

Primary Care Respiratory Society UK - Opinion No.54

Opinion

Fitness to Fly for Passengers with Lung Disease

The flight environment and effects of altitude on people with existing lung disease

In general, commercial aircraft are pressurised to cabin altitudes of up to 8,000 ft (2438 m). At 8,000 ft (2438 m) the partial pressure of oxygen falls and equates to 15.1% oxygen at sea level. In healthy passengers exposed to this altitude arterial oxygen tension (PaO₂) falls to between 8.0 and 10.0 kPa (60-75 mmHg, SpO₂ 89-94%) at rest, and may fall further when walking or sleeping. Physiological compensation consists of mild to moderate hyperventilation, limited by a decrease in arterial carbon dioxide tension (PaCO₂), and a moderate tachycardia. Exposure to this altitude may therefore worsen pre-existing hypoxaemia . The fall in atmospheric pressure will also cause expansion (by 38%) of air present in, for example, a non-communicating bulla or residual pneumothorax. Overcrowding during commercial air travel, as during other forms of travel, may cause immobility, doubling the risk of venous thromboembolism on flights over four hours; and increasing exposure to infection.1,2

What criteria should be employed for those working in primary care when assessing whether a patient with a respiratory condition can or cannot be allowed to fly?

Although FEV₁ and SpO₂ are valuable markers of clinical severity, neither reliably predict hypoxaemia or other complications of air travel in those with respiratory disease.³⁻⁷ A practical approach to patients at risk of complications following air travel is thus required.

Primary healthcare practitioners should note the patient's previous experience of air travel and the length of the proposed flight. The proposed destination should be recorded, in particular whether the patient will be staying at high altitude, since the patient may require oxygen at their destination. The patient's ability to walk is important since departure gates and hubs are often situated at some considerable distance from the airport terminal. In general, patients should be stable and fully recovered from any recent exacerbation before flying. The patient's usual care, including bronchodilator therapy and inhaler technique, should be optimised before air travel, and prescription of emergency supplies of oral corticosteroids and antibiotics should be considered. Patients should be advised to plan their trip and arrange any extra services with the airline (including oxygen, wheelchair, or use of their own portable equipment on board) well in advance.

Patients should not fly on commercial aircraft if they have infectious tuberculosis, a pneumothorax with persistent air leak, or major haemoptysis. Commercial aircraft do not routinely supply oxygen at flow rates above 4L/min, and those requiring long term oxygen therapy (LTOT) at flow rates at or above 4L/min are therefore not usually eligible to fly on commercial flights. Current BTS advice is to delay air travel for infants born at term (>37 weeks) for one week to ensure they are healthy.⁸

When should a GP/practice respiratory nurse refer for further assessment?

Specialist respiratory assessment is advised for adults if there is a history of significant respiratory symptoms during air travel (dysphoea, chest pain, confusion or syncope), severe airflow obstruction (FEV₁ < 30% predicted), bullous lung disease, or severe (VC <1L) restrictive disease (including chest wall and respiratory muscle disorders), especially where these conditions are associated with hypoxaemia (O2 saturation <95%) and/or hypercapnia. Specialist respiratory advice should be sought if the patient is suspected of having, or is being treated for, pulmonary or laryngeal tuberculosis, has had a recent pneumothorax, or is at increased risk of venous thromboembolism. Specialist assessment is also advised if there are co-morbidities such as cardiovascular disease, cerebrovascular disease or pulmonary hypertension, or if the patient is taking immunosuppressant therapy. Patients with a preexisting requirement for oxygen, continuous positive airway pressure CPAP or ventilatory support should be referred for specialist advice and/or evaluation.

All infants born prematurely (<37 weeks) who have not yet reached their expected date of delivery, and infants under 1 year with a history of neonatal chronic respiratory problems, should be assessed by a specialist respiratory paediatrician. Specialist advice is also recommended for those with cystic fibrosis or other chronic lung disease, infants and children who are oxygen-dependent at sea level, and those who have received long term oxygen therapy in the last six months.

What investigations/assessment will be carried out following referral?

In addition to history, examination, radiology, pulse oximetry and lung function testing as appropriate, hypoxic challenge testing (HCT) may be performed to decide whether the patient needs in-flight oxygen. HCT is performed in a specialist lung function unit after referral to a respiratory specialist.

The ideal test, which involves exposing the patient to hypoxia in a hypobaric chamber, is not readily available, and HCT as described by Gong9 is therefore frequently used. It assumes that breathing a hypoxic gas mixture at sea level equates to the hypobaric hypoxia experienced at altitude. A cabin altitude of 8000 ft (2438 m) can be simulated at sea level with a gas mixture containing 15% oxygen in nitrogen. Patients are usually required to breathe the hypoxic gas mixture for 20 minutes. Pulse oximetry is monitored throughout; arterial blood gases may also be determined before and after the test.

Fifteen percent oxygen can be given through a mouthpiece or tight-fitting face mask. A modified body box can also be filled with a gas mixture containing 15% oxygen to provide a hypoxic environment without resorting to a face mask or mouthpiece. This allows oxygen requirements to be titrated using nasal cannulae to supply oxygen, and is the method of choice for **Generic advice** British Lung Foundation British Thoracic Society European Lung Foundation

Specialist advice

American Sleep Apnea Association Pulmonary Hypertension Association Grown Up Congenital Heart Patients Association US National Home Oxygen Patients Association

Travel insurance

 Patients are strongly advised to take out travel insurance which covers their health needs. The following UK-based organisations may be able to advise on purchasing insurance policies suitable for patients with disabilities and/or medical needs.

 Association of British Insurers
 www.abi.org.uk

 Post Office
 www.postoffice.co.uk

 SAGA
 www.saga.co.uk

 Age UK
 www.ageuk.org.uk

www.lunguk.org

www.brit-thoracic.org.uk

www.sleepapnea.org

www.guch.org.uk

www.phassociation.org

www.homeoxygen.org

http://www.european-lung-foundation.org/4059-

european-lung-foundation-elf-air-travel.htm

infants or young children, who can be seated in the body box with the carer during the test. An inexpensive alternative for adults or older children is to give a similar level of hypoxic gas mixture via a commercial 40% venturi mask, with 100% nitrogen as the driving gas.

In-flight oxygen is usually recommended if PaO_2 falls below 6.6 kPa (50 mmHg) or SpO₂ falls below 85%.¹⁰ These figures have little supporting evidence, but have been widely accepted in the UK, continental Europe and North America.

It should be made clear to patients that the HCT is not a 'fitness to fly' test, but is used to determine whether a patient needs in-flight oxygen, and that even with in-flight oxygen, safety during or after air travel cannot be guaranteed.

What are the different requirements for airlines, travel agents and insurers?

Information is available from various sources as indicated in the table above. Where possible, patients and/or their carers' are advised to contact different airlines flying to their chosen destination. Some airlines charge for providing oxygen or other services, and fees may vary.

Information for patients travelling with oxygen

In-flight oxygen is prescribed at a rate of 2L or 4L/min and given by nasal cannulae; it should be used according to the aircrew's instructions. For patients already on LTOT current BTS advice is to double the flow rate once cruising altitude is reached; aircrew may ask patients to switch it off immediately before descent. The airline must be consulted well in advance if humidification equipment is needed. Patients may be able to take their own small, full cylinders on board if agreed with the airline beforehand; patients should check whether their equipment is insured against loss and/or damage.

Many airlines now employ pulsed dose (breath-activated) devices in order to conserve oxygen supplies. Some of these are unsuitable for frail, very young (under 6 years old) or very small (≤13kg) passengers with irregular or shallow patterns of breathing. It is advisable to check beforehand that such patients can activate the system. If the device proves unsuitable, an alternative may be agreed with the airline.

Lightweight battery operated portable oxygen concentrators (POCs) are becoming popular and their use on board is allowed by many airlines. US legislation permits certain types for use in all phases of flight (http://rgl.faa.gov). Additional batteries to cover the flight and possible delays must be taken, and the airline consulted in advance.

Before travelling, patients and/or carers should consider the need for oxygen on the ground and while changing flights, as airlines do not provide oxygen at airports. Direct flights are preferable, but if connecting flights are unavoidable, separate arrangements must be made for oxygen while on the ground during stopovers. The main oxygen distributors have an international distribution network and can supply oxygen at intended destinations if active in those areas; they are likely to charge for this service.

What is the formal process for formal certification to permit flying?

Oxygen or other services must be requested in advance. The airline medical department will issue a MEDIF form (www.iata.org) or similar medical form. This is completed by the patient and their GP or respiratory specialist, with details of the patient's condition and their requirements including in-flight oxygen. The airline's Medical Officer or External Advisors then evaluate the patient's needs.

Patients with medical needs who fly regularly can obtain a Frequent Traveller's Medical Card (FREMEC). This documents important medical information and replaces the forms otherwise needed for each flight. Once registered, assistance is available whenever the patient flies. The FREMEC is issued by many airlines, with a variable validity period dependent on the medical condition. If a patient flies with a different airline, they need to confirm that it will be recognized by the new airline.

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