GORDON'S SCHOOL

Medical Gases Policy

The core principle that guides everything we do is **Putting Students First**

1. Introduction

This policy has been written for the use of parents, students and school staff.

The purpose of the policy is to set out clear guidance on the storage and correct use of medical gases at Gordon's School.

It is essential the appropriate safety precautions are undertaken when handling, storing, and transporting medical gases.

2. Safety of Medical Gases

- Some materials which do not normally burn in air will burn in an atmosphere of oxygen, nitrous oxide or in gas mixtures containing more than 21% oxygen. The gases do not burn themselves, but strongly support combustion, and therefore special attention should be directed to the hazards associated with smoking and naked flames.
- A facility which stores medical gases should have appropriate labels on the door regarding fire and explosion risk.
- When the medical gases are being driven in a vehicle the appropriate sticker should also be on display.
- When using medical gas cylinders, it is most important that no part of the cylinder valve or equipment is either lubricated/contaminated with oil or grease. This is due to the risk of spontaneous combustion that can occur with high pressure gases in the presence of hydrocarbons.

3. Storage of Medical Gases

- Keep away from sources of heat or ignition.
- The gases must be stored in an appropriate facility, cylinders should be stored flat.
- Gases should be replaced once they become 1/4 full. It is wise to have a spare cylinder of oxygen stored as occasionally a valve may leak on a cylinder.
- Ensure appropriate signages is available and visible.

4. Handling Cylinders

It is important to comply with current manual handling regulations. It is advisable when handling gas cylinder to ensure:

- An appropriate size cylinder is used.
- Cylinders are not allowed to roll.
- Valves must not be tampered with, and faulty valves must not be used.
- Markings and labels are never obstructed.
- Cylinders are stored near an exit so they can be removed easily in an emergency.
- Appropriate signage is on the storage area.

5. Oxygen

Oxygen is vital to maintain body function. Key organs of the body which require oxygen are the brain and the heart. The brain will sustain significant hypoxic injury if there is more than 3 minutes without a supply of oxygen. As such, trauma to the body which interrupts the supply of oxygen to vital organs can have devastating consequences.

Thus, oxygen should be considered in all trauma patients and the majority of medical emergencies.

5.1 Administration

Oxygen is an administered via a non rebreathe mask.

To administer the oxygen the reservoir bag needs to be filled before being given to patient. To fill the bag, you must connect it to the oxygen cylinder via the tubing. Turn the valve to 15 litres per minute and hold a finger over the valve of the mask as shown to fully inflate the bag.

Using a non rebreathe mask allows minimal rebreathing of expired air and delivers approximately 85% oxygen at a flow rate of 8 litres per minute when applied properly.

Place the mask over the patient's head and support over the nasal area and mouth. If the patient is breathing adequately the mask will 'fog'. The bag should refill between breathes. If this is not the case increase the flow rate up to a maximum of 15 litres per minute.

5.2 Contraindications

There are few contraindications for the use of oxygen.

For patients with Chronic Obstructive Pulmonary Disease oxygen, in high concentrations is potentially deleterious. However, it is unlikely high levels of oxygen within the first hour of trauma will cause significant side effects.

6. Entonox

Entonox is a combination of 50% nitrous oxide and 50% oxygen used exclusively for pain relief. It is the nitrous oxide which provides the analgesic effect; the oxygen ensures the child does not become hypoxic during the procedure. It is fast acting, is taken up and eliminated very rapidly by the lungs. The elimination process occurs when the child stops using the Entonox. The gas is eliminated in an unchanged state. Analgesia commences after 30 seconds with a maximum effect after 2 minutes of inhalation. It is rare but the use of Entonox may cause the patient to lose consciousness. The advantage of it being patient controlled is that they are unable to use it once they become sedated. It is effective in treating procedural pain as there are few contraindications and it has a rapid onset with quick recovery.

6.1 Administration

Entonox is administered under medical supervision. The gas itself is self-administered through a demand valve, using a mouthpiece, bite-block, or face mask. The demand valve opens when a small negative pressure has been generated by the patient's individual effort. The Nitrous oxide is then exhaled via the expiratory effort port of the same valve.

To administer Entonox to smaller children requires an anaesthetic' T'piece circuit in which gas flow is continuous. As a result, this is not self-administering and requires the presence of an anaesthetist.

Administering Entonox by this method is safe because if enough Entonox is inhaled to induce a reduced level of consciousness the patient will be unable to hold the valve and drop the valve thus exhaling residual gas. The mixture of 50 % oxygen ensures the patient has sufficient oxygen in their system.

To administer Entonox the patient must be fully conscious and capable of understanding what is being offered. The patients airway must be clear and the patient be able enough to take a deep breath .It is important to warn the patient they may become drowsy taking only four or five breaths to produce an analgesic effect.

Nitrous oxide is more soluble than oxygen and nitrogen will diffuse in to air spaces within the body. This makes it dangerous to use in patients with suspected pneumothorax or who have recently been scuba

diving. Similarly, caution is required with patients with bowel obstruction or head injuries, since nitrous oxide will increase the pressure effect in these conditions.

6.2 Contraindications for its use

- Where there is a decreased level of consciousness, head injury, intoxication or coma.
- Where there is air trapped within a body cavity and expansion may be dangerous. Nitrous oxide is highly diffusible and will move more rapidly into an air pocket than nitrogen in air will move out, thus causing expansion in the pocket. Artificial, traumatic, or spontaneous pneumothorax, gross abdominal distension, air embolism, after air encephalography, following middle ear surgery, after a recent underwater dive, children with ear pain or middle ear complications, presence of intracranial air after head injury.
- Children with chronic lung disease, abnormal airways, severe emphysema, or lung abscess.
- Gastro-oesophageal reflux (risk of perforation).
- Carbon monoxide poisoning or a decreased oxygen drive.
- Generalised severe infection.
- Maxillofacial Injury
- Intoxication

7. Summary

In contact/collision sports such as rugby, medical gases e.g., oxygen should be available to facilitate the management of traumatised or medically unwell athletes.

It is essential the appropriate safety precautions are undertaken when handling, storing, and transporting medical gases. In particular the correct signage must be in place where cylinders are stored and on vehicles transporting medical gases.

Oxygen should be administered to all traumatised and critically ill athletes in the prehospital setting via a non rebreathe mask.

Entonox is a medical gas containing a mixture of 50% nitrous oxide and 50% oxygen. Within the Pre-Hospital Immediate Care in Sport setting (once contraindications excluded) it is an ideal analgesic to assist in the safe management of fractures or dislocations. Entonox is administered under medical supervision. The gas itself is self-administered through a demand valve, using a mouthpiece, bite-block or face mask.

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