Oxygen Therapy in the Home or Extended Care Facility

OT-CC 1.0 PROCEDURE:

The procedure addressed is the administration of oxygen therapy in the home or in the extended care facility other than by mechanical ventilator.

OT-CC 2.0 DESCRIPTION/DEFINITION:

Oxygen therapy is the administration of oxygen at concentrations greater than that in ambient air with the intent of treating or preventing the symptoms and manifestations of hypoxia.\(^{1}\)

OT-CC 3.0 SETTING:

This Guideline is confined to oxygen administration in the home or extended care facility.

OT-CC 4.0 INDICATIONS:

Documented hypoxemia: In adults, children and infants older than 28 days: (1) PaO\(_2\) \(<\) or \(\leq 55\) torr or SaO\(_2\) \(<\) or \(\leq 88\)% in subjects breathing room air,\(^{1,2}\) or (2) PaO\(_2\) of 56-59 torr or SaO\(_2\) or SpO\(_2\) \(<\) or \(\leq 89\)% in association with specific clinical conditions (e.g., cor pulmonale, congestive heart failure, or erythro-cythemia with hematocrit \(>\) 56).\(^{3,4}\)

Some patients may not qualify for oxygen therapy at rest but will qualify for oxygen during ambulation, sleep, or exercise. Oxygen therapy is indicated during these specific activities when SaO\(_2\) is demonstrated to fall to \(<\) or \(\leq 88\)%\(^{5}\).

OT-CC 5.0 CONTRAINDICATIONS:

No absolute contraindications to oxygen therapy exist when indications are present.

OT-CC 6.0 PRECAUTIONS AND/OR POSSIBLE COMPLICATIONS:

6.1 In spontaneously breathing hypoxemic patients with chronic obstructive pulmonary disease, oxygen administration may lead to an increase in PaCO\(_2\).\(^{6-8}\)
6.2 Undesirable results or events may result from noncompliance with physician's orders or inadequate instruction in home oxygen therapy.
6.3 Complications may result from use of nasal cannulae\(^{9}\) or transtracheal catheters.\(^{10}\)
6.4 Fire hazard is increased in the presence of increased oxygen concentrations.
6.5 Bacterial contamination associated with certain nebulizers and humidification systems is a possible hazard.\(^{11-13}\)
6.6 Possible physical hazards can be posed by unsecured cylinders, ungrounded equipment, or mishandling of liquid oxygen (resulting in burns). Power or equipment failure can lead to an inadequate oxygen supply.
OT-CC 7.0 LIMITATIONS OF PROCEDURE:

Oxygen therapy has only limited benefit for the treatment of hypoxia due to anemia and benefit may be limited when circulatory disturbances are present.

OT-CC 8.0 ASSESSMENT OF NEED:

8.1 Initial assessment: Need is determined by the presence of clinical indicators as previously described and the presence of inadequate oxygen tension and/or saturation as demonstrated by the analysis of arterial blood. Concurrent pulse oximetry values must be documented and reconciled with the results of the baseline blood gas analysis if future assessment is to involve pulse oximetry.  

8.2 Ongoing evaluation or reassessment: Additional arterial blood gas analysis is indicated whenever there is a major change in clinical status that may be cardiopulmonary related. Arterial blood gas measurements should be repeated in 1-3 months when oxygen therapy is begun in the hospital in a clinically unstable patient to determine the need for long-term oxygen therapy (LTOT).(14) Once the need for LTOT has been documented, repeat arterial blood gas analysis or oxygen saturation measurements are unnecessary other than to follow the course of the disease, to assess changes in clinical status, or to facilitate changes in the oxygen prescription.(14,15)

OT-CC 9.0 ASSESSMENT OF OUTCOME:

Outcome is determined by clinical and physiologic assessment to establish adequacy of patient response to therapy.

OT-CC 10.0 RESOURCES:

10.1 Equipment  
10.1.1 Low-flow oxygen systems: Such devices supply oxygen at flows that are less than the patient's inspiratory demand (ie, the delivered oxygen is diluted with room air). These devices may supply either a low or high FIO2 depending upon the specific design.(16,17) Reservoir masks or other devices designed to provide for a high FIO2 are usually not appropriate for long-term oxygen therapy outside of the hospital.  
10.1.1.1 Nasal cannulae can provide 24-40% oxygen (depending on patient's inspiratory flowrate) with flowrates up to 6 L/min in adults;1 infant flows should be limited to a maximum of 2 L/min.(18,19) Oxygen supplied to adults by nasal cannulae at flows < or = to 4 L/min need not be humidified.(20,21)  
10.1.1.2 Transtracheal oxygen catheters can provide continuous oxygen therapy with oxygen consumption compared to nasal cannulas of only about one half of that used at rest and two thirds of that used with exercise. Transtracheal catheters may require greater patient supervision and have an increased risk for complication.(10)  
10.1.1.3 Oxygen-conserving devices: Oxygen reservoir cannulae (nasal or pendant), demand oxygen delivery devices, and transtracheal catheters are currently being utilized for oxygen conservation. Each of these devices may have advantages or disadvantages that are related to specific design.  
10.1.2 High-flow oxygen delivery systems: Such devices can provide a prescribed gas mixture of high or low oxygen concentration at flows that exceed patient demand; however, they are impractical for home use except for humidifying devices that are compressor-driven with supplemental oxygen bled in at low flows. Tracheostomy collars and T-tube adapters may be used with high-flow supplemental oxygen systems. The gas should be humidified by a continuous
aerosol generator or a heated humidifier. (22,23) The humidifier is preferable because of the greater likelihood for the transmission of contagion via nebulizer.

10.1.3 Oxygen supply systems

10.1.3.1 Oxygen concentrators: Concentrators extract oxygen from ambient air and should deliver oxygen at concentrations of 85% or greater at up to 4 L/min. (24) Membrane oxygen concentrators typically provide oxygen at a lower FDO2, and higher flows are required to 'compensate' for the reduced FDO2.

10.1.3.2 Liquid oxygen systems: Liquid oxygen is provided in large reservoir canisters with smaller portable units that can be transfilled by the patient. There is evaporation loss from the canisters when they are not in use. Many of the portable liquid oxygen units are appropriate for ambulatory therapy and can be utilized with oxygen-conserving devices to extend their functional time.

10.1.3.3 Compressed gas cylinders: Oxygen may be supplied in large cylinders (e.g., G or H cylinders) as stationary units for home oxygen therapy. Smaller cylinders (e.g., D and E cylinders) may be equipped with wheels and used as portable oxygen units (strollers). E cylinders may also be used as a backup for oxygen concentrators in the event of a power or equipment failure. Smaller cylinders coupled with oxygen conserving devices may be used as ambulatory units.

10.2 Personnel: Credentialed respiratory care practitioners (RRT or CRTT) or other credentialed persons with equivalent training and documented ability to perform the tasks may assess patients, initiate and monitor oxygen delivery systems, recommend changes in therapy, and instruct caregivers.

Caregivers may operate and maintain oxygen delivery devices and assess a specific patient after they have been instructed by credentialed practitioners and have demonstrated the appropriate level of skill.

OT-CC 11.0 MONITORING:

11.1 Patient

11.1.1 Clinical assessment should routinely be performed by the patient and/or the caregiver to determine changes in clinical status (e.g., use of dyspnea scales and diary cards). Patients should be visited/monitored at least once a month by credentialed personnel unless conditions warrant more frequent visits.

11.1.2 Measurement of baseline oxygen tension and saturation is essential before oxygen therapy is begun (5, 15). These measurements should be repeated when clinically indicated or to follow the course of the disease. Measurements of SO2 also may be made to determine appropriate oxygen flow for ambulation, exercise, or sleep.

11.2 Equipment Maintenance and Supervision: All oxygen delivery equipment should be checked at least once daily by the patient or caregiver. Facets to be assessed include proper function of the equipment, prescribed flowrates, FDO2, remaining liquid or compressed gas content, and backup supply. A respiratory care practitioner or equivalent should during monthly visits reinforce appropriate practices and performance by the patient and caregivers and assure that the oxygen equipment is being maintained in accordance with manufacturers' recommendations. Liquid systems need to be checked to assure adequate delivery. (25) Oxygen concentrators should be checked regularly to assure that they are delivering 85% oxygen or greater at 4 L/min. (24)

OT-CC 12.0 FREQUENCY:

Oxygen therapy should be administered continuously unless the need has been shown to be associated only with specific situations (e.g., exercise and sleep).
OT-CC 13.0 INFECTION CONTROL:

Under normal circumstances low-flow oxygen systems without humidifiers do not present a clinically important risk of infection and need not be routinely replaced. High-flow systems that employ heated humidifiers or aerosol generators, particularly when applied to subjects with artificial airways, can be important sources of infection and should be cleaned and disinfected on a regular basis. (Although studies have suggested that tubing should be changed every 48 hours in the hospital, there are no definitive studies regarding the frequency of tube changes at home or in long-term care facilities.)

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REFERENCES


ADDITIONAL BIBLIOGRAPHY


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