Carriage of Invalids by Air

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As a natural consequence of the vast expansion of civil air routes to more and distant parts of the globe, there has been a marked increase in the number of sick and disabled passengers using air transport, either for specific medical reasons or for pleasure and business pursuits.

Where there are urgent medical considerations, air travel is, of course, the method of choice because of its speed and comfort; early consultant opinion, diagnosis and treatment at highly specialised medical centres throughout the world is now virtually the heritage of all mankind. For those who are infirm, elderly or disabled, air transport ensures that both travel time and fatigue are significantly reduced, and, provided they receive prior notification, most major airlines provide special facilities to assist this class of passenger.

Doctors in all branches of medicine now receive enquiries from patients as prospective travellers regarding their fitness to undertake a particular journey by air, and while they can obtain guidance from the medical department of the airline concerned some indication of the salient features of the criteria of acceptance or assessment can be set out.

It must be emphasised that each case has to be considered on its merits, as a great deal will depend on the flight schedule, the duration of the journey, whether the patient is being escorted or will require any medical attention en route, or special provisions on the aircraft, e.g. stretcher equipment. In addition to the actual medical factors that influence decisions on fitness to travel there are both physiological and environmental considerations affecting the assessment and the conditions of acceptance.

CABIN ALTITUDE

The simulated cabin altitude in modern pressurised aircraft is equivalent to 5,000 to 7,000 ft but the reduction of alveolar partial pressure of oxygen at these levels leads only to a 3 to 4 per cent desaturation of arterial blood, which is of no significance to subjects at rest.

If, however, to this mild degree of hypoxia due to reduced oxygen tension at altitude there is any disability associated with partial obstruction of the airways (sic!) or with any reduction of the effective diffusing area of the lungs or the permeability of the alveolar membrane, or any decrease in respiratory function affecting the transport of oxygen, the degree of hypoxia resulting may become significant.

Any anaemia (anaemic hypoxia) or any degree of failure of the circulation
( stagnant hypoxia) or disease of the tissues or cells (histotoxic hypoxia) or a cumulative combination of such factors may also aggravate the simple hypoxia associated with altitude. A few illustrative examples of cardio-respiratory dysfunction and their acceptance for air travel are as follows—

1. Bronchitis, Bronchial Asthma, Emphysema
   Provided they have a reasonable exercise tolerance at ground level, with no gross cardiac decompensation, such cases may be accepted for travel, but the airline should be requested to provide the following assistance:
   (a) help in clearing the formalities and with baggage;
   (b) wheelchair to assist embarkation;
   (c) a seat near the toilet;
   (d) additional oxygen to be readily available.

2. Cardiac Ischaemia or Myocardial Infarction
   An already ischaemic heart muscle is apt to react poorly to the reduced oxygen tension at altitude and to the physical stresses associated with any form of travel, so that such cases should have a reasonable functional reserve before attempting any exhausting journey by air. Post-infarction cases should have convalesced to the degree that they are ambulant, able to walk at a reasonable pace for 80 to 100 yards or climb 10 to 12 stairs without symptoms. The length of time to achieve this degree of recovery obviously varies from one individual to another, and with the severity of the initial attack, but is normally in the region of 3 to 6 weeks for uncomplicated cases. The airline should be requested to provide:
   (a) assistance with baggage;
   (b) help in clearing the formalities;
   (c) wheelchair to assist embarkation;
   (d) seat adjacent to the toilet;
   (e) additional oxygen to be made available.

3. Blood Dyscrasias
   Cases of severe anaemia or blood dyscrasias with a tendency to haemorrhage are sensitive to any reduction of oxygen tension and before travel may require transfusion to raise the haemoglobin to 50 or 60 per cent, preferably the latter. They require the usual assistance, and additional oxygen must be readily available and physical effort reduced to a minimum.

4. Congestive Cardiac Failure
   Any patient with severe uncompensated heart failure should not attempt air travel until the condition is under control. As well as all assistance with embarkation,
help in clearing formalities, a wheelchair, additional oxygen, and a seat with maximum leg room, should be requested.

*Cases of congenital heart disease* for which there are now many requests for air carriage, if regarded as being suitable for cardiac surgery, are normally acceptable for travel, and very often the competence of the attendant, whether mother or nurse, is of paramount importance. Additional oxygen for prolonged administration may be necessary.

5. *Sickle Cell Disease*

The sickle cell haemoglobinopathies are very sensitive to reduced oxygen tension, while any circulatory stasis or fever or any infections also facilitate sickling with the possibility of splenic infarct, etc. Supplementary oxygen must be available and may be required at regular intervals throughout the journey to avoid any mild hypoxic state.

6. *Altitude of Airports*

It is sometimes not appreciated that certain airports throughout the world may be at altitudes in excess of 5,000 to 6,000 ft so that patients with cardio-respiratory disorders may be subjected to the same degree of hypoxia encountered on the journey. They may be unduly fatigued or experience some mild respiratory distress for the first few days.

7. *Smoking and Alcohol*

Even in moderation both smoking and alcoholic refreshments reduce altitude tolerance so that patients with any cardio-respiratory disease should be advised regarding these effects.

**PRESSURE CHANGES AT ALTITUDE**

In accordance with Boyle's law, pressure and volume vary inversely so that as atmospheric pressure is reduced with altitude any gas in the body cavities will expand. At 6,000 ft equivalent altitude, 100 ml of air will increase in volume to 130 ml, approximately. This seldom causes any discomfort but can be significant in any catarrhal condition affecting the ears or sinuses (barotrauma).

Other conditions that may be affected by these pressure changes include patients with emphysematous bullae who risk the danger of a spontaneous pneumothorax.

Any patient with lung disease associated with cysts or cavitation or who has had air injected into body cavities for diagnostic or therapeutic purposes (pneumothorax, pneumoperitoneum, ventriculography, etc.) must be carefully assessed.

Patients who have undergone abdominal surgery with even a mild degree of postoperative ileus will experience extreme discomfort if they travel too soon,
even after simple operations such as appendicectomy. Though fully ambulant, to avoid complications they should not attempt to travel for approximately 10 days. Colostomy patients will find that their colostomy becomes over-active due to the expansion of gases and they should be prepared with sufficient dressings for the journey, have a mild bowel sedative and medication to increase the bulk of the stool. Dental pain may be experienced (aerodontalgia) if there is any poorly filled dental cavity entrapping a small amount of air, but this is not usually experienced at normal cabin altitude. Those who have had air introduced to any body cavity for diagnostic or therapeutic purposes should not travel for at least seven days and with any induced pneumothorax the lung should at least be three-quarters expanded before travel, to avoid mediastinal embarrassment.

TRAVEL SICKNESS
The incidence of travel sickness in modern pressurised aircraft is very much reduced because of the normally stable atmospheric conditions at cruise altitudes in the stratosphere. While this is purely a temporary disability, and any susceptible individuals can easily be controlled by travel sickness remedies, it may complicate or aggravate some pre-existing medical condition, e.g. pregnancy, gastric disorders, unstable diabetes, and affect children or adults who are anxious regarding flying and tend to hyperventilate. Pregnant women should be advised to consult their doctor regarding the use of anti-travel sickness remedies before travel. Those with gastric or duodenal ulcers or any history of recent gastric haemorrhage should also take anti-motion sickness tablets before and regularly throughout a long journey. Diabetics should be protected against travel sickness before travel and throughout flight should avoid any hypoglycaemic episode and should certainly notify the airline that they are diabetic even though they do not require any special diet. In those with fractures of the mandible and fixed wiring of the jaw, travel sickness may be a serious complication because of the dangers of asphyxia, and special arrangements must be made for any such travellers.

POSTURAL OEDEMA
On any long journey, with the feet in the dependent position there is a tendency to develop slight oedema of the ankles and dorsum of the foot, and even normal individuals should be encouraged to flex and extend the ankles at regular intervals and to make use of transit stops to encourage muscular action. The degree of postural oedema can be aggravated in those with poor circulation, varicose conditions and a mild degree of tissue hypoxia may increase the extravasation of
fluid, compounding the discomfort. Pregnant women or patients with pelvic tumours may also be adversely affected. The need for regular exercise is important in these cases to avoid any possibility of a thrombo-embolic episode due to stasis of the circulation, and psychiatric cases under sedation should travel as stretcher cases to avoid this possible complication.

CIRCADIAN RHYTHMS
For many and varied reasons aircraft departure times may be at extraordinary hours of the day, and any long distance trans-meridian flights also entail crossing time zones; both these factors may cause upset to the normal diurnal rhythms. This disruption of the normal pattern of life has been variously termed 'jet lag', 'bio-asynchrony', etc., but as well as the normal digestive upsets the most important effects are sleep deprivation or sleep deficit, which increase fatigue.

Unstable diabetics may be particularly affected as the regular pattern of their lives, insulin injections, and feeding times are disturbed.

Careful planning of a journey and rest and relaxation before and after flight may be indicated for those who may be affected by any upset to their ordered routine or by undue fatigue.

IMMUNISATION REQUIREMENTS
To comply with statutory requirements under the international health regulations patients may require immunisation before entry or return to some countries. One must therefore consider whether there are any contra-indications to such immunisation in view of any underlying medical condition. If so, a certificate should be provided by the doctor concerned stating the specific reasons for non-immunisation. This should be authenticated by the health authority as if it were an international certificate of vaccination; for example, the contra-indications to smallpox vaccination are already well documented, but if it were essential to vaccinate to enter an infected area where the risk of contracting the disease may be very real, it may be necessary to vaccinate under cover of simultaneous hyperimmune anti-vaccinial globulin in the opposite arm.

As far as other immunisation requirements are concerned there may be a need to provide exemption certificates where immunisation could complicate any disability.

SOCIAL CONSIDERATIONS
For obvious reasons it is difficult to accommodate on a scheduled airline any patients who, either on account of their appearance or behaviour or with malignant odoriferous conditions would cause distress or offence to the travelling public seated in adjacent seats.

Psychiatric patients must be accompanied by a trained attendant, be under suitable sedation throughout, and preferably accommodated as a stretcher case.
Aggressive, noisy or disturbed passengers can be regarded as a hazard to the safety of the aircraft and will either not be accommodated or off-loaded. Those under the influence of strong sedatives should be accommodated as stretcher cases to avoid thromboembolic episodes.

A well-controlled epileptic with minor petit mal attacks may be accepted for travel but preferably should be accompanied by an understanding companion or professional escort. Epileptics should, however, be advised to increase their sedative medicines for the journey as, from experience, even mild hypoxia, apprehension, or hyperventilation may trigger off an attack.

ENVIRONMENTAL CONDITIONS ON THE AIRCRAFT
Although the rate of change of air in modern pressurised aircraft is entirely satisfactory and temperature control in flight is within the comfort zone, the humidity in the cabin may fall well below 20 per cent after cruising at altitude. Those susceptible to low humidities may experience some dryness of the eyes, nose and throat, but this is transient.

Dehydration may, however, affect those with a tendency to renal calculus or crystalluria, particularly in those where the urine is concentrated following excessive perspiration in tropical or sub-tropical climates. Such people should be advised to ensure adequate fluid intake.

ARRANGEMENTS ON THE AIRCRAFT
Irrespective of the assistance required in clearing formalities or embarking/disembarking, there may be a need to request special accommodation on the aircraft, e.g. a seat with maximum leg room or a seat adjacent to the toilet or privacy screens for nursing mothers. Accommodating a stretcher, however, requires displacement of seats that cannot be occupied by other passengers and special arrangements must be made in advance for the fitment of a stretcher, the associated privacy screens, and for the provision of an escort to attend to any medical needs en route as well as the intimate toilet details.

Any special help required should be requested from the medical department of the airline in advance of the date of travel so that the traffic handling staff, flying staff, transit stations and point of disembarkation, may be notified of any special help required.

CASES UNSUITABLE FOR TRAVEL
No case of infectious disease can be accepted for travel on a scheduled aircraft because it is impossible to ensure isolation since there may be partial recirculation of the air, and, even with the childhood exanthemata, many on board may be either elderly or expectant mothers in the first trimester of pregnancy, neither of whom should wittingly be exposed to the risk of such infections.

Other types of case that are unsuitable are those in extremis or likely to die en
route, and however much the relatives plead on humanitarian grounds they are extremely distressed if patients have eventually to be off-loaded in strange countries surrounded by strange people in uncongenial surroundings.

Diversion of modern aircraft to alternative landing fields is not a simple matter and may not be without hazard. No operational limitations as regards altitudes or routes can be contemplated.

Any mental case that may be a hazard to the safety of the aircraft or its occupants, or so repulsive in appearance as to cause distress, is not normally acceptable without special provisions being made.

Pregnancy cases on long international journeys should travel by the end of the 35th week of pregnancy to avoid the possibility of a premature labour on board.

Provided patients or their sponsors are prepared to accept in all respects the conditions of travel laid down by the airline, there are very few absolute contra-indications to travel, other than those outlined above, but it must again be emphasised that each individual case must be considered on its merits because of the many and varied factors involved.

LOOK WHAT I'VE FOUND

The College's social life in the 1860s was enlivened by Conversaziones heralded by an invitation 'if you wish to exhibit any articles of interest...'. The interests in 1862 were eclectic. Model of the Armstrong gun and photographs of its effect upon a target. A medallion of his late Royal Highness the Prince Consort. Wheatstone's Automatic Telegraph. Watches taken among the Spoil of the Summer Palace of the Emperor of China. Scrolls lithographed in the Free Hospital, Kam-li-fau, Canton. Someone had been busy in the Far East. A demonstration of laryngoscopes was alongside Marshall's patent ear trumpet. Photographs by Dr William Budd competed with Abel's Fusees exploded by Magneto Electricity. A substitute for India Rubber was matched by M. Plateau's Glyceric films illuminated with electric light. After such riches refreshments were available in the lower room. It was better than an evening at home watching television. But, even if the spirometer on view was easy to identify, what was Pali writing on palm leaves?