

Medical Advice for Commercial Air Travel

Nicole Powell-Dunford, MD, MPH, School of Army Aviation Medicine, Fort Rucker, Alabama; Uniformed Services University of the Health Sciences, Bethesda, Maryland

Joseph R. Adams, DO, MPH, and Christopher Grace, DO, MPH
School of Army Aviation Medicine, Fort Rucker, Alabama

Air travel is generally safe, but the flight environment poses unique physiologic challenges such as relative hypoxia that may trigger adverse myocardial or pulmonary outcomes. To optimize health outcomes, communication must take place between the traveler, family physician, and airline carrier when there is any doubt about fitness for air travel. Travelers should carry current medications in their original containers and a list of their medical conditions and allergies; they should adjust timing of medications as needed based on time zone changes. The Hypoxia Altitude Simulation Test can be used to determine specific in-flight oxygen requirements for patients who have pulmonary complications or for those for whom safe air travel remains in doubt. Patients with pulmonary conditions who are unable to walk 50 m or for those whose usual oxygen requirements exceed 4 L per minute should be advised not to fly. Trapped gases that expand at high altitude can cause problems for travelers with recent surgery; casting; ear, nose, and throat issues; or dental issues. Insulin requirements may change based on duration and direction of travel. Travelers can minimize risk for deep venous thrombosis by adequately hydrating, avoiding alcohol, walking for 10 to 15 minutes every two hours of travel time, and performing seated isometric exercises. Wearing compression stockings can prevent asymptomatic deep venous thrombosis and superficial venous thrombosis for flights five hours or longer in duration. Physicians and travelers can review relevant pretravel health information, including required and recommended immunizations, health concerns, and other travel resources appropriate for any destination worldwide on the Centers for Disease Control and Prevention travel website. (*Am Fam Physician*. 2021;104(4):403-410. Copyright © 2021 American Academy of Family Physicians.)

Air travel has become increasingly popular over time, despite decreases during the COVID-19 pandemic, with 1.1 billion total passengers in 2019 and most Americans having flown at least once in the past three years.¹ Air travel is generally safe, but especially for the aging U.S. population, the flight environment poses unique physiologic challenges, particularly relative hypoxia, which may trigger adverse myocardial or pulmonary outcomes. To optimize health outcomes, communication must take place between the traveler, family physician, and airline carrier when any doubt occurs about fitness for air travel. Travelers should carry current medications in their original containers as well as a list

of their medical conditions and allergies and should adjust timing of medications as needed based on time zone changes. Travelers should also consider available medical resources at their travel destinations and layover locations. Family physicians and travelers can review relevant pretravel health information, including required and recommended immunizations, health concerns, and other travel resources appropriate for any destination worldwide at <https://wwwnc.cdc.gov/travel/destinations/list>.

Pulmonary Conditions

By law, U.S. commercial aircraft cannot exceed a relative cabin altitude of 8,000 feet (2,438 m) because of the potential for significant hypoxia above this altitude.² Most passengers exposed to this environment will have a partial pressure of arterial oxygen (P_{aO_2}) of 60 to 65 mm Hg (7.98 to 8.64 kPa), corresponding to 89% to 94% peripheral oxygen saturation (SpO_2), which may

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SORT: KEY RECOMMENDATIONS FOR PRACTICE

Clinical recommendation	Evidence rating	Comments
Patients with stable angina triggered by minimal exertion should be evaluated for oxygen needs and any other special assistance before flight. ¹¹	C	Consensus/expert opinion
Patients with unstable angina, new cardiac or pulmonary symptoms, or recent changes in medications without appropriate follow-up should not fly until stable. ¹¹	C	Consensus/expert opinion
Travelers at low risk with a recent myocardial infarction should defer air travel for three to 10 days postevent. ¹¹⁻¹⁵	C	Consensus/expert opinion; smaller studies looking at travel after two weeks or longer
Transdermal scopolamine can prevent air sickness, but patients should be counseled on adverse effects of drowsiness, blurry vision, dry mouth, or dizziness. ²²	B	Cochrane review of variable-quality randomized controlled trials
Insulin requirements may change based on the direction of travel and crossing time zones; fast-acting insulin should be considered for all travelers during flight due to its flexibility and responsiveness. ²³	C	Consensus/expert opinion
Compression stocking use in flights lasting at least five hours can prevent asymptomatic deep venous thrombosis and superficial venous thrombosis. ²⁷	A	Cochrane review
Patients with an uncomplicated singleton pregnancy generally should not fly beyond 36 weeks of estimated gestational age ^{7,24,33,34} and those with a multiple gestation not beyond 32 weeks. ³⁴	C	Consensus opinion

A = consistent, good-quality patient-oriented evidence; **B** = inconsistent or limited-quality patient-oriented evidence; **C** = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, go to <https://www.aafp.org/afpsort>.

compromise cardiovascular or pulmonary disease in affected travelers.³ Neither reassuring pulse oximetry nor reassuring forced expiratory volume in one second has been found to predict hypoxemia or in-flight events for patients with pulmonary conditions.³

The nonstandardized Hypoxia Altitude Simulation Test, administered and interpreted by pulmonologists, can be used to determine specific in-flight oxygen requirements for patients with pulmonary complications or those for whom safe air travel remains in doubt. Typically, the Hypoxia Altitude Simulation Test comprises breathing 15% fraction of inspired oxygen for 20 minutes, with pulse oximeter and blood gas measurements taken before and after testing.⁴⁻⁶ Patients with a Hypoxia Altitude Simulation Test Pao₂ less than 50 mm Hg (6.65 kPa) at any point

during the test require supplemental oxygen in flight, whereas those with a Pao₂ greater than 55 mm Hg (7.32 kPa) do not. Pao₂ measurements falling between 50 and 55 mm Hg are considered borderline and may necessitate further testing with activity.⁵ Given that the test itself incurs some risk and may not be available to all travelers, family physicians can counsel patients who are unable to walk 50 m (164 ft) or those whose usual oxygen requirements exceed 4 L per minute not to fly.^{3,4,7,8}

Patients with oxygen requirements less than 4 L per minute can be counseled to double their usual flow rate while flying.⁸

Commercial airline carriers usually permit the use of personal Federal Aviation Administration–approved portable oxygen compressors, but carriers require travelers to give from 48 hours to

TABLE 1

Indications for Preflight Assessment of Pulmonary Conditions

- Bullous lung disease
- Continuous positive airway pressure use or other automated ventilator support
- Cystic fibrosis
- Less than six weeks have passed since hospital discharge for acute respiratory illness
- Preexisting baseline supplemental oxygen requirement or ventilatory support
- Prior respiratory difficulties during air travel
- Pulmonary tuberculosis
- Recent or residual pneumothorax
- Severe chronic obstructive pulmonary disease (predicted forced expiratory volume in one second < 30%)
- Severe persistent asthma
- Severe restrictive lung disease (vital capacity < 1 L)

Information from reference 3.

one month’s notice before flight when they are requesting the use of compressed oxygen.⁹

Table 1 lists indications for which further assessment (e.g., Hypoxia Altitude Simulation Test, ability to walk 50 m) is warranted, including previous respiratory difficulties while flying, severe lung disease, recent or active lung infections, any preexisting oxygen requirements or ventilatory support, or if less than six weeks have

passed since hospital discharge for acute respiratory illness.³ Patients who have undergone an open-chest lung procedure should defer travel for two to three weeks, must not have any recent or residual pneumothorax, and should be assessed for supplemental oxygen needs.¹⁰

Cardiac Conditions

Travelers with underlying cardiac conditions should use airport assistance services such as wheelchairs and baggage trolleys to decrease myocardial oxygen demand.⁹ Although most cardiac conditions are safe for flight, some require additional consideration. Travelers with minimally symptomatic, stable heart failure may safely fly, but medication adherence is critical.^{9,11} Patients with stable angina should be assessed for oxygen needs if they become short of breath after walking 50 m, and they should not fly following any recent medication changes that have not demonstrated clinical stability beyond that medication’s half-life.^{7,11}

Patients with unstable angina, new cardiac or pulmonary symptoms, or recent changes in medication without appropriate follow-up should not fly until stable, particularly for medication changes that could impact blood pressure or coronary reserve.¹¹ Travelers with recent myocardial infarction at low risk should defer air travel for three to 10 days postevent¹¹⁻¹⁵ (Table 2¹¹). Low-risk patients who required percutaneous transluminal coronary angioplasty may fly after three days as long as they are asymptomatic.⁹ Travelers who

TABLE 2

Air Travel Recommendations for Patients with Recent MI

MI risk category	Definition	Travel recommendations
Low	Younger than 65 years, first event, successful reperfusion, ejection fraction > 45%, no complications, no planned investigations or interventions	Defer for three to 10 days after MI
Medium	Ejection fraction > 40%, no symptoms of heart failure, no evidence of inducible ischemia or arrhythmia, no planned investigations or interventions	Defer for 10 days after MI
High	Ejection fraction < 40% with symptomatic heart failure, pending further intervention or investigations	Defer until condition stabilizes

MI = myocardial infarction.

Information from reference 11.

have had coronary artery bypass grafting or an uncomplicated open-chest procedure should wait to fly until they are 10 days postprocedure.^{7,11}

Many implantable-cardioverter defibrillators are compatible with standard airport security.⁹ The Transportation Security Administration recommends that travelers with pacemakers, defibrillators, or any other implanted metal device request pat-down screening instead of using a walk-through metal detector.¹⁶ For travelers with pacemakers and implantable-cardioverter defibrillators, a two-day flight restriction following uncomplicated placement is appropriate.¹¹ It is prudent for all cardiac patients to travel with a copy of their most recent electrocardiography results and a preflight graded exercise test, which may aid in assessment and management in case of an event during flight.⁹ In patients with hypertension, medication compliance is especially important because aircraft noise and other travel-related stress may provoke blood pressure elevations.¹⁷ Travel in patients with moderately controlled hypertension is not a contraindication, but airline travel for those with uncontrolled hypertension requires shared decision-making and clinical judgment.

Ear, Nose, and Throat Conditions

Trapped gases and sinus air-fluid levels can cause significant pain for the patient with ear, nose, and/or throat conditions. Adult patients with symptomatic rhinosinusitis or allergic rhinitis may benefit from oxymetazoline (Afrin) and/or pseudoephedrine to prevent ear blockage during descent.¹⁸ No evidence suggests that antihistamines or decongestants are beneficial in children with sinusitis,¹⁹ and these medications should not be used to hasten an early clearance for flight in any age group. Flight within 36 hours of otitis media resolution is generally safe.²⁰ Equalizing pressure on descent can also be accomplished in adults with frequent swallowing, chewing gum or food, or by generating pressure against a closed mouth and glottis. In young children and infants, upright bottle feeding or pacifier use can achieve similar effects.²¹

Patients who have undergone jaw fracture repair should defer flying for at least one to two weeks, and jaw wiring should be temporarily replaced with elastic bands in case of emesis.¹⁸ Transdermal scopolamine is effective in

preventing air sickness,²² and alternatives such as first-generation antihistamines may also be useful. Patients who elect to take scopolamine should be counseled on adverse effects of drowsiness, blurry vision, dry mouth, or dizziness.²² Individuals who are prone to air sickness should refrain from alcohol use during flight and in preflight and should eat smaller, lighter meals.¹⁸ The expansion of trapped gas at altitude may cause severe tooth pain in patients with caries beneath fixed restorations. Travelers with hearing aids should bring extra batteries and all accessories and may need to adjust their volume levels to offset background noise.

Diabetes Mellitus

In addition to carrying all medications, travelers with diabetes requiring insulin should request appropriate meals and consider checking blood glucose levels at intervals during longer flights.²³ Bringing snacks or other food can assist those with tenuous diabetes management in the event of layovers or delays. Insulin requirements may change based on the direction of travel and crossing time zones, which may entail lost or gained hours. Even if it is not part of the patient's normal regimen, fast-acting insulin, ideally with a pen device, should be considered for all travelers during flight due to its flexibility and responsiveness.²³ When traveling east, if the day is shortened by two or more hours, it may be necessary to give less insulin on the first day at the destination. When traveling west, if the day is extended by two or more hours, it may be necessary to give more insulin on the first day at the destination. Blood glucose should be checked at least 10 hours after the first-day dose to allow for further adjustments. Travelers can return to their normal insulin regimen on day 2 at their destination. A comprehensive public access resource for medical professionals addressing insulin adjustment for the air traveler is available through the Aerospace Medical Association.²³

Gastrointestinal Conditions

For travelers with recent intra-abdominal procedures, trapped gas expansion could disrupt sutures and cause rebleeding. Travelers should wait until 24 hours have passed and any bloating has resolved following laparoscopic abdominal procedures or colonoscopy.^{7,10} Travelers should

wait one to two weeks after open abdominal surgery.¹⁰ Patients with active gastrointestinal problems, including hematemesis, melena, or obstruction, should not fly.²⁴

Hematologic Conditions

A baseline anemia may predispose travelers to syncope given the relative hypoxia of the flight environment. Caution should be exercised for travelers with a hemoglobin level below 8.5 g per dL (85 g per L), and some authorities recommend not advising flight for any travelers with levels below 7.5 g per dL (75 g per L).⁷ Young, otherwise healthy patients with chronic anemia may be more tolerant of relative hypoxia, especially if their hemoglobin level is greater than 7.5 g per dL.²⁴ For the traveler with sickle cell anemia, sickling crisis during flight is unlikely²⁴; however, flight should be delayed for 10 days following an acute crisis, and patients with sickle cell anemia who have received a recent transfusion should not fly if hemoglobin levels are less than 7.5 g per dL.²⁴

Although deep venous thrombosis (DVT) is not caused by the flight environment itself, DVT is a concern for people who sit for extended periods or have risk factors.²⁵ Incidence of DVT reaches up to 5.4% in high-risk groups flying an average of 12.4 hours.²⁶ Compression stockings can prevent asymptomatic DVT and superficial venous thrombosis in flights lasting five hours or longer.²⁷ Table 3 lists recommendations for DVT prophylaxis for travelers who are at low, moderate, and high risk for DVT.¹¹ The baseline recommendations for each group include staying hydrated, avoiding alcohol to prevent dehydration, walking at least 10 to 15 minutes in each two hours of travel time, and performing isometric exercises while seated.¹¹ When indicated for high-risk travelers, including those with reduced mobility, low-molecular-weight heparin (e.g., 40 mg of subcutaneous enoxaparin [Lovenox]) on the day of and day after travel is appropriate for anticoagulation.²⁸

Psychiatric and Intellectual Disability Conditions

Passengers with mental or intellectual disabilities often benefit from a traveling companion because physiologic stresses of flight and the

chaotic nature of busy airports may be especially challenging aspects of travel for these groups.⁹ Prescription anxiolytics may alleviate travel anxiety, but a test dose is highly encouraged before flight.⁹ Service or emotional support animals can be used for a variety of mental health conditions; an article in *American Family Physician* provides information about considerations for documentation for emotional support animals.²⁹ See the U.S. Department of Transportation website for current guidelines regarding the use of these animals during air travel.³⁰

Neurologic Conditions

Passengers predisposed to stress-related headaches and severe migraines should always carry abortive medications. Travelers with uncontrolled vertigo are not good candidates for flight. Patients prone to syncope should remain

TABLE 3

DVT Prophylaxis Recommendations per Risk Category for Air Travel

DVT risk category	Clinical recommendation
Low*	Perform isometric exercises (contracting large muscle groups without joint movement [e.g., alternating contracting and relaxing quads, hamstrings, calves] while seated), hydrate adequately, avoid alcohol, and walk as much as possible (e.g., 10 to 15 minutes every two hours)
Moderate†	Wear compression stockings in addition to low-risk measures
High‡	Administer anticoagulant (e.g., low-molecular-weight heparin [enoxaparin (Lovenox); 40 mg]) subcutaneously on the day of travel and the next day, in addition to low- and moderate-risk measures

DVT = deep venous thrombosis.

*—Low risk for DVT: no history of DVT, no surgery within four weeks, no other risk factors.

†—Moderate risk for DVT: history of DVT or pulmonary embolism, surgery lasting longer than 30 minutes occurring four to six weeks earlier, known clotting tendency, pregnancy, body mass index greater than 30 kg per m².

‡—High risk for DVT: history of DVT with known additional risk factor (e.g., cancer), surgery lasting longer than 30 minutes within the past four weeks.

Information from reference 11.

well-hydrated and be cautioned to avoid alcohol or quickly standing from a seated position. One small study suggests that people who have epilepsy with a history of flight-related seizures and a high baseline seizure frequency are likely to have a seizure after flying.³¹ The Aerospace Medical Association recommends that patients with uncontrolled or poorly controlled seizures should not fly.³² A safe amount of time permitted before flight following a seizure has not been established, but clinical judgment and the presence of a knowledgeable chaperone should factor into any medical recommendation. Although some airline carriers allow patients to fly 72 hours after a stroke,⁷ the Aerospace Medical Association recommends waiting one to two weeks.³²

Obstetric Conditions

Background radiation associated with the flight environment does not pose a special hazard for most pregnant air travelers; however, the Federal Aviation Administration recommends informing aircrew or frequent flyers about health risks of radiation exposure.³³ Because a lack of in-flight medical resources may jeopardize safety of the mother and neonate, patients with an uncomplicated singleton pregnancy should generally not fly beyond 36 weeks of estimated gestational age^{7,24,33,34} and those with a multiple gestation not beyond 32 weeks.^{7,34} Body imaging scanners are safe for security screening during pregnancy.^{34,35} Postpartum travelers are at moderate risk for DVT and should wear compression stockings and perform isometric exercises during flight.¹¹ Travelers who have undergone an uncomplicated cesarean delivery are generally safe for flight within one to two weeks.¹⁰

Ophthalmologic Conditions

Passengers with severe visual impairment may benefit from having a traveling companion. Xerophthalmia may be exacerbated in the low humidity of the airplane cabin, and lubricating eye drops are advisable. Cataracts and clinically stable glaucoma are not contraindications to flight; however, any retinal detachment interventions should restrict flight for at least two weeks.³⁶ Open-globe eye surgery should delay air travel for up to six weeks, and travel recommendations should be made in conjunction with an ophthalmologist.³⁶

Orthopedic Conditions

Because of expansion of trapped air at altitude, all fixed casts should be bivalved.^{7,37} Some airlines do not permit air casts of any kind, but if they are used, a small amount of air should be released to prevent any limb compression that occurs as a result of trapped gas expansion. Elastic bandages can be added to a bivalved cast and can be loosened as tolerated. The Transportation Security Administration recommends that passengers with prosthetic limbs should avoid metal detector screening and should be screened with alternative measures.¹⁶ Individuals with significantly decreased mobility should consider wheelchairs and the use of travel companions. Passengers with low back pain and other mobility-limiting conditions can request seating near the front to reduce walking; however, business and first-class seating is an additional cost.

Urologic Conditions

Foley catheters and other inflatable balloons are compatible with flight; however, they should be filled with liquid for air travel, given the previously described expansion of trapped gas at altitude.

Special Considerations for Children

Healthy, term neonates should not fly for at least 48 hours after birth but preferably one to two weeks.²¹ Infants younger than one year with a history of chronic respiratory problems since birth should be evaluated by a pulmonologist before air travel.³

Other Air Travel Considerations

Jet lag occurs as a result of desynchronization between an individual's internal circadian rhythm and the external environment's time zone.^{38,39} Jet lag is worse for eastward rather than westward travel.⁴⁰ Measures for prevention include ensuring enough sleep before travel, timing light exposure using sunglasses, avoiding alcohol, and eating at appropriate times after arriving at the destination. Timed melatonin is highly effective at treating jet lag,⁴¹ and prescription hypnotic-sedative medications may also work in controlling sleep loss.³⁸

Self-contained underwater breathing apparatus (SCUBA) divers should not fly within 12 hours of a dive because of the concern for

decompression sickness or life-threatening arterial gas embolism.⁴²

The airplane cabin does not inherently pose greater risk for infection than any other close contact, but respiratory viral pathogens are the most commonly transmitted infections.⁴³ Because of the ongoing COVID-19 pandemic, the Centers for Disease Control and Prevention (CDC) recommends delaying travel until the individual is fully vaccinated because traveling increases the chance of getting and spreading COVID-19. For patients not fully vaccinated who must travel, it is important to follow the CDC's recommendations for unvaccinated people. Check for evolving guidelines on the CDC's website.⁴⁴

Patients with breast cancer who have had surgery may fly without risking new or worsening lymphadenopathy.⁴⁵

A comprehensive discussion of in-flight emergencies is beyond the scope of this article. See the *American Family Physician* article on in-flight emergencies for more details.⁴⁶

This article updates a previous article on this topic by Bettes and McKenas.³⁷

Data Sources: A PubMed, Cochrane database, Essential Evidence Plus, ACCESSSS, and ECRI search occurred in April and May 2020 and April and May 2021 using search terms aviation medicine, travel medicine, commercial flight, air travel, and fitness to fly. The Aerospace Medical Association's website resource, Medical Considerations for Airline Travel, was searched in its entirety. The *Handbook of Aviation and Space Medicine, Fundamentals of Aerospace Medicine, and Aviation and Space Medicine* were reviewed for clinically relevant chapters.

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The Authors

NICOLE POWELL-DUNFORD, MD, MPH, MPD, FAAFP, FAsMA, is a faculty member at the School of Army Aviation Medicine, Fort Rucker, Ala., and an associate professor of Military and Emergency Medicine at the Uniformed Services University of the Health Sciences, Bethesda, Md.

JOSEPH R. ADAMS, DO, MPH, is a resident in the Department of Aerospace Medicine at the School of Army Aviation Medicine.

CHRISTOPHER GRACE, DO, MPH, is a resident in the Department of Aerospace Medicine at the School of Army Aviation Medicine.

Address correspondence to Nicole Powell-Dunford, MD, MPH, MPD, FAAFP, FAsMA, 47 Red Cloud Rd., Fort Rucker, AL 36362 (email: nikkipd@gmail.com). Reprints are not available from the authors.

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