Permanent Medical Disqualification of Iranian Air Medical Transportation Pilots

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Abstract

Background: Health is a state of complete physical, mental and social wellbeing. Disability is defined as the effect of a disorder on a person's physical, mental or social activities.

Purpose: Determine the causes and diseases leading to early permanent medical disqualification of Iranian rotary and fixed-wing air medical transportation pilots from 1990 to 2020.

Materials and methods: The study was designed as a descriptive, cross-sectional, retrospective investigation. Data were collected from the medical records and councils and sorted into pre-designed electronic sheets.

Results: Out of 214 permanent disqualifications, 198 were medically disqualified, while the remainder were killed in air accidents. The main reasons for medical disqualification were neurosurgery, psychiatric and cardiovascular causes. Common diseases included discopathy, generalised anxiety disorder and myocardial infarction. The total lost service years were 2239 person-years. The average was 11.3 person-years per individual with a standard deviation of ± 6.04.

Conclusion: The common causes of early permanent medical disqualification of pilots are neurosurgery, cardiovascular and psychiatric. The work environment of rotary-wing pilots is different from fixed-wing pilots. Air medical transportation pilots face higher levels of stress than other pilots due to the transport of patients.

Keywords: Disabilities, Disqualification, Air medical transportation, Pilots, Health

Conflict of interest: None

Introduction

Health is a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity. Health must be a state subject, with the National Health Mission as a reference program of the Ministry of Health. Sufficient attention on health promotion, intersectoral partnership, surveillance, monitoring and evaluation of healthcare delivery should be considered.[1] Healthcare access varies by age group and disability type.[2]

Disability is defined as the effect of a disorder on a person's physical, mental or social activities in which the work environment and family situation are also affected. Disability has been associated with health disparities in behavioural risk factors (e.g., smoking and physical inactivity) and preventive health measures.[3] One-quarter of non-institutionalised US adults (representing an estimated 61.4 million persons) reported some disability. Mobility was the most prevalent disability type (13.7%), followed by cognition (10.8%), independent living issues (6.8%), hearing (5.9%), vision (4.6%) and self-care problems (3.7%). Women reported a higher prevalence of disability (24.4%) than men (19.8%) and higher prevalence of each disability type.[2,4] The prevalence of disability in the unemployed is more than double that of the employed.[4] Prevalence of disability varied by age group and sociodemographic characteristics. Higher prevalences of disability were reported by persons living in poverty.[2] Past studies have shown that adults with disabilities have lower levels of education than non-disabled people.[4]

Selection, training and continuous surveillance of pilots require a lot of material and spiritual costs. Disability or death leads to the loss of expert pilots and increases costs. There is no way except for prevention and continuous surveillance (especially in non-communicable diseases).[1,5,6] The basic principles of health monitoring and disease

prevention include accurate monitoring of workplace conditions, lifestyle, regular periodic examinations and screening tests. The economic, psychological and social problems caused by disabilities have led to many financial and moral burdens.[7]

Disabled persons face greater barriers to healthcare than others. Identifying disparities in access to healthcare highlights disability types, selected demographic groups and possible predisposing factors.[2] Exact demographic data about the prevalence of disability, types of disabilities and their predisposing factors could prevent future disabilities and is essential for public health programming.[2,4]

Safe and successful air medical transportation needs the cooperation of healthy medical and flight crews. They involve medical and operational stressors concomitantly. Therefore, health and medical surveillance are necessary for air medical transportation (AMT) pilots.[8]

The present study aimed to determine the causes and diseases leading to early and permanent medical disqualification (EPMD) of the Iranian AMT pilots based on their service categories from 1990 to 2020. Other objectives included determining the total lost service years (LSY) and the average and exact number of Iranian AMT pilots killed in air accidents according to their service categories. This valuable data helps us to identify and remove existing defects.

Materials and methods

This is a descriptive, cross-sectional, retrospective study on medical causes and diseases that led to EPMD of Iranian AMT pilots from 1990 to 2020. The study population was selected through the purposive sampling method. We considered the first officers (co-pilots) in the pilot's population. Rotary and fixed-wing AMT pilots with EPMD entered the study based on the inclusion and exclusion criteria. The aim was to determine the medical causes and diseases that led to the EPMD of Iranian AMT pilots according to their service categories. This information can play an important role in preventing disabilities and loss of human resources in the future by early identification and correction of existing deficiencies according to their service categories. The obtained data were presented to the officials of preventive medicine and health planning.

Inclusion and exclusion criteria

The Iranian rotary and fixed-wing AMT pilots with EPMD who had relevant official records from 1990 to 2020 were included in the study. The exclusion criteria included medical disqualification due to physical or mental illness, death in non-occupational accidents, non-medical reasons, personal requests or disciplinary extrusion. In addition, pilots who were killed in air accidents were classified as non-medical permanent disqualification.

Study design

Operators collected data with random identification codes from the medical profiles of the pilot and their air medical council and recorded them in pre-designed sheets based in Excel. These data included date of entry into service, date of retirement, length of service before discharge, major medical cause and disease that led to EPMD based on version 10 of the International Classification of Diseases (ICD-10) and according to their service categories.

According to the International Civil Aviation Organization (ICAO) and European Aviation Safety Agency (EASA) regulations, pilots with no disability can continue to fly up to 65 years of age. However, Iranian official employees can usually retire after 30 years of service. Therefore, the minimum pilots' service duration was considered 30 years.

Statistical analysis

The data were analysed statistically by SPSS software (version 26). Ultimately, we presented the most common medical causes and diseases, the total LSY and their average by tables and graphs according to their service categories.

Ethical considerations

The Ethics Committee of the Aerospace and Sub-Aquatic Medical Faculty at Aja University of Medical Sciences approved this study with the registration number 10167214. The information of each participant was recorded with a random code to prevent the disclosure of the pilot's medical profile. The corresponding author paid all the research costs.

Results

Out of 214 AMT pilots with permanent disqualification, 198 cases were EPMD, while the remainder (n = 16) were killed in air accidents. Rotary-wing pilots had 150 cases of medical disqualifications, while fixed-wing pilots had 48 cases. In all pilots, neurosurgery, psychiatric and cardiovascular disorders were the most common causes of EPMD (Figure 1). Whereas discopathy, generalised anxiety disorder (GAD) and myocardial infarction (MI) were the most frequent diseases (Figure 2).

The total LSY in AMT pilots with EPMD was 2239 person-years. The mean and standard deviation of

LSY for any medical cause, disease and all service categories is presented in Table 4. The mean of total LSY was 11.3 person-years per individual with SD=±6.04. In all pilots, psychiatric, neurosurgery and cardiovascular reasons had the highest means between medical causes of LSY. Post-traumatic stress disorder, GAD and discopathy had the highest means between diseases of LSY. However, in fixed-wing AMT pilots, neurosurgery, psychiatric and cardiovascular reasons had the highest means of LSY. Borderline personality disorder, bipolar mood disorder and discopathy also had the highest means of LSY among diseases in this service category (Table 4).

Table 1: Demographic study data

	Service category		
Cause	**Rotary-wing AMT pilots**	**Fixed-wing AMT pilots**	**Sum**
Early permanent medical disqualification	150	48	198
Killed in air accidents	13	3	16
Sum	161	51	214

Table 2: Medical causes leading to the LSY in AMT pilots with permanent disqualification

	Service category		
Cause	**Rotary-wing AMT pilots**	**Fixed-wing AMT pilots**	**Sum**
Psychiatric	**408**	**115**	**523**
Neurosurgery	**376**	**106**	**482**
Cardiovascular	**255**	**109**	**364**
Other causes	690	180	870
Sum	1729	510	2239

Table 3: Diseases leading to the LSY of AMT pilots with permanent disqualification

	Service category		
Cause	**Rotary-wing AMT pilots**	**Fixed-wing AMT pilots**	**Sum**
Discopathy	240	86	326
Generalised anxiety disorder	203	36	239
Myocardial infarction	86	44	130
Other causes	1200	344	1544
Sum	1729	510	2239

Table 4: Mean and SD of LSY in AMT pilots with permanent disqualification

Service category	Cause	Mean and SD	Diseases	Mean and SD	Mean & SD for each service category	Mean & SD for all service category
Rotary-wing AMT pilots	Psychiatric	Mean=14.57 SD=±6.79	Post-traumatic stress disorder	Mean=17.67 SD=±4.78	Mean=11.53 SD=±6.2	Mean=11.3 SD=±6.04
	Neurosurgery	Mean=11.05 SD=±6.02	Generalised anxiety disorder	Mean=14.5 SD=±6.8		
	Cardiovascular	Mean=10.2 SD=±5.34	Discopathy	Mean=11.43 SD=±3.08		
Fixed-wing AMT pilots	Neurosurgery	Mean=13.25 SD=±3.4	Borderline personality disorder	Mean=19 SD=±1.41	Mean=10.62 SD=±4.86	
	Psychiatric	Mean=11.5 SD=±6.17	Bipolar mood disorder	Mean=17 SD=±0.7		
	Cardiovascular	Mean=9.08 SD=±5.56	Discopathy	Mean=14.33 SD=±3.03		

Discussion

Selection, training and periodic health monitoring of pilot volunteers have a lot of human and material costs. According to global estimates, training a skilled pilot will cost millions of US dollars. Any form of pilot disqualification wastes much material and human capital. The only way to prevent this waste is through effective prevention.[5,6]

The number of fixed-wing AMT pilots is less than rotary-wing in Iran because AMT by aircraft is more expensive and usually used for long-distance transportation of critically-ill patients. The leading causes of EPMD in all pilots in this study were neurosurgery, psychiatric and cardiovascular disorders. According to the literature, the most common causes of EPMD in pilots are cardiovascular, neurological and psychiatric reasons, respectively.[(9)] In Høva's study on loss of license in Norwegian professional pilots between 2006 and 2010, cardiovascular, neurologic and musculoskeletal disorders were the most common reason.[10] Ghazizade et al. reported cardiac, neurologic and gastrointestinal disorders as more frequent medical reasons for EPMD in Islamic Republic of Iran Air Force (IRIAF) pilots between 1992 and 2003.[11] In Whitton's research on US Air Force (USAF) pilots and navigators, common causes were cardiac and neurological disorders. McCrary et al. described cardiac, musculoskeletal and neurologic reasons in a similar population.[12,13] In the Federal Aviation Association (FAA)-assisted Dark study, the most common causes of disqualification of American airline pilots between 1983 and 1984 were cardiac, neurological and psychiatric reasons.[14] Amirabadi Farahani et al. reported otorhinolaryngological, psychiatric and cardiac medical causes for IRIAF cadets between 1986 to 2016.[5] In Pombal's study on permanent medical disqualification in airline cabin crew between 1993 and 2002, otorhinolaryngological, musculoskeletal and psychiatric causes were the most frequent medical conditions reported.[15] Nakanishi et al. reported oncologic, neurologic and psychiatric reasons for 260 Japanese crew members with a permanent disability.[16] In Arva's study, the leading medical causes of EPMD in 257 Norwegian civilian pilots included cardiac, neurologic and psychiatric disorders.[17] Evan and Mitchell reported that heart, neurological and psychiatric reasons were responsible for the sudden disability of British civilian pilots.[18,19]

In the current study, common diseases leading to EPMD in all pilots were GAD and MI. However, in fixed-wing AMT pilots, discopathy, MI and GAD were more frequent. In McCrary's research on EPMD of USAF pilots and navigators between 1995 to 1999, common diseases included ischaemic heart disease, high blood pressure and back pain. While Amirabadi Farahani et al. reported motion sickness, adjustment disorder and epilepsy as the common diseases that resulted in EPMD of IRIAF cadets.[5,13] In February 2014, the FAA published a statement titled *FAA's 15 disqualifying aviation medical conditions for prospective pilots*. The first three diseases on that list were angina pectoris, bipolar disease and cardiac valve replacement.[20] In different studies, similar diseases but with different prevalence and sequences have led to EPMD.

In our research, the total LSY in AMT pilots with EPMD was 2239 person-years. In all pilots, psychiatric, neurosurgery and cardiovascular disorders were the most frequent causes. Whereas discopathy, GAD and MI were the most common diseases.

The mean of total LSY was 11.3 person-years per individual with SD=±6.04. In AMT pilots and rotary-wing AMT pilots, psychiatric, neurosurgery and cardiovascular disorders had the highest means between medical causes of LSY. Post-traumatic stress disorder, GAD and discopathy had the highest means between diseases of LSY. However, in fixed-wing AMT pilots, borderline personality disorder, bipolar mood disorder and discopathy also had the highest means of LSY among diseases. In the Amirabadi Farahani study, the total LSY of IRIAF cadets was 1412 person-years. The most common causes include otorhinolaryngeal, psychiatry and cardiac, while frequent diseases included motion sickness, GAD and epilepsy. The mean of LSY was 25.67 person-years per individual. The common reasons included neurology, psychology and otorhinolaryngeal. While common diseases included high blood pressure, occupational hearing loss and GAD.[5] In Ghazizade's study, the mean of total LSY in IRIAF pilots was 6.14 person-years per individual. Cardiac causes had the highest mean (10 person-years per individual).[11]

Our study had some limitations that include: 1) information lost about 10 per cent due to the lack of a comprehensive electronic system for recording personal medical records, 2) the possibility of misuse in disorders that do not have a specific diagnostic method (and most are diagnosed mentally, such as motion sickness, migraine, irritable bowel syndrome, etc.) and 3) lack of necessary information that affects the health of the AMT pilots (such as aircraft, operational and airbase agents, personal agents and others). Current research also has important advantages, which include: 1) this is the first study on EPMD of AMT pilots; 2) the period of this cross-sectional study was 30 years; 3) presentation the statistics of AMT pilots which killed in air accidents, and 4) presentation the statistics of AMT pilots with EPMD based on their service categories.

The authors believe that AMT pilots are exposed to the stresses of flight, patients, their companions and the air medical crew simultaneously. Rotary-wing AMT pilots have more difficult and almost always urgent operations that produce more stress. As a result, it seems that conducting similar studies in the future can effectively determine the predisposing factors in AMT pilot's disabilities and more effective preventive planning. Moreover, the use of up-to-date comprehensive electronic systems, upgrading on-the-job examinations and sufficient periodic examination in occupational health centres are suggested.

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Ethical approval

The ethical approval of this study was issued by the Ethics Committee of the Aerospace and Sub-aquatic Medical Faculty in Aja University of Medical Sciences, with registration No: 10167214.

Abbreviations

US: United States

EPMD: Early and permanent medical disqualification

AMT: Air medical transportation

LSY: Lost service years

ICD-10: Version 10 of the International Classification of Diseases

ICAO: International Civil Aviation Organization

EASA: European Aviation Safety Agency

GAD: Generalised anxiety disorder

MI: Myocardial infarction

SD: Standard deviation

IRIAF: Islamic Republic of Iran Air Force

USAF: United States Air Force

FAA: Federal Aviation Association

Contributorship:

Dr Ebrahim Hazrati, MD

Co-author involved in searching for similar studies, data collection and statistical analysis as an erudite researcher.

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