Federal Air Surgeon's Medical Bulletin

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Professions

By Susan Northrup, MD, MPH
Federal Air Surgeon

There are many definitions of profession from the Oxford English Dictionary "a paid occupation, especially one that involves prolonged training and a formal qualification, to the Australian Council of Professions:

A profession is a disciplined group of individuals who adhere to ethical standards and who hold themselves out as, and are accepted by the public possessing special knowledge and skills in a widely recognized body of learning derived from research, education and training at a high level, and who are prepared to apply this knowledge and exercise these skills in the interest of others.

These ethical standards are typically contained in a code of ethics and require behavior and practice beyond the personal moral obligations of an individual. The typical profession enforces these ethical codes. Doctors and AMEs are professionals. The work of an AME directly contributes to the Safety of the National Airspace. The rules for AMEs are contained in the Guide for Aviation Medical Examiners and FAA Order 8000.95A, Designee Management Policy in Volume 2.

Recently, we have had some interesting AME activities. There are some simple things an AME can do to stay out of trouble with the FAA.

1. Perform the actual physical examination yourself. While paraprofessionals can do the vitals, hearing, and vision checks, the AME must review the history with the pilot and perform the physical examination.
2. Do a complete examination. Remember pelvic, anal, male genitalia, and breast examinations are only required if clinically indicated. We are trying to add a not examined button to these items, but

in the meantime, annotate in Block 60 they were not performed. Changing federal forms is an interesting process so it may take a while.
3. Have a chaperone available. We've had several recent complaints about inappropriate examinations which turned into a he said/she said situation.
4. Only perform FAA physicals at your approved address. You can request a second address through your Regional Flight Surgeon's office.
5. When in doubt, consult the Guide for Aviation Medical Examiners on-line. Please do not depend upon a printed copy. We update it monthly.
6. Date the examination on the day you performed the examination. Don't back date or future date.
7. Verify the identity of the airman and make sure they entered their name the way it is reflected on a government issued ID.

These items bear periodic review and even the most dedicated of us may be tempted to "help out an airman". However, we owe it to our pilots, the flying public, and the Safety of the National Airspace to ensure they are healthy and meet standards on the day we examine them.

My thanks to each of you for what you do on behalf of the FAA.

– *Susan*

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Medical Certification of the Future Lies with Standardized Training

By Eric A. Harmon and Theresa M. Sifuentes

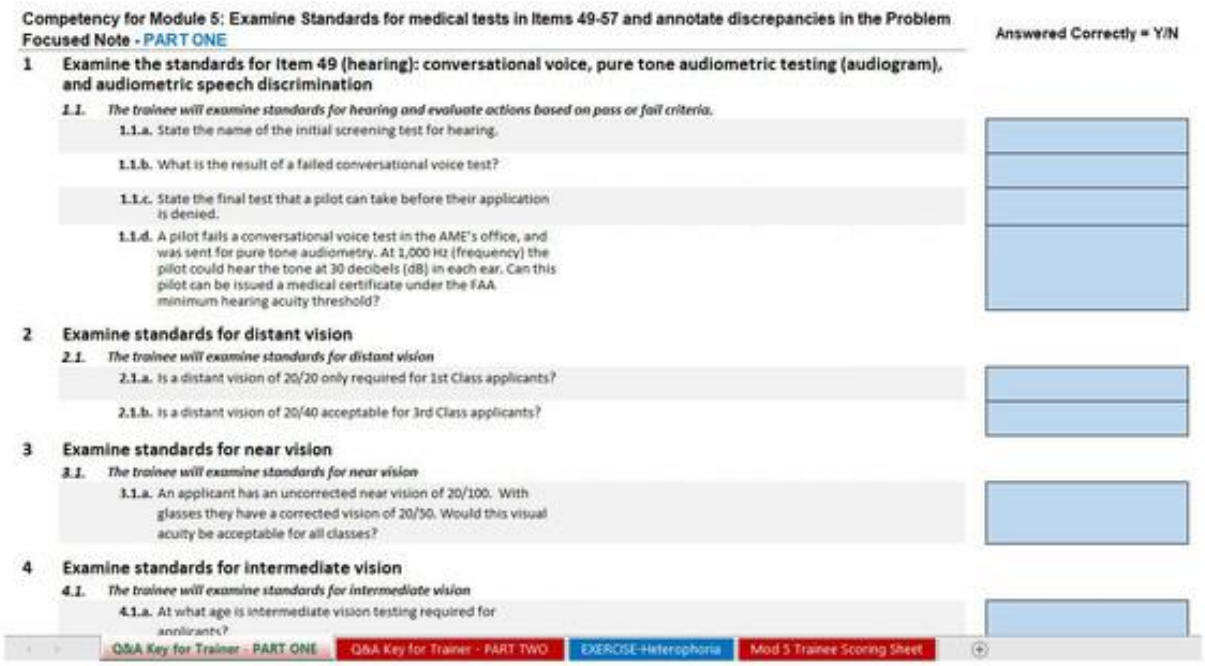
Standardized training will play an increasingly significant and important role now and in the future of the Federal Aviation Administration's (FAA's) Aviator Medical Certification. Aerospace medicine is very

dynamic science where general medicine complements an area of study where medical experts study and analyze the physiological and psychological impact of space on individuals. Aeromedical Physicians (APs) are the chief medical specialists that consider how the airborne environment affects the human body, including specific medical conditions and overall health. This is a very complicated, challenging, and dynamic science, which requires consistent application of medical standards to achieve consistent results.

Legal Instruments Examiners (LIEs) and Regional Program Analysts (RPAs or PAs) assist APs by evaluating, processing, and adjudicating aviators' medical certification applications. These professionals employ the Code of Federal Regulations, Federal Air Surgeon policies, the Aviation Medical Examiners Guide, established office practices, and a sound employee development system. Employee development includes training, quality assurance, supervision, coaching, and mentoring; these developmental programs ensure LIEs and PAs consistently apply standards and render sound and consistent aeromedical decisions. Examiners and RPs may only render decisions within their scope of training and knowledge, including certifying applications meeting standards, requesting additional clinical information, referring to an AP for further view, or denying based on the tools, training, and system. They work hard to get to "yes", allowing aviators to fly with a clear medical certificate or with a special issuance for specific risk-mitigated conditions.

Developing LIEs and RPA to render sound decisions consistently requires a dependable and consistent development program to train examiners to reproduce consistent results. Standardization and consistency are major concerns for the Federal Air Surgeon, who deliberately drives this mantra across all of Aerospace Aviation Medicine (AAM). Standardization and consistency is a focal point of her strategy in leading AAM into the future. That is why "Medical Certification of the Future lies with Standardized Training", along with other tools such as the OneGuide Project—is another topic for another article.

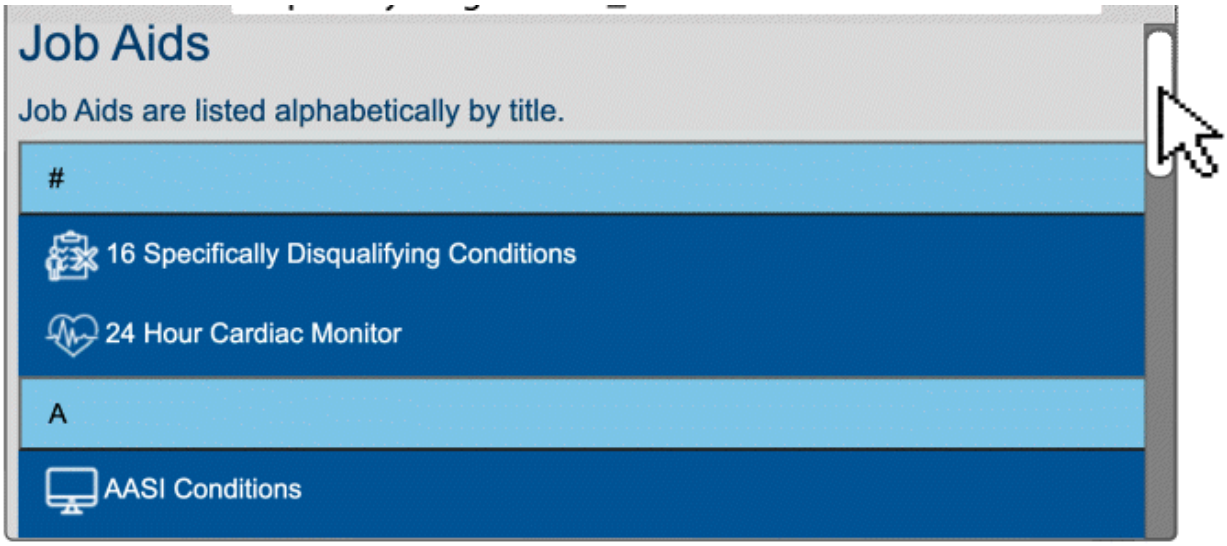
In September of 2019, FAA's Office of Aerospace Medicine, under the direction and leadership of Dr. Susan Buriak (AAM-400 Instructional Systems Specialist) and the oversight of Dr. David O'Brien (Medical Certification Division Manager), and an impressive team of experts formulated the new vision of standardized training for LIEs/PAs.



Example from one of the course rubrics used for learner evaluation

The Education Team conducted a needs assessment, surveying Examiners and PAs. Then, they developed the necessary objectives and strategy to build the new training platform. This dynamic platform

was geared towards giving trainees an interactive and experiential learning experience. Throughout the education process, trainees experienced practical exercises, knowledge checks, job aids, and, “see it and do it” encounters to reinforce learning. Additionally, an experienced LIE Trainer mentored students as they progressed thru this self-paced program. Trainers use a rubric tool to assess trainees’ competency after completing each module and before proceeding to the next module. Currently, seven modules are available for use, an additional three are in production, and 23 modules will eventually be produced.



Learners are given access to a large collection of job aids uniquely tied to course modules

Quality assurance completes the implementation loop for standardized training. Measuring effectiveness, performance consistency, and reliability outcomes facilitate the individual and our teams to correct and improve, ensuring standardization.

These positive outcomes yielded the mantra “We are better together with the power of the collective!” It highlights the excellence when everyone within the system of Aviator Medical Certification works with one accord, to bring AAM’s vision into reality. A greater focus came about for measurement, the 4Cs: Competence, Confidence, Commitment, and Collaboration, the chief focus born from the LIE/PA Training Project, as we strive to develop STARs!

- **S**upport: efficiencies and excitement of members moving AAM into the future.
- **T**rust: enhance the competence, confidence, commitment, and collaboration (4Cs) of internal and external stakeholders.
- **A**ccountability: celebrate successes, but own up to what is not good or working well. Have the courage to take accountability to correct or pivot to secure the excellence our internal and external customers deserve.
- **R**esponsibility: embrace the mission and take responsibility for leading change and owning up to the task of delivering excellence.

We began using the modules with new LIEs/RPS in February 2022. Thus far, trainee feedback is consistently favorable, including a 100-percent satisfaction rate at “end of module” evaluations. Additionally, new Examiners and RPAs are successfully accomplishing the required tasks and rubric measurements for each module. Here are a few comments from new examiners, RPAs, and seasoned thus far:

- A very logical sequence for reviewing. Detailed instruction focused on the block of instruction and was very well presented.

- This is a great refresher course no matter if you are just getting started as a LIE or if you have years of experience as a LIE or PA.
- This course is very detailed and provides helpful tools for current and future LIE's. Glad to see how the LIE training program process has grown.
- This new training will allow current and future LIE's to refer back to these tools work and complete the mission with minimal stress.
- Very easy to navigate.
- The step-by-step instructions were great!
- This module provided great training with perfect scenarios for items encountered regularly.
- Very thorough instructions and very good case studies.

Standardized training is essential for the future of medical certification and to ensure AAM meets the FAA's mission, *"Provide the **safest**, **most efficient** aerospace system in the world!"*

Simply put, the LIE/PA Training Modules standardized training is a program that helps examiners and RPAs build skills and develop good habits to consistently evaluate, process, and adjudicate aviators' medical applications consistently to safely get to "yes."

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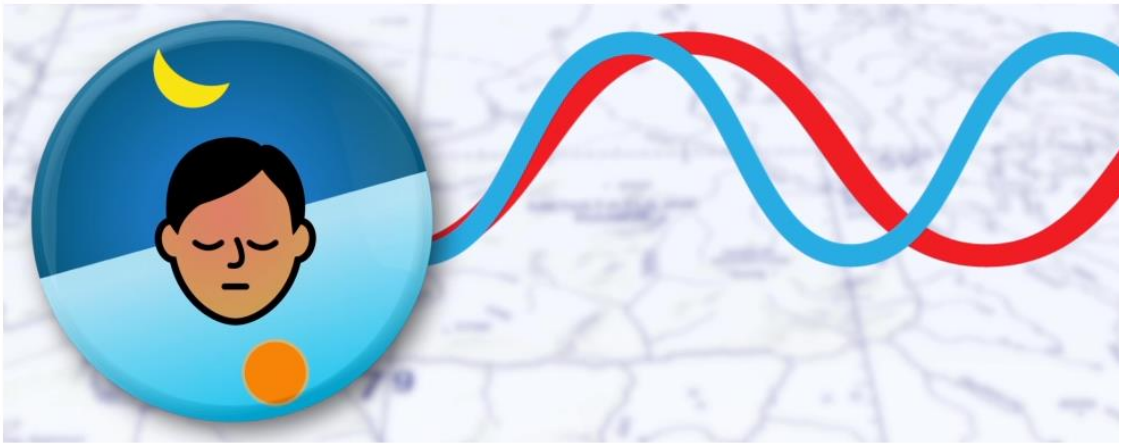
Circadian Rhythm Disruption and Flying

by Dr. Sue Jay, Ph.D., MPH, Research Physiologist

As commercial pilots and flight crews prepare for the busy holiday travel season and passengers make cross-country or transoceanic flights to see family and friends, now is a good time to review circadian rhythms in relation to air travel and how the successful management of circadian rhythms can help ensure a safe and (hopefully) less stressful travel experience.



What is a circadian rhythm? How can air travel cause circadian rhythm disruption (CRD) (a.k.a. “jet lag”)? What are the most common symptoms of CRD and how can they negatively affect pilot and flight crew performance? What are some practical strategies to mitigate the effects of CRD?

All in a Day. The circadian rhythm (Latin for circa = “around” and dies = “day”) **is the internal biological clock that regulates body functions** based on a slightly longer than 24-hour sleep/wake cycle. Many body functions such as temperature, heart rate, blood pressure, and digestive enzymes that regulate appetite fluctuate rhythmically throughout the day. These body functions are synchronized to each other and to the local environment by external cues called zeitgebers (German for “time givers”). Daylight is the strongest zeitgeber. When sunlight shines in your eyes, cells in the retina send signals to a specialized set of “pacemaker” cells deep in the brain that control the circadian rhythm. These pacemaker cells become synchronized to the natural day/night cycle and keep the body’s circadian rhythm “on time” with the local environment. Other zeitgebers include ambient temperature, physical activity, and social contact.

Long Flight + Multiple Time Zones = Circadian Rhythm Disruption. Any time the normal 24-hour circadian rhythm is altered there will be physiological and behavioral consequences. **Crossing multiple time zones rapidly during air travel can lead to circadian rhythm disruption (CRD) –** more commonly known as “jet lag”. It is not the distance traveled, but the speed. The time zone changes are too rapid for the body to adapt, and it can take several days for your circadian rhythm to readjust. CRD symptoms typically occur within a day or two of travel across at least two time zones and are likely to be more severe and last longer the more time zones crossed, especially when flying in an easterly direction. It is more difficult for your body to adjust to “losing time” when flying east than to “gaining time” when flying west. It usually takes one day to recover for each time zone crossed.

Symptoms of CRD. The most common symptoms of CRD are a disturbed sleep pattern (e.g., difficulty falling and staying asleep, late-night insomnia, early waking) **and daytime fatigue with increased sleepiness.** CRD-induced fatigue can negatively affect pilot flying skills and flight crew performance and become a serious safety-of-flight issue due to increased reaction time, decreased attention, impaired memory, a lack of focus or indifference to routine and/or critical tasks, and impaired decision-making. **Other common CRD symptoms include** headaches, decreased concentration and difficulty completing mental tasks, apathy or loss of interest, irritability, mood changes, loss of appetite and/or an “upset” stomach, and a general feeling of discomfort or feeling “unwell”.

Mitigation Strategies for CRD/Jet Lag. Circadian rhythm disruption is inevitable on long cross-country and transoceanic flights across multiple time zones, but there are things you can do to minimize the worse effects of CRD.

- **Go into your flight well-rested.** Sleep well at home before the flight and try to minimize any “sleep debt” (i.e., lack of sleep) prior to your trip. Late nights of stress due to last-minute preparations and packing predispose you to more severe CRD symptoms.
- **Consider the direction of travel and adjust your sleep schedule a few days before your flight.** If flying eastbound, get up one to two hours earlier than normal for several days before your trip and turn on bright lights. This will help advance your internal clock. If flying westbound, delay your bedtime by one or two hours for several days and expose yourself to bright light in the evening to help “push back” your internal clock.
- **Hydrate, hydrate, hydrate.** Drink plenty of water before, during, and after your flight. Dehydration predisposes you to CRD and the dry airplane cabin air can quickly dehydrate you. If you are a passenger, avoid drinking alcohol and caffeinated beverages (e.g., soft drinks, coffee, and tea). Both alcohol and caffeine can increase dehydration and alcohol have the added (undesirable) effect of disrupting the natural sleep cycle.

- **Eat lightly, but strategically.** High-protein foods take longer to digest and keep you awake. Foods high in carbohydrates promote sleepiness (i.e., the sugar-high “crash”) and fatty food make you feel sluggish.
- **For on-duty pilots and flight crew:**
    - Avoid adapting to a local time zone if the layover is short. Try to maintain the circadian rhythm of your “home” time zone.
    - Use caffeine strategically during the flight to counteract circadian rhythm sleepiness. There is a circadian rhythm “dip” (i.e., less energy, tiredness) in the early afternoon and a significant “trough” between 3 and 6 AM.
    - Stay active by conversing with others, stretching/walking around, and taking regular breaks.
    - If you are still sleepy, try to sleep by taking a short nap of no more than 30 minutes (longer than 30 minutes involves deep sleep).
- **Reset your biological clock and recover by exposure to daylight** (especially sunrise) **and staying active on arrival.** Both activities will help your body adjust to the new local time zone. Eating and sleeping are major timekeepers, so it is important to fall into the local schedule and “do as the locals do” on arrival.

At the very least, CRD can make the first few days of a vacation miserable; at worst it can lead to acute or chronic fatigue for pilots and flight crew that is just as debilitating and a safety-of-flight risk as drugs and alcohol. Understanding circadian rhythms, how they can be disrupted by flying, and putting into practice CRD mitigation strategies can make the National Airspace System safer and your next trip more enjoyable.

For more information, see the FAA Brochure "Circadian Rhythm Disruption and Flying".

Dr. Sue Jay serves as a Physiologist for the Life Sciences Section of the Civil Aerospace Medical Institute (CAMI).

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Spatial Disorientation and Vertigo
“A Practical Article for your Airmen”

***By* J.R. Brown**

Not all AMEs or Flight-Docs are pilots/operators. But when the subject of Vertigo and Spatial Disorientation comes up, it can be hard to explain in practical pilot terms. This article was written to be a resource for the doctor and pilot alike to address and understand this menace to safe flight.

The vestibular apparatus of the inner ear contains 3 interconnected semi-circular tubes. Each tube lies at an opposing 90-degree angle from the other. Each tube is filled with endolymph fluid. At the base of each canal is a mound of innervated hair cells. Normally, the hair cells respond to changes in head position or body movement (rotation) along the roll, pitch, and yaw planes; typically felt when we trip and fall.

As the canals move with up or down head motion, this causes the hair cells within the canal to deviate from their normal resting position. For example, when you voluntarily look down or up you move the "pitch" canal of the vestibular apparatus. As the head moves so do the canals, which result in movement, or bending, of the hair cells. The hairs bend because the endolymph fluid surrounding them lags behind the accelerating canal walls. As the hair cells are dragged thru the endolymph, they bend. This sends a signal from the hair cells to the brain indicating that you are either looking up or down.

When there is adequate light for us to see clearly, our visual system overrides the vestibular system in describing our physical orientation. But in low visibility, we transition from using fewer visual cues for orientation in favor of the cues coming from our inner ear. As an example, if while walking in the dark you trip and fall, your body will use the information from the vestibular system to prepare and protect you from injury by bracing and protecting your face and head. In the dynamic environment of aviation, the vestibular system falls short in reporting accurate information pertaining to the orientation of your aircraft. The vestibular apparatus works best in response to short, rapid movements or rotation.

In aviation, a slow and deliberate stimulation is typically applied to the vestibular apparatus. The change in head position doesn't happen as rapidly as in the example of falling. While piloting, head position is chiefly tied to the position of the aircraft. For example, if the pilot pushes the nose of the aircraft over, it's similar to falling forward. If roll is applied, the aircraft responds similarly to one falling over to one side. A pilot performing these maneuvers in VFR conditions won't feel much sensation because the eyes override the input from the inner ear. But, when flying in IFR conditions, the sensations from the vestibular apparatus become more apparent. When these sensations fool you about your aircraft position, this is called Spatial Disorientation.

In aviation, stimulation of any of the 3 canals can be sustained for long periods of time. For example, a standard rate turn is 3 degrees per second. A 90-degree turn to a new heading will take 30 seconds. A sustained coordinated turn 90 degrees or more can create illusions of aircraft attitude, especially when in limited visibility/IFR.

As a pilot initiates a turn to a new heading while in limited visibility, they will initially feel the turn. They will continue to feel it strongly for about 10 – 15 seconds. That's because the hair cells are bent and send a strong signal to the brain. But, as the turn continues, the pilot will start to "feel" as though they are turning less and less. They may actually feel the aircraft has leveled off. In reality, the aircraft is still turning in the same direction and at a standard rate. The reason for this illusion is that the fluid (which initially had no movement within the canal) is now beginning to move and catch up to the rotational speed of the pilot and aircraft. As the fluid begins to equal the rotational speed of the aircraft, the hair cells are bent less and less. Therefore, they falsely perceive a decrease in the turn of the aircraft.

Eventually, the brain senses the turn has stopped. The pilot who is IFR qualified will look at their instruments and understand what they feel is an illusion and ignore it. They trust their eyes by looking at, and BELIEVING their instruments. An IFR-rated pilot also knows not to move their head – only their eyes. Once they are on the correct heading, the pilot rolls out.

A VFR-qualified pilot would never intentionally fly into IFR conditions. But sometimes an inadequate weather briefing can find a pilot flying into unexpectedly bad weather. They may need to descend, or punch through a little weather, to get back to VFR conditions. VFR pilots finding themselves in the weather soon realize this is a whole new type of flying. They often realize it is beyond their skill set and turn 180 degrees back to the comfort of VFR flying conditions.

Learning about the illusions of Spatial Disorientation (SD), and the associated physiology, is only half the battle. Experience teaches the greatest lesson. There is a way you can experience SD up close and personal without jeopardizing your own safety. It's called the General Aviation Trainer (GAT). This advanced simulator is used to demonstrate SD and vertigo while in a safe simulated flight environment. The GAT will initially put each pilot at a simulated altitude of 5,000 feet AGL and in IFR conditions. The pilot will receive heading instructions and the GAT will respond by spinning around the yaw axis in that direction. As the GAT turns, the pilot's vestibular system will be stimulated accordingly and will mimic the illusions we have just learned about. For more information contact Airmen Education, AAM-400, at 405.954.4837.

Mr. Brown is a training specialist in Airmen Education, with the Civil Aerospace Medical Institute (CAMI).

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Understanding Healthcare Avoidance Behaviors and the Importance of Preventative Medicine

By Zykevise Gamble

Healthcare avoidance can be a barrier to receiving the best medical care, but the behaviors and factors leading to healthcare avoidance are not always obvious. Healthcare avoidance behaviors can be subtle, and result in disengagement between healthcare providers and patients. It is important that AMEs, as well as pilots, are aware of these behaviors, and how they contribute not only to short-term safety concerns; but also, may impact long-term overall health and the longevity of a flying career.

According to research conducted by a team of Federal Aviation Administration scientists and physicians, these behaviors are common (Hoffman et al., 2022). In fact, over half of the pilots included in the study disclosed healthcare avoidance behavior. However, this is likely, not unique to pilots, and may be pertinent to many individuals in high-stakes occupations that require attestations of medical health, such as Air Traffic Controllers, professional drivers, physicians, or military service members.

Types of Healthcare Avoidance outlined in the study were:

1) Informal care

Informal care can be described as seeking out information or treatments from sources that lack the skill or expertise to provide an ongoing relationship of good care. For example, with the accessibility of the internet, pilots may utilize web searches to self-diagnose, without the intention to visit their physician. Well known to occur among physicians, but also occurs with pilots, is the tendency to seek "curbside" advice or suggestions from individuals who may be friends, relatives, or colleagues. However, taking this shortcut, without a proper, thorough, and unbiased assessment of a condition is risky. Physicians are trained to avoid this, but pilots may not be aware of this particular medical peril, and oftentimes get caught by this trap.

2) Discounting symptoms

Regardless of whether intentional or not, pilots, and others in high-risk occupations, are tempted not to report symptoms they perceive may prevent them from earning a living. While intentional concealment

does sometimes occur, pilots in particular are extremely safety conscious. So why do we think the study showed this behavior was so common? Many human behaviors are not as intentional or conscious as they may seem to an outside observer, and the need to earn a living is a strong bias. This creates a tendency toward "discounting" symptoms. Many emergency room doctors know this story well: "*it was only a twinge, so I ignored it at first*", in patients presenting after a delay, yet with clear symptoms of a heart attack. This is not an intentional concealment, rather discounting is a common clinical scenario.

3) Medical non-disclosure

This is related, but not exactly the same as not discounting symptoms. It is important that pilots, like all persons, receive recommended preventative health screenings, have accurateagnoses and appropriate treatments to ensure ongoing optimal health. Full disclosure of health history is necessary to accomplish this. FAA-designated medical examinations and other planned screening examinations, address not only current or immediate health concerns but also aim to identify the risk of future health concerns. Effective health screening promotes the identification and mitigation of risks and should help optimize future health. It may be tempting not to bother reporting health information, which may be perceived as not having immediate relevance. This may be detrimental to the assurance of a pilot's long-term health, eventually with possible dire consequences; at best this risks impacting a career at an older age when experience and seniority often place the pilot in the most lucrative stage of their career, and in the most safety-critical roles.

4) Unauthorized prescription usage

Again this situation is more often unintentional than intentional. One of the most common situations is the use of over the counter medications, like allergy or cold medications, which are unsafe to take when performing pilot duties. Pilots may not mention medications prescribed for conditions that resolve after treatment, or medications that are only taken intermittently. For example, blood pressure medication, when after treatment, the blood pressure is normal, or a medication for headaches that is only used once or twice a year. The AME needs to review all medications, not only to advise the pilot on potential side effects and wait periods that ensure unsafe side effects have time to wear off but also to help assure the underlying condition being treated is safely managed. Pilots should be wary about stopping necessary medication solely for fear it may result in a denial of medical certification. There are many allowable medications and methods to achieve certification when using appropriate medications. Notably, the various "Conditions AMEs Can Issue" (CACI) include guidance on how some medications may be safely used when certifying pilots. A Special Issuance provides another pathway for pilots to safely fly while using medication to manage their condition(s), for example, those treated with SSRI antidepressants, or diabetes treated with oral medications or insulin.

The FAA has published an informational guide for pilots on medications and flying: www.faa.gov/go/pilotmeds. Furthermore, pilots are encouraged to discuss new, or changes in, medication with their AME even before a new examination is due.
The FAA Guide for Aviation Medical Examiners provides guidance on medications that are aero-medically unsafe, and for other medications and conditions, sound clinical judgment should be used when determining suitability for certification.

Most pilots will know to use the "IMSAFE" checklist that covers: Illness, Medication, Stress, Alcohol (and other drugs or medications), Fatigue/Food (i.e. enough sleep, nutrition, hydration), and Emotion. This is a useful preflight tool to help ensure safe health-related behaviors.

To sum up, optimal health is important for safety, and it is important for pilots to practice healthy behaviors. These behaviors are the groundwork for ensuring the longevity of a pilot's career. Physicians, AMEs, and pilots are encouraged to fully understand barriers to optimal health, consider the perils of healthcare avoidance, and encourage safe and healthy behavior.

The FAA-required AME examinations are but one part of ensuring a pilot's health and safety. Recommended health screenings, regular exercise, healthy diet, and sleep habits all make it more likely for a pilot to have a healthy, safe, and sustained career.

Mr. Gamble is a pre-med student at Howard University and completed this article as part of an internship with the Office of Aerospace Medicine

References:

Hoffman WR, Aden J, Barbera RD, et al. Healthcare avoidance in aircraft pilots due to concern for aeromedical certificate loss: A Survey of 3765 Pilots. *J Occup Environ Med.* 2022; 64(4): e245-e248. doi:10.1097/JOM.0000000000002519

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Medical Certification Policy Updates

By Judith Frazier, MD, MBA

The Policy and Standards branch continues to focus on helping Aviation Medical Examiners (AMEs) more easily obtain the information they need to make a medical certification decision. Policy change and update highlights from May 2022 to October 2022 are below. The full list of changes is hyperlinked in the Archives and Updates section of the AME Guide.

COVID updates – simplified the Disposition table. Outpatient only and resolved, remember to note "COVID, Month and Year resolved. No ICU, no Sequelae." All others, go to row B or C. The Novavax vaccine is allowed with the same 48 hour not fly after each injection.

1st Degree AV block – simplified the guidance. Need an evaluation if the PR interval is 300ms or longer. Decreased the cardiac conditions that must go to Cardiac Panel. This may get your pilots back in the air faster.

TIAs and completed stroke – require a two (2) year recovery period before consideration. Encourage your pilots to bring a copy of the Specifications for Neurologic Evaluation to their physician. It contains a list of all the info the FAA needs to make a decision on their case.

Situational Depression – decision tool may allow you to issue more pilots at time of your AME exam.

HIMS AMES – No forma HIMS cases will be accepted in paper format after January 1st, 2023. If you are not yet Huddle capable, contact 9-AAM-HIMS@faa.gov for training.

Medication Updates:

- Colitis CACI – expanded to allow Xeljanz, Entyvio and Humira
- Allergy Medication Table – expanded to show product formulation
- CBD and Controlled Substances page added
- Plaquenil Status report renamed (and easier to find)
- HIV PrEP, Apretude (cabotegravir) can be allowed

Check out the "AME ALERT" box each month in the AME Guide. It includes the "don't miss" items.

Dr. Frazier is the Manager of the Policy and Standards Branch in the Office of Aerospace Medicine.

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Aviation Medical Examiner Information Links

For downloadable, printer friendly versions of this Bulletin click here.

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Federal Air Surgeon, Susan E. Northrup, MD, MPH

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