Pre-enlistment hearing loss and hearing loss disability among US soldiers and marines

Marlene E. Gubata, Elizabeth R. Packnett[1], Xiaoshu Feng[1], David N. Cowan[1], David W. Niebuhr

Department of Epidemiology, Preventive Medicine Branch, Walter Reed Army Institute of Research, Silver Spring, Maryland 20910, [1]Allied Technology Group, Inc., Rockville, Maryland 20850, USA

Abstract

Hearing loss is a common condition among US adults, with some evidence of increasing prevalence in young adults. Noise-induced hearing loss attributable to employment is a significant source of preventable morbidity world-wide. The US military population is largely comprised of young adult males serving in a wide variety of occupations, many in high noise-level conditions, at least episodically. To identify accession and service-related risk factors for hearing-related disability, matched case-control study of US military personnel was conducted. Individuals evaluated for hearing loss disability in the US Army and Marine Corps were frequency matched to controls without history of disability evaluation on service and enlistment year. Conditional logistic regression was used to examine the association between accession and service-related factors and hearing-related disability evaluations between October 2002 and September 2010. Individuals with medically disqualifying audiograms or hearing loss diagnoses at application for military service were 8 and 4 times more likely, respectively, to have a disability evaluation related to hearing loss, after controlling for relevant accession, demographic, and service-related factors. Conservative hearing loss thresholds on pre-enlistment audiograms, stricter hearing loss medical waiver policies or qualified baseline audiograms pre-enlistment are needed in the U.S military. Industrial corporations or labor unions may also benefit from identifying individuals with moderate hearing loss at the time of employment to ensure use of personal protective equipment and engineer controls of noise.

Keywords: Disability evaluation, hearing loss, military personnel

Introduction

Hearing loss is a common chronic condition among middle-aged and elderly US adults,[1-4] with some evidence of increasing prevalence in younger age groups.[3] Older age, male sex, and noise exposure are consistently reported as the primary risk factors for hearing loss.[1-4] The US military population is largely comprised of young adult males serving in a wide variety of occupations, many in high noise-level conditions, at least episodically. A review of noise-induced hearing injury among US active duty Army personnel showed that rates were significantly higher in men compared to women, in those over age 40, and in certain occupational groups, including general officers and enlisted personnel in training.[5] Studies of risk for hearing loss among specific military occupations, including flight deck personnel and pilots, have reported inconsistent findings.[6-8]

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Deployments to Operations Iraqi Freedom, Enduring Freedom, and New Dawn are recent military exposures that may put service members at risk for hearing loss. Among US Army personnel seeking care at audiology clinics, higher rates of noise induced hearing injury and associated outcomes were found among those with post-deployment encounters.[9] Noise induced hearing injury and blast-related diagnoses among Soldiers returning from combat deployments increased from 2003 to 2009.[10] A recent Centers for Disease Control study of the Current Population Survey reported that veterans serving after September 2001 were 4 times more likely than non-veterans to have serious hearing impairment in an age and occupation adjusted analysis.[11]

Noise-induced hearing loss attributable to employment is a significant source of preventable morbidity world-wide.[12,13] Analysis of the National Health Interview Survey indicates that nearly one quarter of hearing difficulty in the US workforce is employment-related.[14] According to the Department of

Veterans Affairs (VA), tinnitus and hearing loss are the most prevalent service-related disabilities for which veterans are compensated, with 840,865 veterans receiving compensation for tinnitus and 701,760 for hearing loss in fiscal year (FY) 2011.[15] Despite the substantial numbers, cost, and increasing rate of hearing-related disability reported by the VA, the literature regarding risk factors for hearing loss leading to referral into the Department of Defense (DoD) disability evaluation system is incomplete. Research on military disability includes primarily descriptions of the disabled population,[16-21] musculoskeletal conditions,[21-24] and more recent analysis of mental health conditions.[25]

Applicants to military service undergo intensive pre-enlistment assessment through physical examination, medical history, and screening tests, including an audiogram.[26] Those with medical conditions who do not meet medical standards for entry into the military are considered medically disqualified from service, although they may seek a medical waiver prior to enlistment for specific conditions that are unlikely to impact suitability for military duty.[27] Hearing loss is among the five most prevalent conditions for which military applicants are medically disqualified, and is subsequently a common condition for which medical waivers for entry are requested.[28] Analysis of recruits granted hearing loss waivers showed that waived Army and Navy enlistees were less likely to remain in the military as compared to medically qualified recruits.[29] Although hearing loss represents an important medical condition in the population beginning military service, no studies describe pre-existing risk factors that pre-dispose service members for hearing-related disability. The purpose of this study is to identify accession medical, demographic, and service-related risk factors for hearing-related disability.

Methods

Study design

A case-control study of US Army and Marine Corps personnel was conducted to identify risk factors present upon entry into the military or at pre-enlistment medical examination for hearing loss disability. This study was approved by the Walter Reed Army Institute of Research Institutional Review Board.

Study population

Cases were selected from the population of Soldiers and Marines who underwent service-specific disability evaluation within the DoD disability evaluation system between October 1, 2002 and September 30, 2010 (i.e. FYs 2003-2010). Cases had a Veterans Affairs Schedule of Rating Disabilities (VASRD) code indicating "hearing loss" (i.e., VASRD code 6100). Controls were selected from the population of service members not evaluated for disability prior to the end of the study period, and frequency matched on the year of entry and branch of service to cases at a ratio of 5:1. The case to control ratio was determined from the number of individuals necessary to detect an odds ratio (OR) for hearing loss disability evaluation of 1.2 when comparing disqualified applicants to fully qualified applicants with $\beta = 0.8$ and $\alpha = 0.05$. Cases were included only if they had an accession personnel record (i.e., a record of entry into military service) and a medical examination record that preceded the date of their disability medical evaluation board, and were excluded if their branch of service at the time of disability differed from service at accession. Potential cases and controls were excluded if their pre-enlistment medical examination date preceded the date of entry into service by more than 2 years (730 days) or occurred after the date service began.

A medical provider refers a service member into the DoD disability evaluation system for a medical evaluation board when s/he is diagnosed with a medical condition that does not meet medical retention standards, the standards a service member must meet to continue military service or otherwise warrants referral.[30,31] The medical examination board determines whether the service member meets medical retention standards or is medically fit to perform their duties, including an assessment of hearing impairment with a controlled speech discrimination test and a pure tone audiometry test conducted by a state-licensed audiologist.[32] The case is then referred to the physical evaluation board, where a decision is made on whether the service member is permanently unfit to perform the duties associated with his/her military occupation.[30] A disability evaluation record with a VASRD code for hearing loss indicates that the physical examination board determined the service member was unfit for duty as a result of either hearing loss alone or in conjunction with other disabilities.

Data Sources

Disability

Because disability cases and records are reviewed and maintained separately by each service, disability evaluation records were provided by the US Army Physical Disability Agency for Soldiers and the US Navy Council of Review Board for Marines. Disability evaluation records include demographic characteristics of the service member at the time of disability evaluation as well as information pertaining to the disability evaluation, including key dates, disposition, percent rating/level of compensation, and conditions for which the service member was deemed unfit for continued service. Although VASRD codes are provided for unfitting conditions, no specific diagnoses, such as ICD-9-CM codes, are included in the disability records.

Pre-enlistment medical examination

The US Military Entrance Processing Command provided administrative and medical information from pre-enlistment medical, physical, and aptitude evaluations that determine

eligibility for military service. Screening audiograms are administered to all military applicants using audiometers calibrated to American National Standards Institute standards. Medically disqualifying audiogram standards are contained with DoD Instruction 6130.03 and vary by pure tone level.[26] In this study, results of pre-enlistment audiograms were considered medically disqualifying if they did not meet requirements as outlined in DoD Instruction 6130.03 [Table 1].[26] Audiogram results were considered abnormal but meeting standards if they met requirements outlined in Table 1, but were measured at or greater than 20 decibels (dB) for any frequency measured.[33,34] Frequencies were measured in hertz (Hz).

Medical waivers

The US Army Recruiting Command and US Navy Bureau of Medicine and Surgery provided information on medical waivers for entrance into the military. Medical waivers occurring more than 2 years prior to date of entry or more than 60 days after the date of entry were excluded. In this study, service members were identified and grouped if they had a hearing loss medical disqualification and/or a hearing loss medical waiver.

Accession, separation, and deployment

The Defense Manpower Data Center provided personnel data at accession (i.e., entry) into the military as well as deployment and separation (i.e., service end date). Personnel data includes demographic characteristics, branch of service, component (i.e., active duty or reserve), accession date, and separation date. Deployment start and end dates for all personnel deploying between September 2001 and September 2010 were also provided. For purposes of this study, deployment was defined as an assignment outside of the US for more than 2 weeks in support of Operations Iraqi Freedom, Enduring Freedom or New Dawn.

Ambulatory care

TRICARE Management Authority provided ambulatory health care encounter data through the Military Health-care Data Repository from the Standard Ambulatory Data Record for all visits at military treatment facilities. Ambulatory health care encounters were defined as individual health-care visits at military treatment facility ambulatory clinics on a given date by a given provider. Therefore, ambulatory visits on the same date were considered unique encounters when visits were to distinct providers. Incident hearing loss encounters were defined as the first occurrence of an ambulatory encounter with any diagnostic code from among the following ICD-9-CM hearing loss codes in any diagnosis position: 388.1 (noise effects on the inner ear); 388.2 (sudden hearing loss, unspecified); 388.4 (other abnormal auditory perception); 389.X (hearing loss); 794.15 (significant threshold shift).

Table 1: Pre-enlistment medical standards for hearing threshold levels

Pure tone (Hz)	Average (both ears)	Maximum level (any ear)
500	≤30 dB	≤35 dB
1000	≤30 dB	≤35 dB
2000	≤30 dB	≤35 dB
3000	N/A[a]	≤45 dB
4000	N/A[a]	≤55 dB
6000	N/A[a]	N/A[a]

Hz = Hertz, dB = Decibels, N/A = Not applicable, [a]Indicates that no pre-enlistment hearing standard exists for either the average in both ears or maximum for any ear

Statistical analysis

Descriptive frequency analyses were performed for medical, demographic, and service-related characteristics at the time of entry into service for cases and controls. Means and standard deviations are provided where appropriate, specifically for average months to incident hearing loss diagnosis. Categorical analysis using the Chi-squared tests is presented to compare the distribution of incident hearing loss ambulatory care encounters by length of service and deployment, among cases and controls separately.

Conditional logistic regression was used to examine the association between accession and service-related risk factors and hearing loss disability evaluation. Unadjusted OR with 95% confidence intervals (CI) comparing cases to controls is presented for accession and service related risk factors, and accession audiogram results. Adjusted odds ratios (AOR) with 95% CI comparing cases to controls are shown for accession audiogram results and hearing loss medical disqualifications/waivers, using backward stepwise conditional logistic regression. All analyses were conducted using the SAS statistical software version 9.2 (SAS Institute, Cary, NC).

Results

There were 505 hearing loss disability cases that had a service entry date prior to disability evaluation; 372 (74%) also had an application record within 2 years prior to entry into the military. Controls (n = 1,860), matched to cases at a ratio of 5:1 on service and year military service began, were randomly selected from the population of all service members with an applicant record within the 2 years prior to onset of military service. At the time military service began the study population was predominantly white, male, under age 25, with a high school diploma or equivalent degree [Table 2]. Unadjusted conditional logistic regression analysis indicates that the OR for being a disability case was 8.2 for male sex, 0.65 for the black race, 1.38 for age 25-29; and 1.78 for those deployed during their military career. Individuals disqualified from the military for hearing loss or requiring a hearing loss medical waiver were 5.64 (95% CI: 4.37, 7.29) times more likely to be evaluated for a disability related to hearing loss. Individuals with a disqualifying pre-enlistment audiogram had a 10.92 (95% CI: 7.84, 15.22) times increased odds of hearing loss disability.

Table 2: Pre-enlistment and service-related characteristics of the study population

Pre-enlistment characteristic	Cases		Controls		OR	95% CI
	n	%	*n*	%		
Sex						
Male	364	97.8	1528	82.2	8.20	4.07, 16.54
Female (ref)	8	2.2	330	17.7	1.00	-
Missing	0	-	2	0.1	-	-
Age						
<20	157	42.2	936	50.3	0.83	0.66, 1.06
20-24 (ref)	124	33.3	601	32.3	1.00	-
25-29	55	14.8	179	9.6	1.38	1.00, 1.90
≥30	36	9.7	144	7.7	1.18	0.81, 1.72
Missing	0	-	0	-	-	-
Race						
White (ref)	325	87.4	1437	77.3	1.00	-
Black	21	5.6	304	16.3	0.35	0.22, 0.54
Other	25	6.7	105	5.6	1.03	0.68, 1.56
Missing	1	0.3	14	0.8	-	-
Education						
Less than HS	5	1.3	141	7.6	0.19	0.08, 0.46
HS diploma/GED (ref)	312	83.9	1458	78.4	1.00	-
Some college or higher	34	9.1	152	8.2	1.03	0.72, 1.48
Missing	21	5.6	109	5.9	-	-
Hearing loss medical disqualification/waiver						
Yes	75	20.4	24	1.3	5.64	4.37, 7.29
No (ref)	297	79.6	1836	98.7	1.00	-
Missing	0	-	0	-	-	-
Audiogram						
Normal, meets standard (ref)	72	19.4	932	50.1	1.00	-
Abnormal, meets standard[a]	224	60.2	904	48.6	2.76	2.12, 3.59
Medically disqualifying	73	19.6	24	3.2	10.92	7.84, 15.22
Missing	3	0.8	0	-	-	-
Deployed						
Yes	270	72.6	1076	57.8	1.78	1.41, 2.25
No (ref)	102	27.4	784	42.2	1.00	-
Missing	0	-	0	-	-	-
Total individuals	372		1860			

GED = General educational development, HS = High school, OR = Odds ratio, CI = Confidence interval, ref = Reference category, [a]Abnormal is defined as greater than or equal to 20 dB for any frequency

Table 3: Unadjusted odds ratios for hearing loss disability by accession audiogram results

Result of accession audiogram	Cases		Controls		OR[a]	95% CI
	n	%	*n*	%		
Abnormal, meets standards (Hz)						
500	66	17.7	213	11.5	1.56	1.19, 2.05
1000	51	13.7	107	5.8	2.16	1.60, 2.91
2000	66	17.7	143	7.7	2.22	1.70, 2.91
3000	121	32.5	168	9.0	3.87	3.08, 4.85
4000	148	39.8	209	11.2	4.49	3.60, 5.60
Medically disqualifying (Hz)						
500	6	1.6	4	0.2	3.98	1.77, 8.97
1000	9	2.4	3	0.2	5.20	2.63, 10.27
2000	16	4.3	9	0.5	4.59	2.75, 7.66
3000	38	10.2	11	0.6	7.24	5.10, 10.28
4000	48	12.9	8	0.4	9.67	6.97, 13.42
Total individuals	372		1860			

Hz = Hertz, OR = Odds ratio, CI = Confidence interval, [a]Individuals with normal audiograms within standards at each frequency were used as the referent group (not shown)

Analysis of pre-enlistment audiogram showed that those with audiograms that did not meet medical accession standards and those with audiograms meeting standards, but exceeding the threshold for normal hearing (>20 dB) had increased odds of being a hearing loss disability case at all frequencies measured (500, 1000, 2000, 3000, 4000 Hz) [Table 3]. In particular, individuals with medically disqualifying pre-enlistment audiograms at 3000 and 4000 Hz had 7.24 (95% CI: 5.10, 10.28) and 9.67 (95% CI: 6.97, 13.42) times increased odds of hearing loss disability respectively.

Soldiers and Marines with medically disqualifying audiograms had 8.26 (95% CI: 5.89, 11.58) times greater odds of hearing loss disability, after controlling for deployment, component, sex, and race [Table 4]. Similarly, service members with a hearing loss medical disqualification or medical waiver had a substantially increased odds of hearing loss disability, after controlling for deployment, component, age, sex, and race (AOR 4.14; 95% CI: 3.16, 5.43).

Overall, 97% (n = 362) of hearing loss disability cases and only 7.5% (n = 140) controls had a hearing loss ambulatory care encounter [Table 5]. Among hearing loss disability cases and controls with normal pre-enlistment audiograms, the majority (60.6% of cases, 84.4% of controls) had an incident hearing loss encounter after the 2nd year of service. Among cases with medically disqualifying pre-enlistment audiograms, the majority (54.2%) had an incident hearing loss ambulatory care encounter in the 1st year of service. In contrast, among controls with medically disqualifying accession audiograms, 62.5% had their first hearing loss ambulatory care encounter after the 2nd year of service, and none had an incident encounter in the 1st year of service. The mean months-to–incident-encounter was greater in controls than in cases for all three levels of audiogram results (normal, abnormal, and medically disqualifying).

Overall, 72.7% (n = 263) of cases and 77.1% (n = 108) of controls with a hearing loss ambulatory care encounter deployed [Table 6]. Among subjects meeting pre-enlistment audiogram standards, the majority of cases and controls (>70%) had their incident hearing loss ambulatory care encounter post-deployment. However, among individuals with medically disqualifying pre-enlistment audiograms, the majority of hearing loss disability cases (55.0%) had an incident hearing loss ambulatory encounter pre-deployment, whereas the majority of controls (55.6%) had an incident hearing loss encounter post-deployment.

Discussion

This is the first study to establish pre-enlistment risk factors for hearing loss disability evaluation in a large military

population with diverse occupations. In this case-control analysis of generally young Soldiers and Marines, medically disqualifying pre-enlistment audiograms and hearing loss medical disqualifications/waivers were shown to be the primary pre-existing risk factors for hearing loss disability. A dose-response was also observed, in which individuals with audiograms meeting military medical accession standards, but exceeding the threshold for normal hearing (>20 dB) had increased odds of being a hearing-related disability case at all frequencies measured, compared to those with normal hearing. Although average length of service was similar among disability cases and controls (about 4 years), the majority disability cases with medically disqualifying pre-enlistment audiograms had an incident hearing loss ambulatory care encounter in the 1st year of service while the majority of controls had their first encounter after the 2nd year of service. Despite comparable deployment rates in hearing-related disability cases and controls, among individuals with medically disqualifying accession audiograms the majority of cases had an incident hearing loss ambulatory encounter pre-deployment, whereas the majority of controls had an incident encounter post-deployment.

Table 4: Adjusted odds ratios for hearing loss disability by pre-enlistment audiogram qualification and hearing loss medical disqualification/waiver

Pre-enlistment characteristics	AOR	95% CI
Audiogram[a]		
Normal, meets standard (ref)	1.00	-
Abnormal, meets standard[b]	2.41	1.85, 3.15
Medically disqualifying	8.26	5.89, 11.58
Hearing loss disqualification/waiver[c]		
Yes	4.14	3.16, 5.43
No (ref)	1.00	-

Ref = Reference category, AOR = Adjusted odds ratios, CI = Confidence interval, [a]Controls for significant covariates including, deployment history, component, race, and sex, [b]Abnormal is defined as greater than or equal to 20 dB for any frequency, [c]Controls for deployment history, component, race, sex, and age

This study extends previous findings indicating an association between combat deployments and hearing loss[10] by demonstrating that a history of combat deployment is associated with increased risk of hearing loss severe enough to warrant referral into the disability evaluation system. Other findings, specifically that the white race, male sex, and older age are risk factors for hearing loss, are consistent with current civilian and military medical literature.[1-4,35-37]

Although the pre-enlistment medical examination of service members includes a screening audiogram, this audiogram does not meet the standards for hearing conservation audiograms established by the DoD.[38] Clinically and statistically

Table 5: Occurrence of incident hearing loss ambulatory care encounter among study subjects with at least one encounter

Time of incident hearing loss encounter	Normal (meets standard)		Abnormal (meets standard)		Medically disqualifying	
	n	%	*n*	%	*n*	%
Cases (*n*=362, 97%)[a]						
First year of service	8	11.3	46	21.0	39	54.2
Second year of service	20	28.2	51	23.3	16	22.2
After second year of service	43	60.6	122	55.7	17	23.6
Mean months to diagnosis (SD)	30.2 (15.9)		27.7 (18.3)		14.1 (15.7)	
Total (percent with HL)[b]	71 (97.3)		219 (97.8)		72 (98.6)	
Controls (*n*=140, 7.5%)						
First year of service	5	11.1	18	20.9	0	0.0
Second year of service	2	4.4	11	12.8	3	37.5
After second year of service	38	84.4	57	66.3	6	62.5
Mean months to diagnosis (SD)	44.3 (21.99)		34.7 (23.2)		37.4 (25.8)	
Total (percent with HL)[b]	45 (4.8)		86 (9.5)		9 (37.5)	

HL = Hearing loss, [a]Chi-square $P<0.001$ for the occurrence of incident hearing loss encounters across accession audiogram qualification, for cases only, [b]Percent of individuals in each stratum with at least one hearing loss diagnosis

Table 6: Occurrence of incident hearing loss ambulatory care encounter among study subjects who deployed with at least one hearing loss encounter

Time of incident hearing loss encounter	Normal (meets standard)		Abnormal (meets standard)		Medically disqualifying	
	n	%	*n*	%	*n*	%
Cases (*n*=263, 72.7%)[a]						
Pre-deployment	6	11.0	42	25.0	22	55.0
Post-deployment	49	89.0	126	75.0	18	45.0
Total (deployment rate among those with HL)	55 (77.4)		168 (76.7)		40 (55.6)	
Controls (*n*=108, 77.1%)						
Pre-deployment	11	29.7	18	28.6	3	33.3
Post-deployment	26	70.3	45	71.4	5	55.6
Total (deployment rate among those with HL)	37 (82.2)		63 (73.3)		8 (88.9)	

[a]Chi-square $P<0.001$ for the distribution of incident hearing loss encounters by deployment across accession audiogram qualification, for cases only, HL = Hearing loss

significant differences have been established between the results of pre-accession audiograms and hearing conservation audiograms administered early in service to measure baseline hearing.[38] Subsequently, baseline audiograms are now performed after entry into the military during basic training. This case-control study indicates that poor performance on the pre-enlistment audiogram and hearing loss medical disqualification/waiver are substantial risk factors for hearing loss disability later in a military career. These findings together suggest a potential need for more conservative hearing loss thresholds on pre-enlistment audiograms, stricter hearing loss medical waiver policy, or audiograms performed in accordance with DoD standards prior to enlistment.

Hearing-related disability compensation in the VA system is one of the most prevalent and costly disabilities among veterans.[15] However, the results of this study indicate that hearing related disability does not present the same burden to the DoD disability evaluation system. At the end of FY 2011, approximately 700,000 veterans were receiving disability;[15] less than 300 service members were evaluated for hearing disability discharge in the DoD system in FY 2011.[39] There are several potential explanations for this discrepancy. The majority of service members beginning military service were under 25 years of age and the average time to disability disposition was approximately 4 years. This DoD hearing-related disability population represents a population that is much younger than those generally studied for hearing loss, and may reflect a significantly different population than that served by the VA disability system.

In a study of the National Health and Nutrition Examination Survey (NHANES) data, high frequency hearing loss was evident among individuals aged 20-29 years and 30-39 years, and increasing over time in the younger age group.[3] Further study of NHANES adolescent cohorts showed that high frequency hearing loss was more common than low frequency hearing loss in this age group, and that high frequency hearing loss was higher in the more recent cohort (2005-2006) compared to NHANES III (1988-1994).[40] The current study has shown not only that higher frequency hearing loss prior to enlistment was more prevalent compared to lower frequency hearing loss, but also that high frequency hearing loss prior to enlistment was more common in hearing disability cases than controls. Together these studies suggest that high frequency hearing loss is a common and increasing concern in young adulthood, the age group from which the military recruits. Service members with hearing loss diagnoses or medically disqualifying audiograms have a greater risk of referral into the DoD disability evaluation system for hearing loss, but may not have had enough time for significant age-related and occupational hearing loss to develop such as is found in the VA disability population.

This study's essential strengths are the pre-enlistment evaluation of hearing and the comprehensive data capture of health-care encounters, demographic, and service-related factors from centralized military databases. The case population also includes all DoD disability evaluations related to hearing loss that occurred in the Army and Marine Corps among individuals who met the inclusion criteria during the study period, providing an estimate on the burden of hearing loss disability in the DoD disability system. The case-control design limits causal conclusions, and unique military career experiences such as basic combat training and deployment may hinder generalizability of these findings to other occupations. In addition, the generalizability of this study may be limited by the extensive medical screening that precedes medical service, disqualifying individuals with many medical conditions.[27] Another limitation is the lack of information on specific occupations and occupational exposures, which differ by service, between military occupations, and over a military career.

These findings may be of high interest to larger organizations, such as industrial corporations or labor unions that have occupational health/industrial hygiene programs that monitor the health of employees and their working conditions. Such organizations may find it advantageous to identify individuals with moderate hearing loss at the time of employment and ensure the proper use of personal protective equipment and engineering controls of noise. Further study is required to understand fully the causal relationship between hearing-related disability and military occupational and service-related risk factors. In particular, utilization of healthcare, changes in audiograms with time, especially pre and post-deployment, and the effects of particular occupations are areas of needed future research.

This study indicates that accession medical disqualification/waiver for hearing loss and poor performance on pre-enlistment audiograms is the primary risk factors for hearing-related DoD disability evaluation. These findings highlight a potential need for more conservative pre-enlistment audiogram thresholds, stricter hearing loss medical waiver policies or a requirement for DoD qualified baseline audiograms at initial medical examination. In addition, improved coordination may be needed between the VA and the DoD disability systems to ensure that service members' hearing loss and disability status are accurately identified and compensated.

Address for correspondence:
Dr. Marlene E. Gubata,
Department of Epidemiology, Walter Reed Army Institute of Research, Preventive Medicine Branch, 503 Robert Grant Avenue, Silver Spring, Maryland 20910, USA.
E-mail: Marlene.Gubata@us.army.mil

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