Oxygen Workshop
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Overview

- The Basics
  - Assessment of the need for oxygen
  - Portable oxygen systems
  - Education/Expectations
  - Reimbursement issues
  - Future Trends
Getting The Oxygen Into The Blood

- Oxygen is inhaled and then crosses the walls of the alveoli into passing blood vessels.
Causes of hypoxemia in LAM

- Destruction or loss of the alveolar-capillary membrane due to replacement of lung tissue with cysts impairs the transfer of oxygen from the air sac into the bloodstream.

- There is ‘mismatching’ of areas of poor ventilation (cysts) with areas of good blood flow.
In 1965 two scientific studies documented the benefit of long term oxygen therapy (LTOT) in patients with COPD/ emphysema.

- Nocturnal Oxygen Therapy Trial Group (NOTT). Continuous or nocturnal oxygen therapy in hypoxemic chronic obstructive lung disease:
  
  *A clinical trial demonstrated improved survival for hypoxemic COPD pts. who used oxygen 24 hrs vs only overnight.* (Ann Intern Med. 1980;93:391-8).

Benefits of Oxygen: New Data

**NHLBI Long-Term Oxygen Treatment Trial** (LOTT Trial; New England J of Med 2016)
- Results demonstrated no survival benefit in COPD patients with mild oxygen desaturation, or exercise-induced oxygen desaturation only, who used oxygen compared to those who did not.

**Comparative Effectiveness of Peer-Led Supplemental O2 Infoline for Patients and Caregivers** (PELICAN) (clinicaltrials.gov)
- Tests a ‘peer coaching program vs usual care’
- Outcomes = Adherence, acute care use
Benefits of Oxygen

*If* your oxygen levels are low (<88% on finger pulse oximetry), oxygen therapy *may*:

- Decrease (or prevent) shortness of breath (SOB)
- Decrease stress on the heart (lower heartrate, prevent pulmonary hypertension due to constriction of pulmonary blood vessels)
- Increase activity level
- Improve sleep quality
- Improve quality of life (although using oxygen certainly isn’t easy...)
What Happens If I Qualify for Oxygen, But Don’t Use It?

- Increased heart rate
- Increased breathing rate
- Increased pressure in lung blood vessels
- Increased work for the right side of the heart to pump blood through lungs

*We don’t have data on the impact of short term drops in oxygen saturations (e.g. with daily exercise)*
Overview

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How is your oxygen level measured?

<table>
<thead>
<tr>
<th>INDIRECTLY</th>
<th>DIRECTLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse Oximetry (O2 Sats)</td>
<td>Arterial Blood Sample (ABG)</td>
</tr>
<tr>
<td>Six minute walk (6MW), or exercise oximetry</td>
<td>Done as needed with PFTS, Routine Study</td>
</tr>
<tr>
<td>Continuously monitoring- in hospital, or overnight at home</td>
<td>Sometimes done during hospitalization</td>
</tr>
<tr>
<td>Use finger, earlobe, or forehead</td>
<td>Uses radial artery in wrist</td>
</tr>
</tbody>
</table>
If I am Short of Breath, Does it Mean I Need Oxygen?

Not necessarily. Shortness of breath, especially with activity, is common in patients with LAM.

**Causes of SOB include:**
- greater ‘work’ to breathe due to the change in the lung mechanics
- obstruction to air flow due to changes in the airways
- low oxygen levels
- muscle deconditioning
- carrying extra body weight
- pleural effusions (fluid around the lung - sometimes from chyle
- fluid in abdomen (abdominal ascites) that pushes up on diaphragm
Common Questions:

- **Will I get addicted to oxygen?** No; oxygen is not addicting-you only use what your body needs.

- **Will I need more once I start using it?** Maybe; if your condition progresses your oxygen requirements might increase.

- **Will my oxygen or tank spontaneously catch on fire?** No unless you directly have the flow of oxygen over an open flame (smoking, cooking over open flame stove with cannula very close to flame)
Do you need oxygen? Probably if your pulse oximetry is $\leq 88\%$

<table>
<thead>
<tr>
<th>SITUATION</th>
<th>Oximetry Testing on ‘Room Air’</th>
</tr>
</thead>
<tbody>
<tr>
<td>At rest</td>
<td>Resting Pulse Oximetry</td>
</tr>
<tr>
<td>With activity</td>
<td>Exercise Pulse Oximetry (6 minute walk, stairs, etc...)</td>
</tr>
<tr>
<td>During sleep</td>
<td>Sleep Overnight Pulse Oximetry (while you sleep)</td>
</tr>
<tr>
<td>At altitude</td>
<td>High Altitude Simulation Test (HAST) breathing lower oxygen concentration</td>
</tr>
</tbody>
</table>
How is the Amount of Oxygen Prescribed? *Exercise Oximetry or a Six Minute Walk*

<table>
<thead>
<tr>
<th>Example</th>
<th>Oxygen Liter Flow or Setting</th>
<th>Finger Pulse Oxygen Saturation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest</td>
<td>Room air</td>
<td>95%</td>
</tr>
<tr>
<td>Walking</td>
<td>Room air</td>
<td>86%</td>
</tr>
<tr>
<td>Walking</td>
<td>2 L/m</td>
<td>87%</td>
</tr>
<tr>
<td>Walking</td>
<td>4 L/m</td>
<td>92%</td>
</tr>
</tbody>
</table>
How Is Oxygen Prescribed? Insurance Requirements

“Certificate of Medical Necessity (CMN)”:  
- Oxygen saturation at rest and exercise on ‘room air’ 
- Oxygen saturation at rest and exercise on supplemental oxygen 
- Documentation in MD “face-to-face” visit notes that:
  - oxygen is medically necessary
  - portable oxygen is needed
  - how long oxygen is needed
  - what flow rate AND what type of oxygen
- Specific order needed conserving device, or pulse-dose
- Liter flow prescription needed for rest, exercise, sleep
Oxygen Levels and Altitude:
The higher you go, the less there is!

<table>
<thead>
<tr>
<th></th>
<th>Sea Level</th>
<th>8000 feet</th>
</tr>
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<tbody>
<tr>
<td>O2 pressure</td>
<td>760 mmHg</td>
<td>560 mmHg</td>
</tr>
<tr>
<td>Pa02</td>
<td>98 mmHg</td>
<td>60-70 mmHg</td>
</tr>
</tbody>
</table>
What About Flying?

- Cabins are pressurized to 8000 ft which simulates altitude or breathing 15% oxygen

- Currently the FAA allows many portable oxygen concentrators (POCs)

- You need to arrange oxygen during flight **IN ADVANCE**

- Contact Airlines Medical section to fax your MD the necessary forms 4 weeks before your flight. Carry form/orders with you.
Overview

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- Education/Expectations
- Reimbursement issues Future Trends
What Types of Oxygen Systems are Available?

- **Compressed Gas**
  1. Green E tanks, or smaller ones (M6 or B, C,)
  2. Homefill or Transfill Systems (compressed gas that you can refill at home) usually with D size tanks

- **Liquid Oxygen**
  1. Refillable at home- Liberator, Marathon, Helios

- **Concentrator**: removes oxygen from air and purifies it
  1. Stationary (not portable) plugs into wall
  2. Portable Oxygen Concentrators (POCs)
What Types of Flow are Available?

**Continuous Flow**
1. Delivers oxygen throughout the breathing cycle
2. 4 L/min on a continuous flow does not provide the same amount of oxygen on a pulse dose system set at 4.

**Pulse or Demand Flow**
1. Oxygen only flows when you breathe in; flow is triggered when you start to inhale

2. Minute volume delivery = set amount of oxygen delivered per minute, no matter how fast you are breathing. The volume of oxygen in each ‘pulse’ goes down as your respiratory rate goes up.

3. Fixed pulse delivery = same pulse volume delivered no matter what your rate of breathing
Compressed Gas:

**E Tank:** compressed gas, semi-portable, lasts 3 hrs. on 3L/min continuous or 1.5 hrs on 5 L/min

**M6 (B) Tank:** compressed gas, portable, lasts with OCD or OCR

**Transfill Systems:**
- Homefill
- I Fill
- Ultra Fill
Liquid Oxygen

Liquid Portable

- Portable delivers up to 10 L/min. cont flow (different units for higher flow). Evaporates if not used
- Uses homefill system
- Higher costs of liquid:
  - More frequent delivery
  - Longer time to service
  - More customer needs

Refill from reservoir
Portable Oxygen Concentrators: Size Matters!

- One size does not fit all! (Range 3-20 lbs)
- Uses battery; concentrates ambient air to 90-96% oxygen
- Can run off DC power—although more difficult at higher flow
- FAA approved; need 1 ½ battery life for length of flight
- No continuous flow > setting of 3; or flor pulse over 6
- Higher liter flow = shorter battery life
- Very important to get tested on the system BEFORE you receive it, or purchase it
- Beware marketing!
**How Does an Oxygen Concentrator Work?**

1. An Oxygen Concentrator draws in ambient air and produces medical grade oxygen. The air we breathe is roughly 21% Oxygen and 79% Nitrogen. Once processed, the air delivered to the oxygen user is 90% to 95% pure oxygen.

2. The motor draws in air through the intake filters and pushes it to the sieve beds.

3. Inside the sieve beds, granulates of medical sieve absorb most of the Nitrogen, leaving almost pure Oxygen. The Oxygen is then sent to the holding tank.

4. The holding tank contains a pressure regulator and flow meter that work to ensure the patient receives the proper bolus dose.

5. The Oxygen burst is then delivered via cannula to the patient.
Portable Oxygen Concentrators

Battery Life
- Continuous flow uses battery more quickly
- Higher pulse flow uses battery more quickly
- Higher breathing rate uses battery more quickly
- Time to charge battery varies between POCs
  - Example: 3 L/m pulse lasts 2.5 hrs breathing at 15 BPM, or 1.5 hours breathing at 30 BPM

Weight: includes cart, AC/DC power supplies, battery

Warranty: if purchased: unit and battery coverage separate, shipping? Replacement? Servicing?
Portable Oxygen Concentrators:

The Pulmonary Paper ‘POC Annual Review’ is a Great Resource
How Is Oxygen Prescribed: Equipment issues

- **TIP:** Ask the company first if they have the type of system you want BEFORE you have them set up your oxygen. You can talk about this with your health care team.

- It is challenging to change companies after starting a 5 year contract with them.

- Different companies may offer different portable options.
Problems for Oxygen Users

- **Dry/bloody nose**
  - Use humidifier on concentrator if using over 4L/min
  - Use nasal lubricants designed for oxygen users

- **Skin irritation**
  - Soft tubing “Softech”
  - Foam/fleece padding
  - Non latex cannulas
  - Everest silicone cannulas (Tonopah Medical)
    - [Visit Tonopah Medical website](http://www.tonopahmed.com/products/everest.htm)
Aesthetics

Oxy-View glasses
(oxyview.com)
Overview

- The Basics
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- Education/Expectations
- Reimbursement issues impacting the future
- Future Trends
Education

- Get instruction and education on how to use your equipment
- Know your exact oxygen prescription for rest, exercise, sleep
- Make sure you are tested on the equipment given to you (bring it to clinic with you as well)
- It is important to be re-tested at intervals as sometimes oxygen needs can change
- Have a number to call if questions or problems with your equipment
- Clarify realistic expectations with your care team
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US Medicare Competitive Bidding Program began in January 2011

Medicare reimbursement to oxygen providers was cut by about 30%-40%

The goal was to decrease fraud, cut costs

Lowered Medicare payments to DME oxygen companies have eliminated liquid oxygen for most providers

In general, services have been significantly impacted but not well documented.
What you can do if you have questions about your service

- Contact your physician to clarify that the orders are correct for your oxygen needs
- Refuse any change in equipment that your supplier is requesting; put this in writing
- Contact Medicare as needed who can refer you to a Competitive Acquisition Ombudsman (CAO)
You have been asked to complete this questionnaire because you are an adult with a lung condition that requires you to use supplemental oxygen. This questionnaire is part of a research study to collect detailed information that will help healthcare providers, oxygen suppliers, insurance companies, Medicare, and others to better understand what types of home oxygen services are being used, and what kinds of challenges and problems patients face when using home oxygen. The results of this survey will be used to develop strategies to improve supplemental oxygen services for patients.

This questionnaire will take approximately 20 minutes for you to complete and it will not include any information that identifies you. Completing this questionnaire is voluntary, you can stop at any time, and if there are questions that you prefer not to answer, you do not have to answer them.

This survey was developed by the American Thoracic Society’s Nursing Assembly “Oxygen Working Group” in collaboration with the AARC, COPD, Alpha 1, PHA, PFF, and LAM Foundations. If you have any question about this survey, please call (650) 725-8083.

AARC—American Association of Respiratory Care
COPD-Chronic Obstructive Pulmonary Disease Foundation
Alpha-1- Alpha-1 Anthrpysin Deficiency Foundation
PHA-Pulmonary Hypertension Association
PFF-Pulmonary Fibrosis Foundation
LAM-Lymphangiolieomyomatosis Foundation
Background

Pulmonary clinicians and patients report intolerable barriers to home oxygen services, including insufficient supply, inadequate portable options, and equipment malfunction. Oxygen users have not been surveyed to describe these issues.

Purpose

To describe the frequency and types of problems experienced by adult home oxygen users in the United States.

Methods

Online, 20-minute, 60-item, survey developed by the ATS Nursing Oxygen Working Group

Postings on ATS Public Advisory Roundtable and multiple patient and professional websites.
Patient Supplemental Oxygen Survey (cont’d):
Results of the American Thoracic Society Nursing Assembly Oxygen Working Group
S.S. Jacobs¹, K.O. Lindell², E.G. Collins³, C.M. Garvey⁴, C. Hernandez⁵, S. Mclaughlin⁶, A.M. Schneidman⁷, P.M. Meek⁸

Results:

- 1926 respondents, average age 64 yrs., 72% female, representing all 50 states

- 39% COPD, 26% ILD, 18% PAH, 8% AATD, 4% LAM, 5% other

- 43% reported that their portable system limited their activity outside the home “Frequently” or “All the time”

- 35% reported being either “very” or “somewhat” unprepared to operate equipment even after instruction
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Oxygen Problems “No” vs “Yes” by Diagnosis

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>COPD</td>
<td>56%</td>
<td>44%</td>
</tr>
<tr>
<td>ILD</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>PAH</td>
<td>61%</td>
<td>39%</td>
</tr>
<tr>
<td>AATD</td>
<td>49%</td>
<td>51%</td>
</tr>
<tr>
<td>LAM</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>Other</td>
<td>45%</td>
<td>55%</td>
</tr>
<tr>
<td>Total</td>
<td>49%</td>
<td>51%</td>
</tr>
</tbody>
</table>
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What types of oxygen problems do you have? (n=899)
(Able to select more than one choice)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment Not Working</td>
<td>499</td>
</tr>
<tr>
<td>Travel oxygen problems</td>
<td>268</td>
</tr>
<tr>
<td>Delivery Problems</td>
<td>267</td>
</tr>
<tr>
<td>Lack of portables I can manage</td>
<td>260</td>
</tr>
<tr>
<td>Other</td>
<td>220</td>
</tr>
<tr>
<td>Lack of high flow portable systems</td>
<td>219</td>
</tr>
<tr>
<td>Not enough tanks for activity outside home</td>
<td>201</td>
</tr>
<tr>
<td>Can’t change companies</td>
<td>177</td>
</tr>
<tr>
<td>Company does not respond to calls</td>
<td>169</td>
</tr>
<tr>
<td>Incorrect or delayed MD orders</td>
<td>166</td>
</tr>
<tr>
<td>Can't mix systems</td>
<td>123</td>
</tr>
<tr>
<td>Need or used to use liquid and can't get</td>
<td>86</td>
</tr>
<tr>
<td>Bills not explained</td>
<td>68</td>
</tr>
<tr>
<td>Not enough portables so I can work</td>
<td>40</td>
</tr>
</tbody>
</table>

Average # problems per respondent = 3.5
Patient Supplemental Oxygen Survey (cont’d):
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Actual vs Desired Hours That Portable Oxygen Lasts

<table>
<thead>
<tr>
<th></th>
<th>Actual Hrs. (n=1585)</th>
<th>Desired Hrs. (n=1543)</th>
</tr>
</thead>
<tbody>
<tr>
<td>About 1 hr. or less</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Up to 2 hrs.</td>
<td></td>
<td>38%</td>
</tr>
<tr>
<td>Up to 4 hrs.</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>5-6 hrs.</td>
<td>15%</td>
<td>66%</td>
</tr>
<tr>
<td>More than 6 hrs.</td>
<td>4%</td>
<td>15%</td>
</tr>
</tbody>
</table>
Overview

The Basics
Assessment of the need for oxygen
Available oxygen systems
Education/Expectations
Reimbursement issues
Future Trends
The Future Priority = Lobbying for Oxygen

- Medicare Ombudsman for complaints and advice of your rights 1 800 633 4227
- COPD info line 1 866 316 2673
- Write congressman re: impact of oxygen reimbursement issues to you personally
- Contact MDs that are on Medicare Boards
Resources

National Home Oxygen Patients Association  www.homeoxygen.org

Sea Puffers Cruises  www.seapuffers.com

Worldwide Oxygen Services  1 800 391-2041

www.nonin.com  Nonin oximeter  1 800 882 8889

www.pulseox.info

http://www.oxygenplusconcentrators.com/concentrators.html

www.pulmonarypaper.org  1 800 950 3698

www.oxyview.com  1 877 699 8439

www.COPDfoundation.org  Supplemental Oxygen

Supplemental Oxygen Guide  www.thelamfoundation.org

Oxygen:  Know Your Patient Rights  www.COPDfoundation.org


Oxygen Education:  http://www.pulmonaryfibrosis.org/docs/default-source/Webinars/september-3_webinar-slides.pdf

Thank you! Questions?