

Pulmonary Disease and Air Travel

Traveler Summary

Key Points

- Oxygen levels in an airplane cabin fall with increasing altitude and at high-altitude destinations, resulting in danger for persons with a preexisting pulmonary disorder.
- Stabilization and correct management of pulmonary conditions before travel is important. Medication changes should not occur within 2 weeks of long-distance travel. If under a pulmonologist's ongoing care, specific clearance for each trip should be obtained.
- Travelers with chest surgery, lung collapse, or pleural effusion diagnosis within 1 to 2 weeks of travel, as well as those with active TB, bloody sputum, COPD with an FEV1 of less than 30%, or who require supplemental oxygen over 4L/minute at home, cannot fly.
- Obtain travel medical and evacuation insurance that covers preexisting pulmonary conditions.
- Medical history and a record of baseline pulmonary function and oxygen saturations should be carried or stored in an email inbox or an app for immediate availability during travel.
- Not all airlines permit in-flight nebulizer treatments.
- In-flight oxygen to be supplied by the airline needs to be prearranged well in advance. An online medical application must be completed, often in concert with a treating physician. Most airlines will require results of a recent arterial blood gas measurement. Requirements of connecting and code-share airlines must be complied with. Separate arrangements need to be made for oxygen within all airports en route.
- Some airlines may not permit portable oxygen concentrators (POC) and instead require use of the airline oxygen (see airline websites for allowed POC models). If a POC is used, be sure to carry spare batteries in hand luggage and have enough to last 150% of entire trip duration because in-flight power may not be available.

Introduction

Healthy passengers usually tolerate air travel well, but the aircraft cabin environment can challenge those with pulmonary disease. Approximately 12% of in-flight emergencies are due to respiratory problems, which is the third most frequent cause of diversions due to medical emergencies. Persons with significantly compromising pulmonary disease require advance planning for travel, including risk assessment, basic planning measures and advice, vaccinations, and information on flying with oxygen or other medical devices. Persons who become short of breath when walking should arrange for help at airports and hotels and request a wheelchair if needed. Travelers should also ensure that they have adequate medical insurance and consider obtaining evacuation insurance.

Effects of Flight

The air pressure in an airplane cabin falls with increasing altitude, resulting in a decrease in blood oxygen level (hypoxemia), more so in elderly passengers. Hypoxemia has a wide range of effects on circulation, but the effects do not become apparent until marked hypoxemia occurs. Cabin altitude hypoxia may pose an extra hazard for persons who are already at high risk from a preexisting pulmonary disorder, especially if it is unstable.

Risk Factors

Persons with severe pulmonary disease risk worsening due to hypoxemia during flight. Persons with stable pulmonary conditions, such as well-controlled asthma, will likely tolerate the typical cabin air pressures unless a critical risk factor is already present at sea level. Persons with unstable pulmonary conditions should delay flying until the condition has stabilized. Each airline has a medical clearance procedure, which may be adapted based on local laws and regulations. Flying/traveling to high elevations and scuba diving are not advisable for travelers with severe pulmonary disease.

Persons with any of the following conditions should not travel by air:

- Pneumothorax (collapsed lung) within 2 to 3 weeks prior to travel
- Pleural effusion (excess fluid occurring between the pleural layers) within 2 weeks prior to travel
- Major chest surgery within 10 to 14 days prior to travel

- Active tuberculosis
- Major hemoptysis (coughing up bloody sputum or mucus)
- High supplemental oxygen requirements at sea level that are greater than 4 L/minute

The following conditions might cause difficulties as well:

- History of previous air travel intolerance
- Severe chronic obstructive lung disease (COPD)
- Severe asthma
- Severe restrictive lung disease (reduced lung volume)
- Cystic fibrosis
- Bullous lung disease
- Preexisting requirement for oxygen or ventilator support
- Recent hospitalization for acute respiratory illness (within 6 weeks prior to travel)
- Active lower respiratory infection
- History or risk of blood clots that form in a vein

Symptoms

During flight, difficulty breathing, air hunger, rapid breathing, wheezing, light-headedness, chest discomfort, heart racing or pounding, and tingling or numbness in the skin may indicate respiratory compromise.

Need for Medical Assistance

Hypoxemia can be life threatening. Persons experiencing symptoms as noted above in flight should seek immediate medical attention.

Prevention

Fitness to Fly Assessment

Some passengers that need special medical consideration may be asked to submit the airline's passenger medical clearance form. This may involve clearance for fitness to fly from the airline's Aviation Medicine Unit. Guidelines differ among the airlines; therefore, passengers should check with specific airlines to clarify. Medical clearance to fly may be required for a passenger with:

- A recent illness, hospitalization, injury, or surgery that may need extraordinary medical assistance during the flight.
- An existing medical condition that may need extraordinary medical assistance during the flight.
- A need for supplemental oxygen during the flight or a portable oxygen concentrator (POC).
- A need for medical equipment, such as a stretcher or incubator.

Basic Pretravel Planning Measures

Travelers should:

- Plan a pretravel consultation at least 4 to 6 weeks before departure.
- Notify the health care provider or travel medicine provider of any prior intolerance of air travel and provide a medical history and baseline laboratory results if available.
- Carry a letter with physician's official letterhead that lists medical conditions, medications prescribed, any medical supplies such as oxygen, continuous positive airway pressure (CPAP) machines, or nebulizers.
- Pack sufficient medications for the trip (plus extras in the event of delays); carry medications in original containers in carry-on luggage and carry a copy of the prescriptions.
- Vaccinations should be up to date prior to travel, especially influenza (inactivated) and pneumococcal.
- Clarify health insurance coverage internationally and obtain supplemental insurance and evacuation insurance if needed.
- Have a clear plan of action in the event that complications arise during travel, including how to handle emergencies at any time of day or night, who to contact, and method of transport to a preferred provider or hospital.
- Identify a medical provider at the destination country that can manage the underlying pulmonary disease.

- Pack a first aid/medical kit with consideration for underlying pulmonary disease including antivirals for influenza, antibiotics for respiratory tract infections, and steroids and an albuterol inhaler for asthma attacks. Consider carrying a face mask for travel to areas with severe air pollution. See *Packing Personal Medications and Supplies*.
- Wear a medical alert bracelet or carry medical information identifying the underlying problem.
- Explore information resource including booklets for travel with pulmonary disease:
 - See British Lung Foundation (www.blf.org.uk/Page/Travel).

Flying with Oxygen and Medical Equipment or Devices

Persons needing oxygen should carry their own supply and verify that supplemental oxygen is available if needed. Some individuals who are not oxygen-dependent on the ground may require oxygen during air travel due to the lower cabin pressure and oxygen levels. These persons should also verify that supplies of oxygen are available at the destination.

Most POCs are not considered hazardous equipment but they may not be allowed on all flights, so travelers should be advised to contact the airline well ahead of flying. In-flight oxygen can be arranged by contacting the airline at least 48 hours before the scheduled flight. Even if using the airline's oxygen while in flight, the traveler will still need to arrange for supplemental oxygen during transfers, layovers, and at the destination. A physician's prescription is required for in-flight oxygen that states the flight duration, intermittent or continuous use, and flow rate at 2,400 m (8,000 ft), with an extra supply in case of flight delays.

Most POC, CPAP, bi-level positive airway pressure (BiPAP), and automatic positive airway pressure (APAP) devices, as well as some nebulizers, are designed to operate on both AC and DC battery currents. In the US, the AC current from wall outlets is 110 volts. Overseas, the AC current is usually 220 or 240 volts; a plug adaptor may be needed.

If travelers or their health care providers have concerns about fitness for air travel or the need to obtain a medical certificate before travel, the medical unit affiliated with the specific airline is a valuable source for information. Travelers can contact TSA Cares Help Line (toll-free at 855-787-2227) or check website information (<https://www.tsa.gov/travel/special-procedures>) to obtain information on how to prepare for the airport security screening process with respect to a particular disability or medical condition.

Table: Flying with Health Care Devices

Device	Examples/Types of Product	Airline Allowance or Provision	Security Screening Process ^{1, 2}	Comment
Bronchodilator inhaler	Metered dose inhalers (MDI)	<i>Allowed in carry-on:</i> yes <i>Use during flight:</i> yes Not provided by airlines	Subject to screening	Requires prescription
Nebulizer	Air compressor/ultrasonic device for delivery of aerosolized solutions for inhalation	<i>Allowed in carry-on:</i> yes <i>Use during flight:</i> Check with the airline because policies may differ. May be provided by some airlines; check with the airline when booking.	Subject to screening, including x-ray Nebulizer solutions must meet requirements for liquids that are medically necessary. ³	Nebulizer solution requires prescription. If nebulizer cannot be used during flight, consider a pretreatment prior to boarding. Charge portable devices prior to travel.

1. Inform a screening officer of the device and any special requirements before the screening process begins.
2. If the device cannot be x-rayed (or x-rayed adequately), an inspection and testing for traces of explosives will be done (which may necessitate removal of the device from its protective plastic bag). Tubing and face masks may remain in the case.
3. Medically required liquids are permitted to be brought on an aircraft utilizing the Transportation Security Administration (TSA) 3-1-1 rule for carry-ons, which allows liquids of 100 mL (3.4 oz) or less in bottles in a quart-sized plastic zip-top bag per traveler. Medically necessary amounts > 100 mL are allowed in a carry-on but must be declared to the TSA agent prior to screening. Liquids, gels, and aerosols are typically screened by X-ray, and medically necessary items > 100 mL will receive additional screening.
4. In the US, air carriers with 19 or more seats must permit a person with a disability to use a ventilator, respirator, CPAP machine, or POC if it meets applicable FAA requirements.
5. Travelers with a POC not on the FAA-approved list may still wish to bring it along for use at the destination and rent an approved POC for use in flight.

Device	Examples/Types of Product	Airline Allowance or Provision	Security Screening Process ^{1, 2}	Comment
Portable oxygen concentrator (POC) ^{4, 5}	<p>Any POC bearing the FAA-approved red label stating: "The manufacturer of this POC has determined this device conforms to all applicable FAA acceptance criteria for POC carriage and use on board aircraft." Previous FAA-approved POCs (listed below) are excluded from label requirement.</p> <p><u>Previously FAA-approved POCs:</u></p> <ul style="list-style-type: none"> • AirSep FreeStyle • AirSep Freestyle 5 • AirSep LifeStyle • AirSep Focus • (Caire) SeQual eQuinox/Oxywell (model 4000) • Delphi RS-00400/Oxus RS-00400 • Devilbiss • Healthcare iGo • Inogen One • Inogen One (G2 or G3) • Inova Labs LifeChoice Activox • International Biophysics LifeChoice/Inova Labs LifeChoice • Invacare XPO2/XPO100 • Invacare SOLO₂ • Oxlife Independence Oxygen Concentrator • Precision Medical EasyPulse • Philips Respironics EverGo • Philips Respironics SimplyGo • SeQual Eclipse • SeQual SAROS • VBox Trooper 	<p><i>Allowed on board:</i> yes</p> <p><i>Use during flight:</i> Check with the airline because policies may differ. Some require use of the aircraft's on-board oxygen whereas others allow use of POC on the ground but require a switch to the aircraft's oxygen during flight.</p>	<p>Subject to screening, including x-ray</p> <p><i>Traveler can completely disconnect from the POC:</i> Place the equipment in checked luggage whenever possible.</p> <p><i>Traveler can disconnect during screening but is bringing the POC in carry-on baggage:</i> The equipment will either undergo x-ray screening or inspection.</p> <p><i>If a traveler cannot disconnect or chooses not to be screened by imaging technology or a walk-through metal detector:</i> The traveler will be screened using a thorough pat-down procedure instead, which is also used to resolve any metal detector alarms or anomalies identified by imaging technology.</p>	<p>A physician's order is required to carry oxygen.</p> <p>All POCs (including their batteries) must be appropriately protected from damage.</p> <p>Airline-supplied oxygen face masks are often uncomfortable. Personal nasal prongs, extra connectors, and small scissors should be carried aboard for back-up.</p> <p>US companies that rent FAA-approved POCs:</p> <ul style="list-style-type: none"> • OxygenToGo (http://oxygenwego.com) • Advanced Aeromedical (http://aeromedical.com)
CPAP-type devices ⁴	<p><i>CPAP:</i> Delivers constant airway pressure via CPAP mask.</p> <p><i>APAP or AutoCPAP:</i> Titrates air pressure to determine optimum level.</p> <p><i>BiPAP or bi-level:</i> Positive airway pressure helps to keep upper airways of lungs open by providing flow of air delivered through a face mask.</p> <p>Device must display manufacturer's label showing that the device meets FAA requirements.</p>	<p><i>Allowed on board:</i> yes</p> <p><i>Use during flight:</i> Check with the airline because policies may differ.</p> <p><i>Note:</i> In the US, CPAP machines are not counted as an allotted carry-on item for air travel; however, they are counted as such in some locations in Asia and Europe.</p>	<p>Subject to screening, including x-ray</p>	<p>Requires prescription</p>

1. Inform a screening officer of the device and any special requirements before the screening process begins.
2. If the device cannot be x-rayed (or x-rayed adequately), an inspection and testing for traces of explosives will be done (which may necessitate removal of the device from its protective plastic bag). Tubing and face masks may remain in the case.
3. Medically required liquids are permitted to be brought on an aircraft utilizing the Transportation Security Administration (TSA) 3-1-1 rule for carry-ons, which allows liquids of 100 mL (3.4 oz) or less in bottles in a quart-sized plastic zip-top bag per traveler. Medically necessary amounts > 100 mL are allowed in a carry-on but must be declared to the TSA agent prior to screening. Liquids, gels, and aerosols are typically screened by X-ray, and medically necessary items > 100 mL will receive additional screening.
4. In the US, air carriers with 19 or more seats must permit a person with a disability to use a ventilator, respirator, CPAP machine, or POC if it meets applicable FAA requirements.
5. Travelers with a POC not on the FAA-approved list may still wish to bring it along for use at the destination and rent an approved POC for use in flight.

