

**Respiratory Care Services
John Dempsey Hospital
Policy and Procedure Manual**

Subject:	Oxygen Therapy Protocol
Rationale:	To optimally oxygenate patients, the respiratory care practitioner (RCP) will utilize the following protocol to evaluate, treat, and monitor appropriate oxygen administration for all non-mechanically ventilated patients.
Patient Type:	All patients currently receiving oxygen will be evaluated.
Clinical Area:	All patient care areas.
Equipment Needed:	Pulse oximeter.
Laboratory Data Needed:	Recent arterial blood gas report and chest x-ray results.
Protocol:	The following guidelines will be followed in determining the indications for oxygen therapy and for selection of appropriate oxygen therapy delivery devices.

- I. Indications for oxygen therapy include:
 - A. Documented hypoxemia - PaO₂ of <60mm Hg. or SpO₂ of <90% in adults.^{6,11} PaO₂ <50mm Hg, or SaO₂ <88%, or capillary PO₂ <40 mm Hg. in neonates.^{6,14}
 - B. An acute care situation associated with suspected tissue hypoxia (e.g. pulmonary edema, drug overdose, or carbon monoxide poisoning).^{2,6,8,9}
 - C. Clinical signs or symptoms of tissue hypoxia (e.g. tachycardia, tachypnea, dyspnea, cyanosis diaphoresis, confusion, or chest pain).^{5,6,9}
 - D. Acute myocardial infarction with continuing pain, arrhythmia, or congestive heart failure.^{6,7}
 - E. Immediate post-operative period (Post Anesthesia Room) until the patient is awake and vital signs are stable.^{2,12}
 - F. Other medical emergency situations may include:
 1. Acute pulmonary disorders including:
 - a. adult respiratory stress syndrome
 - b. acute pulmonary embolism
 - c. aspiration pneumonitis
 - d. near drowning
 - e. acute asthma
 - f. acute exacerbations of COPD
 - g. acute pneumonia
 - h. acute bronchiolitis
 - I. newborn respiratory stress syndrome

2. Other medical/surgical emergencies including:
 - a. acute congestive heart failure
 - b. drug overdose
 - c. head and blunt chest trauma
 - d. hepatic failure
 - e. acute pancreatitis
 - f. shock - septic, hemorrhagic, cardiogenic, etc.
 - g. post-seizure

II. The following guidelines will be used in selecting an appropriate oxygen delivery device.
11,13

A. High flow versus low flow oxygen therapy systems.

1. High flow systems provide adequate flow of oxygen to meet/exceed patient's inspired flow needs.
2. Low flow systems will only provide flow of oxygen to supplement the patient's inspired flow rate needs.
3. Criteria for use of a low flow system:¹⁵
 - a. Tidal volume: 300-700ml
 - b. Respiratory rate: <25 breaths per minute
 - c. Ventilatory pattern: regular
 - d. Required FiO_2 <0.45
4. Criteria for use of a high flow system:
 - a. Required FiO_2 >0.45
 - b. Tidal volume <300 ml
 - c. Evidence of alveolar hypoventilation with CO_2 retention¹⁰
 - d. Respiratory rate >25 breaths per minute

- B. Types of low flow devices:
 - 1. Cannula
 - a. Delivers FiO₂: approximately 0.24 - 0.45
 - b. Most appropriate initial device for COPD patients.
 - 2. Catheter (rarely used)
 - a. Delivers FiO₂: 0.24 - 0.45
 - 3. Simple oxygen mask
 - a. Delivers FiO₂: 0.24 - 0.60
 - 4. Partial rebreather mask
 - a. Delivers FiO₂: 0.24 - 0.95+
- C. Types of high flow devices:
 - 1. Non-rebreather mask
 - a. delivers FiO₂: 0.24 – 1.00
 - 2. Venturi mask
 - a. delivers FiO₂: 0.24 - 0.50
- III. The following sequence should be used in evaluating and adjusting (titrating) a patient's oxygen therapy:
 - A. Assess oxygen saturation (SpO₂).

NOTE: If unable to obtain a non-invasive oxygen saturation, an arterial blood gas sample should be obtained. Non-invasive monitoring is preferred, except where CO₂ retention may develop, e.g. COPD. The pulse oximeter will be inaccurate in carbon monoxide poisoning.

- B. Observe any clinical signs and symptoms of hypoxia.
- C. If SpO₂ is >90%, decrease FiO₂ by 1 liter
- D. Continue to decrease FiO₂ in 1 liter increments allowing 15 - 30 minutes for stabilization, until a stable SpO₂ measurement >90% is achieved.
- E. Document new FiO₂ or discontinuance of oxygen therapy in patient chart and notify physician per accepted protocol mechanism.
- F. Re-evaluate SpO₂ or ABG in 24 hours or sooner if indicated.

GUIDELINES/WARNINGS: Monitor patient's vital signs and evaluate patient's clinical status. Do not continue titration process if patient develops:

- A. A pulse greater than 120 bpm, or if adjustment of FiO₂ results in a pulse increase of 20 bpm.
- B. Significant EKG change, e.g. onset of arrhythmias or ischemic morphology.
- C. A change in sensorium occurs, e.g. confusion, lethargy, etc. Notify physician if PaCO₂ increases above 50 mm Hg. or more than 5.0 mm above previous baseline.
- D. A respiratory rate > or = 30 breaths/minute.
- E. Clinical signs and symptoms of tissue hypoxia as listed above (I-C).

NOTE: If patient is not tolerating FiO₂ titration process, return patient to previous FiO₂ setting reassess patient, and continue process as

tolerated. If $\text{FiO}_2 > 0.50$ is required, contact physician for first setting and modality.

CLINICAL RESPONSIBILITIES:

- I. Changes in FiO_2 will be adjusted by respiratory care practitioners, while maintaining SpO_2 above 90% (see Algorithm).
- II. After initial measurements upon oxygen set-up, the following guidelines will be used in determining the frequency of SpO_2 or ABG monitoring:
 - A. Patients receiving an $\text{FiO}_2 < 0.40$; within 12 hours of initiation
 - B. Patients receiving an $\text{FiO}_2 > 0.40$ (including post anesthesia recovery): within 8 hours of initiation.
 - C. COPD patients: within 2 hours of initiation

NOTE: Acceptable SpO_2 levels may be less than 90% (generally no less than 87 - 89%).

- D. Acute myocardial infarction patients: within 72 hours of initiation, if MI is uncomplicated.
- E. Should any questions about oxygenation or acid-base status arise, SpO_2 , ETCO_2 , or ABG checks may be performed.
- III. The following guidelines will be adhered to in all oxygen therapy patients at all times:
 - A. All oxygen titrations will be communicated to and coordinated with the nurse in charge of the patient.
 - B. If, during the titration period, the patient exhibits persistent difficulty maintaining acceptable $\text{SpO}_2 > 90\%$, the respiratory care practitioner will immediately place the patient aback on their last FiO_2 setting, which met criteria in sequence III. D. (above). The result will be documented in the patient chart and the physician may be notified.
 - C. The patients may have their oxygen therapy discontinued upon completion of this protocol if the following criteria are met:
 - 1. Able to maintain $\text{SpO}_2 > 90\%$ on room air for 24 hours.
 - 2. Vital signs remain stable.

NOTE: Advise physicians that patients with marginal oxygen saturation of 90 or 91 may need investigation for nocturnal or exercise desaturation.

REFERENCES:

1. AARC Guidelines: Oxygen therapy in the acute care hospital, Respiratory Care, December 1991, 1410 – 1413.
2. Blue Cross and Blue Shield Association. Medical necessity guidelines for respiratory care (inpatient). Chicago: Blue Cross and Blue Shield, 1982.
3. Rose Medical Center: Evaluation of oxygen therapy utilizing therapeutic objectives (protocol). Denver, Colorado.
4. Soldiers and Sailors Memorial Hospital: Assessment of acute and chronic oxygen therapy (protocol). Wellsboro, Pennsylvania.

5. Snider GL, Rinaldo JE. Oxygen therapy in medical patients hospitalized outside of the intensive care unit. Am Rev Respir Disease, 1980; 122 (5, Part 2): 29 – 36
6. American College of Chest Physicians, National Heart, Lung and Blood Institute. National Conference on Oxygen Therapy. Chest, 1984; 86:234-247. Published concurrently in Respiratory Care, 1984; 29; 922-935.
7. Maroko PR, Radvany P, Braunwell E, Hale SL. Reduction of infarct size by oxygen inhalation following acute coronary occlusion. Circulation, 1975; 52:360-368.
8. Winter PM, Miller JN. Carbon monoxide poisoning. JAMA, 1976; 236:1502-1504.
9. Office of Professional Standards Review Organization, Health Care Financing Administration. Technical assistance document: Approaches to the review of respiratory therapy services. Respiratory Care, 1981; 26:459 - 478.
10. Burton GG, Hodgkin JE, Ward JJ. Respiratory Care: A guide to clinical practice, 3rd Ed., 1991, J.B. Lippincott
11. American Academy of Pediatrics, American College of Obstetricians and Gynecologists. Guidelines for perinatal care, 2nd ed, 1988; 246 -247.
12. Fairley HB. Oxygen therapy for surgical patients. Am Rev Respir dis, 1980; 122:5 (Part 2); 37 - 44.
13. Sanclan CL, Spearman CB, Sheldon RL. Egan's fundamental of respiratory care, 5th ed., 1990, C.V. Mosby Company.
14. Carol WA, Chatburn RL (eds). Neonatal respiratory care: Assessment of neonatal gas exchange, (2nd ed), 1988, Year Book Medical Publishers, 58 - 59.
15. Shapiro BA, Harrison RA, Kacmarek RM, Cane RD. Clinical application of respiratory care, 3rd ed, 1985, Year Book Medical Publishers.