COVID-19 Guide

Prevention, Testing, Contact Tracing,
and Management of COVID-19

Version 1

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Notice

This guide is a draft version designed to give guidance to facilities and staff supported by PIVOT, as well as governments and nongovernmental organizations working in resource-constrained settings on the response to the COVID-19 outbreak. It is intended to be a resource for physicians and other health care professionals. Every effort possible has been made to ensure that the material presented here is accurate, reliable, and in accordance with current standards. However, as new research and experience expand our knowledge, recommendations for care and treatment are expected to change. Furthermore, this guide has not been field tested and is based on limited global experience on the COVID-19 response. It is therefore the responsibility of the individual physician or other health care professional to use his/her best medical judgment in determining appropriate patient care or treatment.

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This guide will be regularly updated and enriched. New versions will be posted at www.pivotworks.org.

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Table of Contents

Abbreviations

Ab	Antibody
Ag	Antigen
ARDS	Acute respiratory distress syndrome
BP	Blood pressure
C	Celsius
CDC	Centers for Disease Control
CHW	Community health worker
COVID-19	Coronavirus disease 2019
DBP	Diastolic blood pressure
FiO2	Fraction of inspired oxygen
healthcare worker	Healthcare worker
HIV	Human immunodeficiency virus
ICCM	Integrated community case management
ICU	Intensive care unit
IgG	Immunoglobulin G
IgM	Immunoglobulin M
IPC	Infection prevention and control
IV	Intravenous
L/min	Liters per minute
MDI	Metered-dose inhaler
MOH	Ministry of health
MSF	Médecins Sans Frontières
O2	Sat oxygen saturation
PAHO	Pan-American Health Organization
PaO2	Partial pressure of oxygen
PEEP	Positive end-expiratory pressure
PIH	Partners In Health
PO	Per os
POC	Point of care
PPE	Personal protective equipment
PUI	Person under investigation
RDT	Rapid diagnostic test
RR	Respiratory rate
RT-PCR	Reverse transcription polymerase chain reaction
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SBP	Systolic blood pressure
SOP	Standard operating procedure
T	Temperature
TB	Tuberculosis
UN	United Nations
UPS	Uninterrupted power supply
WHO	World Health Organization
µL	Microliter

Definitions

General definitions are provided below, which may differ slightly depending on the country. Definitions matter because they inform where the patient should be hospitalized and managed.

COVID-19 suspected case: Includes any person that is being tested for COVID-19.

- Avoid negative terminology such as “COVID suspect;” instead use the terminology of “a person, or patient, with suspected COVID-19”.
- If hospitalization is needed, these cases should be isolated whenever possible, and when not possible, should be hospitalized in a designated suspected case ward.
- If possible, the suspected case ward can be divided into areas for patients who have a high-risk of having COVID and those who have a lower risk of having COVID in order to prevent as much nosocomial transmission as possible.

COVID-19 presumptive case: Includes any person who is likely to have COVID-19, because they have either (1) a positive antigen or antibody test or (2) because they are a close contact of a person with COVID-19 and are exhibiting signs and symptoms of COVID-19.

- In general, if they need hospitalization, they can be placed on the COVID-19 confirmed-ward or in the high-risk suspect ward (if isolation units are not available); they should not be placed on the low-risk suspected case ward or a general medicine ward.
- Treat and manage the patient as if they have confirmed COVID-19.

COVID-19 confirmed case: Includes any person who has been confirmed to have COVID-19 based on PCR testing (including GeneXpert).

- This is what most countries use as a confirmed case definition.
- Some countries include positive rapid tests with a contact or strong clinical history for COVID-19 as a confirmed case.

COVID-19 recovered case: Incudes any person with COVID-19 (presumptive or confirmed) who meets the following three conditions:

- At least 3 days (72 hours) have passed since recovery defined as resolution of fever without the use of fever-reducing medications; and,
- Improvement in respiratory symptoms (e.g., cough, shortness of breath); and,
- At least 7 days have passed since symptoms first appeared.

If the three conditions are met, isolation can be stopped. If a person is going to a skilled nursing facility or returning to work in patient care consider documenting with RT-PCR that the patient is negative before defining the patient as recovered.

Isolation: Separates sick people with a contagious disease from people who are not sick in a private room. This guide recommends isolation for suspected, presumed and confirmed cases.

Quarantine: Quarantine separates and restricts the movement of people who were exposed (or may have been exposed) to a contagious disease. This guide recommends quarantining people who have

been exposed to confirmed COVID-19 cases. Sometimes quarantine is referred to as self-isolation or a person under observation.

Mild Illness: Patients infected with SARS-CoV-2 who develop mild symptoms, such as fever, cough, and/or sore throat, but have no dyspnea or abnormal radiological findings (on X-ray, ultrasound, or CT).

Moderate Illness: Presence of lower respiratory disease based on shortness of breath or radiological changes, but are still able to maintain a normal oxygen saturation (>or= 94%).

Severe Illness: People infected with SARS-CoV-2 who have developed COVID-19 and have a respiratory rate >30, oxygen saturation less than 94% on room air (and thus require oxygen), or infiltrates in at least 50% of lung fields on x-ray or CT.

Critical Illness: Individuals with COVID-19 who have developed respiratory failure, septic shock, and/or multiple organ dysfunction/failure and require intensive care.

1 Basics

1.1 Introduction

- Coronavirus Disease 2019 (COVID-19) is an infectious disease caused by the novel SARS-CoV-2 coronavirus that can cause an acute and severe respiratory illness.
- As a newly emergent disease, the global population has no immunity and it therefore causes high morbidity and mortality.
- The World Health Organization (WHO) declared COVID-19 a global pandemic on March 11, 2020.

1.2 Epidemiology and disease presentation

- Most people with COVID-19 develop only mild or uncomplicated illness with flu-like symptoms of muscle pain, fever and mild respiratory symptoms.
- Median incubation period: Approximately 5 days.
- Most infected persons will have symptoms within approximately 12 to 14 days of infection.
- Clinical syndrome is non-specific, characterized by:
    - Fever at any time during the illness 88-99%
    - Cough 59-79%
    - Dyspnea 19-55%
    - Fatigue 23-70%
    - Sputum production 23-34%
    - Myalgias 15-44%
    - Sore throat 14%
    - Headache 6-14%
    - Nausea or vomiting 4-10%
    - Diarrhea 3-10%
    - Loss of taste and smell (percentage unknown)
    - Rash and skin changes, including discoloration of toes and feet (percentage unknown)
- Approximately 80% of laboratory-confirmed patients have had mild to moderate disease. Up to 20% have had severe disease requiring hospitalization, and one-quarter of those hospitalized (5-8%) have required intensive care with mechanical ventilation.[1]
- Some of the most severe cases may develop what is known as acute respiratory distress syndrome (ARDS), in which the lungs become stiff and oxygenation can only be maintained by mechanical ventilation.
- Other severe complications of COVID-19 include septic shock and multi-organ failure.
- Older people and those with comorbidities (such as diabetes, asthma, and cardiovascular disease) appear to be at significantly higher risk of severe disease.

[1] Anesi, G.L. Coronavirus Disease 2019 (COVID-19): Critical care and airway management issues. UpToDate. Updated, May 15, 2020; Accessed May 16, 2020. https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-critical-care-and-airway-management-issues

- The course of COVID-19 is not well known in patients with HIV, viral hepatitis, malaria or malnutrition.
- There is evidence to suggest that men present with more severe clinical symptoms.2 As of April 9, in every country, men are more likely than women to die from COVID-19 (range: 50-80% more likely).[3]
- Rare presentations of the disease include an inflammatory syndrome that may include clotting, injury to arteries and single or multiorgan damage:
    - In adults, this can present as petechial rash, reddened toes ("COVID toes"), or more severe manifestations such as stroke or pulmonary embolism.
    - In children, this can present as a multi-system inflammatory disorder that resembles Kawasaki disease and is characterized by persistent fever, abdominal symptoms, inflammation and organ damage (single or multiple).
- Information on the risk of COVID-19 in pregnant women is currently limited, but pregnant women are generally more susceptible to severe illness and viral infections such as influenza, and other coronaviruses. Pregnant women should take care to follow all prevention strategies outlined in Section 1.4 and seek medical attention immediately upon onset of respiratory symptoms (fever, cough, difficulty breathing).

1.3 Mechanism of transmission

- The virus is thought to spread mainly from person-to-person between people who are in close contact with one another (within about 2 meters).
- It is primarily thought to be spread by contact with respiratory droplets from one individual onto the mucous membranes (nose, mouth, eyes, etc.) of another individual, such as when coughing or sneezing, but more evidence is becoming available that the virus is also spread via airborne transmission.[4]
- The virus can also be spread from contact with contaminated surfaces or objects.
- It seems likely that a person can get COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose, or eyes.
- Viable virus has been isolated from the feces of confirmed COVID-19 patients, suggesting the possibility of potential transmission through fecal contamination. However, more studies are

[2] Jin, J.-M., Bai, P., He, W., Wu, F., Liu, X.-F., Han, D.-M., Liu, S., & Yang, J.-K. (n.d.). Gender differences in patients with COVID-19: Focus on severity and mortality. *MedRxiv*. https://doi.org/10.1101/2020.02.23.20026864

[3] Global Health 5050. *COVID-19 sex-disaggregated data tracker*. Retrieved April 8, 2020, from https://www.globalhealth5050.org/covid19

[4] Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations: Scientific Brief. World Health Organization. 27 March 2020. https://apps.who.int/iris/bitstream/handle/10665/331601/WHO-2019-nCoV-Sci_Brief-Transmission_modes-2020.1-eng.pdf

needed to confirm this hypothesis, as isolation was from a relatively small number of confirmed cases.[5] [6] [7]

- The period of time this virus can survive on surfaces depends on the type of surface (metal, wood, plastic, etc.) and other environmental conditions, but can be between minutes to days.
- It is not currently known whether pre-natal exposure to COVID-19 is harmful to fetuses, and there are no known cases of maternal transmission during childbirth (as of April 2020)[8].
- However, there have been documented cases of probable transmissions to newborns after birth, believed to be due to the transmission of respiratory droplets during routine neonatal care. COVID-19 has not yet been found in amniotic fluid or breastmilk (as of April 2020).
- People are thought to be most contagious during the few days prior to developing symptoms and the first few days after symptoms develop, and asymptomatic transmission of COVID-19 is common.

How easily does this virus spread?

- How easily a virus spreads from person-to-person can vary. Some viruses are highly contagious (spread easily), like measles, while other viruses do not spread as easily. Another factor is whether the spread is sustained, spreading continually without stopping.
- SARS-CoV-2 seems to be spreading easily and sustainably in the community, which is known as “community spread.”
- "Community spread" means people have been infected with the virus in an area, including some who never traveled and did not come into contact with anyone they knew to be sick with COVID-19, and are not sure how or where they became infected.

1.4 General primary prevention

The only way to prevent infection is to avoid exposure to the virus in the following ways:

- Avoid close contact with people (i.e., maintain a distance of at least 2 meters), particularly those who have a fever or are coughing or sneezing.
- When unable to maintain social distancing of 2 meters, where a face covering (see Appendix, Part F for more information of face coverings in public).
- Practice good respiratory hygiene (i.e., cover mouth and nose when coughing or sneezing, discard tissue immediately in a closed bin, and wash hands). This guide **strongly** recommends

[5] Xiao, F., Sun, J., Xu, Y., Li, F., Huang, X., Li, H., … Zhao, J. (2020). Infectious SARS-CoV-2 in Feces of Patient with Severe COVID-19. Emerging Infectious Diseases, 26(8), 1–5. https://doi.org/10.3201/eid2608.200681

[6] Xu, D., Zhang, Z., Jin, L., Chu, F., Mao, Y., Wang, H., … Wang, F. S. (2005). Persistent shedding of viable SARS-CoV in urine and stool of SARS patients during the convalescent phase. European Journal of Clinical Microbiology and Infectious Diseases, 24(3), 165–171. https://doi.org/10.1007/s10096-005-1299-5

[7] Zhang, Y., Chen, C., Zhu, S., Shu, C., Wang, D., & Song, J. (2020). Isolation of 2019-nCoV from a Stool Specimen of a Laboratory- Confirmed Case of the Coronavirus Disease 2019 (COVID-19). China CDC Weekly, 2(8), 2019–2020.

[8] Schwartz, D. A. (2020). An Analysis of 38 Pregnant Women with COVID-19, Their Newborn Infants, and Maternal-Fetal Transmission of SARS-CoV-2: Maternal Coronavirus Infections and Pregnancy Outcomes. *Archives of Pathology & Laboratory Medicine*. https://doi.org/10.5858/arpa.2020-0901-sa

the use of face coverings (non-medical masks) for the public during a COVID-19 outbreak in urban, semi-urban and in rural areas where people gather.

- Wash hands often with soap and water or an alcohol-based hand sanitizer and avoid touching your eyes, nose, and mouth with unwashed hands.
- Seek medical care early if symptoms such as fever, cough, and difficulty breathing develop.
- Follow your Ministry of Health indications regarding social distancing.
- Social distancing is the practice of maintaining a greater than usual physical distance from other people or of avoiding direct contact with people or objects in public places during the outbreak of a contagious disease in order to minimize exposure and reduce the transmission of infection.

1.5 Screening and secondary prevention

- Isolation, quarantine, social distancing, early case detection, and use of a medical mask on anyone that has symptoms are all examples of secondary prevention.
- Early case detection through screening or contact tracing is an excellent way to prevent further spread (see Chapter 4 for more on contact tracing).
- People who may have been exposed to individuals with suspected COVID-19 (including healthcare workers) should be advised to monitor their health for 14 days from the last day of possible contact, and to seek immediate medical attention if they develop any symptoms, particularly fever, respiratory symptoms such as coughing or shortness of breath, or diarrhea.
- Local health authorities may request people enter into voluntary quarantine (staying at home and avoiding contact with other people for 14 days) depending on their risk of exposure.
- City-wide or even nation-wide instructions on social distancing may be needed. Social distancing means no large group meetings (often <10 people is a common limit), keeping at least 2 meters away from others in public, and avoiding areas that have a lot of people. Sometimes schools and universities need to be closed, and people need to avoid going to church, stores, etc.
- Suspected or confirmed COVID-19 patients should wear a medical mask while waiting in triage or waiting areas or during transportation out of isolation. If medical masks are in short supply, they should use a cloth mask or cover their mouths with a piece of cloth.
- See Section 9.2 for additional information on screening and triage of possible cases of COVID-19.

1.6 Overall strategy

To fight COVID-19, we must:

- Massively scale-up access to rapid diagnostics and provide care for those who test positive.
- Safely and humanely separate infected patients from those not infected.
- Educate the population on the ways COVID-19 spreads and how they can stop the spread and protect themselves (for example washing hands frequently, cough etiquette, and avoiding contact with people when they have respiratory symptoms, isolation/self-quarantine when appropriate, and social distancing).
- Prepare the health system to act swiftly and be ready for a possible large outbreak.
- Leverage the network of skilled community health workers (CHWs) to conduct contact tracing.

- Implement a health system that people trust and which works for the sick. When care is not available, patients will not come forward for testing.
- Have clear guidelines on the best practices for prevention, testing and treatment of COVID-19.
- Collaborate with and support the leadership of the Ministry of Health (MoH).
- Procure and provide diagnostic tests and appropriate personal protective equipment (PPE) protocols for all frontline healthcare workers at every level of the health system (nurses, physicians, lab techs, CHWs) as well as hospital cleaners, ambulance drivers, and other support staff as much as possible.
- Provide global coordination with the World Health Organization, the Centers for Disease Control (CDC), relevant bilateral and multilateral institutions, and others to ensure collaboration and coordination amongst all stakeholders.

2 First steps and interventions for infection prevention and control (IPC)

2.1 First steps and considerations

- Determine testing strategy (Chapter 3) and order adequate tests.
- Initiate readying the health facilities as per Chapter 7.
- Determine necessary operational support, procurement of items, supply chain and logistics as per Chapters 7 and 8.
- In most countries, the COVID-19 tests may be extremely limited in the early days of the response, and certain locations may experience shortages in testing materials as demands increases. Therefore, protocols should be in place for both scenarios - one for locations in which widespread testing is available and another for locations where it is not.
- Whether or not testing is available, it is important to rapidly implement effective prevention and control (IPC) measures as early as possible in an epidemic.

2.2 Implementing initial IPC measures in administrative areas

- Reorganize workspaces in order to maintain a distance of two meters between people and desks
- Clean offices and workspaces frequently with alcohol- or bleach-based cleaning products (see Chapter 7, Section 7.2 for more details).
- Make sure all employees practice good hand hygiene – frequent handwashing, avoiding touching their face, and coughing/sneezing into their armpit or a disposable tissue.
- Set up a screening station outside the office entrance where all visitors and staff are checked every time they enter the office complex.
    - People can be asked about cough, fever, and other symptoms.
    - Their temperature should be taken with an infrared (no-touch) thermometer, and if available, their blood oxygen levels should be checked with a pulse oximeter (even patients with minimal or atypical symptoms of COVID-19 may have a low blood oxygen level)
    - All people should wash their hands, preferably via a container that has liquid soap and water or water mixed with bleach (see Chapter 7 for more details on disinfectants for COVID-19) that can be turned on and off by station attendant so people don't touch water or soap.
- If a staff member or visitor screens positive (has cough, fever, a temperature at or above 38C, and/or a pulse ox below 94%), the following protocol should be followed:
    - All people should maintain at least a 2-meter distance from the symptomatic person.
    - The staff person should be handed a medical mask to wear immediately (if no medical masks are available a makeshift cloth mask should be given to the symptomatic person or the patient can wrap a cloth around their mouth and nose).
    - The symptomatic person should be referred to the a designated COVID-19 resource person (a designated nurse, doctor, or human resources official) that can provide the person with instructions on what to do next.

    - The designated COVID-19 resource person can provide or refer the person for a clinical consult (the clinical consult should be done either in PPE or while maintaining a safe distance of at least 2 meters).
- All suspected cases should receive proper medical attention and should not return to work until they have been medically cleared. If tests are not available, these individuals should go home and self-quarantine for 14 days if mild symptoms or be hospitalized for more severe symptoms.
- Note, even people with negative test results can have COVID-19, since there are a certain percentage of false negatives with these tests; therefore, it is recommended that these people stay at home for 14 days if in doubt or 3 days after the symptoms have subsided (whichever is longer)."

2.3 Implementing initial IPC measures at health centers

- It is important to start work with MOH staff on implementing infection prevention and control (IPC) measures to protect patients and staff at health centers as soon as possible.
- Recommendations for health centers are as follows:
- All health center staff should wear a mask whenever they find themselves 2 meters or less from other people, and they should wear appropriate PPE if they work with (or in proximity to) suspected or confirmed cases of COVID-19.
- Consider needs for additional guards, triage personnel, and healthcare workers for a likely large influx of patients and for crowd control.
- Put systems in place for additional cleaning to reduce the transmission of COVID-19 (see Chapter 7, Section 2 for more detail).
- Set up a screening station outside the health center entrance for all staff, visitors, and patients who enter the facility with the following components:
    - People should be asked about cough, fever, shortness of breath, and any recent travel outside the country, or contact with people diagnosed with COVID-19
    - Their temperature should be taken with an infrared (no-touch) thermometer.
    - Their pulse oximetry should be checked.
    - All people should wash their hands, preferably via a container that has liquid soap and water or water mixed with bleach that can be turned on and off by station attendant so people don’t touch water or soap.
- If a staff member, visitor or patient screens positive, they should be directed to a special COVID-19 triage area for additional clinical screening by a doctor or a nurse. If possible, give this person a mask to cover their mouth while waiting. If no medical masks are available, a makeshift cloth mask should be given to the symptomatic person. If no makeshift masks are available, suggest using a piece of cloth or give the person some tissues to cover their mouths when coughing.
- See Section 9.2 for additional information on screening and triage of possible cases of COVID-19.
- Whenever possible, keep patients awaiting triage in a private outdoor area (by using screens or semi-open tents for example).
- If someone appears particularly sick in the waiting area, then do a prioritized patient consult. Check oxygen saturation if rapid breathing and/or signs of respiratory distress. If O2 sat is less than 94%, start oxygen therapy and refer patient to the hospital.

- If person is a COVID-19 suspect, conduct consultation in private open area (with screens, behind wall, etc.). If that is not possible, conduct the consultation in a room with some ventilation (if possible, add a fan going from behind the doctor or nurse towards patient and out the door to increase ventilation, or between the doctor or nurse and the patient to move air out an open window). Consultation should be done with nurse or doctor wearing PPE whenever possible.
- Please see Chapter 8 for more information on management of suspected COVID-19 cases.

2.4 Implementing initial IPC measures at district hospitals

- It is important to start work with MOH staff on implementing infection prevention and control measures to protect patients and staff at these facilities as soon as possible.
- Consider needs for additional guards, triage personnel, and healthcare workers for a likely large influx of patients and for crowd control.
- Set up a screening station outside the health center entrance for all staff, visitors, and patients who enter the facility with the following components:
    - People should be asked about cough, fever, or shortness of breath, any recent travel outside the country, or contact with people diagnosed with COVID-19.
    - Their temperature should be taken with an infrared (no-touch) thermometer.
    - Their pulse oximetry should be checked if possible.
    - All people should wash their hands, preferably via a container that has liquid soap and water or water mixed with bleach that can be turned on and off by station attendant so people don't touch water or soap.
- See Section 9.2 for additional information on screening and triage of possible cases of COVID-19.
- If suspected case, give person a mask (or something to cover their mouth) and send to separate triage and consultation area. All suspected cases should be kept at least 2 meters from other people not wearing PPE.
- If suspected case is stable, consider testing as appropriate/available. Note, family members will likely have been exposed as well.
- Whenever possible, keep suspected cases, presumptive cases, and confirmed cases in isolation rooms. If this is not possible, separate suspected cases from confirmed cases.
- For "lower-risk" suspected cases (suspected cases that do not meet the definition of presumptive cases) requiring hospitalization, hospitalize them in a separate part of the hospital in individual rooms. If not possible, put these suspected cases together in a dedicated tent just for suspected cases, and every effort should be made to keep suspected cases as far as possible apart from each other as possible (minimum 2 meters apart). If unable to keep adequate separation, consider having patients wear surgical masks (if patients are not too short of breath and masks are available). If possible, separate the lower risk COVID-19 suspected cases from the higher risk presumptive cases. Higher-risk suspected cases or "presumptive cases" include people who are known close contacts of confirmed cases, whereas lower risk suspected cases are people without known exposures who present with COVID-19 symptoms.
- While evaluating for COVID-19, consider GeneXpert testing for TB for patients with cough greater than two weeks.

- Once tests are available and the patient's status has been confirmed, known positive cases can be placed together in a confirmed case ward, with suspected cases remaining in separate ward or tent.
- Whenever possible, set up spaces so healthcare workers are coming in one "entrance door" (with ability to put on PPE outside the entrance) and coming out of a separate "exit door" where they can take off potentially contaminated PPE in an area outside the exit that can be frequently sterilized.
- Dispose of used PPE and other materials in a designated container that is carefully disposed of through incineration. Cleaners handling used PPE and cleaning designated "dirty" areas should wear PPE whenever possible.
- Once there are confirmed cases of COVID-19, healthcare workers should round on suspected cases first and then presumptive and confirmed cases later. Whenever possible, healthcare workers should work in COVID wards or non-COVID wards, rather than both in one day. If they have to work in both during the same day, they should start in non-COVID wards, then move to suspected wards, and then to confirmed wards to minimize nosocomial infection. However, any unstable cases should be reviewed as early as possible.
- Keep all family, friends and other visitors out of suspected and confirmed wards.

2.5 Implementing initial IPC measures for community health workers

- Community health workers (CHWs) are an invaluable part of the healthcare system and can have different roles in fighting COVID-19. CHWs can play a critical role in things like contact tracing and the spread of information. For more information on community health programs during COVID-19 response, please see Chapter 6.
- Recommendations for CHWs are as follows:
    - With CHWs, put in place measures for improving hand hygiene—both for communities and for CHWs specifically.
    - For the community, ensure there is a water source available with soap.
    - For CHWs, encourage the use of an alcohol-based hand sanitizer, and careful hand hygiene (for at least 20 seconds) before and after each patient visit. It is generally recommended to wash your hands thoroughly with soap and water after every fifth use of hand sanitizer.
    - If possible, provide appropriate PPE to CHWs (including a surgical mask, gown, gloves, etc.) so that they can carry out their routine activities and treat children under 5 years of age; and control COVID-19, but with certain modifications (see Chapter 6 for more details).
    - In the event that PPE is not available, use a locally made cloth mask or improvise by placing a piece of cloth over the mouth, nose and around the neck to reduce the risk of spread.

3 Testing

3.1 Types of Tests

- There are three primary types of tests for COVID-19, as described in Table 1.
    1. **Reverse transcriptase polymerase chain reaction (RT-PCR)**: The PCR test detects the genetic material of the virus. This type of test is also called a molecular test.
    2. **Antibody (IgM/IgG) rapid diagnostic tests (RDTs):** This test detects antibodies in the blood to SARS-CoV-2.
    3. **Antigen rapid RDT:** This test detects SARS-CoV-2 proteins with a nasopharyngeal (or oropharyngeal) swab.
- Many programs may only have access to RDTs; therefore, the testing algorithm outlined below can be used with or without RT-PCR testing.
- The Xpert® Xpress SARS-CoV-2 cartridge also uses PCR technology and uses the same Xpert machines as used for the diagnosis of tuberculosis (TB); cartridges are expected to be available more broadly around July 2020.
- There is rapid growth in development of diagnostics for COVID-19. Visit FIND's curated COVID-19 diagnostic pipeline for a list of tests and testing suppliers (listed in the references).
- There is a **window period** at the start of the onset of symptoms during which a patient may test negative but have the disease. The window period is due to either:
    - The viral load is low, and virus is not detected (RT-PCR and antigen RDT), which can happen either early in disease (when viral load is not yet high enough) or late in disease (when viral proteins are decreasing); or
    - Antibodies have not yet been produced by the body to the level at which they are detectable by the test (antibody RDT).

Table 3.1. Types of tests

Characteristic	RT-PCR	Antibody (IgM/IgG) RDT	Antigen (Ag) (RDT)
Sample	Nasopharyngeal/oropharyngeal swab or deep sputum[ii,iii]	Blood (finger stick or blood draw)	Nasopharyngeal/oropharyngeal swab or deep sputum
Window period	A few days before symptom onset viral load may be low and virus cannot be detected	7-10 days after symptoms	A few days before symptom onset viral load may be low and virus cannot be detected
False positives	Almost none	Low to moderate; it is possible to have cross-reactivity with other coronavirus	Very Low
False negatives	Low to moderate (especially in the window period) or as a person is starting to clear infection and viral load is decreasing	Variable, but high early on in infection	Moderate, as not as sensitive as RT-PCR
Turn-around time/ laboratory requirements	Hours - requires a laboratory with high technical capacity	15 min – no laboratory required	15 min – no laboratory required

Reverse transcriptase polymerase chain reaction (RT-PCR)

- This test is done most commonly on a nasopharyngeal swab. The test can also be done on oropharyngeal swab, bronchoalveolar lavage fluid or a deep sputum.
- Note: Deep sputum is not saliva but the thick mucus—sometimes called phlegm—which is coughed up from the lungs and should be collected in a similar way to how a TB sputum sample is collected. If the patient has a dry cough, or has no sputum production, sputum collection may not be possible.
- Avoid sputum induction as the virus will be aerosolized, which causes an increased risk of transmission of infection.
- Work is being done to determine whether RT-PCR can be done on saliva in place of nasopharyngeal swabs. Preliminary studies are very encouraging; however, until more studies are available nasopharyngeal swab, oropharyngeal swab or a deep sputum (from a patient with a productive cough) remain the most common standard.
- A nasopharyngeal swab is taken from deep in the nose or oropharynx.
- RT-PCR is highly specific, which means the chance of a false positive is low.
- RT-PCR may have a sensitivity of around 75%, especially early in person's infection, or later in infection as the viral load is decreasing. Sensitivity is also impacted by the quality of the sample collected.
- A single negative RT-PCR doesn't exclude COVID-19 (especially if obtained from a nasopharyngeal source or if taken relatively early in the disease course).
- If the RT-PCR is negative but suspicion for COVID-19 remains, then ongoing isolation and re-sampling and re-testing several days later should be considered.

Antibody (IgM/IgG) RDT

- This test is done on blood (via a finger stick or blood draw).
- Sensitivity and specificity is generally 10 to 15% lower than that of RT-PCR. Sensitivity varies based on prevalence in the community at the time of testing (sensitivity increases as prevalence increases). Please see the following link for more information: https://qz.com/1848674/how-to-interpret-the-specificity-sensitivity-of-antibody-tests/.
- False positives can happen when there is cross-reactivity to other coronaviruses (such as those which cause the common cold).
- In general, IgM is indicative of acute infection and can be detected in most patients 8 days after the onset of symptoms, and IgG becomes positive a few days after the rise of IgM (see Figure 3.1) and can remain elevated after the infection has resolved, but antibody production is highly variable between individuals

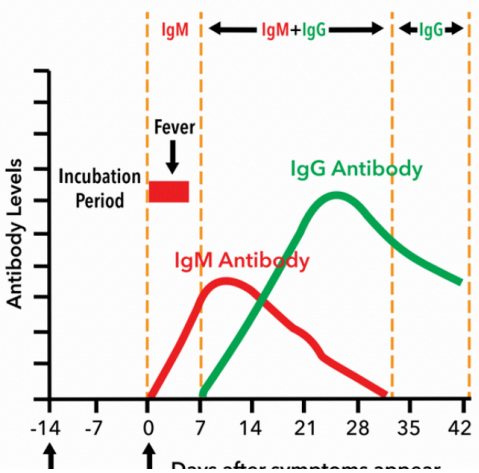


Figure 1. The lag time between onset of symptoms and production of detectable antibodies.

- The lag time it takes the body to create antibodies after initial infection causes a window period during which the patient may have a negative IgM/IgG RDT, but still have COVID-19.
- Interpretations of the IgM/IgG antibody are provided in Table 3.2 below.
- Antibody tests for COVID-19 are not the ideal diagnostic option, because they can be negative at the beginning of the disease and do not distinguish well between an active ongoing infection from an old infection. Nonetheless, these tests can be used for diagnostic purposes as long as their limitations are carefully considered. If antibody tests are being used for diagnostic purposes, it is recommended to follow up with an antigen or PCR test to confirm positive cases (see Testing Algorithm below).

Table 3.2 Interpretation of the IgM/IgG antibody test

IgM	IgG	Interpretation	instructions
Negative	**Negative**	• No serological evidence of infection with COVID-19. • Possibly in the "window period" of infection. • Possibly a weak, late or absent antibody response. This has been reported in patients of older age, poor nutritional status, and with severe COVID-19 disease. Also, medications or infections like HIV that suppress the immune system can blunt the antibody response.	• If symptomatic, isolate in the hospital or at home. • Consider repeat testing in 5 days.
Positive	**Negative**	• Likely case. • Probably in the early stage of infection, no IgG has been produced yet or IgG level does not reach the lowest level of detection. • Possibly a false-positive IgM (cross-reaction to other coronaviruses).	• Isolate in the hospital or at home. • Refer sample for RT-PCR testing if possible.
Negative	**Positive**	• Possibly a case, but resolving or resolved. • Probably in the advanced stages of infection or has had a past infection that has resolved (the time frame of when IgM disappears in old infection has not been determined, IgG remains in the blood for a long time). • May no longer be infectious if symptoms have resolved. • Possibly a false-positive IgG (due to cross-reaction to other coronaviruses).	• Refer sample for RT-PCR testing if possible. • If still symptomatic, consider isolation.
Positive	**Positive**	• Probable case. • Probably in the active phase of infection or is in the recovery phase of the disease and the IgM is still above the level of detection. • Possibly a false-positive resulting from immunity to other coronaviruses.	• Isolate in the hospital or at home. • Refer sample for RT-PCR testing if possible

- To decrease the number of false negatives, use the antibody test at least 8 days after the onset of symptoms such as fever.

- It is widely accepted that IgM provides the first line of defense during viral infections, followed by the generation of IgG responses for long term immunity and immunological memory.

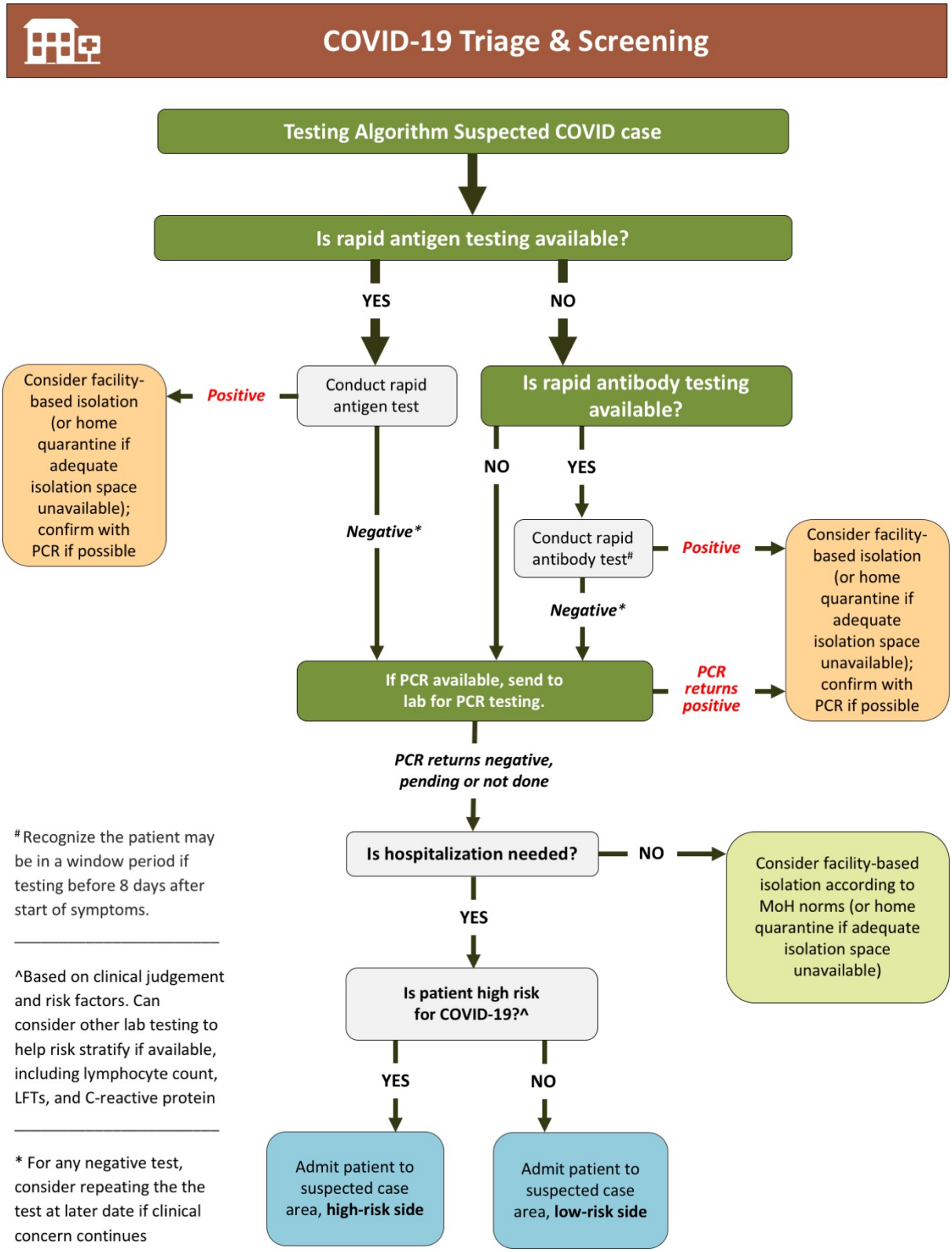
Antigen (Ag) RDT

- Consult the manufacture's insert to see what the specimen collection requirements are, many are designed for nasopharyngeal swab only.
- A single negative Ag RDT doesn't exclude COVID-19 (especially if taken relatively early in the disease course). If the Ag RDT is negative, but suspicion for COVID-19 remains, then ongoing isolation or quarantine and re-testing several days later should be considered.
- False positives are quite rare for the antigen tests.

3.2 Indications for preforming the test and the testing algorithm

- If there is limited availability of tests, only people who have symptoms consistent with COVID-19 infection should be tested.
- A symptomatic person with COVID-19 often has a fever, respiratory symptoms or shortness of breath. However, the clinical presentation can vary, and individuals may present with any combination of the symptoms listed in section 1.2 and may present with only one or two non-specific symptoms.
- A loss of smell (and sometimes changes in taste) have been seen with COVID-19, and is not associated with other common respiratory illnesses. Thus, respiratory illness together with the loss of smell and/or taste should alert the health care worker to test the patient for COVID-19.
- In areas where there is suspicion of an outbreak, even people with mild or moderate symptoms should be tested to better identify clusters and perform contract tracing.
- A person is no longer considered to be a contact if the last contact with a COVID-19 patient was greater than 14 days; however, there are some outliers where the incubation period is longer than 14 days (rare). See Chapter 4 below for more information on contacts.
- Report all confirmed cases of COVID-19 to the MOH as per their guidelines.
- Figure 2 below provides recommendations on when and how to use the different available tests. Protocols for different testing scenarios (such as when a facility only has antibody tests for example) can also be found in the Appendix.

Figure 2. Testing algorithm for suspected cases of COVID-19.



3.3 Screening high-risk groups

- As part of surveillance or contact tracing, high-risk groups can be screened for COVID-19.
- Although screening can be done with simple questionnaires to alert who to test, this section concentrates on testing a group of persons with one of the testing modalities discussed in section 3.1.
- Screening is commonly done in asymptomatic people who have a high-risk of COVID-19.
- Common high-risk groups to be considered for screening:
    - Health care workers (including community health workers) caring for patients with COVID-19.
    - Congregate settings (such as churches, schools, businesses, prisons, refugee camps, or nursing homes) where an outbreak is suspected or has occurred.
    - Travelers coming from high-prevalence areas can be screened using questionnaires about their travel, contact with sick people, symptoms of infection, and/or measurement of their temperature, and oxygen saturation, but this screening has been relatively ineffective and may miss many cases of COVID-19 cases (particularly those with no symptoms during the incubation period).
- Eventually, when tests become more available, programs may want to test asymptomatic people with known exposure to COVID-19 (asymptomatic contacts) to better identify, isolate and monitor cases with the potential to spread the disease or become sick.

3.4 Imaging tests for COVID-19

Chest X-ray, ultrasound, and CT-scan are being used to diagnose patients with COVID-19.

- **Triage** – Imaging may be useful as an additional data point in triage. Ultrasound and chest X-rays can be used. Chest X-rays are normal in 30% of patients requiring hospitalization, the false negative rate of ultrasound is not currently known.
- **Management** – Imaging can assist in evaluation of disease severity and progression as well as the detection of acute respiratory distress syndrome, bacterial co-infection, pleural effusion and pneumothorax. Serial ultrasound is showing promise as a low-cost method to assess disease progression.

Chest X-ray

- If available, portable X-ray equipment avoids the needs to fully decontaminate a radiography room and to transport a COVID-19 patient to another section of the hospital. If portable x-ray is not available, be sure to disinfect the x-ray room between patients.
- X-ray appearance is not specific for COVID-19 but may be helpful to guide management decisions in patients with moderate or severe disease, to assess endotracheal tube positioning, and to detect complications, including pleural effusion and pneumothorax.
- Findings: Initial focal or multifocal consolidation and/or ground glass opacities (GGOs) in a peripheral, lower lobe and bilateral distribution are consistent with COVID-19. Pleural effusion at presentation is unusual.

Ultrasound

- Is portable, easy to disinfect, and involves no radiation. If more than one ultrasound is available, consider having a dedicated COVID-19 ultrasound only used for infected patients. The primary disadvantage of ultrasound is its operator dependence and the inability to image central portions of the lung. Reports suggest that having the same person perform serial ultrasounds improves reproducibility.
- While ultrasound findings are not specific for COVID-19 infection, in the appropriate clinical setting, findings may be helpful in confirming lung involvement and may play a role in treatment decisions. Ultrasound is also useful to detect associated pulmonary findings such as pleural effusion and pneumothorax.
- **Findings:** A standardized approach to scanning, using 14 designated landmarks, has been proposed and is strongly recommended to allow for serial comparison. Scoring of abnormalities can be performed using a 3-point scale:
    - Score 0 – normal pleural line;
    - Score 1 – indented pleural line;
    - Score 2 – Broken pleural line with associated consolidation (darker areas) and areas of white lung;
    - Score 3 – dense, extended white lung.

CT scan

- Selective use of CT imaging can be considered in patients with typical COVID-19 symptoms with a negative PCR test.
- CT scan plays no role as a screening test for patients for COVID-19.
- CT offers relatively high specificity and the ability to image the entire thorax unlike ultrasound. Use should be limited, if available, to patients in whom critical management decisions require detailed pulmonary evaluation.
- CT scanning involves a higher level of radiation than chest X-ray, more personnel, and is the most difficult imaging equipment to decontaminate.
- Findings: Ground-glass opacities, typically bilateral, lower lobe, subpleural, and peripheral; crazy paving (GGO with septal thickening); consolidation, and vascular thickening. Bilateral pneumonia on X-ray or CT with ground-glass opacities in the lung parenchyma can also help support the diagnosis of COVID-19.

3.5 Suggested personal protective equipment for test collection and processing

- The collection and processing of coronavirus tests requires PPE, because the patient is infectious to the healthcare worker when giving the sample.
- Taking a nasopharyngeal or oropharyngeal swab specimen can result in large amounts of aerosolized virus as it can provoke gagging, coughing and/or sneezing; N-95 masks are best for healthcare workers collecting samples, but if unavailable, use surgical masks. If patients are wearing a mask, ask them to pull their mask down so it is no longer covering their nose but still covering their mouth in case they cough during nasopharyngeal sample collection.

Table 2. Different PPE requirements depending on test

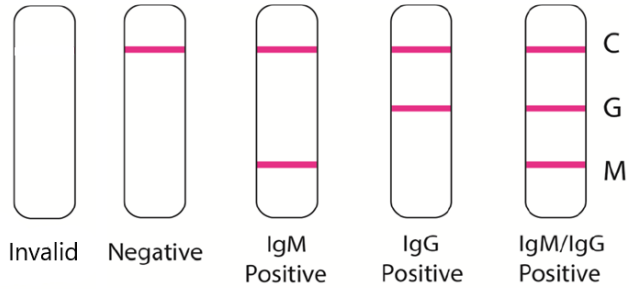
	Sample	PPE
Antibody RDT	Whole blood, serum, plasma	Masks, gloves, gowns
Antigen RDT	Nasopharyngeal/oropharyngeal swab or deep sputum	N95 masks, gloves, gowns, face shield
PCR test	Nasopharyngeal/oropharyngeal swab or deep sputum	N95 masks, gloves, gowns, face shield

3.6 General laboratory warnings and procedures for the antibody and antigen RDTs

- Wear proper PPE as described above.
- Clean work surface with 70% alcohol (or similarly approved chemical disinfectant) before starting work.
- Store test kits in the dark at room temperature (18-26°C) and protect them from exposure to light.
- Generally, a timer does not come included with the test kits and will be needed.
- Do not freeze test cassettes or buffer solution.
- Do not open the pouch containing the cassette until you are ready to use it.
- The test should be used within one hour of opening the sealed cassette pouch. Do not use the test cassette or buffer solution beyond the indicated expiration date.
- For the Antibody RDTs, do not use samples with hemolysis, high lipid concentration, or turbidity, which can affect results.
- Use universal precautions when handling blood samples.
- Clean work surfaces and plastic reusable materials (pens, timer, etc.) with appropriate disinfectant at the end of this process.
- Discard used test tubes, swabs and test cards in suitable biohazard waste container.
- Discard PPE into biohazard containers and follow your hospital or laboratory's waste disposal practices and regulations.

3.7 Interpretation of the results of the antibody tests

Figure 3. Interpretation of results of the antibody test

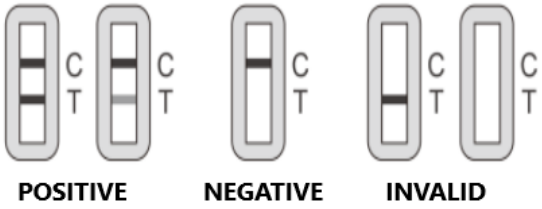


A total of three detection lines are possible, with the control (C) line appearing when sample has flowed through the cassette.

- **Negative Result:** If only the quality control line (C) appears and the detection lines G and M are not visible, then no novel coronavirus antibody has been detected and the result is negative. A negative result does not necessarily mean the person hasn't been infected with SARS-CoV-2; as it could be a situation where the antibodies are not yet at a detectable level at that time.
- **Positive Result, M only**: If both the quality control line (C) and the detection line M appears, then the novel coronavirus IgM antibody has been detected and the result is positive for the IgM antibody. M only implies that the person is early in the infection.
- **Positive Result, G only**: If both the quality control line (C) and the detection line G appears, then the novel coronavirus IgG antibody has been detected and the result is positive for the IgG antibody. G only implies that the person is beyond the early phases of the infection. Note, there can be false positive results due to cross-reactivity with other types of coronaviruses.
- **Positive Result, G and M**: If the quality control line (C) and both detection lines G and M appear, then the novel coronavirus IgG and IgM antibodies have been detected and the result is positive for both the IgG and IgM antibodies. Having both G and M implies the person is in the early to middle stages of infection.
- **Invalid Result:** If the control line does not appear, the test is invalid.

3.8 Interpretation of the test results for the Antigen RDT

Figure 4. Interpretation of results of the Antibody Test



- **Positive result:** Both the colored test band (T) and control band (C) appear on the membrane. Within the specified observation time, a very weak band should be judged as a positive result.
- **Negative result:** Only the colored control band (C) appears on the membrane. The absence of the test band indicates a negative result.
- **Invalid result:** There should always be a colored control band in the control region regardless of test result. If control band is not seen, the test is considered invalid.
- An invalid test can be due to an incorrect operation process. Possible reasons for this are discussed in separate testing SOPs and the test packaging insert.

4 Contact Tracing

A key strategy to stopping the spread of COVID-19 is contact tracing. This chapter describers the manner in which to do contact tracing.

4.1 Definition of a contact

- Applies to the preceding 14 days:
    - Providing direct care to COVID-19 patients without proper PPE;
    - Spending significant time in the same close environment with a COVID-19 patient (in the workplace, classroom, household, at church, or at other close gatherings); or
    - Traveling together in close proximity (<2 m) with a COVID-19 patient in any kind of vehicle for an extended period of time (more than a few minutes, although transmission of infection can occur in minutes).

4.2 Personnel and the contact tracing team

- Contact tracing teams can include trained personnel including community health nurses, CHWs, other clinical staff, and trained community leaders.
- Personnel should be equipped with PPE. Proper PPE is important to protect the contact tracing team and the person being interviewed (infected healthcare workers could be asymptomatic and infectious, thereby potentially inadvertently spreading the virus to community members they visit them during contact tracing).
- COVID-19 testing can be done in community health posts with the windows open, with the staff member wearing PPE, and the patient wearing a mask.

4.3 Contact tracing procedures and follow-up

- Contact tracing involves finding out who a patient with COVID-19 has been in contact with, finding those individuals, and screening them for symptoms of COVID-19.
- All contacts of a confirmed case should be quarantined and monitored for 14 days from the time of exposure to the index case.
    - **Symptomatic contacts** should be tested for COVID-19, treated and housed in isolation away from household members (see section 10.3 for quarantine/isolation instructions).
    - **Asymptomatic contacts** should be followed for the development of symptoms and instructed on what to do if they develop symptoms. If possible, asymptomatic contacts should also be isolated as per Section 10.3, away from household members. If isolation is not possible, self-quarantine at home can be considered.
- If self-quarantine at home is being implemented, daily or frequent communication with a member of the contact tracing team via phone or in person is ideal to monitor for symptoms. Contact tracing team members (such as CHWs) who are monitoring contacts for symptoms in person at their homes should preferably do so without entering the house and staying 2 meters away (or with appropriate PPE if available).
- Provide all contacts self-quarantining at home with information on where, when and how to seek care if they develop a cough, fever, shortness of breath, or other symptoms.

- If a contact undergoing self-quarantine at home develops symptoms of COVID-19, the following steps should be taken:
    - He or she should alert the person monitoring them;
    - The symptomatic person should be instructed to travel to the nearest healthcare facility for testing and isolation.
    - If possible, that individual or a CHW should notify the health center or hospital that the patient is on their way.
    - Whenever possible, patients should remain at least 2 meters apart from anyone accompanying them to a healthcare facility.
    - Avoid public transportation, use an ambulance if available, and if not, go by foot or use a private vehicle if possible.
    - Whenever possible, clean surfaces that come into contact with the patient during transport with a liquid disinfectant as per Chapter 6, section 2.
- See Sections 10.3 and 10.4 for more information on recommendations for management of mild cases, suspects, and contacts of confirmed cases, as well as Section 10.6 for detailed guidelines for discharge from isolation or home quarantine.

5 Community Health

Combatting a global pandemic requires coordination at all levels of the healthcare system and between all cadres of healthcare workers. In resource-poor environments where access to healthcare is often limited by socio-economic, political and geographic factors, community health workers play a pivotal role in protecting poor patients who are the most vulnerable during a pandemic. Epidemics such as COVID-19 are sources of fear, anger, and anxiety for many. CHWs are particularly well placed to build on the foundations of trust they have already built within their own communities, and to communicate new and rapidly evolving recommendations for prevention and disease management. This work should be supported by appropriate training and payment (including hazard pay or increased incentives for CHWs working in an epidemic). Consider increasing the number of CHWs (and their supervisors) or identifying additional personnel who can help CHWs inform the local population about COVID-19 and assist with the acute increase in the burden of disease in their communities. When addressing an outbreak of COVID-19, CHWs should have access to personal protective equipment whenever possible, and if appropriate PPE is unavailable, their work routines should be modified to help protect them and the people they serve.

Find more general guidance on community-based care in the context of COVID-19 compiled jointly by WHO, UNICEF and IFRC here.[9]

5.1 Role of community health workers

- CHWs can play critical roles in the spread of information, contact tracing, and supporting patients and their families who are self-quarantined or respecting social distancing measures at home.
- In order to effectively play this critical role, CHWs should be designated as an essential part of the healthcare workforce.
- The nature of CHW participation in addressing a pandemic changes depending on the number of cases in a certain region, as outlined in Section 6.4, but there are certain roles that are necessary regardless of the number of cases.

[9] Community-based health care, including outreach and campaigns, in the context of the COVID-19 pandemic. World Health Organization. Updated 5 May 2020. https://www.who.int/publications-detail/community-based-health-care-including-outreach-and-campaigns-in-the-context-of-the-covid-19-pandemic

Table 3: Roles for community health workers to interrupt the COVID-19 epidemic[10]

Prevent	• Leverage evidence-based behavior change strategies to educate communities regarding signs, symptoms, and transmission of disease. • Lead skill building sessions for preventive measures such as social distancing, hand hygiene, coughing/sneezing into elbows, and sanitation interventions. • Organize hand hygiene stations in communities and mobilize local residents to use them. • Support facility-based IPC measures, such as construction of triage areas and facility-based hand hygiene. • Communicate rapidly and effectively to residents in COVID-19 areas, including taking time needed to communicate health information in a tailored, context-specific, and relevant way while combating the spread of misinformation.
Detect*	• Identify potential signs and symptoms of COVID-19 in the community and assist patients with accessing healthcare services as appropriate. • Enter alerts into community-based surveillance systems, or give information on potential clusters of disease to healthcare staff and MOH officials.
Respond	• Support contact tracing, symptom reporting, and monitoring of contacts of COVID-19 patients to ensure access to testing and treatment for those who develop signs and symptoms. • If community-based testing is available, and CHWs have been appropriately trained and equipped to conduct such tests safely, they can support safe collection of samples and their rapid transport to laboratories for analysis.

**Mobilizing CHWs to test, contact trace, and isolate cases is the strategy best placed to control the epidemic. In the absence of PPE and RDTs, workflows should be modified to allow for the provision of patient care in a safe manner via phone or from a safe distance, while balancing ongoing needs such as the diagnosis and treatment of malaria which may require close contact to save lives.*

5.2 PPE for community health workers

- Consider needs for CHWs when ordering personal protective equipment.
- If a sufficient quantity of PPE is available, rapidly deploy it to CHWs.
- If PPE is available for CHWs, they will need training on how to appropriately don and doff PPE, and instructions on how to dispose of it properly (see Chapter 9, Section 9.5 for more details). Appropriate disposal of PPE will be particularly challenging for rural CHWs.
- If appropriate PPE is not available, community health programs should be redesigned so that CHWs can provide needed community health services while staying safe themselves.
- In such scenarios, programs should consider the pros and cons of making PPE for CHWs or using limited forms of PPE (such as just masks and/or gloves) as CHWs try to maintain necessary services for sick patients in their communities (see Table 5 in Section 6.7 for more details). The Appendix also contains information on safe donning and doffing of PPE, extended use of PPE, and ways to conserve PPE.

[10]Adapted from Prevent, Detect, Respond: Rapidly expanding healthcare teams through community health workers in the fight against COVID-19: http://lastmilehealth.org/wp-content/uploads/2020/03/Prevent-Detect-Respond-Rapidly-expanding-healthcare-teams-through-community-health-workers-in-the-fight-against-COVID-19.pdf

5.3 COVID-19 training for CHWs

- As an epidemic of COVID-19 grows in a particular area, protocols for the management of standard care (such as identification and treatment of malaria and diarrheal illnesses, as well as the provision of family planning services, etc.) should be modified for this new reality.
- Protocols should also be developed for CHWs responding specifically to COVID-19, and will differ slightly depending on the stage of the epidemic, whether or not diagnostic tests are widely available, and the availability of PPE.
- If CHWs are involved in community-based testing using rapid antigen or antibody tests (see chapter 3 for additional information on testing), they require training on appropriate use of tests, and PPE is even more important.
- Data and recommendations on management of this novel coronavirus are rapidly developing, and training materials for CHWs will need to evolve as new information and recommendations come to light. Thus, CHW supervisors and program managers should be prepared for ongoing training needs in a short period of time.
- Programs should consider ways of changing standard training routines to conduct trainings safely. First, start community health trainings early before the epidemic has spread widely. Second, consider conducting trainings using remote tools (such as video conferencing) when available, and in lower-tech settings, set up trainings so that they maintain a safe distance between participants. For example, trainings can be set up in open air settings with people with a 2-meter distance between individuals and the trainer can use a microphone to conduct trainings. This can also be done in indoor settings as needed. In this case, consider opening windows and setting up fans to direct airflow outside the room.
- Consider using telephones, text messaging, and/or mobile applications to provide updates on new information to CHWs and their supervisors.

5.4 COVID-19 CHW case management

Table 4: The provision of care by CHWs during COVID-19 epidemic

Scenario	Provision of care
Scenario 1: No known cases	PPE • PPE not necessary. • Initiate handwashing (with soap & water or hand sanitizer solution that is at least 70% alcohol) as possible. Diagnosis and treatment • Stay 2 meters away from patients except when doing a malaria test or other needed procedure. • Diagnose and treat malaria and diarrhea as per normal protocols. • Follow normal protocols for cough and difficulty breathing for children <5 years of age (which typically include referrals of severe cases to a healthcare facility). • Evaluate cough and difficulty breathing of children >5 years and adults (even if not a part of normal national protocols).

	• Manage the provision of family planning services and evaluation of pregnant women as per normal protocols. Referrals and follow-up • Refer all moderate to severe cases (adults and children) to a healthcare facility for further evaluation and management. • Follow-up per normal protocols.
Scenario 2: Sporadic/clusters of cases	PPE • Whenever possible, use PPE. • If PPE is not available, consider other ways (such as using cloth masks) to minimize spread of infection when CHWs are evaluating patients, and if possible have coughing patients cover their nose and mouth with a piece of cloth or disposable tissue. • Use appropriate hand hygiene (washing hands with soap & water or >70% alcohol-based solution/hand sanitizer) before and after each patient being touched whenever possible. Diagnosis and treatment • Stay 2 meters away from patients except when doing a malaria test or needed procedure. • Treat malaria and diarrhea as per normal protocols, but keep in mind that while it is less common, COVID-19 can present with diarrhea and abdominal pain • Look for clusters of fever, cough and/or shortness of breath. All moderate and severe cases should be sent to a healthcare facility for testing (if available) and further management. All mild cases should be isolated or self-quarantine at home (depending on availability of isolation facilities and national guidelines), and if insufficient capacity exists at healthcare facilities to do appropriate testing it may make sense for mild suspected cases to remain at home. Consider community-based testing of mild cases if appropriate tests, training, and PPE are available for this. • Manage family planning and pregnant women as per normal protocols, but work with healthcare facilities and patients to support women in having a supply of contraception that will last for multiple months in case routine services are unavailable. • Consider working with CHWs and other healthcare staff to arrange for a supply of medications for multiple months for patients with chronic diseases. Referrals and follow-up • Follow-up any mild cases who may be doing home quarantine daily (if possible) or every few days and refer to a healthcare facility if worsening. If in doubt, refer cases of possible COVID-19 to a healthcare facility for additional evaluation, as patients with this disease can rapidly progress from mild to severe symptoms.
Scenario 3: Community transmission (lots of cases, a full-blown epidemic is in the area)	PPE • Whenever possible, use PPE. If PPE not available, use a mask made of cloth when evaluating patients, and if possible have coughing patients cover their nose and mouth with a piece of cloth or disposable tissue.

	• Use appropriate hand hygiene (washing hands with soap & water, >70% alcohol-based solution/hand sanitizer) before and after each patient being touched whenever possible. Diagnosis and treatment • If patient has fever and no respiratory symptoms, consider treating empirically for malaria. • If patient has fever and mild respiratory symptoms, do not touch the patient. If symptoms are mild, patient should stay home, consider treating children <5 empirically for malaria or other presumed infections and consider referring mild cases to healthcare facilities if they have sufficient capacity to do appropriate testing and have a clear plan for isolation or self-quarantine of all positive cases not in need of hospitalization. Consider community-based testing of mild cases if appropriate tests, training, and PPE are available for this. • If patient has fever and moderate to severe respiratory symptoms, do not the touch patient, and refer him or her to a healthcare facility for testing (if available), isolation, and treatment. Such patients should avoid contact with others as they make their way to a healthcare facility. • Do not touch pregnant women and make sure women on family planning have enough oral contraceptives for the coming months when accessing routine care may be challenging (and pose higher risks of infection); if another form of family planning is needed that involves touching the patient, refer for her to a health center for additional care. • Consider working with CHWs and other healthcare staff to arrange for a supply of medications for multiple months for patients with chronic diseases. Referrals and follow-up • For anyone doing home quarantine, follow up mild cases daily (if possible) or every few days and refer to a healthcare facility if worsening. If in doubt, refer cases of possible or confirmed COVID-19 to a healthcare facility for additional evaluation, as patients with this disease can rapidly progress from mild to severe symptoms.

Scenario 1: No known cases and it is believed that the area is in the very early phases of the country's epidemic.

- This is the optimal time to prepare but be aware that cases may arise in the area quite rapidly. Be aware, the lack of testing may give the illusion that there are no cases in the area when in reality there are cases already present in the community.
- During initial preparations, measures should be taken to ensure that CHWs are able to participate fully in the pandemic response. In the meantime, CHWs should continue in their customary roles.
- CHWs should continue their normal clinical duties and can interact with patients as they normally do, but with extra attention paid to hand hygiene and signs of coughing, fever, or shortness of breath. CHWs should be aware of the possibility of undetected COVID-19 cases appearing in the community - especially amongst people who have traveled outside of the area - and should therefore be extra vigilant with hand hygiene during this time.

- If feasible, preparations should be made to have current CHWs with risk factors for severe disease (age >65 years, pregnancy, and pre-existing medical conditions) assigned to non-clinical roles and these individuals should be replaced in their clinical duties by CHWs without these risk factors.
- CHWs should be extensively educated and trained in areas such as evaluating patients based on exposure, clinical symptoms, risk factors and signs of severe disease. They should also be aware of important public health concepts such as social distancing, home-quarantine and isolation.

Scenario 2: Sporadic clusters of cases. COVID-19 is in the area, but in low numbers of sporadic clusters or individual cases.

- During the early stages of an epidemic in a particular area, CHWs can help with evaluating patients, mapping cases, and tracing contacts.
- They can also continue to deliver non-epidemic-related services, see Table 4 above.
- CHWs can contribute directly to public health efforts, including case management and contact tracing. In such a scenario, CHWs would be engaged in the following ways:
    - Disseminating information and advice.
    - Contact tracing of confirmed cases, and seeking out other suspected cases, either by referral or by going door-to-door. In fact, this is the time to do extensive contact tracing, chasing down every single contact to have them self-quarantine and educate all contacts on what to do if they develop symptoms and how to stop the spread of the disease. In some cases it will be CHWs that help with this contact tracing and in other cases it will be a dedicated contact tracing team.
    - Testing febrile patients for malaria and referring or treating positive cases as appropriate.
    - Assessing patients with potential symptoms of COVID-19 (fever and cough or difficulty breathing), and either counseling them on self-quarantine or referring them to the hospital if they have severe symptoms.
    - Helping arrange safe transfer to the hospital when needed.
- Whenever possible, this work should be conducted with full PPE. If full PPE is not available, programs will need to weigh the pros and cons of care with partial PPE or using techniques where the CHW stays 2 meters from patients and only conducts short visits.
- Even if CHWs do not have access to adequate PPE, they can contribute to public health efforts and help prevent community stress by disseminating information to communities with phone trees, bullhorns, microphones or fliers designed for low literacy populations, all while respecting social distancing (keeping a minimum of a 2-meter distance between themselves and those they are counseling and evaluating).
- Consider how to modify CHW programs so that they can continue to deliver essential services (such as referrals of pregnant women and detection of childhood illness), while encouraging the postponement of non-essential services (see table above for more details).
- CHWs can provide emotional support as well as financial or in-kind support as needed if funding allows.

Scenario 3. Community transmission (lots of cases, a full-blown epidemic is in the area)

- Once a full-blown epidemic is in the area, CHWs can continue to disseminate information to the community and help guide patients to care.
- Activities on mapping cases and tracing contacts should continue if possible, although priorities of guiding patients to care may overwhelm the ability to do contact tracing.
- Non-epidemic-related services move to no-touch activities (see Table 4 above).
- PPE continues to play an important role for CHWs that have any types of patient contact during helping manage cases.

It bears repeating that CHWs must be continuously updated with the latest information as it becomes available and updated via training throughout the course of the pandemic, especially as their roles change.

Recommendations for non-hospitalized confirmed cases and suspected cases when tests are unavailable

- If a case of COVID-19 has been confirmed, that individual should ideally be placed in isolation. This can either be in an isolation room or designated COVID-19 confirmed ward at a healthcare facility, in an isolation room or a designated COVID-19 confirmed housing at a temporary facility, or in isolation in their own house without other people there (for mild cases). If adequate isolation facilities are not publicly available, and patients do not have access to a private home, this individual should stay in their own private room at their house. If this is not possible, consider alternative housing as described below in Section 6.8. If this is not a possibility, and the confirmed patient must sleep in the same room with other family members, everyone in the house should self-quarantine and be monitored for the development of concerning symptoms.
- Suspected cases should be managed similarly, but should maintain at least a 2-meter distance between themselves and other suspected cases (as some are likely infected with COVID-19 and others are not, so putting these people together in the same room increases the likelihood of non-infected people becoming infected over time). If adequate isolation facilities are not available, and the suspected case is staying at home with family members, their family members can go outside, but should avoid crowds and close contact with other individuals.

5.5 Contact tracing by CHWs

Table 5: Contact tracing by CHWs

Scenario	Contact tracing recommendations
No known cases	• If there is a strong suspicion of COVID-19 with a hospitalized patient (but confirmatory testing is unavailable), CHWs should follow up with the patient's household members and recommend they should self-isolate. • In this scenario, household members can continue to work in the fields if they are rurally-based, but should stay away from crowded places (such as markets, churches, etc.) and avoid socializing with other people.
Sporadic/cluster cases	• Once there are confirmed cases of COVID-19 in the community, CHWs can be engaged to conduct contact tracing. • This involves making a list of all of the patient's close contacts (including household members and people from work or school), finding each of them, and screening them for this disease (by asking about symptoms and checking temperature with an infrared thermometer). • The CHW can counsel the patient's family on self-quarantine measures.
Community transmission (lots of cases)	• Continue contact tracing as above. • At this point, assume most people have COVID-19 - whether or not they are symptomatic –and act accordingly.

5.6 Consider expansion of CHW network in the setting of COVID-19

- CHWs will likely have to deal with significantly increased patient loads, as well as a higher level of personal risk during the response to COVID-19. Therefore, these individuals should receive hazard pay for additional work.
- In addition, programs should consider recruiting and training additional CHWs or temporary community response assistants to support CHWs with their increased workload.
- This response may also require additional community health supervisors to manage this expanded staff.

5.7 Programmatic dilemmas associated with community health work in the setting of COVID-19 disease

Table 6: Trade-offs of key community health programmatic decisions

Questions	Pros	Cons	Recommendations as of April 1, 2020
Should CHWs who normally do iCCM switch to "no touch" protocols including giving malaria treatments without RDT results?	• This is the safest strategy for CHWs to avoid getting infected themselves • It also decreases risk of CHWs inadvertently infecting their patients • This should decrease unnecessary deaths from malaria	• May inappropriately treat cases • May increase drug resistance • Could lead to stock outs of antimalarials • May cause data issues as malaria incidence & prevalence will likely appear to increase, but it will not be clear if these were true cases or not	• This is a choice each program will need to make based on local COVID-19 risk, availability of PPE for CHWs, and current stock of malaria RDTs & medications
If RDTs for COVID-19 are not available, should CHWs avoid diagnosing new TB cases (through sputum collection) during high COVID-19 prevalence?	• Safest strategy for CHWs to avoid infection	• Some patients may not follow up for facility-based diagnosis • Possible increase in TB-related morbidity and mortality	• Testing for COVID-19 and TB is important for both individual and public health, but should be done at a healthcare facility • If testing is unavailable, individuals with mild respiratory symptoms can wait to pursue diagnosis and care until a later date (unless symptoms are worsening)
Should CHWs see patients if they don't have PPE or have to use makeshift PPE (such as a cloth covering their nose & mouth)?	• This approach likely decreases the change of needless deaths in the community from lack of care • It decreases the burden on healthcare facilities and facility-based healthcare workers • It saves PPE for healthcare workers managing the sickest patients (who are also likely to be more infectious)	• Heightened risk to CHWs of infection with COVID-19, which also means they are more likely to pass it on to other community members • The higher chance of CHWs becoming infected will likely mean fewer CHWs available to work over time	• Full PPE is always preferable, but if unavailable, consider recommending that CHW and any patients with respiratory symptoms, both use cloth masks

5.8 Data and community health in the setting of COVID-19

- As of the writing of these guidelines (in April 2020), digital tools are rapidly being developed for information sharing and communication, training on new responsibilities, COVID-19 surveillance, data collection, and decision support.
- Consider the pros and cons of using such digital tools as available to strengthen the community health response to COVID-19. If digital tools are not an option, consider modifying paper-based data tools.
- Some data points programs can consider adding to routine data collection are as follows:
    - Number of CHWs trained on detection and management of COVID-19.
    - Number of stockouts of medications and consumable reported by CHWs.
    - Number of cases (suspected and confirmed) of COVID-19 identified by CHWs.
    - Number of COVID-19 RDTs used, and percentage positive.
    - Number of children <5 evaluated for COVID-19.
    - Number of children 5-17 evaluated for COVID-19.
    - Number of adults age 18 and over evaluated for COVID-19.
    - Number of contacts traced by CHWs and their outcomes.
    - Percentage of CHW salaries paid on time.
    - Number of households receiving cash transfers and other forms of social support.

This is by no means a comprehensive list, but provides some ideas for programmatic data collection.

5.9 Social support for communities negatively impacted by disease and social distancing

Poor families who are already economically fragile may suffer catastrophic losses from the combined effects of illness, death, and social distancing due to COVID-19.

- Consider support to those most impacted in the community through immediate cash transfers at the household level and work with local leaders and MOH officials on the creation of community plans to protect the most vulnerable community members.
- Consider working with MOH officials and community leaders to convert buildings such as schools, hotels, and warehouses into temporary housing for patients with mild COVID-19 disease (and suspected disease) in order to decrease the chance of spread to family members. These individuals will need assistance with meals.
- As people are diagnosed with COVID-19, CHWs also have an important role to play in dispelling rumors and decreasing the stigma associated with this disease.

6 Preparing and managing the facility

As COVID-19 is highly infectious, facility preparedness and management are critical to ensuring high-quality care of patients who are sick with COVID-19 and to protect staff and non-COVID patients from contracting this novel coronavirus. Like the management of Ebola, Lassa, cholera or other infectious diseases, infection control and prevention is central to facility management. IPC requires the right staffing, supplies like PPE, infrastructure for proper distancing and triage, and systems (to assure adherence to IPC protocols). Chapter 2 described initial IPC measures to put in place early on in an outbreak, and this chapter further describes the preparation and management of a facility with COVID-19 patients.

6.1 Infrastructure requirements

Hospitals and clinics must be able to continue to see their regular patient load, while simultaneously triaging patients with symptoms of COVID-19 through a safe pathway of physical spaces.

- Clinic and hospital outpatient areas:
    - Triage at designated points of entry:
        - As discussed in Chapter 2, facility points of entry should be limited as much as possible without discouraging sick patients from accessing care.
        - Whenever possible, triage should be conducted in open air (e.g. as ambulances pull up with patients or on walkway outside) but should also maintain patient privacy as much as possible.
        - Symptomatic patients and their close contacts are persons under investigation (PUI) and should be given a mask and instructed to go to the waiting area for suspected cases, to wash their hands and to wait 2 meters from other people.
        - Patients who are not COVID-19 suspected cases should be triaged as usual.
    - **Consultative space** contiguous with waiting area and separate from other areas of the facility.
- If possible, have a separate entrance for healthcare workers wearing PPE.
- Specimen collection **space**:
    - Sputum collection – when needed for GeneXpert testing - should be done outside in an open-air area designated for sample collection.
    - Nasopharyngeal swabs, blood finger prick and venous blood draws can be done in the consultative space.
- Hospitals (or clinic) inpatient areas
    - **Isolation room(s)/ward(s)/tent(s):** If available, negative pressure isolation rooms should be used whenever possible. When this is not possible, patients should be cared for in single self-contained isolation rooms or on wards with other confirmed COVID-19 patients. Consider using other methods of ventilation (such as fans and open windows) when negative pressure air systems are not available.
    - Infrastructure spaces should include:
        - Screening station: At entrance to screen all people entering healthcare facilities; if possible, these stations should have a roof to shelter people from the sun and rain.

- Triage unit: For patients who meet the case definition at triage and require clinical consult and COVID-19 lab testing.
- Suspected Case Ward: For patients under investigation for COVID-19 to get care while awaiting test results. Notably, this ward requires the highest level of IPC, to reduce nosocomial transmission, as patients here are a mix of positive and negative cases, and there is significant risk of COVID-negative patients contracting the virus while hospitalized in this unit.
- Covid-19 Inpatient Ward(s): For care of patients with confirmed suspected COVID-19.
- COVID-19 ICU: For care of critically ill patients if available. If not available, consider placing an isolation unit near nursing station / emergency care unit so that these patients can be closely monitored 24-hours a day.
- Small laboratory space: for COVID-19 testing.
- Donning stations: Separate from areas with suspected COVID-19 and confirmed COVID-19 patients where healthcare personnel can put on protective gear. Preferably, this should be located just outside an entrance to each ward or tent.
- Doffing stations: Located just outside the exit of suspected and confirmed wards where used PPE will be removed and then will either be sterilized (for goggles), incinerated (used gowns and gloves), or laundered (scrubs) and handled by cleaning personnel in full PPE. These stations should be separated from doffing stations/entrances.
- Patient exit: If possible, have a third exit for patients to use. This is generally possible with temporary structures but may be more challenging or impossible with pre-existing wards. In those cases, use doffing exit for patients.

- See the schematic below (Figures 5 through 8) for a drawing of the ideal wards.
  - Figure 5 denotes green/yellow/red areas that represent increasing risk of patients having COVID-19 as well as the flow of patient
  - Patients in the suspected COVID-19 ward ideally should be placed in individual isolation rooms and not in an open ward. If open wards are used while patients are awaiting diagnosis put a medical mask on all patients and try to separate the beds by at least two meters with impermeable barriers (such as temporary walls, plastic sheeting or shower curtains) between each patient's bed.

Figures 5 through 8 have been adapted from materials provided by Build Health International (BHI), and additional information can be found on their website located at https://www.buildhealthinternational.org/coronavirus/.

Figure 5: Diagram of a dedicated COVID-19 hospital

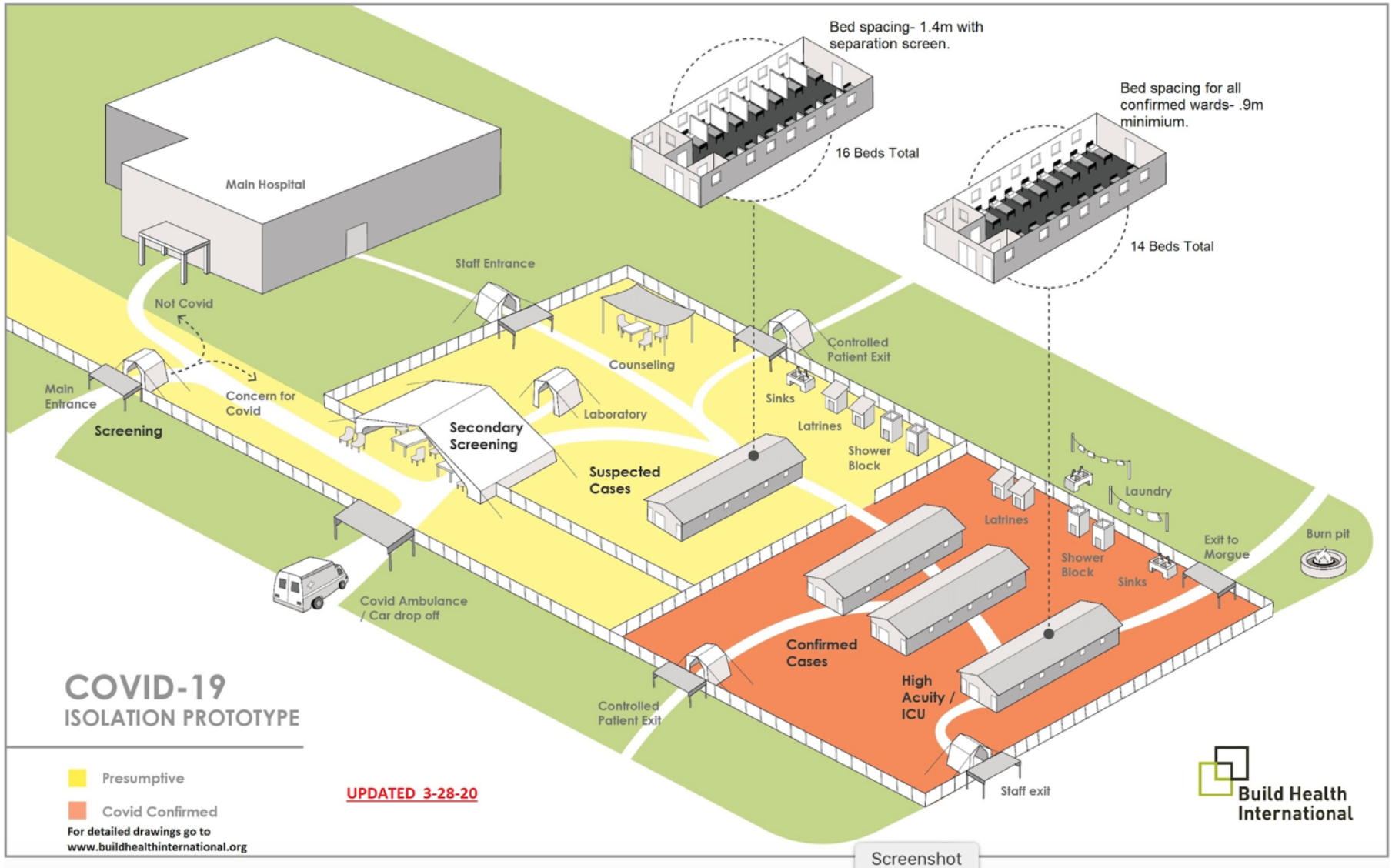


Figure 6: Diagram of an isolation room for COVID-19 suspected, presumptive or confirmed cases

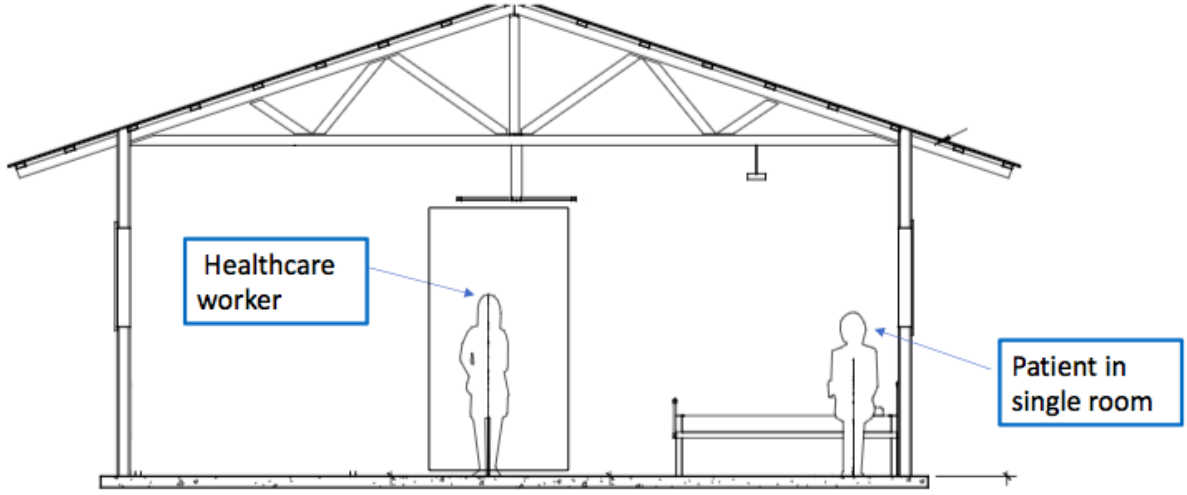
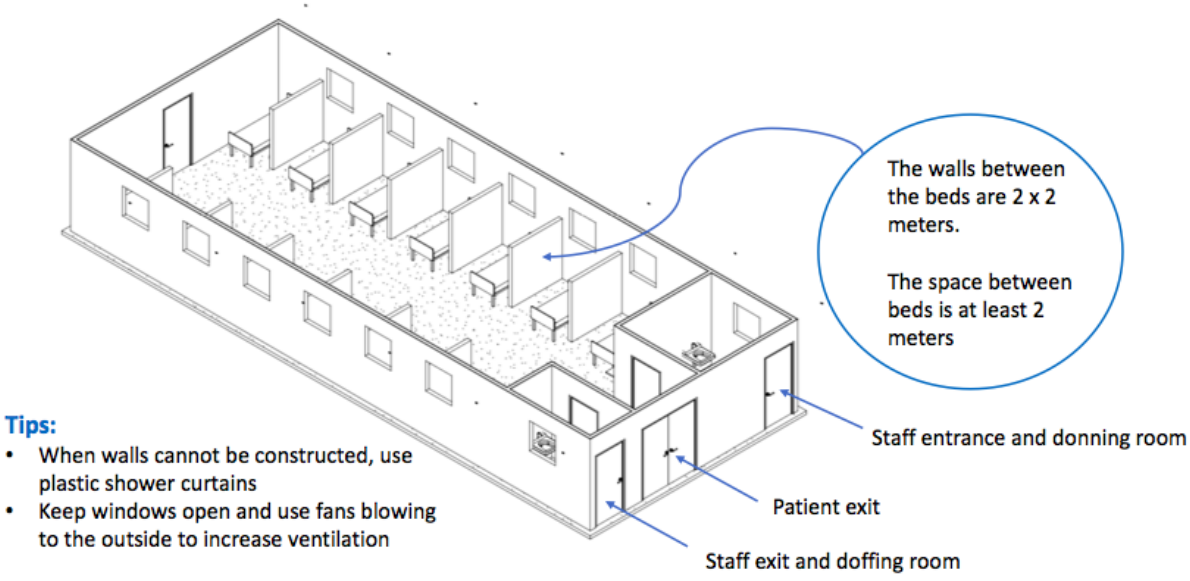
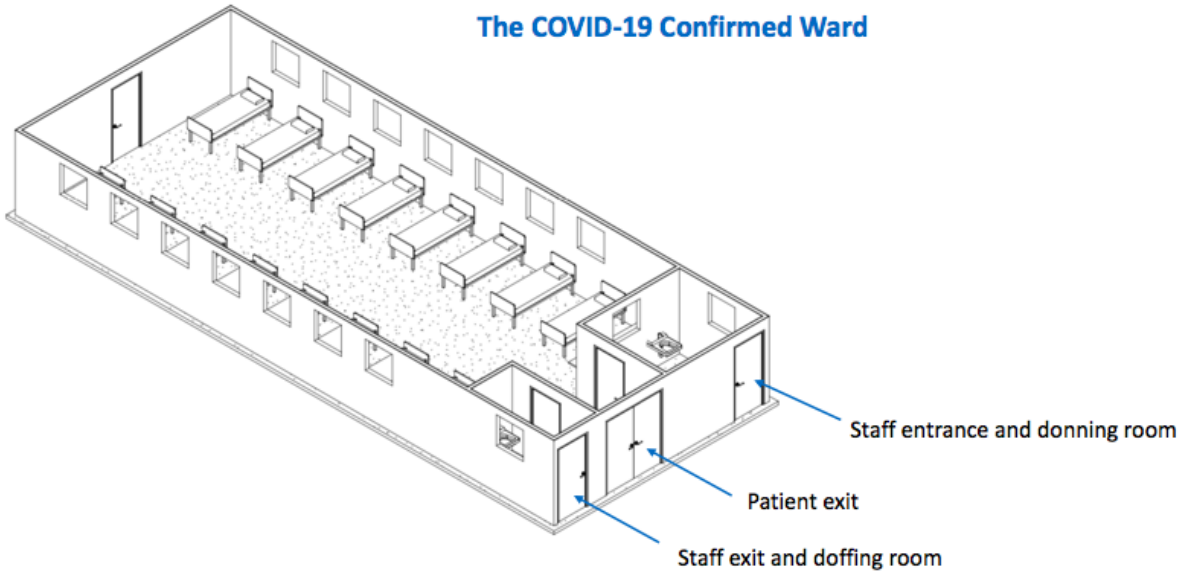


Figure 7: Diagram of a ward for suspected cases of COVID-19



- While true isolation facilities are best for suspected cases of COVID-19, temporary wards with appropriate spacing and barriers between patients such as the one shown above can be set up if private isolation rooms are not available.
- When possible, it is best to keep suspected cases who are more likely to be infected further away or even separated from those with a lower likelihood of being infected.

Figure 8: Diagram of a ward for confirmed cases of COVID-19



- Since people with confirmed COVID-19 are not at risk of infecting each other, they can be grouped together in confirmed wards without barriers between beds.
- Table 7 addresses the infrastructure and facility standards that should be in place to safely address a COVID-19 outbreak.

Table 7. Infrastructure and facility standards

Facility needs	COVID-19 treatment center standards
Water supply 1. Supply 2. Potability 3. Reserve capacity	Adequate water supply is required for hand washing, drinking water, cleaning, laundry, and patient bathing. Consider having rainwater collection systems in place for reserves.
Power supply 1. Reliability 2. Capacity 3. Redundancy	Consistent electrical power is needed for safe basic care. If possible, two sources of electricity should be available to ensure a consistent oxygen supply for patients. They can be any combination of diesel generator, solar and batteries, or utility grid connection. In the case of a power supply based on a generator only, two redundant generators are recommended. Consider mechanisms for stabilizing power supply, such as UPCs, and a dedicated fuel tank to provide fuel for a minimum of 7 days continuous generator use.
Wastewater treatment 1. Treatment level 2. Capacity 3. Monitoring and maintenance	Wastewater from hand sinks, janitorial sinks, and showers should be discharged by gravity into holding tank for 48-hour retention and chlorination and then discharged into soak pit, built to WHO and MSF guidelines. Toilets in temporary facilities should be dedicated pit latrines which discharge into a lined tight tank of sufficient size that it requires pumping no more than twice per month. The lined pit latrine should have access and inspection hatches and be vented to promote breakdown of solids to the WHO guidelines for "Improved Pit Latrines."

	There should be an overflow pipe for liquid wastewater at least 15 cm below the floor and run to a separate soak pit.
Biohazardous waste 1. Collection 2. Disposal 3. Staff safety	Sharps containers should be readily available in places where needles are being used (including the laboratory, triage area, and each ward or patient room). All individuals dealing with soiled bedding and clothes from patients with COVID-19 should wear appropriate PPE when handling soiled items, including an apron if the gown is not fluid resistant, and boots or closed shoes. They should perform hand hygiene after each exposure to blood or body fluids and after removing PPE.
Oxygen 1. Supply 2. Distribution 3. Reserve capacity 4. Redundancy	An oxygen quantity of 10 liters per minute (LPM) per bed is recommended for sizing piped oxygen planning. Make sure a sufficient supply of oxygen is available and ensure redundant capacity. Having a backup supply of oxygen is important in case the primary source fails. An H-cylinder yields approximately 7,000 usable liters of oxygen; so, for a 24-hour supply you would need 15 full cylinders. A reserve manifold (in addition to the 15 cylinders) should have a minimum of 4 full H-cylinders. Bedside O2 concentrators are a good option. O2 concentrators should be protected with a uninterrupted power supply (UPS) device. Anticipate that 40% of hospitalized patients with COVID-19 will require O2.
Ventilation of patient wards	Consider ventilation of patient wards through the use of exterior exhaust fans and opposite wall/end air intake louvers to achieve 12 air changes per hour (ACH) by volume in the space. It may be possible in some locations and climates to achieve 12 ACH by using natural ventilation. If this method is employed, it is strongly recommended that a professional engineer be consulted and that the space be tested for carbon dioxide build up and transfer prior to the space being operationalized.
Network/internet 1. Connectivity 2. Reliability 3. Speed 4. Availability	If possible, set up the ability to connect to the internet whether via wire or wireless connection wherever appropriate based on the layout of facility. We suggest dual-wired RJ45 connections at each convenient and/or required location, and wireless access points can be placed throughout facility positioned for complete and optimum coverage. Consider backup internet source from 4G cellular routers, if available.

6.2 Water, sanitation, hygiene & waste management

- Principles of surface decontamination:
    - It is not yet clear how long SARS-CoV-2 survives on surfaces, but it seems likely to behave like other coronaviruses:
        - Up to 2 hours to 9 days on certain surfaces.
        - The survival time depends on the type of surface, temperature, relative humidity and specific strain of the virus.
        - Effective inactivation can be achieved within one minute using appropriate disinfectants.

Table 8. Recommended cleaning and disinfecting frequencies for offices and non-clinical areas

Type of Surface	Examples	Soap and Water	Disinfect
Minimally Touched Surfaces	Floors, ceilings, walls, windows	When dirty, at least 3 times per week	After human contact and when dirty (at least weekly)
Frequently Touched Surfaces	Door handles, tabletops, desks, light switches, computers, sink	Daily	Daily

Table 9. Recommended cleaning and disinfecting frequencies for clinical areas

Type of Surface	Examples	Soap and Water	Disinfect
Minimally Touched Surfaces	Floors, walls, blinds	3 times daily and with any known COVID-exposure	3 times daily and with any known COVID-exposure
Frequently Touched Surfaces	Door handles, tabletops & desks, light switches, computers, sinks	3 times daily and between each patient	3 times daily and between each patient

Cleaning preparation

- Wear disposable gloves for all tasks in the cleaning process, including handling trash**.** Wash hands immediately after gloves are removed.
- Close off areas to be cleaned and wait as long as is practical before beginning cleaning and disinfection to minimize the potential for exposure to respiratory droplets.
- Open outside doors and windows to increase air circulation in the area.

Soap and water cleaning

- Always clean surfaces using a detergent or soap and water *before* disinfection.
- Remove visible pollutants (blood, secretions, excreta) completely.
- Damp mopping is preferable to dry mopping.
- Surfaces should be disinfected if they have come into direct human contact or are frequently touched.
- Always sterilize washing cloths, mops and other supplies used during cleaning.

Disinfection guidelines

- Wear disposable gloves for all tasks in the disinfection process, including handling trash**.** Wash hands immediately after gloves are removed.
- Use freshly made solutions, or premix and follow manufacturer's instructions or table below for appropriate dilution.

- Wipe the area with the disinfectant solution using a cloth.
- Wipe cleaner regions first, then more contaminated regions.
- Dispose or sterilize cloth immediately after use.
- After cleaning, wash hands well using soap and water. If water is unavailable, clean hands with alcohol-based hand rub.

Choosing the right disinfectant

- Chlorine bleach can damage computers, plastic, fabric and metal.
- Use chlorine bleach on non-porous surfaces such as floors, sinks, toilets, walls.
- Use an Alcohol-based cleaner (if available) on biomedical equipment, electronics, computers, phones, screens, etc.
- DO NOT MIX SOLUTIONS.

Preparation and use of disinfectant solutions

- Gloves should be worn when handling and preparing bleach solutions.
- Protective eye wear should be worn in case of splashing.
- Cleaning solutions (example chlorine bleach) should be made up daily.
- Leave the disinfectant solution on the surface for a sufficient time to kill the virus – a minimum of 10 minutes for chlorine bleach.
- Always rinse chlorine bleach with water after 10 minutes. Hydrogen peroxide and alcohol-based cleaners do not need to be rinsed.

Table 10. Acceptable disinfectants

Disinfecting Solution	Concentration	Directions	OK to use on	Do NOT use on
Diluted chlorine bleach (5.25% sodium hypochlorite)	0.5% (1:50)	Apply, leave for 10 min, rinse	Floors, desks, non-porous surfaces	Computers, phones, screens, fabric, can discolor plastic, metal
Chlorine (see table below to mix chlorine)	0.5%	Apply, leave for 10 min, rinse	Floors, desks, non-porous surfaces	Computers, phones, screens, fabric, can discolor plastic, metal
Hydrogen peroxide	0.5%	Apply	Floors, desks, non-porous surfaces, metal	Fabric
Ethanol / ethyl alcohol	62% minimum	Apply	Computers, Phones, Non-porous surfaces	Can discolor plastic
Isopropyl alcohol	70% minimum	Apply	Computers, Phones, Non-porous surfaces	Can discolor plastic
Propanol	70% minimum	Apply	Computers, Phones, Non-porous surfaces	Can discolor plastic
Do NOT use: Ammonia or vinegar on their own, but they can be used in combination with other products. Do NOT: Mix multiple disinfectants				

Liquid chlorine preparations				
Basic Product	**% Solution**	**0,05 %**	**0,5 %**	**2 %**
	Use for:	Hands, skin, laundry, clothes	Floors, walls, equipment	Disinfection of stool, vomit, blood. Disinfection of corpses.
	Bleach, 5% sodium hypochlorite (5% active chlorine)	10 milliliters in 10 liters of water	1 liter in 10 liters of water	4 liters in 6 liters of water
	Chlorine laundry powder (30% active chlorine)	16 grams (1 tablespoon) in 10 liters of water	16 grams (1 tablespoon) in 1 liter of water	64 grams (4 tablespoons) in 1 liter of water
	Chlorine granules (HTH) (70 % active chlorine)	8 grams (1/2 tablespoon) in 10 liters of water	8 grams (1/2 tablespoon) in 1 liter of water	32 grams (2 tablespoons) in 1 liter of water
ALWAYS label solutions using a permanent marker				
Note: Water Guard is 1.25% Sodium Hypochlorite --> if this is used, then will need to use different ratios.				

Disposal of excreta

- It is critical to conduct hand hygiene when there is suspected or direct contact with feces (if hands are dirty, then soap and water are preferred to the use of an alcohol-based hand rub).
- If the patient is unable to use a latrine, excreta should be collected in either a diaper or a clean bedpan and immediately and carefully disposed of into a separate toilet or latrine used only by suspected or confirmed cases of COVID-19.
- Feces must be treated as a biohazard and handled as little as possible. Anyone handling feces should follow WHO contact and droplet precautions and use PPE to prevent exposure, including long-sleeved gowns, gloves, boots, surgical masks, and goggles or a face shield. If diapers are used, they should be disposed of as infectious waste as they would be in all situations.
- If a bedpan is used, after disposing of excreta from it, the bedpan should be cleaned with a neutral detergent and water, disinfected with a 1% chlorine or 0.5% sodium hypochlorite solution, and then rinsed with clean water; the rinse water should be disposed of in a drain or a toilet or latrine.
- Whenever possible, all individuals dealing with soiled bedding, towels and clothes from patients with COVID-19 infection should wear appropriate PPE before touching it, including heavy duty gloves, a mask, eye protection (goggles or a face shield), a long-sleeved gown, an apron if the gown is not fluid resistant, and boots or closed shoes.
- Soiled linen should be placed in clearly labelled, leak-proof bags or containers, after carefully removing any solid excrement and putting it in a covered bucket to be disposed of in a toilet or latrine.

- Machine washing with warm water at 60–90° C with laundry detergent is recommended. Consider using a heat-resistant thermometer that won't be damaged by such high temperatures. The laundry can then be dried according to routine procedures.
    - If machine washing is not possible, linens can be soaked in hot water and soap in a large drum using a stick to stir and being careful to avoid splashing. The drum should then be emptied, and the linens soaked in 1% chlorine for approximately 30 minutes. Finally, the laundry should be rinsed with clean water and the linens allowed to dry fully in sunlight.
    - If excreta are on surfaces (such as linens or the floor), the excreta should be carefully removed with towels and immediately safely disposed of in a toilet or latrine. If the towels are single use, they should be treated as infectious waste; if they are reusable, they should be treated as soiled linens.

6.3 Dead body management

As of March 20, 2020, the World Health Organization has not yet given specific guidance around dead body management (DBM) in the COVID-19 pandemic. However, there is a risk of transmission post-mortem, and the US CDC and several Ministries of Health have given guidance to reduce transmission of disease to healthcare workers and family members.[11]

Based on this guidance, we recommend:

- Removal of a person's body from the room or isolation ward:
    - Perform hand hygiene and ensure proper use of PPE, including gown, goggles/face shield, surgical mask and gloves.
    - Remove all tubes, IVs and other lines from the patient.
    - Place the body in a leak-proof plastic body bag.
    - Decontaminate the exterior of the body bag with chlorine 1% or bleach 5%.
    - The family may then be given the body or it may be taken to the mortuary.
    - Provide counseling to the family.
    - Ensure that all equipment used and the patient's bed are cleaned, as per the protocol above.
- Mortuary procedures:
    - Ensure that mortuary staff wear appropriate PPE, including gown, goggles/face shield, surgical mask and gloves. Then may continue usual mortuary procedures.
    - Ensure daily cleaning of the mortuary, as above, with chlorine 1% or bleach 5%.

[11] https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-postmortem-specimens.html

7 Operational support, supply chain, procurement, and logistics

Logistics and supply chain are a critical part of any emergency response. Below are some key lessons from Partners In Health (PIH), based on prior emergency response efforts. It is also important to ensure operations staff, including logisticians, couriers, drivers, and warehouse workers, receive basic education about COVID-19, including modes of transmission, proper hand-hygiene and any enhanced precautions required (wiping down equipment, wearing gloves to handle boxes, and wearing masks to pick up medications at pharmacy vendors). Please see Appendix for additional information on cleaning and for drivers.

7.1 Clarify organizational/governmental supply chain management

- Clearly identify a specific individual to lead emergency supply chain efforts.
- Develop protocols for how the emergency and routine supply chains should interact, including storage, information systems, and purchasing.
- Commonly, they are not separated at the outset of the response out of necessity and are later separated as dedicated funding becomes available. More restrictive funders, such as bilateral agencies (USAID, DFID, etc.), will require this.
- Clearly identify and authorize specific funds for emergency procurement in the earliest stages of the response and identify ongoing funding approval processes.
- Clearly identify a specific individual to lead clinical decisions for emergency supply chain efforts (i.e. product specifications, substitutions, forecasting, etc.).

7.2 Clarify country level governance of emergency supply chain in partnership with the Ministry of Health

- Determine whether the United Nations (UN) Logistics Cluster (LogCluster) System has been established and identify how to engage with it.
- Among other things, this global mechanism coordinates requests of supplies across local, regional, and global implementers of all sizes, including donors (USAID, DFID) and local governments. At minimum, review LogCluster reports.
- If the UN Log Cluster is not active, identify mechanisms to coordinate efforts with other partners involved in emergency response.
- Often this happens through the Ministry of Health and/or the implementing partner for USAID-funded supply chain projects.

7.3 Map the organization's current systems and available resources

- Develop lists of materials necessary for COVID-19 response and conduct a review of stock levels of all relevant items.

- Conduct a rapid assessment of essential clinical and non-clinical equipment/systems and spare parts (oxygen, generators, incinerators, patient monitoring equipment, etc.) that will be necessary for this response.
- Conduct a rapid assessment of vehicle fleet and stocks of spare parts (SUVs, ambulances, motos, etc.).
- Review the national supply chain management system(s) - including importation and customs regulations, strategic stockpiling, storage, security, transportation, distribution, information systems, and requisitions - for clinical and other essential supplies and equipment. Arranging for maintenance or repairs and obtaining spare parts is often more challenging during an epidemic.
- Assess storage and warehousing infrastructure and capacity.

7.4 Map current supply systems and available resources, in health and other sectors:

- If the UN Logistic Cluster has been activated in the relevant country (or countries), utilize their mapping and transport systems, which will include local & global partners, including military, private, and public agencies.
- Asses basic in-country logistics and identify any major (or potential) infrastructure breakdowns (port closures, road or bridge disruptions, etc.), and consider contingency plans for potential breakdowns.
- Coordinate closely with district and national Ministry of Health colleagues, as well as other potential partners, to understand public supply chain processes, even if they are seemingly sparse.
- Assess the capacity of the local market to meet increased demand for clinical & other essential supplies. Encourage preference for qualified local sources when possible and consider the need to order additional materials for a longer period of time than usual.
- Assess the capacity of the international market to meet increased demand for clinical and other essential supplies; prioritize order placement based on knowledge of at-risk and essential items.
- Work with donors to seek out in-kind donations and ensure that they align with identified needs.
- Assess likely funders of medium and long-term response efforts to anticipate allowable commodities and other restrictions. Also assess the availability of donated materials for response efforts.

8 Hospital Management of patients with COVID-19

COVID-19 is highly infectious. Infection control and prevention are critical to protect patients and staff. Administrative controls, environmental controls and personal protection are all key elements of a safe environment. All of these controls rely on vigilance for suspected cases, as well as safe screening, testing and isolation of suspected and confirmed cases.

8.1 Triage & isolation

For information on initial screening at healthcare facility entry point and IPC for triage, see Chapter 2.

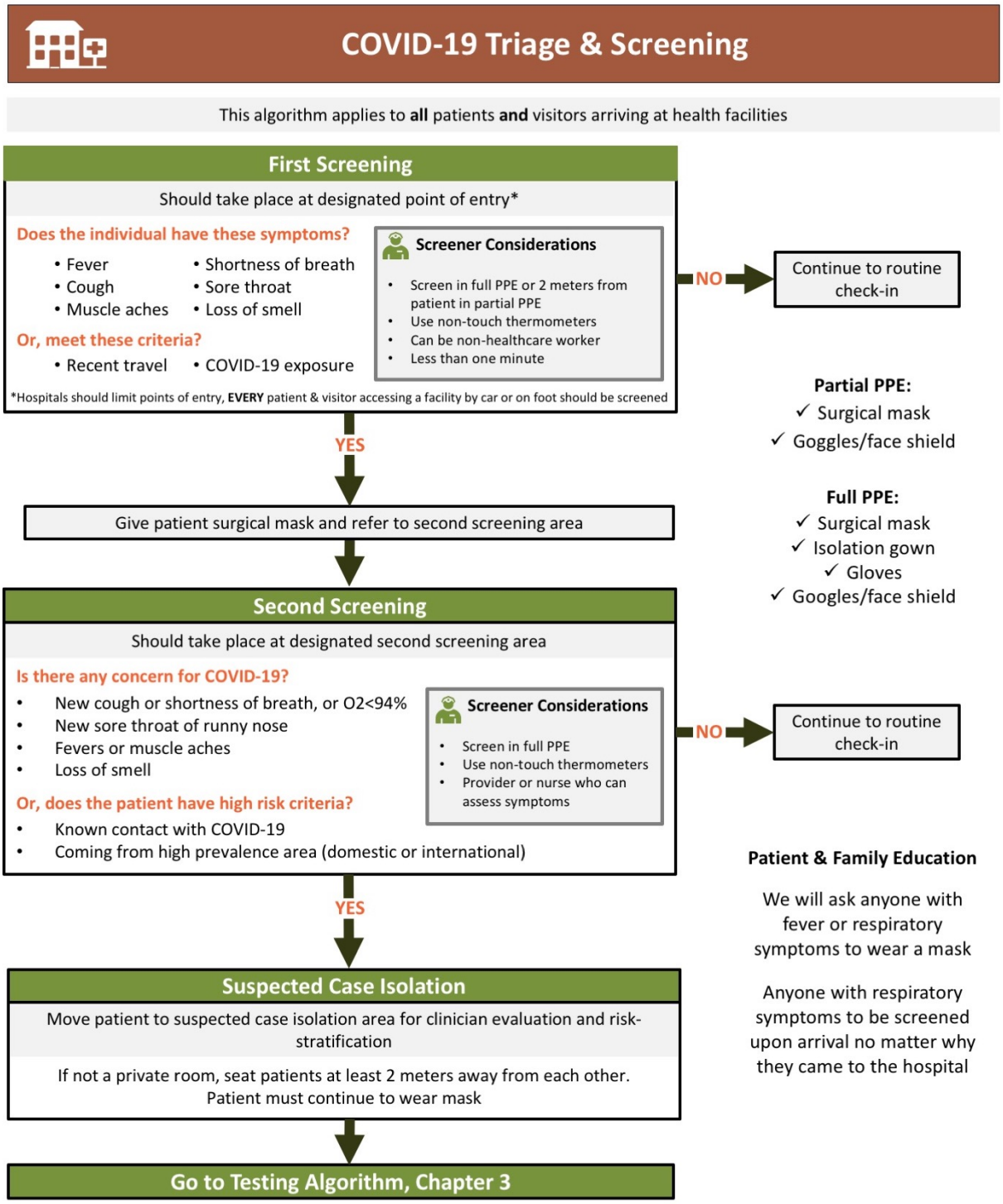
- Triage:
    - COVID-19 triage space should be separate from routine triage of other patients.
    - Providers should wear full PPE, and whenever possible, patients should be wearing masks or something to cover their nose and mouth.
    - Follow protocols for specimen collection for laboratory testing (see Chapter 4) when testing is available.
    - Patients with more severe presentations of suspected or confirmed COVID-19, will be admitted to isolation rooms or to designated wards/tents that separate suspected, presumptive and confirmed cases from each other if sufficient isolation space is not available.
- **Persons under investigation (PUI) for COVID-19 or suspected cases**: There should be separate isolation areas for PUIs for COVID-19 who have not yet been confirmed to have COVID-19 and who do not meet the definition of a presumptive case.
- **Presumptive and confirmed COVID-19 cases** (with positive laboratory tests per testing protocols) and suspected cases who are living with someone with confirmed COVID-19 should be separated from other suspected cases and moved immediately to an isolation room or ward/tents for confirmed cases.
- General Practices Procedures:
    - It is preferable for healthcare providers to only work with suspected and confirmed cases of COVID-19 and to have other providers managing non-COVID patients if possible. If this is feasible, providers should care for suspected COVID-19 patients first and then confirmed COVID-19 patients next. If this is not feasible, non-COVID-19 patients should be seen first, then the suspected cases, and then the confirmed cases. However, if there are particularly sick patients in any ward, they should be seen as soon as possible, which may require a division of labor between providers managing patient care.
    - Limit transport and movement of patients as much as possible. When transport is necessary, put on clean PPE, place a surgical mask on the patient, and follow appropriate respiratory hygiene.
    - Equipment such as stethoscopes, blood pressure cuffs, and pulse oximeters should remain in the patient's isolation room or designated ward as much as possible and must be cleaned and disinfected between each patient (e.g., by using ethyl alcohol 70% or

appropriate bleach solution) if being shared with suspected cases or other non-COVID wards.

- There should be no visitors for suspected or confirmed patients (with the exception of one parent for young children as necessary) as a strategy to help conserve PPE and diminish transmission of infection. All parents caring for young children must wear PPE.
- Once a patient is in the isolation area or designated ward, they cannot leave unless it is to travel to a dedicated bathroom for COVID-19 patients. Ideally, each confirmed and suspected case would have their own toilet facilities. Recognizing this is not often possible, there should be designated toilet and bathing areas for suspected cases as well as separate facilities for confirmed cases of COVID-19.
- If negative pressure ventilation is not available, maintain good ventilation (by using fans and/or keeping windows open) in wards and isolation rooms whenever possible.
- To minimize the spread of infection, one designated person in PPE should bring meals and drinking water for patients. This could be a designated nurse who is already entering COVID affected wards to give medications and check vital signs (which decreases possibility of transmission to multiple people and decreases need for PPE for additional staff), or other staff if nursing staff is too busy to provide meals.

See Figure 9 for more information on screening and triage of possible cases of COVID-19.

Figure 9: Screening and triage of possible cases of COVID-19



8.2 Social distancing in the hospital setting

When an epidemic shifts into the community transmission phase, it is important to maintain appropriate measures to reduce transmission within the hospital.

- Ensure isolation wards and hospital operations for COVID-19 suspects and confirmed cases are maintained separately from routine hospital operations.
- The health facilities should adopt restricted visitation policies (see below for more details).
- Avoid large gatherings of staff in confined spaces, including staff meetings, mealtimes, or congregating at nurses' stations.
- Consider doing patient handoffs between clinical staff by phone or at a safe distance to avoid inadvertent transmission of infection between healthcare workers.
- Consider holding staff meetings outdoors (where there can be ample space between people), and rotating mealtimes and eating outdoors to avoid crowded dining areas. If staff have to be less than 6 feet apart for a meeting or rounds, they should wear surgical masks.

8.3 Visitor guidelines

- All visitors should be screened at entry point according to guidelines.
- In general, avoid visitors should be limited as much as possible throughout the hospital. Whenever possible, restrict visitation in non-COVID wards to those people who may need extra assistance that the hospital is unable to provide (such as young children or severely disabled individuals).
- Visitors should not be permitted in COVID-19 suspect or confirmed case wards.
- Additional staff will likely be needed to help care for basic patient needs that family members may normally attend to.

8.4 Standard, droplet and airborne precautions

Standard and droplet precautions should be practiced for all patients under investigation for COVID-19 or confirmed to have COVID-19. These include hand and respiratory hygiene, the use of appropriate PPE, safe injection practices, safe waste management, proper cleaning of linens and environmental cleaning, as well as sterilization of patient care equipment and areas.

Standard precautions:

- Hand washing is always a critical protection for staff and patients. Gloves should be used for handling any blood or body fluids.

Figure 10: WHO's hand hygiene recommendations

WHO's 5 Moments for Hand Hygiene

1. Before touching a patient
2. Before clean/aseptic procedures
3. After touching a patient
4. After body fluid exposure/risk
5. After touching the patient's surroundings

Droplet precautions for suspected and confirmed COVID-19 patients:

Due to the infectious nature of SARS-CoV-2, masks, gowns, gloves and eye protection are recommended whenever caring for a patient.

- Airborne precautions should be used for aerosol-generating procedures, such as intubation, non-invasive ventilation, tracheotomy, cardiopulmonary resuscitation (CPR), manual ventilation before intubation, bronchoscopy, and nebulizer treatments.
- Perform procedures in an adequately ventilated space.
- If performing one of the procedures outlined above, don an N95 mask in addition to the above-mentioned PPE.
- Limit the number of people in the room to those absolutely individuals who are absolutely necessary; there should be no other patients present in the room.

8.5 Donning and doffing of PPE

Putting on (donning) and taking off (doffing) PPE is an important part of infection control as improper placement and removal of protective gear places staff at risk of infection. Contamination of mucous membranes while removing gear can expose staff to the virus. Staff should be carefully trained on the appropriate donning and doffing of PPE to decrease risks of infection. Please see videos available online for details on appropriate donning and doffing measures, such as this one: youtube.com/watch?v=wphfhqkzSgI&feature=youtu.be

Table 11. Donning and doffing PPE

Donning	Doffing
1. Perform hand hygiene* 2. Don gown 3. Don N95 respirator mask or surgical mask 4. Don face shield or goggles	1. Remove gloves (being careful not to have the outside of gloves touch exposed skin) and dispose of them in designated container 2. Perform hand hygiene 3. Remove gown (being careful not to touch the outside of the gown) and dispose in designated container 4. Perform hand hygiene 5. Remove face shield and place in designated container for sterilization 6. Perform hand hygiene ○ Leave the treatment area

5. Don gloves, ensuring wrist covered	○ Remove N95 mask (outside the treatment area) and dispose of it in designated container ○ Perform hand hygiene ○ Thoroughly wash hands with soap & water

**When using alcohol-based hand gel, allow gel to dry before continuing.*

If possible, staff should change into scrubs (or other work outfit) when they arrive at the healthcare facility, take them off at the end of the day, and they should be laundered before being worn again. If shoe covers are not available, staff should leave a pair of shoes at the healthcare facility that is only worn there and wear other shoes when coming to and from home. Staff should not wear jewelry or any other unnecessary item that could become contaminated due to viral exposure.

8.6 Strategies for conserving PPE

Conservation of PPE can begin prior to any cases of COVID-19 detection. It is critical that as triage and isolation systems are rapidly planned and implemented, early efforts are made to conserve PPE as stock is limited globally. Conserving PPE now will help to ensure enough supplies are available to keep providers safe throughout the epidemic.

Table 12. Strategies for conserving PPE

- N95 masks should ***only*** be used for aerosolizing procedures for coronavirus patients (such as nebulization, ventilation, and intubation). This is a WHO and CDC recommendation based on current limitations of the global supply. Some procedures (such as nebulization and ventilation) should be avoided unless absolutely necessary.
- When possible, concentrate patient care activities to minimize sets of PPE needed. For example, take vital signs and give medications at the same time to use one set of PPE instead of returning a second time and using a second set of PPE.
- If needed, consider the extended use of surgical and N95 masks between patients (meaning that the mask is not removed between patients, but instead stays on a healthcare provider's face continuously). These strategies are being used at many hospitals, including many in the United States. CDC guidelines for extended use (including when the mask should be changed) can be found at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/respirators-strategy/contingency-capacity-strategies
- In general, N95 masks should not be re-used (meaning removed and then replaced on a provider's face) in the care of patients with COVID-19.
- If N95 masks must be reused, do so for <8 hours at a time, wear gloves when removing mask, place mask in a paper bag, and wear gloves when putting mask on again, and then dispose of those gloves and put on a clean pair of gloves before continuing on to patient care. At the end of the day, N95 masks can be placed in a paper bag with user's name and date of use. They can be stored in paper bags for five days to allow for viral decay, and then reused 5 days later by the same user. Masks should no longer be reused when they are damaged, do not fit well, or are wet or soiled.
- Plastic goggles and face shields can be cleaned with a bleach solution and reused between patients.

**Please note none of these suggestions should detract from patient care. The safety of staff and patients is always the top priority!*

8.7 Suggestions for when recommended PPE is unavailable

- Maintain at least a 2-meter distance to avoid inhalation of infectious droplets.
- Frequent hand washing >20 seconds, particularly before and after seeing each patient.
- Avoid touching face and mucous membranes.
- Avoid touching surfaces without gloves.
- If performing aerosolizing procedure that would normally need an N95, double surgical masks and remain out of the direct line from the patient's nose and mouth. If possible, avoid the room in which an aerosolizing procedure has been done for at least 30 minutes after procedure is completed.
- Any available additional eye protection can be used to cover the eyes.

8.8 Decontamination of PPE

- Reusable face shields and goggles can be soaked in sodium hypochlorite 0.5% for 1 hour and left in a clean, open space to dry for at least 1 hour. Alternatively, alcohol-based disinfecting wipes can be used to disinfect face shields and goggles while the healthcare worker is wearing them, and then they should wait two minutes before seeing the next patient. This same process can be used to clean stethoscopes and other medical devices between patients as long as it is done thoroughly and carefully.
- If reusable gowns are used, they should be machine washed with warm water at 60-90° C with laundry detergent. The laundry can then be dried according to routine procedures.
    - If machine washing is not possible, linens can be soaked in hot water and soap in a large drum using a stick to stir and being careful to avoid splashing (preferably outside or in a well-ventilated location). The drum should then be emptied, and the linens soaked in 0.05% chlorine for approximately 30 minutes. Finally, the laundry should be rinsed with clean water and the linens allowed to dry fully in the sunlight.

8.9 Managing surge situations

- Growing patient numbers can outpace healthcare facility capacity, requiring adjustments to operations.
- Ideally, hospitals should have an incident command structure set up before this happens. If not, an ad hoc structure can be created:

Table 13. Incident Management Committee

Recommended personnel for hospital incident command center	
Administration	Security
Communication	Pharmacy
Medical personnel and nursing administration	Laboratory
Infection control	Maintenance and engineering
Respiratory therapy	Nutrition services
Human resources	Laundry, cleaning, and waste management

- Estimate both your maximum total demand and your maximum total capacity (including space, supplies, and staff).
- Plan for staffing interruptions. Staffing needs will surge, and the risk of staff exposures or illness will increase, meaning some needed staff members will likely be unavailable to work.
- Identify what services must be preserved and maintained at all times and consider prioritizing these areas and temporarily stopping less critical services if insufficient staff are available. Plan for back-up staff in critical areas.
- Plan in advance for changes in where patients can be admitted as patient numbers increase.
- In addition to planning for additional medications and supplies that may be needed in the event that there are interruptions to supply chain systems (as discussed in Chapter 8), consider the negative impact an epidemic may have on the availability of blood products for transfusion, and plan ahead for how to address this.

8.10 Strategies for increasing hospital capacity during surge periods

Table 14. Strategies for increasing hospital capacity during surge periods

Strategies for managing surge capacity
1. Consider condensing normal wards and converting wards or administrative space typically used for other reasons into COVID-19 wards, and/or creating tent wards for COVID-19 patients. 2. Consider cancelling elective procedures and surgeries prior to patient surge. 3. Shift outpatient appointments to other times or settings. This may be particularly useful for chronic diseases. For example, consider the following: ○ Having CHWs distribute medication refills (if they can do so safely); ○ Phone or text messaging for virtual appointments instead of in-person consultations; and ○ Consider increasing the time duration between follow up visits for stable patients, so they are given sufficient quantities of medications until their next visit. 4. Shift non-COVID-19 inpatients to alternate treatment sites. ○ Transition patients on long courses of antibiotics to oral antibiotics and send home as soon as safely possible; ○ Move all routine hospital outpatient visits (e.g. ANC, <5) to primary care centers to repurpose outpatient hospital space for inpatient or isolation beds; ○ Identify alternate treatment sites (such as churches, schools, etc.) for mild cases of COVID-19 with local authorities. 5. If several beds can be freed from each non-COVID-19 ward, different pre-existing wards can be combined to create an empty ward for COVID-19 management. 6. These approaches require a multidisciplinary team, including physicians, nurses, CHWs, facilities managers, and hospital administration whenever possible. 7. Critical resources, such as oxygen therapy or mechanical ventilation, may become insufficient to meet demand. In such scenarios, there are two key recommendations to consider: ○ Advance planning is critical to ensuring equity for patients and to protect staff from making very difficult decisions without support; and ○ Focus on the likelihood of survival with COVID-19 when choosing which patients should be prioritized for life-saving measures.

Principles to consider in rationing protocols
1. Health care providers have a duty to provide care. 2. Health systems have a duty to responsibly and equitably manage resources – so resources should go to those most in need, rather than those with special influence. 3. Health systems have a duty to plan for these scenarios to avoid placing the burden on frontline healthcare workers. 4. Rationing systems should ensure just and equitable allocation of resources. 5. Protocols and decisions must be transparent.
Procedures to consider for allocation systems
1. Utilize an officer or committee to guide decisions around allocation of scarce resources. This can help avoid individual healthcare workers having to make tough decisions alone. 2. *Assessing eligibility:* Exclusion criteria for advanced care resources may include factors that will lead to near-term death regardless of intervention (e.g. cardiac arrest, irreversible septic shock and/or organ damage, severe traumatic brain injury). 3. *Standardize risk assessment:* A replicable way for an officer or committee to use clinical data to assess mortality risk can help determine patients most likely to survive coronavirus infection. One example is the Sequential Organ Failure Assessment (SOFA) calculator, which can be found here: https://www.mdcalc.com/sequential-organ-failure-assessment-sofa-score. 4. *Reassess at routine intervals:* Decisions should be reevaluated on an ongoing basis as clinical parameters change.

9 Treatment

9.1 The basics of clinical management

- As of May 2020, there is no vaccine available to prevent COVID-19 and the only potential therapies for this disease are experimental, and have unclear benefits. The primary strategy for management of patients with COVID-19 is to assess their severity and manage them accordingly with supportive care as needed. For those who are mildly symptomatic, they should either remain at home with social support that allows for safe home quarantine or, if sufficient isolation facilities are available, they should be isolated and have appropriate meals and water provided.
- Unfortunately, approximately 15% of those suffering from COVID-19 may become severely ill. This percentage may be even higher in countries with high rates of immune suppression from HIV, TB or malnutrition. Delivering high-quality supportive care has the potential to be lifesaving. Supportive care ranges from oxygen, pain control, and IV fluids to mechanical ventilation and vasopressors. There are some drugs described in this section that may have anti-viral activity against COVID-19, but as of May 2020, they are all still under investigation for this use. This guide will be regularly updated as new information on therapies becomes available.
- The table below is adapted from UpToDate and describes risk factors for more severe presentations of COVID-19.[12]

Table 15. Potential risk factors for severe COVID-19

• Age >65*
• Pre-existing pulmonary disease
• Chronic kidney disease
• Diabetes
• Pre-existing cardiovascular disease (such as hypertension)
• Obesity
• Using biologic agents such as TNF inhibitors, interleukin inhibitors, or anti-B cell agents • History of transplant or other cause of immunosuppression
• HIV positive with a CD4 count <2000 or unknown

** There is a clear association with older age and more severe forms of COVID-19, but there is no clear age cutoff at which the risk of serious illness increases; 65 years of age is used here based on the median age of complications seen in several cohort studies.*

9.2 Initial evaluation of a confirmed COVID-19 patient

- While COVID-19 can affect many different organ systems in the body, the most common serious illness amongst patients with COVID-19 is pneumonia. The initial evaluation of a patient with confirmed COVID-19 disease should involve checking the blood pressure, pulse, respiratory rate, and

[12] https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-epidemiology-virology-and-prevention

blood oxygen level. If oxygen saturation levels are normal, consider testing O2 sat with ambulation, as some patients will experience a significant drop in O2 sat with exertion. These patients may not require oxygen while lying in bed, but should be closely monitored for development of worsening hypoxia.

- Assessment should only be done by personnel in proper PPE, and all medical devices used on the patient should be carefully cleaned with 70% alcohol or other approved sterilizing product after each use.

Lab Studies

The prognostic value of many lab tests with COVID-19 remains uncertain. However, general recommendations for lab tests (if readily available), include:

- Complete blood count (CBC) with differential, with a focus on the total lymphocyte count, and its trend over time, because lymphocyte counts tend to decrease as COVID-19 worsens
- Complete metabolic panel
- Creatine kinase (CK)
- C-reactive protein (CRP)
- Ferritin
- Prothrombin time (PT), partial prothrombin time (PTT), and fibrinogen
- D-dimer, which should also be checked regularly if there is a concern for developing coagulopathy13

It is also recommended to check hepatitis B & C viral serologies and HIV antigen/antibody testing if these have not been previously performed. Chronic viral hepatitis could affect interpretation of transaminase elevations and exacerbate hepatotoxicity of certain therapies. Underlying HIV infection may change the assessment of the patient's risk for deterioration and would warrant initiation of antiretroviral therapy.

Table 16: Lab values associated with severe COVID-19[14]

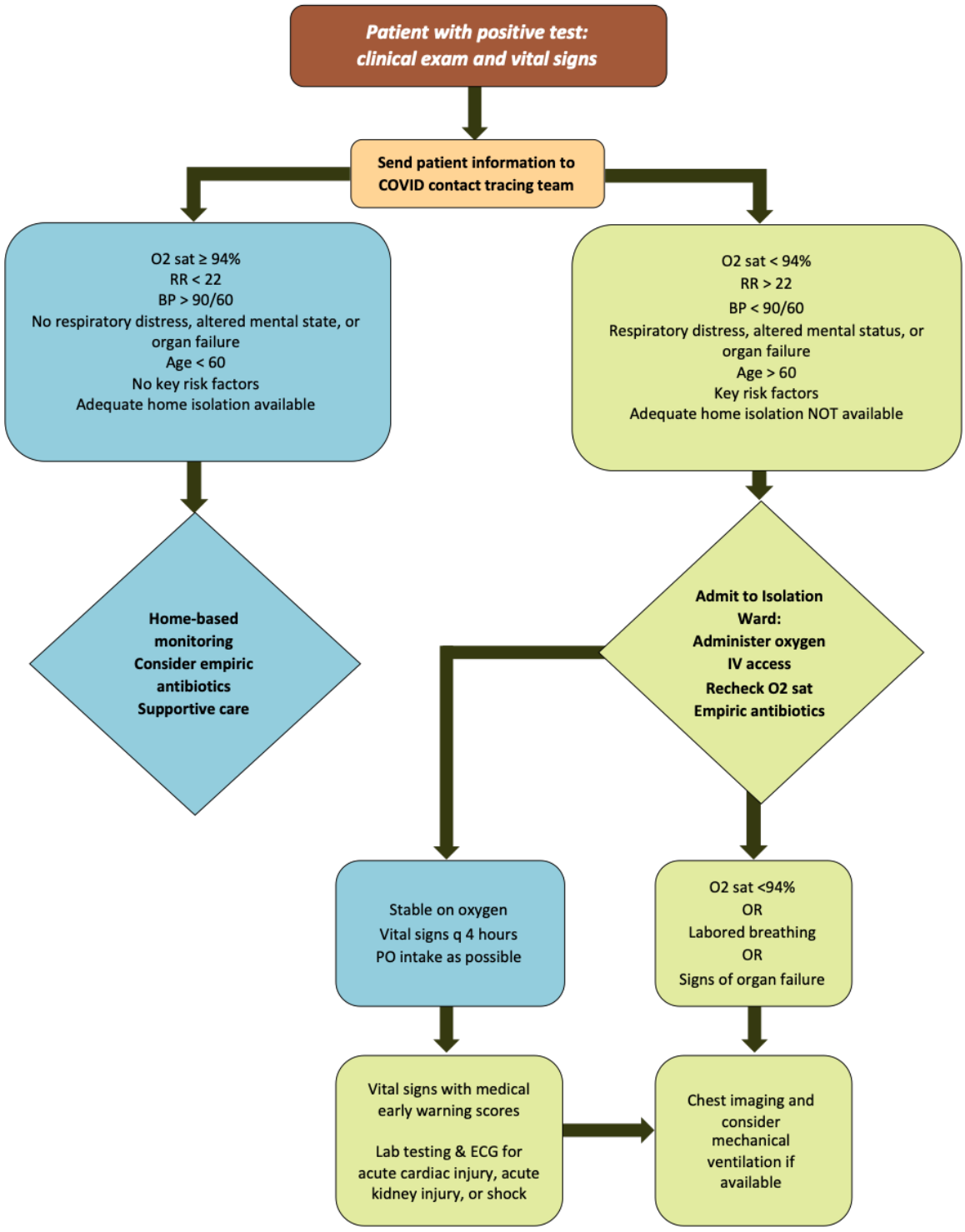
Abnormality	Possible threshold
Elevated:	
D-dimer	>1000 ng/mL (normal <500 ng/mL)
CRP	>100 mg / L (normal <8 mg/L)
LDH	>245 units/L (normal 112-210 units/L)
Troponin	>2x the normal limit (normal is 0-9 ng/L for women; 0-14 ng/L for men)
Ferritin	>500 mcg/L (normal is 10-200 mcg/L for women; 30-300 mcg/L for men)
CPK	>2x the normal limit (normal 40-150 units/L)
Decreased:	
Absolute number of lymphocytes	<800/microL (normal for persons <21 years is between 1800 and 7700/ microL)

[13] https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-management-in-hospitalized-adults
[14] https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-management-in-hospitalized-adults

Clinical and laboratory assessments should only be done by personnel in proper PPE, and all medical devices used on the patient should be carefully cleaned with 70% alcohol or other approved sterilizing product after each use.

The initial clinical assessment of patients is described in the algorithm in Figure 11.

Figure 11. Initial Assessment of a Confirmed or Suspected Patient with COVID-19



9.3 Management of suspected cases and contacts

Great care must be taken with the management of suspected cases, presumptive cases and confirmed cases of COVID-19. Some of these individuals will be infected with SARS-CoV-2, and others will not. See Chapters 2 and 7 and Section 9.1 for more detail.

It is ideal if all contacts of confirmed cases can be monitored in a dedicated facility, but if this is not possible, they should be monitored closely during a 14-day self-quarantine at home. If the contact has not developed any symptoms of COVID-19 during the 14 days of self-isolation and monitoring, he or she can stop self-isolation measures (see Chapter 5 for more details on contact tracing).

Local health authorities should consider working together to ascertain what community resources may exist to increase the capacity and availability of designated isolation facilities. Hotels, schools, and universities may have unused private rooms or dormitory space that could be utilized by suspected cases and contacts of confirmed cases. It should be noted that it is also important to consider setting up private rooms and bathrooms for healthcare workers caring for patients with COVID-19 in order to keep them from exposing their family members and other close contacts to infection.

See Section 10.4 for more information on recommendations for management of mild cases, suspected cases, and contacts of confirmed cases, as well as Section 10.6 for detailed guidelines on discharge from isolation or quarantine.

9.4 Management of mild and moderate COVID-19

The management of severe cases of COVID-19 requiring hospitalization is clear. However, the vast majority (over 80%) of cases of COVID-19 cases are mild or moderate and do not require hospitalization for care. The management of people with mild or moderate cases of COVID-19, which do not require hospitalization, is a more complex question, particularly as the number of cases in a specific region increases. Some countries have chosen to recommend that milder cases stay home (typically known as self-quarantine or self-isolation) to avoid infecting other people when they seek care, and because healthcare systems are rapidly overwhelmed by the number of people seeking care. In this case, it is generally recommended that mild confirmed and suspected cases stay in their own dedicated private room (and wear a covering over their nose and mouth if interacting with other family members) so as not to infect other household members. If this is not possible, then all household members should self-quarantine to avoid spreading infection to the community.

Other countries have chosen to isolate all mild confirmed cases of COVID-19 in dedicated field hospitals or designated isolation facilities. Of note, true isolation facilities (with individual rooms and bathrooms) are not necessary for separating confirmed cases from each other, as they have already been infected with SARS-CoV-2.

9.5 Considerations for home-based care of patients with mild COVID-19

Table 17. Considerations for home-based care

Considerations for Home-based Care	
Isolation/ quarantine	• Quarantine should last 14 days (or longer if patient is still symptomatic).* • There should be no visitors to the home during this time, other than a community health worker or other designated person for patient monitoring. • Whenever possible, patients should be in a well-ventilated single room and should maintain a distance of >2 meters from other household members, and should use private bathroom facilities if possible. • Minimize use of shared spaces and eating utensils; ensure that spaces are well ventilated. If a fan is available, point it out of one window and keep another window open to facilitate increased air exchange in the room. • Assign one person to be the patient's caregiver. This person should be monitored closely for the development of symptoms.
Hygiene	• Wash hands with soap or alcohol-based product after any type of contact with the patient, before and after preparing food, and before eating. • Cover mouth with cloth or paper when coughing or sneezing, and wear a covering over nose and mouth if interacting (or sharing space) with other household members. • Clean eating utensils with soap and water after using. • Clean linens with detergent and hot water and clean household surfaces with appropriate bleach or alcohol-based cleaning products as described in previous sections.
Care	• Social support, including food supplementation is critical to help individuals and families through this challenging time. • The patient should be monitored daily by family members for worsening symptoms. The patient should go to a healthcare facility to be evaluated if he or she develops shortness of breath, altered mental status, severe sleepiness, inability to eat, drink or walk, or has any other significant worsening in his or her condition. • Community health workers (or other appointed patient monitors) should call (if possible) or visit patients on a frequent basis, checking in with family members and patients *outside* the home (maintaining a distance of at least 2 meters away from the patient and family members). • If the patient worsens and needs to be transported to a facility, whenever possible, anyone accompanying the patient should wear a face mask or similar face covering. When these are not available, attempt good cough hygiene as much as possible.

**As of May 2020, the US Centers for Disease Control and Prevention's recommendations on this had changed from 14 days to 10 days, but we are leaving this as 14 days for now, since that appears to be more standard globally.*

9.6 Management of patients with COVID-19 pneumonia requiring oxygen

If the initial assessment shows that the patient has hypoxia, supplemental oxygen should be given with a goal to maintain the oxygen saturation (SpO_2) ≥94%.

- Oxygen delivered by *nasal cannula* at 2 to 5 L/min provides an FiO2 of 25-49%.
- If oxygen saturation remains <94% with O_2 by nasal cannula at 5 liters/minute, then administer oxygen with a *simple facemask* (at 6-10 L/min, which delivers an FiO2 of 40-60%.
- If oxygen saturation remains <94% with a simple face mask, administer oxygen with a *non-rebreather* mask at 10-15L/min, which delivers an FiO2 of 60-95%. Healthcare workers managing patients on non-rebreathers should wear N95 masks.
- If there is not enough supplemental oxygen to administer to all patients with oxygen saturations below 94%, lower cutoffs can be implemented and healthcare workers should provide oxygen to those patients most in need (while also considering a patient's likelihood of survival if there is insufficient oxygen supply for everyone who needs it).
- Keep in mind that it is best to have oxygen concentrators hooked up to an uninterruptible power supply (UPS) device to avoid unnecessary damage to concentrators due to surges in electrical currents than can occur.

Figure 12. Management of oxygen in patients with COVID-19 pneumonia

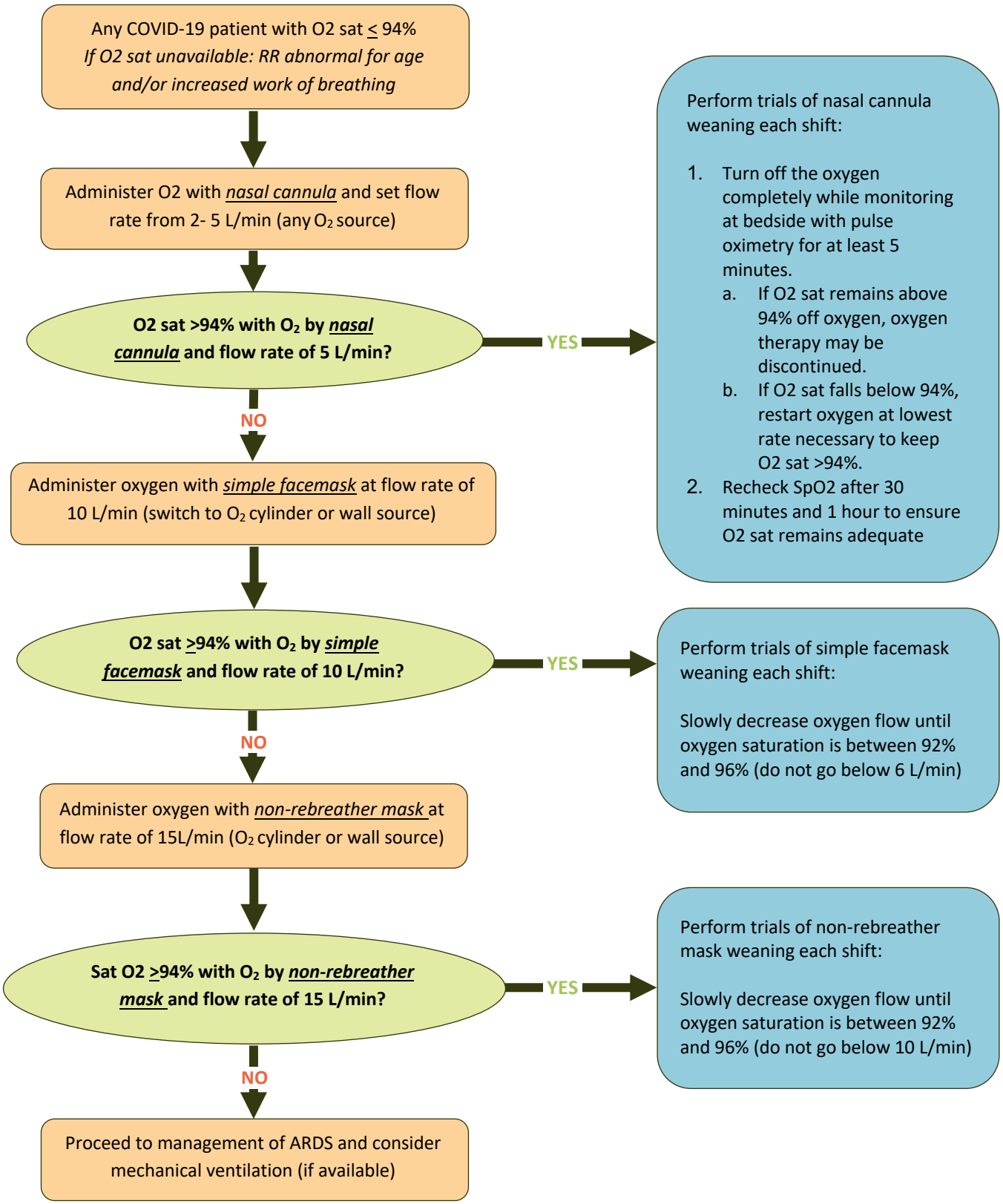


Figure 13. Oxygen Delivery Systems for Different Levels of Flow

Oxygen Delivery	Oxygen Flow	Acceptable Oxygen Sources		
 Nasal cannula/prongs	1 to 5 L/min	 Oxygen concentrator	 Oxygen cylinder	 Piped oxygen from central source
 Simple facemask	6 to 10 L/min	 Oxygen concentrator	 Oxygen cylinder	 Piped oxygen from central source
 Non-rebreather	10 to 15 L/min	 Oxygen concentrator	 Oxygen cylinder	 Piped oxygen from central source

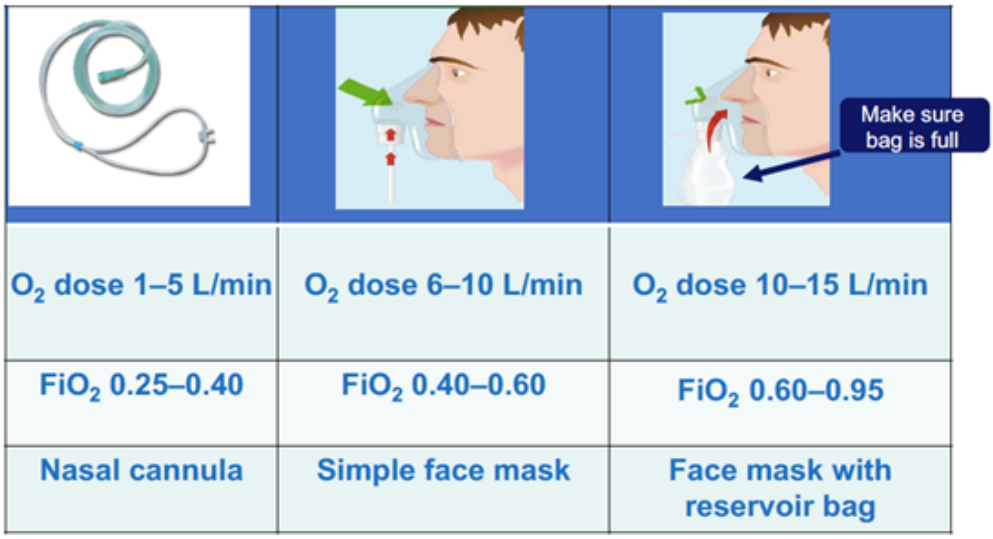
Note: Nebulizer treatments should be used very sparingly in COVID-19 patients as they pose a significant risk of aerosolizing the virus and further exposing staff to the virus. Efforts should be made to limit nebulizers to patients who really need them including those wheezing and/or patients with asthma or chronic obstructive pulmonary disease (COPD). Alternatively, patients who would normally receive nebulizer treatments can be given therapy with metered-dose inhalers (MDI) and spacers. In this case, consider giving 2-6 puffs every 20 minutes three successive times by MDI.

9.7 Oxygen weaning protocols

- As the patient improves, he or she may be gradually taken off oxygen.
- For patients who are receiving oxygen by nasal cannula, trials of oxygen weaning should be done each shift.
- Turn off the oxygen completely while monitoring at bedside with pulse oximetry for at least 5 minutes.
- If oxygen saturation falls below clinical target (94% if no target specified), restart the oxygen at the lowest flow rate necessary to meet the patient's clinical goal.
- If patient maintains saturations above clinical target without oxygen, oxygen therapy may be discontinued. However, keep in mind that oxygen saturation levels may drop significantly with even small amounts of exertion (such as walking across the room to use the lavatory).

- Check oxygen saturation 30 minutes later and then again one hour later (or any time the patient seems more short of breath) to ensure saturation remains adequate without oxygen therapy.
- For patients who are stable on a simple face mask or non-rebreather, trials of oxygen weaning should be done each shift by slowly decreasing oxygen flow until oxygen saturation is at least 94%.

Figure 14. Type of oxygen delivery and resulting FIO2



- High flow oxygen and non-invasive positive pressure ventilation (NIPPV):
    - Continuous positive airway pressure (CPAP) ventilation can be considered when mechanical ventilation is not available; however, be aware of the following:
        - CPAP or BiPAP have not been demonstrated to be effective in the treatment of COVID-19.
        - There is a higher risk of aerosolization of particles that can leak into the air around the mask, which has a higher potential for infection transmission to healthcare workers, strict airborne precautions should be instituted when CPAP is used.
        - Non-invasive ventilation devices like helmets for the delivery of continuous positive airway pressure were used in Italy when respirators were not available. Efficacy evaluations have not been published.
- High-flow oxygen can be considered in the situation of respiratory failure and no availability of invasive mechanical ventilation. Due to concerns about the risk of aerosolization with high flow oxygen, airborne precautions should be instituted when it is used.

9.8 Management of the mechanically ventilated patients

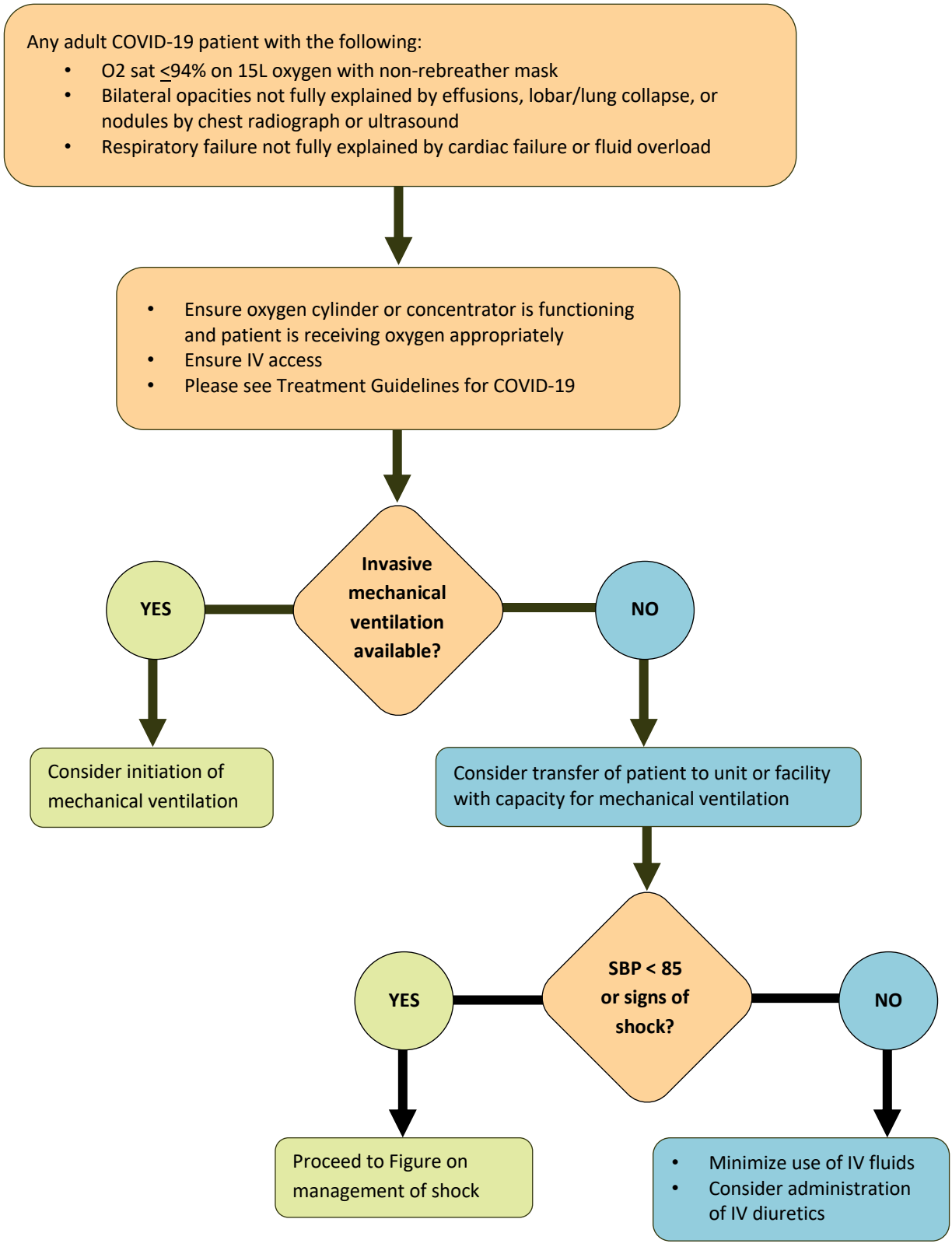
Only facilities which have an already established intensive care unit (ICU) with mechanical ventilation procedures and staff trained in their use should consider using mechanical ventilation for patients with severe COVID-19.

- Considerations for Intubation:
    - Intubation is an aerosol generating procedure with increased risk for health worker exposure to infection. Airborne precautions should be established and staff should don appropriate PPE (including an N95 mask). Intubation should be done in a private room away from other patients, ideally one with negative pressure if available. Only experienced staff should perform intubation in order to minimize the risk of spreading viral particles during multiple attempts at intubation. Pre-oxygenation and rapid sequence induction should be used to avoid manual ventilation of the patient.
- Discussions on ventilation settings, modes of ventilation and ventilation adjustments are beyond the scope of this guide.

9.9 Acute respiratory distress syndrome (ARDS)

One of the most severe complications of COVID-19 is acute respiratory distress syndrome, in which breathing becomes extremely labored, the lungs become stiff and fluid-filled and the patient's ability to oxygenate is severely impaired. ARDS is often seen on X-ray or CT scan as bilateral opacities in the lungs and is typically an indication for mechanical ventilation.

Figure 15. Management of the patient with ARDS

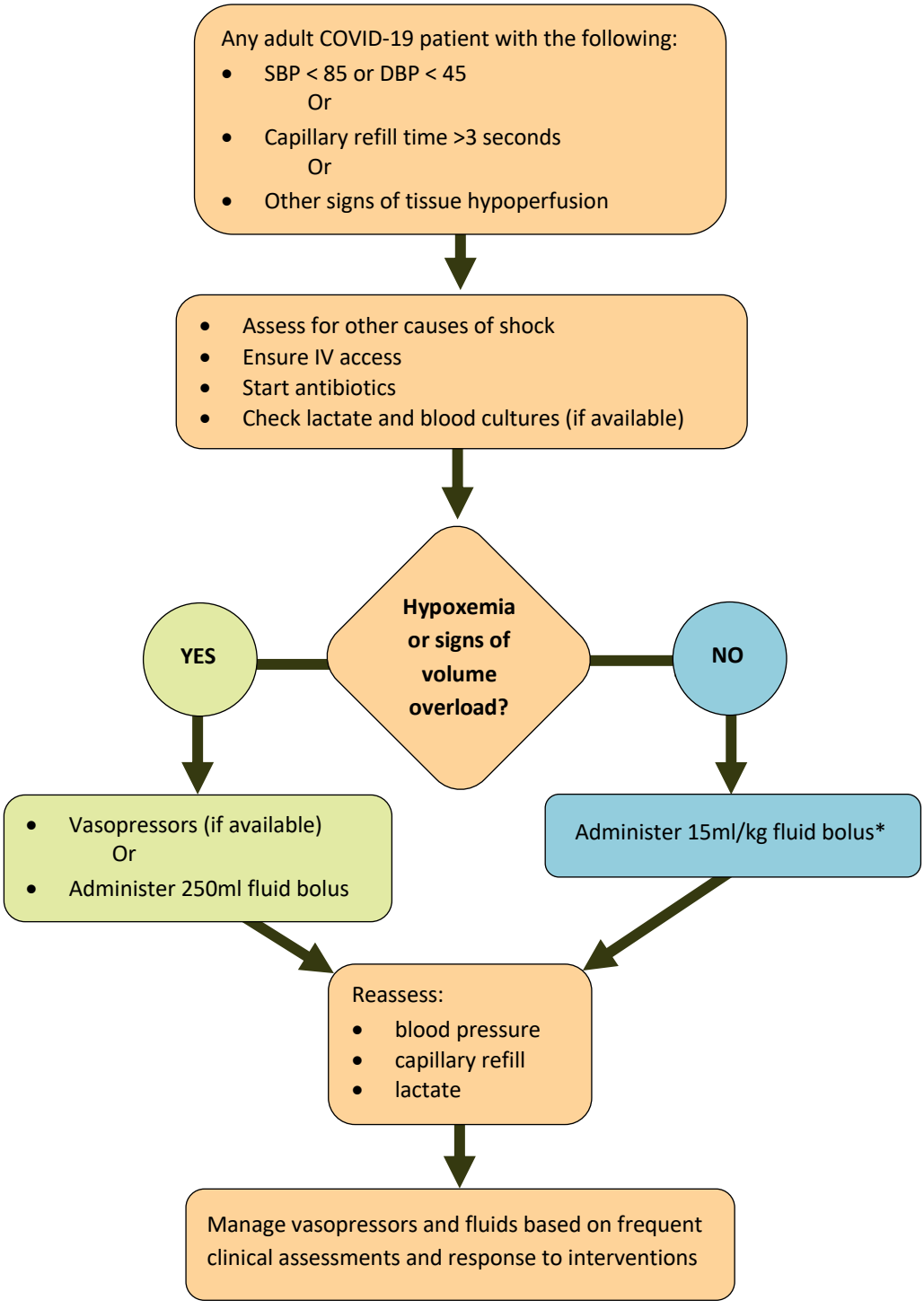


Definitions from the protocol:

- SpO2 is the oxygen saturation measured from a pulse oximeter.
- FiO2 is defined as the percentage or concentration of oxygen that a person inhales (the fraction of inspired oxygen). The atmospheric air that we inhale on a daily basis is made up of 21% oxygen. Effective oxygen therapy is about finding a balance between delivering the lowest FiO2 in order to achieve normal oxygen saturations for the patient. Hypoxia is not a good thing, but neither is too much FiO2.
- Multisystem organ failure or shock

This diagram is meant to illustrate the overall management of organ failure/shock and does not replace more detailed intensive care guidelines.

Figure 16. Algorithm for management of multisystem organ failure or shock



**Manage vasopressors and fluids based on a conservative fluid strategy: give patients smaller volume fluid boluses (15ml/kg instead of 30ml/kg) and, when available, initiate vasoactive medications (e.g. norepinephrine, dopamine) earlier in the course of shock.*

9.10 Drug therapy

As of May 2020, there is no highly successful treatment for COVID-19. Remdesivir and dexamethasone both may offer some benefit and their use and evidence supporting the benefit is described below. Many drugs are currently under investigation for use in COVID-19. The following table and algorithms represent drugs and therapies in current use for COVID-19; the evidence on the recommendations is still limited and evolving. This guide does not recommend the use of antimalarials such as chloroquine, hydroxychloroquine or Artemisia annua until further evidence is produced on their efficacy and safety for use in patients with COVID-19.

*Table 18. Treatment recommendations for COVID-19 infection**

Clinical Severity	Treatment	Considerations
Mild COVID-19 diagnosis without hypoxia or radiographic evidence of disease (if x-ray available)	Symptomatic treatment	Use paracetamol for fever Keep patients well hydrated
COVID-19 diagnosis with hypoxia	• Oxygen therapy • Dexamethasone 6 mg (oral or injectable) once daily for adult patients 10 days • IV fluids for hydration if patient not able to take adequate oral intake • Prophylactic enoxaparin (for anticoagulation) • Consider remdesivir if available	• Benefit of dexamethasone not established in children, use only in consultation with an expert • In pregnant patients, use prednisolone 40 mg daily instead of dexamethasone • Consider empiric antibiotics, such as amoxicillin or azithromycin for children, and azithromycin for adults with likely superimposed bacterial pneumonia (which is likely a minority of patients) • Ceftriaxone can be used for patients requiring IV medications
COVID-19 with critical illness or ARDS	• Dexamethasone 6 mg (oral or injectable) once daily for adult patients 10 days • Remdesivir if available • See Figure 15 for management of ARDS	• Benefit of dexamethasone not established in children; use only in consultation with an expert, but it is reasonable to assume there will be benefit in children with ARDS • In pregnant patients, use prednisolone 40 mg daily instead of dexamethasone • Consider empiric antibiotics as above

**Treatment recommendations are changing rapidly and what is included below is based on recommendations from US guidelines listed in UpToDate and other relevant sources as of May 2020.*

Corticosteroids (dexamethasone and prednisolone)

The use of corticosteroids for patients with COVID-19 has been controversial and continues to change.[15] Glucocorticoids have been associated with an increased risk of mortality in patients with viral pneumonias due to influenza and Middle East Respiratory Syndrome coronavirus (MERS-CoV) infection. However, recent evidence (June 2020) coming from the RECOVERY trial[16] (publication pending) demonstrated a benefit with use of low-dose corticosteroids.

The RECOVERY trial being conducted in the United Kingdom found that low-dose dexamethasone could reduce mortality among patients with moderate-to-severe ARDS. The mortality of critically ill patients on ventilators was reduced by one-third, and it was reduced by one-fifth for patients requiring oxygen alone. In that trial, they used doses of 6 mg (either oral or injectable) once daily for adult patients over the course of 10 days. For pregnant women, they recommend substituting dexamethasone with prednisolone 40 mg once daily by mouth or hydrocortisone 80 mg twice daily IV. This mortality benefit was only seen with more severe cases, and not for patients with milder disease.

This guide recommends starting low-dose dexamethasone in all adult patients that require oxygen. For children, because the benefits of dexamethasone have not yet been established, we recommend using dexamethasone on a case-by-case basis and in consultation with a pediatric or infectious disease expert.

Remdesivir

Remdesivir is a novel nucleotide analogue medication that has activity against SARS-CoV-2 in vitro.[17] On interim analysis of a trial of over 1000 people in the United States, remdesivir resulted in a faster time to recovery, defined as being discharged from the hospital or no longer requiring supplemental oxygen (median 11 versus 15 days with placebo). There was also a trend towards lower mortality that was not statistically significant (8 versus 11.6 percent with placebo, p = 0.059). Final analysis and peer review of these data are pending.

Based on these preliminary clinical trial results as of May 2020, the US FDA issued an emergency use authorization for remdesivir for hospitalized children and adults with severe COVID-19 (SpO2 ≤94 percent on room air, requiring supplemental oxygen, or mechanical ventilation).[18] While more data is needed on the effects of remdesivir, as of May 2020, current US guidelines recommend the following:

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[15] https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-management-in-hospitalized-adults?search=remdesivir&source=search_result&selectedTitle=2~15&usage_type=default&display_rank=1#H1596828032
[16] RECOVERY study Protocol. https://www.recoverytrial.net/files/recovery-protocol-v6-0-2020-05-14.pdf

[17] https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-management-in-hospitalized-adults/abstract/33
[18] https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-management-in-hospitalized-adults/abstract/34

- A suggested adult dose of 200 mg intravenously on day 1 of treatment, followed by 100 mg daily for 10 days total in patients on mechanical ventilation and 5 days total in other patients (with extension to 10 days if there is no clinical improvement).
- Remdesivir is not recommended in patients with an alanine aminotransferase (ALT) ≥5 times the upper limit of normal (and should be discontinued if the ALT rises above this level during treatment or if there are other signs of liver injury). The pharmacokinetics of remdesivir in the setting of renal impairment are uncertain, so it is not currently recommended for use in patients with significant renal impairment.

Reported side effects include nausea, vomiting, and transaminase elevations. Other adverse events described in patients who received remdesivir include worsening kidney injury, multiple organ failure, and worsened cardiopulmonary status.[19]

Lopinavir/ritonavir and other protease inhibitors[20]

Of note, very little evidence is available on the efficacy of protease inhibitors to treat COVID-19. A randomized controlled trial has shown that lopinavir/ritonavir was not superior to standard of care in severe COVID-19 cases. Therefore, as of May 2020, the National Institutes of Health in the United States did not recommend using the combination of lopinavir/ritonavir or other protease inhibitors for COVID-19 patients unless they are engaged in a clinical trial.

- If used, recommend dosing for lopinavir/ritonavir is two capsules twice daily for 7 days.

Chloroquine and hydroxychloroquine

- Both chloroquine and hydroxychloroquine have been reported to inhibit SARS-CoV-2 in vitro, although hydroxychloroquine appears to have more potent antiviral activity.
- Clinical data evaluating hydroxychloroquine and chloroquine are limited, and their efficacy against SARS-CoV-2 is unknown. This guide recommends their use only in the setting of a clinical trial or study and not for routine use.
- Note, possible adverse effects include QTc prolongation (particularly at higher doses), which may lead to arrythmia and death. More rare adverse effects include cardiomyopathy and retinal toxicity. ECG monitoring of the QT interval (corrected for heart rate) should be done. If QTc >500, stop the chloroquine or hydroxychloroquine, and consider stopping any other QT prolonging drugs if possible
- Patients should be informed to promptly report any new symptoms including palpitations, syncope, or pre-syncope. Monitor clinical changes that could lead to hypokalemia, such as diarrhea or the initiation of diuretic therapy.

[19] https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-management-in-hospitalized-adults/abstract/36,40
[20] Cao et al. A Trial of Lopinavir–Ritonavir in Adults Hospitalized with Severe Covid-19.

IL-6 pathway inhibitors

- Clinical features consistent with a cytokine release syndrome with elevated interleukin (IL)-6 levels have been described in patients with severe COVID-19.
- Anecdotal reports have described good outcomes with the use of the IL-6 receptor inhibitor tocilizumab, but there are no published clinical data supporting its use.
- Treatment guidelines from China's National Health Commission include tocilizumab for patients with severe COVID-19 and elevated IL-6 levels. This agent, as well as sarilumab and siltuximab, which also target the IL-6 pathway, are being evaluated in clinical trials.
- These agents are not available in many countries.

Convalescent plasma

- Plasma is the liquid in blood that is obtained when you separate out red blood cells, white blood cells, etc. Plasma can be obtained from donors through standard transfusion practices.
- The use of convalescent plasma (plasma from people who have already recovered from COVID-19 infection and have the relevant antibodies to fight this infection) for people with COVID-19 is being studied in Europe and the United States.
- Plasma therapy is as safe as blood transfusion and based on similar practices.
- A case series described administration of plasma from donors who had completely recovered from COVID-19 to five patients with severe COVID-19 on mechanical ventilation and persistently high viral titers despite investigational antiviral treatment. The patients had decreased nasopharyngeal viral load, decreased disease severity score, and improved oxygenation by 12 days after transfusion.
- The known risks of this therapy are transfusion reactions and the less common risk of transmission of infectious diseases if blood products are not appropriately screened.
- There is also another theoretical risk, which is that these antibodies could trigger a pro-inflammatory reaction that worsens the patient's disease. Data to date has not shown this, but as more people are treated, this may come up.
- To date, convalescent plasma has been used more often in late, severe cases of COVID-19, and has shown promise, but antibodies generally work better if used earlier in disease.

Use of antibiotics for patients with COVID-19[21]

While data is still being collected, as of May 2020, it appears that secondary infection with bacterial pneumonia is still fairly uncommon. A meta-analysis showed possible bacterial pneumonia in only about 8% of patients hospitalized with severe COVID-19. If antibiotics are used for the management of patients with COVID-19, they should be selected based on local availability, epidemiology, and prevalence of

[21] Rawson TM, Moore LSP, Zhu N, Ranganathan N, Skolimowska K, Gilchrist M, Satta G, Cooke G, Holmes A. Bacterial and fungal co-infection in individuals with coronavirus: A rapid review to support COVID-19 antimicrobial prescribing. Clin Infect Dis. 2020 May 2.

bacterial resistance. If co-infection with bacterial pneumonia is thought to be likely, clinicians can consider using the following agents:

- Amoxiciliin or azithromycin for children with less complicated disease.
- Azithromycin is the best therapeutic option for relatively stable adults with likely community acquired pneumonia, but doxycycline or erythromycin are other oral alternatives if azithromycin is not available.

For adult and pediatric patients with more severe presentations, consider using IV ceftriazone (along with oral azithromcyin if available).

9.11 Other clinical considerations with COVID-19

Silent hypoxia

A phenomenon known as “silent hypoxia” can occur in patients with COVID-19 when their blood oxygen levels are exceedingly low, indicating they aren't getting enough oxygen to their lungs and other essential organs, yet these patients do not experience dyspnea (shortness of breath). Silent hypoxia is usually preceded by other symptoms, such as muscle aches, fatigue, fever and cough.

All patients being evaluated for possible COVID-19 should have an oxygen saturation checked. If normal, and the patient complains of shortness of breath on exertion, obtain an ambulatory O2 saturation test (a rapid exercise test for exertional desaturation). There are two common rapid exercise tests for exertional desaturation:

- The 1-minute sit-to-stand test (in which the patient goes from a seated position to standing as many times as they can in one minute);
- The 40-step test (in which the patient takes 40 steps on a flat surface).

Either of these tests can be done with the oxygen saturation monitor on the patient, thereby providing continuous readings as they move around. The validation and safety of exercising tests for COVID have not been well studied and should be done under close supervision with infection control measures in place.

Further studies will be necessary to better understand this recently identified phenomenon of silent hypoxia. However, as of May 2020, there are several theories as to why this occurs. One theory is that the virus may affect the airways of the lungs as well as the blood vessels flowing through the lung. For normal oxygen levels to occur, the blood flow through the lung needs to match where the airflow through the lungs is occurring. The virus may be disrupting this normal matching of blood flow and airflow, but the disruption may not be enough for us to sense a feeling of shortness of breath since the lung has not become stiffer or congested as it might in other pneumonias or with acute respiratory distress syndrome. In patients with silent hypoxia, COVID-19 may not be affecting the lungs’ ability to expel carbon dioxide, and the rise in carbon dioxide levels is what normally gives patients the feeling of shortness of breath.

Patients with silent hypoxia should be treated with oxygen, even if not short of breath (see Chapter 10 for information on oxygen therapy). It is thought that some of the morbidity and mortality of COVID-19 is due to these limitations in tissue oxygenation which take place over a longer period of time due to the lack of sensation of shortness of breath some people experience.

COVID-19 and hypercoagulability

Infection with SARS-CoV-2 has been associated with inflammation and a prothrombotic state, with increases in fibrin, fibrinogen, and D-dimer.[22] [23] This, in turn, has been associated with worse clinical outcomes.[24] [25] Although the true incidence of these complications is not yet known, there have been reports of increased incidence of thromboembolic disease associated with COVID-19 in patients in the intensive care unit (ICU). [26] [27]

- In a French multicenter cohort study of 150 ICU patients, 16.7% had pulmonary embolism (PE) despite prophylactic anticoagulation. Patients with COVID-19 and ARDS had increased incidence of PE compared to patients without COVID-19-associated ARDS.[6]
- A Dutch study of 184 ICU patients reported a cumulative incidence of venous thromboembolism (VTE) of 27% despite prophylaxis.[28] Studies that used screening ultrasounds have reported VTE incidence of 22%[29] and 69% [28] in those admitted to the ICU.
- However, other centers have reported lower event rates. Among 393 patients from New York, only 13 patients (3.3%) experienced VTE.[30]

Clots are causing heart attacks and strokes in COVID-19 patients, and leading to swollen wounds on fingers and toes, and skin rashes. Autopsies often show blood vessels choked with blood clots. Clots

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[22] Han H, Yang L, Liu R, et al. Prominent changes in blood coagulation of patients with SARS-CoV-2 infection. *Clin Chem Lab Med*. 2020. Available at: https://www.ncbi.nlm.nih.gov/pubmed/32172226.

[23] Driggin E, Madhavan MV, Bikdeli B, et al. Cardiovascular considerations for patients, health care workers, and health systems during the coronavirus disease 2019 (COVID-19) pandemic. *J Am Coll Cardiol.* 2020. Available at: https://www.ncbi.nlm.nih.gov/pubmed/32201335.

[24] Guan WJ, Ni ZY, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*. 2020. Available at: https://www.ncbi.nlm.nih.gov/pubmed/32109013.

[25] Tang N, Bai H, Chen X, Gong J, Li D, Sun Z. Anticoagulant treatment is associated with decreased mortality in severe coronavirus disease 2019 patients with coagulopathy. *J Thromb Haemost*.

[26] Llitjos JF, Leclerc M, Chochois C, et al. High incidence of venous thromboembolic events in anticoagulated severe COVID-19 patients. *J Thromb Haemost*. 2020. Available at: https://www.ncbi.nlm.nih.gov/pubmed/32320517.

[27] Helms J, Tacquard C, Severac F, et al. High risk of thrombosis in patients in severe SARS-CoV-2 infection: a multicenter prospective cohort study. *Intensive Care Med*. 2020:[Preprint]. Available at: https://www.esicm.org/wpcontent/uploads/2020/04/863_author_proof.pdf.

[28] Klok FA, Kruip M, van der Meer NJM, et al. Incidence of thrombotic complications in critically ill ICU patients with COVID-19. *Thromb Res*. 2020. Available at: https://www.ncbi.nlm.nih.gov/pubmed/32291094.

[29] Tavazzi G, Civardi L, Caneva L, Mongodi S, Mojoli F. Thrombotic events in SARS-CoV-2 patients: an urgent call for ultrasound screening. *Intensive Care Med*. 2020. Available at: https://www.ncbi.nlm.nih.gov/pubmed/32322918.

[30] Goyal P, Choi JJ, Pinheiro LC, et al. Clinical characteristics of COVID-19 in New York City. *N Engl J Med*. 2020. Available at: https://www.ncbi.nlm.nih.gov/pubmed/32302078.

seem to target the lungs, cutting off blood flow to the alveoli (tiny air sacs in the lungs) where blood should exchange oxygen and carbon dioxide.

Based on this, clinical management of COVID-19 patients should include certain measures to prevent, diagnose, and manage possible thromboembolic disease.

- It is now common to measure hematologic and coagulation markers in hospitalized patients with COVID-19, and hospitalized adults with COVID-19 should receive VTE prophylaxis per the standard of care.
- Hospitalized adults with COVID-19 should receive VTE prophylaxis per the standard of care for other hospitalized adults.
- Consider administering a low molecular weight heparin such as enoxaparin (also known as Lovenox) 40 mg subcutaneously once daily for VTE prophylaxis.
- For hospitalized COVID-19 patients, the possibility of thromboembolic disease should be evaluated in the event of rapid deterioration of pulmonary, cardiac, or neurological function, or of sudden, localized loss of peripheral perfusion, or the development of a swollen extremity suspicious for a deep venous thrombosis (DVT).
- Patients who have a thromboembolic event (or who are highly suspected to have thromboembolic disease when imaging is not possible) should be managed with therapeutic doses of anticoagulant therapy as per the standard of care for patients without COVID-19. Consider administering IV unfractionated heparin per national guidelines if available.
- Management of anticoagulation therapy during labor and delivery requires specialized care and planning and should be managed similarly in pregnant patients with COVID-19 as with other non-COVID patients who require anticoagulation in pregnancy.
- Unfractionated heparin, low molecular weight heparin, and warfarin do not accumulate in breast milk and do not induce an anticoagulant effect in the newborn; therefore, they can be used in breastfeeding women with or without COVID-19 who require VTE prophylaxis or treatment**.**

Multisystem inflammatory syndrome in children and adolescents[31]

Robust evidence associating underlying conditions with severe illness in children is still lacking. However, among 345 children with laboratory-confirmed COVID-19 and complete information about underlying conditions, 23% had an underlying condition, with chronic lung disease (including asthma), cardiovascular disease, and immunosuppression most commonly reported.[32]

[31] Multisystem inflammatory syndrome in children and adolescents with COVID-19. World Health Organization: Scientific Brief. 15 May 2020. https://www.who.int/publications-detail/multisystem-inflammatory-syndrome-in-children-and-adolescents-with-covid-19

[32] Team CC-R. Coronavirus Disease 2019 in Children - United States, February 12-April 2, 2020. MMWR Morb Mortal Wkly Rep. 2020;69(14):422-6. Epub 2020/04/10

As of May 2020, reports from Europe and North America have described clusters of children and adolescents requiring admission to intensive care units with a multisystem inflammatory condition with some features similar to those of Kawasaki disease and toxic shock syndrome. Case reports and small series have described a presentation of acute illness accompanied by a hyperinflammatory syndrome, leading to multiorgan failure and shock.[33] [34] [35] Initial hypotheses are that this syndrome may be related to COVID-19 based on initial laboratory testing.

The WHO's preliminary case definition this for multisystem inflammatory syndrome:

- Children and adolescents 0–19 years of age with fever >3 days **AND** at least two of the following:
    - Rash or bilateral non-purulent conjunctivitis or muco-cutaneous inflammation signs (oral, hands, or feet);
    - Hypotension or shock;
    - Features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities;
    - Evidence of coagulopathy (by PT, PTT, or elevated d-Dimer);
    - Acute gastrointestinal problems, such as diarrhea, vomiting, or abdominal pain;
- **AND** Elevated markers of inflammation such as erythrocyte sedimentation rate (ESR), C-reactive protein, or procalcitonin.
- **AND** No other obvious microbial cause of inflammation, including bacterial sepsis, staphylococcal or streptococcal shock syndromes.
- **AND** Evidence of COVID-19 **(**RT-PCR, antigen or antibody test positive), or likely contact with patients with COVID-19.

Children have been treated with anti-inflammatory treatment, including parenteral immunoglobulin and steroids, and the majority have recovered. It is not yet clear the full spectrum of disease, and whether the geographical distribution in Europe and North America reflects a true pattern, or if the condition has simply not been recognized elsewhere.

9.12 Pregnancy and breastfeeding

Pregnancy

Research is currently underway to understand the impacts of SARS-CoV-2 infection on pregnant women. Data are limited, but at present there is no evidence that they are at higher risk of severe illness than the general population.

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[33] Riphagen S, Gomez X, Gonzalez-Martinez C, Wilkinson N, Theocharis P. Hyperinflammatory shock in children during COVID-19 pandemic. Lancet. 2020. Epub 2020/05/11.
[34] DeBiasi RL, Song X, Delaney M, Bell M, Smith K, Pershad J, et al. Severe COVID-19 in Children and Young Adults in the Washington, DC Metropolitan Region. J Pediatr. 2020
[35] Jones VG, Mills M, Suarez D, Hogan CA, Yeh D, Bradley Segal J, et al. COVID-19 and Kawasaki Disease: Novel Virus and Novel Case. Hosp Pediatr. 2020. Epub 2020/04/09

However, due to changes in their bodies and immune systems, we know that pregnant women can be badly affected by some respiratory infections. It is therefore important that they take precautions to protect themselves against COVID-19, and report possible symptoms (including fever, cough or difficulty breathing) to their healthcare provider right away.

Management of COVID-19 in a pregnant woman is similar to that with other patients, except there are the added risks of drugs negatively impacting the fetus.

Breastfeeding

As of May 2020, SARS-CoV-2 has not yet been detected in breastmilk. However, due to the risk of transmission during routine care, and a small number of cases of neonatal infection thought to be linked to routine care from infected mothers, breastfeeding women should consider whether they want to breastfeed while actively infectious or supplement with infant formula or expressed breastmilk.

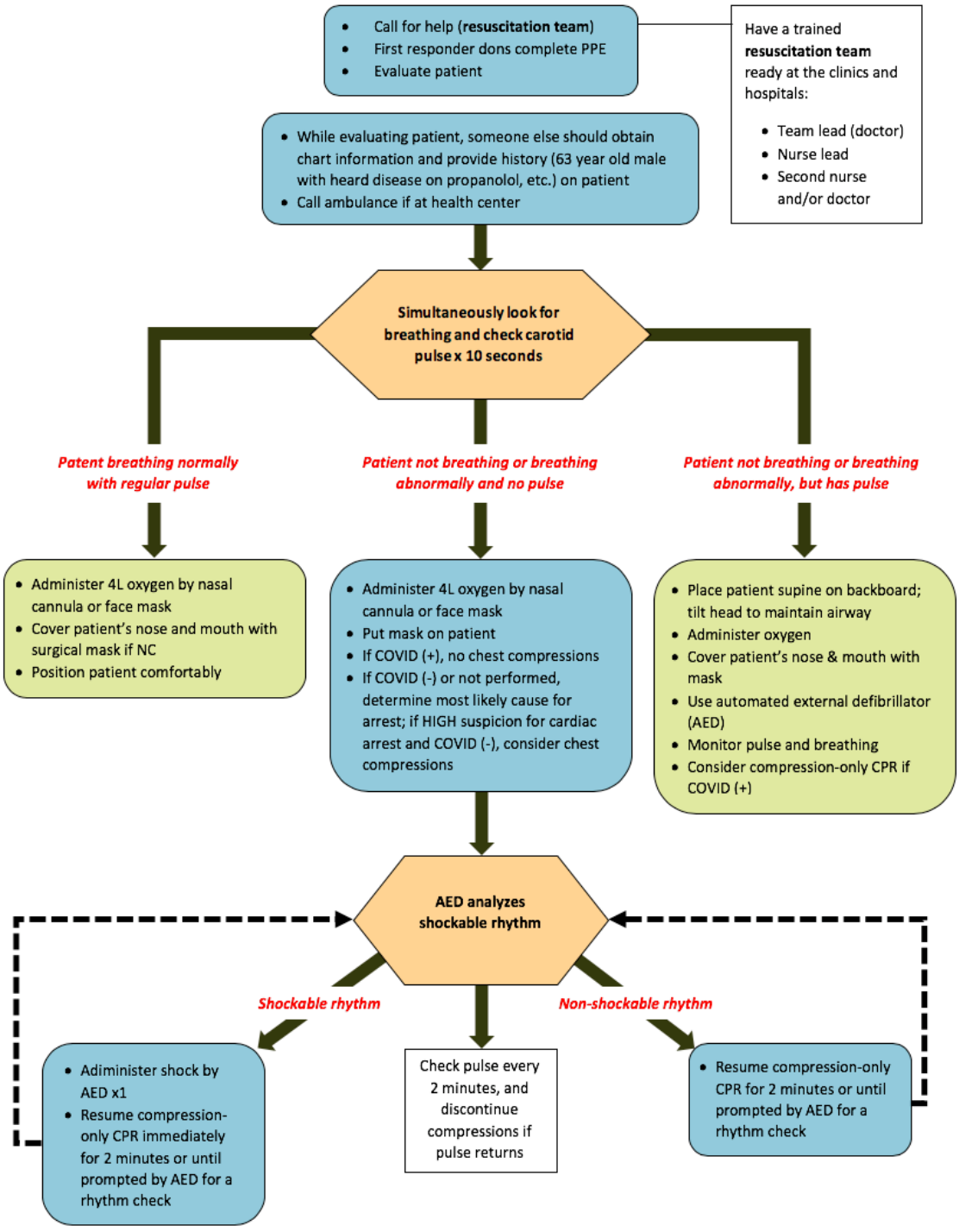
If lactating mothers infected with SARS-CoV-2 choose to breastfeed, the following steps should be taken:

- Wear a surgical mask.
- Consider having some sort of protective barrier between the newborn and the mother during breastfeeding and minimize contact while symptomatic.
- Wash hands with soap and water (use an alcohol-based hand sanitizer) before and after touching the infant.
- Disinfect all surfaces in the vicinity of the infant.

9.13 Resuscitation protocols for patients with COVID-19

If mechanical ventilation is available and indicated, follow normal institutional protocols for coding patients. If mechanical ventilation and ICU care is not available, it is generally recommended to avoid chest compressions and bag-mask ventilation (BVM), as both are aerosol generating procedures that put healthcare workers at higher risk. In addition, there is a potential risk to the patient of propagating ARDS pathways with resuscitation procedures, and there is minimal benefit when expert intubation and mechanical ventilation is not readily available. Instead, initiate basic life support sequence as follows per the protocol below, Figure 17.

Figure 17. Emergency Resuscitation Protocols for COVID-19 Patients



9.14 Discharge of patients from the facility

Once a patient is breathing without oxygen and able to perform basic functions, the patient may be discharged. In some settings, a negative PCR x 2 is performed, but patients who recover from COVID-19 may shed the virus for as long as 37 days with a median of 20 days, so this may not be useful (even if available). Therefore, if the patient is not cleared by successive negative PCR tests, a judgement call must be made. It is reasonable to discharge patients once they have been afebrile for at least 72 hours, with symptoms improving, as long as it is at least 10 days since the onset of symptoms.

- Consider discharging patients from the hospital when they are clinically stable (clinician judgement) and meet the following criteria:
    - Oxygen saturation ≥94%;
    - Respiratory rate <20;
    - BP >90/60;
    - No signs of increased work of breathing or respiratory distress;
    - Afebrile for >72 hours;
    - Other symptoms are improving; and
    - It has been 10 days since the original onset of symptoms.
- If possible, make sure patient has psychosocial support if needed.

9.15 Recommendations for ending isolation or quarantine for mild cases, suspected cases, and contacts

How long should patients self-quarantine at home or stay at a designated isolation facility outside of a hospital?

- The optimal duration of home isolation/quarantine is uncertain.
- The United States Centers for Disease Control and Prevention has issued recommendations on discontinuation of home isolation, which include both test-based and non-test-based strategies (see below).
- The choice of strategy depends upon the patient population, the availability of testing supplies, and access to testing.

When a test-based strategy is used, patients may discontinue home quarantine when all three of the following criteria are met:

- Resolution of fever without the use of fever-reducing medications (such as paracetamol);
- And improvement in respiratory symptoms (such as cough and shortness of breath);
- And negative results of an authorized molecular assay for COVID-19 from at least two consecutive nasopharyngeal swab specimens collected ≥24 hours apart. However, some patients may continue shedding virus for many weeks, and PCR can remain positive after resolution of symptoms.

When a non-test-based strategy is used, patients may discontinue home quarantine when both of the following criteria are met:

- At least 10 days have passed since symptoms first appeared**;**
- And at least three days (72 hours) have passed since resolution of symptoms - defined as resolution of fever without the use of fever-reducing medications and improvement in respiratory symptoms (cough and shortness of breath).

In some cases, patients may have had laboratory-confirmed COVID-19 without having any symptoms when they were tested. In such patients, home isolation may be discontinued when at least 10 days have passed since the date of their first positive COVID-19 test as long as there was no evidence of subsequent illness. Whether a patient with mild disease is going to be managed in an isolation unit or at home, he or she should be educated on their situation, have access to food and water, and have a way to access a hospital if their disease becomes worse. This last piece is particularly important for patients being managed from home, as patients with COVID-19 may decline relatively quickly. If possible, a PCR test can be used to confirm that the patient is no longer shedding virus, but this is likely unavailable in most cases of home-based care in a resource-limited setting.

10 Occupational Health

10.1 Healthcare worker monitoring

All healthcare workers interacting with COVID-19 patients should maintain a high state of awareness of any early symptoms that may be indicative of COVID-19. If symptoms develop, the healthcare worker should inform their manager or respective supervisor and remove themselves from patient care areas. A testing protocol should be initiated, and that individual should self-quarantine until test results are obtained and symptoms resolve. If test is negative and symptoms remain, continue to self-quarantine and re-test in 5 days. If the repeat test after 5 days is also negative, that individual can return to work.

10.2 High-risk exposures

Table 19. High-risk exposures

High-risk exposures refer to healthcare workers who have had close contact with patients with COVID-19 and were within 2 meters of a patient in any of the situations listed below.
• Exposure to symptomatic and confirmed COVID-19 patient (with in 2-meter distance) without proper PPE. • Known exposure with biological fluid/respiratory secretion (ex. biological fluids/respiratory secretion in mucous membrane – eyes, mouth, nose, non-intact skin). • Needle stick with contaminated needle. • Exposure to an aerosolizing procedure (such as intubation or nebulizer treatment) without proper PPE (i.e. N95 mask, gown, gloves). • Cleaning area with suspect or confirmed patients without proper PPE.

10.3 Guidelines for healthcare workers

- Stop all interactions with patients for a period of 14 days after the last day of high-risk exposure to a confirmed COVID-19 patient, self-quarantine and monitor for symptoms for 14 days
- Get tested for COVID-19 virus infection (see test protocols).
- Submit an incident report per hospital protocol.
- If symptoms develop, contact a healthcare facility and get re-tested if initial test was negative.
- If positive, follow guidelines for home-based versus facility-based management as appropriate based on severity of illness and availability of isolation facilities.

10.4 Guidelines for healthcare facilities

- Provide psychosocial support to healthcare workers during quarantine and for the duration of illness if healthcare worker becomes a confirmed COVID-19 case.
- Continue their regular salary for the period of quarantine and for the duration of illness. Also, governments and NGOs should consider hazard pay for all facility-based employees and community health workers during an infectious epidemic.

- Ensure incident report filed per hospital systems.
- Work with health facility management to identify systems improvements for IPC and healthcare worker protection.
- Initiate contact tracing procedures if a healthcare worker is confirmed as a new positive case.

11 Mental health, psychosocial support, and socioeconomic support

This chapter was adapted in part from the Inter-Agency Standing Committee (IASC) Guidelines on Mental Health and Psychosocial Support in Emergency Settings, the recent WHO updates for COVID-19 response, and PIH guidelines. Mental health and psychosocial support should be a core component of any public health response. Understanding and addressing mental health and psychosocial considerations will help alleviate both short- and long-term negative effects on the wellbeing of individuals and communities. Consider integrating mental health approaches within community health strategies, community outreach programs, case identification and contact tracing plans, and at healthcare facilities and quarantine sites (including in discharge procedures). The mental health and wellbeing of frontline workers needs to be addressed and supported. Healthcare workers, case identifiers/contact tracers, workers involved in the cleaning of wards and the management of dead bodies, and many other support staff will need mental health and psychosocial support services to help them cope with what they are facing and to diminish the possibility of long-lasting negative effects from these experiences.

11.1 Initial response

During the acute emergency stage of a pandemic, the focus of mental health providers and psychosocial support should be to work closely with the broader medical and public health systems to strengthen efforts of Ministries of Health on infection risk management and treatment, including:

1) Prevention of COVID-19 transmission;
2) Support of surveillance, case triage and contact tracing;
3) Psychosocial support for people testing positive and those in quarantine/isolation, as well as their family members;
4) Psychosocial support for healthcare workers.

11.2 Recommended initial actions in the acute phase of the response

- Facilitate collaboration across teams and stakeholders, both with NGOs and with Ministries of Health, to ensure a coordinated response.
- If mental health services are already available at facilities, develop a plan to continue mental health and psychosocial services. If these services are not available, consider hiring mental health providers and setting up systems to assist with the expected increase in anxiety, depression, post-traumatic stress disorder, and other mental health diagnoses and manifestations during this time.
- Assess what human, financial and other resources are available for the mental health and psychosocial services in the setting of a COVID-19 response.
- Establish a strategy for supporting specific groups affected by the pandemic, including individuals testing positive for COVID-19, those in quarantine/isolation and their families, as well as the elderly, those with disabilities, and children.

- Work closely with community health workers to ensure that front-line workers have accurate information on COVID-19, and know to expect an increase in psychosocial problems during this time.
- Train all frontline health workers on essential psychosocial care principles, including communication techniques, psychosocial care principles, psychological support, and referral pathways.
- Consider developing M&E systems for mental health and psychosocial support activities

11.3 Social and economic support in the setting of COVID-19

Access to social and economic support enhances treatment success, which in turn, helps decrease the spread of the virus. It also provides essential components to maximize prevention among the most vulnerable groups. Indications and packages for social support may vary depending on the local context.

Table 20. Groups of people affected by COVID-19 who may need additional psychosocial or socioeconomic support

Group I	Patients diagnosed with the novel coronavirus Individuals in isolation or quarantine Patients with severe co-morbidities
Group II	Healthcare workers, including CHWs Older adults (sick or not) People with pre-existing chronic conditions (e.g. lung disease, HIV, TB, heart disease, diabetes)
Group III	Non-exposed family members (children, pregnant women, disabled, particularly poor families (such as those living in crowded slums))

Table 21. Social support package

Home-based care*	Hygiene kit: Soap, water bucket, towel, sanitary pads, detergent, and bleach Plate/cup/fork for patient to use exclusively Food packages Non-medical masks to decrease transmission of infection to others Consider cash transfers for economically vulnerable individuals unable to work due to illness or quarantine
Inpatient care	Food packages Hygiene supplies Consider cash transfers to family members for prolonged patient stays if particularly economically vulnerable family

Psychosocial support and mental health

- It is normal - and even healthy - to feel sad, distressed, worried, confused, scared or angry during this crisis. Anxiety related directly to fear of contracting COVID-19, or related to the short- or long-term consequences of the crisis related to this pandemic is normal. However, it is concerning if these feelings become overwhelming or get in the way of normal functioning.

- It can be helpful to talk to people you trust, such as friends, family, or coworkers to help process these feelings.
- Social distancing does not mean emotional distancing; use technology (including cell phones, instant messaging, emails, social media, or video chats) to connect widely if possible.
- While staying at home, try to maintain a consistent routine and a healthy lifestyle (including a proper diet, sleep, and exercise, as well as social contact with loved ones at home and through use of technology).
- Maintaining physical activity and daily exercise is important.
- Try to maintain clear routines and a schedule. Bathe regularly and maintain good personal hygiene.
- Don't let your own anxiety dictate an overly rigid schedule for children. Make time for positive family interactions in the household. It is essential to work together as a household to manage tensions and provide positive support to children, the elderly and vulnerable family and community members. Everyone needs to feel safe and have a sense of power and responsibility until there is greater clarity. Work together to counter negativity.
- In crises such as these, child abuse and domestic violence can increase in some households, so healthcare workers should be on the lookout for such things
- Model positive behaviors for children. Be conscious of the use of language, or the expression of strong emotions. Don't use tobacco, alcohol or other drugs to cope with your emotions. These promote depression, erratic behavior, and poor sleep.
- Limit exposure to television and internet news as these can be overwhelming. Choose good sources of information and take this information in during small windows of time. Avoid listening to rumors.
- Take time to "anchor" on things that will give your brain a break from distressing information through meditation, reading, listening to music, or prayer. Consider physical movement that will help clear your mind, such as walking in nature and running (if possible), or stretching and yoga if under quarantine.
- Engage in activities that you enjoy doing, that you can still do in this situation. Draw on skills that you have used in the past during difficult times to manage your emotions during this crisis.
- If you feel overwhelmed, talk to a health worker, social worker, or another trusted person in your community (e.g., religious leader or community elder).

11.4 Special populations to consider

Epidemics can have particularly devastating effects on people who are elderly, those who have disabilities and/or pre-existing chronic diseases, and children. This section discusses some of the challenges these groups may face, and strategies for addressing them. It also includes information geared towards healthcare workers.

Table 22. Supporting the needs of special populations (IASC, February 2020)

Special populations and the challenges they may face	Strategies to address these challenges
Older adults may be more prone to isolation, fear, anger, suspicion, or stress during an outbreak or while in quarantine	• Provide emotional support through family members and informal networks • Utilize mental health professionals if available • Share simple facts and give clear information about what is going on • Encourage older adults with knowledge or expertise to volunteer in their community
People with disabilities (and their caregivers) and those with chronic disease may face additional barriers to accessing information and important services	• Consider accessible messaging and services for those with disabilities • Messages shared with individuals with cognitive limitations should be appropriate for their level of comprehension • Engage community members and CHWs in helping people with disabilities and/or chronic diseases to access information, make plans for routine and urgent care, and arrange for them to have a consistent supply of their medications in case access to routine health services are not available for a period of time

The following are suggestions for helping children cope with the stress of COVID-19 in a healthy way (adapted from IASC, February 2020):

- Listen actively to children's fears and concerns; they may be different than one's own.
- Adopt an understanding attitude as children cope with stress in different ways, including being clingy with caregivers, withdrawing, getting angry or agitated, having nightmares, and bedwetting.
- Children usually feel a sense of relief if they are able to communicate their concerns in a safe and supportive environment.
- Activities like drawing and playing sports can help alleviate their stress.
- It is important that adult caregivers manage their own emotions when communicating with children, as they will take their cues from adults.
- Avoid separating children and parents (or other caregivers) unless this is medically necessary to reduce transmission of infection. If this is necessary, explain to children what is happening and why.
- Keep regular routines in place as much as possible.
- Provide information in a clear, easily understandable and honest way.
- Parents can consider using games to explain the virus and help their children adopt healthy strategies. For example, make handwashing into a game, or create stories to explain how the virus functions, and figure out ways to explain PPE so that it is not scary to children.

The following is a list of considerations for frontline health workers in the COVID-19 response:

- This is likely a unique and unprecedented situation for many frontline workers. For others who have worked in disasters or serious epidemics in the past, this may bring up feelings of fear, loss, or anger from previous experiences. Either way, using coping strategies people have used in the past to

manage stress, are useful now. If someone feels a need for additional support, he or she should alert their supervisor or a trusted colleague, and make it clear if feelings of anger, fear, or anxiety become overwhelming.

- Consider utilizing the strategies highlighted in Section 11.4. In addition, frontline workers should stop throughout the day to briefly take some deep breaths and settle their mind from the chaos they have experienced. They can also discuss challenges with colleagues at the end of the day or the week to help alleviate stress.
- Take care of your basic needs (such as healthy meals and adequate sleep) and employ positive emotional coping strategies (such as discussing feelings with friends, family, and coworkers).
- Some frontline workers may experience ostracization from their community due to stigma, so public campaigns supporting frontline workers and decreasing overall stigma are important.
- Some healthcare workers may choose to stay away from family during this time (to avoid spreading infection to family members), which can be particularly challenging. If possible, help them to stay connected with loved ones by phone or email.

12 Data Collection

12.1 Data flow

Data collection forms for use with new COVID-19 programs have been designed in a modular fashion, to allow for flexible adoption across disparate care delivery contexts. While most forms have been designed for settings where paper and Excel-based data entry are the primary solution, this content is also in the process of being integrated into various digital health platforms, including CommCare, OpenMRS, and REDCap.

The goal for all of the data collection solutions profiled below is to facilitate data-driven service provision while also minimizing data entry burdens on busy staff.

12.2 Forms

The following forms (based on WHO forms modified by PIH) are available:

- Symptom screening for COVID-19 cases and contacts;
- Lab testing registers & lab request and result forms;
- Patient intake and exposure history for COVID-19 cases and contacts;
- Facility admission, daily progress, and discharge forms; and
- Final outcomes for COVID-19 cases and their contacts.

Additionally, several other forms are currently under development (April 2020) and will be available soon. These additional registers are designed to facilitate efficient tracking of large numbers of cases and contacts who may need to be followed over time in community and facility settings:

- Contact tracing and isolation monitoring register for COVID-19 contacts;
- Suspected case testing follow-up register;
- Case monitoring in the community register;
- COVID-19 patient treatment register;
- Forms for the management of home-based care (daily symptom diaries, etc.); and
- Mental health and social support forms.

These forms will be added to future versions the Appendix of this guideline as they become available.

12.3 Practical concerns

In times like this during which PPE is in short supply and we are fighting a disease with high transmissibility, data collection practices must be adapted to minimize risks of infection. For example, paper forms should not leave isolation areas and data collection staff should not enter these areas unless they are equipped with appropriate PPE. In order to continue collecting data under these circumstances, some creative tactics must be employed.

For example, clinicians with appropriate PPE can use paper forms to record vital information. For information that needs to leave the isolation unit for programmatic or research purposes, a cell phone or tablet can be used to photograph data. Data clerks outside the isolation unit can then enter the data from the photographs into Excel (or another database). If internet is available in the isolation units, de-identified data (data without people's names attached to it) can be sent securely by internet. If the isolation units are not connected to the internet and/or data cannot be sent securely, a cell phone or tablet can be sterilized and brought out of the isolation unit to share photos with data clerks through wired upload from phone to laptop.

For staff collecting data at households or other community settings, IDinsight has created a helpful guide with resources for maximizing staff safety even as they engage in this important work (https://www.idinsight.org/data-collection-practices-and-recommendations-for-covid-19).

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Testing

- SARS-COV-2 Diagnostic Pipeline. Foundation for Innovative New Diagnostics (FIND): https://www.finddx.org/covid-19/pipeline/?section=molecular-assays#diag_tab
- FDA Guidelines for use of Xpert Xpress SARS-CoV-2: https://www.fda.gov/media/136314/download

Treatment and clinical management

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- More information about ongoing clinical trials related to COVID-19 can be found at the following website: https://www.clinicaltrials.gov/ct2/results?cond=covid-19&term=&cntry=&state=&city=&dist
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- World Health Organization. Advice on the use of masks in the community, during homecare and in health care settings in the context of the novel coronavirus (2019-nCoV) outbreak. January 2020.
- Up-To-Date Guidance on Treatment: https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-management-in-adults?search=chloroquine&sectionRank=1&usage_type=default&anchor=H2014414098&source=machineLearning&selectedTitle=6~123&display_rank=5#H3855514466

Operational support

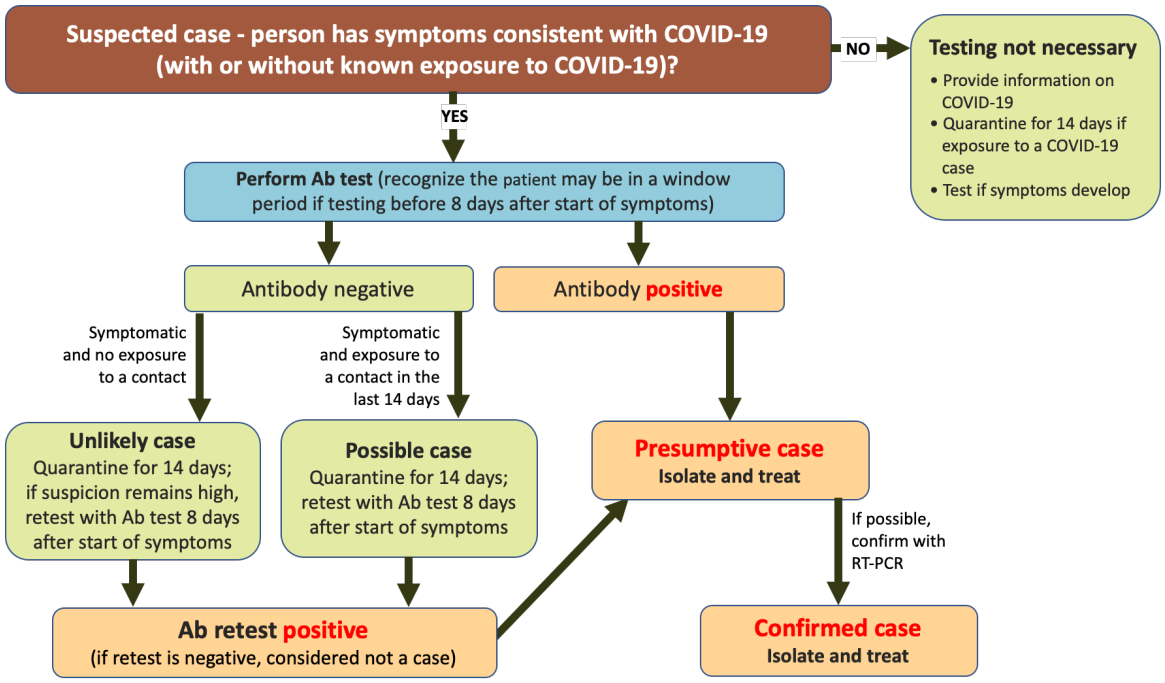
- Build Health International's website: https://www.buildhealthinternational.org/coronavirus/
- World Health Organization. Water, Sanitation, Hygiene, and Waste Management for the COVID-19 Virus. Technical Guidance. March 2020.

PIVOT COVID-19 Guide Appendix

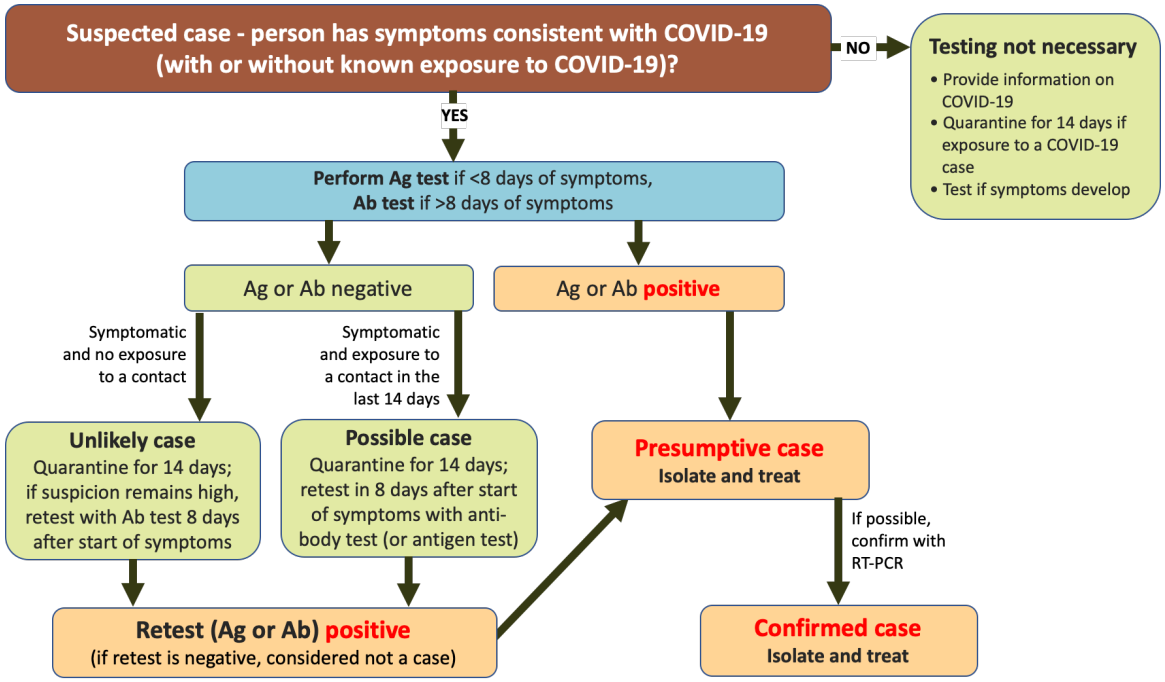
This appendix draws heavily upon resources produced by Partners in Health, as well as additional materials. It aims to provide a space for job aids tools and quick references for staff to use in implementing a response to the COVID-19 pandemic. These will be frequently updated to correspond directly to the official guidelines.

A. Clinical Resources

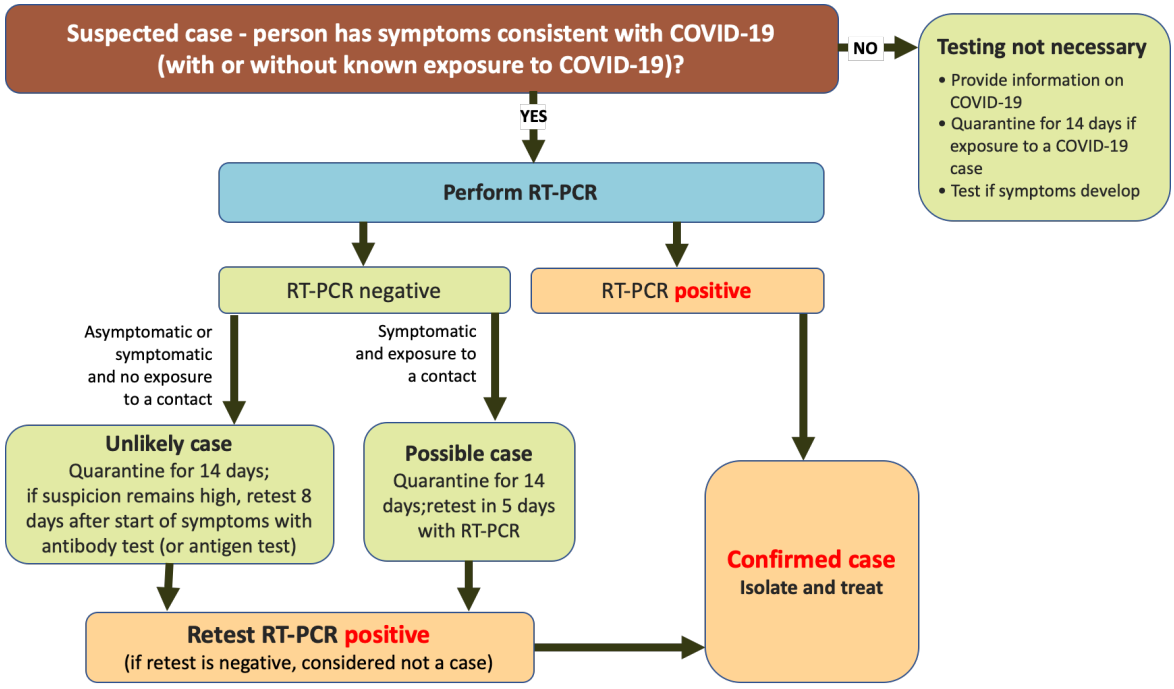
Testing Algorithm 1: When only antibody (Ab) testing is available



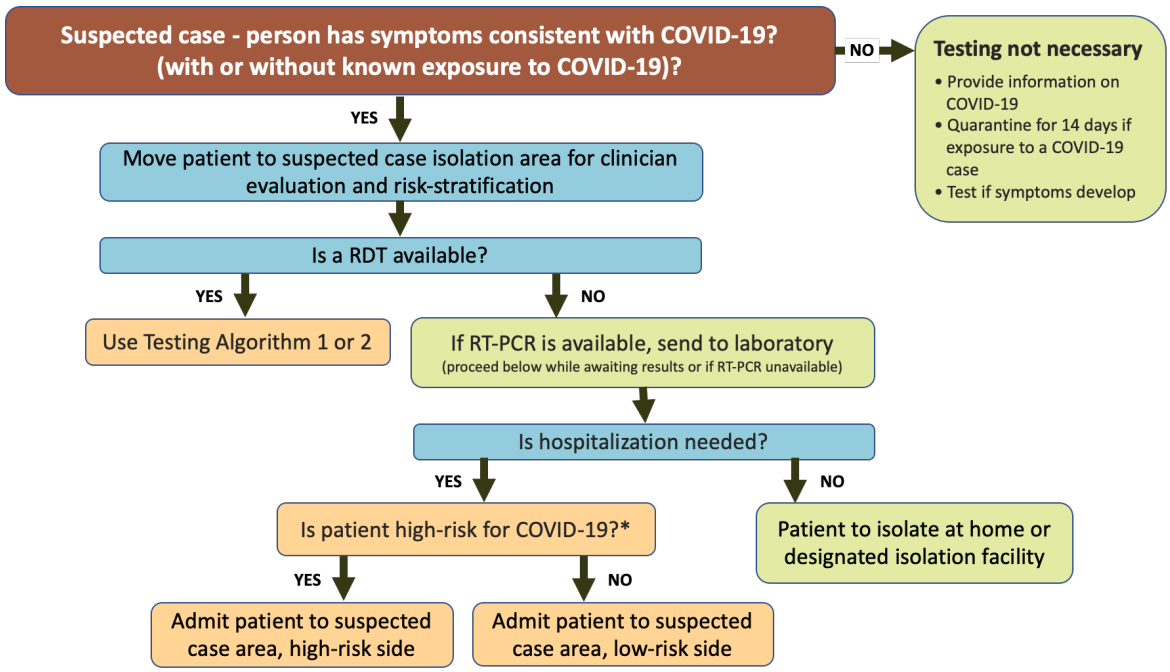
Testing Algorithm 2: When antigen and antibody tests are both available



Testing Algorithm 3: When RT-PCR testing is readily available



Testing Algorithm 4: When RDT testing is not available



*Based on clinical judgement and risk factors. Can consider other lab testing to help risk stratify if available, including lymphocyte count, liver function tests, and C-reactive protein.

Interpretation of the Rapid and Molecular Tests Used for Diagnosis of COVID-19

PURPOSE:

These tables are provided to help interpret the antigen and the antibody rapid diagnostic tests (RDTs) based on the following factors*:*

- Is confirmatory molecular testing (RT-PCR or SARS-CoV GeneXpert ("Xpert")) available?
- Is the patient symptomatic with symptoms consistent with COVID-19 disease?
- Is the patient a contact of a confirmed (or highly likely) case of COVID-19?

Table A.1 is based on the availability of the *antibody* test (Ab), with or without confirmation by RT-PCR or Xpert.
Table A.2 is based on the availability of the *antigen* test (Ag), with or without confirmation by RT-PCR or Xpert.
Table A.3 is based on *only* RT-PCR or Xpert testing.
Table A.4 is based on the availability of *both* the antibody and antigen tests, with or without confirmation by RT-PCR or Xpert.

NOTE FOR ANTIBODY TESTING:

The antibody test measures the immune response to the virus in which, an average of 7 to 10 days is required before the body produces enough antibody to yield a positive antibody test result. As such, antibody testing is not an ideal test for diagnosis during the first 10 days of symptoms and should only be used as a complementary test in COVID-19 diagnosis. In sum:

Less than 10 days after onset of symptoms: antibody testing is NOT recommended for use in diagnosis of COVID-19 due to the lower sensitivity of the test when administered < 10 days after symptom onset.

More or equal to 10 days after onset of symptoms: antibody testing can assist in the case management of symptomatic patients presenting late, in addition to the antigen test, RT-PCR, or Xpert.

In **low prevalence** settings, the use of antibody tests to triage symptomatic patients is unlikely to be beneficial due to a low positive predictive value. Antibody tests can be used for seroprevalence surveys to estimate the levels of population exposure and inform public health measures. The test can also be used in the testing of contacts (in general wait ≥ 20 days post-exposure, although more studies are needed in this area) to assess previous exposure.

KEY:

Green = no COVID-19 infection detected and no quarantine measures are indicated.
Yellow = no COVID-19 infection detected BUT quarantine measures are indicated.
Red = presumed or confirmed COVID-19 infection and isolation is indicated.

Rationale in assignment to isolation or quarantine:

No quarantine indicated	This assignment is reserved for persons that test negative on one or more tests AND have no symptoms AND have no contacts.
Quarantine	This assignment is reserved for persons that test negative on one or more tests BUT have symptoms OR have contacts. Quarantine separates and restricts the movement of people who were exposed to COVID-19 or might eventually test positive for it. Quarantine protocols vary and some countries allow for self-quarantine (voluntary quarantine) in certain situations.
Isolation (presumptive)	Includes persons that are likely to have COVID-19 because they have either (1) a positive antigen or antibody test or (2) because they have a close contact of a person with COVID-19 and are exhibiting signs and symptoms of COVID-19. In general, isolation in a single room is recommended.
Isolation (confirmed)	Includes persons that have a positive test result from an approved molecular method (RT-PCR or Xpert). Isolation in wards with other confirmed cases is allowed, although single room isolation is preferred.

TABLE A.1: Interpretation of Ab RDT and RT-PCR/SARS CoV-2 Xpert

Combination of tests	Ab-IgM	Ab-IgG	Ag	PCR / Xpert	Symptoms	Contact	Interpretation of test and management of patient	Quarantine or isolation
Antibody only (no contact)	NEG	NEG	Not Done	Not Done	No	No	**No COVID-19 infection, medium to high confidence.** Note, antibody testing is not generally used for diagnosis in patients with no symptoms because its low specificity.	**NONE REQUIRED**
	NEG	NEG	Not Done	Not Done	Yes	No	**No COVID-19 infection, low confidence**. Could be in the window period.	**QUARANTINE**
	POS	NEG	Not Done	Not Done	Yes	No	**Possible COVID-19 infection**. Manage as presumed COVID-19. False positives can occur.	**ISOLATION (PRESUMPTIVE)**
	NEG	POS	Not Done	Not Done	Yes	No	**Possible COVID-19 infection (at later stage of infection).** False positive (a cross-reaction to a different coronavirus) is very possible, especially in a low prevalence setting and no contact. Err on side of caution and quarantine.	**QUARANTINE**
	POS	POS	Not Done	Not Done	Yes	No	**Possible COVID-19 infection**. Manage as presumed COVID-19. False positives can occur.	**ISOLATION (PRESUMPTIVE)**
Antibody only (with a contact)	NEG	NEG	Not Done	Not Done	No	Yes	**No COVID-19 infection, low confidence.** Could be in the incubation or window period.	**QUARANTINE**
	NEG	NEG	Not Done	Not Done	Yes	yes	**No COVID-19 infection, very low confidence.** Could be in the incubation or window period. Because the patient is both symptomatic and a contact, isolation should be considered in highly suspected cases.	**QUARANTINE or ISOLATE**
	POS	NEG	Not Done	Not Done	Yes or No	Yes	**Presumed COVID-19 infection, medium confidence**. False positives can occur.	**ISOLATION (PRESUMPTIVE)**
	NEG	POS	Not Done	Not Done	Yes or No	yes	**Possible COVID-19 infection (at later stage of infection).** Manage as presumed COVID-19. False positives can occur.	**ISOLATION (PRESUMPTIVE)**
	POS	POS	Not Done	Not Done	Yes or No	yes	**Presumed COVID-19 infection, medium confidence**. False positives can occur.	**ISOLATION (PRESUMPTIVE)**
Antibody and RT-PCR / Xpert	NEG	NEG	Not Done	NEG	No	No	**No evidence of COVID-19 infection, high confidence.** No quarantine required.	**NONE REQUIRED**
	NEG	NEG	Not Done	NEG	Yes or No	Yes	**No COVID-19 infection, medium probability**. Could be a false negative. Quarantine because the patient is a contact. Consider isolation if both symptomatic and a contact.	**QUARANTINE or ISOLATE**
	POS	NEG	Not Done	NEG	Yes or No	Yes or No	**Presumed COVID-19 infection**. Manage as presumed COVID-19. False positive can occur with antibody test and false negative can occur with RT-PCR test.	**ISOLATION (PRESUMPTIVE)**
	NEG	POS	Not Done	NEG	Yes or No	Yes or No	**Possible COVID-19 infection (at later stage of infection).** Antibody false positive (a cross-reaction to a different coronavirus) is very possible, especially in a low prevalence setting and no contact. Err on side of caution and quarantine or isolate. Consider isolation if both symptomatic and a contact.	**QUARANTINE or ISOLATE**
	POS	POS	Not Done	NEG	Yes or No	Yes or No	**Presumed COVID-19 infection**. Manage as presumed COVID-19. False positive can occur with antibody test and false negative can occur with RT-PCR test.	**ISOLATION (PRESUMPTIVE)**
	NEG or POS	NEG or POS	Not Done	POS	Yes or No	Yes or No	**Confirmed COVID-19 infection.** False positive is rare with RT-PCR testing.	**ISOLATION (CONFIRMED)**

TABLE A.2: **Interpretation of Ag RDT and RT-PCR/SARS CoV-2 Xpert**

Combination of tests	Ab-IgM	Ab-IgG	Ag	PCR / Xpert	Symptoms	Contact	Interpretation of test and management of patient	Quarantine or isolation
Antigen only	Not Done	Not Done	NEG	Not Done	No	No	**No COVID-19 infection, medium confidence**. False negatives can occur.	NONE REQUIRED
	Not Done	Not Done	NEG	Not Done	No	Yes	**No COVID-19 infection detected, low confidence**. False negatives can occur.	QUARANTINE
	Not Done	Not Done	NEG	Not Done	Yes	No	**No COVID-19 infection detected, medium confidence**. False negatives can occur.	QUARANTINE
	Not Done	Not Done	NEG	Not Done	Yes	Yes	**No COVID-19 infection detected, very low confidence.** False negatives can occur. Because the patient is both symptomatic and a contact, isolation should be considered in highly suspected cases.	QUARANTINE or ISOLATE
	Not Done	Not Done	POS	Not Done	Yes or No	Yes or No	**Presumed COVID-19 infection.** False positives are not common with antigen test.	ISOLATION (PRESUMPTIVE)
Antigen and RT-PCR / Xpert	Not Done	Not Done	NEG	NEG	No	No	**No COVID-19 infection, high confidence.** False negatives can occur.	NONE REQUIRED
	Not Done	Not Done	NEG	NEG	No	Yes	**No COVID-19 infection detected, medium confidence**. False negatives can occur, but less common when both antigen and PCR tests are used.	QUARANTINE
	Not Done	Not Done	NEG	NEG	Yes	No	**No COVID-19 infection detected, medium confidence.** False negatives can occur, but less common when both antigen and PCR tests are used.	QUARANTINE
	Not Done	Not Done	NEG	NEG	Yes	Yes	**No COVID-19 infection detected, low confidence.** False negatives can occur. Because the patient is both symptomatic and a contact, isolation should be considered in highly suspected cases.	QUARANTINE or ISOLATE
	Not Done	Not Done	NEG or POS	POS	Yes or No	Yes or No	**Confirmed COVID-19 infection**. False positives are rare with PCR tests.	ISOLATION (CONFIRMED)

TABLE A.3: **Interpretation of RT-PCR/ SARS CoV-2 Xpert when RDTs are not performed**

Combination of tests	Ab-IgM	Ab-IgG	Ag	PCR / Xpert	Symptoms	Contact	Interpretation of test and management of patient	Quarantine or isolation
RT-PCR / Xpert only	Not Done	Not Done	Not Done	NEG	No	No	**No COVID-19 infection detected, medium to high confidence.** False negatives can occur.	NONE REQUIRED
	Not Done	Not Done	Not Done	NEG	Yes	No	**No COVID-19 infection detected, medium confidence**. False negatives can occur. Self-quarantine (because of having symptoms).	QUARANTINE
	Not Done	Not Done	Not Done	NEG	Yes or No	Yes	**No COVID-19 infection detected, medium confidence**. False negatives can occur. Self-quarantine (because of being a close contact).	QUARANTINE
	Not Done	Not Done	Not Done	POS	Yes or No	Yes or No	**Confirmed COVID-19 infection**. False positives are rare with PCR tests. Isolate.	ISOLATION (CONFIRMED)

TABLE A.4: **Interpretation of Ab, Ag, and RT-PCR/ SARS CoV-2 Xpert**

Combination of tests	Ab - IgM	Ab - IgG	Ag	PCR / Xpert	Symptoms	Contact	Interpretation of test and management of patient	Quarantine or isolation
Antibody and Antigen (with or without) RT-PCR testing / Xpert	NEG	NEG	NEG	NEG or Not done	No	No	**No COVID-19 infection, medium to high confidence.**	NONE REQUIRED
	NEG	NEG	NEG	NEG or Not done	Yes	No	**No COVID-19 infection, medium confidence**. False negatives can occur.	QUARANTINE
	NEG	NEG	NEG	NEG or Not done	Yes or No	Yes	**No COVID-19 infection, medium confidence**. False negatives can occur. Consider isolation if both symptomatic and a contact.	QUARANTINE or ISOLATE
	POS	NEG	NEG	NEG or Not done	Yes or No	Yes or No	**Possible COVID-19 infection**. Manage as presumed COVID-19. False positives can occur.	ISOLATION (PRESUMPTIVE)
	POS	NEG	POS	NEG or Not done	Yes or No	Yes or No	**Presumed COVID-19 infection**. False positives of antigen test are not common.	ISOLATION (PRESUMPTIVE)
	NEG	POS	NEG	NEG or Not done	Yes or No	Yes or No	**Possible old COVID-19 infection.** Antibody false positive are possible, especially in a low prevalence setting and no contact. Quarantine or isolate. Consider isolation if both symptomatic and a contact.	QUARANTINE or ISOLATE
	NEG	POS	POS	NEG or Not done	Yes or No	Yes or No	**Presumed COVID-19 infection**. False positives of antigen test are not common. Isolate.	ISOLATION (PRESUMPTIVE)
	POS	POS	NEG	NEG or Not done	Yes or No	Yes or No	**Possible COVID-19 infection**. Manage as presumed COVID-19. False positives can occur. Isolate	ISOLATION (PRESUMPTIVE)
	NEG or POS	NEG or POS	NEG or POS	POS	Yes or No	Yes or No	**Confirmed COVID-19 infection**. False positives of PCR test are extremely rare. Isolate.	ISOLATION (CONFIRMED)

B. COVID-19 Data Collection Tools Overview

Contact Tracing and Community Monitoring Registers

Contact Tracing and Isolation Monitoring Register

What	A register to collect a COVID-19 patient's recent contacts. This register allows any contact tracer to find and screen contacts. The register also allows contact tracer to follow up with contacts to monitor for symptom development, refer for testing, and close out contact record at the end of isolation period or upon conversion to a case.
Where	List of contacts can be filled out in the healthcare facility if patient is admitted for care or in the community/isolation facility. Contact follow up happens in wherever the contact is.
Who	Contact tracer
When	When a COVID-19 patient gives a list of their contacts, then it is maintained at any follow up with contacts.

Case Monitoring in Community Register

What	A register for patients who are positive but have mild symptoms and are isolating at home or an isolation facility. Health workers will need to monitor these people for worsening symptoms and support home-based care.
Where	Either at home or at an isolation facility.
Who	Any care team member following up with community-based cases of COVID-19.
When	A new person is added to a team member's list when they become responsible for monitoring a case in the community.

Suspected Case Testing Follow-Up Register

What	A register for people who are still waiting for confirmatory testing and may not be COVID-19 cases despite symptoms or exposure. Suspected cases move off this list quickly when their diagnosis is presumed, confirmed or ruled-out at the end of the isolation time period.
Where	First filled out at the laboratory when a patient receives a rapid test. Intended for tracking at the community level, but could be adapted for follow up of admitted patients who are also awaiting **confirmatory** test results.
Who	Community care team member who is assigned to follow up with patients who need confirmatory testing.
When	When a symptomatic person requires confirmatory testing to determine diagnosis. Suspect is assigned to a community care team member and moved from the list when it is determined that patient will be isolating in the community or admitted to facility, or is not a COVID-19 case.

Form 1. COVID-19 Contact Tracing and Isolation Follow Up List

Case ID:	**Age:**	**Case Name:**	**Case phone number:**
Case Address:	**Gender:** □M □F	**Nearest health facility:**	**Date of interview :** (DD/MM/YY) ____/____/_____
Contact Tracer name:		**Contact Tracer phone:**	**Location of interview:** ☐ Facility ☐ Community

Line No.	Assigned Contact ID / Name of Contact	Phone Number / Address of Contact (Town/Village and Landmarks)	Age / Sex	Date of Last Contact with Case (DD/MM/YY)	Scheduled Date of Isolation End (DD/MM/YY)	Date Symptoms Develop (DD/MM/YY)	Referred for testing and results	Assigned Case ID[1]	Final Outcome[2]
1			□M □F	/ /	/ /	/ /	□ refer □ + □-		
2			□M □F	/ /	/ /	/ /	□ refer □ + □-		
3			□M □F	/ /	/ /	/ /	□ refer □ + □-		
4			□M □F	/ /	/ /	/ /	□ refer □ + □-		
5			□M □F	/ /	/ /	/ /	□ refer □ + □-		
6			□M □F	/ /	/ /	/ /	□ refer □ + □-		

1Received on positive test result or presumed positive.

[2]NS=Never had symptoms REC=recovered RF=refuse D=died L=Lost A=admitted

Form 2. COVID-19 Case Community Monitoring List

Page #_____

Data collector name:	**Location:**	**Date** (dd/mm/yyyy):

Line Number	**Case Name** **Assigned Case ID** **Assigned Contact ID** (if case started as a contact)	**Address of contact** (Town/Village &Landmark) OR (Location of isolation) **Phone Number**	**Sex** **Age**	**Date of Symptom Onset** (DD/MM/YY)	**Date of Scheduled Isolation End** (DD/MM/YY)	**Develop Severe Symptoms?** **Refer to health facility?**	**Still symptomatic at end of Isolation?** If Yes → **New Date of Isolation End**	**Final Outcome**[1] (See codes below)
1			□ M □ F	/ /	/ /	□ severe □ refer	□ still symptom / /	
2			□ M □ F	/ /	/ /	□ severe □ refer	□ still symptom / /	
3			□ M □ F	/ /	/ /	□ severe □ refer	□ still symptom / /	
4			□ M □ F	/ /	/ /	□ severe □ refer	□ still symptom / /	
5			□ M □ F	/ /	/ /	□ severe □ refer	□ still symptom / /	
6			□ M □ F	/ /	/ /	□ severe □ refer	□ still symptom / /	

Form 3. COVID-19 Suspected Case List (for patients who need confirmatory testing)

Name of date collector		Location of data collector	

#	Date of initial diagnostic test (DD/MM/YY)	Case ID or Contact ID	Full Name	Age	Address of Suspected Case (Town/Village and Landmarks)	Date of First Rapid Test (DD/MM/YY)	Scheduled Date of Second Rapid Test (+5 days from first) **OR** Actual Date of PCR Confirmatory Test (DD/MM/YY)	Results of Second Rapid Test or Confirmatory Test	Suspected Case Next Steps[1] (See codes below)
1						/ /	□ 2nd RDT □PCR / /	□ + □ -	
2						/ /	□ 2nd RDT □PCR / /	□ + □ -	
3						/ /	□ 2nd RDT □PCR / /	□ + □ -	
4						/ /	□ 2nd RDT □PCR / /	□ + □ -	
5						/ /	□ 2nd RDT □PCR / /	□ + □ -	
6						/ /	□ 2nd RDT □PCR / /	□ + □ -	
7						/ /	□ 2nd RDT □PCR / /	□ + □ -	
8						/ /	□ 2nd RDT □PCR / /	□ + □ -	
9						/ /	□ 2nd RDT □PCR / /	□ + □ -	
10						/ /	□ 2nd RDT □PCR / /	□ + □ -	

[1]**Next Step Codes :RF**=Case refuses follow up; **N**=Follow up not necessary; **A**=Admitted; **L**=Lost; **M**=Move case information to Case Community Monitoring List

Intake, Symptom Screening, Exposure, and Outcomes

Note: These forms are combined into one document, and can be printed front and back to make one form.

Intake and Symptom Screening for Cases or Contacts

What	• Demographics and Conditions (front of form):
	  ○ Demographic information
	  ○ Maternal, neonatal and child health information
	  ○ Pre-existing conditions
	• Symptom screening (back of form):
	  ○ History of present illness
	  ○ Danger signs
	  ○ Other symptoms

Where	Facility or community screening. Stays with facility-based staff if patient is admitted to a healthcare facility, goes to the community health worker (or other person identified for follow up) if patient is undergoing home quarantine or being monitored in an isolation facility, or with the patient if follow up is not available.
Who	Facility-based or community frontline worker
When	Once – at first interaction with individual.

Exposure and Final Outcomes for Cases or Contacts

What	• Exposure (front of form):
	  ○ General COVID-19 exposure information (travel, occupation, contact with known case).
	  ○ Contact with COVID-19 case information.
	• Final Outcomes (back of form):
	  ○ Defines final outcomes for COVID-19 cases. **Note**: Discharge from a facility while the patient is not yet recovered is not a final outcome. Follow up will be required to obtain the final outcome of these patients.
	  ○ Defines final outcome for contacts (those who had contact with confirmed cases, but never were confirmed or presumed to be positive). **Note**: The final outcome for contacts includes being converted to a case if they receive a confirmed or presumed COVID-19 diagnosis, a case outcome will then be required for these people.

Where	Facility or community. Stays with facility staff if patient is admitted to a facility, goes to the community health worker (or other designated monitoring official) if patient is undergoing home quarantine or being monitored in an isolation facility, or with the patient if community follow up is not available.
Who	Facility-based or community frontline worker.
When	Exposure is taken once at first interaction with individual. Final outcome is filled out when a patient has a final outcome in either the facility or the community.

Form 4. COVID-19 Patient Intake and Symptom Screening

1. Patient Status at Intake ☐ Confirmed case ☐ Suspected case ☐ Contact
1.1 Case ID (if COVID-suspected or -confirmed):
1.2 Contact ID (if close contact of COVID case):

*A person may have a contact and case ID if they started as a contact and then were converted to a case.

2. Contact Information and Demographics	
2.1 First name:	**2.2 Surname:**
2.3 Sex: ☐ Male ☐ Female	**2.4 Date of Birth:** _____/_____/_____ (DD/MM/YYY)
2.5 Age: _____Years _____Months (if <60 months)	**2.6 Nearest health facility**
2.7 Telephone number	**2.8 National social number/other identifier**
2.9 Other electronic patient identifier	**2.10 Community health worker name**
2.11 Province/region if non-national, list country here	**2.12 District/commune**
2.13 Town or village	**2.14 Landmark/street name**

3. Visit Information	**[pre-print country here]**
3.1 Facility name list community if not in facility	**3.3 Date of interview** ____/____/_____ (DD/MM/YYY)
3.2 Data collector name	**3.4 Data collector phone number**

4. Symptoms	
4.1 Has the respondent experienced any respiratory symptoms (cough, shortness of breath, sore throat, runny nose) in the last 14 days?	☐ No ☐ Yes
4.2 Fever (≥38 °C) or history of fever	☐ No ☐ Yes → Start date: _____/_____/_____ (DD/MM/YYYY) → Maximum temperature: _____
4.3 Dry cough	☐ No ☐ Yes → Start date: _____/_____/_____ (DD/MM/YYYY)

5. Danger Signs

5.1 Rapid breathing or shortness of breath	☐ No ☐ Yes → Start date: _____/_____/_____ (DD/MM/YYYY)
5.2 Altered consciousness	☐ No ☐ Yes → Start date: _____/_____/_____ (DD/MM/YYYY)
5.3 Inability to eat, drink, or walk	☐ No ☐ Yes → Start date: _____/_____/_____ (DD/MM/YYYY)
If yes to at least one danger sign, patient needs to be seen by clinician immediately	

Form 5. COVID-19 Other Symptoms and Pre-existing Conditions

6. Other symptoms Check all that apply		
□ Sore throat	□ Rhinorrhea	If Yes to any →
□ Chest pain	□ Loss of appetite	Start date for first symptom:
□ Muscle aches (myalgias)	□ Neurological signs	_____/_____/_____ (DD/MM/YYYY)
□ Fatigue or general malaise	□ Seizures	
□ Vomiting or nausea	□ Rash	
□ Diarrhea	□ Conjunctivitis	
□ Headache	□ Other symptoms, specify: _____	
□ Loss of taste or smell		

7. Pre-existing Condition(s) check all that apply	
☐ Obesity	☐ Chronic lung disease (non-asthma)
☐ Underweight	☐ Chronic liver disease
☐ Hypertension	☐ Hematological disorder
☐ Diabetes Type 1	☐ Chronic kidney disease
☐ Diabetes Type 2	☐ Epilepsy
☐ HIV	☐ Chronic neurological impairment/disease
☐ TB	☐ Cancer
☐ Heart disease	☐ Stroke
☐ Asthma (requiring medication)	☐ Other immune deficiency
☐ Mental health condition: _____	☐ Other pre-existing condition: _____

7.2 Smoking	☐ Current ☐ Former ☐ Never	
7.3 Vaccinated for influenza in last 12 months	☐ No ☐ Yes → ☐ Unknown	Date:_____/_____/_____ (DD/MM/YYYY)
7.4 Received pneumococcal vaccine	☐ No ☐ Yes → ☐ Unknown	Date:_____/_____/_____ (DD/MM/YYYY)

8. Maternal and Child Health Information		
8.1 Pregnant	☐ No ☐ Yes → → ☐ Unknown	Trimester: ☐ First ☐ Second ☐ Third ☐ Unknown Estimated delivery date: _____/_____/_____ (DD/MM/YYYY)

8.2 Post-partum Delivery in last 6 months	☐ No ☐ Yes → ☐ Unknown	Delivery date: _____/_____/_____ (DD/MM/YYYY)
8.3 Is patient <1 year old?	YES →	**Breastfeeding?** ☐ Yes ☐ No ☐ Unknown
8.4 Is patient <5 years old?	YES →	**Are vaccinations up to date?** ☐ Yes ☐ No ☐ Unknown

Form 6. COVID-19 Patient Exposure Screening Form

1. Patient Status	☐ Confirmed case	☐ Suspected case	☐ Contact
1.1 Case ID (if COVID-suspected or -confirmed):			
1.2 Contact ID (if close contact of COVID case):			

*A person may have a contact and case ID if they started as a contact and then were converted to a case.

2. Contact Information and Demographics (fill if separated from intake form)	
2.1 First name:	**2.2 Surname:**
2.3 Telephone number	**2.4 National social number/other identifier**
2.5 Province/region	**2.6 District/commune**
2.7 Town or village	**2.8 Landmark/street name**

3. General Exposure Information		
3.1 Have you travelled within the last 14 days? If YES → Countries, regions and cities visited:	☐ Yes → ☐ No ☐ Unknown	☐ Domestically ☐ Internationally Start date: _____/_____/_____ (DD/MM/YYYY) End date: _____/_____/_____ (DD/MM/YYYY)
3.2 Have you been present in a healthcare facility in the last 14 days?	☐ Yes → ☐ No ☐ Unknown	Facility: _____
3.3 Occupation	☐ Health worker ☐ Health laboratory worker ☐ Student ☐ Other, specify:_____	If YES to any → location of work or study: _____
4.4 In the past 14 days, have you had contact with anyone with suspected or confirmed COVID-19 infection?	☐ Yes → Go to **Primary Case Contact Information** ☐ No → Go to **Symptoms Form** ☐ Unknown → Go to **Symptoms Form**	

5. Primary Case Contact Information Complete if respondent had contact with a known/suspected COVID-19 case	
5.1 Name of primary COVID-19 case	**5.2 Case ID of primary COVID-19 case**

5.3 Relationship to primary COVID-19 case		**5.4 Date of last contact with case** _____/_____/_____ (DD/MM/YYY)
5.5 Does contact live with primary case?	☐ Yes → ☐ No ☐ Unknown	Number of days during the time the case was ill that were spent within 6 ft of case _____ Number of rooms in the home _____ Number of residents in the home _____

Form 7. COVID-19 Patient Follow Up Form

1. Patient Status	☐ Confirmed case ☐ Suspected case ☐ Contact
1.1 Case ID (if COVID-suspected or confirmed):	
1.2 Contact ID (if close contact of COVID case):	

*A person may have a contact and case ID if they started as a contact and then were converted to a case

3. Close Contact Record Complete if respondent had contact with a known/suspected COVID-19 case	
3.1 What was contact outcome?	☐ Completed isolation period **without** becoming a confirmed or presumed COVID-19 case ☐ Lost to follow up ☐ Died ☐ Refused follow up ☐ Became a confirmed or presumed COVID-19 case → Go to **Close Case Record**

4. Close Case Record Complete if respondent was a known/suspected COVID-19 case	
4.1 What was case outcome?	☐ Recovered outside health facility (isolation period ended) ☐ Recovered at health facility (discharged) ☐ Lost to follow up ☐ Died ☐ Transferred out (Facility name: _____) ☐ Refused treatment or follow up

Lab Orders and Test Results

Rapid Test Request and Result Form

What	• Submit orders and specimens to lab for testing • Record test results
Where	At screening location and in laboratory. Stays with facility-based staff if patient is admitted to facility, can go with community health worker if patient is isolating at home or with appropriate staff at an isolation facility, or with patient if there is no follow up available.
Who	Orders: Completed by clinical staff Results: Completed by clinical or laboratory staff
When	When tests are ordered and completed.

Lab Register

What	Record basic patient information in one row per patient to easily tally number of each kind of test performed and the corresponding results.
Where	In laboratory
Who	Clinical or laboratory staff
When	When tests are ordered and completed.

Form 8. COVID-19 Test Request Form

1.Patient Status at Intake
1.1 Case ID (if COVID suspected):
1.2 Contact ID (if close contact of COVID case):

*A person may have a contact and case ID if they started as a contact and then were converted to a case

2. Contact Information and Demographics	
2.1 First name:	**2.2 Surname:**
2.3 Sex: ☐ Male ☐ Female	**2.4 Date of birth:** _____/_____/_____ (DD/MM/YYY)
2.5 Age: _____Years _____Months (if <60 months)	**2.6 Telephone number**
Check if patient is a health worker: ☐	

3. Request Information	[pre-print country here]
3.1 Facility name	**3.2 Date of request** _____/_____/_____ (DD/MM/YYY)
3.3 Type of test: ☐ Antibody test (IgM/IgG) ☐ Antigen test ☐ RT-PCR test ☐ Other PCR test	**3.4 Type of specimen**: ☐ Nasal swab ☐ Oropharyngeal swab ☐ Venous blood ☐ Finger prick (blood)
3.5 Additional info/comments:	
3.6 Requested by:	**3.7 Signature:**

4. Specimen/Sample Information	
4.1 Sample ID:	**4.2 Collected by:**
4.3 Sample collection date and time: _____/_____/_____ (DD/MM/YYY) _____:_____ HH:MM	

TO BE COMPLETED IN THE LABORATORY

5. Test Information		
5.1 Test performed by:	**5.2 Test Date and Time:**_____/_____/_____ (DD/MM/YYY) _____:_____ HH:MM	
5.3 Result antibody test: ☐ Negative ☐ Positive IgM only ☐ Positive IgG only	**5.4 Result antigen test:** ☐ Negative ☐ Positive **If result is invalid re-do test**	**5.5 Result RT-PCR (or other PCR) test:** ☐ Negative ☐ Positive ☐ Invalid

☐ Positive IgM and IgG **If result is invalid re-do test**		
3.5 Additional info/comments:		
Result communicated to:	**Date of result: ____/____/_____** (DD/MM/YYY)	**Signature:**

Form 9. COVID-19 facility patient register

Case ID	Patient name	Age	Reason			Date of 1st rapid test	1st rapid test								Date of 2nd Rapid Test (if applicable)	2st rapid test (if applicable)								Date of RT-PCR Test (if applicable)	RT-PCR test	
	Contact info	Sex					Antibody Test					Antigen Test				Antibody Test					Antigen Test			Sample ID		
			Symptoms	Exposure	Contact		IgG Positive	IgG Negative	IgM Positive	IgM Negative	Invalid	Positive	Negative	Invalid		IgG Positive	IgG Negative	IgM Positive	IgM Negative	Invalid	Positive	Negative	Invalid		Positive	Negative
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		☐ M ☐ F	S	Ex	C		IgG +	IgG-	IgM+	IgM-	inv	(+)	(-)	inv		IgG +	IgG-	IgM+	IgM-	inv	(+)	(-)	inv		(+)	(-)
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Facility-based care for COVID-19 cases

Facility Patient Register

What	Monitors the overall situation in the wards as a way to understand the status of currently and historically admitted cases. Collects information about admission date, basic demographics, COVID-19 and secondary diagnoses, intensive care needed, medications and outcomes.
Where	Filled out in the facility. Stays in the facility.
Who	Clinical staff
When	Patient information is entered on admission. Staff maintains register throughout treatment until the patient receives a **facility** outcome. Facility outcome may not be a patient's final outcome if they are discharged before recovery.

Facility Admission Form

What	Based on WHO Core Case Record form - collects information at admission like symptoms, medications, secondary diagnoses.
Where	Filled out in facility. Stays in facility unless patient is discharged to recover in home/isolation facility, in which case the forms transfer with patient to a community health worker or isolation facility staff. If there is no community health worker or isolation facility staff available for ongoing monitoring, then forms should stay in the facility.
Who	Clinical staff
When	Filled out upon admission to health facility.

Facility Daily Progress Form

What	Based on WHO Core Case Record form – daily assessment of vitals and lab results and admission to intensive care.
Where	Filled out in facility. Stays in facility unless patient is discharged to recover at home or in an isolation facility, in which case the forms transfer with patient to a community health worker or isolation facility staff. If there is no community health worker or isolation facility staff available, then forms should stay in the facility.
Who	Clinical staff
When	Filled out daily while patient is at the facility.

Facility Discharge Form

What	Based on WHO Core Case Record form – discharge information for patients upon leaving the facility, includes secondary diagnoses and medications given to patient upon discharge.
Where	Filled out in facility. Stays in facility unless patient is discharged to recover at home or at an isolation facility, in which case the forms transfer with the patient to a community health worker or isolation facility staff. If there is no community health worker or isolation facility staff available, then forms should stay in facility.
Who	Clinical staff
When	Filled out at the time of discharge from facility.

Form 10. COVID-19 Facility Patient Register

Facility Name: _____ Date: _____

Date of admission D/M/Y	Case ID	First name Last name	Age Sex	COVID-19 suspected or confirmed Secondary diagnosis	Treatment OT	 IVF	 AB	 AV	Outcome (see codes below)	Discharge date D/M/Y	Notes
				□ susp □ conf	□	□	□	□			
			□M □F		OT	IVF	AB	AV			
				□ susp □ conf	□	□	□	□			
			□M □F		OT	IVF	AB	AV			
				□ susp □ conf	□	□	□	□			
			□M □F		OT	IVF	AB	AV			
				□ susp □ conf	□	□	□	□			
			□M □F		OT	IVF	AB	AV			
				□ susp □ conf	□	□	□	□			
			□M □F		OT	NV	AB	AV			
				□ susp □ conf	□	□	□	□			
			□M □F		OT	IVF	AB	AV			
				□ susp □ conf	□	□	□	□			
			□M □F		OT	IVF	AB	AV			

Treatment codes: OT=oxygen therapy; IVF=intravenous fluids; AB=antibiotics; AV=antiviral medication.

Outcome codes: REC=Recovered at facility and discharged; ISO=Discharged to Isolation; TO=Transferred out; REF=Refused care; D=Died.

Form 11. Admission Note

Partners In Health 2-April-2020 page 1 of 2

Admission Note

Date: _____ **Time:** _____

Patient Name:	Patient Id:
Age:	EMR Id:
Sex:	Hospital day #:

Patient Demographics

Employed as Healthcare Worker ☐ Yes ☐ No

Patient is pregnant? ☐ Yes ☐ No
Gestational Age: _____ weeks
Or Expected Due Date: _____

Post-partum patient? ☐ Yes ☐ No
Outcome: ☐ live birth ☐ still birth Delivery Date: _____

Patient is Infant? ☐ Yes ☐ No
Gestational Outcome: ☐ Term birth (≥37wk GA) ☐ Preterm birth(<37 wk GA)
Breastfeed: ☐ Yes ☐ No

If child, vaccinations up to date? ☐ Yes ☐ No

Home Medications

Allergies

Comorbidities ☐ None ☐ Unknown

Type 1 Diabetes	☐	Chronic kidney disease	☐
Type 2 Diabetes	☐	Asthma	☐
Hypertension	☐	Chronic pulmonary disease (not asthma)	☐
Epilepsy	☐	Tuberculosis	☐
Sickle Cell disease	☐	Cardiomyopathy	☐
Rheumatic Heart Disease	☐	Stroke	☐
HIV	☐	Malnutrition	☐

Mental Health Condition:

Smoking: ☐ Current ☐ Past ☐ Never

Other:

Onset/Admission

Transfer from other facility? ☐ Yes ☐ No
Transfer facility: _____ Admission Date: _____

Known contact with COVID-19 patient in 14 days prior to symptoms ☐ Yes ☐ No

Patient History

Symptom start date: _____

Fever	☐	Chest pain	☐
Cough	☐	Muscles aches (Myalgias)	☐
With sputum production	☐	Fatigue/malaise	☐
Shortness of breath (Dyspnea)	☐	Nausea/vomiting	☐
Sore throat	☐	Diarrhea	☐
Runny nose	☐	Loss of taste/smell	☐
Headache	☐	Confusion	☐

Other, specify:

Vitals

Temp	°C °F	Cap refill time	☐ < 3 sec
Pulse	bpm		☐ ____ sec
RR	bpm	Pain:	☐ None ☐ Mild ☐ Moderate ☐ Severe
BP	/ mmHg		

O2 _____ % on _____ L/min ☐ room air

Physical Exam

AVPU ☐ Alert ☐ Verbal ☐ Pain ☐ Unresponsive

System	Normal	Findings
HEENT	☐ Yes ☐ No	
Neck	☐ Yes ☐ No	
Lungs	☐ Yes ☐ No	
Thorax	☐ Yes ☐ No	
Heart	☐ Yes ☐ No	
Abdomen	☐ Yes ☐ No	
Urogenital	☐ Yes ☐ No	
Back	☐ Yes ☐ No	
Skin	☐ Yes ☐ No	
Musculoskeletal	☐ Yes ☐ No	
Neuro	☐ Yes ☐ No	

Other, specify:

Admission note, page 2:

Admission Note

COVID-19 Testing

Specimen Date	Specimen Type	Test Type	Test Result
___/______/___	☐ Nasal swab ☐ Oropharyngeal swab ☐ Venous blood ☐ Finger prick (blood)	☐ Antibody test (IgM/IgG)	☐ Negative ☐ Invalid ☐ Positive IgM only ☐ Positive IgG only ☐ Positive IgM and IgG
		☐ Antigen test	☐ Negative ☐ Positive ☐ Invalid
		☐ RT PCR test	☐ Negative ☐ Positive ☐ Invalid
___/______/___	☐ Nasal swab ☐ Oropharyngeal swab ☐ Venous blood ☐ Finger prick (blood)	☐ Antibody test (IgM/IgG)	☐ Negative ☐ Invalid ☐ Positive IgM only ☐ Positive IgG only ☐ Positive IgM and IgG
		☐ Antigen test	☐ Negative ☐ Positive ☐ Invalid
		☐ RT PCR test	☐ Negative ☐ Positive ☐ Invalid
___/______/___	☐ Nasal swab ☐ Oropharyngeal swab ☐ Venous blood ☐ Finger prick (blood)	☐ Antibody test (IgM/IgG)	☐ Negative ☐ Invalid ☐ Positive IgM only ☐ Positive IgG only ☐ Positive IgM and IgG
		☐ Antigen test	☐ Negative ☐ Positive ☐ Invalid
		☐ RT PCR test	☐ Negative ☐ Positive ☐ Invalid

Other testing

Test	result	Test	result
Haemoglobin	g/L or g/dL	Sodium	mmol/L
Haematocrit	%	Potassium	mEq/L
WBC count	x109/L or x103/µL	BUN	mmol/L or mg/dL
Lymphocyte count	cells/µL	Creatinine	µmol/L or mg/dL
Neutrophil count	cells/µL	Glucose	mmol/L or mg/dL
Platelets	x109/L or x103/µL	Total Bilirubin	µmol/L or mg/dL
Lactate	mmol/L or mg/dL	ALT/SGPT	U/L
CRP	mg/L	AST/SGOT	U/L

Chest X-Ray performed? ☐
Result:

Ultrasound performed? ☐
Result:

Other diagnostic tests:

Other findings:

First Line Medications

☐ Hydroxychloroquine 400mg PO q12h x 24 hours then 200mg q12h for 5-10 days
☐ Chloroquine phosphate 500mg PO bid for 10 days

Second Line Medications

☐ Lopinavir/ritonavir 400mg/100mg PO q12h x 14 days
☐ Remdesivir

Antibiotics

☐ Ceftriaxone ____ gm q ____ hours ☐ Amoxicillin ________ q ____ hours
☐ Doxycycline 100 mg BID

Diagnosis

COVID-19: ☐ Confirmed ☐ Suspected ☐ No

Secondary/Other Diagnoses:

Supportive Care

☐ Oxygen __________ L/min ☐ IV Fluids__________________ ml/hour
☐ Paracetamol ______ mg every ______ hour

Provider Clinical Plan

Nursing Admission Note

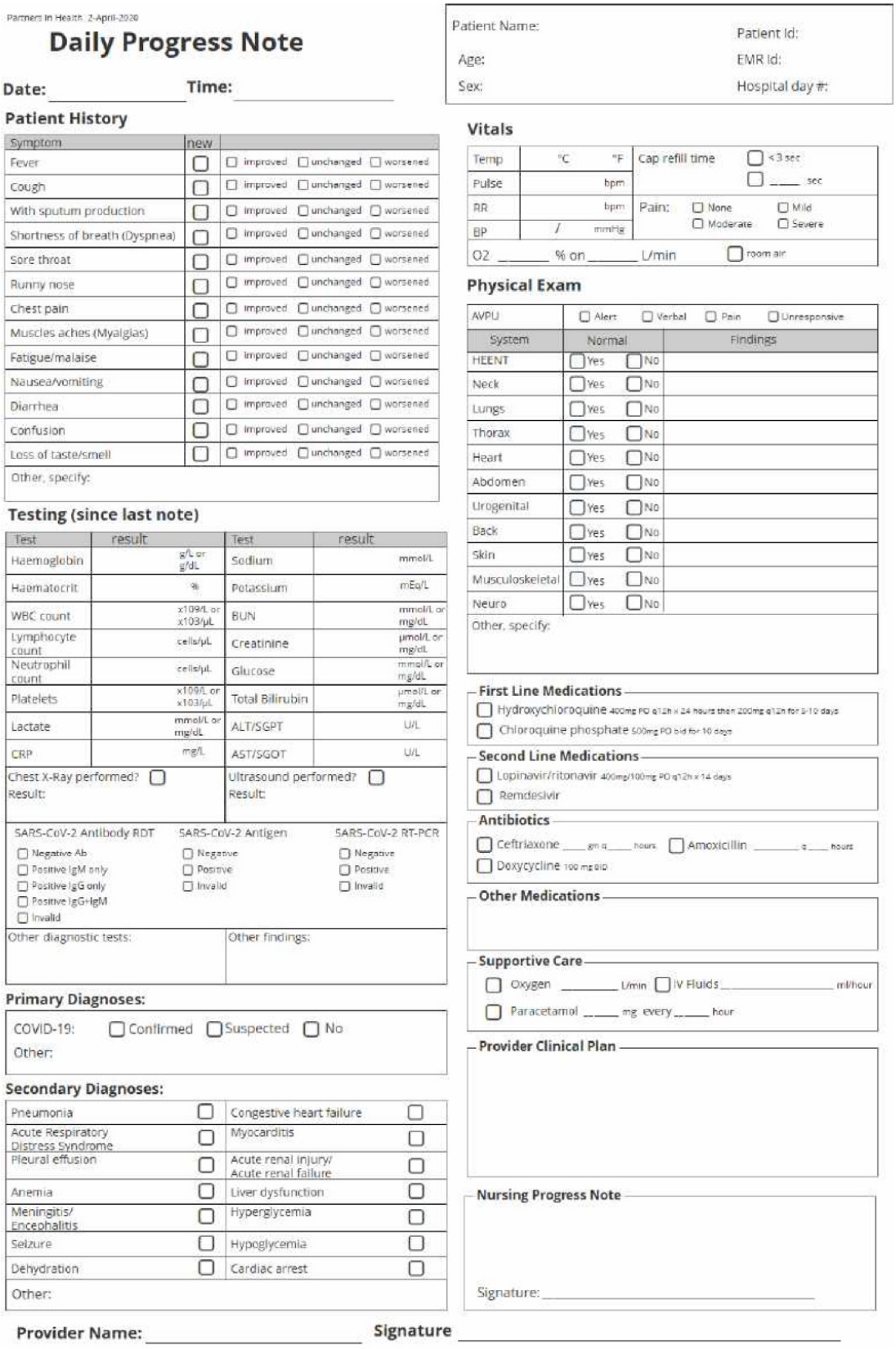
Signature: ____

Disposition

☐ Admit to ward ☐ Discharge to home isolation
☐ Discharge to: ______________________________________
☐ Transfer to: ____

Name ____ **Signature** ____

Form 12. Daily Progress Note



Partners In Health. 2-April-2020

Daily Progress Note

Patient Name:	Patient Id:
Age:	EMR Id:
Sex:	Hospital day #:

Date: _____ **Time:** _____

Patient History

Symptom	new			
Fever	☐	☐ improved	☐ unchanged	☐ worsened
Cough	☐	☐ improved	☐ unchanged	☐ worsened
With sputum production	☐	☐ improved	☐ unchanged	☐ worsened
Shortness of breath (Dyspnea)	☐	☐ improved	☐ unchanged	☐ worsened
Sore throat	☐	☐ improved	☐ unchanged	☐ worsened
Runny nose	☐	☐ improved	☐ unchanged	☐ worsened
Chest pain	☐	☐ improved	☐ unchanged	☐ worsened
Muscles aches (Myalgias)	☐	☐ improved	☐ unchanged	☐ worsened
Fatigue/malaise	☐	☐ improved	☐ unchanged	☐ worsened
Nausea/vomiting	☐	☐ improved	☐ unchanged	☐ worsened
Diarrhea	☐	☐ improved	☐ unchanged	☐ worsened
Confusion	☐	☐ improved	☐ unchanged	☐ worsened
Loss of taste/smell	☐	☐ improved	☐ unchanged	☐ worsened
Other, specify:				

Vitals

Temp	°C	°F	Cap refill time	☐ <3 sec ☐ ____ sec
Pulse		bpm		
RR		bpm	Pain:	☐ None ☐ Mild ☐ Moderate ☐ Severe
BP	/	mmHg		
O2 _____ % on _____ L/min				☐ room air

Physical Exam

AVPU	☐ Alert	☐ Verbal	☐ Pain	☐ Unresponsive
System	Normal		Findings	
HEENT	☐ Yes	☐ No		
Neck	☐ Yes	☐ No		
Lungs	☐ Yes	☐ No		
Thorax	☐ Yes	☐ No		
Heart	☐ Yes	☐ No		
Abdomen	☐ Yes	☐ No		
Urogenital	☐ Yes	☐ No		
Back	☐ Yes	☐ No		
Skin	☐ Yes	☐ No		
Musculoskeletal	☐ Yes	☐ No		
Neuro	☐ Yes	☐ No		
Other, specify:				

Testing (since last note)

Test	result	Test	result
Haemoglobin	g/L or g/dL	Sodium	mmol/L
Haematocrit	%	Potassium	mEq/L
WBC count	x109/L or x103/µL	BUN	mmol/L or mg/dL
Lymphocyte count	cells/µL	Creatinine	µmol/L or mg/dL
Neutrophil count	cells/µL	Glucose	mmol/L or mg/dL
Platelets	x109/L or x103/µL	Total Bilirubin	µmol/L or mg/dL
Lactate	mmol/L or mg/dL	ALT/SGPT	U/L
CRP	mg/L	AST/SGOT	U/L

Chest X-Ray performed? ☐	Ultrasound performed? ☐
Result:	Result:

SARS-CoV-2 Antibody RDT	SARS-CoV-2 Antigen	SARS-CoV-2 RT-PCR
☐ Negative Ab	☐ Negative	☐ Negative
☐ Positive IgM only	☐ Positive	☐ Positive
☐ Positive IgG only	☐ Invalid	☐ Invalid
☐ Positive IgG+IgM		
☐ Invalid		

Other diagnostic tests:	Other findings:

Primary Diagnoses:

COVID-19: ☐ Confirmed ☐ Suspected ☐ No

Other:

Secondary Diagnoses:

Pneumonia	☐	Congestive heart failure	☐
Acute Respiratory Distress Syndrome	☐	Myocarditis	☐
Pleural effusion	☐	Acute renal injury/ Acute renal failure	☐
Anemia	☐	Liver dysfunction	☐
Meningitis/ Encephalitis	☐	Hyperglycemia	☐
Seizure	☐	Hypoglycemia	☐
Dehydration	☐	Cardiac arrest	☐
Other:			

First Line Medications

☐ Hydroxychloroquine 400mg PO q12h x 24 hours then 200mg q12h for 9-10 days

☐ Chloroquine phosphate 500mg PO bid for 10 days

Second Line Medications

☐ Lopinavir/ritonavir 400mg/100mg PO q12h x 14 days

☐ Remdesivir

Antibiotics

☐ Ceftriaxone ____ gm q ____ hours ☐ Amoxicillin _____ q ____ hours

☐ Doxycycline 100 mg BID

Other Medications

Supportive Care

☐ Oxygen _____ L/min ☐ IV Fluids _____ ml/hour

☐ Paracetamol _____ mg every _____ hour

Provider Clinical Plan

Nursing Progress Note

Signature: _____

Provider Name: _____ **Signature** _____

Form 13. Discharge Note

Partners In Health 2-April-2020

Discharge Note

Date: _____ **Time:** _____

Patient Name:	Patient Id:
Age:	EMR Id:
Sex:	Hospital day #:

Primary Diagnoses:

COVID-19: Confirmed ☐ Suspected ☐ No ☐

Other:

Secondary Diagnoses:

Viral pneumonia	☐	Congestive heart failure	☐
Bacterial pneumonia	☐	Myocarditis	☐
Acute Respiratory Distress Syndrome	☐	Acute renal injury/ Acute renal failure	☐
Pleural effusion	☐	Liver dysfunction	☐
Anemia	☐	Hyperglycemia	☐
Meningitis/ Encephalitis	☐	Hypoglycemia	☐
Seizure	☐	Cardiac arrest	☐

Other:

ICU/Isolation

ICU or High Dependency Unit admission? ☐ Yes ☐ No

Total duration in ICU: _____

date of ICU admission ___/___/___

date of ICU discharge ___/___/___

Discharge Medications

☐ Hydroxychloroquine 400mg PO q12h x 24 hours then 200mg q12h for 5-10 days

☐ Chloroquine phosphate 500mg PO bid for 10 days

☐ Other Antibiotic: _____

☐ Amoxicillin _____ q ___ hours

☐ Doxycycline 100 mg BID

☐ Other Antibiotic: _____

☐ Coricosteroids: Type _____ Route ____ Dose _____

☐ Antifungal agent

☐ Paracetamol _____ mg every _____ hour

Other medications:

Therapy given during hospital stay

Oxygen Therapy? ☐ Yes ☐ No

Non-invasive ventilation? (e.g. BIPAP, CPAP) ☐ Yes ☐ No

Inotropes/vasopressors? ☐ Yes ☐ No

Antibiotics? ☐ Yes ☐ No

Other intervention of Procedure:

Discharge Information

Discharge Date: _____/_____/_____

Disposition:

☐ Discharged

Continued home isolation: ☐ Yes ☐ No

☐ Transfer to other facility

☐ Death

☐ Other (specify): _____

Discharge condition: ☐ Good/recovered ☐ Fair ☐ Poor

Follow up plan:

Other comments:

Name _____ **Signature** _____

C. Cleaning and Disinfecting

COVID-19 transport guidelines

1. **General Hygiene Guidelines for Drivers and Transport Staff**
    a. If possible, wear new disposable gloves for every journey
    b. If not wearing gloves: Before, during, and after each trip, wash your hands with soap and water for at least 20 seconds. Use an alcohol-based hand sanitizer that contains at least 60 percent alcohol if soap and water are not available.
    c. Avoid touching your face, eyes, nose, or mouth with unwashed hands.
    d. Avoid close contact with passengers
    e. If possible, ask passengers to sit in the back to create physical distance.
    f. Have hand sanitizer available for both driver and passengers

2. **Vehicle Disinfection**
    a. Routine Cleaning/Disinfection – *Before and After each trip and at the end of each shift/day*
        1. *Use a 70% alcohol-based solution (or soap and water if not available) to wipe down all high-touch surfaces:* steering wheel, shifter, door handles, windows, any other area that has been touched by passengers or driver
        2. Deep cleaning – *After each trip carrying symptomatic patients, follow routine cleaning plus:* Full cleaning of all passenger areas, including: floor, passenger seat, back of front seat, door, window, etc.
    b. If proper cleaning/disinfection cannot be performed, leave vehicle unused for minimum 48 hours

Recommended Minimum Cleaning and Disinfecting Frequencies

Type of Surface	Examples	Soap and Water	Disinfect
Minimally Touched Surfaces	Exterior, Headliner, Trunk	When Dirty	Only after Human Contact
Frequently Touched Surfaces	Door Handles, Switches, Dashboard, Carpet, Seats Steering Wheel, Shifter, Keys, Interior Windows	Routinely	High Touch Areas

Choosing the Right Disinfectant (please see below for acceptable disinfectants)

- Use an Alcohol-based cleaner for cars.
- Avoid: Chlorine Bleach as it can damage plastic, fabric and metal
- DO NOT MIX SOLUTIONS

3. Trip Guidelines

Low-Risk Trips	Medium-Risk Trips	High-Risk Trips
As many carriers of COVID-19 are asymptomatic, the only no-risk journey is by yourself. a. PPE (Mask and Gloves) Recommendations: follow general hygiene guidelines b. Follow routine cleaning instructions above c. Maximum capacity: 1 (driver only)	Non-medical trips, including carrying asymptomatic close contacts, Medical trips carrying patients with other conditions (trauma, obstetric), No high-risk passengers (pre-existing health conditions, elderly, etc.) a. PPE (Mask and Gloves) Recommendations: Masks and gloves highly recommended for passengers and driver b. Follow routine cleaning instructions above. c. Maximum Capacity: 4 d. Keep windows open during trip	Symptomatic patients, Patients in high-risk categories (pre-existing health conditions, elderly, etc.) **Symptomatic and high-risk passengers should only travel for purposes of medical treatment** a. PPE (Mask and Gloves) Recommendations: **Masks and gloves must be worn by all occupants in the vehicle** b. For moving patients, wear appropriate full PPE, including eye protection, gown and gloves c. After helping a medical passenger out of the car, you should remove all protective equipment and wash your hands or use hand sanitizer before getting back into your vehicle. d. Follow routine and deep cleaning instructions above e. Maximum Capacity:4 f. Keep windows open during trip

Liquid Chlorine Preparation

	Liquid Chlorine Preparation			
	% Solution	**0,05 %**	**0,5 %**	**2 %**
	Use for:	**Hands, skin, laundry, clothes**	**Floors, walls, equipment**	**Disinfection of stool, vomit, blood. Disinfection of corpses.**
Basic Product	**Bleach, 5% sodium hypochlorite (5 % active chlorine)**	10 milliliters in 10 liters of water	1 liter in 10 liters of water	4 liters in 6 liters of water
	Chlorine laundry powder (30% active chlorine)	16 grams (1 tablespoon) in 10 liters of water	16 grams (1 tablespoon) in 1 liter of water	64 grams (4 tablespoons) in 1 liter of water
	Chlorine granules (HTH) (70 % of active chlorine)	8 grams (1/2 tablespoon) in 10 liters of water	8 grams (1/2 tablespoon) in 1 liter of water	32 grams (2 tablespoons) in 1 liter of water

ALWAYS label solutions using a permanent marker

Note: WaterGuard is 1.25% Sodium Hypochlorite --> if this is used, then will need to use different ratios

D. Guide to PPE conservation (from PIH)

Our priority is the safety of patients and healthcare workers. It is critical that as triage and isolation systems are rapidly planned and implemented, early efforts are made to conserve PPE since the global stock of PPE is limited. Conserving PPE now will help to ensure enough supplies to keep healthcare providers and other essential workers safe throughout the pandemic.

Strategically reduce individual PPE use

- **Extend use & re-use:** Extended use is preferred over reuse. Extended use of respiratory protection is defined as the wearing a disposable mask without removal and re-donning of the mask. Due to the rapidly evolving epidemic and to ensure protection for the frontline health workers many organizations (including the US CDC) are recommending re-using PPE when necessary. See below for safe re-use procedures.
- **Concentrate care delivery:** Develop strategies to complete multiple tasks utilizing the same set of PPE. For example: Take vital signs and give medications at the same time. Consider also serving meals at the same time.
- **Appropriate use of PPE:** The WHO recommends the use of a surgical mask for routine care of suspected COVID-19 patients, and the use of a N95 mask with COIVD-19 patients during aerosolizing procedures like intubation or nebulization. When readily available, N95 masks should be replaced after any aerosolizing procedure. However, re-use of N95 masks may be necessary.

Reusing PPE:

- **Face Shields**: Reusable face shields and goggles can be soaked in sodium hypochlorite 0.5% for 1 hour and left in a clean, open space to dry for at least 1 hour. Reusable face shields and goggles can also be wiped down with disinfectant between patients while still on the provider's face.
- **Gowns:** In some wards, gowns may need to be worn continuously as a provider moves between patients. In these cases, the provider should double glove and change outer gloves between patients. If gowns are in short supply, re-usable gowns can be considered (see PIH guidelines on alternative PPE). If reusable gowns are used, they should be machine washed with 60-90° C water and laundry detergent.
- **Surgical and procedural masks*:*** Given current global supply limitations, most hospitals will need extended use of masks between patients (meaning that the mask is not removed between patients but stays on a provider's face continuously). At many hospitals, masks will need to be re-used (meaning removed from the face and then put back on in between patients).
    - Surgical and procedural masks must be worn by a single wearer.
    - Remove the mask carefully by the straps. Do not touch the outside surface (dirty surface). Perform hand hygiene after mask removal.
    - The removed mask should be placed in a designated receptacle (such as a paper bag) for reuse. Consider putting the provider's name on the mask or bag.
    - Perform hand hygiene immediately before and after putting on or otherwise touching a reused mask.
    - Do not pull a mask down partway under the chin to take a drink of water; this could cause accidental contamination of the person's face. If taking off the mask, remove it all the way.
    - Masks must be replaced when dirty, wet, or visibly contaminated.

Minimize the number of people using PPE

- **On patient rounds:** Consider only having direct caregivers interact with the patient rather than members of the team responsible for the care of other patients.
- **On shift:** Designate a subset of caregivers to work with COVID confirmed or suspected cases, and others to work with non-COVID patients.
- **In the operating room (OR):** Limit surgeries to only essential surgeries and limit the number of personnel in the OR in order to reduce the amount of PPE used.
- **In general:** There should be no visitors for patients suspected or confirmed to have COVID-19 (with the exception of parents for young children).

Role for hospital administrators:

Hospital administration should actively enforce PPE conservation measures. Some strategies include:

- Removing or limiting PPE on wards less likely to require them.
- Centralized PPE distribution instead of PPE stored on wards.
- PPE monitors who can correct individuals when PPE is overused (for example, if an N95 mask is used in a situation where a surgical mask would have been sufficient).

PIH guide to extended use and reuse of masks and eye protection

During the COVID pandemic, extended use (when the mask or eye protection is worn continuously and not taken off between patients) or reuse (when the mask or eye protection is removed and then replaced) of personal protective equipment may be required.

In general:

- *Keep your mask on continuously as much as possible.* Extended use is preferred over reuse because there is less risk of spreading the virus.
- *You can never do hand hygiene enough.* Remember hand hygiene before and after removing or replacing any PPE item
- *If you need to take your mask off, take it all the way off***.** For example, do not pull a mask down under your chin to take a drink of water. This keeps your face from being accidently contaminated by the outside of the mask.

How to remove a mask:

- Perform hand hygiene
- Remove mask carefully by the straps. Do not touch the outside surface (dirty surface).
- Place the mask in your designated storage container – ensure you always place the dirty side (the outside of the mask) in the same direction.
- Perform hand hygiene

How to put a used mask back on:

- Perform hand hygiene and put on gloves
- Carefully pick the mask up by the straps, and ensuring the outside does not touch your nose or mouth, replace it on your face

- Remove gloves and perform hand hygiene
- Only re-use your own mask

When to replace a mask for a new one:

- If it is wet or dirty
- If it is damaged
- If it has been used in an aerosol generating procedure, such as intubation, nebulization, or suctioning (for N95s)

When do I need an N95 mask instead of a surgical mask:

- When swabbing a patient for a COVID test (extended use or reuse ok)
- When performing an aerosol generating procedure, such as intubation, nebulization, or suctioning (discard after the procedure)

How to remove and reuse eye protection:

- Remove eye protection by the handles of the goggles or strap of the face shield. Carefully place outside down (dirty side down) in a 'dirty bin.'
- Perform hand hygiene. Then either:
    - Option 1: Put on new gloves. Clean all sides of the eye protection with the cleaning solution. Place the eye protection into your own designated storage container (separate from your mask), dirty side (outside down). Remove gloves and perform hand hygiene.
    - Option 2: Reusable eye protection may be soaked in sodium hypochlorite 0.5% for 1 hour and left in a clean, open space to dry for at least 1 hour.

Extended Use PPE – Donning

Updated 27 March 2020

1. Don PPE outside of patients room. Ensure hair is pulled back away from face.

2. Perform hand hygiene
   - Alcohol-based sanitizer OR soap and water

3. Put on gown
   - Ensure gown fully covers entire body when closed or tied

4. Put on mask/respirator
   - If new mask/respirator, hold mask/respirator in one hand and bring to face
     - Pull lower elastic band over head and below ears
     - Pull upper elastic band over head and above ears
     - Press nose clip to ensure a tight seal of mask
   - If re-using mask/respirator, hold by straps only, taking care not to touch the outside (dirty) side of the mask

5. Perform Hand Hygiene
   - Alcohol based hand sanitizer

6. Put on gloves
   - Ensure gloves go over cuff of gown
   - If using same gown between patients, put 2 pairs of gloves on. Change external pair between each patient

Extended Use PPE – Doffing

STOP COVID Partners In Health OPEN PEDIATRICS Updated 27 March 2020

1. Doff PPE, except for mask/respirator in patient's room/ward. Remember gloves, face shield, front of gown and sleeves are CONTAMINATED. Wash hands immediately if you touch any of these surfaces with your bare hands

2. Remove gown
- Avoid touching outside contaminated surface of gown
- Pull gown from head and away from body
- If possible, remove gloves at same time as gown, ensuring you only touch the inside of gown and gloves
- Wrap gown into a ball with contaminated surface (outside of gown) inside
- Discard gown in appropriate receptacle

3.If gloves removed, perform hand hygiene
- Alcohol-based hand sanitizer

4. If not already done, remove gloves
- Grasp gloves in palm of hand and pull glove off
- Discard glove in waste container
- Slowly and gently slide finger under other glove between glove and cuff of gown. Avoid touching contaminated side of glove

5. Perform hand hygiene
- Alcohol-based hand sanitizer

6. Remove eye protection
- If using face shield, tilt head forward, grasp strap and gently pull strap over head, pulling the face shield away from face
- If using googles, grasp ear pieces behind ears and pull googles and away from face
- Carefully place outside down (dirty side down) in a 'dirty bin' until they can be cleaned for re-use (see instructions on re-using PPE)

7. Perform hand hygiene
- Alcohol-based hand sanitizer

8. With mask/respirator in place, leave patients room and enter anteroom or hallway

9. Remove mask/respirator
- Pull lower elastic band over head
- Pull upper elastic band over head and pull mask away from face
- If re-using, place mask/respirator in an appropriate storage container (plastic container recommended). Ensure dirty side of mask/respirator is face down

10. Perform hand hygiene
- Alcohol-based hand sanitizer

Guidance on non-standard PPE for COVID-19

The global COVID-19 pandemic has led to worldwide shortages of personal protective equipment (PPE). This document discusses alternative non-standard PPE that can be considered. It is important to note that, at present, none of the options below have sufficient evidence to recommend their routine use. First steps to expand PPE availability should be PPE conservation, which includes extended use, re-use, and limiting the number of people and procedures requiring PPE. The use of non-standard PPE should be used as a 'last resort' strategy.

Non-standard Mask Options

- Locally-made cloth masks:
    - Should be worn with face shield that extends to the chin or below for added protection.
    - To increase effectiveness, masks should be made with tightly-woven, fluid-resistant fabric and fit closely to the face, over both the nose and mouth.
    - Effectiveness may decrease when wet; should be replaced if sweaty or damp.
    - It should be noted that multiple studies show these do not provide as much protection as surgical masks. One study suggests an increased risk of infection risk and a false sense of protection for clinicians.
    - During this time of global shortage there are some institutions that are prioritizing the use of cloth masks in low-risk areas to conserve the use of surgical masks and N95 masks for higher risk patient areas.
- Makeshift 'respirators' from surgical masks and viral filters are being researched as alternatives to N95 masks for use during aerosolizing procedures.
    - https://www.childrenshospital.org/research/departments-divisions-programs/departments/surgery/surgical-innovation-fellowship
- Multiple organizations are researching options to sterilize single use masks, but no standards have emerged yet. More information on this may be available in coming weeks.

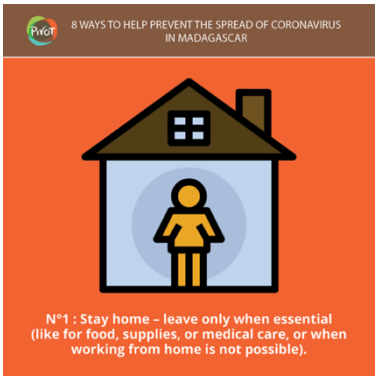
Non-standard gown options

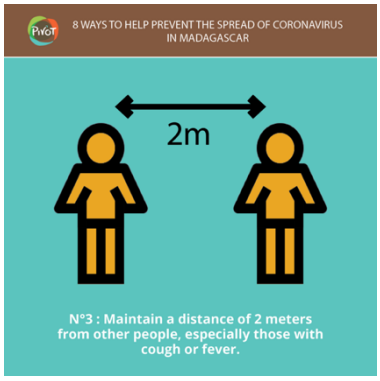
- Locally made gowns can be considered in the absence of certified gowns. There is limited data on these.
    - Should be made of cloth with small pore size: non-woven, spun bound fabric, or tightly-woven, fluid-resistant fabric (such as polyester) Certified re-usable gowns are typically coated with a fluorocarbon-based repellant finish to prevent liquid and microbial penetration. This may not be possible with local gowns, so particular care should be taken to avoid getting gowns wet and to change when wet.
    - Design:
        - Extends to knees; fully covers arms and torso (front as one piece and back with ties)
        - Cuffs at end of arms (consider thumb loops to prevent gap between gown and gloves)
        - Higher neck to protect against splashes
        - Tight-seams or sealed seems
    - Inspect with each use to ensure no visible holes
    - Clothes worn underneath a locally made gown should be inspected after doffing – if soiled, they must be properly sterilized or discarded
    - Other gown alternatives include lab coats, patient gowns, aprons, combinations of clothing (sleeve covers + coats) and should be used as a last resort.

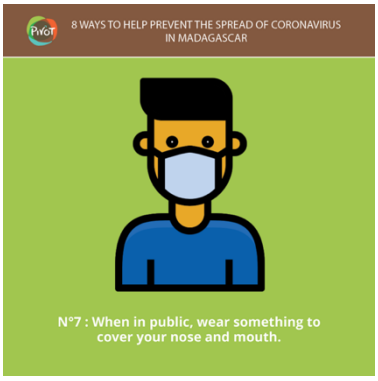
E. Sensitization Materials

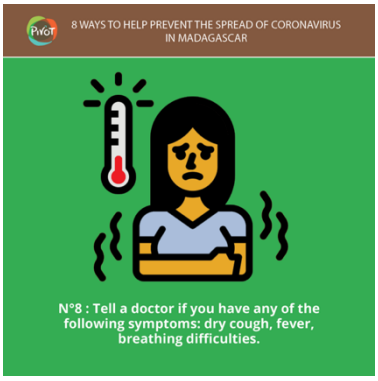
These sensitization materials can be printed and/or made into wall posters. Click the links below to download printable versions available in 3 languages:

- MALAGASY
- FRANÇAIS
- ANGLAIS









F. Public use of face coverings for prevention of COVID-19

- This guide strongly recommends the use of face coverings (non-medical masks) for the public during a COVID-19 outbreak in urban, semi-urban and in rural areas where people gather.
- All MoHs should have a media campaign to promote and educate the public on the use of face coverings, including how to safely use them.
- In urban hotspots of COVID-19, it is reasonable to make face coverings mandatory in spaces where social distancing is not possible. However, we discourage fining people without a mask but rather for MoHs to have a strong campaign on how wearing a face cover protects others.
- Face coverings are NOT a substitute for other preventive measures like regular handwashing, cleaning surfaces, social distancing and contact tracing – all must be done together
- It is easy to tell at a glance in a public space how well a population is following this very important preventive measure. When it is not being followed, measure to increase awareness and compliance should be implemented immediately.
- Countries are encouraged to mass produce cloth face coverings and give them out for free to all.
- While waiting for mass production, people can make their own masks (see section below)
- This chapter is in large part adapted from the South African recommendations.[36]

Justification of face coverings

- Research shows N95 masks, medical masks, even homemade masks could block a very high percentage of the virus in aerosols that come from a wearer's nose and mouth.[37]
- Maximal viral shedding of SARS-CoV-2 (the cause of COVID-19) occurs early in the course of the illness. Patients can be contagious before they develop symptoms or even know that they are infected. Face coverings can be effective at decreasing spread from presymptomatic or asymptomatic individuals.
- Face covers are simple, cheap, and there is some evidence that shows them to be effective.[38] While no randomized control studies exist on the use of public face covering, general scientific consensus is they could have a substantial impact on transmission with a relatively small impact on social and economic life.
- Face coverings should be worn outside the home in situations where meeting others is likely (for example, shopping, public transport).
- Face coverings can also be used at home by a person showing symptoms to help protect other family members when quarantining outside of the house is not possible.
- The public is likely to comply more closely with face cover advice than wider stay at home orders in some settings. People have to leave their houses for essential items. Face coverings allow them to do this with less risk to others.

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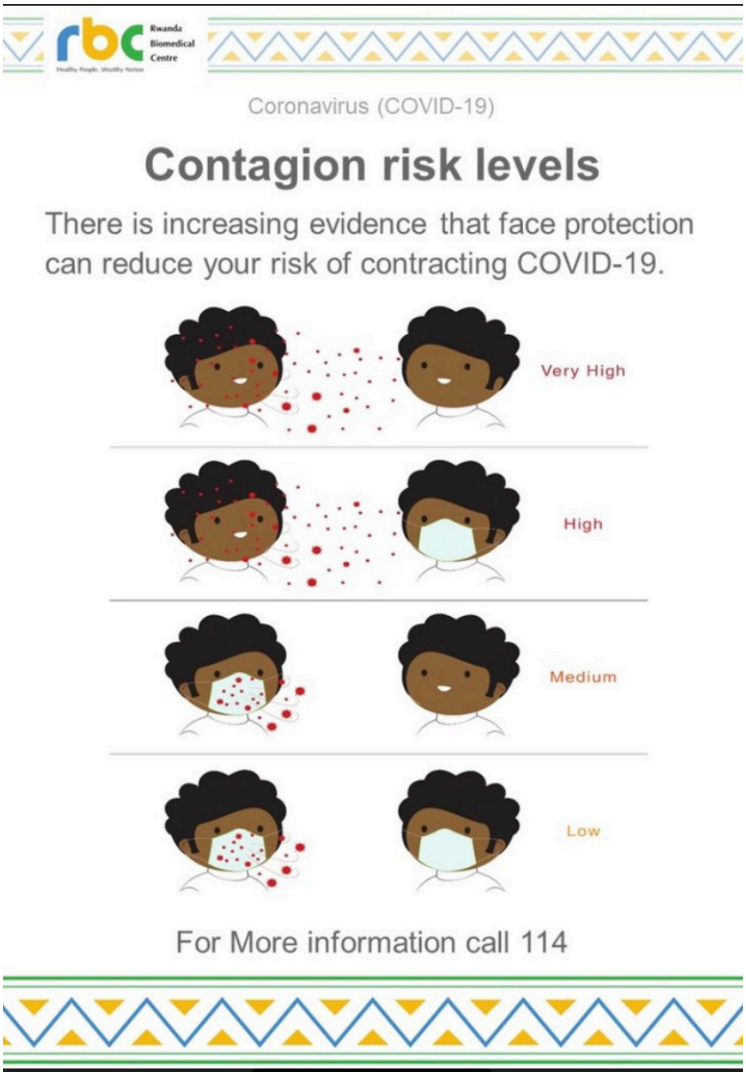
[36] https://www.westerncape.gov.za/department-of-health/news/covid-19-cloth-masks-public-use

[37] Ma QX, Shan H, Zhang HL, Li GM, Yang RM, Chen JM. Potential utilities of mask wearing and instant hand hygiene for fighting SARS-CoV-2 [published online ahead of print, 2020 Mar 31]. J Med Virol. 2020;10.1002/jmv.25805

[38] https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover.html

- Modelling studies suggest that even a small reduction in community transmission could make a major difference in the epidemic and save many lives.
- Figure 5.1 demonstrates the theory of how transmission is decreased the most when EVERYONE in public wears a face covering: ” My Face Cover Protects You, Your Face Cover Protects Me”.
- In summary, a cloth face covering, if appropriately used and cleaned, can offer the following protection:
    - Reduce the transmission of droplets from the source (any person coughing or sneezing)
    - Reduce inhaling a large number of droplets from others
    - Reduce exposure in overcrowded areas such as taxis, shops, or government buildings

Example on public face covering from Rwanda:



Rwanda Biomedical Medical Center. Kigali Rwanda

Medical masks and N95 respirators should NOT be used by the public

- The cloth face coverings recommended for the public are NOT surgical masks or N-95 respirators.
- At top priority of the MoH is to ensure front-line healthcare workers caring for COVID-19 patients have the required N95 respirators and/or medical masks so that they are protected while caring for patients.
- In addition, there is a global shortage of medical masks, so we are urging non-healthcare workers not to wear medical masks. This is to ensure an adequate supply of medical masks are available to frontline healthcare workers.
- It should also be noted that **cloth masks** are not considered appropriate for health care workers.
- Patients with suspected or confirmed COVID-19 can wear a medical mask because they are very good at capturing droplets coming from the persons' nose and mouth. However, if medical masks are not available for COVID-19 cases, a face covering described in this chapter will likely do just as well.

When to use cloth face covering

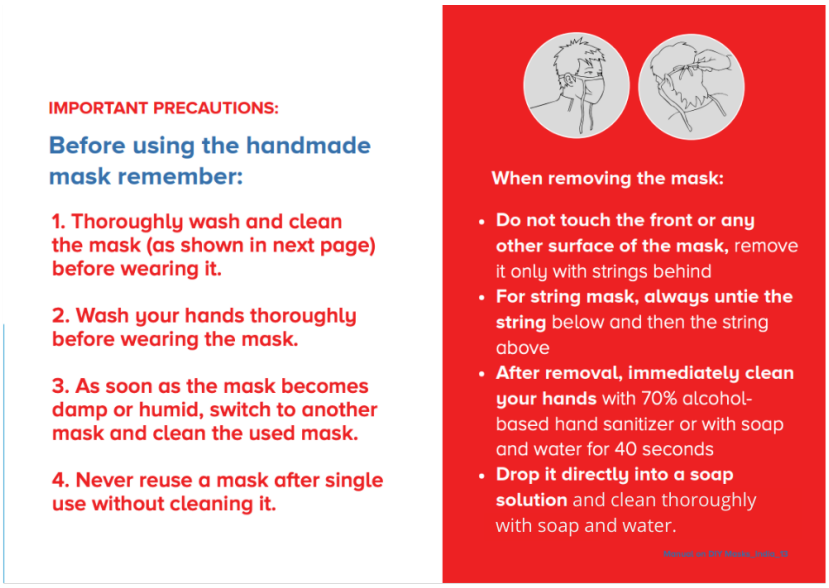
- When less than one meter from people who may have COVID-19 infection, for example**:**
    - Travel to and from work in public transport
    - When stepping outside the house to go shopping or seeking healthcare
    - In quarantine/self-quarantine/isolation when contact with others is necessary.
    - In offices when physical distance is not feasible.
    - When conducting interviews during house to house visits, quarantine homes (e.g., community health workers, etc.)
    - When cleaning the streets/ disposing of domestic rubbish
- A face covering is not needed outside if the road or area is scarcely populated, and the person can keep 2 meters away from all other persons at all times.

How to properly use a cloth face covering

- Wash your hands before putting on and removing of a cloth face covering, never touch the cloth part, never touch the inside whilst wearing, avoid touching your face.
- Wash cloth face coverings with warm soapy water and iron when dry.
- Only use a cloth face covering that has been cleaned and disinfected/ ironed
- Place the face covering carefully, ensuring it covers the mouth and nose, and tie it securely to minimize any gaps between the face and the cover.
- Tie the strings behind your head, or if you are using elastic bands, make sure these are tight
- Make sure it fits well. Move it around to get the best fit. Never touch the cloth part.
- Once you have put on the cloth face covering, DO NOT TOUCH YOUR FACE or the front of the face cover again until you take it off.
- When you take it off, undo the ties, and carefully fold the cloth face covering inside out, hold it by the strings/elastic and place it in a plastic/container preserved for washing the cloth face covering only

- After removal or whenever a used face cover is inadvertently touched, clean hands using an alcohol-based hand rub or soap and water if hands are visibly dirty.
- Replace face covers as soon as they become damp with a new clean, dry one.
- If a person can manage to have several face coverings it is better. That way it can be changed as soon as it becomes moist or damp.
- Keep small plastic bag for placing dirty cloth face cover. Do not re-use a face cover that has been stored in a plastic bag before washing it.
- Figure 5.2 illustrates the key components of using a face covering.

Important instructions on using a cloth face covering:



Making cloth face coverings (homemade)

- A cloth face covering can be made in any non- industrial or domestic setup and is relatively simple to make. There are many YouTube videos that suggest how to make a homemade face cover.
- The following features related to nonmedical masks should be taken into consideration:
    - Numbers of layers of fabric/tissue
    - Breathability of material used
    - Water repellence/hydrophobic qualities
    - Shape of cover
    - Fit of cover
- A cloth cover typically comprises of square pieces of cloth with three pleats that can cover the face from ABOVE the nose to BELOW the chin and almost up to the ears.
- A typical T-shirt is often very loosely woven and if used three layers of cloth should be used to comprise the face cover.
- A favorite design of ours is to use the combination of a cotton T-shirt with a paper towel placed in between (see Figure 5.3).

How to make a face cover out of a T-shirt and paper towel:

- Cloth face coverings can be also hand-made with sewing machines. They can be designed with a pocket to insert a paper towel or tissue paper.
- Basic design tips of a handmade sewn face covering include:
    - Two layers, an inner and outer surface of the face cover:

        1. Outer layers:
            - Made from thick weave cotton like denim, calico or upholstery cotton fabric that can be easily washed.
            - Comprising two different patterns on the cloth - if possible - to distinguish between inside and outside of the cloth face cover

        2. Inner layers:
            - Two layers of ordinary cotton typically used for linen;
            - If possible – between the two inner cotton layers - a breathable layer of non-woven fabric which is washable at high temperatures – or if you don't have that, something like a jacket lining inner.
            - Alternative to having an inner layer of non-woven cloth, is to have a pocket where filter paper (like a paper coffee filter), tissue paper or paper towel can be inserted.

        3. Strings or strap:
            - Strings or straps can be sewn, tied through a small whole in the cloth's edge.

Harms of face coverings are unlikely

- The general scientific consensus is that the use of face coverings for the population will be largely beneficial and harms are unlikely.
- One potential harm is face coverings can give a person a false sense of protection and they do not do other preventive measures like handwashing and social distancing.
- A second potential harm is if the cloth face cover is not handled correctly or washed correctly the person could self-infect themselves with a contaminated cover.
- If education on the use of cloth face coverings is done correctly, it is unlikely and of the potential harms will materialize.

Evaluation of implementation of face coverings

- It is very easy to evaluate how well face coverings are being used by a population.
- Simple take a look at a public street, park or market and estimate the percentage of persons wearing a mask.