

PRESENTATION Oxygen (O₂) is a gas provided in compressed form in a cylinder. It is also available in liquid form, in a system adapted for ambulance use. It is fed via a regulator and flow meter to the patient by means of plastic tubing and an oxygen mask or nasal cannula.	INDICATIONS All cases with cardiac symptoms, decreased level of consciousness, sickle cell disease, carbon monoxide poisoning, major trauma, and long bone fracture. Chronic obstructive pulmonary disease (COPD) with oxygen saturation (SpO₂) <90-92%. Hypoxia with SpO₂ <95%.
ACTIONS Essential for cell metabolism. Adequate tissue oxygenation is essential for normal physiological function. It assists in reversing hypoxia, by raising the concentration of inspired oxygen. Hypoxia will, however, only improve if respiratory effort or ventilation and tissue perfusion are adequate. If ventilation is inadequate or absent, assisting or completely taking over the patient's ventilation is essential to reverse hypoxia.	CONTRA-INDICATIONS Paraquat poisoning. Defibrillation. Explosive environments. NOTE: COPD is NOT a contra-indication in the critically ill or injured hypoxic patient but the COPD guidelines should be followed.
CAUTIONS Oxygen increases the fire hazard at the scene of an accident.	

DOSAGE AND ADMINISTRATION

Oxygen therapy is essential in virtually **ALL** cases of serious or potentially serious illness or injury.

Administer high concentration oxygen (O₂) via a non-re-breathing mask, using the stoma in laryngectomy and other neck breathing patients, to ensure an SpO₂ of >95%, except in patients with COPD (*see below*).

High concentration O₂ should be administered routinely, whatever the oxygen saturation in all patients sustaining major trauma, long bone fracture, chest pain, acute coronary syndrome, sickle cell crisis, and patients with decreased level of consciousness (Glasgow Coma Score (GCS) <15).

Patients with COPD should receive metered oxygen therapy to achieve an O₂ saturation in the range of 90-92%. In cases of serious respiratory distress, cardiac chest pain, or major trauma in COPD patients, high concentration oxygen may be required.

Oxygen therapy is administered via a mask and tubing. Masks are either the standard (non-reservoir bag) or with reservoir bag. Oxygen may also be administered via an automatic ventilator or self inflating bag-valve-mask and reservoir.

High concentration

Oxygen can be provided through a non-rebreathing mask with a reservoir bag and with an oxygen flow rate sufficient to keep the reservoir bag fully inflated (usually 10-15 litres/min).

Low flow

24-28% oxygen can be provided at flow rates of 2 litres per minute through a medium concentration, non reservoir bag mask.

Laryngectomy patients

Laryngectomy and other neck breathing patients breathe through a stoma in the neck. A facemask or nasal cannula may be of little or no value. An appropriate method of administration must be considered that delivers oxygen to the stoma.

SIDE EFFECTS

Non-humidified O₂ is drying and irritating to mucous membranes over a period of time.

In patients with COPD who rely upon hypoxic drive for respiration there is a small risk that high-flow oxygen may cause respiratory depression or respiratory arrest (*refer to COPD guideline*).

ADDITIONAL INFORMATION

A pulse oximeter should always be used to measure O₂ saturation whenever O₂ is being administered (except in possible carbon monoxide poisoning where results may be artificially elevated). This is to monitor the effects of O₂ therapy and the effectiveness of the patient's ventilation.

Oxygen saturation levels

- 95-100% normal
- 90-95% evidence of hypoxia
- 85-90% serious hypoxia
- <85% critical hypoxia

Hypoxic drive is found in COPD patients with chronic lung damage, where as a result of long standing respiratory failure, a higher than normal carbon dioxide (CO₂) level is retained in the blood stream. This would normally trigger a persistent high respiratory rate to attempt to lower the CO₂ level. To compensate, the body becomes less sensitive to raised CO₂, and begins to react to a lowered O₂ level, as a trigger to breathe. Giving high concentration O₂ will raise the O₂ level in the blood stream, and may prevent the natural lowering of O₂ occurring to stimulate breathing. This in turn may cause respiratory depression or respiratory arrest. If this occurs, oxygen should be delivered through assisted ventilation or intermittent positive pressure ventilation and the patient removed rapidly to hospital with a **Hospital Alert Message**.

Most patients with acute asthma **DO NOT** have COPD and require high concentration O₂ with a non-rebreathing mask with a reservoir bag and with an oxygen flow rate sufficient to keep the reservoir bag inflated before and after nebulisation.

Some elderly patients have a mixture of COPD, which causes irreversible bronchospasm, and asthma, which is reversible. The priority in treating these patients is to ensure adequate oxygenation. Less seriously ill or injured patients still require O₂ therapy as per individual guidelines.

In cardiac arrest **100% O₂** must be delivered via automatic ventilator **or bag/mask/reservoir during ventilation**.

In carbon monoxide poisoning administering **100% O₂** increases the speed of elimination of CO from red cells.