Clinical Management of COVID-19
### Clinical Features

- Fever (87.9%)
- Dry cough (67.7%)
- Fatigue (38.1%)
- Sputum production (33.4%)
- Shortness of breath (18.6%)
- Sore throat (13.9%)
- Headache (13.6%)
- Myalgia or arthralgia (14.8%)
- Chills (11.4%)
- Nausea or vomiting (5.0%)
- Nasal congestion (4.8%), change in smell/taste sensation
- Diarrhea (3.7%)
- Hemoptysis (0.9%)
- Conjunctival congestion (0.8%)
- ARDS (3%)

### When to suspect for COVID-19

- **Symptoms** (within 14 days after travel from COVID affected area) like-
  - Fever
  - Cough
  - Shortness of breath
- Close contact with symptomatic person (who travelled to COVID affected area)
- Symptomatic health care worker/caretakers
- **Severe form of unusual illness** (not explained by other diagnosis)
- Cluster of patients

### Triage

- ARI with –
  - Temp $\geq 38^\circ C (100.4 \text{ F})$
  - Cough
  - Onset within last 10 days
  - Requiring Hospitalization
- Illness not explained by other diagnosis
- Absence of fever do not exclude viral infection

*Triage is the process of early recognition of patients with SARI, associated with nCoV infection*
Case Classification & Patient Monitoring

**Suspect Case**
- ARI with
  - Fever
  - Cough
  - Requiring hospitalization
- Illness not explained by other diagnosis
- At least one of the criteria discussed

**Probable Case**
- COVID-19 test result inconclusive
- Tested positive on pan-coronavirus assay-presumptive positive

**Confirmed Case**
- Lab confirmed COVID-19 infection (Irrespective of symptoms)

What to monitor when patients comes?

1. Heart Rate
2. Blood Pressure
3. Oxygen Saturation
4. Respiration
5. Temperature
### Clinical Syndromes associated with COVID Infection

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Uncomplicated Illness</th>
<th>Mild Pneumonia</th>
<th>Severe Pneumonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory tract infection</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Fever</td>
<td>May or may not</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Cough</td>
<td>May or may not</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Shortness of breathe</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

For Fast breathing:
- Children:
  - <2 months: ≥60 breaths/min
  - 2-11 months: ≥50 breaths/min
  - 1-5 years: ≥40 breaths/min
- Adolescent or adults: Respiratory rate > 30 breaths/min

For SpO2:
- Children: SpO2 < 90% on room air
- Adolescent or adults: Central cyanosis or SpO2 < 90%

### Assessment of Severity of Pneumonia

<table>
<thead>
<tr>
<th>CURB 65 Criteria</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confusion</td>
<td>Altered mental status</td>
</tr>
<tr>
<td>Blood urea</td>
<td>7 mmol/l (42 mg/dl)</td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>&gt; 30 breaths/min</td>
</tr>
<tr>
<td>SBP, DBP</td>
<td>&lt; 90 mmHg, &lt; 60 mmHg</td>
</tr>
<tr>
<td>Age</td>
<td>&gt; 65</td>
</tr>
</tbody>
</table>

In Children:
- Severe respiratory distress
- Inability to breastfeed/ drink
- Lethargy
- Unconsciousness
### Indications for Admissions

#### Hospital Admission

<table>
<thead>
<tr>
<th>COVID Care Center (CCC)</th>
<th>Dedicated Covid Health Center (DCHC)</th>
<th>Dedicated Covid Hospital (DCH)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cases with</strong></td>
<td><strong>Respiratory rate 15-30 breaths/min</strong></td>
<td><strong>Respiratory rate &gt;30 breaths/min</strong></td>
</tr>
<tr>
<td>• Suspected cases of COVID19 awaiting results</td>
<td>• SpO2 90-94% in room air</td>
<td>• SpO2 &lt; 90% in room air</td>
</tr>
<tr>
<td>• COVID positive</td>
<td>• High risk patients</td>
<td>• Moderate/ Severe ARDS</td>
</tr>
<tr>
<td>• Pre-symptomatic</td>
<td>• Age &gt; 60 years</td>
<td>• Multi-organ dysfunction</td>
</tr>
<tr>
<td>• Very Mild Symptoms</td>
<td>• Cardiovascular diseases</td>
<td>• Shock</td>
</tr>
<tr>
<td>• Mild Symptoms</td>
<td>including hypertension</td>
<td>• Transfer from ward to ICU</td>
</tr>
<tr>
<td></td>
<td>• Diabetes mellitus/other</td>
<td>if needs mechanical</td>
</tr>
<tr>
<td></td>
<td>immunocompromised states</td>
<td>ventilation/closer</td>
</tr>
<tr>
<td></td>
<td>• Chronic lung/liver/kidney disease</td>
<td>monitoring</td>
</tr>
<tr>
<td></td>
<td>• Cerebrovascular disease</td>
<td></td>
</tr>
</tbody>
</table>

*Suspect and confirmed cases should not be allowed to mix under any circumstances*
### Investigations to be Sent

#### Blood Cell Count
- WBC count can vary – do not provide accurate information
- Leukopenia
- Leukocytosis
- Lymphopenia (seen in more than 80% patients)
- Mild thrombocytopenia- poor prognostic sign

#### Other Investigations
- Serum LDH, Ferritin, CRP and HbA1c levels
- LFT
- RFT
- Serum electrolytes
- ECG
- CPK MB, TROP I
- D- dimer, coagulation parameters
- ABG, S Lactate
- Procalcitonin
- Abnormalities on chest X-ray (59%)
- Radiological findings on chest CT scan (86%)

*Other biochemical & pathological investigations to be sent as required for critical patients*
Tomographic changes of 21 patients with mild to moderate disease who recovered from the disease were studied, and they described **four stages** (Pan et al).

<table>
<thead>
<tr>
<th>Stage</th>
<th>0-4 days after onset of symptoms</th>
<th>5-8 days after onset of symptoms</th>
<th>9-13 days after onset of symptoms</th>
<th>&gt; 14 days after onset of symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Stage</td>
<td>0-4 days after onset of symptoms</td>
<td>5-8 days after onset of symptoms</td>
<td>9-13 days after onset of symptoms</td>
<td>&gt; 14 days after onset of symptoms</td>
</tr>
<tr>
<td></td>
<td>Frequent ground glass opacities (GGO)</td>
<td>Multi- lobe distribution with GGO</td>
<td>Denser consolidation, present in almost all the cases</td>
<td>No crazy craving pattern</td>
</tr>
<tr>
<td></td>
<td>Sub-pleural distribution (involving predominantly lower lobes)</td>
<td>Rapid involvement of both lungs</td>
<td>Residual parenchymal bands</td>
<td>GGO could remain</td>
</tr>
<tr>
<td></td>
<td>CT could be normal</td>
<td>Crazy paving</td>
<td>Consolidation of airspaces</td>
<td></td>
</tr>
</tbody>
</table>

**Computed Tomography (CT Chest)**

**Chest Radiography (CXR)**

- Findings not specific
- Initial phase of disease could be normal
- Most common features
  - Lobar/Multi lobar
  - Bilateral lung consolidation

**Findings not specific**
- Initial phase of disease could be normal
- Most common features
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### Clinical Conditions

<table>
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<tr>
<th>Acute Respiratory Distress Syndrome</th>
<th>Sepsis</th>
<th>Septic Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bilateral opacities</strong> (not fully explained by)</td>
<td>- Life threatening <strong>organ dysfunction</strong>&lt;br&gt;- Laboratory evidence of –&lt;br&gt;  - Coagulopathy&lt;br&gt;  - Thrombocytopenia&lt;br&gt;  - Acidosis&lt;br&gt;  - High lactate&lt;br&gt;  - Hyperbilirubinemia</td>
<td>- <strong>Persisting hypotension despite volume resuscitation</strong>&lt;br&gt;- Requiring Vasopressors to maintain&lt;br&gt;  - MAP ≥65 mmHg&lt;br&gt;  - Serum lactate level &gt;2 mmol/L</td>
</tr>
<tr>
<td>• Lobar&lt;br&gt;• Lung collapse&lt;br&gt;• Nodules</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Origin of <strong>oedema</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <strong>Respiratory failure</strong> (not fully explained by)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Cardiac failure&lt;br&gt;• Fluid overload</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Need of <strong>Echocardiography/ Pro BNP</strong> (to exclude hydrostatic cause of oedema if no risk factor present)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dedicated COVID Health Centre (DCHC)

### Case Type
- All Cases that have been clinically assigned as moderate

### Facility Type
- Full Hospital or a Separate Block in an Hospital (Separate entry, exit)
- Private Hospital (Could be)

### Admission Protocols
- Separate areas for suspected and confirmed cases
- No intermixing of patients allowed by any means

### Facility Mapping for referrals
- To be mapped to at least or more DCH

### Stakeholders
- Medical Officer, Staff Nurse, Ward Boy, Guard, Sweeper, Senior Resident
- PMGO, Medicine, Anaesthetist, Pulmonologist, Ventilator Technician

### Essentials
- Dedicated Basic Life Support Ambulance (BLSA) equipped with sufficient oxygen support on 24x7 basis
- Beds with Assured Oxygen support
Clinical Management

1. Immediate implementation of appropriate IPC measures
2. Early supportive therapy and monitoring
3. Management of hypoxemic respiratory failure and ARDS
4. Prevention of complication
### IPC Measures

**AT Triage**
- Give patient a **medical mask**
- Direct patient to separate area, an isolation room if available

**Droplet Precaution**
- **Hand hygiene** after contact with respiratory secretion

**Contact Precaution**
- **Use PPE** when entering room and remove PPE when leaving.

### Early Supportive Therapy & Monitoring

1. **Give supplemental oxygen therapy**
   - Initiate oxygen therapy at 2-5L/min
   - Titrate flow rates
     - SpO2 ≥90-92% in non-pregnant adults
     - SpO2 ≥92-95% in pregnant women
   - High-flow nasal oxygen (HFNO) or non-invasive ventilation (NIV) to be used in patients with hypoxemic respiratory failure
   - Implement mechanical ventilation
     - 4–8ml/kg predicted body weight, PBW
     - Plateau pressure < 30cmH2O
     - Hypercapnia is permitted if pH - 7.30-7.45
     - Prone ventilation for >12 hours per day in patients with severe ARDS

2. Use conservative fluid management. **IV Line** and inotropes

3. Empiric antimicrobials to treat all likely pathogens causing SARI

4. Systemic corticosteroids
### Need for glucocorticoids
- For patients with:
  - Progressive deterioration of oxygenation indicators
  - Rapid **worsening on imaging**
  - Excessive **activation of the body's inflammatory response**
- Duration: **3 to 5 days** (short period)
- Dosage: **1 – 2mg/kg/day** (should not exceed the equivalent of methylprednisolone)
- Larger dose will delay the removal of coronavirus due to immunosuppressive effects

### Specific Therapy
- No specific Antiviral
- For severe patients in ICU:
  - **Hydroxychloroquine** (Dose 400mg BD – for 1 day followed by 200mg BD for 4 days)
  - With/without-combination with Azithromycin (500 mg OD for 5 days)
  - Regular monitoring for side effects including QTc interval
- Above medication not recommended for children < 12 years, pregnant and lactating women
- **Consider Tocilizumab/Therapeutic plasma exchange when there is progressive worsening**

### Prevention of Complication
- Reduce incidence of:
  - Catheter related **blood stream infection**
  - **Pressure ulcers** - turn patient every two hourly
  - **Stress ulcers and gastrointestinal bleeding** - early enteral nutrition, PPI
  - **ICU-related weakness Early mobilization**
  - **Ventilator associated pneumonia**
    - Oral intubation, semi recumbent position, closed suctioning system, new ventilator circuit for each patient
  - Venous thromboembolism **LMWH**
- Reduce days of invasive mechanical ventilation **weaning protocol**, intermittent sedatives
1. **Recognize septic shock** in adults in case of infection
   - Vasopressors are needed to maintain
   - Mean arterial pressure (MAP) ≥65 mmHg
   - Lactate is >2 mmol/L, in absence of hypovolemia

2. **Recognize septic shock in children** with any hypotension
   - Systolic blood pressure [SBP] <5th centile or >2 SD below normal for age
   - 2-3 of the following conditions -
     - Altered mental state
     - Tachycardia or bradycardia (HR <90 bpm or >160 bpm in infants and HR <70 bpm or >150 bpm in children);
     - Prolonged capillary refill (>2 sec)
     - Warm vasodilation with bounding pulses
     - Tachypnea/ mottled skin or petechial or purpuric rash
     - Increased lactate/oliguria;
     - Hyperthermia or hypothermia
   - Standard care includes-
     - Antimicrobial therapy and fluid loading
     - Vasopressors for hypotension
   - In adults-
     - at least 30 ml/kg of isotonic crystalloid in the first 3 hours
   - In children
     - 20 ml/kg as a rapid bolus and up to 40-60 ml/kg in the first 1 hour
   - Do not use hypotonic crystalloids, starches, or gelatins for resuscitation
   - Discontinue fluid administration if there is no response to fluid loading and signs of volume overload appear (example- jugular venous distension, crackles on lung auscultation, pulmonary oedema on imaging, or hepatomegaly in children)
### Management of Septic Shock

- Perfusion targets include
  - **MAP** (>65 mmHg or age-appropriate targets in children)
  - **Urine output** - Adults: >0.5 ml/kg/hour; Children: 1 ml/kg/hour
  - **Improvement of skin mottling, capillary refill, level of consciousness, and lactate level**

- Administer vasopressors when shock persists during or after fluid resuscitation

- If signs of **poor perfusion and cardiac dysfunction persist** despite achieving MAP target with fluids and vasopressors, consider an inotrope such as **dobutamine**

### Daily Follow-Up

- Monitor Vitals, SpO2
- Auscultate from back only with due precaution
- CBC, Blood Sugar, RFT, Electrolytes
- CXR
- ABG
- Inflammatory markers
Discharge Protocol

**For cases awaiting nCOV test results** –
- To be kept in home isolation/isolation at health facility till receipt of lab results and given symptomatic treatment as per existing guidelines

**For negative nCOV test**
- Provisional/confirmed diagnosis and
- Decision of treating physician
- Case shall still be monitored for 14 days after their last contact with a confirmed 2019-nCoV case

**For Positive nCOV test**
- Stable (asymptomatic/mild/moderate) cases will be discharged at 10th day (with next 7 days isolation) and no further testing, alternatively home isolation can be followed
- Severe case to be discharged after evidence of clinical recovery- chest radiographic clearance and viral clearance in respiratory samples after one specimens test negative for nCOV

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**Discharge Policy**

**Plan for Discharge**

- Chest x ray PA view
- Clinically stable

**Instructions**-
- Rest in isolation, review if symptoms
- Nutritious diet
- Plenty of liquids
- Watch for symptoms- own/family/contacts.
Revised Discharge Policy for COVID-19

Confirmed COVID-19 Case

Very Mild/ Mild/ Pre-symptomatic *
- Discharge after 10 days of symptom onset and no fever for 3 days

Moderate *
- Fever resolved within 3 days and oxygen saturation maintained without support
  - Discharge after 10 days of symptom onset
    - Absence of fever without antipyretics
    - Resolution of breathlessness
    - No oxygen requirement
- Symptoms not resolved and demand of oxygen therapy continues
  - Discharge only after resolution of clinical symptoms
    - Ability to maintain oxygen saturation for 3 consecutive days

Severe **
- Discharge only after
  - Clinical recovery
  - Patient tested negative once by RT-PCR (after resolution of symptoms)

NO RT-PCR test required before discharge

Patient to be isolated at home for next 7 days as per guidelines
(https://www.mohfw.gov.in/pdf/GuidelinesforHomeisolationofverymildpresymptomaticCOVID19cases.pdf)

* Clinical categorization of patients as per guidelines
(https://www.mohfw.gov.in/pdf/FinalGuidanceonManagementofCovidcasesversion2.pdf)

** including immunocompromised (HIV patients, transplant recipients, malignancy)
Thank You!