Intensive Care Unit Management Guidelines for COVID-19 patients

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Admission Criteria of suspected COVID-19 patients

Suspected COVID-19 patients will be admitted in AIIMS Patna under different units according to Modified Early Warning Score (MEWS).

Modified Early warning score (MEWS) for 2019-nCoV Infected Patients:

Parameters		3	2	1	0	1	2	3	Score
Age					< 65			≥ 65	
Resp. Rate (/ min)		≤ 8		9-11	12-20		21-24	≥ 25	
SpO2 (Room air) %		≤ 91	92-93	94-95	≥ 96				
Oxygen Supplement Necessary			Yes		No				
SBP (mmHg)		≤ 90	91-100	101-110	111-199			≥ 220	
Pulse (/min)		≤ 40		41-50	51-90	91-110	111-130	≥ 131	
Consciousness					Alert			Confused, Lethargic, Coma, convulsion	
Temperature	^{0}C	≤ 35.0		35.1-36.0	36.1-38.0	38.1-39.0	≥ 39.1		
	^{0}F	≤ 95.0		95.2-96.8	97-100.4	100.6- 102.2	≥ 102.4		
Total Score =									

Triage according to MEWS

MEWS	Hospitalisation	Minimum Monitoring frequency	Action Plan
0-4 Points	Isolation wards	6 hourly	Inform to Doctor
5-6 Points or (Single parameter ≥ 3)	Isolation wards with monitoring unit	Hourly	Inform to Doctor O_2 supplementation IV Access
> 6 Points	COVID-19 ICU	Continuous	As Per ICU Protocol

- *MEWS will be used as objective criteria for triage purpose and clinician acumen can supersede these criteria.*

Implementation of appropriate infection prevention and control measures

- Standard precautions should always be applied in all areas of health care facilities. Standard precautions include hand hygiene and the use of personal protective equipment (PPE) when in indirect and direct contact with patients' blood, body fluids, secretions (including respiratory secretions) and non-intact skin. Standard precautions also include prevention of needle-stick or sharps injury; safe waste management; cleaning and disinfection of equipment; and cleaning of the environment.

- In addition to standard precautions, health care workers should do a point-of-care risk assessment at every patient contact to determine whether additional precautions (e.g. droplet, contact, or airborne) are required.

Protection Level	Protective Equipment	Scope of Application
Level I protection	• Disposable surgical cap • Disposable surgical mask • Work uniform • Disposable latex gloves • Disposable isolation clothing if necessary	• Pre-examination triage • General outpatient department
Level II protection	• Disposable surgical cap • Medical protective mask (N95) • Work uniform • Disposable medical protective uniform • Disposable latex gloves • Goggles	• Isolation ward area (including isolated intensive ICU) • Non-respiratory specimen examination of suspected/confirmed patients · • Imaging examination of suspected/ confirmed patients • Cleaning of surgical instruments used with suspected/confirmed patients
Level III protection	• Disposable surgical cap • Medical protective mask (N95) • Work uniform • Disposable medical protective uniform • Disposable latex gloves • Full-face respiratory protective devices or powered air-purifying respirator	• During tracheal intubation, tracheotomy, bronchoscopies etc., during suspected/confirmed patients.

Collection for specimen for laboratory diagnosis

- Collect blood cultures for bacteria that cause pneumonia and sepsis, ideally before antimicrobial therapy. Do not delay antimicrobial therapy to collect blood cultures.
- Collect specimens of nasopharyngeal and oropharyngeal swab for RT - PCR**. (First sample)**
- Obtaining a lower respiratory tract samples in preference to upper respiratory tract (nasopharyngeal or oropharyngeal) samples is suggested for intubated patients.
- If RT- PCR for suspected COVID patient turns positive:
  Second Sample: 14 days after collection of first sample positive for SARS-CoV2
  Third Sample: At least 24 hours after the negative sample.
- If RT- PCR for suspected COVID patient turns negative: No need for second sample.

Other Investigations

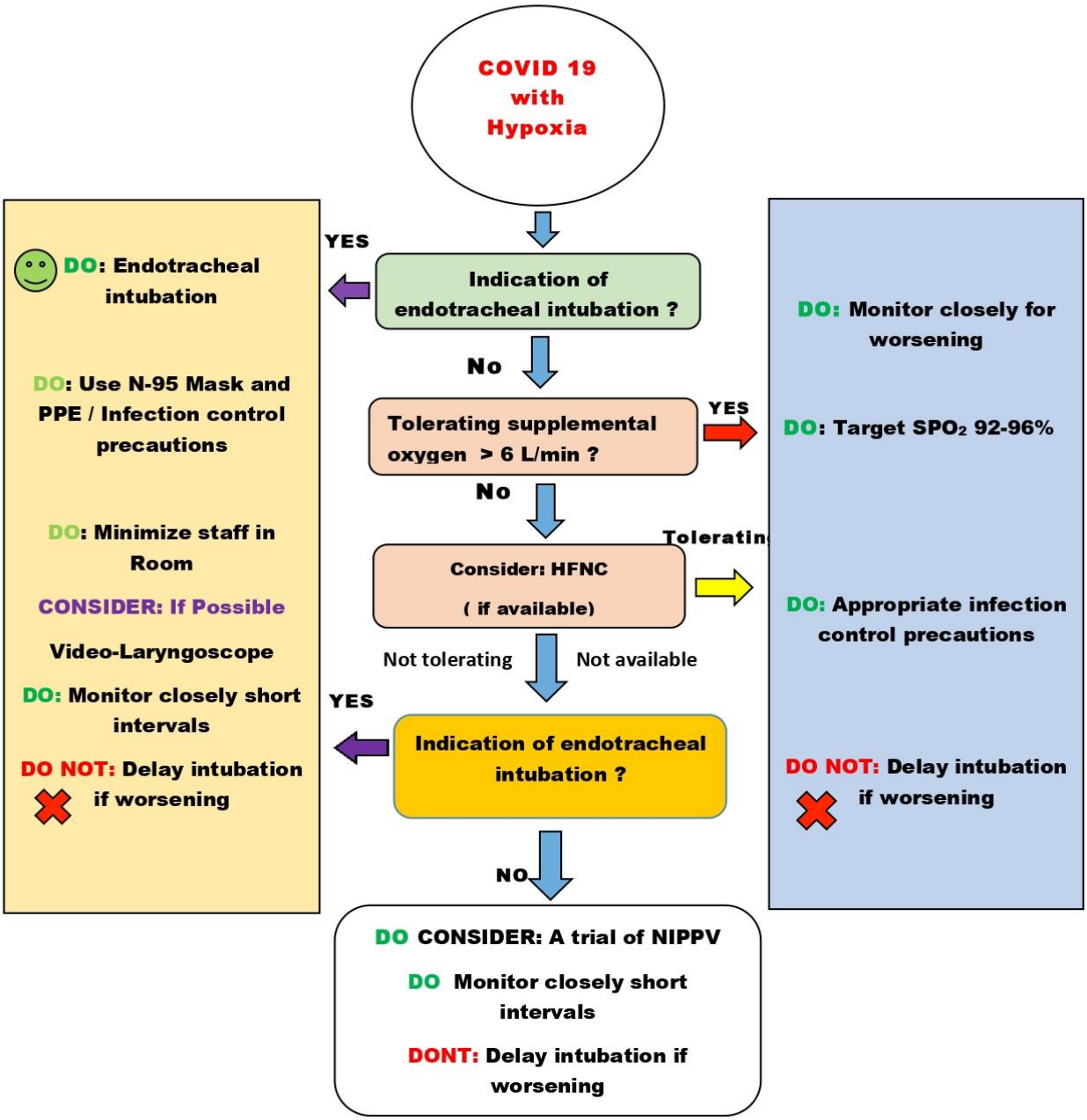
Baseline:
Complete hemogram with neutrophilic-lymphocytic ratio
Liver function test
Renal function test
Chest Radiograph
Baseline ECG
ABG (if SpO2 <94%)
Cultures when sepsis is suspected.

Follow up:
Complete hemogram with neutrophilic-lymphocytic ratio
Liver function test
Renal function test
Other investigations as deemed appropriate by intensivist.

Oxygen therapy and monitoring

- Give supplemental oxygen therapy immediately to patients with Severe Acute Respiratory Illness (SARI) and respiratory distress, hypoxemia or shock and target SpO2 > 94%.
- A facemask should be worn by the patient for source control. If a nasal cannula is in place, a facemask should be worn over the nasal cannula. Alternatively, an oxygen mask can be used if clinically indicated.
- Patients requiring endotracheal intubation should receive appropriate pre oxygenation. Rapid sequence intubation should be preferred for intubation unless contraindicated. Avoid bag mask ventilation if possible.
- Endotracheal intubation should be performed by experienced individual with appropriate airborne infection control precautions.

Algorithm for management of hypoxia in a COVID-19 patient:



Treatment of co infections

- Give empirical antimicrobials to treat all likely pathogens causing SARI and sepsis as soon as possible, within 1 hour of initial assessment for patients with sepsis.
- Empiric therapy should be de-escalated on the basis of microbiology results and clinical judgment.

Ventilation

- Recognize severe hypoxemic respiratory failure when a patient with respiratory distress is failing to respond to standard oxygen therapy and prepare to provide advanced oxygen/ ventilatory support.
- Implement mechanical ventilation using lower tidal volumes (4–8 mL/kg predicted body weight, PBW) and lower inspiratory pressures (plateau pressure < 30 cm H_2O).
- In adult patients with severe ARDS, prone ventilation for 12–16 hours per day is recommended.
- Use a conservative fluid management strategy for ARDS patients without tissue hypoperfusion.
- In patients with moderate or severe ARDS, higher PEEP instead of lower PEEP is recommended.
- In patients with moderate-severe ARDS (PaO_2/FiO_2 < 150), neuromuscular blockade by continuous infusion should not be routinely used.
- Avoid disconnecting the patient from the ventilator, which results in loss of PEEP and atelectasis.
- In ARDS, NIV has limited utility but Non-invasive ventilatory support may be tried initially in selected patients under close observation in patients with mild to moderate ARDS, who are hemodynamically stable, alert and able to handle respiratory secretions.
- Caution is advised when non-invasive ventilation or high flow nasal cannula are being used, as there is risk of aerosol formation, especially in patients with poorly fitting masks or interfaces.
- Use close suctioning for airway suctioning and clamp endotracheal tube when disconnection is required (for example, transfer to a transport ventilator).

Hemodynamics

- Use of dynamic parameters (skin temperature, capillary refilling time, and/or serum lactate measurement over static parameters in order to assess fluid responsiveness is suggested.
- For acute resuscitation of adults with shock, a conservative over a liberal fluid strategy is suggested.
- For acute resuscitation of adult with shock, use of BSS > unbalanced crystalloid > colloid is suggested.

- For acute resuscitation of adults with shock, use of hydroxyl ethyl starches, gelatins, dextrans and routine use of albumin for resuscitation is not suggested.

- Following choices of vasoactive agents is suggested for patients with COVID-19 and shock:

    - First line vasoactive agent- Norepinephrine (Epinephrine or vasopressin if norepinephrine is unavailable)
    - Second line agent- vasopressin over titrating norepinephrine dose, if target mean arterial pressure (MAP) cannot be achieved by norepinephrine alone.
    - Titrating vasoactive agents to target a MAP of 60-65mmHg, rather than higher MAP targets.
    - In the presence of evidence of cardiac dysfunction and persistent hypoperfusion despite fluid resuscitation and norepinephrine, adding dobutamine, over increasing norepinephrine dose is suggested.

- For adults with refractory shock, low-dose corticosteroid therapy ("shock-reversal") is suggested, over no corticosteroid.

  (A typical corticosteroid regimen in septic shock is intravenous hydrocortisone 200 mg per day administered either as an infusion or intermittent doses.)

Prone Positioning

- If patient does not show improvement in oxygenation, then proning should be tried, preferably earlier. It is usually associated with significant improvement in oxygenation status.
- On an average 12-16 hours of proning should be done.
- If there is a contraindication to proning, then recruitment maneuver can be tried. Follow thorough aerosol precaution while proning and take utmost precaution to avoid disconnection of ventilator circuit.

Medical Management

- For critically ill adults with COVID-19 who develop fever, use of acetaminophen / paracetamol for temperature control, is suggested.

- Nonsteroidal anti-inflammatory drugs like ibuprofen should be avoided.

- Do not routinely give systemic corticosteroids for treatment of viral pneumonia or ARDS outside of clinical trials unless they are indicated for another reason.

- Routine use of IVIg or convalescent plasma is not suggested.

- Closed suctions and HME filters should be preferred to prevent aerosol spread.

- All inhaled medicines (bronchodilators) should preferably be given by metered dose inhalers (MDI) so as to reduce the chances of aerosolization.

Risk factors and Prognostic Determinants

Elderly patients and comorbidities like hypertension, diabetes, COPD, Coronary heart disease, and Chronic kidney disease have poor prognosis. In the Wuhan cohort, the following Laboratory cut offs appeared to indicate a poor prognosis:

Laboratory Parameters	Cut off values	Prognosis
Lymphopenia	**< 20 %**	**Poor**
Serum LDH	**> 245 U/L**	**Poor**
HS-Cardiac Troponin	**> 28 ng/ml**	**Poor**
Prothrombin time	**> 16 s**	**Poor**
Serum ferritin	**> 300 µg/L**	**Poor**
D Dimer	**> 1 µg/ml**	**Poor**
CRP	**> 100 mg/dl**	**Poor**

* Patients, who worsened, had gradual worsening of these values.

Nutrition Support

The severe and critically ill COVID-19 patients who are in a state of severe stress are at high nutritional risks. Early evaluations of nutrition risk, gastrointestinal functions and aspiration risks, and timely enteral nutritional support are important to the patient's prognosis.

- Oral feeding is preferred.
- Enteral nutrition pathway for severely and critically ill patients.
- For patients with tracheal intubation, intestinal nutrition tube indwelling is recommended for post-pyloric feeding.
- Selection of nutrient solution.
  For patients with intestinal damage: predigested short peptide preparations
  For patients with good intestinal functions: whole-protein preparations (high calories)
- Energy supply. 25-30 kcal per kg body weight, the target protein content is 1.2-2.0 g/kg daily.

Prevention of Complications

Anticipated Outcome	Interventions
Reduce days of invasive mechanical ventilation	• Use weaning protocols that include daily assessment for readiness to breathe spontaneously • Minimize continuous or intermittent sedation, targeting specific titration endpoints (light sedation unless contraindicated) or with daily interruption of continuous sedative infusions
Reduce incidence of VAP	• Oral intubation is preferable to nasal intubation • Use semi-recumbent position (elevation 30-45º) • Use a closed suctioning system; periodically drain and discard condensate in tubing. • Use a new ventilator circuit for each patient; once patient is ventilated, change circuit if it is soiled or damaged but not routinely. • Change HME when it malfunctions, when soiled, or every 5–7 days
Reduce incidence of VTE	• Use pharmacological prophylaxis (LMWH [preferred if available] or heparin 5000 units subcutaneously twice daily) in adolescents and adults without contraindications. • For those with contraindications, use mechanical prophylaxis (intermittent pneumatic compression devices).
Reduce incidence of CRBSI	• Use a checklist with completion verified by a real-time observer as reminder of each step needed for sterile insertion and as a daily reminder to remove catheter if no longer needed
Reduce incidence of pressure ulcers	• Turn patient every two hours
Reduce incidence of stress ulcers and gastrointestinal bleeding	• Give early enteral nutrition (within 24–48 hours of admission) • Administer histamine-2 receptor blockers or PPI in patients with risk factors for GI bleeding • Risk factors for gastrointestinal bleeding include mechanical ventilation for ≥48 hours, coagulopathy, RRT, liver disease, multiple co-morbidities, and higher organ failure score
Reduce incidence of ICU-AW	• Actively mobilize the patient early in the course of illness when safe to do so

VAP: Ventilator associated pneumonia, VTE: Venous thromboembolism, CRSBI: Catheter related blood stream infection, ICU-AW: Intensive care unit associated weakness, HME: Heat moisture exchanger, LMWH: Low molecular weight Heparin RRT: Renal replacement therapy

Specific COVID - 19 treatments (Should be decided by treating team on case to case basis in light of latest guidelines by ICMR or MoHFW)

There is no current evidence from RCTs to recommend any specific treatment for suspected or confirmed patients with COVID - 19. No specific antivirals are recommended for treatment of COVID – 19 due to lack of adequate evidence from literature.
However, based on the available information (uncontrolled clinical trials), the following drugs may be considered as an off – label indication in patients with severe disease and requiring ICU management:

- **Tab. Hydroxychloroquine** (Dose 400mg BD – for 1 day followed by 200mg BD for 4 days) In combination with
- **Tab. Azithromycin** (500 mg OD for 5 days) under close monitoring including QTc interval.

The above medication is presently not recommended for children less than 12 years, pregnant and lactating women.

These guidelines are based on currently available information and would be reviewed from time to time as new evidence emerges.

Discharge Criteria from ICU to Ward / Step Down:

- When patient's physiological status has stabilized and the need for ICU monitoring and care is no longer necessary.

Discharge criteria Variable	Values
Temperature	36℃ - 38^0 C
Heart Rate	50- 90 beats/min
Systolic Blood Pressure	100-180 mm Hg
Vasopressor	Not required
Respiration rate	< 20 rate/min
Conscious level	Oriented
Enteric feed	Accepting
Organ support (CRRT, ECMO)	Not needed

Discharge from ward / Step Down:

- **If First sample of suspected COVID 19 patient is negative:**
  He/she shall be monitored for 14 days from their date of arrival to India/last exposure whichever is latest.

- **If First sample of suspected COVID 19 patient is positive:**
  Discharge after clinical clearance and chest radiograph cleared and two specimens turn negative taken 24 hours apart

**** This document is indicative for guidance purpose, clinical and administrative responsibilities regarding individual case management lies with the treating teams.***
**** Teams are advised to keep updating their knowledge from ICMR, NCDC and MoHFW website.***

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Flow chart showing movement of patients at AIIMS Patna: