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In This Issue

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From the Federal Air Surgeon's perspective...

Pilot Fitness Aviation Rulemaking Committee Recommendations

By James R. Fraser, MD, MPH

In the Spring issue of the Federal Air Surgeon's Medical Bulletin, I discussed the formation of the Pilot Fitness Aviation Rulemaking Committee (ARC) and told you that I would report to you when they completed their recommendations.

The ARC was chartered by the FAA to consider specific objectives and tasks in a forum for the U.S. aviation community to discuss and provide recommendations to the FAA on pilot mental fitness for duty. The ARC was chartered after the Commercial Aviation Safety Team (CAST) considered the circumstances surrounding the Malaysia flight 370 and Germanwings flight 9525 events. CAST determined it did not have all of the needed expertise to examine pilot mental fitness issues (that is, issues affecting a pilot's emotional state, mental health, or cognitive ability to safely conduct their duties), and a committee of medical and aviation industry professionals with expert knowledge on pilot mental fitness issues was best suited to explore the topic.

The ARC membership and working groups consisted of a broad representation of people including aerospace medicine, psychiatric, and psychological medical experts from both inside and outside the FAA, FAA Flight Standards Service, U.S. aviation industry trade associations, pilot representative organizations, and international aviation industry associations. Dr. Mike Berry, Deputy Federal Air Surgeon, from the FAA Office of Aerospace Medicine served as the ARC co-chair. Dr. Penny Giovanetti, Manager Medical Specialties, from the FAA Office of Aerospace Medicine served as an ARC member and chair of the Medical Working Group.

The ARC developed eight recommendations. Several of these recommendations suggest actions the FAA and air carrier community could take to address pilot mental fitness issues through education, outreach, and training initiatives. Others address reporting mental health issues, operational procedures, and aircraft design.

The ARC believes the best strategy for minimizing the risks related to pilot mental fitness is to create an environment that encourages and is supportive of pilot voluntary self-disclosure. However, even within a supportive environment the group identified many barriers to voluntary self-disclosure. It is clear even when symptoms are recognized, pilot mental fitness self reporting may be perceived as a high risk situation. There may be misperceptions that all mental illness is career ending. Financial and career implications for professional

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(ARC Recommendations—continued from page 1)

pilots can be significant even for short term medical disqualification. Therefore, it is critical that the pilot community receive healthcare and support information that is timely, accessible, and accurate. The best approach to address misperceptions is to expand the use of pilot support programs, educate the air carrier and pilot communities on mental fitness for duty issues, and ensure pilots experiencing such issues are cared for in a confidential, non-stigmatized, and safe environment. Aviation medical examiners (AMEs) play a critical role in this process.

Additionally, the ARC believes a risk mitigation process should be used by air carriers and pilot representative organizations to create an environment where early reporting, appropriate treatment, and rapid return to the flight deck are the expectation. Early identification of mental fitness issues leads to better results. A holistic approach to educating and addressing pilot mental fitness issues offers the best opportunity for a positive outcome.

The eight recommendations include:

1. Enhance AME Training

The Federal Aviation Administration (FAA) should ensure all Aviation Medical Examiners (AME) demonstrate knowledge in assessing basic mental health concerns, and enhance AME training on this topic.

Rationale: Many AMEs have limited psychiatric education and experience. It is desirable to expand general knowledge regarding mental status assessment and mental health. This could be accomplished by restructuring the AME basic and refresher curricula, with the goal to enhance the AME's ability to identify warning signs and refer the pilot for evaluation and appropriate intervention.

2. Psychological Testing

The ARC does not recommend mandating formal psychological testing during the pilot hiring process nor as part of routine FAA aviation medical examinations beyond those which already exist.

Rationale: The Aviation Rulemaking Committee (ARC) found no convincing data to conclude that adding psychological testing to the hiring process or to the routine medical examinations enhance the ability to assess the mental fitness of the pilot workforce.

3. Pilot Assistance Programs

Air carriers should develop effective pilot assistance programs.

Rationale: An environment needs to be created where pilots feel comfortable disclosing mental fitness issues. Pilot support programs should provide the opportunity for a pilot to disclose a mental fitness concern and if appropriate, receive temporary relief from flight duties and be referred to professional resources. The successful implementation of pilot support programs benefits from a joint collaboration between the air carrier to include senior management support, its pilot representative organization, and pilot peer volunteers. The trusting relationship with a fellow pilot in a peer supported program may provide the best opportunity to identify and engage an individual requiring assistance. To encourage use, pilots must be handled in a confidential, non stigmatized, and safe environment. If a culture of mutual trust and cooperation is maintained, pilots are less likely to conceal a condition, and more likely to report and seek help for mental health issues.

> ***The ARC believes the best strategy for minimizing the risks related to pilot mental fitness is to create an environment that encourages and is supportive of pilot voluntary self-disclosure.***

4. Air Carrier Education

Air carrier operators should be encouraged to implement mental health education programs for pilots and supervisors that improve awareness and recognition of mental health issues, reduce stigmas, and promote available resources to assist with resolving mental health problems.

Rationale: Improved mental health literacy is associated with earlier reporting and improved treatment outcomes.

5. Informational Material on Pilot Support Programs

The FAA should assemble and disseminate information on benchmark pilot support programs, which includes pilot assistance programs, to serve as a resource for air carriers to develop new or improve existing programs.

Rationale: There is a need for more opportunities for sharing best practices among air carriers. Providing the basic description, function, and benefits of pilot support programs will encourage air carriers to implement some or all of these programs. Implementation of the full complement of these programs is considered a best practice.

6. Medical Professional Reporting

Encourage advocacy for a uniform national policy on mandatory reporting of medical issues that affect public safety.

Rationale: In the United States, medical professional reporting responsibilities are unclear. Reporting requirements and guidelines vary by State and by licensing boards. The perceptions of adverse legal consequences of reporting appear to be greater than not reporting. AMEs are expected to report issues potentially affecting public safety, but among medical professionals at large, concerns exist about professional and legal liability for violating patient privacy.

It should be noted there exists a concern that universal implementation

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(ARC Recommendations—continued from page 2)

of mandatory reporting requirements may deter individuals from seeking treatment. Also, because of the current uneven legal landscape, and medical ethics considerations notwithstanding, it is important that existing or future pilot support programs and policies continue to raise pilot awareness and encourage voluntary self-disclosure in a confidential and safe environment.

7. Two Persons on Flightdeck and Flightdeck Access

The ARC recommends no changes to the guidance found in FAA Order 8900.1, "Procedures for Opening, Closing, and Locking Flight Deck Doors" concerning two persons on the flightdeck and flightdeck access.

Rationale: The ARC notes that mental health episodes have occurred even with two persons in the cockpit, and no single safety practice can address all possible hypothetical events and other civil aviation authorities may have different procedures best suited to their regulated air carriers and operating environments.

8. Aircraft Design Standards

The ARC believes existing aircraft and flightdeck door design standards are adequate and no changes are required by the FAA.

Rationale: No additional design requirements or pending technologies have been identified that would reduce risk more than these systems currently in place.

In summary, thanks to the work done daily by AMEs and others in our aviation community, I believe our U.S. pilots undergo a reasonably robust medical screening. The adoption of the recommendations above will only make it better. Thanks for all that you do for aviation safety.

-Jim

Student Pilot Certificate Changes: AMEs Stopped Issuing Student Pilot Certificates April 1, 2016

By Stephen Véronneau, MD, MS

After March 31, 2016, it was no longer possible for an Aviation Medical Examiner (AME) to issue a Medical Certificate and Student Pilot Certificate (FAA Form 8420-2). Changes were effected in MedXPress and AMCS to prevent issuance of the combination pilot and medical certificate.

In response to a 2004 Congressional law and FAA Flight Standards (AFS) rulemaking accomplished in January of this year, designated AMEs stopped issuing the combination paper certificate, which was both a medical certificate and a Student Pilot Certificate.

Student pilots are still required to have at least a Third Class Medical Certificate (FAA Form 8500-9) prior to their first solo flight, so part of the quest to become a pilot will still require a medical certificate. As an AME you printed that form, either the combination certificate (8420-2) or the medical certificate (8500-9) from within AMCS.

While there is a minimum age requirement of 16 for the Student Pilot Certificate, it is important to remember that there is no age requirement for a Medical Certificate of any class. An applicant who meets the standards may be issued an appropriate medical certificate. The student pilot could conceivably approach an AME as much as five years in advance of his or her solo flight, if under age 40. A third class medical certificate would still be valid were the solo flight to occur during the validity of the medical certificate.

There are a variety of means by which a student pilot can apply for a Student Pilot Certificate, which is required only before the first solo flight. The student pilot should contact the Certified Flight Instructor (CFI) who will advise on how this is completed. One can take flying lessons while applying for the Student Pilot Certificate. A medical certificate must also be obtained at some point prior to the first solo flight.

After April 1, 2016, a Student Pilot Certificate issued by the new process does not expire, is made of plastic, may take several weeks to process, and is only issued after a TSA vetting process. A Student pilot certificate issued prior to April 1, 2016, has an expiration date 24 months from the date of issuance for an applicant older than age 40 or 60 months from the date of issuance for an applicant under age 40.

Student pilots who are not citizens or residents of the US continue to follow the existing Alien Flight Student Program: https://www.flightschoolcandidates.gov/. This is of importance to our International Region AMEs, who must advise prospective student pilots to apply for the student pilot certificate with the Transportation Security Administration. The AME may issue a medical certificate of

(Continued on page 4)

(Student Pilot Certificate—continued from page 3)

any class if the foreign applicant meets the Part 67 medical standards.

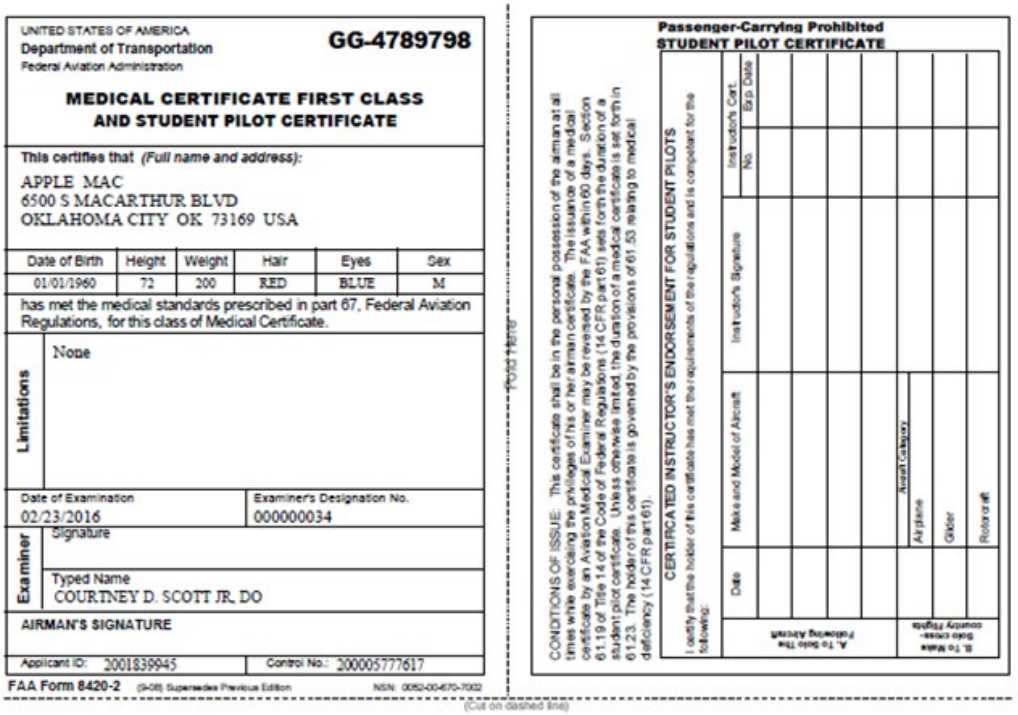
Take Home Points

- ✓ No further Student Pilot Certificates from AMEs
- ✓ The most likely source of the Student Pilot Certificate will be the student's Certified Flight Instructor (CFI)
- ✓ Solo flight requirements are a minimum age of 16, English comprehension, Student Pilot Certificate from AFS, and a current Medical Certificate from an AME (no age requirement)
- ✓ https://www.faa.gov/pilots/become/student_cert/

For More Information:

Advisory circular AC 61-65F, Certification: Pilots and Flight and Ground Instructors, contains the latest guidance on how applicants will acquire a Student Pilot certificate. http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_61-65F.pdf

FAA online guidance for Student Pilots is at: https://www.faa.gov/pilots/become/student_cert/



UNITED STATES OF AMERICA
Department of Transportation
Federal Aviation Administration

GG-4789798

MEDICAL CERTIFICATE FIRST CLASS AND STUDENT PILOT CERTIFICATE

This certifies that *(Full name and address)*:
APPLE MAC
6500 S MACARTHUR BLVD
OKLAHOMA CITY OK 73169 USA

Date of Birth	Height	Weight	Hair	Eyes	Sex
01/01/1960	72	200	RED	BLUE	M

has met the medical standards prescribed in part 67, Federal Aviation Regulations, for this class of Medical Certificate.

Limitations: None

Date of Examination: 02/23/2016
Examiner's Designation No.: 000000034
Examiner Signature:
Typed Name: COURTNEY D. SCOTT JR, DO

AIRMAN'S SIGNATURE

Applicant ID: 2001839945 Control No.: 2000057777617

FAA Form 8420-2 (9-08) Supersedes Previous Edition NSN: 0052-00-670-7002

(Cut on dashed line)

Passenger-Carrying Prohibited
STUDENT PILOT CERTIFICATE

CERTIFICATED INSTRUCTOR'S ENDORSEMENT FOR STUDENT PILOTS

I certify that the holder of this certificate has met the requirements of the regulations and is competent for the following:

Date | Make and Model of Aircraft | Aircraft Category: Airplane, Glider, Rotorcraft | Instructor's Signature | Instructor's Cert. No. | Exp. Date

CONDITIONS OF ISSUE: The certificate shall be in the personal possession of the airman at all times while exercising the privileges of his or her airman certificate. The issuance of a medical certificate by an Aviation Medical Examiner may be revoked by the FAA within 60 days. Section 61.19 of Title 14 of the Code of Federal Regulations (14 CFR part 61) sets forth the duration of a student pilot certificate. Unless otherwise limited, the duration of a medical certificate is set forth in 61.23. The holder of this certificate is governed by the provisions of 61.53 relating to medical deficiency (14 CFR part 61).

A. To solo the following aircraft
B. To make solo cross-country flights

Dr. Véronneau is the Manager of the Aerospace Medical Education Division, AAM-400.

Aviation Medical Examiner Seminars

June 20-24, 2016	Oklahoma City, Oklahoma	Basic (2)
July 15-17, 2016	Jacksonville, Florida	Refresher (1)
September 8-10, 2016	Rochester, Minnesota	CAMA (4)
October 24-28, 2016	Oklahoma City, Oklahoma	Basic (2)
December 2-4, 2016	Tucson, Arizona	Refresher (1)
March 20-24, 2017	Oklahoma City, Oklahoma	Basic (2)
June 19-23, 2017	Oklahoma City, Oklahoma	Basic (2)
October 23-27, 2017	Oklahoma City, Oklahoma	Basic (2)

NOTES

(1) A 2 ½-day Aviation Medical Examiner (AME) refresher seminar consisting of updates in aerospace medicine and FAA policies. Registration must be made through the Designee Registration System on the .

(2) A 4½-day basic AME seminar focused on preparing physicians to be designated as aviation medical examiners. Call your Regional Flight Surgeon.

(3) A 3½-day refresher AME seminar held in conjunction with the Aerospace Medical Association (AsMA). This seminar is a Medical Certification refresher, with aeromedical certification lectures presented by FAA medical review officers, in addition to other medical specialty topics. Registration must be made through AsMA at (703) 739-2240. A registration fee will be charged by AsMA to cover their overhead costs. Registrants have full access to the AsMA meeting. CME credit for the FAA seminar is free.

(4) This seminar is being sponsored by the Civil Aviation Medical Association (CAMA) and is sanctioned by the FAA as fulfilling the FAA recertification training requirement. Registration will be through the CAMA Website:

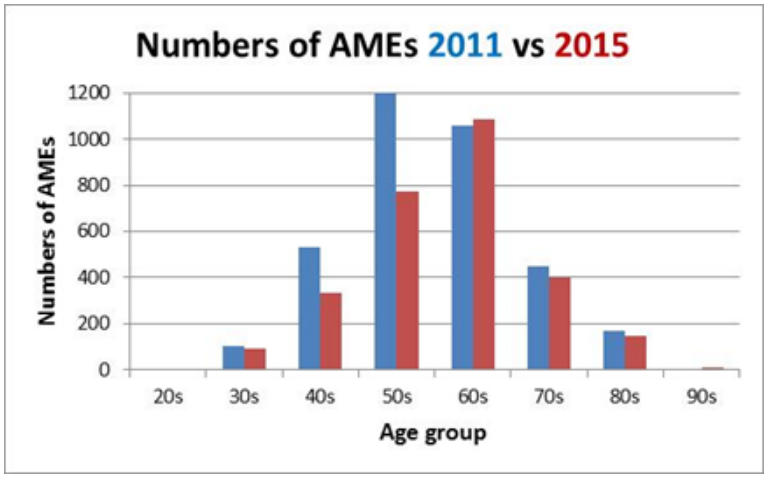
www.civilavmed.com

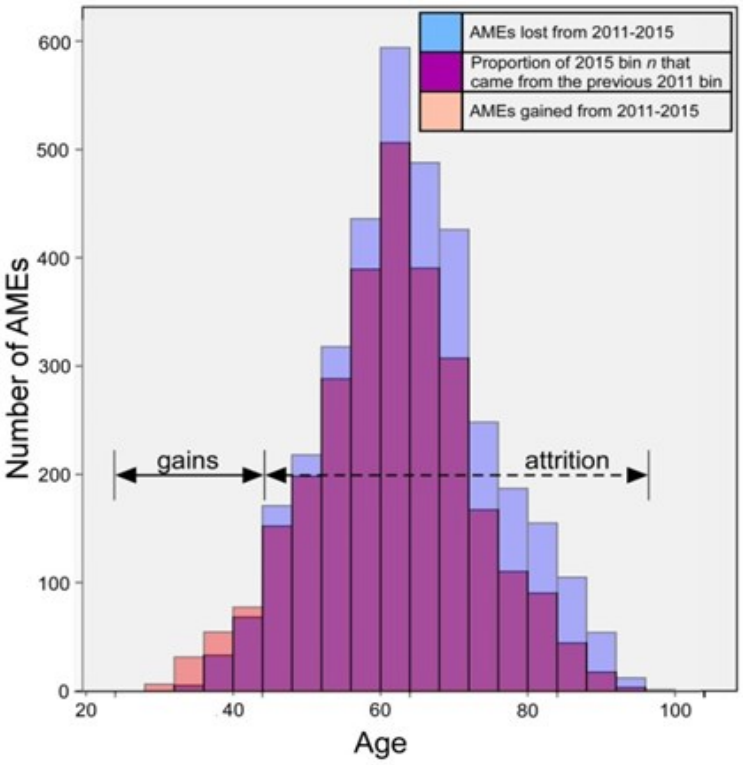
Reader Response to "Analyzing Age Trends"

By William R. Knecht, PhD

In the last issue, we observed that aviation medical examiners (AMEs) are working longer, on average, but decreasing in numbers. The overlay graph below showed AMEs grouped by 4-year age bins. Salmon-colored meant new hires from 2011 to 2015, purple meant AMEs staying and getting 4 years older. Sky-blue bars meant those leaving the workforce.

At the time, we hypothesized that most of this looked like normal retirement with perhaps some influence of people needing to work longer, coupled with a slowdown in hiring due to a trend toward fewer pilots. But, we judged this an open issue, and welcomed your comments.





Well, we got a number of reader responses that added to the discussion. One came from **Stephen Replogle**, DO, who noted that "physicians are largely abandoning solo private practices, and incorporating into large groups. The group medical practices leave little room for time spent on an FAA physical exam."

Steve Wahls, MD, agreed, and added that "demand for third class medical exams has declined substantially in the last decade" due to factors such as the advent of Light Sport, and the change from 2 to 5 years for renewals under age 40. Steve also noted that "as we get closer to retirement, we tend to focus our efforts and cut back on practice complexity. Aviation medicine lends itself to this." Finally, he diplomatically brought up the issue that "changes in health care… are putting pressure on the traditional ways we have delivered care…"

This last point was expanded on by **Bruce Decking**, MD, who hypothesized that the high retirement rates might have something to do with the ever-increasing complexity of the AME's basic job. Bruce cited as an example the new regs on obstructive sleep apnea, which, while hopefully a relatively rare condition (3-7% of U.S. adults),[1] nonetheless now involve the AME in pilot certification.

Similar to the second law of thermodynamics (entropy is ever-increasing), as we learn more about the human body and medical practice, will the AME's job inexorably become harder? Now, there's a question.

Dr. Knecht is an engineering research psychologist in the Office of Aerospace Medicine's Human Factors Research Division.

[1]Punjabi, N.M. (2008). The epidemiology of adult obstructive sleep apnea, *Proceedings of the American Thoracic Society, 5*(2), 136-143.

Aortic Stenosis

CASE REPORT BY HUI LING LI, DO, MPH

Aortic stenosis is the most common form of valvular heart disease (8) affecting 1.5 million people in the United States. A third of this population has severe aortic stenosis, of which 50% are symptomatic (9). This report presents a case of aortic stenosis in a first-class pilot and provides a review of this cardiac condition and addresses concerns for medical certification.

History

A 61-year-old first-class male pilot with over 17,700 hours of flight time applies for a first-class medical certification but was found to have moderate aortic stenosis. This diagnosis was an incidental finding, discovered as part of a workup for an unrelated medical condition. The airman appears to be in good health and is otherwise asymptomatic. His cardiac exam is unremarkable with no murmur appreciated on auscultation. Echocardiogram shows normal left ventricle size, with ejection fraction estimated at 60-65%. The valve leaflets and annulus are moderately to heavily calcified. There is the suggestion of fusion of the left and right coronary cusps (bicuspid valve). The calculated aortic valve area is 1.1cm^2. The mean transvalvular pressure gradient is 22 mmHg and peak transvalvular pressure gradient is 49 mmHg. His cardiologist diagnosed moderate valvular aortic stenosis.

Aeromedical Issues

Aeromedical concerns associated with the diagnosis of aortic stenosis are significant: valve stenosis, requiring valve replacement and repair and the risk of sudden incapacitation due to angina, syncope, and heart failure (6, 9). Symptoms of aortic stenosis typically develop gradually over a period 10-20 years. Exertional dyspnea or fatigue is the most common initial presenting symptom. As patients progress to severe aortic stenosis, they develop the three cardinal symptoms of chest pain, syncope, and congestive heart failure (8). It is important to note that severe aortic stenosis has a high rate of progression to symptoms. The following disease progression rates have been published for this disease: a decrease in calculated valve area of 0.1cm^2 per year, an increase in mean pressure gradient of 7 mmHg per year, and an increase in velocity of 0.3m/s per year (7). While most sudden cardiac death is preceded by the onset of symptoms, 3% to 5% of asymptomatic patients with moderate to severe AS resulted in sudden cardiac death (7). Since it is impossible to predict individual disease progression, regular cardiac evaluation for affected aviators is essential.

Role of the AME

It is important that aviation medical examiners (AMEs) recognize that aortic stenosis can adversely affect cardiac pre-load and afterload. This can result in decreased cardiac output and increased cardiac workload, which is further exacerbated in a flight environment of reduced ambient oxygen (7). Aortic stenosis requires that the AME defer the applicant to the Federal Aviation Administration (FAA) Aerospace Medical Certification Division for an Authorization of Special Issuance. Submission requirements include all pertinent medical records

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ETIOLOGY OF CONGESTIVE HEART FAILURE

Aortic stenosis is the obstruction of blood flow across the aortic valve. Classification is based on valve area and mean transvalvular gradient seen on echocardiography- mild (valve area >1.5cm2, mean flow gradient <= 20mmHg), mild-to-moderate (valve area 1.1-1.5cm2, mean flow gradient <= 20mmHg), moderate (valve area 1.1-1.5cm2, mean gradient 21 to 39 mmHg) and severe (valve area <1.0cm2 , mean flow gradient >40mmHg) (5). The two most common causes of aortic stenosis in the United States are progressive hardening and calcification of the aortic valve associated with aging (senile calcific aortic stenosis), and a congenital defect of the aortic valve (unicuspid or bicuspid) (7,9). Rheumatic disease is also a culprit, but is rare in the United States (8). Bicuspid aortic valve is the most common cause of aortic stenosis in military aviators. Aortic stenosis associated with bicuspid valve usually occurs in middle age or older patients (10). Aortic stenosis is more common in men (3). Progression of this condition is commonly very slow and highly variable. Affected individuals are generally asymptomatic until stenosis is severe. The classic aortic stenosis murmur is a mid-systolic, crescendo-decrescendo outflow murmur (heard best at the upper sternal border), with radiation to the neck (7). The triad of angina pectoris, syncope, and congestive heart failure are classic end-stage symptoms of this disease (8). Published data showed that the average survival rate of patients with severe aortic stenosis after the onset of chest pain, syncope, and congestive heart failure were 5 years, 3 years, and 1.5 to 2 years, respectively (4). Surgical valve replacement is the treatment of choice for symptomatic moderate-to-severe aortic stenosis. Lacking valve replacement, 50% of patients with symptomatic aortic stenosis will die within an average of two years (9).

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and a current cardiology evaluation with an M-mode, 2-dimensional and Doppler echocardiogram. AMEs confronted with aortic stenosis should either defer or call and speak with a regional flight surgeon or the Civil Aerospace Medical Institute (CAMI) on-call physician to obtain verbal authorization. The airman will receive a one-year certification if asymptomatic and has an unremarkable cardiology evaluation with the following echo results: valve area > = 1cm^2, peak transvalvular pressure gradient < 60 mmHg, and mean transvalvular pressure gradient < 40 mmHg. For the symptomatic airmen with valve measurements contrary to these parameters, they will most likely require valve replacement and will be required to follow the FAA valve replacement protocol thereafter.

For 2013, the FAA issued 420 Authorizations for Special Issuance for aortic stenosis—29 for first-class, 41 second-class, and 350 for third-class (6).

Outcome

Aortic stenosis is disqualifying for medical certification under Title 14 of the Code of Federal Regulation (CFR), revised part 67, section 67.113 (1,2). The airman in this case was granted an Authorization for special issuance under Title 14 of CFR, section 67.401 (1,2). The certificate expires in 1 year. An AME may recertify him in after this time period if there has been no adverse change in the airman's medical condition and current medical reports are favorable. The AME must submit the airman's application and the required reports to the Aerospace Medical Certification division for review.

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Hui Ling Li, DO, MPH, Lt Col, USAF, MC, FS, was a resident in aerospace medicine at United States Air Force School of Aerospace Medicine when she wrote this case report at the Civil Aerospace Medical Institute.

Medical Certification of Pilots With Atrial Fibrillation

CASE REPORT BY JOHN M. HATFIELD, DO, DC, MPH

Atrial fibrillation (AF) is the most common, sustained, cardiac arrhythmia and is associated with a reduction in cardiac output, as well as peripheral embolization and stroke. Hypertensive heart disease and coronary heart disease are the most common underlying disorders associated with AF in developed countries, and affected patients may be at increased risk for mortality. Nevertheless, assuming the airman meets certain criteria, AF is a condition that is medically certifiable through the Federal Aviation Administration (FAA).

History

An 86-year-old, male, general aviation pilot with approximately 1,500 hours of flying time is applying for reissuance of his third-class medical certificate. He has a history of atrial fibrillation, which was initially discovered during a 2010 hospitalization for gallstones/pancreatitis. Additionally, he has a history of an abdominal aortic aneurysm repair, a Mallory-Weiss tear, hypertension, dyslipidemia, hypothyroidism, and glycosuria. His current medical conditions are stable, and his treatment regimen, as noted in a recent correspondence from his primary care provider, consists of warfarin (Coumadin) 2.5 mg daily, simvastatin 20 mg daily, levothyroxine 130 mcg daily, sildenafil citrate (Viagra) 100 mg as needed, Vitamin D 50,000 units weekly, as well as a daily capsule of fish oil and a multivitamin. No other medications were noted.

After the diagnosis of AF in 2010, the patient's aviation medical examiner (AME) requested an initial Special Issuance (SI), even though this medical condition is disqualifying under Title 14 of the Code of Federal Regulations, Part 67. This SI required a decision at the FAA level and, fortunately for the pilot, the SI was granted. At this time, however, the pilot is in need of a SI renewal. AF is one of the 25 diagnoses that can currently be reissued by the AME, for all classes of airmen, in accordance with the AME Assisted Special Issuance (AASI) protocol (1).

Outcome

The AME may reissue an airman's medical certificate under the provisions of an AASI, if the applicant provides the following:

- An initial SI granted by the FAA;
- A summary of the applicant's medical condition since the last FAA medical examination, including a statement regarding any further episodes of AF;
- The name and dosage of medication(s) used for treatment and/or prevention, with comment regarding side effects;
- A report of a current 24-hour Holter monitor performed within last 90 days; and
- A minimum of monthly International Normalized Ratio (INR) results for the prior 6 months, for those being treated with warfarin. Incidentally, it is generally advised to assess bleeding risk with the HAS-BLED tool (2) and to assess stroke risk with the CHA2DS2-VASc tool, in patients with AF. When compared to the older CHADS2 score, CHA2DS2-VASc performed better in predicting patients at high risk, and those categorized as low risk by CHA2DS2-VASc were truly at low risk for thromboembolism. Warfarin anticoagulation titrated to an INR of 2.0-3.0 is recommended (required by the FAA) for the average patient with a CHA2DS2-VASc score ≥2 unless contraindicated (e.g., history of frequent falls, clinically significant bleeding, or inability to obtain regular INR). Either

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ETIOLOGY OF ATRIAL FIBRILLATION

AF affects anywhere between 2.7 million and 6.1 million American adults, and that number is expected to double over the next 25 years. Common precipitating factors include alcohol, emotions, and even exercise. The prevalence increases with advancing age: only 1% of patients with AF are <60 years of age. For individuals of European descent, the lifetime risk of developing AF after 40 years of age is 26% for men and 23% for women. In African Americans, although risk factors for AF are more prevalent, the incidence of AF appears to be lower.

AF is often associated with structural heart disease and other co-occurring chronic conditions, and the mechanisms causing and sustaining AF are multifactorial; thus, AF can be complex and difficult for clinicians to manage. Symptoms of AF range from nonexistent to severe. Frequent hospitalizations, hemodynamic abnormalities, and thromboembolic events related to AF result in significant morbidity and mortality. AF is associated with a 5-fold increased risk of stroke, a 3-fold increased risk of heart failure, and a 2-fold increased risk of both dementia and mortality. In the absence of a reversible precipitant, AF is typically recurrent (8).

Current literature indicates that alcohol consumption, even at moderate intakes, is a risk factor for AF (9), as are negative emotions such as anger, anxiety, sadness, and stress. Happiness appears protective (10). Finally, a recent meta-analysis suggests that vigorous exercise (in men) is associated with increased risk, while moderate physical activity (in both sexes) lowers the incidence of AF (11). Therefore, the best current lifestyle advice to decrease the risk of AF is to drink minimally, exercise moderately, and laugh frequently.

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warfarin or aspirin can be used for the average patient with a CHA2DS2-VASc score of 1 depending on physician discretion and patient preference. Aspirin 325 mg daily is recommended for the average patient with a CHA2DS2-VASc score of 0 (3).

Furthermore, the FAA now allows the treatment of persistent AF with the medications dabigatran (Pradaxa), apixaban (Eliquis), and rivaroxaban (Xarelto). However, dabigatran is not acceptable if the airman is ≥ 75 years old, had a stroke within the last 6 months, has significant valve disease or a prosthetic valve, has renal impairment with creatinine clearance of < 30, is on other thrombin inhibitors, has ulcerative gastrointestinal or other bleeding disorders, or is taking more than the Food and Drug Administration's recommended dosage of the medicine. Also, apixaban and rivaroxaban are not acceptable in airmen with prosthetic heart valves. These two medicines will require a two-week observation period, and will require follow-up every 6 months for first- and second-class medical certificate holders, and 12 months for third-class medical certificate holders (4).

The AME must defer to the FAA's Aeromedical Certification Division or Regional Flight Surgeon if:

•Holter Monitor demonstrates non-exercise heart rate >140 or <40 (average rate >90) beats per minute or pauses >3 seconds during waking hours,

•More than 20% of INR values are <2.0 or >3.0, or

•The applicant develops emboli, thrombosis, bleeding that required medical intervention, or any other cardiac condition previously not diagnosed or reported (5).

Fortunately for this gentleman, his INRs were acceptable, a recent exercise stress test was within normal limits, and two recent 24-hour Holter monitor tests (and a transthoracic echocardiogram) were also read as normal, so he was issued an AASI for his AF. Moreover, he was issued CACIs for his hypertension and hypothyroidism. This will allow him to fly for the next 12 months.

Aeromedical Concerns

Aeromedical concerns for AF are thromboembolism, side effects from the medication(s), and symptoms related to the AF itself, especially if the ventricular rate is rapid. Incapacitation secondary to a stroke is clearly the most worrisome thromboembolic event. Long-standing, persistent (previously referred to as chronic) AF, as is evident in this patient, is characterized by hemodynamic and symptomatic stability, and adequate patient performance is more readily established simply because the rhythm is persistent. Thus, the recommendation to return to flying status is often easier to make with persistent, as compared to paroxysmal (e.g., self-terminating or intermittent) AF, particularly after the documentation of adequate ventricular rate control (7).

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Traumatic Brain Injuries

Case Report By Benjy Park, MD, MPH

Each year more than 1.7 million traumatic brain injuries (TBI) occur in the United States, resulting in over 50,000 deaths and 275,000 hospitalizations (1). Falls comprise the majority of external causes of TBI contributing to more than 60% among adults over 65 years of age (1). This article presents a case report of a first-class pilot who experienced TBI from a fall and includes the aeromedical issues associated with TBI.

History

A 62-yr-old right-handed male first-class pilot with over 20,000 hours of flight time applied for a first-class medical recertification 12 months following an episode of syncope resulting in head trauma with brief loss of consciousness and approximately 30 minutes of amnesia. He held an airline transport certificate and flew for a major airline.

Upon landing at an overseas location, the airman reported feeling ill with two brief episodes of lightheadedness that resolved spontaneously. After eating breakfast the following morning, he was outside walking when he felt a prodrome of lightheadedness and nausea followed by syncope. The next event the airman recalled was being evaluated at a local emergency department where he had a GCS (Glasgow Coma Score) of 14, and a normal non-contrast CT scan of the head. A physical exam showed superficial abrasions and a small laceration to his occiput, with an otherwise non-focal neurologic exam. Witnesses to his fall stated that 30 minutes had elapsed from the time of his fall and his evaluation in the emergency department.

Upon his return to the United States, the airman was referred to a neurologist who reported a normal neurologic exam. Ancillary studies including an awake and sleep-deprived EEG were reported as normal. An MRI of the head and neck 2 weeks post-injury showed increased signal on T2 weighted images to the inferior frontal lobes and source images on MRA showed evidence of methemoglobin at the site of his injury suggestive of subacute injury. There was no evidence of encephalomalacia suggestive of an old injury. After cardiac and neurologic work up, it was determined that the episode of syncope was likely secondary to a vasovagal event with resultant TBI from the fall with evidence of brain contusion and subacute blood demonstrated on brain MRI/MRA.

Aeromedical Issues

Aeromedical concerns following TBI include residual neurologic or neurocognitive deficit, as well as risk of sudden incapacitation from post-traumatic seizures (2,3). Any functional neurologic deficit must be determined by the aviation medical examiner (AME) with consultation from a neurologist. Depending on the deficit will determine the disposition of the airman's functional status. Loss of strength, sensation, or even proprioceptive sense can diminish the airman's ability to properly operate the mechanical as well as tactile aspects of the aircraft.

Post-traumatic neurocognitive deficits can be assessed by ancillary neuropsychological testing, with major depressive disorder being the most common and disabling condition following TBI (3). Other conditions that might be seen by the AME include diminished cognitive functioning, anxiety, and even personality changes (3). Specific neuropsychological studies are specified within the *Guide for Aviation Medical Examiners* (4) and includes, but is not limited to the "core test battery," which provides a standardized basis for the FAA review of cases (4).

The risk of post-traumatic seizure is difficult to predict, however, it increases with the severity level of TBI. Risk factors for later seizures include older age, LOC and amnesia greater than 24 hours, skull fracture, and brain contusion with subdural hematoma (2). Pharmacoprophylaxis with

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Traumatic Brain Injury Classification

Generally, TBI can be classified as either focal or diffuse, where focal injuries are localized and occur at the site of impact, and diffuse injuries are widespread resulting from the shearing of axons secondary to acceleration and deceleration forces (8,9). There are several classification schemes on the severity of head injury and is usually based on clinical factors, including the duration of LOC, amnesia, the GCS, and neural imaging (9,10). The Department of Defense and Department of Veterans Affairs stratify severity based on length of LOC, alteration of consciousness and post-traumatic amnesia, neuroimaging, and the GCS measured at or after 24 hours.9 To be classified as mild, structural imaging must be normal with LOC 0-30 minutes, and post-traumatic amnesia no longer than 1 day. However, this airman's head injury would be considered greater than mild by most criteria as his MRI/MRA had findings consistent with blood/brain contusion. Clinical TBI severity does not necessarily equate to aeromedical TBI severity due to the unique aeromedical risks associated with operating aircraft.

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antiepileptic drugs is currently recommended by multiple organizations, although these guidelines focus on adults with severe TBI (GCS 3-8) (5).

Role of the AME

The neurologic standards for medical certificates annotated in Title 14 of the Code of Federal Regulations (CFR) Parts 67.109 (a)(b), 67.209(a)(b), and 67.309 (a)(b) include no disturbance of consciousness or neurologic condition that makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held (6). The AME cannot certify an airman with a history of head trauma associated with any loss or alteration of consciousness.

The AME Guide outlines the basic neurologic exam to consist of 12 cranial nerves, motor strength, superficial reflexes, deep tendon reflexes, sensation, coordination, mental status, and other maneuvers (7). However, in cases of TBI with any LOC, the AME should obtain a complete neurologic exam from a consultant neurologist involved with the airman's case. This should include documentation of ancillary studies such as neural imaging and possible other studies to include EEG. Neurocognitive testing should also be performed post-injury, as well as on follow up after the observation period. Neurocognitive testing could be chosen from the "core test battery."

The disposition guidance in the AME Guide states that for all classes of medical certificate requires FAA decision regarding airman disposition for an episode of head trauma associated with any loss or alteration of consciousness. All pertinent medical records to include hospital and prehospital records, consultant evaluation, ancillary studies, and medication(s) should be submitted as part of the disposition process.

Outcome

After complete review of the airman's history, physical exam, and ancillary studies, the FAA Aerospace Medical Certification Division determined a 24-month observation period with required neural imaging to ensure resolution of post-traumatic blood, an updated neurologic report from his treating neurologist with a summary of the history, treatment plan, prognosis, and a comment on cognitive function and neurocognitive testing. In cases where TBI results in brain contusion, neural imaging must be an MRI, as CT may not be sensitive enough to ensure the injury has been resolved. While the airman already demonstrated a normal neurologic exam, to include a normal post-injury EEG, he is considered higher risk to sudden incapacitation from a seizure secondary to findings on his MRI/MRA. As of this writing, the airman's period of observation was ongoing.

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AME I.Q.

BY STEPHEN P. HORNER

Did you know every AME is under *Surveillance!* There are two ways the Office of Aerospace Medicine *inspects* what they *expect.* The first is the AME reject queue, an automated system that flags potential errors of an issued pilot medical certificate or an airman's exam. The other is an in person or virtual site visit of the AME's office. This edition of AME I.Q. will focus on common errors that Surveillance Program Analysts see in the reject queue.

The most common issue encountered in the reject queue is poor AME comments or the use of ***PRNC.*** Let's be very clear, the airman can put PRNC, or Previously Reported No Change. According to FAA Order 8000.95 the AME responsibilities are as follows:

"When completing FAA Form 8500-8, either on paper or electronically, the AME shall personally review and provide definitive (not just "no change" or "previously reported" comments in Item 60 on all positive entries and all physical findings; and sign the FAA forms in ink or electronically as appropriate."

Why are definitive comments important? For two reasons, first when the Surveillance Analyst reviews your transmitted exam they will have a clear, complete, and mutual understanding of the airman's condition. Second, the comments made by you upon exam, in combination with *your* Aeromedical opinion and evidence received, provide the information necessary to determine if the airman should or should not have been issued a medical certificate.

There are specific areas we expect to see comments: 17a & b, all item 18 questions, item 19 questions, and abnormal findings during the exam. By getting a clear explanation of the airman's yes answers, a determination can be made quite easily if the exam was issued correctly and should be sent to file or if the exam was incorrectly issued and should be sent for further clarification or revocation.

There is some debate as to what constitutes an acceptable or definitive comment. Some excellent examples of comments from your peers have been listed below as well as some poor examples. Let's test your AME I.Q. and see which comments you think are acceptable.

1. These two examples are from an airman who answered yes to 17a, items in 18 and 19 on the 8500-8. The comments are actual comments from AMEs. Which comments would you want to see if you were the flight surgeon making a determination?

   a. The first AME example: "*17a: NOTED 18c: NOTED 18u: NOTED 18v: NOTED 19: NOTED*"

   b. The second AME example:"*17a: Flonase for allergies Lisinopril & Fenofibrate for HTN atorvastatin for cholesterol all medications without report of side effects 18e: previously reported seasonal allergies, symptoms controlled with Flonase as needed 18h: previously reported HTN, favorable follow up stating good control, meets CACI criteria for issuance with hypertension 18v: previously reported 2011 incident, no new or additional occurrences 19: no disqualifying medical visits*"

2. These are two examples of airman who have a Condition an AME Can Issue (CACI). Which one is correct?

   a. The airman entered in 17a Levothyroxine- AME comments are: *"17a: PRNC 19: PRNC"*

   b. The airman entered in 17a Synthroid- AME comments are: *"17a: Patient tolerates well with no adverse effect 18x: Patient appears euthyroid. There are no side effects with medication. The TSH is 3.130. Pilot meets the standards for certification per FAA AME guide. CACI qualified for hypothyroidism 19: routine checkup"*

The examples given above are real examples from your peers issuing airman medical certificates. All were sent to be reviewed by a Surveillance Analyst: two were quickly sent to file, and two were sent to AMCD for action which could result in a delay of flying status or revocation.

In both of the above scenarios the correct answers are *b*.

The Federal Aviation Administration's Office of Aerospace Medicine, teamed with highly professional designated physicians is essential to a safe National Air Space (NAS). Solid evidence based aeromedical decisions appropriately documented in the 8500-8 play a key role to aviation safety.

Please look in the next edition for more AME I.Q. questions, answers and information.

Mr. Horner is a Surveillance Program Analyst for the Western Pacific Regional Medical Office.

Former Vermont Pilot Pleads Guilty and is Sentenced for Submitting False Medical Information to FAA

On April 25, 2016, a Newport, VT, pilot pleaded guilty in U.S. District Court, Burlington, VT, to a charge of making false statements for submitting false medical information to FAA. He was sentenced to time-served, one year of supervised release, and $3,600 in fines.

DOT-OIG initiated this investigation in June 2014 after the pilot crashed his single-engine aircraft at the Newport State Airport in Newport, VT, and fled the scene. The investigation revealed that he failed to disclose to FAA his history of arrests involving driving while intoxicated and the use of prescribed medications for a diagnosed mental condition. He also did not possess a valid medical certificate and was operating an unregistered aircraft.

The pilot was arrested in August 2015, after failing to abide by the terms of a Pre-Trial Diversion Agreement related to this investigation. In September 2015, he was indicted and charged with making false statements to FAA in connection with his falsified application for an FAA medical certificate.

Information provided by the Office of Inspector General

Office of Aerospace Medicine New Hires

Brett A. Wyrick, DO, MPH
Northwest Mountain Region
Flight Surgeon

Stephen J.H. Véronneau, MD, MS
Aerospace Medical Education Division
Manager

Warren Silberman, DO, MPH
Aerospace Medical Education Division
Medical Officer

Gena Drechsler
Civil Aerospace Medical Institute
Writer-Editor

And a Fond Farewell to

Jan Wright
Aerospace Medical Education Division's
AME Program Team Lead,
who is retiring this June

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Multimedia Aviation Medical Examiner Refresher Course (MAMERC)

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MedXPress: The Royal Treatment Video

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