, probable or confirmed COVID-19 infection, including women who may need to spend time in isolation, should have access to woman-centered, respectful skilled care, including obstetric, fetal medicine and neonatal care, as well as mental health and psychosocial support, with readiness to care for maternal and neonatal complications

Principles of management of coronavirus disease 2019 in pregnancy include early isolation, aggressive infection control procedures, oxygen therapy, avoidance of fluid overload, consideration of empiric antibiotics (secondary to bacterial infection risk), laboratory testing for the virus and

co-infection, fetal and uterine contraction monitoring, early mechanical ventilation for progressive respiratory failure, individualized delivery planning, and a team-based approach with multispecialty consultations. Recently Pregnant women who have recently recovered from COVID-19 should be enabled and encouraged to attend routine antenatal, postpartum care as appropriate. Additional care should be provided if there are any complications.

Information on coronavirus disease 2019 is increasing rapidly. Clinicians should continue to follow the WHO, Centers for Disease Control and Prevention and UNICEF websites among others to stay up to date with the latest information.

A confirmed COVID-19 neonatal case has been recently reported; however the mode of transmission remains unclear. The virus has not been found in breast milk.

Delivery room management

Delivery room management and neonatal resuscitation should follow the principles outlined in the “Rwanda Neonatal Care Protocol”

In order to conserve PPE and resources and protect healthcare providers, the following adjustments are required in deliveries where mothers have suspect, probable or confirmed COVID-19:

1. All health care workers present at the delivery, should adhere to local infection prevention and control recommendations
2. There should be anticipated planning for attendance at delivery for a mother suspected or confirmed with COVID-19
3. For deliveries that are considered “low risk” but for which a neonatal team is usually in attendance, such as planned C-section at term in a mother without pregnancy complications, the neonatal team is allowed to be on standby, outside the delivery room but with PPE on and all equipment for neonatal resuscitation ready.
4. Immediate skin to skin is not recommended, however as soon as the chest is cleaned skin to skin may apply
5. If a neonatal resuscitation is needed (fetal distress, prematurity...), a very limited and experienced team should be present at the delivery. This team should use Airborne, Droplet, and Contact Precautions-level PPE, given both the increased likelihood of maternal virus aerosols and the potential need to intubate, perform airway suctioning, and initiate positive pressure ventilation, all of which may generate infant aerosols.
6. The neonatal team should maintain a minimum of 2 meters from the mother during the delivery of newborn care. This is explained by the fact that we presume that newborns are unlikely infected at delivery.
7. If the mother is intubated or needs to be intubated, newborn resuscitation and post-natal care should be done in a separate room.

Breastfeeding for newborns

As of yet, the SARS-CoV2 virus has not been found in the breast milk of women with COVID-19. Breastfeeding protects against morbidity and death in the post-neonatal period and throughout infancy and childhood. The protective effect is particularly strong against infectious diseases that are prevented through both direct transfer of antibodies and other anti-infective factors and long-lasting transfer of immunological competence and memory. Therefore, standard infant feeding guidelines should be followed with appropriate precautions for IPC, keeping in mind that close contact and early, exclusive breastfeeding helps a baby to thrive (WHO Ref).

The following adjustments are to be made to neonatal and kangaroo mother care:

1. Before the birth of her baby, the health care professionals should explain to the mother the benefits of breast milk and breastfeeding and the need for IPC measures to prevent contaminating the baby after delivery
2. Infants born to mothers with suspected, probable, or confirmed COVID-19 should be fed according to standard newborn and infant feeding guidelines, while applying necessary precautions for IPC
 - a. Breastfeeding should be initiated within 1 hour of birth.
 - b. Because there is a dose-response effect, in that earlier initiation of breastfeeding results in greater benefits, mothers who are not able to initiate breastfeeding during the first hour after delivery should still be supported to breastfeed as soon as they are able.
 - c. Exclusive breastfeeding should continue for 6 months with timely introduction of adequate, safe and properly fed complementary foods at age 6 months, while continuing breastfeeding up to 2 years of age or beyond.
3. Women with COVID-19 should be supported to breastfeed safely, hold their newborns skin-to-skin and share a room with their babies.
4. Symptomatic mothers who are breastfeeding or practicing skin-to-skin contact or kangaroo mother care should practice respiratory hygiene, including during feeding with the use of a medical mask when feeding or near her newborn. Mothers should be assisted to perform hand hygiene before and after contact with the child, wash the breasts and surfaces in which the mother has been in contact should be routinely cleaned and disinfected.
5. In situations when severe illness in a mother due to COVID-19 or other complications prevent her from caring for her infant or prevent her from continuing direct breastfeeding, mothers should be encouraged and supported to express milk and/or a caregiver can safely provide breast milk to the infant, while applying appropriate IPC measures.
6. Only in the event that the mother is too unwell to breastfeed or express breast milk, appropriate breast milk substitutes can be used.
7. There should be no promotion of breast milk substitutes, feeding bottles, pacifiers or dummies in any part of facilities providing maternity and newborn services.
8. Minimizing disruption to breastfeeding during the stay in the facilities providing maternity and newborn services will require health care practices that enable a mother to breastfeed for as much, as frequently, and as long as she wishes.
9. Mothers and infants should be enabled to remain together and practice skin-to-skin contact,

kangaroo mother care and to remain together and to practice rooming-in throughout, whether they or their infants have suspected, probable or confirmed COVID-19 virus infection.

10. Even though room in is encouraged, the mother should sleep at two meters distance from the baby when she is not breastfeeding

11. Kangaroo Mother Care (KMC) is recommended for premature babies with IPC precautions

Temporary maternal separation with newborn:

Systematic separation of mothers and newborn is NOT recommended. The only situation where a newborn will need to be separated from his mother is when a term or preterm newborn is admitted to the NICU and the mother is a suspect, probable or confirmed COVID-19 case.

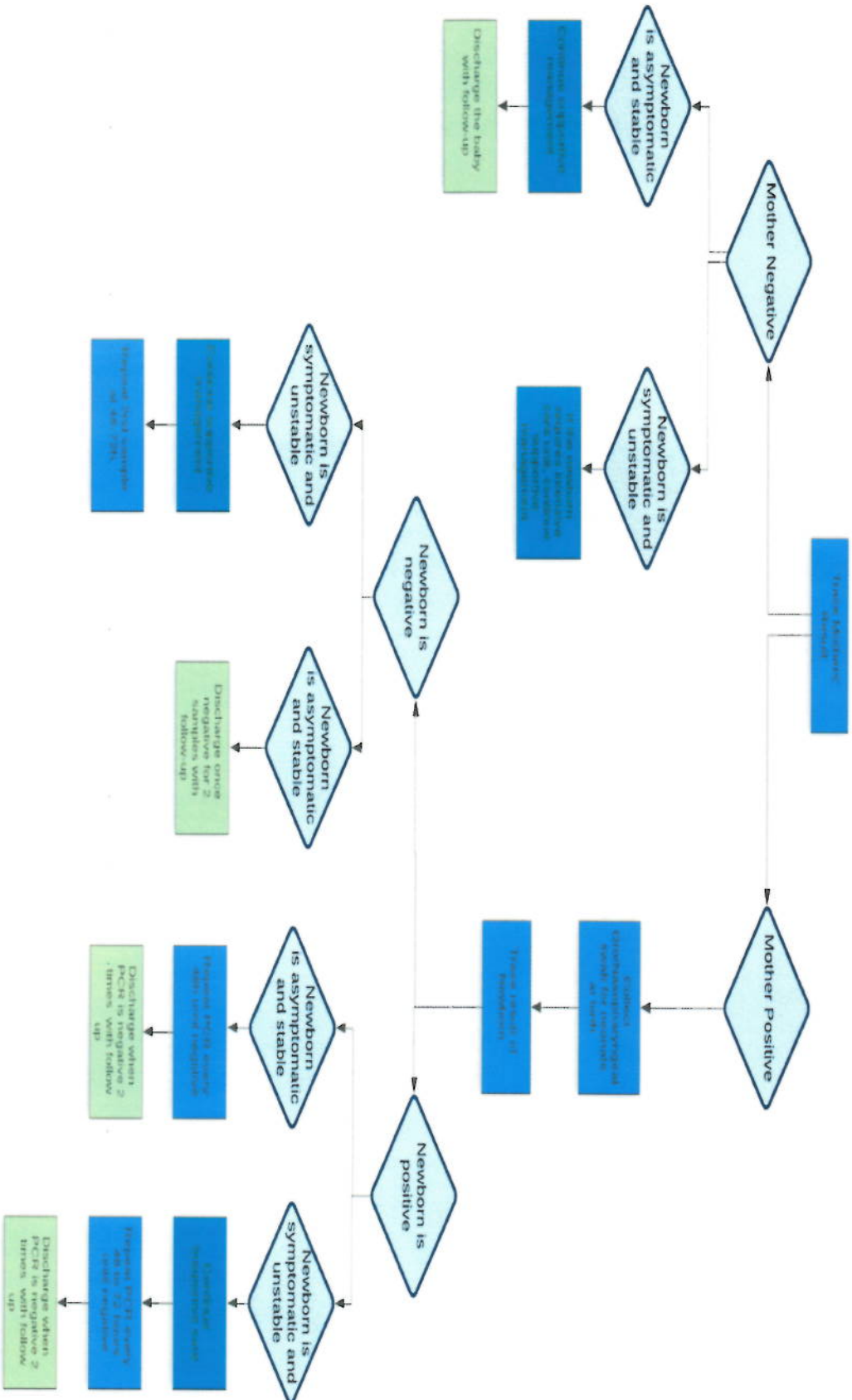
Mothers may decide to opt for temporarily separating from the baby.

Breast milk can be expressed during separation period until the mother has fully recovered and is discharged.

Covid-19 testing of newborns from confirmed Covid-19 mother:

- Asymptomatic term newborns do not require testing for COVID 19
- Symptomatic and/or preterm newborns should have testing for COVID-19 at 24 and 48 hours of life.
 - If the test is negative, these newborns should be considered close contact of a confirmed case and must be cared for under droplet/contact precautions for a minimum of 14 days.
 - If the test is positive, these newborns should care for their underlying disease and supportive care for COVID-19

Figure 3: Management of newborns of COVID-19 suspect or confirmed mothers



Neonatal admission

Admission for Symptomatic or preterm neonate born to COVID-19 suspect, probable or confirmed mothers:

- Negative-pressure room (if possible) under airborne/droplet/contact precautions.
- Visit restriction for symptomatic mother in the NICU while pending test result.
- Testing of the baby can depend on mother’s result (see screening chapter). If mother is negative, consider allow visit under IPC measures.

Asymptomatic neonates born to COVID-19 suspect, probable or confirmed mothers and admitted to the NICU for other reasons:

- A separate space from other babies with mother comply to droplet/contact precautions.
- Suspect mothers are NOT allowed in the NICU pending test results
- If mother is negative, testing the baby who remains asymptomatic is not mandatory
- If mother is a confirmed case of COVID-19, she is not allowed in the NICU

Children (3)

Following the epidemiological data from China, Europe and the USA, it appears children are significantly less affected by infection with SARS-CoV-2 than their adult counterparts. This was reflected both in total case numbers, but also severity, with very few cases in young children and no deaths in children under 10yrs in the initial report. The overarching principles of international guidelines are that best practice care should not be hindered by pandemic-related concerns, and consideration must be given to reduction in health care worker exposure.

The principles of management of children with COVID-19 is detailed in the “Managing children and newborns with COVID-19 in Rwanda” guideline. The following management issues are specific to children and should be highlighted about management of children with COVID-19.

1. Clinical presentation of COVID-19 is different in children than in adults and keep a high index of suspicion for COVID-19 as well as for the common pediatric illnesses.
2. Check for High Risk Vital signs in Children:
 - a. Temp < 36° or > 39°
 - b. . SpO2 < 92%
 - c. . AVPU other than A:

Respiratory Rate	< 1 year	1-4 years	5-12 years
High	50	40	30
Low	25	20	10
Heart Rate	< 1 year	1-4 years	5-12 years
High	180	160	140
Low	< 90	< 80	< 70

3. The majority of children with COVID will be either asymptomatic or have mild symptom. Only a very small proportion of children will become severely ill and require an intensive care unit.
4. Healthcare providers must take into consideration issues pertaining to management of severe pneumonia and acute respiratory distress syndrome that are specific to children. A pediatrician or an intensivist experienced in the care of severely ill children must be involved in the daily management of these children. Best practice care considerations for ventilated patients should be implemented under daily guidance by a pediatrician or intensivist with pediatric expertise and the Pediatric Acute Lung Injury Consensus Conference (PALICC) recommendations should be followed for pediatric ARDS (PARDS) (REF: *Pediatr Crit Care Med.* 2015 June ; 16(5): 428-439. [doi:10.1097/PCC.0000000000000350](https://doi.org/10.1097/PCC.0000000000000350)).
5. Although clinical trials are ongoing, there are no proven therapies to prevent COVID-19, to decrease the risk of progression to severe disease or to treat COVID-19 or prevent its complications, therefore only supportive care should be provided to children with COVID-19.
6. Investigational anti-COVID-19 therapeutics should be used only in approved, randomized, controlled trials.

Healthcare facilities that will be hospitalizing pediatric patients should take into consideration Children's rights in the context of COVID-19. Children (and in particular small children) may have difficulties tolerating the wear of masks. Child size masks should be available. Quarantine and isolation may have negative effects on the children's physical and mental health. It can greatly increase the risk of post-traumatic stress disorder. Therefore, as the isolation facilities are set up, there is a need to have interventions to circumvent this including counselling by trained child psychologist and play areas.

Where possible, one healthy parent or caregiver is allowed to stay with the child at all time. This caregiver must wear a surgical mask and if the child is a confirmed COVID-19 case, the parent or caregiver will be considered a close contact.

Caring for older persons with COVID-19

Older age and comorbid diseases such as diabetes and hypertension have been reported as a risk factor for death with people with COVID-19 (4). Therefore, older people are at highest risk for fatality and are one of the most vulnerable populations. It is important to recognize that older people have the same rights as others to receive high-quality health care, including intensive care.

For older people with probable or suspected COVID-19, provide person-centered assessment, including not only conventional history taking, but a thorough understanding of the person's life, values, priorities, and preferences for health management.

Ensure multidisciplinary collaboration among physicians, nurses, pharmacists, and other health care professionals in the decision-making process to address multimorbidity and functional decline.

Remark 1: Physiological changes with age lead to declines in intrinsic capacity, manifested as malnutrition, cognitive decline, and depressive symptoms; those conditions should be managed comprehensively.

Early detection of inappropriate medication prescriptions is recommended to prevent adverse drug events and drug interactions for those being treated for COVID-19.

Remark 2: Older people are at greater risk of polypharmacy, as a result of newly prescribed medications, inadequate medication reconciliation, and a lack of coordination of care, all of which increases the risk of negative health consequences. Involve caregivers and family members in decision-making and goal-setting throughout the management of older COVID-19 patients

6. DISCHARGE CRITERIA FOR CONFIRMED COVID-19 CASES (15)

The patients with COVID-19 infection will eventually reach a clinical state that will trigger the process of consideration to be discharged from the Treatment Center. The clinical improvement often precedes the viral clearance by a factor of days and weeks.

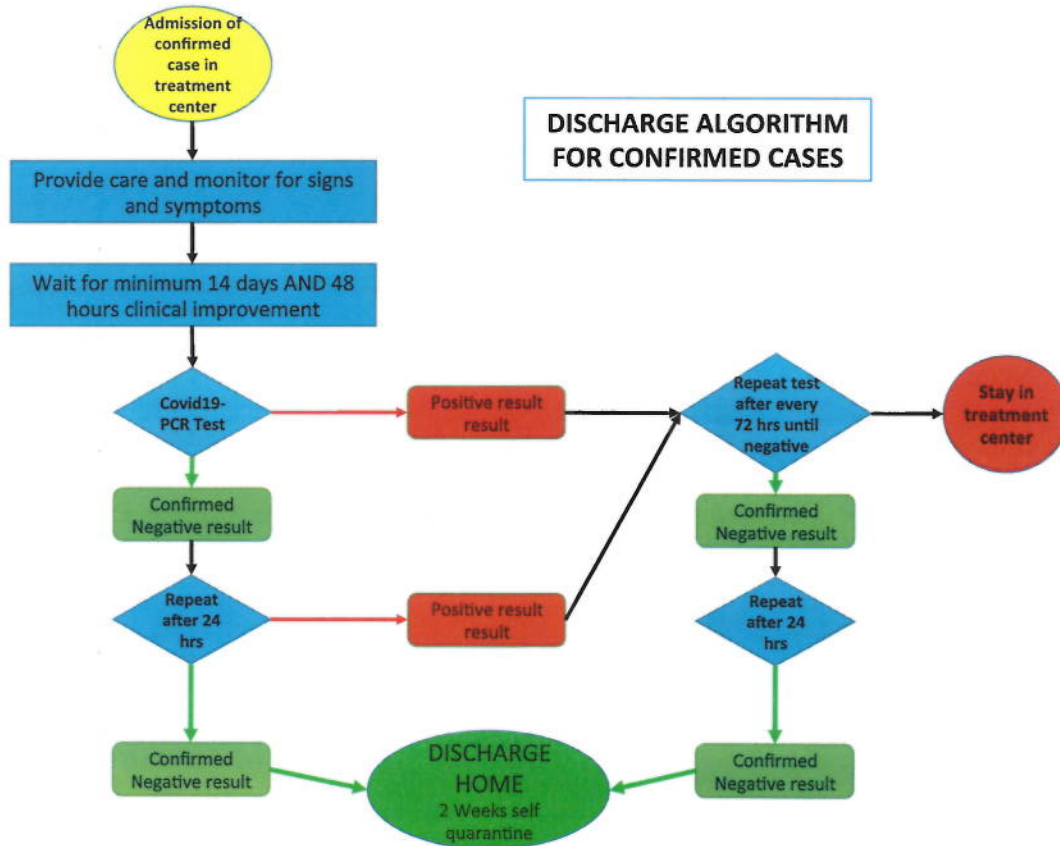
Current studies report a median time of 20 days (IQR 17 - 24) to reach a complete viral clearance, although there are also few cases that cleared the virus after 37 days.

For Rwanda, we set the following criteria for consideration for discharge from the Treatment Center:

1. Document clinical improvement for more than 48 hours
2. Assess eligibility for control test based on CT values on admission
3. Obtain two negative results of COVID-19 RT-PCR, 24 hours apart.
4. Must be willing to remain in self-isolation mode at their homes for an additional 2 weeks, counting from the day of discharge.

Detailed addresses and phone numbers of discharged persons are collected for active follow up.

Figure 4: discharge algorithm for confirmed Covid-19 cases



7. MEDICAL FOLLOW UP AND SOCIAL REINTEGRATION OF DISCHARGED PATIENTS

At time 14 days, 30 days and 3 months after discharge the following tests will be performed:

- COVID-19 (PCR and serology if available)
- Liver function: AST, ALT, Total bilirubin
- Kidney function: blood urea and creatinine

Patients with Covid-19 diseases have gone through severe physical (unless asymptomatic) and psychological pressure. They were isolated from their relatives and friends and full recovery is likely to take time. While physical recovery can be assisted through physiotherapy and exercising, psychosocial support to the discharged patients and the family is required

Similarly community sensitization sessions needed to be organized to address possible stigmatization and further isolation of discharged patients

Emotional reactions to coming out of quarantine may include

- Mixed emotions, including relief after quarantine
- Fear and worry about your own health and the health of your loved ones
- Stress from the experience of monitoring yourself or being monitored by others for signs and symptoms of COVID-19
- Sadness, anger, or frustration because friends or loved ones have unfounded fears of contracting the disease from contact with you, even though you have been determined not to be contagious
- Guilt about not being able to perform normal work or parenting duties during quarantine
- Other emotional or mental health changes

Children may also feel upset or have other strong emotions if they, or someone they know, has been released from quarantine.

Stressors following quarantine include:

- 1. Financial loss.** Absence from work, healthcare costs, and other unanticipated financial burdens can result in socioeconomic distress, particularly among those with lower incomes.
- 2. Stigma from others.** Stigmatization and rejection by neighbors, co-workers, friends, and even family members can manifest as being treated differently or with fear and suspicion, being avoided or excluded from leisure, workplace, or school activities, and experiencing stigmatizing comments. Stigma can be exacerbated if quarantined individuals are members of a particular ethnic or religious group.
- 3. Getting back to one's "normal" routine.** Returning to usual work and social routines may take anywhere from several days to several weeks or even months. Knowing that it might take time to get back into regular routines can help with concern, anxiety, and frustration.

8. DEAD BODY MANAGEMENT IN THE CONTEXT OF COVID-19 (17-21)

Key considerations

- Consider that the virus may stay alive in all body fluids for a long period, therefore the risk of transmission is as high as in a confirmed case or patient
- Any dead body is potentially infectious and standard hygiene precautions must be applied
- The virus is present in upper respiratory tract and potentially lower respiratory tract as well as digestive system. It may be excreted in stools though it is not confirmed whether the virus found in the stools is still infectious
- There are still some uncertainties in the natural history of the COVID-19, including source(s), transmissibility mechanisms, viral shedding, and persistency of the virus in the environment
- Transmission of infectious diseases associated with management of dead body can occur and can be enhanced by non-compliance to standard and transmission-based precautions, especially in healthcare settings.
- Assess the risk during the mortuary care process and provide adequate explanation to the family, respecting the cultural context of the local community. If indicated, provide personal protective equipment (PPE) to the family, with instruction in its use
- Manage each situation on a case-by-case basis, balancing the rights of the family with the risks of exposure to infection

Packing and transfer of the body from the isolation room/ward/other setting to a mortuary, crematorium or burial

- Ensure that mortuary staff and the burial team apply standard precautions at all times (i.e. perform hand hygiene, environmental cleaning) including appropriate use of PPE; long sleeved gown, gloves and facial protection if there is a risk of splashes from the patient's body fluids or secretions onto the body or face of the staff member)
- Avoid any direct contact with blood and body fluids
- Remove all catheters, tubes and drains
- Body bags can be used if available², or wrap the body in cloth or any other tissue for transfer and remove it as soon as possible to the mortuary area
- Keep both handling and movement of the body at minimum
- Cover the stretched with a sheet and bring the body on top of the sheet
- PPE requirements for transport team (if change of team from the team doing packing of the body) include gloves and gown/apron
- No special vehicle is required

²There is no consensual agreement about the use of the body bag, for instance WHO does not recommend it when EU do

Mortuary care

- When preparation of the deceased (e.g. cleaning of body, tidying of hair, trimming of nails and shaving) wear appropriate PPE including gloves, gown, mask, eye protection)
- Mortuary staff and funeral directors must be advised of the biohazard risk and should be trained on safe procedures to avoid infection transmission
- Apply principles of cultural sensitivity. If the family of the patient wishes to view the body after its removal from the isolation room or related area, they may be allowed to do so with following standard precautions at all times, hand hygiene. Give the family clear instructions not to touch or kiss the body
- Embalming is not recommended.
- The body is taken into the coffin
- Room Cleaning should be conducted in accordance with manufacturer's instructions for all cleaning and disinfection products (e.g., concentration, application method and contact time, etc.)

Burial

- Decedents with COVID-19 can be buried or cremated.
- Check local requirements that may dictate the handling and disposition of the remains of individuals who have died of COVID-19.

Environmental cleaning

- Human coronaviruses can remain infectious on inanimate surfaces for up to 9 days. Surface disinfection with 0.1% sodium hypochlorite or 62 – 71% ethanol significantly reduces coronavirus infectivity on surfaces within 1 min exposure time. It is expected a similar effect against the SARS-CoV-2
- Chlorine should be diluted to 0.1% (1000 ppm) daily and be kept out of sunlight. Clean all surfaces by:
 - Wearing appropriate PPE
 - Removing any spill/body fluids with absorbent (paper) towels then dispose of them immediately as infectious waste
 - Cleaning surfaces with water and detergent first then disinfect with chlorine 0.1% or other disinfectant standardized by the health-care facility – if sodium hypochlorite solution is used wet the surface with the solution and allow at least 10 minutes contact time
 - Rinsing the area with clean water to remove the disinfectant residue (if required)
- Room cleaning (after removal of the body):
 - Cleaners to wear masks while cleaning the room, with gown and gloves
 - Ventilate the room for at least 30 minutes
 - Clean all surfaces, walls (man height) and floor with chlorine 0.1%
 - Take linen into specific bag for 'infections lines'

PPE Summary

PROCEDURE	Hand hygiene	Gloves	Surgical mask	N-95 or similar	Long sleeve waterproof gown	Facial protection
Managing body at isolation room/home	X	X	X		X	X
Removal of the body to mortuary	X	X	X		X	X
Mortuary care	X	X	X	X	X	X

ANNEX 1: DISCUSSION ON DISCHARGE GUIDELINES

ECDC provides a desk review of existing guidance documents and protocols from national and international organizations and a convenient search of peer-reviewed publications (15).

SARS-CoV-2 virus can initially be detected 1–2 days prior to symptom onset in upper respiratory tract samples; the virus can persist for 7–12 days in moderate cases and up to 2 weeks in severe cases (WHO mission to China Report). In feces, viral RNA has been detected in up to 30% of patients from day 5 after onset and up to 4 to 5 weeks in moderate cases. The significance of fecal viral shedding for transmission still has to be clarified. Prolonged viral shedding from nasopharyngeal aspirates – up to at least 24 days after symptom onset – was reported among COVID-19 patients but that viability of SARS-CoV-2 detected by qRT-PCR has not been proven by viral culture.

Discharged patients should be advised to strictly follow personal hygiene precautions in order to protect household contacts. This applies to all convalescing patients, but particularly to convalescent children.

In another way, the virus has been detected in asymptomatic persons with positive RT-PCR results and for some cases, potential infectivity was confirmed by virus culture indicating a transmission potential of asymptomatic or pre-symptomatic patients. Studies confirmed that potential transmission from asymptomatic persons has been reported. Provided that there are sufficient resources, there is a clear benefit in testing asymptomatic patients before they are released from isolation. However, in the context of limited resources for healthcare and laboratories during the COVID-19 epidemic, the testing of symptomatic persons should have priority over the testing of asymptomatic patients before release from isolation.

Significance of persistence of viral RNA vs. infectious virus

Viral RNA can persist over long periods of time in bodily fluids. This does not necessarily mean that the person is still infectious. Isolation of viruses in virus culture is needed to show the infectivity of

the virus. Despite of some differences in practice, a consensus exists to combine:

An overview of recommendations for the de-isolation of COVID-19 patients from national bodies in countries discussed the following:

- Despite of some differences in practice, a consensus exists to combine a) the evidence for viral RNA clearance from the upper respiratory tract with b) the clinical resolution of symptoms
- At least two upper respiratory tract samples negative for SARS-CoV-2, collected at ≥ 24 -hour intervals are recommended to document SARS-CoV-2 clearance
- For symptomatic patients after the resolution of symptoms, samples should be collected at least seven
- days after the onset or after > 3 days without fever.
- For asymptomatic SARS-CoV-2-infected persons, the tests to document virus clearance should be taken at a minimum of 14 days after the initial positive test.
- Italy indicates that serology tests to document IgG antibody specific to SARS-CoV-2 will be of value.

Conclusions

In the early stages of SARS-CoV-2 spread (limited number of cases and no apparent sustained transmission:) and with no pressure on healthcare facilities and optimal laboratory testing capacity, COVID-19 patients may be discharged from hospital and moved to home care (or other types of non-hospital care and isolation) based on:

- Clinical criteria (e.g. no fever for > 3 days, improved respiratory symptoms, pulmonary imaging showing obvious absorption of inflammation, no hospital care needed for other pathology, clinician assessment)
- Laboratory evidence of SARS-CoV-2 clearance in respiratory samples; 2 to 4 negative RT-PCR tests for respiratory tract samples (nasopharynx and throat swabs with sampling interval ≥ 24 hours). Testing at a minimum of 7 days after the first positive RT-PCR test is recommended for patients that clinically improve earlier
- Serology: appearance of specific IgG when an appropriate serological test is available

ANNEX 2: NOTE ON LABORATORY PROCEDURES

Laboratory-confirmed case by NAAT in areas with established COVID-19 virus circulation

In areas where COVID-19 virus is widely spread a simpler algorithm might be adopted in which, for example, screening by rRT-PCR of a single discriminatory target is considered sufficient.

One or more negative results do not rule out the possibility of COVID-19 virus infection. A number of factors could lead to a negative result in an infected individual, including:

- Poor quality of the specimen, containing little patient material (as a control, consider determining whether there is adequate human DNA in the sample by including a human target in the PCR testing)
- The specimen was collected late or very early in the infection
- The specimen was not handled and shipped appropriately
- Technical reasons inherent in the test, e.g. virus mutation or PCR inhibition.

If a negative result is obtained from a patient with a high index of suspicion for COVID-19 virus infection, particularly when only upper respiratory tract specimens were collected, additional specimens, including from the lower respiratory tract if possible, should be collected and tested.

Each NAAT run should include both external and internal controls, and laboratories are encouraged to participate in external quality assessment schemes when they become available. It is also recommended to laboratories that order their own primers and probes to perform entry testing/validation on functionality and potential contaminants.

Serological testing

Serological surveys can aid investigation of an ongoing outbreak and retrospective assessment of the attack rate or extent of an outbreak. In cases where NAAT assays are negative and there is a strong epidemiological link to COVID-19 infection, paired serum samples (in the acute and convalescent phase) could support diagnosis once validated serology tests are available. Serum samples can be stored for these purposes.

Specific antibodies are produced after SARS-CoV-2 infection. Serum antibody determination methods include colloidal gold immunochromatography, ELISA, chemiluminescence immunoassay, etc. Positive serum-specific IgM, or specific IgG antibody titer in the recovery phase ≥ 4 times higher than that in the acute phase, can be used as diagnostic criteria for suspected patients with negative nucleic acid detection. During follow-up monitoring, IgM is detectable 10 days after symptom onset and IgG is detectable 12 days after symptom onset. The viral load gradually decreases with the increase of serum antibody levels (10).

Viral culture

Virus isolation is not recommended as a routine diagnostic procedure.

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