Portable Home Oxygen Equipment
Matching the patient to the proper device

U.S. home oxygen patient population

Traveling oxygen patients

- Patient mix
  - Unmet demand
  - Nocturnal
  - High portability requirements
  - Standard portability requirements
  - Homebound

- Undiagnosed
  - 15 M patients
- 1.8 M Medicare oxygen patients

Source: Providing Oxygen Sensibly, Thomas J. Williams, MBA, RRT, and Robert L. Chablain, BS, RRT-NPS, FAARC. HomeCare, July 2009

The portable home oxygen patient

Patients are...

- Diagnosed earlier
- Younger than before
- More active
- More educated about their disease and treatment options
- More likely to travel
Home oxygen therapy prescription
The oxygen therapy prescription

- Flow rate
- Frequency of use
- Duration of need
- Diagnosis
- Laboratory evidence of hypoxemia
- Additional medical documentation

Typically not prescribed
Specific oxygen equipment

- Homecare provider often determines the equipment patients receive
- If nocturnal or non-ambulatory
  - Typically receives stationary concentrator and a backup (usually cylinders)
- If ambulatory
  - Typically receives stationary concentrator and some form of portable oxygen equipment

Overview of portable oxygen equipment
Compressed gas cylinders, liquid oxygen and portable oxygen concentrators
Definition of portability
Long-term oxygen therapy (LTOT) recommendations

Recommendations by the LTOT Consensus:

• Portable oxygen is defined as equipment that can be carried by most patients on their person during activities of daily living, weighs 10 pounds or less, and provides 2 LPM for at least 4 hours

• “Portable or wearable” devices should be a size and weight that allow the patient to do the activities of daily living suitable to his or her own lifestyle while maintaining proper oxygenation

Source: Recommendations of the Fifth and Sixth Oxygen Consensus Conference, www.ltotnet.org

Types of portable home oxygen equipment
Homecare provider supplies patient with choice of ...

• Compressed gas cylinders
• Liquid units
• Portable oxygen concentrators (POCs)

Compressed gas cylinders

Delivered gas cylinders
• Liter flow is 6 LPM or less
• Variety of sizes to support different activity levels and ability to carry
• Different types of oxygen conserving devices (OCDs) available

Gas transfill systems
• Patients fill the cylinders themselves
• Liter flow may be restricted during fill
• Variety of sizes to support different activity levels and ability to carry
• Patient needs to be capable of filling
Delivered compressed gas cylinders
Patient advantages/disadvantages

**Advantages**
- Small units are lightweight
- Require no electricity
- Larger units available for continuous flow

**Disadvantages**
- Small units have short duration
- Largest units heavy and difficult to move
- Not allowed on planes
- Patient must wait for delivery

Delivered gas transfill compressed gas cylinders

**Advantages**
- Small cylinders are lightweight
- Patients can fill cylinders themselves
- No waiting for deliveries
- Can generate as much portable oxygen as needed

**Disadvantages**
- Small units have short duration
- Not allowed on planes
- Takes time to fill cylinders
- Oxygen limits on some devices
- May increase patient’s electric bill
- Patients may be limited to two tanks

Delivered liquid systems

- Provided in large reservoirs delivered to the patient home by provider and refilled by provider
- Reservoir is kept in patient home and patient fills portable unit from reservoir
- Active patients
- Patient needs to have ability to fill portable or have a caregiver capable of filling
Delivered liquid system

Advantages
- Small units are lightweight and longer-lasting than comparably-sized gas cylinders
- Very quiet
- Majority do not require batteries
- Larger units available for continuous flow

Disadvantages
- Evaporative loss
- Filling may be difficult – overfilling and freezing
- Reservoir takes up space in patient home
- Not allowed on planes
- Patient must wait for oxygen delivery
- Patient may be limited to one portable unit

HomeLox
Portable liquid oxygen generating system

Introducing HomeLox
- Only product in its class
- Portable unit is lightweight with long duration – 10 hours (setting of 2, 20 BPM)
- Patients can fill portable themselves
- No waiting for deliveries
- Can generate portable liquid oxygen as needed in the home

HomeLox

Advantages
- Only product that can generate and store liquid oxygen in the home
- Portable unit is lightweight with long duration – 10 hours
- Hands-free filling process
- No waiting for deliveries
- Very quiet

Disadvantages
- Evaporative loss
- Takes up space in patient home
- Not allowed on planes
Portable oxygen concentrators

- Typically pulse dose delivery systems with integrated electronic OCD
- Some provide continuous flow
- Make oxygen anywhere there is power
- Battery, AC, and DC operation
- Permitted for use onboard many aircraft
- Most devices weigh between 5-10 lbs and as much as 17 lbs
- Battery life, oxygen delivery, size, and weight vary among units

Advantages

- Unlimited oxygen supply – make oxygen anywhere there is AC/DC power
- Freedom from deliveries
- Permitted for use aboard many airlines

Disadvantages

- Greater noise level
- Heavier than smallest portable liquid cylinders
- Fixed oxygen capacity per minute; lack of continuous flow on most units

### Portable oxygen concentrator variability

<table>
<thead>
<tr>
<th>Model</th>
<th>POC A</th>
<th>POC B</th>
<th>POC C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery life (Setting of 2)</td>
<td>2.5 hours</td>
<td>3 hours</td>
<td>8 hours</td>
</tr>
<tr>
<td>Weight</td>
<td>4.4 lbs</td>
<td>9.8 lbs</td>
<td>9.9 lbs</td>
</tr>
<tr>
<td>Settings</td>
<td>1-3</td>
<td>1.5 in .5 increments</td>
<td>1-6 in .5 increments</td>
</tr>
<tr>
<td>Oxygen dosage (Setting of 2)</td>
<td>18</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>Maximum oxygen (ml/min)</td>
<td>500</td>
<td>750</td>
<td>1050</td>
</tr>
</tbody>
</table>

Oxygen conserving devices (OCDs) overview

- Three types
- Used with, or integrated into, portable oxygen systems
- Limit the flow of oxygen to inspiration
- Objectives of OCDs
  - Reduce the weight and/or increase the duration of portable oxygen systems
  - Oxygenate the patient
- 6th LTOT consensus recommendation


Oxygen conserving devices (OCDs)

Source: 2007 Guide to Understanding Oxygen Conserving Devices

Oxygen conserving device

Flow

Source: 2007 Guide to Understanding Oxygen Conserving Devices
**OCD key issues**

- Portable systems use OCDs
  - Liquid, cylinders, portable oxygen concentrators
- OCDs have settings such as 1, 2, 3, 4, 5
- OCD settings are **not** the same as liter flow
  - Setting of 2 ≠ 2 LPM continuous flow
- The OCD setting is equal to a volume of gas
- OCDs operate in different ways and deliver different volumes
- Manual adjustment is often necessary with exercise
- Newest OCD technology: Auto-adjusting

**Decision-making criteria for choosing an OCD**

**Operational**
- Savings ratio
- Battery life
- Weight
- Cannula type
- Ease-of-use

**Clinical**
- Pneumatic versus electronic or auto-adjusting
- Dose volume
- Sensitivity
- Continuous flow
- Maximum oxygen volume per minute

**OCD power options**

OCDs sense an inspiratory signal that opens a valve to deliver oxygen

**Pneumatic**
- Operates from the gas pressure in the supply system
- May need a dual-lumen cannula

**Electronic**
- Battery operated and has the capability to time the cycling of the device
- Portable oxygen concentrators have integrated electronic conservers
- Tend to have better trigger sensitivity
OCD features – sensitivity

- Measure of OCD responsiveness to inspiratory effort
- Determines when the flow of oxygen will be delivered
- Some devices are more sensitive and will deliver oxygen sooner than others
  - If OCD does not sense the patient’s efforts, no oxygen will be delivered
  - If OCD is slow to respond, oxygen will be delivered late in the inspiratory phase

OCD features – dose volume

- Amount of oxygen delivered with each breath
- A higher dose volume will equal a higher FIO₂ at a constant breathing pattern rate
- Dose volumes at the same settings:
  - Differ among manufacturers
  - Can differ among models from the same manufacturer

Other OCD features

Continued flow
- Some provide continuous flow option

Intermittent breath
- Some do not deliver oxygen every breath
- They may skip 1, 2, or 3 breaths

Savings ratio
- Amount of oxygen that the device claims to save compared to continuous flow
- Example 3:1 savings ratio
- Not applicable to portable oxygen concentrators
Testing and evaluation

Awake and with exercise

• Patients should be individually assessed and titrated
• Titrated to the specific device that the patient will be using
• Titrated through various activities of daily living
• Goal is to maintain patient saturation at an acceptable level as determined by treating physician

Testing and evaluation

During sleep

• If concerned about use of OCDs at night; testing during sleep may be advised for:
  – Trigger issues
  – Hypoventilation
• Clinical studies validate clinical efficacy of OCDs with sleeping patients
• Overnight pulse oximetry study may be recommended
• Check with manufacturer concerning use of OCD at night
• Devices have different algorithms and responsiveness

Source: Nocturnal Oxygenation Using a Pulsed-Dose Oxygen-Conserving Device Compared to Continuous Flow, Respiratory Care, March 2006, Vol 51, No 3, p 254

Matching portable oxygen to your patient

Tools to help you choose
Matching portable oxygen to your patient

- Wide choice of portable oxygen systems with varying capabilities
- Systems vary in oxygen delivered, duration, size, weight, ease-of-use, and travel friendliness
- Systems are not "one size fits all"
- Key is to match the clinical capabilities and features of the portable oxygen system to the unique needs of the patient

Matching portable oxygen to your patient

Suggested process to match equipment based on criteria

<table>
<thead>
<tr>
<th>Liter flow</th>
<th>• Flow setting (1-10 LPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to operate equipment</td>
<td>• Strength and dexterity</td>
</tr>
<tr>
<td>Ambulation</td>
<td>• Frequent activity</td>
</tr>
<tr>
<td>Travel</td>
<td>• Frequency and type</td>
</tr>
</tbody>
</table>

Patient evaluation criteria – liter flow

<table>
<thead>
<tr>
<th>Oxygen dose</th>
<th>Portable equipment considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow setting (1-10 liters per min)</td>
<td>• If high liter flow, likely choice is liquid oxygen where available</td>
</tr>
<tr>
<td>Pulse vs. continuous</td>
<td>• If pulse, choice of cylinder, liquid or portable oxygen concentrator (all with oxygen conserving device)</td>
</tr>
<tr>
<td></td>
<td>• If continuous, limited to large cylinder without oxygen conserving device, large liquid system, large portable oxygen concentrator (up to 3 LPM continuous)</td>
</tr>
</tbody>
</table>
### Patient evaluation criteria – ability to operate equipment

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Portable equipment considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength and dexterity</td>
<td>• Higher strength and dexterity required to fill liquid canisters</td>
</tr>
<tr>
<td></td>
<td>• POCs typically require only touch-screen operation</td>
</tr>
<tr>
<td>Cognitive ability</td>
<td>• Assess patient and/or caregiver ability to operate filling systems</td>
</tr>
</tbody>
</table>

### Patient evaluation criteria – ambulation

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Portable equipment considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate activity</td>
<td>• Profile: Leaves house for doctor appointments and other occasional trips</td>
</tr>
<tr>
<td></td>
<td>• Weight of unit more critical than oxygen duration unless length of outing is typically long</td>
</tr>
<tr>
<td>Frequent activity</td>
<td>• Profile: Leaves house frequently; may work part- or full-time</td>
</tr>
<tr>
<td></td>
<td>• Oxygen duration requirements more critical than weight; assess typical amount of time out of house</td>
</tr>
</tbody>
</table>

### Patient evaluation criteria – travel

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Portable equipment considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>• Determine if travel is by land, air, sea</td>
</tr>
<tr>
<td></td>
<td>• Portable oxygen concentrators allowed on many planes</td>
</tr>
<tr>
<td></td>
<td>• Other portable options can work for land and sea</td>
</tr>
<tr>
<td>Frequency</td>
<td>• Frequent travelers may be best suited for a portable oxygen concentrator</td>
</tr>
<tr>
<td></td>
<td>• If infrequent travel, portable oxygen concentrator can be rented or provided as needed</td>
</tr>
</tbody>
</table>
Putting it all together — example patient Mrs. Smith

- Frequent traveler by air and by land at least once per month
  - Family out of state
- 2 LPM, 24 hours per day
  - Can tolerate pulse dose technology
- Highly active
  - Works part time, attends pulmonary rehab, and is active in church
  - 24+ hours of activity per week
- Which system would you recommend?

The Right Fit Oxygen Advisor

About the Right Fit Oxygen Advisor

Oxygen Advisor inputs include:
- Flow rate
- Mean airway pressure
- Arterial saturation
- Ability to sit or stand
- Delivery distance
- Tidal volume

The Advisor gives you to add comments in a text box and can recognize compliance with patient instructions.

The Right Fit Oxygen Advisor

Prescription

Enter the prescription from the physician.

LPM via nasal cannula

If the physician has ordered a liter flow range, please enter the highest value.
The Right Fit Oxygen Advisor

**Prescription**
From theIMPORTANT fields: 
- **UNW** is usually calculated at 0.
- **Web** is also usually calculated at 2.
- **Prescription** is usually calculated at 4.
- **Oxygen** is usually calculated at 0.
- **Minutes per day** is usually calculated at 0.
- **Hours per day** is usually calculated at 0.

**Patient Assessment**
- **Nocturnal oxygen only?**
- **Yes**
- **No**

**Activity**
- **Input the patient’s expected hours of activity per week.**
- **Current days of activity**
- **Monday**
- **Tuesday**
- **Wednesday**
- **Thursday**
- **Friday**
- **Saturday**
- **Sunday**

**Notes**
- **Specify any additional notes or considerations.**

**Oxygen Flow Rate**
- **Set the flow rate based on the prescription.**

**Oxygen Equipment**
- **Select the appropriate equipment based on the prescription.**

**Oxygen Delivery System**
- **Choose the delivery system that best suits the patient’s needs.**

**Oxygen Canister**
- **Select the canister size based on the prescription.**

**Oxygen Mask**
- **Choose the appropriate mask type for the patient.**

**Oxygen Cannula**
- **Select the cannula size based on the prescription.**

**Oxygen Concentrator**
- **Choose the concentrator model that best suits the patient’s needs.**

**Oxygen Timer**
- **Set the timer based on the prescription.**
The Right Fit Oxygen Advisor

Patient Assessment

Does the patient spend time between residences?

Yes

No

next >

The Right Fit Oxygen Advisor

Patient Assessment

Input the patient's distance from the office in miles.

It's the travel value: 33

next >

The Right Fit Oxygen Advisor

Oxygen Advisor Results

Delivered gas equivalent

Interest and Freight

The right fit oxygen calculator

next >
The Right Fit Oxygen Calculator

About the Right Fit Oxygen Calculator

The Right Fit Oxygen Calculator compares the costs of delivered oxygen versus oxygen generating equipment for a new oxygen patient for any number of years. Which system is the most cost effective? Our calculator easily and quickly allows you to make that determination.

- Cost
- Which system is the most cost effective?

Flexibility

Choosing the option to review the costs for the patient and the business quickly determines which system is most cost effective.

As Allies in Better Sleep and Breathing, we make it our #1 priority to work in harmony with caregivers and patients to establish:

- **Healthier patients** by accelerating adoption, maximizing therapy effectiveness and promoting long-term compliance
- **Healthier practices** by enabling care team collaboration and creating easy access to critical information
- **Healthier businesses** by streamlining patient management and increasing efficiency

Allies in Better Sleep and Breathing
CEU certificate

- To obtain your CEU certificate log on to the Philips Respironics’ Partners in Training website at: http://pit.respironics.com
- Log in to the website
- Click on “CEU Online Management System” on the left side