

A07: Oxygen Administration

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Introduction

The administration of oxygen is a fundamental component of paramedic and EMR/FR practice. Although routine, thoughtful consideration is required: paramedics and EMRs/FRs must have a comprehensive understanding of a patient's clinical indications for oxygen administration, and must adhere to current best practices while engaged in any therapeutic activity.

Essentials

- The administration of oxygen should be based on an assessment of overall patient need rather than a formulaic application. Respiratory effort, mentation, oxygen saturation, blood pressure, and clinical scenario all play a role in determining whether oxygen should be given.
- In general, paramedics and EMRs should use the lowest oxygen flow rate possible to achieve an SpO₂ of 94%, or for FRs, until symptoms resolve. This may not be possible for patients who have pre-existing conditions, such as chronic obstructive pulmonary disease; in these cases, titrate to maintain the patient's normal oxygen saturation.
- Do not routinely administer oxygen to patients with normal oxygen saturations where a clearly defined clinical need is lacking.

Additional Treatment Information

- The administration of oxygen should follow a staged approach, where simple, non-invasive options are tried before more aggressive (or invasive) options are explored. Nasal cannula are preferable to face masks, while face masks are preferable to bag-valve masks.
- Recall that adequate oxygenation depends not only on the fraction of inspired oxygen but also on the ability of the patient to ventilate, diffuse gases in the alveoli, and transport oxygen in the blood. Patients require sufficient hemoglobin and an adequate blood pressure to oxygenate effectively.
 - → [B01: Airway Management](#)
 - → [D01: Shock](#)
 - → [D02: Bleeding](#)
- Do not withhold oxygen from patients who are significantly short of breath in order to obtain a room air oxygen saturation. Treat symptomatically to start, and then titrate to bring the oxygen saturation into a normal range.
- For FRs, or in the absence of accurate pulse oximetry in a patient with shortness of breath, administer oxygen until symptoms resolve, or accurate measurements can be obtained.

General Information

- Early, aggressive oxygen administration may be beneficial to critically ill and hemodynamically unstable patients, such as those in cardiac arrest or who require resuscitation. In these cases, paramedics and EMRs should aim to achieve an oxygen saturation of 100%. Once the patient is stabilized, oxygen can then be titrated down to an SpO₂ of ≥ 94%.
- Adverse events from hyper-oxygenation do occur, and sustained hyperoxia has been linked to increases in morbidity and mortality.
- Pulse oximetry may be particularly unreliable in patients with peripheral vascular disease, severe asthma, severe anemia, cold extremities or peripherally hypoperfused, severe hypotension and carbon monoxide poisoning. In the absence of reliable oximetry data, in critical illness, oxygen should be administered.
- Oxygen administration via a BVM should provide a tight seal with the BVM using a 2-person technique where possible.

Interventions

First Responder

- Intervene early; do not wait for signs or symptoms of obvious hypoxia to develop, but act on the potential or suspicion of respiratory insufficiency
- Ventilation is as important as oxygenation; do not withhold BVM ventilations to patients who require ventilatory support
- Maintain a tight seal with the BVM using a 2-person technique where possible
- Patients with mild to moderate shortness of breath (e.g., tachypnea, two-to-three word sentences, obvious wheezing, accessory muscle use):
 - Consider nasal cannula at a maximum flow rate of 5 L/min
- Patients with severe shortness of breath or suspicion of critical illness (e.g., anaphylaxis, seizures, shock, traumatic injuries):
 - Consider non-rebreather face mask (NRFM) at 10-15 L/min
 - A nasal cannula may be placed under an NRB or BVM when flow rates above 15 L/min are required
 - Assist ventilations with BVM where required

Emergency Medical Responder – All FR interventions, plus:

- Mild-Moderate Hypoxemia (SpO₂ 85-89%):
 - Initial dose of 2-5 L/min via nasal cannula
 - consider face mask 5-10 L/min
- Severe hypoxemia (SpO₂ < 85%) or critical illness:
 - Initial dose of 10-15 L/min via non-rebreather face mask (NRFM)
 - Consider BVM ventilation
 - Once stable, titrate oxygenation to 94%
- Chronic hypoxemia (COPD, cystic fibrosis, obesity, neuromuscular disorders)
 - Titrate SPO₂ 88-90%
 - High-flow oxygen may be harmful in these patients; do not neglect the need for ventilation
 - → [B05: Chronic Obstructive Pulmonary Disease](#)
- Regardless of SpO₂, treat the following illnesses with high-flow oxygen (15 L/min via NRFM):
 - Toxic inhalation, decompression sickness, cord prolapse, postpartum haemorrhage, shoulder dystocia, and cluster headache
 - → [J01: Approach to Toxic Exposures](#)
 - → [I03: Dive / SCUBA Injuries](#)
 - → [L08: Maternity: Delivery Complications](#)

References

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4. Misasi P, et al. Medication safety in emergency medical services: approaching an evidence-based method of verification to reduce errors. 2019. [\[Link\]](#)
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6. Canadian Patient Safety Institute. Patient safety in emergency medical services: Advancing and aligning the culture of patient safety in EMS. 2010. [\[Link\]](#)
7. Ni Y-N, et al. The effect of hyperoxia on mortality in critically ill patients: a systematic review and meta analysis. 2019. [\[Link\]](#)

Practice Updates

- 2023-12-18: Removed COVID-related changes to guideline (target SpO2 in most cases of 94%).

