The assessment of fitness to travel

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The majority of health problems encountered in association with travel stem from pre-existing, perhaps latent, illness in the individual which may be exacerbated by the rigours and hazards of travel. It is essential that the advising physician understands the hazards that are likely to be encountered during travel in order that they may develop informed decisions regarding fitness for travel and give appropriate advice.

In an occupational health setting, the employer has a responsibility to safeguard the health of their employees whilst travelling on behalf of the organisation and will also have to fund any treatment abroad or the cost of repatriation.

The dictating factor in determining fitness to travel will often be fitness to travel by air, consequent to the reduced partial pressure of oxygen and pressure changes in-flight. The majority of significant health problems encountered during travel are attributable to coronary heart disease and detailed guidance exists to determine fitness for travel. For many health problems little if any evidence based guidance exists and decisions will therefore have to be based on an understanding of the hazards likely to be encountered during travel. Access to appropriate standards of medical care abroad and the difficulties and expense of repatriation, should this be necessary, are also important factors to consider in addition to the basic determination of fitness for travel itself.

This paper outlines the main factors to be considered when assessing fitness to travel and also examines available guidance for some of the more commonly encountered conditions.

Key words: Business travel; health promotion; prevention; travel health.

INTRODUCTION

The majority of health problems encountered by the traveller do not arise as a result of exposure to exotic infections but, in fact, stem from pre-existing, perhaps latent, illness in the individual. The rigours and hazards of travel may, however, be implicated as a precipitating or exacerbating factor. The primary aims when assessing fitness prior to travel are, consequently, to identify the presence of any pre-existing disease and where appropriate assess the risks this will present in relation to travel. Although specific guidance exists for the more common diseases where travel is known to pose a clear risk, for many diseases there is little, if any, guidance available. It is therefore essential that the advising physician understands the hazards that are likely to be encountered during travel in order that they may arrive at their own informed decisions.

There are relatively few absolute contra-indications to travel and even the severely ill can travel with appropriate planning and support. Clearly, however, in an occupational health setting, employers have a responsibility to safeguard the health of their employees and will also have to fund any treatment abroad or the cost of repatriation. Consequently, the threshold for advising against travel, on the grounds of health, will be lower. The reasons for travel and the associated commercial priority will both be factors in the decision-making process. If the environment, lifestyle abroad or the journey itself is likely to significantly aggravate pre-existing illness, it may be appropriate to advise that the trip is postponed, cancelled or an alternative employee assigned.

This paper outlines the main factors to be considered when assessing fitness to travel and also examines available guidance for some of the more commonly encountered conditions.

HEALTH HAZARDS ASSOCIATED WITH TRAVEL

Hazards can be categorized as those relating to transit and those relating to the destination.
Transit

Airport terminals, coach and railway stations, can all be busy places with the traveller having to traverse long distances whilst carrying heavy luggage, all within a constrained time period. Any restrictions on the physical capabilities of an individual should be considered in this light.

Common to most travel plans, to a greater or lesser degree, is an element of air travel. Air travel places a number of physiological demands on the human body and in many cases ensuring fitness to travel by air will be the key issue in determining fitness to travel. The incidence of in-flight medical emergencies is estimated to be about 1 per 35,000 passengers. In-flight medical emergencies are largely a result of problems including cardiac arrest, unstable angina, exacerbation of chronic obstructive pulmonary disease and cerebro-vascular accidents, although psychiatric problems also feature in this list. Half of all deaths in flight are a result of cardiac problems.

The physiological effects of flight can be considered in respect of pressure and oxygen factors. The possible risks associated with altitude have long been recognized, as illustrated by Harding, in one of his many papers on the subject, with a description of early aeronautical activities:

The distinction of being the first balloonists to take to the air belonged to a sheep, a cockerel, and a duck, which had been despatched from Versailles in a Montgolfier in September 1783. The balloon descended after 8 minutes when the air inside it cooled. The sheep and the duck were both in good health, but the cockerel was ‘unwell’. Learned professors at first attributed this to the effects of the rarefied atmosphere. However, closer inspection revealed that this was not the case and that the cockerel had probably been trodden on by the sheep.

Another relevant factor is the prolonged immobility associated with commercial air travel. Cabin altitude can vary between different aircraft but modern commercial jets must have a certified maximum cabin altitude of 2400 m (simulated). Although most commercial flights are conducted at around 1500 m equivalent, some operate close to the maximum level. By comparison, Concorde is the best at 300 m when cruising at 35,000 ft (normal cruising altitude is 55,000 ft).

At 2400 m, intra-body gases will expand by around 25%. Inspired pO₂ is 116 mmHg, with an alveolar pO₂ of 70 mmHg equating to an arterial pO₂ of 60 mmHg (at sea level the respective values are 160 and 107 mmHg, with an arterial pO₂ of 98 mmHg). Expansion of trapped gas and the risk of hypoxia must both be considered.

For those interested in acquiring a greater understanding of the physiological aspects of flight, Harding has reviewed these, allowing the advising physician to develop informed judgements where specific guidance does not exist.

The pressure changes involved when underwater diving is combined with flying, deserves specific consideration. Flying too soon after diving may lead to decompression sickness, which is caused by nitrous oxide coming out of solution and into tissues, when the barometric pressure is reduced quickly on ascent to altitude. The Diver’s Alert Network has made the recommendation that for those making single dives per day, the interval between diving and flying should be 12 hours, but for those with complicated diving itineraries the interval should be longer.

The prolonged immobility associated with long-haul flying, and perhaps other factors which are poorly understood, appear to carry a greater risk of deep vein thrombosis (DVT). Healthy individuals do not appear to be at increased risk, but those with risk factors (discussed later) are at increased risk.

Destination

In developing countries the provision of infrastructure, essential to public health, often lags behind the development of trade relations and tourism. The risks of contracting water- and food-borne infections are therefore increased, with the risk of de-stabilizing underlying disease. The infrastructure may be adequate in the larger cities but virtually non-existent within a few miles of the centre. Similarly, the risk of contracting insect-borne infections increases greatly on moving out of the confines of the city. It is therefore essential to understand the nature of the visit before forming an opinion as to the suitability of an individual for the trip planned.

It is important to consider the effects of climate or altitude on any underlying medical condition. Both extremes of temperature present risks to those with underlying medical conditions. Extremes of hot and cold are both likely to precipitate symptoms of coronary heart disease. The risk of dehydration is particularly relevant to those with renal problems and diabetes mellitus. Particularly in Central and South America and central Asian areas some destination airports and cities may be at high altitude.

Culture shock may be an important factor in those who are psychologically less stable.

The need for access to adequate medical facilities should be considered. Cultural differences and language barriers can lead to difficulties where pre-existing health problems require monitoring, medication or treatment.

GENERAL PRE-TRAVEL ASSESSMENT

It is important to consider the stability of any medical condition, the individual’s fitness to cope with the hazards that can be expected, together with their emotional stability. A check list for assessing a traveller’s fitness should include a review of medical history and current treatment, physical examination and assessment of exercise tolerance. Enquiry about previous travel experience may be helpful. Further assessment may be indicated, and include an ECG, haemoglobin levels (and blood group for prolonged visits), chest X-ray (where lung bullae or pneumothor...
ax is suspected), and specialized lung function testing or cardiac stress testing. For prolonged visits, routine examinations such as dental, ophthalmic and ‘well woman’ should be considered.

ASSSESSMENT OF SPECIFIC HEALTH ISSUES

The majority of literature examining the relationship between health and travel is linked to air travel. This is presumably because air travel is a common factor to the majority of travel plans with clearly quantifiable physiological stressors, the effects of which can be assessed.

Cardiovascular disease

The association between coronary heart disease and air travel is well documented. This is probably as a result of the reduced partial pressure of oxygen in the cabin at cruising altitude. Tobacco may further exacerbate hypoxia, with the effect being compounded by alcohol, which reduces cardiac output secondary to myocardial depression. Other factors to be considered are the stress of travel and the rigours of navigating busy airports with heavy luggage.

The Aerospace Medical Association provides guidance on fitness for commercial airline flight. Those who have suffered an uncomplicated myocardial infarction should not fly within 3 weeks. Those who have undergone coronary artery bypass grafting should not fly within 2 weeks but thereafter, following successful grafting, it is not considered a specific risk factor. Following a complicated myocardial infarction, a period of 6 weeks should have elapsed before flying. Unstable angina and congestive cardiac failure are both contra-indications to flight. Cox advocates that a stress test at 3 weeks post infarct is preferable to using time estimates after a myocardial infarction. Where in doubt it is safer to stress test those with proven coronary heart disease or those with symptoms suggestive of coronary heart disease.

Uncontrolled hypertension is also considered a contra-indication to commercial airline travel. Hot climates may aggravate postural hypotension, resulting from the use of hypotensives, while diuretics can exacerbate salt loss. Individuals who have suffered a cerebral vascular accident should not fly by air within 2 weeks of the stroke.

There is considerable debate about the association between venous thrombo-embolism and air travel. The use of prophylactic anti-platelet drugs or heparin is advocated for those considered to be at higher risk, for example those with a history of previous deep venous thrombosis, varicose veins or congestive cardiac failure.

A minority of pacemakers can be interfered with by portable magnetic security devices at airports. Where a traveller is uncertain as to whether this applies to the device they have fitted, they should advise security staff and avoid such searches. A letter warning of this risk is useful.

Those suffering from cardiovascular problems should plan their trip carefully and avoid physical activities that exceed their individual exercise capacity. It is important to ensure that the traveller with underlying cardiovascular problems receives comprehensive advice prior to travel.

Respiratory disease

When assessing the risks travel may pose to those who suffer from respiratory disease, and in particular the risks of flying, it is important to consider the pressure changes during flight, the cabin air quality, and the reduction in the partial pressure of oxygen. Travelers who have impaired gas exchange may require special consideration; for example, those suffering from chronic obstructive pulmonary disease, severe asthma, bronchiectasis, cystic fibrosis and fibrosing alveolitis. Patients who are compensated at sea level may not cope with the reduced PaO2 at altitude. A practical guide for assessing the fitness to fly of those who have a significant degree of respiratory disease is to make sure the patient can walk 50 m or climb one flight of stairs without becoming severely dyspnoeic. Individuals unable to complete this are unlikely to be in full-time employment. However, where prospective travelers are unable to manage this, referral to a respiratory physician for more detailed assessment is appropriate.

Using the FEV1 and arterial PaO2 at sea level, it is possible to predict the effects of altitude. Individuals with chronic obstructive pulmonary disease can exhibit marked desaturation at cruising altitude, dropping to levels of 87% saturation.

Pneumothorax is an absolute contra-indication to flight because of the risk of tension pneumothorax. Large bullae may cause problems as a result of gas expansion at altitude, particularly if they are poorly ventilated.

The air in aircraft cabins is very dry and may pose a problem to the severe asthmatic. Some cities in the Far East and Central America have extremely high levels of air pollution. Bronchodilators should be close to hand.

Diabetes mellitus

Non-insulin dependent diabetics should not experience any specific problems with travel although those on oral hypoglycaemics should be aware of the risks of dehydration. Similarly, well controlled insulin dependent diabetes should not present a particular risk. Uncontrolled, newly diagnosed and ‘brittle’ diabetics should consider postponing travel until stabilized. It is important to ensure adequate supplies of insulin, syringes and other equipment are available in hand luggage. If a trip is prolonged, access to appropriate insulin abroad should be investigated, together with facilities for managing eye, renal and neuropathic complications of diabetes.

Unstable retinopathy is a contra-indication to air travel as dilatation of retinal and choroidal vessels, in response to hypoxia, increases the risk of intra-ocular bleeding. General advice for diabetic travellers would
include (in addition to the standard advice applicable to all travellers) the value of carrying standby treatment for travellers diarrhoea and for fungal skin infections. Instructions regarding potential practical difficulties (transport of insulin, sufficient supply of insulin, syringes, oral sugar source) and adjustment of the insulin dose in line with changing time zones should be given. Increased frequency of blood testing should also be recommended.

**Ear, nose and throat (ENT)**

During air travel, expansion of gas on ascent to altitude and contraction on subsequent descent can give rise to sinus and middle ear problems. On ascent, gas vents through the eustachian tube but on descent it cannot pass back up the tube so readily. This may give rise to otic barotrauma, particularly in the presence of congestion caused by allergy or infection. There are various manoeuvres which may help equalize pressure and the use of a decongestant spray, prior to descent, can be helpful. After middle or inner ear surgery, air travel should be delayed for at least 2 weeks.

**Surgical considerations**

Patients should not fly within 3 weeks of thoracic surgery, 1–2 weeks of intracranial surgery or 14 days of abdominal surgery because trapped gas may expand and give rise to problems. Ventricular shunts are subject to stress with environmental change and should be checked for normal operation. Routine surgery, such as hernia repair, is best attended to prior to prolonged trips abroad.

**Epilepsy**

There is no evidence that travel, and specifically air travel, contributes to an increased likelihood of seizures but there is a theoretical risk due to stress, jet lag and sleep deprivation. Travellers suffering from epilepsy should be careful to ensure they maintain a regular sleep pattern as lack of sleep may increase the risk of seizure. If they suffer regular fits, and are travelling unaccompanied, it is wise to inform airline crew of their wishes in the event of a seizure during travel. International airlines have widely differing policies on the carriage of those who suffer from epilepsy, with many policies having little scientific rationale to support them.

**The immuno-compromised traveller**

Patients with asplenia (functional or anatomic) are at particular risk of severe sepsis due to encapsulated meningococcus and haemophilus and should avoid travel to areas where risk of falciparum malaria transmission is high. They should be immunized against the pneumococcus, meningococcus, and haemophilus bacteria. Detailed guidance is available in respect of pneumococcal, meningococcal, HIB and influenza vaccinations, and about antibiotic prophylaxis as well as treatment of acute infections. Asplenic patients should be advised of the danger of animal and tick bites.

HIV positive individuals respond well to most vaccines when asymptomatic but response is less predictable when symptomatic disease is present. Generally, live vaccines should be avoided in all stages of HIV disease.

Patients receiving cancer chemotherapy or transplant recipients on long-term immunosuppression should avoid live vaccines but may benefit from bacterial polysaccharide vaccines such as pneumococcal vaccines.

**Miscellaneous**

Sickle cell crisis is a risk for sufferers above altitudes of 6000 ft. Air travel and high altitude destinations are therefore hazardous.

Physical handicap is not a barrier to international travel but the need for careful anticipatory planning is vital. Although facilities can usually be made available during travel the destination can present additional problems. In particular, third world countries have few if any facilities for the disabled.

Blind travellers will experience difficulty if unaccompanied. Boarding instructions are usually via a visual display unit. Guide dogs cannot cross international boundaries without quarantine and ‘canes’ will probably be removed during air travel. Flight staff will help guide the blind traveller to their seat and to the toilet.

**Psychological**

A psychological assessment, although difficult, is important prior to prolonged stays abroad. There is evidence that people with personality disorders are more likely to be seconded abroad by their employer. Rapid time zone changes can precipitate affective disorders in the pre-disposed. Expatriate culture and frequent business travel are both associated with an increased alcohol intake. A history of alcohol abuse or dependency is a relative contra-indication for overseas secondment or a job that involves a significant element of business travel abroad.

A history of regular use of tranquillisers should also be viewed as a possible contra-indication to regular overseas travel or secondment. Travel phobias, in particular the fear of flying, are common but with good management, including behavioural therapy, can usually be resolved.

Even the ‘well adjusted’ individual will find adaptation to a new culture stressful. The cultural shock generated by visits to the third world can be very disturbing with poverty, racism and religious fanaticism, coupled with endless bureaucracy, serving to alienate the traveller and creating the desire to withdraw from the new surroundings.

The travelling employee needs to be provided with a realistic appraisal of the living and working environment
Table 1. Summary advice on fitness to fly/travel

<table>
<thead>
<tr>
<th>Health issue</th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>Cardiovascular</td>
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<tr>
<td>Uncomplicated myocardial infarction</td>
<td>Avoid flight for 3 weeks</td>
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<tr>
<td>Complicated myocardial infarction</td>
<td>Exercise ECG if in doubt</td>
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<tr>
<td>Coronary artery bypass graft</td>
<td>Avoid flight for 6 weeks</td>
</tr>
<tr>
<td>Unstable angina</td>
<td>Exercise ECG if in doubt</td>
</tr>
<tr>
<td>Heart failure</td>
<td>Avoid flight for 2 weeks post-operatively</td>
</tr>
<tr>
<td>Increased risk of thrombo-embolic disease</td>
<td>Flight contra-indicated until condition stabilized</td>
</tr>
<tr>
<td>Respiratory disease</td>
<td></td>
</tr>
<tr>
<td>Chronic respiratory disease</td>
<td>Prophylactic treatment with anti-platelet therapy or heparin</td>
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<tr>
<td>Pneumothorax or presence of large pulmonary bulla</td>
<td>Flight contra-indicated</td>
</tr>
<tr>
<td>Asthma</td>
<td>Fit for flight</td>
</tr>
<tr>
<td>General</td>
<td>Ensure medication is close at hand</td>
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<tr>
<td>Diabetes</td>
<td></td>
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<tr>
<td>Sickle cell disease</td>
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<tr>
<td>Surgical</td>
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<tr>
<td>Middle/inner ear surgery</td>
<td>Avoid flight for first 2 weeks</td>
</tr>
<tr>
<td>Thoracic surgery</td>
<td>Avoid flight for first 3 weeks</td>
</tr>
<tr>
<td>Abdominal surgery</td>
<td>Avoid flight for first 2 weeks</td>
</tr>
<tr>
<td>Intra-cranial surgery</td>
<td>Avoid flight for first 2 weeks</td>
</tr>
<tr>
<td>Ventricular shunts</td>
<td>Check for normal operation</td>
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and should be advised to have tempered expectations as to what can be achieved in a given time. The importance of comprehensive pre-travel briefing for employees, particularly those being seconded abroad for prolonged periods, cannot be over emphasized. Issues such as language barriers, culture, local customs, geography and climate should all be addressed.

If the family is accompanying, they should also be included in the training and planning process.

The above recommendations are summarized in Table 1.

SUMMARY

In many instances, where business related travel is to foreign cities with five-star accommodation, the dictating factor in determining fitness to travel will be fitness to travel by air. The main factors to consider are the possible effects of the reduced partial pressure of oxygen, pressure changes and the effects of prolonged immobility on any underlying health problems. From a physical perspective it is reasonable to expect that the majority of individuals able to cope with the demands of full time employment should also be fit for travel. In practice, the majority of significant health problems encountered during travel are attributable to coronary heart disease. Consequently, detailed guidance exists to assist the advising physician in determining an individual’s fitness for travel. However, for many health problems, little if any evidence-based guidance exists and decisions will therefore have to be based on an understanding of the hazards likely to be encountered in the course of a specified itinerary. Access to appropriate standards of medical care abroad and the difficulties and expense of repatriation, should this be necessary, are also important factors to consider in addition to the basic determination of fitness for travel itself.

REFERENCES

   This is the most recent comprehensive publication available outlining the medical aspects to consider when forming decisions on fitness to fly. The guidance is also presented in a book published by the Aerospace Medical Association, Medical Guidelines for Airline Travel, Air Transport Medicine Committee of the Aerospace Medical Association. Published April 1997.
   This is an informative article which focuses on many of the minor conditions related to travel health which, while not life threatening, can have a significant impact on the traveller’s well-being (and competence) whilst abroad.
A review article examining the general health risks associated with travel and relating these to specific medical conditions. Contains guidance on the objective assessment of cardiac and respiratory fitness for travel.
A review of the literature relating to cardiovascular disease and travel which provides specific recommendations for assessing cardiovascular status and risk prior to travel.
Provides detailed guidance on the assessment of travellers with respiratory disease prior to making decisions on fitness to travel.