The Discerning Traveler

by Philip Wagenaar, M.D.

Cabin air quality — 14 tactics to increase your flying comfort

The following essay was inspired by a letter from ***ITN*** reader Mrs. Carey Casey in Cathedral City, California.

"Who are those two strange-looking people?" our fellow travelers must have wondered.

Our faces covered by oxygen masks with their extended hoses dangling toward the supply tanks, we must have looked like creatures from outer space as we flew from Auckland to Seattle on Air New Zealand.

Most participants on our 26-day Elderhostel program had developed a viral gastroenteritis on the last few days of our excursion. I fell ill three days before the end of the program and my wife, Flory, got sick on the plane.

At first, we declined the oxygen offered by the crew, thinking that it wouldn't do any good. However, after the flight attendant kept urging us to partake of that "wonderful gas," we succumbed to her request.

To our surprise and delight, the supplemental oxygen really helped. We both slept during the rest of the flight. (How is *that* for a new sleeping potion?)

Only after this experience did I realize that two factors had contributed to our initial misery: the thinner air at increased altitudes and the recirculated air.

"Recirculated air? What is he talking about?" you may ask yourself as you read this.

The cabin environmental control system

To enlighten myself and to properly inform you about the atmosphere inside commercial airliners, I researched various sources, including the Boeing, Airbus and International Air Transport Association (IATA) websites. Below I paraphrase some of the content from the Boeing website *(www.boeing.com/commercial/cabinair/facts.html)*.

To counteract the normal fall of air pressure at increasing altitudes (typical cruising altitudes range from 36,000 to 40,000 feet), the cabin is pressurized to the atmospheric pressure present at 6,000 to 8,000 feet above sea level. At that altitude, the air is "thinner," which means that the amount of oxygen you are able to breathe is decreased.

Pressurization is handled by what is called the cabin environmental control system, which also takes care of the flow of air, its filtration and temperature.

Here's how it works.

1. Outside air continuously enters the engine, where it is compressed. As it becomes pressurized, the air gets very hot.

2. The portion drawn off for the passenger cabin is first cooled by heat exchangers and subsequently by the main air-conditioning units, which lie under the floor of the cabin. On its way, the air may pass through a catalytic ozone converter, used on high-altitude polar flights.

3. From the air-conditioning units, the air is sent to a manifold where, on newer aircrafts, fresh air is mixed 50% to 50% with the used (also called recirculated) air, which has been cleaned with high-efficiency filters. The other 50% of the recirculated air is immediately exhausted from the airplane.

4. The mixture from the manifold then goes to the cabin, where the entire atmosphere is changed every two to three minutes.

Cabin air quality

The Boeing website continues: "Since the outside-air content keeps carbon dioxide and other contaminants well within standard limits and replaces oxygen far faster than the rate at which it is consumed, it is unlikely that cabin air contains sufficient contaminants to cause such occasionally reported conditions as fatigue, headache, nausea or respiratory problems.

"It is more probable that these conditions are caused by the com-

plex interactions of such factors as the individual's health, jet lag, medications, alcohol consumption and motion sickness in combination with cabin altitude effects and low humidity."

Expected problems during a flight

After reading the above, you probably wonder, "Would I experience any difficulties linked to the cabin environmental control system during a flight?"

I describe the three most important ones below.

a. Mild hypoxia

Due to the "thinner" air at 6,000 to 8,000 feet (the altitude to which the cabin is pressurized), less oxygen is supplied to the tissues than at sea level, a condition called hypoxia.

This may cause inattentiveness, poor judgment and a decrease in motor coordination. Some individuals also could suffer mild hyperventilation, headache, insomnia or digestive dysfunction.

While the effects of reduced cabin air pressure usually are well tolerated by healthy passengers, travelers with heart and lung ailments, patients who recently had abdominal or eye surgery and those with certain blood disorders, such as sickle-cell disease, may not tolerate the mild hypoxia. These individuals should contemplate making arrangements with the airline for the provision of an additional oxygen supply during an upcoming flight.

(For more details, see the section "Important information for travelers with medical conditions or special needs," below)

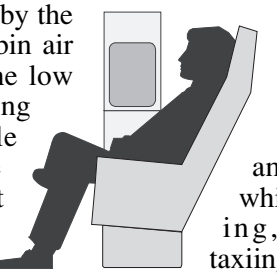
b. Gas expansion

Another result of reduced cabin pressure is the expansion of air in body cavities. While in the abdomen this may cause only moderate discomfort, in the middle ear and sinuses it could trigger pain, particularly during descent.

Individuals with ear, nose and sinus infections should avoid flying because pain and even injury may result from the inability to equalize pressure differences. Susceptible lung patients could also be at risk.

c. Decreased humidity and dehydration

Low humidity in the cabin (usually less than 20%) is caused by the frequent replenishment of cabin air with outside air, which, at the low temperature of typical cruising altitudes, contains very little moisture. This can cause dehydration, with resultant headaches, tiredness, fatigue and drying of the nose, throat and eyes.



Causes of complaints

Based on the above information, we might conclude that breathing the air in the cabin has minimal adverse effects. However, a 2001 report from the National Research Council, which was sponsored by the FAA and can be found on the Web at *http://ens-newswire.com/ens/dec2001/2001-12-11-07.asp*, states that passengers and cabin crew still frequently complain that the air on planes is unpleasant and may be unhealthy.

The committee states that, although environmental control systems on board aircraft provide an ample supply of air, this is about half the ventilation rate frequently required in sealed buildings.

In addition, the committee reports that the following factors can contribute to passengers' complaints.

1. Decreased oxygen pressure.
2. Recirculated air. On the other hand, since it is filtered, it is essentially sterile and particle-free.
3. Low relative humidity.
4. "Sardine seating," which may spread infectious agents.
5. Ozone pollution, which on some flights exceeds FAA standards.
6. Higher CO_2 levels and odors in the intake, which occur during boarding, disembarking and taxiing (where they can come from the airplane ahead).
7. Contamination during abnormal operations when engine oil, hydraulic fluids or de-icing solutions enter the cabin through the ventilation system in what is called "bleed air."
8. Potential exposure to common chemical and biological contaminants, such as pesticides routinely sprayed on some international flights.

The committee called for a regulation requiring the removal of passengers from an aircraft within 30 minutes after the ventilation system fails or is turned off on the ground. (The ventilation normally is not turned on until after takeoff.) The report also requires that the air-conditioning be kept on continuously while the plane is on the ground during warm weather.

The researchers conclude that the cabin atmosphere sometimes fails to meet federal health standards. (Now, that is breaking news!)

What can you do to make your flight more comfortable?

To have a more pleasant flight. . .

1. Swallow, chew gum or suck on a hard candy to relieve discomfort in your ears from changes in cabin pressure (most marked during takeoff and landing). Give babies a bottle or pacifier. If the problem persists, pinch your nose while doing a short forceful expiration with your mouth closed — the so-called Valsalva maneuver.

2. Drink enough bottled water (the water in the planes' bathrooms is contaminated) to counteract dehydration. Moderate your intake of caf-

feine and alcoholic beverages, both of which intensify dehydration. Note that hypoxia compounded by alcohol intake is especially troublesome and contributes to air rage.

3. Keep your nostrils moist with saline nasal spray (available at drugstores) and/or cover your nose and mouth with a wet cotton handkerchief to increase the amount of moisture during inhalation.

4. Keep in mind that cold, dry air may trigger asthma in some people.

5. Use artificial tears, available at drugstores and supermarkets without prescription, to relieve dry eyes.

6. Lubricate your skin with a moisturizer.

7. Disinfect your hands with Purell® (or a similar) instant, alcohol-based, hand sanitizer before you eat.

8. Carry a disposable surgical mask in your carry-on and use it to protect yourself from a coughing fellow passenger.

9. Wear loose-fitting, comfortable clothes.

10. Stretch your arms and legs every half hour.

11. Avoid crossing your legs when seated.

12. Exercise by walking down the aisle or doing seated exercises, which can include ankle circles, feet pumping, knee lifts, shoulder rolls, knee-to-chest movements, forward flexes, neck rolls and overhead stretches. To find out more and to practice these beforehand, go to the website *www.boeing.com/commercial/cabinair/seatedexercises.html*.

13. When ready to sleep (note: to cope with jet lag, it is best to take a nap only on an overnight flight), do the following:

• Put a sweater on if the blowing air makes you feel chilly.

• Remove your shoes and, if necessary, put on warm socks.

• Remove your contact lenses (if applicable). Bring a contact lens box and fluid. (Remember to put the fluid in your 3-1-1 bag. If it is over three ounces, declare it separately.)

• Insert earplugs to shut out the engine and air-conditioning noise. (Flents Ear Stopples, which I described on page 88 of the July '06 issue, work well.)

• Fasten your seat belt on top of your blanket, which confirms to the flight attendants that you are buckled up.

• Use eyeshades (which you have to bring from home if you fly economy class) to shut out disturbing lights.

• Avoid taking sleeping pills, especially when you have to drive after deplaning, since many such medications have lingering aftereffects. (Be sure to read the recently issued FDA warnings.)

Availability of on-the-spot, in-flight oxygen

14. Ask for on-the-spot supplemental oxygen if you have difficulty breathing. (Our Air New Zealand 747 had 25 bottles on board.)

To determine whether U.S. airlines would grant such a request, I contacted a number of carriers. Below you will find a synopsis of the questions I asked and the replies I received.

Q: Do you carry supplemental

oxygen tanks on board? If so, how many?

A: Yes. All U.S. passenger-carrying commercial jet aircraft are required to have oxygen bottles on board. The number of portable oxygen bottles differs widely from one aircraft to another, depending in part on the seating capacity of the aircraft, the number of crew members normally assigned to the aircraft and the route being flown. All of these criteria are defined in a multitude of regulations set by the FAA.

Q: Assuming that I am a passenger without disabilities and who doesn't need oxygen in daily life, will the flight attendant furnish me with supplemental oxygen from one of the tanks if I ask for it when I don't feel well? Which criteria will induce the personnel to grant my request?

A: Every incident of customer illness presents a different scenario. Flight attendants are trained to place a customer on oxygen when faced with any potential or apparent serious malady, such as a heart attack, a seizure, severe chest pain, difficulty breathing, irrationality, unconsciousness, etc. A note from a physician also might help in obtaining oxygen.

Some airlines have a contract with an in-flight medical counseling firm which provides guidance by radio or telephone for the treatment of an ailing traveler.

Q: Is there enough room in economy class to accommodate an oxygen cylinder next to or in front of the passenger?

A: Absolutely. The portable oxygen bottles used by most carriers worldwide are small enough for the customer to wear with a shoulder strap. They also may be secured in the seat next to the customer using a seat belt.

Q: Can the pilot, upon request, increase the oxygen pressure in the cabin?

A: The pilot has the ability to raise the air *pressure* inside the cabin within a specific range.

Important information for travelers with medical conditions or special needs

While patients with chronic lung disease only rarely have problems during air travel, they may need in-flight oxygen supplementation, even if they do not use oxygen at home. To determine this, a preflight assessment from a lung specialist is required well in advance of a trip.

Be aware that airlines have the right to refuse to carry passengers with conditions that may worsen, or have serious consequences, during a flight.

Since U.S. carriers are not required to provide oxygen services on board, their policies and the type of oxygen containers they carry vary considerably.

Prearranged in-flight oxygen

Although FAA rules prohibit travelers from transporting their own oxygen supply aboard commercial aircraft, many airlines have medical oxygen cylinders available upon prearrangement, with costs running from $50 to $150 per flight leg, a cost which most insurance policies do not reimburse.

To get the latest information about prearranged in-flight oxygen, call the carrier's reservation department (not customer service) and ask the following questions:

• Do you accept passengers who require supplemental oxygen?

• How much advance notice do you require before the flight?

• What documentation is required from my doctor?

• What liter-flow options are available on the equipment you use?

• Do you provide nasal cannulas or masks or do I bring my own? (A nasal cannula is a device that delivers oxygen via two small tubes inserted in the nostrils.)

• What are the charges?

Get more information at the following organizations' websites:

• UpToDate®Patient Information *(http://patients.uptodate.com/topic.asp?file=lung_dis/5339)*,

• The National Library of Medicine *(www.nlm.nih.gov/medlineplus/healthtopics.html)*,

• American Lung Association *(www.lungusa.org)*,

• European Respiratory Society *(www.ersnet.org)*,

• American Association for Respiratory Care *(www.aarc.org)* and

• YourLungHealth.org *(www.yourlunghealth.org)*.

If, after trying everything, you still feel under the weather during a flight, approach the senior flight attendant with a request for supplemental oxygen. This may make your flight a more pleasant experience. *ITN*

Dr. Wagenaar welcomes questions but may not be able to answer them individually. Write to him at 6556 50th Ave. NE, Seattle, WA 98115, or e-mail pwagenaar@qwest.net.

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Clock Museum in Portugal

The town of Serpa, in southern Portugal, has a clock museum housed in a former 14th-century convent. The collection includes more than 1,700 watches and clocks dating from the 17th century, including many rare Portuguese watches.

Contact Museu do Relógio *(Convento do Mosteirinho, Rua do Assento, 7830-341 Serpa, Portugal; phone 284543194)*.