



# **Bahrain COVID-19 Protocols**

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(COVID-19)

# COVID-19 Testing Protocol

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**Suspected Cases**

A **suspected case** is a person that fulfill **any** of the following

- **Symptoms of Fever or Cough or Shortness of Breath**
- **Acute respiratory illness with or without fever**
- **Any Pneumonia requiring admission (especially if ICU admission OR Bilateral radiological infiltrates OR Hypoxic Respiratory failure)**
- **Or hospital associated pneumonia**
- **Or Any Health care provider with Community acquired Pneumonia**
- **Contact of a positive case, with or without symptoms**
- **History of Travel, with or without symptoms**

**Note :**

- False Negative results can be seen early during the infection. Peak of viral shedding appears 3 to 5 days after the onset of disease.
- If the nucleic acid test is negative at the beginning, and case is suspected, to test on subsequent days.

**Contact Cases**

A **contact** is a person that belongs to either of the two defined groups

**There are two types of contact cases****1 - Close Contact (High Risk Exposure), any of the following**

1. A person living in the same household as a COVID-19 case
2. Had direct physical contact with a COVID-19 case (e.g shaking hands, infectious secretions of a COVID-19 case)
3. Had face-to-face contact with a COVID-19 case within 2 metres and > 15 minutes.
4. Was in a closed environment (e.g. classroom, meeting room, hospital waiting room, etc.) with a COVID-19 case for 15 minutes or more and at a distance of less than 2 metres
5. A healthcare worker (HCW) or other person providing direct care for a COVID-19 case, or laboratory workers handling specimens from a COVID-19 case without recommended PPE or with a possible breach of PPE;
6. A contact in an aircraft sitting within two seats (in any direction) of the COVID-19 case, travel companions or persons providing care, and crew members serving in the section of the aircraft where the index case was seated (if severity of symptoms or movement of the case indicate more extensive exposure, passengers seated in the entire section or all passengers on the aircraft may be considered close contacts).


**2 - Casual Contacts (Low Risk Exposure)**

**Casual contact defined as any of contacts not listed in the close contacts, examples such as:**

- Had casual contact with an ambulant COVID-19 case
- Had casual contact with presumptive (not confirmed) COVID-19 case
- Had stayed in an area presumed to have ongoing, community transmission

**Inpatient Suspected Case**

As per COVID-19 case definition

- 
1. Immediate isolation
  2. Collect Nasopharyngeal
  3. COVID19 swabs and to public health labs
  4. Inform 444
  5. If positive, arrange transfer to COVID-19 isolation facilities
  6. If negative, continue inpatient care

**Suspected Cases**A suspected case is a person that fulfill **any** of the following

- Symptoms of Fever or Cough or Shortness of Breath
- Acute respiratory illness with or without fever
- Any Pneumonia requiring admission (especially if ICU admission OR Bilateral radiological infiltrates OR Hypoxic Respiratory failure)
- Or hospital associated pneumonia
- Or Any Health care provider with Community acquired Pneumonia
- Contact of a positive case, with or without symptoms
- History of Travel, with or without symptoms

**Note :**

- False Negative results can be seen early during the infection. Peak of viral shedding appears 3 to 5 days after the onset of disease.
- If the nucleic acid test is negative at the beginning, and case is suspected, to test on subsequent days.

# Healthcare providers (HCP) and Laboratory personnel COVID-19 testing protocol

The following procedures apply to all HCP and lab personnel caring for positive COVID19 cases

## For Unprotected exposure (No mask or goggles)

### Symptomatic or Asymptomatic (Fever, cough or shortness of breath)

1. Isolate and test for COVID-19 and wait for result
2. HCP working in COVID-19 facilities can undergo testing in their facility. Otherwise, can be tested in testing center
3. Inform war room
4. If positive, admit in isolation facility
5. If negative, home isolation 14 days
6. Exemption from work for 14 days
7. Retest at the end of the isolation period before going back to work

## For Protected exposure (Atleast mask with goggles)

### Symptomatic (Fever, cough or shortness of breath)

1. Isolate and test for COVID-19 and wait for result
2. HCP working in COVID-19 facilities can undergo testing in their facility. Otherwise can be tested testing center
3. Inform war room
4. If positive, admit in isolation facility
5. If negative, further action to be decided by the facility

### Asymptomatic

#### Routine HCP monitoring

1. Regular COVID-19 screening every 7days
2. Self reporting of symptoms
3. Self reporting of unprotected exposure
4. Daily checking of temperature and assessing symptoms
5. Can continue working regularly

## HCP exposed to suspected case in the community

1. Test if develops symptoms
2. Test if fitting COVID-19 case definition of suspected case or close contact to a confirmed case
3. Inform war room if any HCP is planned for testing

- Daily checking of symptoms and temperature of healthcare providers (HCP) caring for COVID19 positive cases.
- All HCP should report any symptoms or unprotected exposure to confirmed cases of COVID19, to their designated department
- Any unprotected exposure to COVID-19 should be exempted from work.
- HCP who are NOT caring for COVID19 cases are not included in the above protocol and they should follow their hospital procedure.

**All healthcare providers caring for COVID19 positive cases should undergo nasopharyngeal swab COVID19 test every 7days in their working place. Results are to be traced by the facility supervisor, and to follow the actions above**

# Testing for Non-Healthcare Workers in COVID-19 facilities

## Non-Healthcare Workers

*Non-healthcare workers include drivers, cleaners, and personnel that operate at COVID treatment/quarantine facilities*

### Unprotected Exposure to confirmed COVID-19 case (with or without symptoms)

1. Isolate and test for COVID 19 and wait for result
2. Test in facility or testing center
3. Inform war room
4. If positive, admit in isolation facility
5. If negative, quarantine/home isolation\* for 14 days
6. Exemption from work for 14 days
7. Retest at the end of the isolation/quarantine period before going back to work

### Symptomatic with Protected exposure to confirmed COVID-19 case

1. Isolate and test for COVID 19 and wait for result
2. Test in facility or testing center
3. If positive, admit in isolation facility and Inform war room
4. If negative, hospital facility to decide further management and action

### Asymptomatic and Protected exposure

1. Regular checking of symptoms and temperature
2. Regular screening every 7-14 days by rapid test in their facilities

\*self isolation depends on the capability of home isolation, if not possible, then to quarantine by sponsored company or quarantine in COVID-19 facilities

Symptoms : Fever or cough or shortness of breath

Unprotected exposure is the absence of either mask or goggles ; Protected exposure is the presence of at least both mask and goggles

# Testing for Prison Personnel and Inmates

## General Recommendations

- Encourage good hygiene by education and posters
- Increase the frequency of cleaning lavatories
- Distribution of hand sanitizers and tissues in the building
- Strict procedure to prevent animals entering the prison site
- Daily report about prison situation to war room

### Prison

#### Symptomatic Inmates

- Isolate immediately
- Take nasopharyngeal and oropharyngeal swab and send to Public Health lab
- Inform 444/War room to facilitate testing
- If positive, to arrange transfer to isolation facility

#### Prison Guard & Staff

- Daily checking of temperature and symptoms
- Encourage self reporting of close contact to COVID-19 cases
- Test any staff who fits the criteria for testing, based on case definitions



## Community

**Suspected Cases +/- epidemiological criteria**

*As per COVID-19 case definition*

**Asymptomatic individuals with history of close contact to confirmed COVID19 case**

**Symptomatic individuals with travel history or contact to confirmed COVID19 case**

**Symptomatic individuals living in overcrowded residence** (eg: expatriate workers, prisoners)

**Symptomatic individuals with comorbidities such as:**

- Elderly (age  $\geq 65$  years)
- Chronic medical conditions (e.g., diabetes, heart disease, chronic lung disease, Chronic renal disease etc)
- immunocompromised state
- Pregnancy

**Symptomatic individuals working in high risk areas**  
(eg: COVID19 isolation/ quarantine facilities, airport)

## Healthcare

**Hospitalized Patients**

- Any Pneumonia requiring hospitalization (especially if ICU admission OR Bilateral radiological infiltrates OR Hypoxic Respiratory failure)
- Hospital acquired Pneumonia

**Healthcare provider & non-HCP working in COVID19 facilities**

- HCP and non-HCP with Symptoms
- History of an unprotected exposure to a confirmed COVID19 case (even without symptoms)

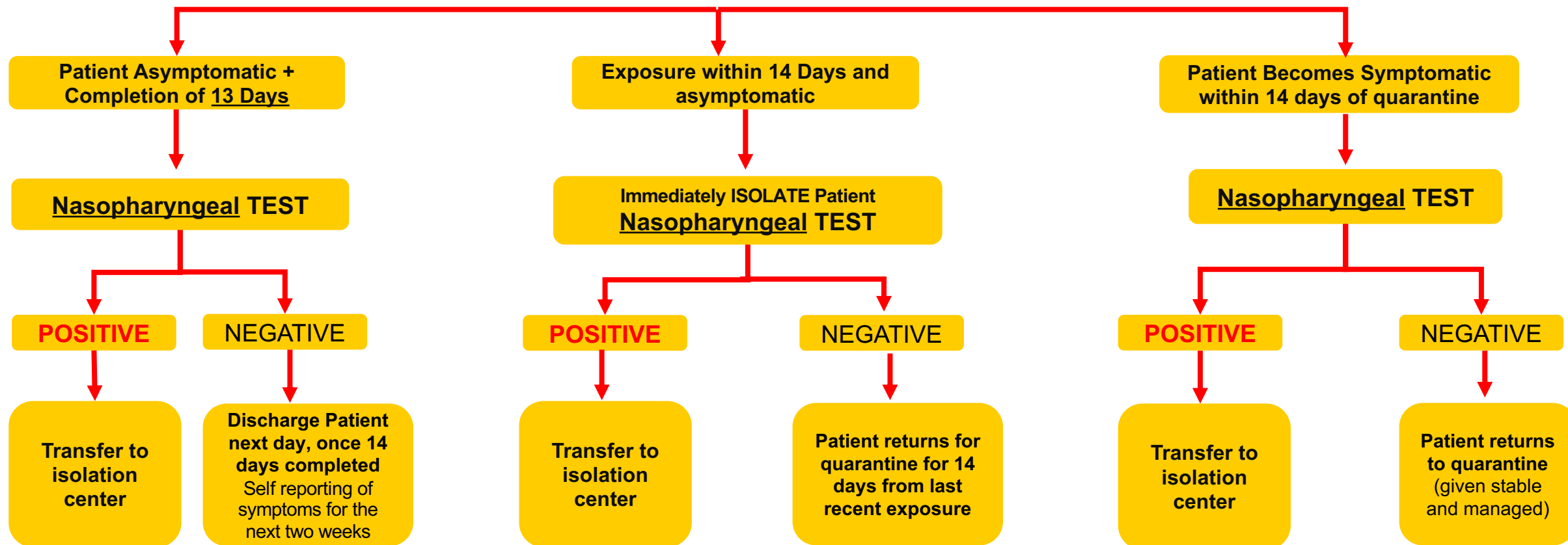


## **Discharge Protocol and Repeat testing guidelines**

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for Quarantine and Treatment facilities

## When to Repeat Test or Discharge for Patients in Institutional or Home Quarantine



### EXPOSURE:

Patient was exposed to a confirmed case for at least 15 minutes at a distance of less than 1 meter

The Following Procedures Govern Discharge of Patients in Isolation at any Treatment Facilities

**SYMPTOMATIC**

- (1) Upper Respiratory Tract Infection (runny nose or coughing); OR
- (2) Lower Respiratory Tract Infection (Pneumonia or shortness of breath); OR
- (3) Fever

Assess patient for retesting on day 4 of admission :  
If patient asymptomatic for >3days with normal X-ray ( if it was done)  
If not, asses regularly until fitting above criteria

Yes

Retest

**POSITIVE**

**NEGATIVE**

Repeat Nasopharyngeal  
(ONLY) 48 hours after last  
positive test

Nasopharyngeal swab only  
24 Hours after last test

**POSITIVE**

**NEGATIVE**

Discharge Patient with home  
isolation instructions for 14 days

**POSITIVE**

**NEGATIVE**

April 15



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## Follow up Guidelines for Recovered COVID-19 Patients

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Excluding labor individuals

1. All COVID19 patients who are discharged should be advised for **14 days** of self isolation at home with BeAware App
  - Anytime after discharge if the patient develop COVID19 symptoms they have to tested by Nasopharyngeal(NP) swab
2. Patient should have a NP swab and serology test by rapid test on day 7 of discharge and have a clinic follow up on day 14 and day 28
3. At Day 7 after Discharge patient should have a repeat NP swab and a rapid test (finger prick)
4. At Day 14 post discharge, at the follow up visit
  - Screen for any respiratory, GI or sexual symptoms.
  - NP swab should be taken and sent for COVID19 testing.
  - Rapid test by blood (finger prick) and document result in ISEHA
  - **Patient should be informed that they might be called for plasma donation to help treat COVID19 patients through clinical trial**
  - **If NP swab negative patient can be cleared from quarantine**
5. At Day 28 post discharge, at the follow up visit :
  - screen for any respiratory, GI or sexual symptoms
  - Rapid test by blood (finger prick) and document result in ISEHA
6. if patient PCR result came out positive during follow up, decision on readmission depends on case-case and should be discussed with Dr Jameela/Dr Manaf
  - If patient PCR result is equivocal, patient to be swabbed after 1 day.
  - if patient is to be admitted, all his contact must be swabbed.

April 15



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## Follow up Guidelines for Recovered COVID-19 Patients

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**For labor individuals**

- All COVID19 patients (labor) who are discharged will be transferred to Quarantine Zone in Sitra Field Hospital
- After completion of 14 days in Sitra Quarantine Zone , Patient will have an **exit swab** on day 13
  - Patient should be informed that they might be called for plasma donation to help treat COVID19 patients through clinical trial
- Once discharged from Quarantine, can go back to work under supervision
- Supervised work refers to
  1. Supervision will be done by sponsor/employer or volunteers (depending on the labor worker category)
  2. Specific work assignment
  3. Social distancing
  4. Wearing face mask
  5. Monitor symptoms on daily basis
  6. Reporting to 444 in case of any change in the health status
  7. Supervision will continue for additional 14 days from leaving quarantine
- Employer shall prepare and provide an appropriate accommodation after completion of quarantine
- if patient PCR result came out positive at the exit swab, decision on readmission depends on case-case and should be discussed with Dr Jameela/Dr Manaf
  - If patient PCR result is equivocal, patient to be swabbed after 1 day.
  - if patient is to be admitted, all his contact must be swabbed.



March 26



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## Reporting of PCR results in relation to CT Values:

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TiB MOLIBOL COVID19 (Berlin)

# General Guides

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1. Lab and equipments should be cleaned thoroughly once weekly or more frequently based on the volume processed
2. All PCR results should be reported with CT Values
3. All PCR tests should use positive and negative control
4. All test run in PCR should use water(as negative control) in between test to rule out contamination
  - If several positive results with high CT values  $>37$  in once batch, raises suspicion of contamination, especially if previous batch had confirmed positive cases ( $CT < 37$ ); Hence we should ask for repeat new NP sample within 24hrs and run on different machine if possible
5. Observe for any pattern that would raise suspicion of contamination
  - Example 1: a full row that with  $CT > 37$  would raise suspicion that its contaminated, hence repeat testing of the sample in the row in two different machines
  - Example 2: Repeated tests in same well with  $CT > 37$  raises suspicion of contamination, hence clean and repeat in a different well
6. Never read after 40 cycles, as recommended by WHO
7. Follow the TiB MOLIBOL RT-PCR protocol for detection of COVID-19 virus - WHO 2020 (attached)

## Lab Reporting

- The threshold of the CT Value should be referenced from the used kit
  - If a different kit is used, CT Values should be changed according to the kit in use
- CT values for the currently available kit (TiB MOLIBOL- Berlin: E gene) should be interpreted as following
- Final interpretation should take into account the PCR curve in addition to the CT Value

CT Values	Interpretation	Actions to be taken
Less than 37	Positive	Positive, continue to confirmatory testing
37 to 40	Inconclusive; either due to contamination or low amount of viral load	Report as Inconclusive for clinical correlation <b>AND</b> Repeat new NP swab within 24hours
More than 40	Negative	Negative

**April 12**

**Subject to regular update  
and revision**



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# **Laboratory Distribution of Samples**

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# Laboratory Distribution of Samples

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## Public Health Lab :

- EKK, HBDC, JMH
- SMC,
- Sitra Quarantine,
- Hidd Quarantine,
- Muharraq Geriatric Centre,
- Public health department (contacts),
- Exhibition Centre

## BDF Lab:

- VIPs
- MKCC (Awali)
- BDF Hospital

## Airport Lab:

- Airport, causeway,
- Ministry of Interior,
- Mobile stations,
- Private Hospitals
- Exhibition Centre

## KHUH Lab: for KHUH only



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## Treatment Guidelines and Pathways

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## Treatment Guidelines : General approach

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- **Healthcare personnel should care for Ventilated patients or perform aerosolized procedure in an Airborne Infection Isolation Room (AIIR).**
- **Healthcare personnel should care for stable infected patients in single or cohorted room with standard, contact & droplet precautions**
  - Full PPE should be worn by HCP
- **Daily clinical assessment of patients is required**
  - It have been reported that deterioration is more common within the second week of the disease
- **Strict Isolation and adherence to infection control measures**
- **Laboratory investigations:**
  - Baseline: ECG, CBC, Urea/Electrolytes, creatinine, CRP, D-Dimer, Ferritin, LFT, Chest X-ray, Respiratory panel PCR , Novel Corona virus test
  - Consider repeating other blood tests for follow up if clinically indicated or there is a change in patient's condition
- **Check vital signs on every shift and more often if indicated**
- **This Guidelines is created based on open label studies, observational studies, case reports and expert opinion (mostly on adults), no strong recommendation hold up to date**
- **Physician should use this as a guide and depend on clinical and scientific judgment and individualizing of care**
- **Simultaneous use of three or more antivirals is not recommended**

# Uncomplicated Infection

## Definition:

- non-specific symptoms such as fever, cough, sore throat, nasal congestion, malaise, headache, muscle pain.
- These patients do not have any signs of dehydration, sepsis or shortness of breath.

## **Risk Factors:** any ONE of :

- Age>60yrs
- BMI>30
- Diabetes (HbA1C>8)
- Chronic heart disease
- Chronic lung disease
- Immunosuppression state\*
  - Cancer treatment within 1 year
  - The use of immunosuppressive drugs (biologics, chronic prednisone ≥20mg daily),
  - Solid organ transplant,
  - Bone marrow transplantation,
  - HIV/AIDS (regardless of CD4 count),
  - leukemia, lymphoma, SLE, and vasculitis.

## Immediately implement strict infection control measures

### Without risk factors

#### Supportive care:

- IVF
- Antipyretics (Avoid NSAID)
- Symptomatic care

Assess Clinical Trial Eligibility (SOLIDARITY Bahrain)  
No specific antimicrobial advised

### With risk factors

#### Supportive care:

- IVF
- Antipyretics (Avoid NSAID)
- Symptomatic care

Medications based on Adult patients

**Antimicrobials:** Hydroxychloroquine +/- Azithromycin  
(for 5 – 7 days)

**DVT Prophylaxis** with LMWH if not contraindicated

**Empiric therapy:** Ostelamivir only if evidence of coinfection

## Investigations

### **Baseline investigations :**

- ECG, Chest Xray
- CBC, Urea/Electrolytes, Creatinine, LFT
- CRP, LDH, ESR, D-Dimer, Ferritin, PCT (and Respiratory panel PCR if available)

### **Risk stratification and prognostic markers (Daily for with risk factors)**

- D-dimer, Fibrinogen, PT/PTT, Mg
- Ferritin, CRP, ESR, PCT
- LDH, Troponin, BNP

**Daily ECG if on hydroxychloroquine or any QT prolonging medication**

**Guidelines are created based on observational studies and case reports, no strong recommendation hold up-to-date  
Physicians should use this as a guide and depend on clinical and scientific judgment and individualizing of care**



# Mild & Severe Pneumonia

## Definition

### Mild Pneumonia:

Patient with pneumonia and no signs of severe pneumonia.  
Child with non-severe pneumonia has cough or difficulty breathing + tachypnea

### Severe Pneumonia:

#### Adolescent or adult:

fever or suspected respiratory infection, **plus** one of

- respiratory rate >30 breaths/min
- severe respiratory distress
- SpO<sub>2</sub> <93% on room air
- Lung infiltrates >50% of the lung field within 24- 48 hours
- **Ferritin >500 ug/L; Ddimer >1mg/L ; CRP>100mg/L ; LDH>245 U/L ; Elevated Troponin**

**Child** with cough or difficulty in breathing, **plus** at least one of the following:

- Central cyanosis
- SpO<sub>2</sub> <93%;
- severe respiratory distress (e.g. grunting, very severe chest indrawing);
- signs of pneumonia with a general danger sign:
- inability to breastfeed or drink,
- lethargy or unconsciousness, or convulsions.
- Other signs of pneumonia may be present: chest indrawing and tachypnea.

## Immediately implement strict infection control measures

### Mild Pneumonia

Look for other treatable causes of community acquired pneumonia

#### Supportive care:

- IVF
- Antipyretics (Avoid NSAIDS) and Symptomatic care
- Oxygen (keep saturation >94%, start with 5L)

**Antimicrobials:** Hydroxychloroquine +/- Azithromycin (for 5 - days)

**DVT Prophylaxis** with LMWH if not contraindicated

**Empiric Antimicrobials:** Ceftriaxone +/- Oseltamivir (Empiric therapy should be considered and based on microbiology results and clinical judgment)

Medications based on Adult patients

### Severe Pneumonia

ICU Consultation with ICU Care if clinical indicated

#### Supportive care:

- IVF, Antipyretics (Avoid NSAIDS) and Symptomatic care
- Oxygen (keep saturation >94%, start with 5L)
- Ventilatory support if needed

**Antimicrobials:** Hydroxychloroquine + Kaletra.

If fails, consider the use of **Remedesevir** or **Favipiravir** or **Plasma Therapy** through clinical trials/compassionate use

**DVT Prophylaxis** with LMWH if not contraindicated

**Empiric Antimicrobials:** Pip/Tazobactam +/- Oseltamivir (Empiric therapy should be considered and based on microbiology results and clinical judgment)

Medications based on Adult patients

## Investigations

### Baseline investigations :

- ECG, Chest Xray
- CBC, Urea/Electrolytes, Creatinine, LFT
- CRP, LDH, ESR, D-Dimer, Ferritin, PCT
- and Respiratory panel PCR (if available)

### Risk stratification and prognostic markers (q12hr)

- D-dimer, Fbrinogen, PT/PTT, Mg
- Ferritin, CRP, ESR, PCT
- LDH, Troponin, BNP

**Daily: CBC, Biochemistry, ECG**

**Guidelines are created based on observational studies and case reports, no strong recommendation hold up-to-date  
Physicians should use this as a guide and depend on clinical and scientific judgment and individualizing of care**

# Acute Respiratory Distress Syndrome (ARDS)

## Definition

**Onset:** new or worsening respiratory symptoms within one week of known clinical insult.

**Chest imaging** (radiograph, CT scan, or lung ultrasound): bilateral opacities, not fully explained by effusions, lobar or lung collapse, or nodules.

**Origin of edema:** respiratory failure not fully explained by cardiac failure or fluid overload. Need objective assessment (e.g. echocardiography) to exclude hydrostatic cause of edema if no risk factor present.

## Oxygenation (adults):

- Mild ARDS:  $200 \text{ mmHg} < \text{PaO}_2/\text{FiO}_2 \leq 300 \text{ mmHg}$  (with PEEP or CPAP  $\geq 5 \text{ cmH}_2\text{O}$ ,
- Moderate ARDS:  $100 \text{ mmHg} < \text{PaO}_2/\text{FiO}_2 \leq 200 \text{ mmHg}$  with PEEP  $\geq 5 \text{ cmH}_2\text{O}$
- Severe ARDS:  $\text{PaO}_2/\text{FiO}_2 \leq 100 \text{ mmHg}$  with PEEP  $\geq 5 \text{ cmH}_2\text{O}$ ,
- When  $\text{PaO}_2$  is not available,  $\text{SpO}_2/\text{FiO}_2 \leq 315$  suggests ARDS (including in non-ventilated patients)

## Oxygenation (children):

- Bilevel NIV or CPAP  $\geq 5 \text{ cmH}_2\text{O}$  via full face mask:  $\text{PaO}_2/\text{FiO}_2 \leq 300 \text{ mmHg}$  or  $\text{SpO}_2/\text{FiO}_2 \leq 264$
- Mild ARDS (invasively ventilated):  $4 \leq \text{OI} < 8$  or  $5 \leq \text{OSI} < 7.5$
- Moderate ARDS (invasively ventilated):  $8 \leq \text{OI} < 16$  or  $7.5 \leq \text{OSI} < 12.3$
- Severe ARDS (invasively ventilated):  $\text{OI} \geq 16$  or  $\text{OSI} \geq 12.3$

*OI = Oxygenation Index and OSI = Oxygenation Index using  $\text{SpO}_2$*

Immediately implement strict infection control measures

ARDS

ICU Care

## Supportive care:

- IVF : **conservative** fluid management given NO tissue hypoperfusion
- Antipyretics (Avoid NSAIDS) and Symptomatic care
- Ventilatory support

Medications based on Adult patients

**Antimicrobials: Hydroxychloroquine + Kaletra.** If fails, consider the use of **Tocilizumab** if cytokine storm is suspected (refer to criteria of use). Can consider inhaled Interferon. Consider the use of **Remdesvir** or **Favipiravir** or **Plasma therapy** if available through trials/compassionate use

**DVT Prophylaxis** with LMWH if not contraindicated

**Empiric Co-Infection Antimicrobials:** Pip/Tazobactam or Meropenem + Ostelamivir (Empiric therapy should be de-escalated based on microbiology results and clinical judgment)

## Investigations

### Baseline investigations :

- ECG, Chest Xray
- CBC, Urea/Electrolytes, Creatinine, LFT
- CRP, LDH, ESR, D-Dimer, Ferritin, PCT
- and Respiratory panel PCR (if available)

### Risk stratification and prognostic markers (q12hr)

- D-dimer, Fbrinogen, PT/PTT, Mg
- Ferritin, CRP, ESR, PCT
- LDH, Troponin, BNP

**Daily: CBC, Biochemistry, ECG**

**Consider ruling out PE (by echo or CTPA)**

Guidelines are created based on observational studies and case reports, no strong recommendation hold up-to-date  
Physicians should use this as a guide and depend on clinical and scientific judgment and individualizing of care

### **No specific therapies have been tested for pregnant patients**

*Not all reported medications are studied and not all are thought to be safe in pregnancy*

- Pregnant women should be considered to be at high risk for developing severe infection during this current outbreak.
- Coronaviruses can also result in adverse outcomes for the fetus and infant including intrauterine growth restriction, preterm delivery, admission to the ICU, spontaneous abortion and perinatal death.
- It seems that likelihood of intrauterine maternal-fetal transmission of coronaviruses is low
- Infected Pregnant women should be monitored more frequently
- Neonates born to Infected mothers should be tested
- Mothers with confirmed COVID-19 or symptomatic mothers with suspected COVID-19 should take precautions to prevent transmission to the infant during breastfeeding by having a different individual feed expressed breast milk to the infant

## Noninvasive Ventilation (NIV)

- NIV is not strongly recommended in COVID-19 patients who fail HFNC treatment. Some severe patients progress to ARDS rapidly.
  - Excessive inflation pressure may cause gastric distension and intolerance which contribute to aspiration and worsen lung injury.
- A short-term (less than 2 hours) use of NIV can be closely monitored if the patient has acute left heart failure, chronic obstructive pulmonary disease or is immunocompromised.
- Intubation should be performed as early as possible if improvement of respiratory distress symptoms or PaO<sub>2</sub>/FiO<sub>2</sub> is not observed. NIV with a double circuit is recommended.
- A virus filter should be installed between the mask and the exhalation valve when applying NIV with a single tube. Suitable masks should be chosen to reduce the risk of virus spread through air leakage

## Invasive Mechanical Ventilation

- It is important to balance the ventilation and oxygenation demands and the risk of mechanical ventilation-related lung injury in the treatment of COVID-19.
- Strictly set the tidal volume to 4 - 8 ml/kg. In general, the lower the lung compliance, the smaller the preset tidal volume should be.
- Maintain the platform pressure < 30 cmH<sub>2</sub>O (1 cmH<sub>2</sub>O = 0.098 kPa) and driving pressure < 15 cmH<sub>2</sub>O.
- Set PEEP according to the ARDS's protocol.
- Ventilation frequency: 18-25 times per minute. Moderate hypercapnia is allowed.
- Administer sedation, analgesia, or muscle relaxant if the tidal volume, platform pressure and driving pressure are too high
- In patients with ARDS, 12-16hrs prone ventilation per day is recommended

## Advanced therapies

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- Use of Convalescent Plasma therapy (from recovered patients) for COVID-19 patients should be considered through clinical trials
  - In critically ill patients, where the physician consider plasma therapy to be beneficial, the use of Convalescent Plasma therapy through compassionate use should be considered
  - Interim guidance and protocol to be requested
- ECMO should be considered and used whenever needed if available

# COVID19 Medications and Dosage

Drugs	Dose
<b>Ceftriaxone</b>	<u>Adults</u> : 2 g IV daily <u>Pediatrics</u> : 100mg/kg/dose once daily (usual maximum daily dose: 2,000 mg/day)
<b>Azithromycin:</b>	<u>Adults</u> : 500 mg orally daily for a minimum of 3 days <u>Pediatrics</u> : 10 mg/kg once on day 1 (maximum dose: 500 mg/dose), followed by 5 mg/kg (maximum dose: 250 mg/dose) once daily on days 2 to 5  <u>Note</u> : No activity for SARS-CoV-2. Studies of combination therapy with hydroxychloroquine does not convincingly suggest added benefit with azithromycin combination therapy, given multiple study limitations and concern for antibiotic overuse.
<b>Oseltamivir</b>	<u>Adults</u> : 75 mg-150mg every 12 hours for 5 days (a longer duration can be considered in severely ill or immunocompromised patients). <u>Pediatrics</u> : ≤15 kg: 30 mg orally twice daily ; >15 to 23 kg: 45 mg orally twice daily ; >23 to 40 kg: 60 mg orally twice daily ; >40 kg: 75 mg orally twice daily For 5 days.
<b>Kaletra (Lopinavir/ Ritonavir)</b>	<u>Adults</u> : 400/100 every 12 hours ; No more than 10 days <u>Pediatrics</u> : Dosage based on weight, presented based on mg of lopinavir; maximum dose: Lopinavir 400 mg/ritonavir 100 mg 7–15 kg: 12 mg/kg twice daily ; 15–40 kg: 10 mg/kg twice daily ; >40 kg: 400 mg/100 mg twice daily <u>ADR</u> : Kaletra can increase risk of altered cardiac conduction (especially QT prolongation)Use with caution when combined with other QT prolonging drugs or in patients with structural heart diseases or in patients with electrolyte abnormalities causing prolonged QT or congenital long QT. Kaletra may cause hepatitis and pancreatitis  <u>Note</u> : Multiple in vitro studies suggesting activity. Early clinical reports are inconclusive; one randomized trial with LPV/r initiated late in the disease course in moderately-ill hospitalized patients did not demonstrate benefit. Being investigated in further clinical trials. Many clinically significant drug-drug interactions. Adverse effects are common.

# COVID19 Medications and Dosage

Drugs	Dose
<b>Piperacillin/ Tazobactam</b>	<u>Adults</u> : 4.5g IV Q6hr (consider extended infusion) <u>Pediatrics</u> : 300 mg/ kg/day divided every 6-8 hours (usual maximum daily dose: 16g/day)
<b>Hydroxychloroquine</b>	<u>Adults</u> : <ul style="list-style-type: none"> <li>• Day 1: loading dose of 400 mg orally every 12 hours,</li> <li>• Day 2 to 5 : 200 mg orally every 12 hours</li> </ul> <u>Pediatrics</u> : 10 mg/kg orally every 12 hours (max: 600 mg/dose), followed by 3 mg/kg orally every 8 hours (max: 200 mg/dose)
<b>Chloroquine</b>	<u>Adults</u> : 500 mg every 12 hours <u>Pediatrics</u> : (dosing based on chloroquine base) loading 10 mg/kg orally (maximum 600 mg) followed by 5 mg/kg orally (maximum: 300 mg) daily 6 hours after the loading dose for 5 days.
<b>Ribavirin</b> <u>Adults</u> : Oral dose 400mg BD for 14 days	
<u>Note</u> : Typically used in combination with an interferon, ribavirin has been studied for patients with other coronaviruses, with mixed results. Additionally, its adverse effect profile can be significant (anemia), particularly at the dosages for which it has been tested for MERS	
<b>IFN-α</b>	5 million U in sterile water, 2 times/day, deliver with nebulizer ; No more than 10 days
<b>Remdesivir</b>	Day 1: 200mg IV loading dose Day 2 to 5: 100mg IV OD
<b>Favipiravir</b>	Day 1: 1600 mg PO twice daily (loading doses) Days 2 to 7: 600 mg PO twice daily
<b>Tocilizumab</b> (refer to next page)	The initial dose is 4-8mg/kg (recommended dose of 400mg diluted with 0.9% normal saline to 100ml). If the initial medication is not effective, one extra administration can be given after 12 hours (same dose as before). No more than two administrations should be given, with the maximum single dose no more than 800mg. The infusion time should be more than 1 hour. Contraindicated for people with active infections such as tuberculosis.

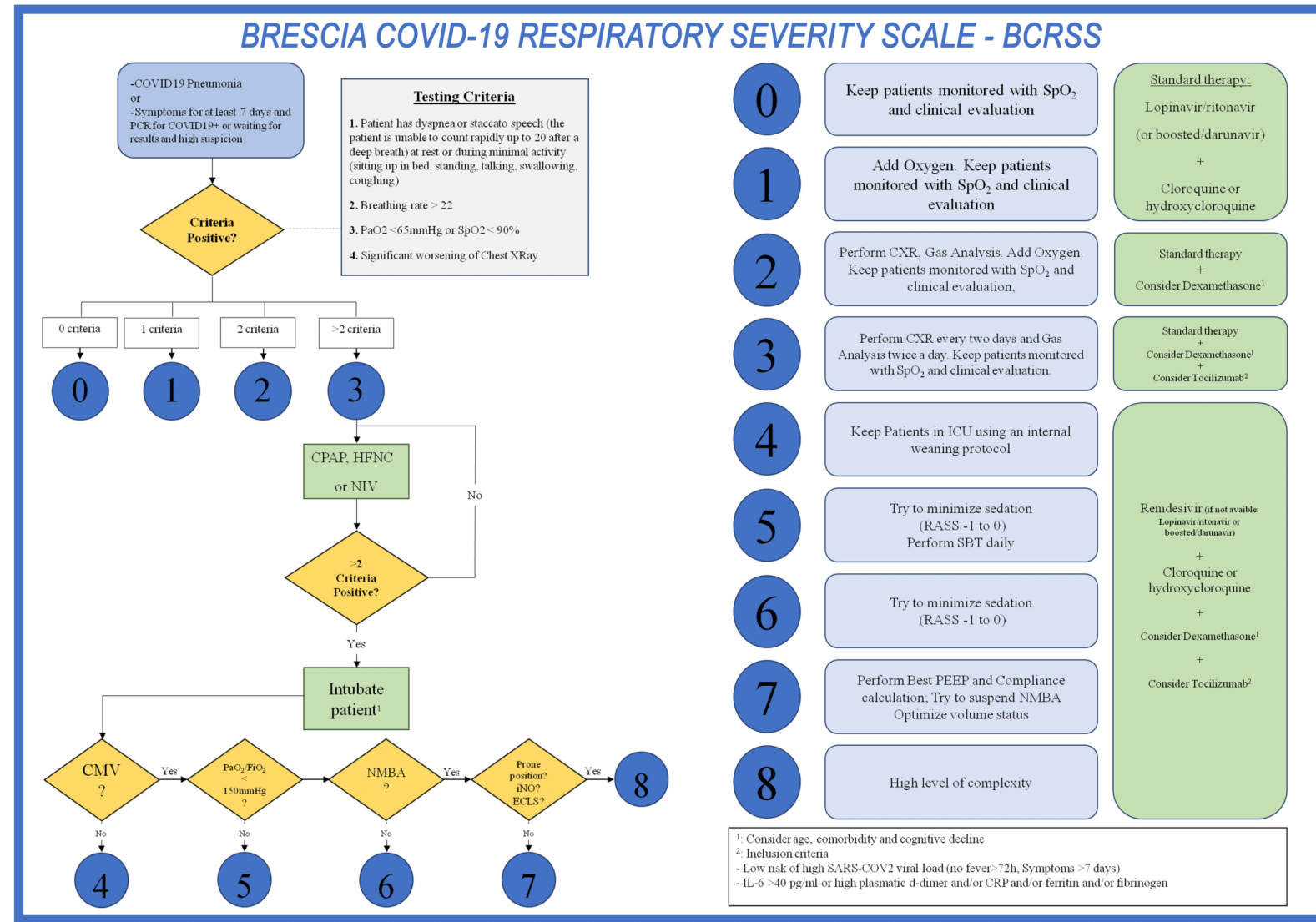
# Tocilizumab

## Inclusion

- >18-year-old
- BCRSS score  $\geq 3$
- and/or IL6 levels >40pg/ml
  - or high CRP, Ferritin or D-Dimer levels

## Exclusion

- Age<18
- Deranged LFT>5x
- Plt<50
- active infections such as tuberculosis, documented bacterial sepsis





## Investigations and consultations

Category	Investigations
Basic investigations (on admission and if clinically indicated)	<ul style="list-style-type: none"><li>• ECG, Chest Xray</li><li>• CBC, Urea/Electrolytes, Creatinine, LFT</li><li>• CRP, LDH, ESR, D-Dimer, Ferritin, PCT</li><li>• Respiratory panel PCR if available</li></ul>
Risk stratification (considering repeating frequently or if clinically indicated)	<ul style="list-style-type: none"><li>• D-Dimer, Fibrinogen, PT/PTT, Mg</li><li>• Ferritin, CRP, ESR, PCT</li><li>• LDH, Troponin, BNP</li></ul>
Others (if clinically indicated)	<ul style="list-style-type: none"><li>• Blood cultures</li><li>• Viral Serology</li><li>• PCT</li><li>• Stool Corona virus (only if GI symptoms present)</li></ul>

### **Cardiology :**

If significantly elevated troponin or EKG abnormalities and/or concern for CHF, consider TTE and cardiology consult

### **Hematology :**

Cases of prothrombotic state with thrombosis have been reported in severe cases, consider investigation for thrombosis and hematology input in case of thrombosis

## Further Reading

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- Refer to [www.covid19-druginteractions.org](http://www.covid19-druginteractions.org) for further details on drug interaction
- Details on advanced therapies can be further read from <https://covid-19.alibabacloud.com>

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