# COVID-19

**History:**

31 December 2019 → WHO was alerted to several cases of Pneumonia in WUHAN City, CHINA

30 January 2020 → WHO declared COVID-19 as Public Health Emergency

11 March 2020 → WHO declared COVID-19 Pandemic

## ETIOPATHOGENESIS:

- Causative agent → **SARS-COV-2**
  - Enveloped, SSRNA virus with helical symmetry.

  Crown like appearance under electron microscope due to presence of spike glycoproteins on the envelope

- Transmission:

Bats (Reservoir) → Civet cats, Pangolins and other mammals in wuhan market → Humans [Infected]

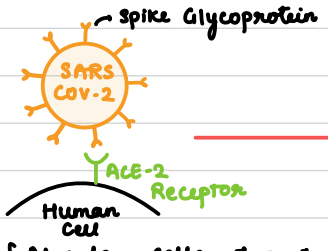
Humans [Infected] → Droplets

Droplets → Sneeze / Cough / Contact (Fomites)

Sneeze, Cough, Contact (Fomites) → Spread to Humans who are in close contact (6 feet)

· Incubation period: 2-14 days (Median = 5 days)

· Pathogenesis:




[Alveolar cells - Type I & II,
NK cells,
Macrophages,
Dendritic cells]

**DIRECT CYTOTOXICITY**

**ENDOTHELIAL INFLAMMATION**

- ↓ Fibrinolysis
- ↑ Thrombin production

**DYSREGULATION OF RAAS**

- Inflammation
- Vasoconstriction
- ↑ vascular permeability

**DYSREGULATED IMMUNE RESPONSE**

- T-cell lymphopenia
- ↓ Interferon signalling
- Cytokine storm (↑↑ IL-6)

**CLINICAL FEATURES:**

- Fever (M/C)
- Dry cough
- Shortness of Breath (Dyspnea)
- Fatigue, Myalgia
- Headache
- Anosmia, Ageusia
- Diarrhea, vomiting
- Respiratory distress

· Phases :

· Early infection phase: (Initial 1-2 days from onset) → Non-specific → Fever, myalgia, headache
viral burden is low. 80% cases recover

· Pulmonary phase (next few days) → Fever, cough, dyspnea.
High viral burden
Only 20% progress to this phase

· Severe Hyperinflammatory phase → High grade fever, cough, dyspnea at rest, Hypoxemia, Multiorgan Dysfunction
(Rapid progression)
Major mediator: IL-6
Seen in 3-5% of all cases
High mortality

**COMPLICATIONS :**

· ARDS
· Secondary Bacterial Infections
· Sepsis, Septic shock
· Cardiac Injury, Cardiomyopathy, Arrhythmia, Sudden cardiac death
· Acute Kidney Injury
· Liver dysfunction
· Thromboembolism → stroke
· Skin → COVID Toes (Purplish blue discoloration)
· Children → Kawasaki Disease, TSS

## INVESTIGATIONS:

1. Specific investigations:
   - RT-PCR
   - TrueNAT
   - Rapid antigen kits

   Specimens:
   - Nasal swab
   - Throat swab
   - Sputum
   - ET Aspirate
   - Bronchoalveolar lavage
   - Viral culture

* Antibody detection [IgM & IgG] is used for rapid screening of carriers, and serosurveillance, but not for diagnostic purposes

2. Routine investigations: CBC, Glucose, Electrolytes, LFT, RFT

3. Inflammatory markers and prognostic indicators: CRP, IL-6, Ferritin, PT, D-Dimer, LDH, Troponin

4. Imaging:

Chest X-Ray → B/L diffuse lower lobe infiltrates, Peribronchial consolidations

CT Scan
↳ Typical findings:
- multifocal GGO
- peripheral & basal distribution

- Unsharp demarcation
- Vascular thickening
- Round opacities
- Crazy-paving
- Ground glass and consolidations
- Reverse Halo (Atol sign) → Ground glass surrounded by consolidation
- spider web appearance

CO-RADS (Based on level of suspicion)

CO-RADS 1 (No suspicion) → Normal lungs or non-infectious abnormalities

CO-RADS 2 (Low suspicion) → Abnormalities consistent with infections other than COVID-19

CO-RADS 3 (Indeterminate) → Unclear whether COVID-19 is present

CO-RADS 4 (High suspicion) → Abnormalities suspicious for COVID-19

CO-RADS 5 (Very High suspicion) → Typical COVID-19

CO-RADS 6 → PCR +ve Case

CT-Severity score:

Percentages of each of the 5 lobes that is involved → Sum of scores for each lobe

<5% involvement → Score = 1

5-25% involvement → Score = 2

26-49% involvement → Score = 3

50-75% involvement → Score = 4

>75% involvement → Score = 5

Range = 0-25

<8 → Mild

9-15 → Moderate

>15 → Severe

MANAGEMENT:

**ANNEXURE II**

# Clinical Guidance for management Covid-19 Suspect/confirmed cases

## COVID–19 Suspect/Confirmed Case

### Stratification on the basis of disease severity

| Mild [1] | Moderate | Severe |
|---|---|---|
| (Fever and/or uncomplicated Upper Respiratory Tract Infection) without dyspnoea or hypoxemia | • Pneumonia with no signs of severe disease<br>• RR ≥24/min **OR** $SpO_2$ < 94% on room air | Respiratory distress requiring mechanical ventilation (non-invasive & invasive)<br>RR ≥30/min **OR** $SpO_2$ < 90% on room air |
| **Admit to CCC** | **Admit in DCHC / Dedicated COVID Health Centre** | **Admit in DCH / Dedicated COVID Hospital** |
| • Contact and droplet precautions<br>• Strict hand hygiene<br>• Symptomatic management with adequate hydration<br>• Tab HCQ (400 mg BD x 1 day f/b 400 mg OD x 4 days) may be considered in patients with high-risk features [2] - preferably after shifting to DCHC/DCH<br>• Referral to DCHC/DCH is indicated if : RR≥24/min **OR** $SpO_2$ < 94% on room air | **Oxygen Support**<br>•Target $SpO_2$ : 92-96% (88-92% in patients with COPD)<br>•Preferred device for oxygenation: Non-rebreathing face mask (if HFNC or simple nasal cannula is used, N-95 or surgical mask should be applied over it)<br>•Awake proning may be used in patients who continue to have hypoxemia despite oxygen >4L/min, if no contraindications<br>**Anticoagulation**<br>•Prophylactic dose of LMWH/UFH, if no contraindications (e.g. enoxaparin 40 mg daily SC)[3]<br>**Corticosteroids**<br>•IV Methylprednisolone 0.5-1 mg/kg or Dexamethasone 0.1-0.2 mg/kg for 3-5 days<br>**Antivirals**<br>•Tab HCQ (400 mg BD x 1day f/b 400 mg OD x 4 days) if no contraindications and after assessment of ECG for QT interval, CRP,D-dimer & Ferritin every 48-72 hourly (if available); CBC with differential count, absolute lymphocyte count, KFT/LFT to be done daily<br>**Investigational Therapies[6]** | **Oxygenation**<br>•Cautious trial of CPAP with oro-nasal mask/NIV with helmet interface/HFNC, if work of breathing is low. Consider intubation if work of breathing is high/not tolerating NIV[4]<br>•Lung protective ventilation strategy by ARDSnet protocol<br>•Prone ventilation to be considered when there is refractory hypoxemia<br>**Anticoagulation**<br>•High dose prophylactic UFH or LMWH (e.g. enoxaparin 40 mg or 0.5 mg/kg BD SC) if not at high risk of bleeding[5]<br>**Corticosteroids**<br>•IV Methylprednisolone 1-2 mg/kg or Dexamethasone 0.2-0.4 mg/kg for 5-7 days<br>If sepsis/ septic shock: Manage as per existing protocol & local antibiogram<br>Use sedation and nutrition therapy as per existing guidelines<br>**Investigational Therapies[7]** |

**1 Very mild/pre-symptomatic/ asymptomatic cases** can be considered for home isolation subject to fulfilment of conditions stipulated in guidelines (https://www.mohfw.gov.in/pdf/RevisedHomeIsolationGuidelines.pdf) .

**Testing:** While attending suspect cases, as per above protocol based on clinical assessment, testing shall be resorted to, and if negative, manage in non-COVID facility according to clinical diagnosis

**Discharge:** After clinical improvement, discharge as per revised discharge policy (available at: https://www.mohfw.gov.in/pdf/ReviseddischargePolicyforCOVID19.pdf)

**2 High-risk patients for severe disease include:**

- Age: 60 years or more
- Hypertension, DM (diabetes mellitus) & other immunocompromised states
- Cerebrovascular disease and Obesity (BMI > 25 kg / m2)
- Chronic lung / kidney / liver disease

**3 LMWH:** Low Molecular Weight Heparin: if no contraindication or high risk of bleeding; UFH: Unfractionated heparin

**4 Higher chances of NIV failure**

**5 Risk of bleeding: use validated score** for assessing bleeding risk (eg HAS-BLED score), **Use D-dimer and SIC score** for further risk stratification (SIC score ≥4 portends high thrombotic risk) , **Follow AHA/ESC and ISTH guidelines** in case patient is on anti-platelet agents

**Investigational Therapies (Informed and shared decision making is essential before prescribing any of these therapies besides taking note of contra-indications as mentioned in the detailed guidelines)**

**6** *Inj Remdesivir 200 mg IV on day 1 followed by 100 mg IV daily for next 4 days (total 5 days therapy), in moderate to severe disease on oxygen or mechanical ventilation (preferably early disease), if no contraindications.
*Use of Convalescent plasma (200 ml single dose, may be repeated after 24 hrs may be considered in moderate to severe patients with persistent or increasing oxygen requirement

**7** Inj Tocilizumab 8mg/kg (max. dose 800 mg once; usual dose 400 mg) may be considered (if no contraindications) in patients moderate-severe disease with progressively increasing oxygen requirements despite use of corticosteroids with raised inflammatory markers; dose can be repeated after 12 to 24 hours if no improvement occurs with the first dose

# Clinical management Protocol :

COVID-19 patient → Severe

Mild → Admit in isolation area,
Symptomatic care
Tab. Hydroxychloroquine (HCQ)
in high risk patients

Moderate →

Admit in designated CCU → COVID Care Unit
Start empirical antibiotics as per local CAP treatment guidelines
Oseltamivir
O2 SUPPORT. Awake proning may be used as a rescue therapy
HCQ :400mg BD f/b 200mg bd total 5days
Prophylactic dose of UFH or LMWH (e.g., enoxaparin 40 mg per day SC)
IV methylprednisolone 0.5 to 1 mg/kg OR Dexamethasone 0.1 to 0.2 mg/kgfor 3 days
May Consider investigational therapies such as Remdesivir, Convalescent Plasma (Off label use)

High risk patients :

- Age > 60
- CAD/ CKD/ CLD / HTN/ DM/ Chronic lung disease/ Obesity

Severe case

High Flow Nasal oxygen (HFNO) or NIV used carefully in view of aerosol generation

Anticoagulation : High dose UFH/ LMWH (eg. enoxaparin 40 mg BD)

Steroids : i.v. methylprednisolone or Dexamethasone → 1 week

Anti-IL 6 (Tocilizumab)

IMV indications : Obstructed or absent breathing, Severe respiratory distress, Central cyanosis, Shock, Coma or convulsions.

(Intubate with necessary precautions)

# Discharge Policy.