

ICAO has increased the mandatory upper age limit for airline pilots to 65, but some wonder if a limit is really necessary.

BY LINDA WERFELMAN



TOO OLD TO FLY

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Most people are in their 40s or older when they become aware that they are experiencing gradual age-related physical and mental changes. The effects of aging are different for everyone, however, and the age-related developments that present problems for some people at 40 may materialize for others when they are considerably younger or older — or they may not materialize at all.

The effect of aging on pilot performance has been the subject of numerous studies; results have been mixed. The Aerospace Medical Association (AsMA) said that, because of the significant differences in study findings,



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“Pilot cognitive performance has been shown to generally decline with age.”

“a clear understanding of the relationship between age, pilot performance and safety [is] difficult.”¹ Many national civil aeromedical authorities have dealt with the issue by imposing an upper age limit — for commercial airline pilots. In November, the International Civil Aviation Organization (ICAO) increased its mandatory age limit from 60 to 65 for pilots-in-command; in recent years, some national civil aviation authorities have rejected limits altogether.

Unavoidable Changes

Age-related physiological changes are unavoidable (see “Help for Aging Bodies,” page 13, and “Changing With Age,” page 14).

Some of these changes, like wrinkled skin and graying hair, have no real effect on the body’s ability to function — and no effect on a pilot’s ability to fly an airplane.

Other changes, however, can diminish vision, hearing or mental acuity, all of which can present problems — often correctable — for pilots and other crewmembers.

Still other changes, most notably cardiovascular disease and associated heart attacks and strokes, can — rarely — present the risk of sudden incapacitation. When the first age limits were imposed on commercial airline pilots in the 1960s, sudden incapacitation often was cited as a major concern. Subsequent studies have found that, although the risk of in-flight incapacitation increases with the pilot’s age, it does not present a significant risk to the safety of flight — in part because, with two-pilot crews, another pilot is available to take the controls in the event the pilot flying is incapacitated.²

A number of studies have examined the effects of age-related changes — physical and mental — on flight performance and have concluded that these changes usually are “progressive and continuous,” AsMA said in a summary of study findings. Often, mental changes are of greater concern to aeromedical specialists than physical changes.

“Pilot cognitive performance has been shown to generally decline with age, with the possible exception of time-sharing tasks,” AsMA said. “While pilot performance on most memory tasks has shown age-related declines, aviation expertise has been shown to reduce age differences on more aviation-related memory tasks. Some studies document age-related declines in attention, while others show that the performance of older subjects equals that of younger subjects.”

The AsMA report said the review of study findings resulted in three conclusions: “First, performance on measures of most (not all) cognitive functions decline with advancing age. Second, the group of average effects may not predict the performance of any specific individual. Third, there are limited data demonstrating that the observed ‘declines’ in test performance are predictive of any changes in performance in the cockpit.”

A 2006 study of pilot error in air carrier accidents found that the “prevalence and patterns

of pilot error ... do not seem to change with pilot age.”³

Age 60 Versus Age 65

For decades, regulatory authorities have adopted upper age limits in an attempt to reduce risks. In 1919, ICAO’s predecessor, the International Commission for Air Navigation, established a limit of age 45. ICAO began recommending an age-60 limit in 1963 — four years after what was then the U.S. Federal Aviation Agency (FAA) imposed a mandatory age-60 limit — and ICAO’s recommendation became a mandatory standard for pilots-in-command in 1978. In November 2006, a revision of the ICAO standard increased the upper age limit to 65 for commercial pilots of two-pilot aircraft, on the condition that only one pilot per flight crew is older than 60. In addition, ICAO said that an aeromedical exam is required every six months for pilots 60 and older.⁴

The ICAO Air Navigation Commission, which recommended the change, said that, since 1978, when the age-60 limit was adopted, “the increase in longevity and associated good health into old age in many states, the progress of medical science, the introduction in incapacitation training for multi-pilot operations and advances in aircraft technology have altered the flight safety risk associated with aging pilots.”⁵

When the standard took effect, several countries held to the old age-60 limit. Of those, at least one — the United States — was considering increasing the limit to 65.

Even after the ICAO change, some aeromedical specialists — including aeromedical authorities that have abolished age limits in several countries — said that commercial pilots should not be barred from the flight deck simply because of age.

“The big things that brought on the age-60 rule aren’t factors any more,” said Dr. Stanley R. Mohler, professor emeritus of aerospace medicine at Wright State University in Dayton, Ohio, U.S., and a member of the Federal Aviation Administration (FAA) panel that studied age limits in the late 1950s, before the FAA’s adoption of the rule.

“In the 1960s, heart disease was the big risk. Alcoholism was a factor because there were more heavy drinkers. ... Today, stroke is increasingly rare among healthy pilots with their blood pressure under control. Cancer is still a risk, but with a flight physical every six to 12 months, it will be diagnosed. If a pilot has Alzheimer’s, he won’t pass the simulator check,” said Mohler, a staff member at the U.S. National Institutes of Health Center for Aging Research when he served on the FAA panel, and later chief of the Federal Aviation Administration Civil Aeromedical Research Institute (now the Civil Aerospace Medical Institute). “And the main cause of sudden incapacitation is food poisoning, which has nothing to do with age.”

The normal aging process is separate from disease, and in evaluating a pilot’s fitness for flight,

Help for Aging Bodies

Medical specialists say there are some things that can be done to cope with the effects of aging, such as:^{1,2}

- Eat a healthy diet low in fats, cholesterol and sodium that includes plenty of fruits and vegetables and an adequate amount of fiber — 25 grams daily for women and 38 for men. Specialists sometimes recommend dietary supplements such as B vitamins to reduce risks of dementia and to maintain sharp thinking, and calcium and vitamin D for strong bones;
- Don’t smoke;
- Limit alcohol consumption;
- Exercise regularly. Many specialists recommend at least 30 minutes of brisk walking or other similar activity most days of the week. In addition, weight training and weight-bearing exercises like walking can help strengthen bones;
- Limit exposure to the sun, and use sunscreen; and,
- To reduce the risk of Alzheimer’s disease and other forms of dementia and to keep your thinking sharp, obtain at least six hours of sleep a night and challenge the brain with activities such as solving crossword puzzles, reading, learning a foreign language or developing new hobbies.

— LW

Notes

1. U.S. National Library of Medicine; U.S. National Institutes of Health (NIH). *Aging Changes in ...* <www.nlm.nih.gov/medlineplus>.
2. “How Our Bodies Age (and What You Can Do About It),” *The Washington Post*. Dec. 5, 2006.

Changing With Age

Aging begins at birth, but the effects that most people associate with middle age and old age typically begin to become obvious during their 40s. During this decade, most people develop presbyopia, difficulty focusing their eyes on nearby objects. The decline in visual acuity continues so that by about age 50, objects at intermediate-distance — about the distance between a pilot’s eyes and an instrument panel — also are difficult to see. These visual problems can be corrected with eyeglasses.

Slightly later, beginning at about age 50, many people notice age-related hearing loss, also known as presbycusis, the most common of the forms of hearing loss that are associated with damage to the inner ear, the auditory nerve or auditory nerve pathways in the brain. Age-related hearing loss may be partly a result of the amount of noise a person has been exposed to over a lifetime. It affects men more often than women and begins after age 20. About 25 percent of people from ages 65–75 have age-related hearing loss; the figure increases to 70 to 80 percent for people older than 75.¹ Hearing aids often are prescribed, and most pilots with hearing loss that impairs communication either use hearing aids or develop their own coping strategies.

Because the inner ear also is the source of control for maintaining balance, or equilibrium, age-related deterioration of the ear structure sometimes makes it more difficult to maintain balance.

Although changes in vision and hearing are most pronounced, other senses also diminish with advancing age:²

- Taste suffers because the number of taste buds declines, beginning around age 40 for women and

around age 50 for men. During their 60s, some people experience a decreased sensitivity to taste sensations, typically losing salty and sweet tastes first and then bitter and sour; and,

- During the 70s, a loss of nerve endings in the nose may reduce the sense of smell.

A number of musculoskeletal changes also may occur, including osteoarthritis — a deterioration of the cartilage in the joints that can result in pain, swelling and restricted mobility — which affects millions of people worldwide. The United Nations World Health Organization (WHO) estimates that osteoarthritis affects 9.6 percent of men and 18 percent of women over age 60.³ Osteoarthritis can affect any joint but most often the knees and hips. In most cases, pilots with osteoarthritis in a knee can continue flying, unless the knee’s range of motion is significantly restricted or medication impairs mental functioning; if corrective surgery is required, they can return to flight duties after recovery.

In addition, people usually begin to lose height after age 40 — about 0.4 in (1.0 cm) every 10 years. At the same time, as the proportion of body fat increases, especially around the center of the body, including abdominal organs, cells may be lost from the muscles and internal organs and the bones may become less dense — a condition known as osteopenia, which sometimes progresses to osteoporosis. Eventually, the skin becomes thinner and less elastic, resulting not only in wrinkles but also in a lessened ability to feel pressure, vibration and temperature.⁴

As age increases, the risk increases of developing cardiovascular disease — a group of diseases affecting the heart and blood vessels, such as heart attack and stroke. The heart rate may

slow, and abnormal rhythms called arrhythmias may develop. Blood pressure sometimes increases.⁵

The body’s immune system begins a slow decline after young adulthood, and it gradually becomes less able to detect malignant cells. As a result, cancer risk increases with age.⁶

With advancing age, the brain and spinal cord lose nerve cells and weight. The breakdown in nerve cells may slow reflexes. Thought, memory and thinking may slow *slightly* as a normal part of aging. More dramatic declines result from diseases such as Alzheimer’s disease, which is not part of the normal aging process.⁷

— LW

Notes

1. U.S. National Library of Medicine (NLM); U.S. National Institutes of Health (NIH). *Age-Related Hearing Loss*. <www.nlm.nih.gov/medlineplus/ency/article/001045.htm>.
2. NLM; NIH. *Aging Changes in the Senses*. <www.nlm.nih.gov/medlineplus/ency/article/004013.htm>.
3. Woolf, Anthony D.; Pflieger, Bruce. “Burden of Major Musculoskeletal Conditions.” *Bulletin of the World Health Organization* Volume 81 (2003): 646–656.
4. NLM; NIH. *Aging Changes in Body Shape*. <www.nlm.nih.gov/medlineplus/ency/article/003998.htm>.
5. NLM; NIH. *Aging Changes in the Heart and Blood Vessels*. <www.nlm.nih.gov/medlineplus/ency/article/004006.htm>.
6. NLM; NIH. *Aging Changes in Immunity*. <www.nlm.nih.gov/medlineplus/ency/article/004008.htm>.
7. NLM; NIH. *Aging Changes in the Nervous System*. <www.nlm.nih.gov/medlineplus/ency/article/004023.htm>.

“only three things matter,” Mohler said. “They are the ability to perform, freedom from impairing diseases — if you have them but they don’t impair you, so what? — and motivation to keep flying.”

William R. Voss, president and CEO of Flight Safety Foundation and former director of the ICAO Air Navigation Bureau, agreed that age is not a good indicator of a pilot’s fitness for flight.

“The possibility of incapacitation of a pilot causing an accident in a modern, multi-crew airplane is extremely remote,” Voss said. “It hasn’t been a problem in age-60 states, and it hasn’t been a problem in age 65 states [that adopted an age-65 limit years before ICAO’s action].”

The current debate should focus not on age limits but on “doing a better job of assessing medical fitness regardless of age,” he said.

Dr. Anthony Evans, chief of ICAO’s Aviation Medicine Section, agreed that age limits are “quite good at reducing risks but unfair to some and probably generous to others. By that, I mean some individuals are fit to continue operating when elderly, but others are not.”

Nevertheless, an age limit might be the best technique for determining pilot fitness, Evans said.

“As we don’t have adequate assessment tools to accurately determine who is in one group or another, a one-size-fits-all approach, based on average risk (one that fits in with generally accepted norms of retirement) is the fairest system,” he said. “Without a retirement age, the logical conclusion is that pilots will operate until they fail a medical or an operational check. Without a culture change, there will continue to be a reluctance [by medical examiners and check pilots] to fail an experienced pilot, with his career (perhaps a glittering one) ending in failure.”

Evans said that medical evaluations and simulator checks developed to determine whether pilots have age-related problems would help identify those who are no longer fit for flight but are “far from being 100 percent accurate.”

Dr. Dougal Watson, principal medical officer for the Civil Aviation Authority in New Zealand, which has no upper age limit for pilots, said that although age influences various aspects of safety-related human performance, it is not the most significant factor.

“On purely medical-safety grounds, an argument to do away with age-based exclusion criteria has a very solid foundation,” Watson said. Nothing in New Zealand’s aviation safety record indicates that the absence of an upper age limit has caused safety problems — or that it offers any safety advantages, he said.

Nevertheless, he added, “Age is an important factor. ... As age increases, so does the risk of cardiovascular incapacitation (heart attacks, etc.) and neurological incapacitation (cerebrovascular — strokes ... etc.), while mental/physical performance and capacity reduces. A safe certification system that does not utilize age-based exclusion criteria must, therefore, consider those age-related risk factors.”

In New Zealand, aeromedical certification involves a “structured system of cardiovascular risk assessment,” which closely resembles cerebrovascular risk assessment, as well as periodic operational performance evaluations, Watson said. The result is that some pilots are denied aeromedical certification “because of age-related medical factors, rather than because of their age alone.”

In Canada, where government regulations have never included an upper age limit, Dr. Jay Danforth, Transport Canada’s acting director of civil aviation and marine medicine, agreed that “maybe we

should be looking at ways to risk-identify those in the older age group,” perhaps with more frequent medical evaluations and/or checks of age-specific ailments. “We’re continually trying to fine-tune and evaluate the efficiency of our medical assessment process.” ●

Notes

1. Aerospace Medical Association (AsMA). “The Age 60 Rule.” *Aviation, Space and Environmental Medicine* Volume 75 (August 2004): 708–715.
2. Ibid.
3. Li, Guohua; Grabowski, Jurek G.; Baker, Susan P.; Rebok, George W. “Pilot Error in Air Carrier Accidents: Does Age Matter?” *Aviation, Space and Environmental Medicine* Volume 77 (July 2006): 737–741.
4. The International Civil Aviation Organization (ICAO) issues both *recommended practices* and *mandatory standards*. If ICAO’s member states do not comply with a recommended practice, they are asked to inform the ICAO Council; if they deviate from a standard, notification is required.
5. ICAO. “Changes to Annex 1 Include New Upper Age Limit for Pilots.” *ICAO Journal* Volume 61 (March–April 2006).

Further Reading From FSF Publications

FSF Editorial Staff. “Memory Lapses Usually Do Not Signal Serious Medical Problems.” *Human Factors & Aviation Medicine* Volume 52 (July–August 2005).

Mohler, Stanley R. “Prompt Treatment May Minimize Knee Problems and Their Interference With Flight Duties — and Daily Routines.” *Human Factors & Aviation Medicine* Volume 51 (July–August 2004).

Mohler, Stanley R. “Early Diagnosis is Key to Correcting Age-Related Vision Problems Among Pilots.” *Human Factors & Aviation Medicine* Volume 47 (September–October 2000).

FSF Editorial Staff. “Heredity, Disease, Aging Present Crewmembers With Increased Risk of Hearing Loss.” *Human Factors & Aviation Medicine* Volume 47 (July–August 2000).