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Pilots' Healthcare Seeking Anxiety When Experiencing Chest Pain

Aircraft pilots of all levels of training require varying levels of medical evaluation in order to function as a required crew member.[1,2] Airmen medical certification must be reviewed at defined intervals and pilots are required to disclose new medical conditions or changes to their health status to their physician.[1,2] The frequency of regular medical assessment by a Federal Aviation Administration (FAA) designated Aviation Medical Examiner (AME) to maintain a valid medical certificate depends on the age of the pilot and the type of pilot certificate. If pilots are unable to renew their medical certification due to a change in their health status, they may legally lose their flying privileges.[2,3] For some pilots, this means loss of a valuable hobby but for others this means the end of a career or an extended gap in flight time, which could require additional training.[1]

The FAA deems a variety of medical conditions as disqualifying for medical certificate.[2] An AME must automatically deny or defer a medical certificate to a pilot with symptomatic cardiovascular disease (treated or untreated angina pectoris) or a history of myocardial infarction.[2] Further, if pilots experience symptoms of a medically disqualifying condition (eg, chest pain), they are required to ground themselves from flight operations until evaluation and treatment by a physician can be conducted.[3] While it is possible for the FAA to exercise discretionary authority to issue an airman medical certificate despite a medical history of a disqualifying condition, it can be a long, burdensome, and difficult administrative process.[2]

The aviation community and the healthcare providers who care for this population are often aware of pilot healthcare seeking aversion due to their fear of medical certificate disqualification and loss of flying privileges. Though this may be common knowledge to some providers who care for pilots regularly, to the best of our knowledge, there has been no major survey completed on civilian pilots in the United States about their approach to seeking medical care for symptomatic cardiovascular disease and their anxiety over losing their flying privileges. This is significant as cardiovascular disease is common,[4] delayed presentation during a true myocardial infarction has poorer outcomes,[5,6] and data will likely be a primary driver for any future FAA policy changes. Some smaller studies have previously suggested military pilot healthcare aversion: a 2006 study surveying 325 Israeli military pilots showed 70.9% of pilots who experienced a clinical symptom listed on a health screening questionnaire did not seek medical care.[7] Of those who did seek medical advice, they were more likely to seek advice from a non-physician healthcare provider (ie, dentist, alternative medicine, etc) than a physician.[7] Another study showed 55.5% ($n = 151$) of surveyed US Air Force aircrew members did not seek medical attention for upper respiratory infections (URI), which can cause disequilibrium and disorientation in flight.[8] The authors suggested a more rigorous health screening program should be considered for pilots because current programs require pilots to self-identify a symptom or condition. Authors of a 1996 study showed cardiac events in US Air Force pilots increased with age and advocated for more aggressive screening in hopes of decreasing the risk of a cardiac event while a pilot is operating an aircraft.[9] A 2002 study showed in 559 pilot autopsies from 498 fatal fixed wing aircraft that 1.07% ($n = 6$) of accidents were due to fatal pilot myocardial infarction prior to impact.[10] Further, 43.82% ($n = 234$) of those autopsies showed the pilot had some degree of coronary artery stenosis.[10] In this context, we believe strongly this topic is of significant concern and should be further evaluated. We hypothesize pilots may endure a longer duration of chest pain before seeking medical care than non-pilot controls and are more likely to withhold information from a physician due to concern for retaining their medical certification.

We set out to gather data to support our hypothesis by conducting an anonymous, 20-question survey (Appendix 1, http://links.lww.com/JOM/A598) using Qualtrics software (Qualtrics Software, Qualtircs XM, Seattle, WA) housed on a secure Georgetown University Medical Center (GUMC) server to study and quantify pilot healthcare seeking behavior. The survey was distributed electronically with the assistance of contacts in the airline and general aviation industry. David Tulis, an editor from Aircraft Owners and Pilots Association (AOPA) Magazine, featured the study in an online column with a link to participate. No participants were paid or monitored, no single question was required, and all completed and uncompleted surveys were analyzed. GUMC IRB granted the study exempt status prior to data collection.

The survey had 843 total respondents consisting of 613 pilots and 230 non-pilots (Survey Results, Supplemental Digital Content 1, http://links.lww.com/JOM/A583, to see full results). Demographic information of participants is summarized in Table 1, which reflects the current civilian pilot population in the United States that is shifted toward the older male cohort. We consolidated the level of pilot training in four main groups, which is described in

TABLE 1. Participant Demographics

	Licensed Pilots	Non-Pilots	Total
Sample size (n)	613 (72.7%)	230 (27.3%))	843 (100%)
Complete surveys	473/613 (77.2%)	189/230 (82.2%)	662/843 (78.5%)
Gender			
Male	459/613 (74.9%)	99/230 (43.0%)	558/843 (66.2%)
Female	154/613 (25.1%)	131/230 (57.0%)	285/843 (33.8%)
Age			
18–30	139/613 (22.7%)	128/230 (55.7%)	267/843 (31.7%)
31–50	266/613 (43.4%)	50/230 (21.7%)	316/843 (37.5%)
51–65	185/613 (30.2%)	34/230 (14.8%)	219/843 (26.0%)
>65	23/613 (3.8%)	18/230 (7.8%)	41/843 (4.9%)

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TABLE 2. Pilot Demographics

	Value
Level of training	
Airline transport pilot	429 (70.0%)
Certified flight instructor	59 (9.6%)
Commercial/Instrument certificate	53 (8.6%)
Private pilot's certificate	69 (11.3%)
No answer	3 (0.5%)
Logged flying hours	
0–499	91 (14.8%)
500–4,999	183 (29.9%)
5,000–9,999	124 (20.2%)
10,000+	213 (34.7%)
No answer	2 (0.3%)

Table 2 along with number of logged flight hours. Airline transport pilots formed the great majority of survey participants with more than half of pilots having over 5000 hours of flight experience.

When survey participants were asked if they have "ever felt worried about seeking medical care due to concern for their career or hobby," 78.63% of pilots answered "yes," compared with 28.7% of non-pilot controls ($P = 2.2e{-}16$) (Fig. 1). There were differences in demographics between our pilot and non-pilot cohort, but similar trends were seen after subgroup analysis (Fig. 2). There was a statistically significant difference in answers between all male pilots versus non-pilots ($P < 0.001$), all female pilots versus non-pilots ($P < 0.001$), and both more than 31 years old and 18 to 30 years old pilots versus non-pilot cohorts ($P < 0.001$). 76.9% of male pilots and 83.8% of female pilots answered "yes" to the question. Interestingly, 78.9% of pilots more than 31 years old answered "yes" and 77.7% of pilots less than 30 years old answered "yes," which was high and not a significant difference. This is at odds with non-pilot controls, which showed age (79.4% for more than 31 years old vs 64.8% for 30 to 18 years old where $P < 0.023$) was a significant difference. These data suggest health care seeking anxiety is high in pilots and neither pilot age nor sex play a significant role.

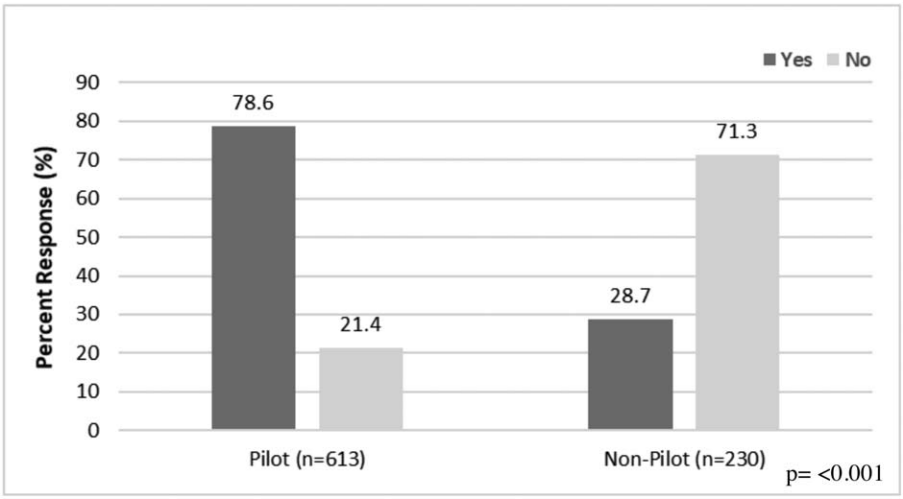

FIGURE 1. Have you ever felt worried about seeking medical care because it may impact your career and/or hobby?

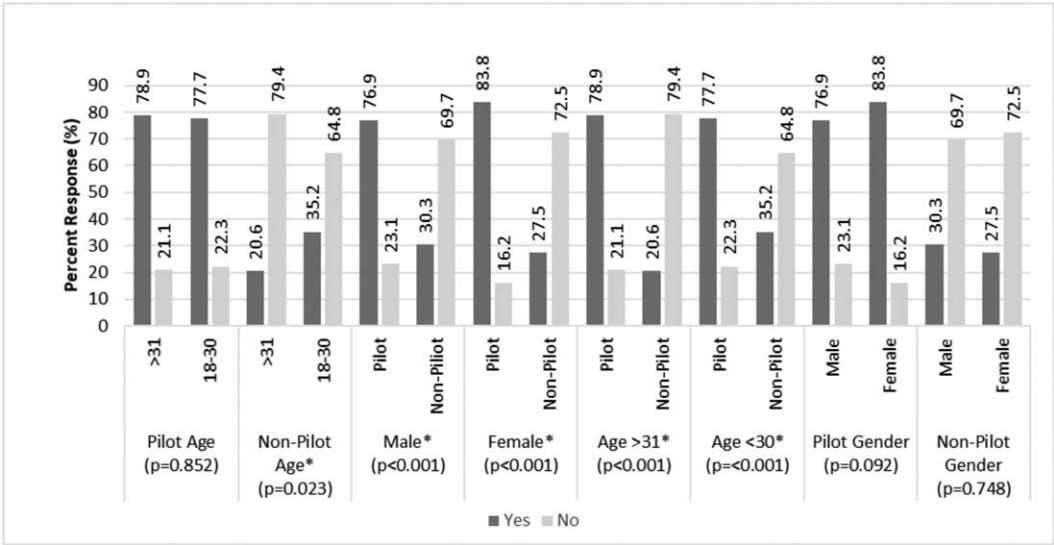

FIGURE 2. Subgroup analysis: have you ever felt worried about seeking medical care because it may impact your career and/or hobby?

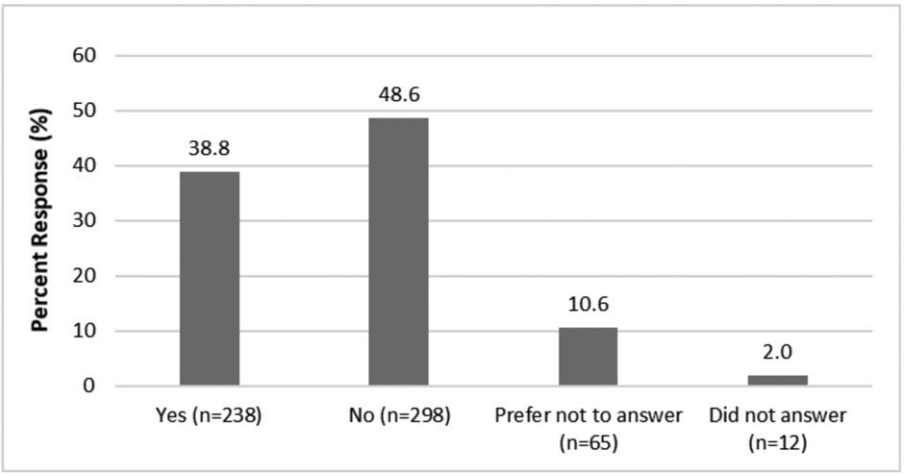

FIGURE 3. Have you ever withheld information from a physician due to concern for your medical status as a pilot?

The predicted pilot healthcare anxiety was also reflected on answers regarding timing of medical care and sharing information with their AME. Of all 613 surveyed pilots, 238 pilots (38.8%) answered ''yes'' when asked if they have withheld medical information from a physician and 369 pilots (60.2%) answered ''yes'' when asked if they have delayed or not sought out medical care due to their concern for lose their pilots license (Figs. 3 and 4). Note these two questions were not asked to the non-pilot control group.

Two-sided Fisher exact test shows proportion of ever withheld information from a physician due to concern for medical status is significantly different between pilot types ($P = 0.007$). More self-identified Airline Transport Pilots and Certified Flight Instructors answered ''Yes'' or ''Prefer not to answer'' compared with Private Pilots and Commercial/Instrument Pilots suggesting this difference may be related to type of flying experience (professional vs recreational) (Table 3). The difference between Airline Transport Pilots and commercial/instrument certified pilots withholding information from a physician was statistically significant (11.35% vs 5.88%, $P = 0.006$) while other comparisons between pilot groups were not significant.

Both pilots and non-pilots were asked how likely they were to seek medical care for various duration of symptoms and four of twelve symptom durations showed a statistical difference between pilots and controls. The data showed pilot healthcare-seeking behavior for exertional angina was statistically significant for symptoms lasting 3 months, 6 months, and 1 year as compared with non-pilot controls (Fig. 5). Additionally, the data showed behavior was significantly different for sudden, resting angina experienced for 1 hour (Fig. 6).

Post-hoc analysis was preformed after significance was found between pilots and non-pilots for exertional angina. If only two answers for 3 months of symptoms are analyzed, the proportion of ''probably not seek care'' and ''would seek care'' are 12.31% and 87.69% of pilots versus 4.07% and 95.93% for non-pilots and the proportion is a significant difference between pilots and non-pilots (P-value $= 0.012$). Similar results were seen between ''probably would'' and ''would see care'' over 3 months ($P = 0.028$). Pilots were also more likely to answer ''probably not'' seek care as opposed to ''would seek care'' for exertional angina lasting 6 months

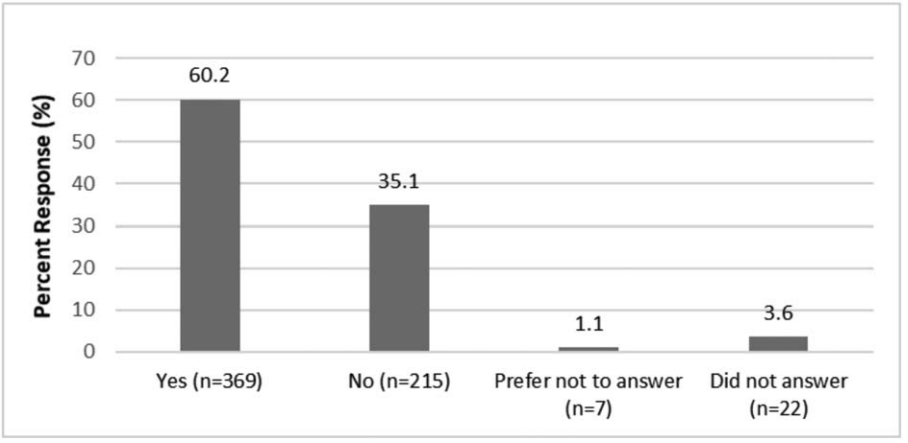

FIGURE 4. Have you ever not sought for delayed medical care for a symptom due to concern for your medical status as a pilot?

TABLE 3. ''Have You Ever Withheld Information From a Physician due to Concern for Your Pilot's License?''

	Airline Transport Pilot	Certified Flight Instructor	Commercial/Instrument Certificate	Private Pilot's Certificate	*P*-Value
Yes	48/429 (11.2%)	7/59 (11.9%)	3/53 (5.7%)	7/69 (10.1%)	0.007
No	190/429 (44.3%)	30/59 (50.8%)	37/53 (69.8%)	40/69 (58.0%)	
Prefer not to answer	185/429 (43.1%)	22/59 (37.3%)	11/53 (20.8%)	20/69 (29.0%)	
Did not answer	6/429 (1.4%)	0/59 (0.0%)	2/53 (3.8%)	2/69 (2.9%)	

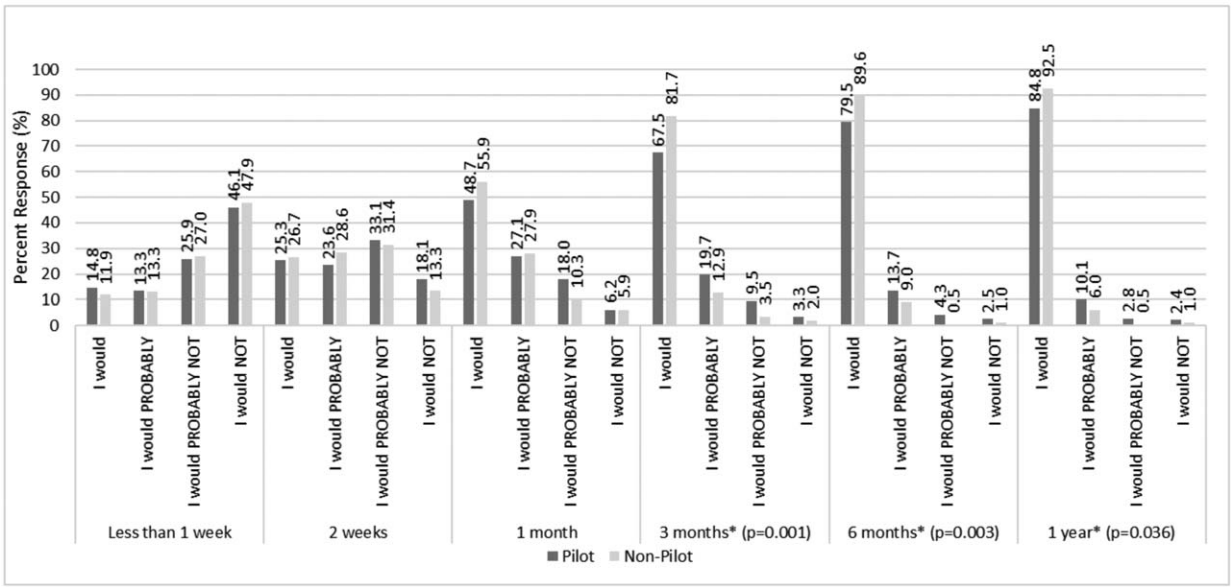

FIGURE 5. You begin to experience chest pressure only when you exercise/walk upstairs. If the symptoms continued for the listed duration, how likely would you seek professional medical care?

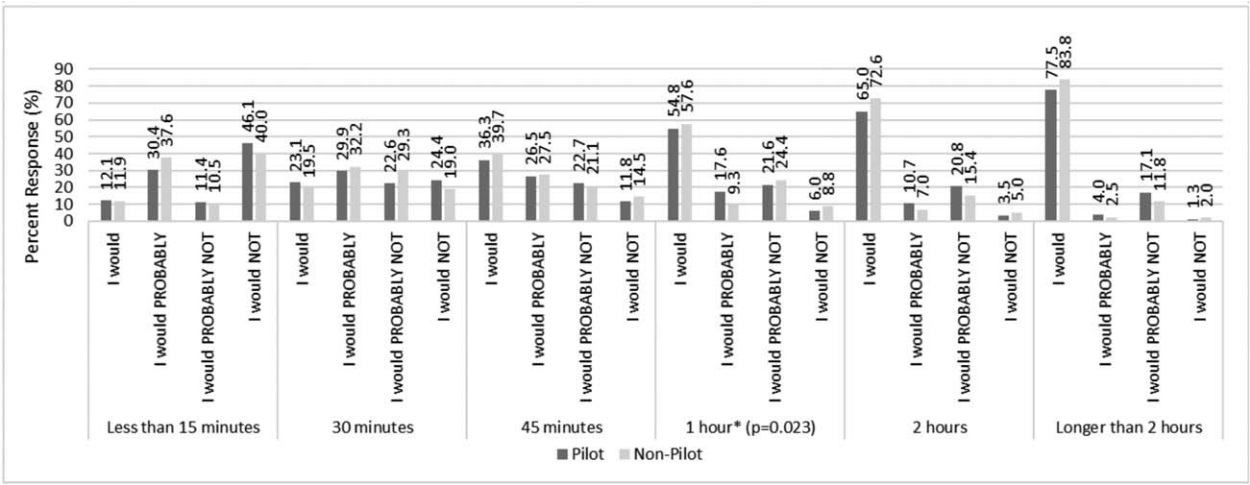

FIGURE 6. You suddenly experience constant chest pressure while sitting and watching TV. If the symptoms continued for the listed duration, how likely would you seek professional medical care?

($P = 0.026$). No single subgroup analysis was significant between pilots and non-pilots for exertional angina lasting for more than a year in post-hoc analysis. One explanation is that due to false discovery rate (FDR) correction, which controls family-wise error rates, and causes statistical power to be reduced.

For sudden, resting angina lasting 1 hour, post-hoc analysis showed pilots were more likely to answer ''probably not'' seek care as instead of ''probably would'' and ''would'' seek care compared with non-pilots ($P = 0.031$ and $P = 0.031$). Pilots were also more likely to answer ''would not'' seek care as compared with ''probably not'' seek care ($P = 0.031$) compared with controls (Fig. 6).

We hypothesize that there is a barrier for pilots to seek medical care because of the professional or personal impact it may have on the status of their medical certification and pilots license. Pilots seeking medical care for the complaint of chest pain may cause permanent or temporary loss of their license if the pain is determined to be of cardiac etiology or require them to undergo a burdensome administrative process if the pain is determined to not be of cardiac etiology. The results of our study document the anxiety surrounding pilot healthcare seeking behavior and can serve as an indirect measure of pilots' hesitation to seek medical care compared with non-pilot controls due to concern for their ability to fly. The data show this trend is not impacted by pilot sex or pilot age, which was different compared with the control group. Importantly, a significant portion of pilots (38.8%) admitted to withholding information from their physicians while 60.2% of pilots indicated that they have delayed seeking medical care. These results are concerning because it may suggest there are pilots flying with medically disqualifying conditions or have complaints that have not been medically evaluated. Interestingly, these results were different between different pilot types. Pilot categories associated with compensation (Airline Transport Pilots) were statistically more likely to withhold information from a physician compared with non-compensation categories, suggesting the role of compensation or employment may be a contributing factor. A similar trend was seen when we asked pilots and controls how likely they were to seek medical care for various durations of chest pain, with four of 12 scenarios showing pilots wait a statistically significant longer time than controls. While we selected chest pain as our study question, we propose this barrier may be evident for other complaints as well (extremity weakness resulting from cerebral infarction, clinical depression, etc).

While the purpose of the FAA medical evaluation system is to ensure pilots are fit to fly, we suggest the current system may have unintended and negative consequences which may have room for improvement. The data suggest pilots have more health care anxiety and may withhold information or delay seeking care when experiencing chest pain. This is significant because delayed medical care in a true myocardial infarction is associated with worse health care outcomes.[5,6] Further, the data suggest there may be pilots who have not sought care for a symptom of a potentially medically disqualifying condition and continue to fly, putting passengers and people on the ground as risk. For this reason, perhaps adjustments to the current pilot healthcare-screening program should be considered so pilots are not required to self-identify symptoms of a potentially medically disqualifying condition. An alternative program could include a pilot medical help line to allow pilots to ask medical questions anonymously and determine if formal medical evaluation is necessary. This service could aid pilot decision making when experiencing symptoms that may be risky in flight (ie, URI symptoms that may cause disequilibrium in flight, etc) and could mirror the flight planning and weather service provided by Lockheed Martin Flight Service Line. Though our recommendations are far from comprehensive and a perfect solution will likely not exist, the goal should be to develop a non-retribution system where pilot health is thoroughly assessed and healthcare seeking is not discouraged. While we understand providers who work with pilots regularly are often aware of trends addressed in this study, data will likely be the key driver in any policy reform and we hope this project will contribute to that effort and serve as a springboard for further investigation and FAA policy improvements.

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