National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation Report

Improving Pilot and Aviation Medical Examiner Knowledge of Cataract Hazards

Accident Number:	WPR14FA078
Operator/Flight Number:	N/A
Aircraft and Registration:	Cessna/172K, N251JM
Location:	Fresno, California
Date:	December 26, 2013
Adopted:	July 11, 2016

The National Transportation Safety Board (NTSB) is providing the following information to urge the Federal Aviation Administration (FAA) and the Aircraft Owners and Pilots Association (AOPA) to take action on the safety recommendations in this report. These recommendations address the flight safety of pilots who develop cataracts. These recommendations are derived from the NTSB's investigation of a December 26, 2013, fatal aircraft accident in Fresno, California, involving a pilot with progressive cataracts who had demonstrated recent difficulty landing his airplane at night but was able to pass FAA medical certification vision testing.[1] The NTSB has determined there is limited educational information provided to pilots and aviation medical examiners (AME) concerning the hazards cataracts pose to flight safety, especially at night. As a result, the NTSB is issuing two recommendations to the FAA and one recommendation to AOPA.

Background and Analysis

On December 26, 2013, about 6:21 p.m. Pacific standard time, a Cessna 172K, N251JM, was destroyed when it impacted terrain while maneuvering near the Fresno Chandler Executive Airport (FCH), in Fresno, California. The airplane was privately registered and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91. The private pilot and his passenger sustained fatal injuries. At the time of the accident, it was dark night (about 1.5 hours after sunset) and visibility was 5 miles with haze, clear sky, and wind from 320° at 3 knots. No flight plan was filed for the personal flight.

Three weeks before the accident, the 72-year-old pilot demonstrated difficulty seeing well enough to safely taxi from a familiar lighted runway onto the taxiway at night. A witness at the pilot's home airport reported the pilot had been unable to find his way off the lit runway until

[1] For more information, see NTSB accident number WPR14FA078 in the Aviation Accident Database at www.ntsb.gov.

the witness had driven his truck onto the taxiway to better illuminate it with the truck's headlights. Investigators did not find reports of other pilots having problems landing or taxiing at the airport at night, so this was not a common problem.

Although the pilot's corrected visual acuity remained 20/20 bilaterally, he had previously complained to his optometrist of vision problems with halos around stars. The optometrist documented the pilot's progression of bilateral cataracts and vitreous opacities during annual examinations over the 4 years before the accident. Cataracts can cause halos around points of light (glare) and degrade night vision.[2]

According to witnesses, on the night of the accident, the pilot attempted to land at FCH, an unfamiliar airport, with the usual nighttime lighting working correctly. On his initial attempt, he landed the airplane hard midfield on runway 30 and then took off. In a second attempt to land, he maneuvered the airplane and then flew in the opposite direction 10 to 15 feet above the midfield of runway 12. During the third attempt to land, the airplane struck a 62-foot-tall tree with the left wingtip; the tree was located about 1,400 feet from the approach end of runway 30. The airplane then continued to fly over the runway and entered a left turn. Subsequently, the airplane descended rapidly into the ground. Examination of the wreckage revealed no evidence of any preimpact mechanical malfunctions or failures.

The NTSB determined the probable cause of the accident was "the pilot's failure to maintain adequate clearance from trees while on approach, which subsequently led to a loss of airplane control. Also causal was the pilot's continued operation of the airplane at night with a diagnosed medical condition that degraded his night vision."[3]

Cataracts

A cataract is an area of clouding of the lens of the eye. Symptoms include cloudy or blurry vision; seeing faded colors, glare from point sources of light, and halos around lights; as well as the diminished ability to perceive color and contrast in low lighting conditions, such as at night. When a cataract progresses to the point that a person can no longer see well during the day or pass a vision test, the symptoms are usually significant enough that the person will seek treatment.[4] This accident demonstrates the hazards cataracts pose to safely operating an airplane, especially at night. Although the pilot was able to pass certification examinations and could see adequately to operate the airplane during the day, the glare around lights and diminished visual acuity created by the cataracts degraded the pilot's ability to see and safely control the airplane at night. Current medical certification examinations and standard eye tests cannot easily detect cataracts; more in-depth examination using additional technology is required to do so (direct and indirect ophthalmoscopy). Cataracts are common, and the incidence increases with each decade of life, starting about age 40. At age 65, more than 20 percent of all Americans have cataracts, and by age 75, about half of all Americans have cataracts.[5] As of December 31, 2013, about

[2] National Institute of Health, National Eye Institute, "Facts About Cataract," https://nei.nih.gov/health/cataract/cataract_facts.

[3] NTSB accident number WPR14FA078.

[4] "Facts About Cataract," https://nei.nih.gov/health/cataract/cataract_facts.

[5] National Institute of Health, National Eye Institute, "Cataracts," https://nei.nih.gov/eyedata/cataract.

60,000 active US pilots were more than 65 years old, and the average age of pilots was increasing.[6] Thus, at any given time, about 12,000 or about 4 percent of active pilots may have cataracts that could progress and impair their ability to see well enough to safely operate aircraft, particularly at night. However, many will likely have their cataracts treated before their vision degrades enough to create a hazard to flight safety.

The visual effects of cataracts can be readily treated by cataract surgery. Ophthalmologic guidelines note there is no single test that defines when cataract surgery should be performed. Instead, the decision should be based on evaluating the degree to which cataracts cause visual changes that negatively affect activities of daily living. Mainly, cataract surgery should be performed when visual function no longer meets the patient's needs and when such surgery provides a reasonable likelihood of improved vision.[7] Following cataract surgery, vision generally improves in 90 percent of cases.[8] Therefore, it is important for pilots to understand the effects cataracts can have on vision, especially night vision, and the potential effects on flight safety. Understanding these effects will allow pilots to discuss any visual difficulties they have with flying or daily living with their eye care professional to decide if surgical intervention is an option.

There is no formal test that defines when a pilot's cataracts have impaired their vision enough to create a safety hazard. However, educating AMEs about the potential impairments caused by cataracts should prompt discussion during medical examinations about vision at night with pilots of an age where cataracts may be a concern.

Available Information Concerning Cataract Hazards

The NTSB reviewed pilot education material in an attempt to identify information about cataracts and the associated hazards to pilots, including FAA Pilot Safety Brochures, the *Aeronautical Information Manual*, the *Pilot's Handbook of Aeronautical Knowledge*, and Aerospace Medicine Technical Reports issued by the FAA's Civil Aerospace Medical Institute.[9] The NTSB did not find any guidance information about cataracts or the risks they pose to flight safety. Information available to AMEs, including the FAA *Guide for Aviation Medical Examiners* and current FAA AME training courses discuss the administrative disposition of pilots following

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[6] Federal Aviation Administration, Office of Aerospace Medicine, *2013 Aerospace Medical Certification Statistical Handbook*, DOT/FAA/AM-14/15, December 2014, http://www.faa.gov/data_research/research/med_humanfacs/oamtechreports/2010s/media/201415.pdf.

[7] American Academy of Ophthalmology Cataract and Anterior Segment Panel, Preferred Practice Pattern Guidelines, "Cataract in the Adult Eye," (San Francisco, California: American Academy of Ophthalmology, 2011), http://www.aao.org/preferred-practice-pattern/cataract-in-adult-eye-ppp--october-2011.

[8] "Facts About Cataract," https://nei.nih.gov/health/cataract/cataract_facts.

[9] (a) Federal Aviation Administration, Pilot Safety Brochures, https://www.faa.gov/pilots/safety/pilotsafetybrochures/. (b) Federal Aviation Administration, *Aeronautical Information Manual (AIM)*, Chapter 8 Medical Facts for Pilots, April 3, 2014, www.faa.gov/air_traffic/publications/media/aim_basic_4-03-14.pdf. (c) Federal Aviation Administration, *Pilot's Handbook of Aeronautical Knowledge*, Chapter 16: Aeromedical Factors, 2008, https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/pilot_handbook/media/PHAK%20-%20Chapter%2016.pdf. (d) Federal Aviation Administration, Aerospace Medicine Technical Reports, http://www.faa.gov/data_research/research/med_humanfacs/oamtechreports/results/?q=cataracts.

treatment for cataracts but provide limited information concerning the flight safety implications or medical management of pilots with progressive cataracts.[10] Additionally, the NTSB reviewed the medical information provided to pilots by AOPA, the largest aviation industry association.[11] AOPA provides a variety of electronic and printed medical information resources to its members and maintains a medical staff to respond to member questions. Discussion with AOPA medical staff revealed that the organization provides information to its members about returning to flight after cataract surgery but does not provide information about the risks cataracts pose to flight safety.[12]

The NTSB investigation of the December 26, 2013, aircraft accident in Fresno, California, determined that progressive cataracts impaired the pilot's ability to safely land his plane at night. The NTSB found that the FAA does not provide sufficient educational material to pilots and AMEs regarding cataracts and the risks they pose to flight safety, especially at night. The NTSB concludes that the FAA educational information for pilots and AMEs concerning the hazards cataracts pose to flight safety, especially at night, is inadequate. Therefore, the NTSB recommends that the FAA develop and disseminate educational information for pilots regarding the December 26, 2013, aircraft accident in Fresno, California, and the risks cataracts may pose to flight safety including a discussion of degraded vision at night, and encourage pilots with cataracts to communicate with their eye care professionals regarding diagnosis and treatment options. The NTSB further recommends that the FAA develop and disseminate educational information for AMEs regarding the December 26, 2013, aircraft accident in Fresno, California; the risks cataracts may pose to flight safety including a discussion of degraded vision at night; and referral of pilots with cataracts to eye care professionals. The NTSB has also reviewed AOPA's educational material for pilots on the topic. The NTSB concludes that AOPA's pilot education program does not provide sufficient information about the hazards cataracts pose to flight safety, especially at night. Therefore, the NTSB recommends that AOPA include in its educational resources for pilots information about cataracts and the risks they pose to flight safety including a discussion of degraded vision at night, and encourage pilots with cataracts to communicate with their eye care professionals regarding diagnosis and treatment options.

Recommendations

To the Federal Aviation Administration:

Develop and disseminate educational information for pilots regarding the December 26, 2013, aircraft accident in Fresno, California, and the risks cataracts may pose to flight safety including a discussion of degraded vision at night, and encourage pilots with cataracts to communicate with their eye care professionals regarding diagnosis and treatment options. (A-16-15)

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[10] (a) Federal Aviation Administration, Office of Aerospace Medicine, *Guide for Aviation Medical Examiners*, Decision Considerations—Aerospace Medical Dispositions, Item 31. Eyes, http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/item31/amd/. (b) Phone conversation between an NTSB medical officer and the FAA Manager of the Aeromedical Education Division, February 3, 2016.

[11] Aircraft Owners and Pilots Association, "About AOPA," http://www.aopa.org/About-AOPA.

[12] E-mail message from an AOPA medical representative to an NTSB medical officer, dated August 12, 2015.

Develop and disseminate educational information for aviation medical examiners regarding the December 26, 2013, aircraft accident in Fresno, California; the risks cataracts may pose to flight safety including a discussion of degraded vision at night; and referral of pilots with cataracts to eye care professionals. (A-16-16)

To the Aircraft Owners and Pilots Association:

Include in your educational resources for pilots information about cataracts and the risks they pose to flight safety including a discussion of degraded vision at night, and encourage pilots with cataracts to communicate with their eye care professionals regarding diagnosis and treatment options. (A-16-17)