AN INTRODUCTION TO SELF-CONTAINED BREATHING APPARATUS

Luxfer Ltd

Luxfer Gas Cylinders Ltd, Nottingham, UK

Starting oxygen therapy can be a very worrying time, with a few patients even seeing it as a last resort or “the end”. However, there is no doubt that respiratory patients benefit from oxygen therapy and that such therapy improves their quality of life. Every patient is different and their needs are different; however, making oxygen therapy easy and keeping it simple, whilst giving patients flexibility and freedom, is the “Holy Grail” that every practitioner and homecare provider is striving for. The provision of these services is constantly evolving, with new products and devices becoming available all the time.

PRESCRIBING OXYGEN THERAPY

There are two major ways in which home oxygen can be prescribed: 1) Long-term oxygen therapy (LTOT), usually for a minimum of 16 h day⁻¹. 2) Ambulatory oxygen therapy, for use when patients are active/mobile. The majority of patients on LTOT are prescribed stationary oxygen concentrators, which sit in a room in the house with tubing stretching along the skirting boards. Patients are also prescribed back-up cylinders and some have liquid oxygen, which is breathed in as a gas using a small canister that they top up from a Dewar vessel. Ambulatory oxygen may be prescribed if oxygen levels drop when patients are active, and patients are tested for this when they go for an oxygen assessment. Portable ambulatory oxygen comes in the form of smaller cylinders; however, all the devices that are currently available have their challenges and limitations. These include: 1) Weight of the device or cylinder, which means patients may have to use a trolley or backpack to carry it. 2) Lack of confidence in the gauge, which leads to a fear of oxygen running out or of the consequences of leakage. 3) Requirement to wait at home for cylinder delivery. 4) Embarrassment of using such obvious equipment.

GETTING IT RIGHT FOR PATIENTS

In the past, oxygen concentrators were largely static objects that extracted oxygen from the air. Transportable oxygen concentrators (TOCs) were then introduced, which give patients an unlimited supply and more freedom and flexibility. However, many TOCs are still bulky and heavy, often requiring a trolley to be transported. This is not appropriate for frail patients, who can find the devices impractical and may need a free hand for their walking sticks or might need help lifting the devices in and out of cars. Additionally, some patients cannot use a system that delivers oxygen in a pulse (intermittent on-demand oxygen delivery linked to breathing in). A range of self-contained breathing apparatus exists to meet this need and, over the past few years, more products have come onto the market and become available for patients, improving compliance with the standard 16 h day⁻¹ of oxygen therapy.
In response to the limitations of TOCs more companies are bringing portable oxygen concentrators (POCs) onto the market. These devices are lighter and more patient friendly, empowering patients to use their oxygen as they want to. As a result patients are more mobile and are able to do more, keeping active for longer. Luxfer is one of the companies that has just introduced a new POC. The device comes in a small, neat carrying case with a strap and a spare battery nestling beside the main unit (figure 1). No larger than a regular toaster, the device delivers constant oxygen purity of 88–95% which means oxygen can be given safely. Oxygen is delivered as a pulse when the device detects that a patient is breathing in and this system, along with other elements of the design, enable the Luxfer POC to operate for 6 h on setting two (figure 2) for patients on 2 L min$^{-1}$. While not all patients can use the pulse setting, POCs may only be suitable for around 50% of subjects, it has dramatically extended the time a patient can be mobile whilst using their device. While this boost is dependent on the patient’s prescribed flow rate in L min$^{-1}$, more active patients requiring ambulatory oxygen will be able to live a more independent and varied lifestyle, hopefully improving their quality of life. For patients who want to perform strenuous activity, continuous flow may be a more suitable method.

The rapid expansion in the availability of POCs to clinicians and patients in recent years has led to conflation of the terms POC and TOC. POCs are truly portable and are designed to be easily carried by patients in small backpacks that allow mobility and independence as patients visit friends, go shopping or engage in other such activities. TOCs, on the other hand, are not designed to be carried and must be moved around with a trolley. Although TOCs are suitable to be wheeled (or transported) from a patient’s home to a temporary location, such as a hotel or holiday cottage, they are not the best choice for a walk in the park. Some tell-tale signs that your POC is actually a TOC include: 1) POCs will typically weigh no more than 3 kg, while a TOC will weigh closer to 9 kg; 2) POCs are normally no bigger than a small toaster, whereas a TOC is typically the same size as a carry-on suitcase suitable for airline overhead storage; 3) POCs are light enough to be carried by the patient, whereas a TOC will often come with a trolley so it can be wheeled around.

Despite their benefits, one limitation of POCs is that they currently deliver oxygen only on demand. This means that the patient triggers delivery of a bolus of oxygen when inhaling, rather than the device delivering a continuous flow. TOCs, on the other hand, normally give patients the option of either on-demand or continuous-flow oxygen delivery. The research and development race is on to provide the market with a true continuous-flow POC; however, in the meantime, the desire to capitalise on the growth of POCs has led some manufacturers to promote TOCs as continuous-flow POCs, which can be quite misleading to patients who want portability. Always remember, for an easy way to tell the difference between a POC and a TOC—if it comes with a trolley or has to be wheeled around, it’s probably not a POC!

Finally, patients should always be assessed by clinicians, using their own equipment, to check for saturation. It is important that every part of a patient’s lifestyle is assessed to make sure they get the correct equipment, and the right solution may be a combination of continuous flow and a pulse POC. Oxygen therapy needs to be given with the right equipment, in the right amount, in the right way, and to the right patient.

**THE IMPACT OF PORTABLE OXYGEN CONCENTRATORS**

**THE DIFFERENCE BETWEEN “PORTABLE” AND “TRANSPORTABLE”**

**CONFLICT OF INTEREST**

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