

**GOVERNMENT OF MANIPUR
DIRECTORATE OF HEALTH SERVICES**

**Guidelines on Oxygen for Management of COVID-19
[Clinical Protocol, Rational use & Audit]
Order No. No.2/Covid-19/DHS-2020 Dated 11th June, 2021.**

A. Clinical Protocols

1. It is assumed that out of the 100 confirmed cases of COVID-19;

1.1. 80 cases will be Asymptomatic/ Pre-Symptomatic or with **"Mild"** disease requiring home isolation or admission to Covid Care Centre (CCC).

1.2. Out of the remaining 20 cases:

a. 17 cases will be of **"Moderate"** disease requiring hospitalization for 7 days on Non-ICU Oxygen Supported Beds. Districts would require having oxygen storage capacity for all 17 Beds.

b. 3 will be **"Severe"** cases requiring ICU Beds for 18 days in ratio of

i. 20% for Invasive Ventilation

ii. 40% for Non-Invasive Ventilation on (NIV)/ High Flow Nasal Cannula (HFNC) and

iii. Remaining 40% for oxygen therapy by Non-Re Breathing Mask (NRBM) etc.

For the purpose of calculation of Daily Oxygen consumption requirement at each health facility, all the Beds (i.e. 3) would be considered for computation purpose.

2. For Moderate cases (SpO₂ level *between* 94%-90%) use humidifier always when delivering more than 4 liters of Oxygen as it is a dry gas and the respiratory secretions in the airways will be dried up. The indicative oxygen flow rate is:

2.1. 2-4 Liters/minute by nasal prongs [FiO₂ up to 24-30%]

2.2. 2-15 Liters/minute by Venturi mask [FiO₂ upto 60% as per colour code given below]

Color	FiO ₂	O ₂ Flow
Blue	24%	2 L/ min
White	28%	4 L/ min
Orange	31%	6 L/ min
Yellow	35%	8 L/ min
Red	40%	10 L/ min
Green	60%	15 L/ min

2.3. 5-10 Liters/minute by facemask [FiO₂ 40-50%].

2.4. >10 liters/minute, usually 10-15 liters/minutes by Non-Re-breathing Mask (NRBM) [FiO₂ 60% and above]

3. For Severe cases (SpO₂ level less than 90%), the indicative oxygen flow rate is:

3.1. >40-50 Liters/minute by Invasive Mechanical Ventilation depending upon the setting.

3.2. 10-15 Liters/minutes by NRBM.

3.3. 25-60 Liters/minute by Non-Invasive Ventilation

4. HFNC device should be used only in ICU setting under supervision of a Respiratory Physician/ Physician/ Anesthetist/ Intensivist.

4.1. Patient should be put on HFNC only after approval of the senior most Respiratory physician/ Physician/ Anesthetist/ Intensivist (Professor/head of the unit/ HoD).

4.2. Such directions is to be recorded in the case sheet of the patient duly obtaining ink signature of the of the Physician/ Respiratory/ Physician /Anesthetist/Intensivist.

5. Oxygen is a life-saving essential drug. The target Oxygen saturation rate should be 92%-94% for the hospitalized COVID 19 patient. Once this rate is achieved, flow of oxygen may not be increased as it may not provide any additional benefit to the patient.

6. The "improving oxygen therapy in acute illness" (IOTA), systematic review and meta-analysis concluded that in acutely ill adults, high quality evidence shows that liberal oxygen therapy increases mortality without improving patient important outcomes. Supplemental oxygen might become unfavorable above an SpO2 range of 92-94%. These reports support the conservative administration of oxygen therapy.

7. Starting Oxygen therapy:

7.1. Ensure pulse oximetry is available to monitor response to oxygen therapy.

7.2. Document baseline observations including saturations, respiratory rate, blood pressure and pulse.

7.3. Note respiratory effort; color of lips, fingers & toes for Cyanosis and level of consciousness.

7.4. Check that there is a prescription for oxygen with a stated target saturation range.

7.5. Ensure delivery device is connected via tubing to oxygen supply and turned on to the appropriate flow rate (if cylinder, check fill level of cylinder and be aware of duration).

7.6. Explain procedure to the patient and gain consent where possible.

7.7. Place the oxygen mask on the patient's face, adjusting the nose clip and elastic straps to ensure a close fit.

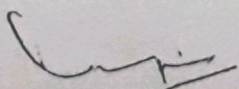
7.8. Reassure the patient – if the patient is very breathless, oxygen masks can feel very claustrophobic.

7.9. Monitor response to oxygen therapy – recheck oxygen saturations, vital signs, colour and level of consciousness.

7.10. Titrate oxygen according to oxygen saturations to maintain saturations within prescribed target range. Allow five minutes at each dose before further adjustment.

8. Ongoing care of patients requiring oxygen therapy

8.1. Continue to monitor oxygen saturations at least four times a day. Always record saturations at rest. Real-time or at least hourly monitoring for



critically ill patients.

- 8.2 Help the patient to stay in an upright position to maximize ventilation unless contraindicated by underlying clinical problems, for example, spinal or skeletal trauma
- 8.3 Observe potential pressure areas, particularly behind the ears, from nasal cannula tubing or mask elastic and ensure skin is protected and pressure is relieved by altering the position of the tubing or using padding.
- 8.4 Be aware of the drying effect of oxygen on oral and nasal mucosa ; encourage patients to maintain adequate oral fluid intake where appropriate.

9. Prone position ventilation

Various acute lung diseases including Covid result in hypoxemic respiratory failure. A clinical trial by name PROSEYA (PROning SEVere ARDS patients) revealed that keeping a mechanically ventilated patient in prone position (sleep on belly) for 16 hours a day improves oxygenation. *In the COVID-19 era, this finding is extended to keep an awake patient on oxygen cannula, facemask, HFNC (high flow nasal cannula) or NIV (Non-invasive ventilation) in prone position to improve oxygenation status. It even delayed intubation (putting a tube in the trachea).*

- 9.1 The basis of prone position is that,
 - a. The dorsal lung will expand well
 - b. Compression of the lung tissue by the heart weight is relieved, and
 - c. Secretions will be properly drained
- 9.2 Protocol: 30 minutes prone, 30 min left lateral, 30 min supine semi recumbent, 30 min right lateral and then prone again. This cycle continues.
- 9.3 Avoid proning in conditions of (i) pregnancy, (ii) deep venous thrombosis, (iii) major cardiac conditions, (iv) unstable spine, femur or pelvic fractures.
- 9.4 Review
 - a. Patients are to be reviewed twice during morning & evening rounds to evaluate their oxygen requirements as well as oxygen saturation rates.
 - b. Discontinue oxygen therapy once the patient has stable saturations (at least two consecutive recordings) within their target range. Monitor saturations for five minutes after stopping oxygen and recheck after one hour.
 - c. Order discharge of patients as per discharge policy.
 - d. Discharge process to be complete within one hour

B. Rational use measures

1. Administrative structure

- 1.1. The District Collector of the district must monitor the consumption including the rational use of oxygen in all facilities of the district on a daily basis.
- 1.2. **Oxygen Audit Committee** is to be formed in every hospital to supervise inventory planning, oxygen consumptions etc. which may consist of Additional Medical Superintendent, Head of Anesthesia, Head of Respiratory Medicine

(Head of Internal Medicine in case Respiratory Medicine department does not exist) and Nursing Superintendent.

Duties:

- a. O₂ needs estimates and preparation of indent.
 - b. Regular repair & Maintenance of bio-medical gas pipeline system, gas plant, and wall mounted gas outlets.
 - c. Accessories for O₂ administration.
 - d. Supervision & maintenance of O₂ supply chain.
 - e. Reporting
- 1.3. A team of one nurse and one OT Technician may be designated as **Oxygen Monitoring Team** for each shift at each hospital/ health facility level.
- a. The team must inspect daily during their shift the gas pipeline, wall mounted gas outlets, as well as gas cylinders to detect and promptly address leakages.
 - b. Nurse in the team will check the oxygen mask on a regular basis & ensure that they are properly placed, not fallen down.
 - c. Ensure closure of valves during "no-use" at all times.

2. Training

- 2.1. Hands on training of every staff involved in handling Oxygen, from Attendants to head of the Department is necessary.
- 2.2. Capacity building to nursing staff on basic maintenance of O₂ accessories & pipelines.
- 2.3. Regular training of OT Technicians and Nurse should be undertaken on proper oxygen administration and monitoring.
- 2.4. Engineers and technical staff from different departments to be trained with the functioning and maintenance of Air Separation Unit & O₂ supply chain & to monitor and report periodically the amount of O₂ consumed, time left to replenish and accounting of cylinders.

3. Competencies required for delivering oxygen therapy

- 3.1. Demonstrate an ability to use oxygen equipment safely, including an awareness of fire risks and cylinder use
- 3.2. Demonstrate an ability to use a pulse oximeter to determine oxygen saturations.
- 3.3. Demonstrate accurate monitoring and recording of oxygen therapy
- 3.4. Be able to recognize changes in a patient's respiratory status
- 3.5. Demonstrate an understanding of target range prescriptions and applications to different patient groups
- 3.6. Demonstrate an ability to assess suitability of delivery devices for individual patients and recognize when a change of device is needed
- 3.7. Be able to correctly identify and set up a range of oxygen-delivery devices
- 3.8. Demonstrate accurate recording of adjustments to the oxygen dose and the patient's response
- 3.9. Recognize the need for escalation of treatment/ medical review and further assessment

4. Monitoring

- 4.1. Oxygen therapy should be monitored under supervision even in night.
- 4.2. The attending Nurse or MNO/FNO of the ward should educate the patient to turn off the oxygen when the patient wants to use washroom or duly calls & seeks help to do so. In no case the Oxygen delivery device will be left

unattended without turning off.

5. Infrastructure

5.1. Oxygen cylinders: Check the working condition of following and ensure its satisfactory functional status.

- a. Pressure gauge regulators
- b. Flow meters
- c. Humidifiers

5.2. Pipeline intra-hospital distribution networks

- a. Maintenance check of pipelines including outlets to avoid leakage - every shift i.e. 8 hours
- b. The inspection to be documented in shift register

6. Calculating Oxygen requirement

Sl. No.	Type of Oxygen Delivery device used	Average Oxygen Flow rate per minute	No. of patients on Oxygen	Average Oxygen Flow rate per hour	Average Oxygen Flow rate per day (L/day)
1	Nasal prongs	3 L/minute	A	(3*A*60)	(3*A*60*24)
2	Venturi Mask	5 L/minute	B	(5*B*60)	(5*8*60*24)
3	Facemask	8 L/minute	c	(8*C*60)	(8*C*60*24)
4	Non- Re-breathing mask	13 L/minute	D	(13*0*60)	(13*0*60*24)
5	Non-Invasive Ventilation	42 L/minute	E	(42*E*60)	(42*E*60*24)
6	Invasive Ventilation	10 L/minute	F	(10*F*60)	(10*F*60*24)
	Total				

C. Audit of O₂ rational use

1. Daily Oxygen Audit report [Supervision]

Sl.	Enquiries	Response	
1	Oxygen Audit Committee (OAC) has been formed?	Yes	No
2	OAC's performance is satisfactory:	Yes	No
3	Oxygen Monitoring Team has been formed?	Yes	No
4	OMT's performance is satisfactory:	Yes	No
Capacity Buildin2			
5	Staff in-charge & other technical staff have been trained?	Yes	No
6	Nursing staffs have been trained on basic maintenance and administration O ₂ to patients?	Yes	No
Stock Management			
7	Oxygen needs assessment for next 24 hours has been done?	Yes	No
8	As on 10 AM today		
9	How much oxygen was as opening		
10	How much Oxygen stock received during last 24		
11	How much oxygen consumed during last 24		
12	What is the closing stock of		
13	For how many hours the existing stock is sufficient for		
14	Is the functional accessories to administer O ₂ are	Yes	No

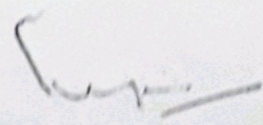
15	Requirements of accessories, if	Name	Quantity
		a. Pressure gauges b. Regulators c. Flow meters d. Humidifiers e. Nasal canula f. Facemask g. NRBM h. NIV mask i. HFNO canula j. HME viral bacterial filter for ventilators	

2. Daily Oxygen Audit report [Operations]

Sl.N	Enquiries	Response	
		Yes	No
8.	Has the O2 pipelines been checked in all 3 shifts? <input type="checkbox"/> Shift I register checked: <input type="checkbox"/> Shift 2 register checked: <input type="checkbox"/> Shift 3 register checked:		
8.a.	What all issues have been found	1. 2.	
8.b.	What all issues have been resolved	1. 2.	
9.	Unused mechanical ventilators found to be plugged into oxygen source?	Yes	No
10.	Unused mechanical ventilators have been unplugged?	Yes	No

3. Daily Oxygen Audit report [Monitoring]:

Sl.No.	Type of patient	Mode of Oxygen therapy	No of patients		
			Covid Ward	ICU	Total
1	Moderate (SPO2 90-94%)	Nasal prong			
		Face masks			
		NRBM			
		NIV			
2	Severe (SPO2 <90%)	Invasive mechanical ventilation			
		NIV			
		NRBM			
Total					


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