Chapter 3

THE ENLISTED ACCESSION MEDICAL PROCESS

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INTRODUCTION

Each year, the US military processes about 240,000 first-time applicants for active duty enlisted service, of which roughly 70% will eventually enter active duty. Making sure applicants are medically fit for duty is a major challenge, made more difficult when recruitment levels fail to meet manpower requirements. However, the high cost of recruiting and training a soldier through basic combat training (estimated to be in excess of $35,000) dictates that early attrition from medical and other causes be kept at a minimum.

The accession medical evaluation is a multi-stage process intended to detect any medical issues that might prevent a recruit from serving successfully, while leaving the final decision on the recruit's fitness to the judgment of service-specific medical personnel. Applicants in all service branches and components are assessed according to the same standards. A medical entrance processing station (MEPS) physician identifies disqualifying conditions, which are forwarded to individual service authorities for waiver consideration. This process allows medical personnel to make an informed decision as to which applicants are medically acceptable, and epidemiologic researchers can track the data and provide feedback on how well the process differentiates between those who should and should not serve.

Detection of some important medical conditions, however, requires that the applicant be aware of and forthright about the problem. For example, there is no currently reliable or economically feasible means of detecting asthma, a condition that leads to as many as 1,000 discharges from basic training each year. Past studies have indicated that well over half of the discharges for pre-existing medical conditions were for conditions undisclosed at the time of application. The possibility of receiving an accession medical waiver, coupled with improved means of detecting some common conditions, should provide greater incentive for full disclosure on the part of military applicants.

This chapter will describe the process through which applicants for enlisted service are examined for medical fitness and characterize the fitness of recent applicant populations. Current research designed to improve the scientific basis for accession medical standards will also be outlined.

ACCESSION MEDICAL STANDARDS

To maintain force structure and readiness, the Department of Defense (DoD) needs over 230,000 enlisted and 36,000 officer accessions (active and reserve) each year to maintain force structure and readiness. Figure 3-1 details the annual average total enlisted accessions to active duty (excluding reserve and National Guard) by service from 1998 through 2002.[1] To accomplish the accession requirement, military applicants must be medically screened to ensure they are physically fit for the rigors of military training, able to fulfill occupational requirements, and ready to serve in deployments worldwide.

Accession medical standards for all uniformed services, including all components (active, reserve, and National Guard) and both officers and enlisted personnel, are codified in DoD Instruction (DoDI) 6130.4, *Criteria and Procedure Requirements for Physical Standards for Appointment, Enlistment, or Induction in the Armed Forces*.[2] This instruction contains a list of disqualifying conditions, organized by 36 different anatomical systems, which must be current diagnoses or verified by past medical history. First published in 1986, DoDI 6130.4 was revised twice, in 1994 and 2000, before the current version. Historically, the medical standards in the instruction were developed largely from the expert opinions of medical specialists, as opposed to well-designed research.

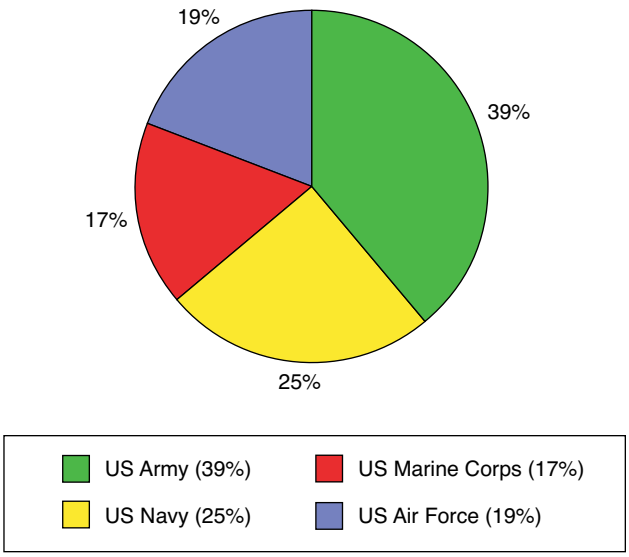

Fig. 3-1. Total enlisted accessions to active duty by service: 5-year average, 1998–2002. Average of 167,000 per year. Data source: Krauss MR, Niebuhr D, Trofimovich L, Powers T, Li Y. *AMSARA: Accession Medical Standards Analysis and Research Activity Annual Report 2003*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2004. AD-A427738. Available at: http://www.amsara.amedd.army.mil/. Accessed September 27, 2005.

(Another *Textbook of Military Medicine* volume, *Preventive Medicine: Mobilization and Deployment*, recounts the evolution of US military medical accession standards from the 18th century to the present.[3])

The current version of DoDI 6130.4 is the result of an exhaustive 3-year review undertaken by the Accession Medical Standards Working Group (AMSWG), composed of representatives from each office of the Medical-Personnel (MED-PERS) Executive Steering Committee. The MED-PERS Committee was established in 1996 by the Undersecretary of Defense for Personnel and Readiness to bring together the medical and military personnel communities for collaboration on providing policy guidance and establishing standards for accession requirements.[1] The committee is co-chaired by the Deputy Assistant Secretary of Defense (Military Personnel Policy) and the Deputy Assistant Secretary of Defense (Clinical and Program Review) and includes members from each military service. AMSWG reviewed the instruction to validate each standard according to evidence-based data and, where possible, well-conducted research. Evidence-based medical accession standards offer the potential to maximize accessions by minimizing unnecessary disqualifications and decrease service losses by disqualifying only those applicants having conditions associated with a risk of morbidity and attrition.

The current DoDI 6130.4 is the first version to be fully evidence-based and organized by organ systems. It uses contemporary diagnoses and current codes from the *International Classification of Disease*s, 9th Revision (ICD-9). Changes include new standards for asthma and attention deficit with hyperactivity disorder, the elimination of weight and body build standards from DoDI 1308.3,[4] and the qualification of uncomplicated refractive surgery.

THE MISSION OF AMSARA

To support the scientific development of DoD medical accession standards, the Accession Medical Standards Analysis and Research Activity (AMSARA) was established in 1996 within the Division of Preventive Medicine at Walter Reed Army Institute of Research.[4] Its mission is to aid the development of evidence-based accession standards by guiding improvement in medical and administrative databases, conducting epidemiologic analyses, and integrating relevant operational, clinical, and economic considerations into policy recommendations. The goal of AMSARA is to maximize accession and minimize attrition. Exhibit 3-1 summarizes the objectives of AMSARA.

EXHIBIT 3-1

OBJECTIVES OF THE ACCESSION MEDICAL STANDARDS ANALYSIS AND RESEARCH ACTIVITY (AMSARA)

- Validate current and proposed standards (eg, should a history of childhood asthma be disqualifying?)
- Validate assessment techniques (eg, improve current screening tools)
- Perform quality assurance (eg, monitor geographic variation)
- Optimize assessment techniques (eg, develop an attrition prediction model)
- Track impact of policies, procedures, and waivers (eg, refractive surgery for myopia)
- Recommend changes to enhance readiness, protect health, and save money (eg, screen for fitness during the military applicant medical examination)

Reproduced from: Krauss MR, Niebuhr D, Trofimovich L, Powers T, Li Y. *AMSARA: Accession Medical Standards Analysis and Research Activity Annual Report 2003*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2004. AD-A427738. Available at: http://www.amsara.amedd.army.mil/

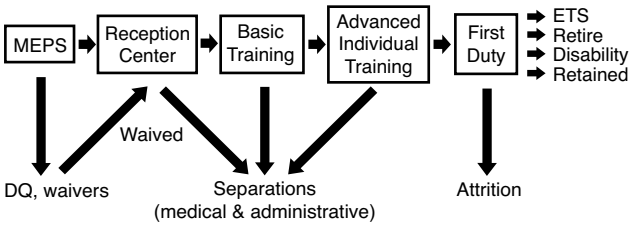

Fig. 3-2. The accession process from recruitment, through initial entry training, to first tour of duty.
DQ: disqualification
ETS: expiration of term of service
MEPS: medical entrance processing station
Data source: Krauss MR, Niebuhr D, Trofimovich L, Powers T, Li Y. *AMSARA: Accession Medical Standards Analysis and Research Activity Annual Report 2003*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2004. AD-A427738. Available at: http://www.amsara.amedd.army.mil/. Accessed September 27, 2005.

Since its inception, AMSARA has provided the DoD with research data on many of the medical conditions common among applicants and those responsible for relatively large numbers of discharges. These data have included disqualifications, waivers, hospitalizations, disability discharges, and EPTS (existing prior to service) discharges. Studies on the morbidity and subsequent attrition associated with numerous prevalent conditions have also been completed. Based on this work and manpower and financial requirements, new evidence-based standards have been proposed. AMSARA's analytic horizon, or period of study, lasts from the time an applicant begins the MEPS evaluation process through initial entry training (IET), which includes basic and advanced individual training, to completion of the first tour of duty, usually 3 to 5 years (Figure 3-2).

OVERVIEW OF THE ACCESSION MEDICAL PROCESS

The accession medical process is depicted in Figure 3-3. The primary applicant pool for military accessions is persons 18 to 24 years old.[5] In the United States, there are approximately 28 million people in this group.[6] For every birth-year group, recruiters need to successfully enlist about 11% of the men and 1% of the women to meet military requirements; an even greater number must be recruited because of disqualifications. The US Military Entrance Processing Command (USMEPCOM) is responsible for the cognitive, physical, and medical screening of enlistees to the uniformed services (Army, Navy, Marine Corps, Air Force, and Coast Guard). Under the executive agency of the US Army Accession Command and the Army Office of The Surgeon General, USMEPCOM's mission is to ensure the quality of military accessions during both peacetime and mobilization in accordance with established standards. There are 65 MEPS throughout the country (Figure 3-4) staffed by 2,750 military and civilian personnel, of which 860 are engaged in physical and medical screening. The annual budget, currently $163 million, falls under the Defense Health Program.[7]

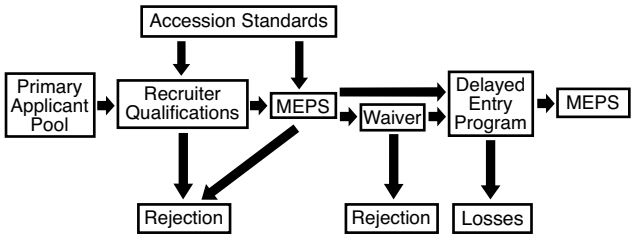

Fig. 3-3. The accession medical process.
MEPS: medical entrance processing station
Data source: Krauss MR, Niebuhr D, Trofimovich L, Powers T, Li Y. *AMSARA: Accession Medical Standards Analysis and Research Activity Annual Report 2003*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2004. AD-A427738. Available at: http://www.amsara.amedd.army.mil. Accessed September 27, 2005.

In the 5-year period from FY 1998 to FY 2002, USMEPCOM performed an approximate annual average of 265,000 examinations. Over this same time period there were approximately 232,000 accessions per year onto active duty, the reserves, and National Guard.[7] Eight percent of applicants were given "permanent" disqualifications by USMEPCOM for medical conditions that were not remediable (remediable conditions include being overweight and positive urine drug screens). Applicants with a permanent disqualification and subsequent waiver accounted for 4% (6,800) of accessions. After recruitment, the qualified and waived recruits either enter IET or stay in the delayed-entry program for a variable period of time (up to a maximum of 18 months). They must then return to the MEPS station for final processing and a brief inspection before entering basic training. In FY 2003, 252,000 enlistment contracts were completed: 184,000 to the active component and 68,000 to the reserves.

THE ACCESSION MEDICAL EXAMINATION SCREENING PROCESS

The governing regulations for medical screening are detailed in Table 3-1. Applicants must pass several screening steps. (1) The recruiter administers a medical prescreen checklist (DD 2807-2) of enlistment standards to identify any preexisting conditions. (2) If the applicant passes the prescreen, he or she proceeds to the MEPS for a cognitive screening test and background check. Cognitive screening is done with the Armed Services Vocational Aptitude Battery (ASVAB), which is administered to approximately 1.3 million applicants per year. A subset of the ASVAB is the Armed Forces Qualification Test (AFQT), which is used to measure cognitive ability and qualify applicants for positions in selected military occupational series. Background screening checks are also performed annually on approximately 300,000 applicants. (3) Applicants who pass the cognitive test and background check proceed to a physical/medical examination, which includes

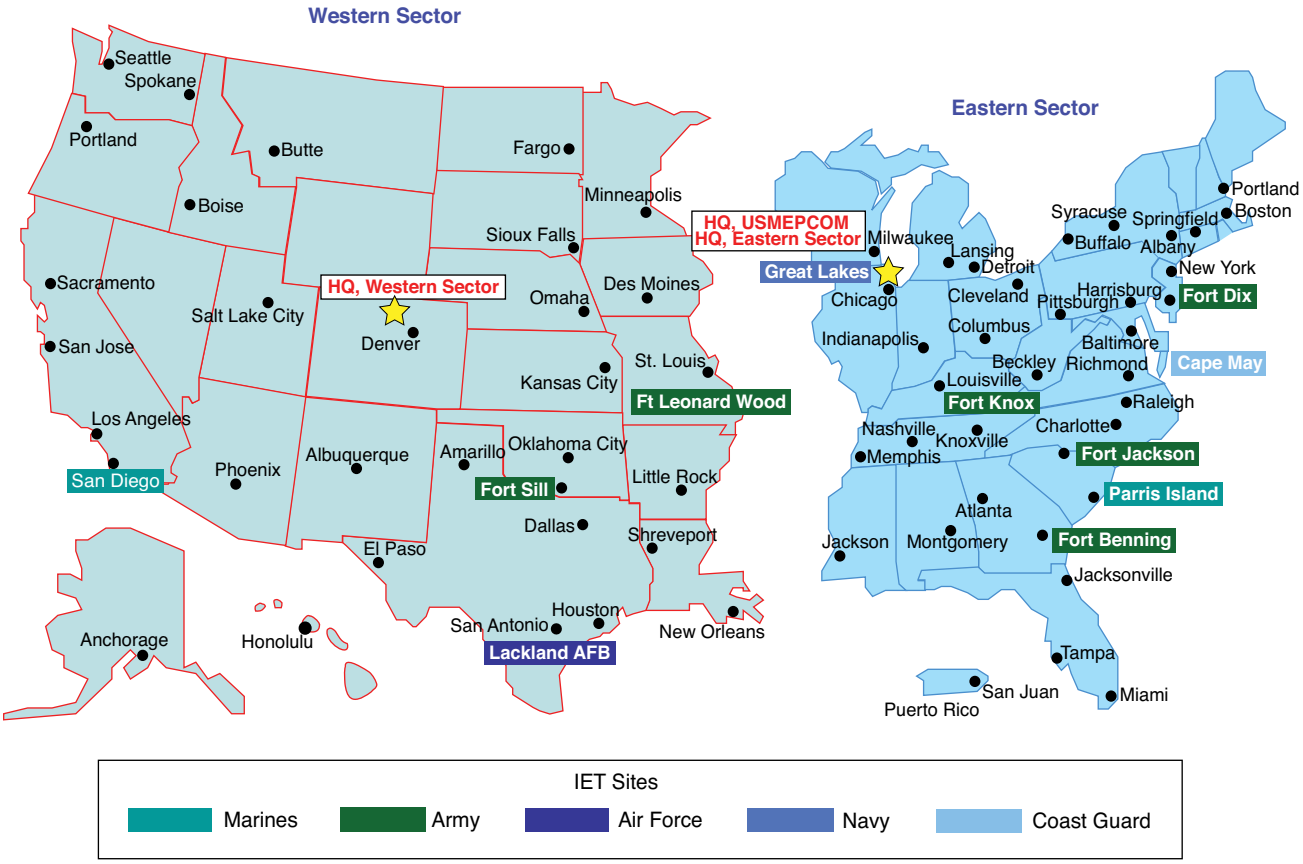

Fig. 3-4. Map of USMEPCOM medical entrance processing stations (MEPS) and initial entry training (IET) sites. The 65 MEPS are divided into eastern and western sectors (separated by the Mississippi River).
HQ: headquarters
USMEPCOM: US Military Entrance Processing Command
Reproduced from: DoD US Military Entrance Processing Exam Command Stakeholders Conference, Commanders Overview Briefing, April 7, 2004 ; Chicago, Ill.

the following: height and weight; hearing and vision; blood tests for HIV, selected drugs, and alcohol; orthopedic and neurologic examination (including range of motion); and an individual medical history (DD 2807-1) and examination performed by a medical provider (DD 2808). There is no formal physical fitness (either general or specific to military job) or psychiatric examination.

Based on the results of their medical examination, applicants are judged qualified or disqualified and assigned a medical profile according to AR 40-501.[8] If the applicant is disqualified, he or she may apply for a service-specific medical waiver, which can involve consultations, medical record reviews, and additional medical testing. If the waiver is granted, the applicant qualifies for basic training.

CHARACTERISTICS OF MILITARY ACCESSIONS

The annual average number of military applicants from 1998 to 2002 was more than 237,000, of which 167,000 (70%) entered active duty. Table 3-2 shows selected demographic characteristics of the applicant accession population. Most accessions were male (~82%), aged 17 to 20 years (~78%), and white (~71%). The percentage of individuals with at least a high school diploma and an AFQT percentile score of 50 or higher at the time of accession was approximately 68%. Demographic distributions of applicants (results not shown) were similar to the accession population with regard to gender, age, race, and AFQT score. More than 90% of the accessions occurred within 1 year of application and virtually all (98%) within 2 years.[1]

MEDICAL DISQUALIFICATIONS

Figure 3-5 shows the 5-year annual average number of medical disqualifications among applicants for all services, categorized by USMEPCOM medical failure codes (from 1997 to 2000 and 2002; data for 2001 is not included because the coding scheme for medical disqualifications was changed during that year, making it unclear which code was used for many of the disqualifications). Disqualifications may be either temporary or permanent. The most common reason for temporary disqualification was failure to meet body weight standards (22% of medical disqualifications on average, 17,269 individuals in 2002). Although this disqualification can be eliminated by losing weight, the increasing prevalence of overweight and obesity among young adults in the United States poses a challenge to military recruitment.[9] The next most common (13%) and also generally a temporary disqualifying condition was the use of cannabis (marijuana). Third most common overall and the most common among permanent disqualifications were lung and chest conditions, a category that consists largely of recruits reporting a history of asthma. Hearing, orthopedic, skin, psychiatric, and vision disorders were less common disqualifying conditions. All other conditions combined account for nearly a third of disqualifications.[1]

MEDICAL WAIVERS

Applicants who receive a permanent medical disqualification at the MEPS may be granted a medical waiver from service-specific waiver authorities. The percentage of permanently disqualified applicants who apply for an accession medical waiver varies by service, between roughly 50% and 60%. Individuals frequently have multiple records of consideration by the same waiver authority, which likely reflect resubmissions, perhaps with additional information. Only the most current record for each individual was considered for this analysis (so the number of considerations shown do not reflect the waiver authorities' actual workload).[1]

Table 3-3 summarizes the accession medical waiver considerations for active duty enlisted accessions—5-year annual average (1998–2002)—for all services by selected demographic characteristics. The number of records by the various demographic factors may vary slightly depending on the data's completeness. Most waived accessions were male (~82%), aged 17 to 20 years (~74%), and white (~74%). Distribution by age, race, education, and AFQT score of applicants with waiver approvals was similar to both the subsequently accessed and the applicant populations (results not shown). The annual average number of waiver applications across all services was 22,700; and 12,800 were approved, for an average DoD approval rate of 56%.

Figure 3-6 shows the diagnostic categories that account for the majority of accession medical waivers considered and approved by each service's waiver authority from 1997 through 2002. Possible reasons for variation in approval percentages include unique service manpower, training, and occupational requirements. It should be noted that the accession medical standards were revised during the time period shown; in particular, a December 2000 publication revised the standards that had been in effect since the previous revision in May 1994. However, the standards for the major categories shown in Figure 3-6 did not change as a result of this revision.

Among US Army applicants, hearing deficiency was the most common diagnostic category for waiver consideration, accounting for 14.2% of all considerations and 14.6% of approvals. The second and third leading categories were disorders of refraction and asthma, each accounting for roughly 10% of considerations and approvals. The percentage of waivers

TABLE 3-1

USMEPCOM MEDICAL SCREENING GOVERNING REGULATIONS

Regulation	Title	Date
DoDI 6130.4	Standard for Appointment Enlistment, or Induction	January 2005
AR 40-501	Standard of Medical Fitness	February 2004
USMEPCOM 40-1	Medical Processing and Examinations	September 2002
USMEPCOM 40-8	HIV and Department of Defense Preaccession Drug and Alcohol Testing Program	July 1991
USMEPCOM 40-9	Bloodborne Pathogen Program	February 2004

USMEPCOM: US Military Entrance Processing Command
DoDI: Department of Defense Instruction
AR: Army Regulation
HIV: human immunodeficiency virus
Reproduced from: DoD US Military Entrance Processing Exam Command Stakeholders Conference, Command Surgeon's Briefing, April 7, 2004; Chicago, Ill.

TABLE 3-2

DISTRIBUTION OF ACTIVE DUTY ENLISTED ACCESSIONS BY SELECTED DEMOGRAPHIC CHARACTERISTICS: A 5-YEAR ANNUAL AVERAGE (1998–2002)

Characteristic	Count	%
Gender		
Male	136,258	81.79
Female	30,346	18.21
Age		
17–20	129,516	77.74
21–25	29,757	17.86
26–30	5,850	3.51
>30	1,482	0.89
Race		
White	118,519	71.14
Black	30,531	18.33
Other	17,358	10.42
Education		
< high school senior	4,808	2.89
High school senior	47,319	28.40
High school graduate	109,228	65.56
Some college	1,544	0.93
Bachelor's degree	3,233	1.94
AFQT score		
93–99	8,195	4.92
65–92	58,825	35.31
50–64	46,130	27.69
30–49	50,077	30.06
1–29	3,247	1.95

AFQT: Armed Forces Qualification Test
Data source: Krauss MR, Niebuhr D, Trofimovich L, Powers T, Li Y. *AMSARA: Accession Medical Standards Analysis and Research Activity Annual Report 2003*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2004. AD-A427738. Available at: http://www.amsara.amedd.army.mil. Accessed September 27, 2005.

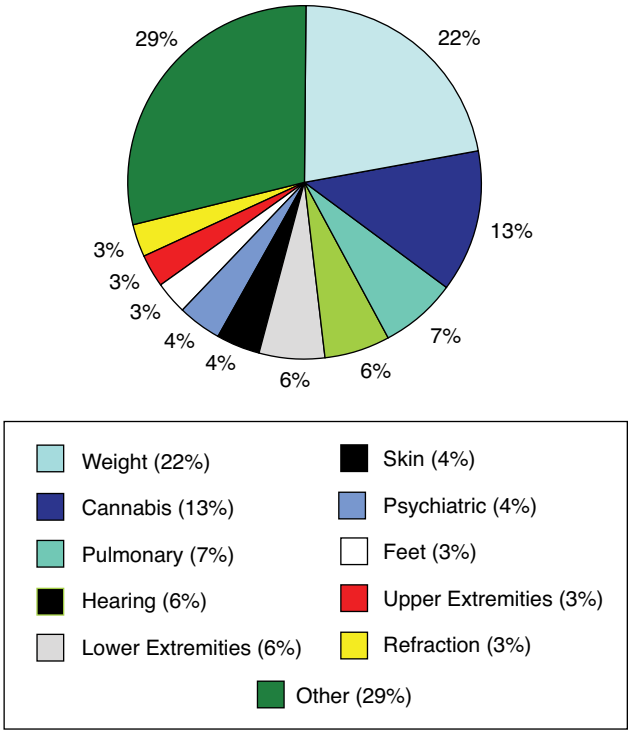

Fig. 3-5. Medical failure diagnostic categories in disqualified military applicants: 5-year annual average (1997 to 2002 excluding 2001); average of 77,742 per year.
Data source: Krauss MR, Niebuhr D, Trofimovich L, Powers T, Li Y. *AMSARA: Accession Medical Standards Analysis and Research Activity Annual Report 2003*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2004. AD-A427738. Available at: http://www.amsara.amedd.army.mil. Accessed September 27, 2005.

approved was approximately 74% for hearing loss, 76% for vision disorders, and 72% for asthma. All categories combined averaged 8,745 applications and 6,291 approvals per year, for a 72% overall approval rate.

Hearing deficiency was also the most common reason for waiver consideration in the US Navy, accounting for 10.9% of considerations and 9.2% of approvals. The second and third leading categories, disorders of refraction and asthma, were also the same as in the Army (again each accounted for roughly 10% of considerations and approvals). The approval percentage was approximately 45% for hearing loss, 59% for vision disorders, and 38% for asthma. All categories averaged 5,148 applications and 2,728 approvals per year, for a 53% overall approval rate.

Among US Marine Corps applicants, asthma was the most common condition for waiver consideration, accounting for 12.6% of considerations and 12.3% of approvals. The second and third leading conditions were disorders of hearing and refraction, accounting for 11.1% and 8.7% of considerations, respectively. The waiver approval percentage was approximately 54% for asthma, 33% for hearing deficiency, and 53% for vision disorders. All conditions averaged 3,028 applications and 1,680 approvals per year, for a 55% overall approval rate.

Vision disorders were the most common condition for waiver consideration in the US Air Force, accounting

for 12.7% of considerations and 17.0% of approvals. Asthma and hearing loss, the second and third leading conditions, accounted for 9.7% and 6.5% of considerations, respectively. The waiver approval percentage was approximately 60% for vision disorders, 26% for asthma, and 4% for hearing loss. All conditions averaged 2,098 applications and 941 approvals per year, for a 45% overall approval rate.[1]

AMSARA MEDICAL SCREENING RESEARCH

The need to medically screen large numbers of individuals on an annual basis requires balancing overall costs with the effectiveness of identifying disqualifications. DoD studies have shown that universal syphilis testing is not cost-effective.[10] The DoD has also studied the effect of recruits' prior medical conditions such as knee injuries on the risk for hospitalization and attrition.[11] Prospective studies on recruit populations are ongoing. Research data on the prevalence of certain medical conditions in recruit populations are used to develop more objective, evidence-based tools for screening applicants at MEPS stations. Three of these research efforts for asthma, physical fitness, and psychiatric disorders are summarized below.

TABLE 3-3

FREQUENCY OF APPROVED WAIVERS FOR ACTIVE DUTY ENLISTED ACCESSIONS BY SELECTED DEMOGRAPHIC CHARACTERISTICS: 5-YEAR ANNUAL AVERAGE (1998–2002)

Characteristic	Count	%
Gender		
Male	6,789	82.20
Female	1,470	17.80
Age		
17–20	6,083	73.66
21–25	1,639	19.85
26–30	415	5.02
>30	122	1.47
Race		
White	6,092	73.77
Black	1,397	16.91
Other	770	9.32
Education		
< high school	215	2.61
High school senior	2,228	26.98
High school diploma	5,455	66.06
Some college	83	1.01
Bachelor's degree	262	3.17
AFQT score		
93–99	494	5.98
65–92	2,978	36.06
50–64	2,266	27.44
30–49	2,380	28.82
1–29	140	1.69

AFQT: Armed Forces Qualification Test.
Reproduced from: Krauss MR, Niebuhr D, Trofimovich L, Powers T, Li Y. *AMSARA: Accession Medical Standards Analysis and Research Activity Annual Report 2003*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2004. AD-A427738. Available at: http://www.amsara.amedd.army.mil. Accessed September 27, 2005.

Screening for Asthma with Exhaled Nitric Oxide Levels

Since 2004, asthma reliably diagnosed and symptomatic after the 13th birthday disqualifies an applicant for military service. Unfortunately, the condition is undetectable and is often not revealed by applicants during entrance medical examinations. As a consequence, each year approximately 1,000 asthmatic individuals are recruited into military service and then medically discharged during IET. Decreasing the loss of personnel and resources associated with this attrition requires more objective methods of identifying applicants with asthma. Exhaled nitric oxide levels, which have been clinically correlated with airway inflammation among asthmatic individuals, may be one such measure.[12]

In 2002, AMSARA initiated a study to determine whether applicants are more likely to reveal their asthma or history of asthma when tested for an objective measure they are told is correlated with asthma. Volunteers for nitric oxide level testing were sought among military applicants at the Baltimore MEPS. Nitric oxide levels were measured three consecutive times per volunteer in a temperature-controlled room using a standard chemiluminescence technique.[13] During the usual MEPS physical examination, all applicants are routinely asked if they have a history of asthma. Study volunteers also completed a self-administered questionnaire about asthma-related symptoms and factors that might affect nitric oxide levels. After nitric oxide testing, all volunteers with an elevated level of nitric oxide were told that their results might indicate they have asthma. A trained interviewer then questioned each volunteer again about his or her history of asthma. Volunteers

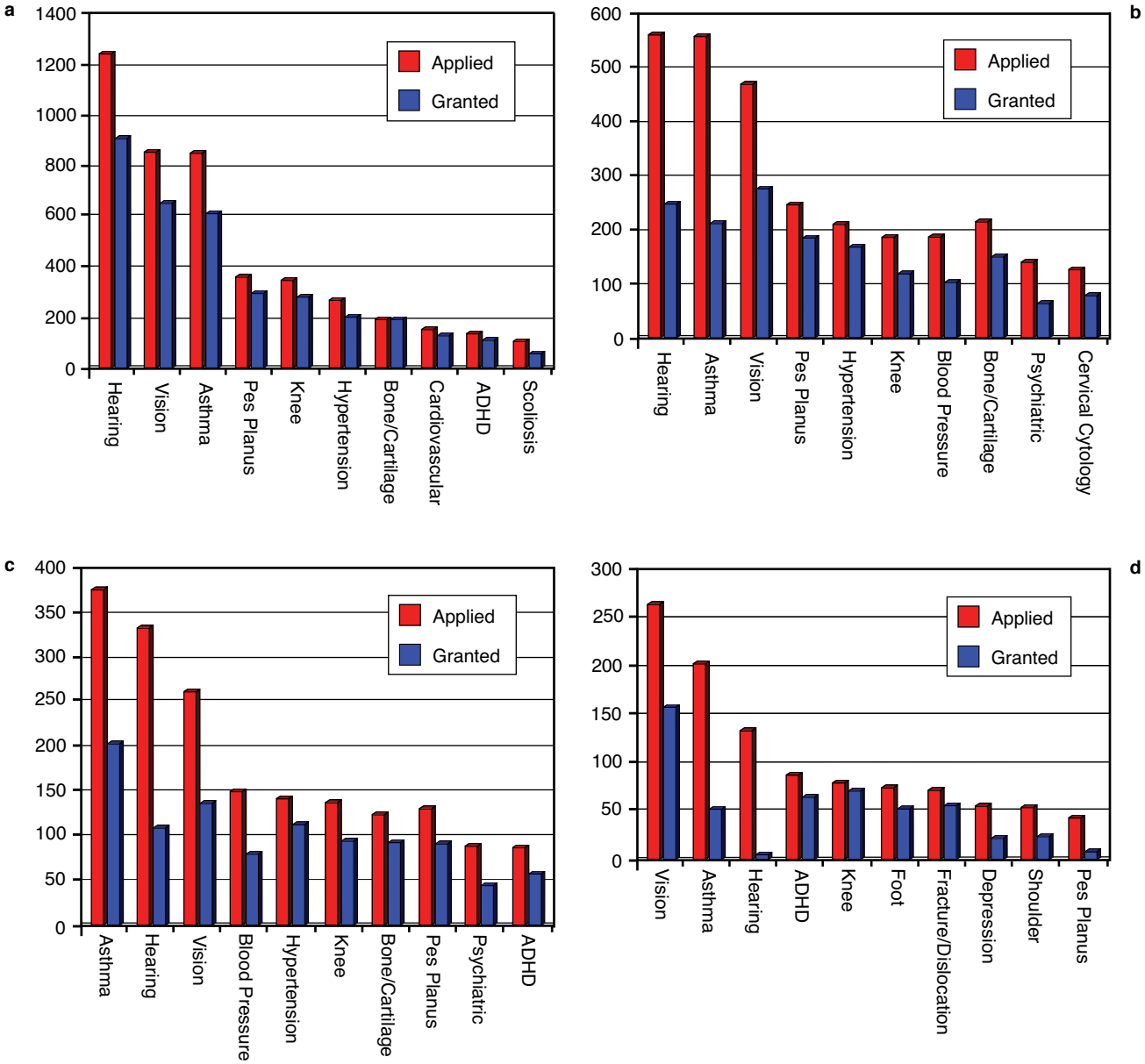

Fig. 3-6. Average frequencies of the top 10 diagnostic categories of waiver applications and approvals for US active duty enlisted personnel from 1997 through 2002: (**a**) Army, (**b**) Navy, (**c**) Marines, and (**d**) Air Force.
ADHD: attention deficit hyperactive disorder
Data source: Krauss MR, Niebuhr D, Trofimovich L, Powers T, Li Y. *AMSARA: Accession Medical Standards Analysis and Research Activity Annual Report 2003*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2004. AD-A427738. Available at: http://www.amsara.amedd.army.mil. Accessed September 27, 2005.

were assured that participation in the study would not adversely affect their ability to enter active service.[1]

The study examined 1,591 volunteers, most of whom were male (99%), young (median age 20), and representative of the racial makeup of the applicant population (54% white, 32% black). Only 35 (2.2%) of the volunteers revealed a history of asthma during the routine physical examination. After being told their nitric oxide levels indicated they might have asthma, an additional 81 (5.2%) admitted a prior history of the condition. The measurements also revealed that 48 (3%) of all volunteers may have had exercise-induced bronchospasm, a nondisqualifying condition that is not identified by the current physical examination, which

they either didn't know of or concealed.

Of all the volunteers who reported current asthma,[14] 77% (21/27) of those reporting symptoms of asthma after age 12 and 60% (34/57) of those reporting symptoms potentially related to exercise-induced bronchospasm had nitric oxide levels greater than 14 ppb (a level correlated with bronchial inflammation). Only 29% of those volunteers with a history of asthma (under both the current and proposed new standards) were detected by the current MEPS examination.

The results of this study demonstrate that exhaled nitric oxide measurement may be a useful adjunct to the physical examination currently used for evaluating military applicants. Future study is required, however, to determine which cut-off level for nitric oxide correlates best with symptomatic asthma.

Assessing Physical Fitness Levels

Despite the in-depth histories and physical examinations conducted at the MEPS, more than 3,000 US Army recruits receive EPTS medical discharges annually. Prior studies have shown that approximately 50% of these discharges represent willful concealment of known conditions.[1] In addition, 4% of males and 15% of females fail the minimum fitness test when they first arrive at IET.[15] This poor physical fitness level contributes to more than 2,000 serious injuries and at least 1,000 discharges annually at Fort Jackson, South Carolina, alone.[15] Other studies of military recruits have demonstrated that improved pretraining fitness levels result in fewer training-related injuries and reduced attrition.[16–19] To continue this research, the Assessment of Recruit Motivation and Strength (ARMS) study was designed to determine the minimum level of pre-entry fitness that would reduce injuries and lower early attrition without adversely affecting recruitment and accession. It is hypothesized that motivation to complete IET and serve in the military is associated with fitness.

The ARMS study is currently being conducted with Army applicants at six MEPS sites. To determine baseline levels of fitness, volunteers undergo a physical assessment consisting of a 5-minute modified Harvard step test, a 1-minute push-up test, and a maximum weight-lifting test using incremental dynamic lift. Results are correlated with findings on the standard MEPS examination.

The goal of ARMS is to assist the Army in accessing the most qualified applicants and in reducing injuries and lowering attrition during IET. The study's primary research question is whether its results will better predict early success in the military than the medical screening examination alone. Success will be determined by the following factors: entrance into active duty (whether those who pass the ARMS test are more likely to enter active duty); EPTS attrition (whether those who admit to disqualifying conditions, pass the ARMS test, and enter active duty will do better than those who have not admitted to any medical condition and do not pass the ARMS test); and injury reduction (whether those who pass the ARMS test will suffer fewer injuries during IET than those who do not pass).

Testing is being conducted in three phases. Phase 1 encompasses the establishment of performance testing and data collection procedures at the selected MEPS. During phase 2, the participating applicants undergo ARMS testing both during the MEPS physical examination and on entering IET. Accessed subjects are then followed for statistical tracking and comparison of early attrition rates, and these data are used to establish the level of test performance associated with improved likelihood of retention in active duty. The criteria currently being used for "passing" the ARMS test include completing the 5-minute step test at the proper pace with a posttest pulse rate not higher than 180 beats per minute, performing 15 pushups for males and 4 pushups for females within 60 seconds, and lifting 50 pounds for males and 40 pounds for females. These criteria are based on maintaining an acceptable degree of fitness as well as reasonable passing percentages among applicants.

During phase 3, applicants who exceed established body fat standards but who pass the ARMS test will be granted an immediate waiver and, barring other disqualifying conditions, accessed into active duty. Their rate of injury and discharge events will then be compared to the rate among all other accessions.

For those physically able to serve, the ARMS paradigm allows for the removal of unnecessary barriers to enlistment. At the same time, the study is helping to identify potentially serious physical problems often concealed by applicants. The "screening in" approach that underlies the ARMS study could reasonably be applied to many of the accession medical standards designed as surrogate measures of physical readiness.

Screening for Psychiatric Disorders

Psychiatric disorders, a leading cause of EPTS discharges, are common in young adults within the age range of most military applicants (17–25 years). From 1997 through 2002, approximately 30% of all EPTS discharges were a result of psychiatric conditions, most of which were concealed at accession. Recruitment and accession expenses associated with these losses cost the military an estimated $27.3 million in 1998 alone; this estimate excludes the costs of medical care, subsequent

disability discharges, and associated attrition.[1] Research has shown that recruits being discharged often had a history of depression and suicidal ideation and had concealed their mental health history during their medical accession examination.[20] Another study found that mental illness in military service members is a leading cause of healthcare utilization and is associated with a relatively high risk of subsequent attrition compared to other diagnostic categories.[21]

Currently, there is no reliable screening tool for identifying individuals at risk of mental health problems. Various screening programs implemented in military recruitment and basic training settings have yielded inconsistent results.[22–25] AMSARA has begun a Small Business Innovation Research project to develop a rapid, inexpensive, and reliable method of screening recruits for major psychiatric disorders and other behavioral factors that strongly predict occupational dysfunction in the military. To reduce attrition, the screening tool should identify both psychiatric disorders that would prevent people from entering active duty and conditions that can be addressed with appropriate intervention before entry (eg, mental health counseling, cognitive group therapy, and life skills training). The overall goal is to reduce attrition related to psychiatric disorders by 10% or more. This methodology may also aid in assessing disease severity and response to therapy.[1]

In 2002 two contractors were awarded phase 2 of the project—a 6-month effort to develop a prototype of an appropriate screening tool designed to be standardized and interpreted by physicians without specialty training in psychiatry. Possible screening tools included questionnaires, biochemical markers, and detection of psychoactive pharmaceuticals to identify those who recently discontinued psychiatric medications. The contractors will then evaluate each screening methodology in a population of young adults to determine its sensitivity, specificity, positive predictive value for any disqualifying psychiatric disorder, and ease of use. These validation trials will be conducted at selected MEPS sites under the approval of the Army Surgeon General's Human Subjects Research Review Board at the US Army Medical Research and Materiel Command (Fort Detrick, Md). Phase 3, currently planned but not yet funded, will include large-scale efficacy trials.

SUMMARY

The objective of the accession medical process is to screen out applicants who are medically unfit for service while presenting few obstacles to those fit to serve. This process currently uses both a self-reported medical history and a physical examination to determine if an applicant meets all current enlistment standards. The current accession medical standards are primarily scientifically based, relying heavily on studies of past outcomes among accessions with various medical histories (see Chapter 4 in this volume for details).

Temporary medical disqualifications are given for conditions that can be remediated by the applicant, such as being overweight or recently using marijuana. A permanent medical disqualification is given for failure to meet all other standards. Applicants with a permanent medical disqualification may request a service-specific accession medical waiver. Roughly 20% of all military applicants have a medically disqualifying condition, about two thirds of which are temporary. Service-specific accession medical waiver authorities review more than 22,000 waiver applications for permanent disqualifications per year and ultimately approve roughly 55%. Although the types and frequency of medical waiver considerations vary by service, deficient vision, deficient hearing, and history of asthma are among the more common conditions seen across all services. Waiver approval percentages differ according to medical condition and sometimes across services for a given condition. Although there are many plausible explanations for such differences, further examination is required to assess the contributing factors.

AMSARA is conducting several studies to improve the ability of the accession medical process to discriminate between applicants who will and who will not be able to serve successfully in the armed forces. One study is investigating whether exhaled nitrous oxide levels can be used reliably to detect reactive airway disease (asthma) among applicants. Another study is determining whether a brief functional examination of fitness can indicate medical readiness to serve. Finally, a mental health screening examination is being reviewed to determine whether this major source of first-term morbidity and attrition can be reduced.

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ATTACHMENT: DATA SOURCES AND LIMITATIONS

To conduct research and analysis, AMSARA receives data from various sources, most of which are the primary collection agencies for the data provided. Because data are seldom collected for epidemiological study, AMSARA works with designated points of contact to ensure that the data received are in an appropriate form for epidemiological work. The following are descriptions of the major sources and types of data AMSARA uses to examine the accession process and the impact of accession medical standards.

US Military Entrance Processing Command

USMEPCOM stores data on all applicants who undergo an accession medical examination at any of the 65 MEPS. These data contain several hundred demographic, medical, and administrative items on applicants for each component (regular enlisted, reserve, National Guard) and branch of service (US Air Force, Army, Coast Guard, Marines, and Navy). Personal, medical, and administrative information necessary for studies of military attrition are extracted from the data records provided by USMEPCOM. These include personal identifiers (eg, name and social security number) for linking with other data files that include demographic information (eg, gender, age, and race) and other data relevant to military attrition studies (eg, intended service, education level, and AFQT scores).

In addition, MEPS records provide extensive medical examination information, including date of examination, qualification status, failure (disqualification) codes where relevant, and any waiver requirements. The results of some specific medical evaluations are also extracted, including measurements of hearing, vision, alcohol and drug levels, height, weight, and blood pressure. Medical disqualifications are categorized as either temporary conditions that can be remediated (eg, being overweight) or permanent conditions that remain with the applicant (eg, history of asthma). For those applicants with a permanent disqualification, an accession medical waiver from the relevant service-specific waiver authority is required before they are eligible for military accession (see MEDICAL WAIVERS, above).

MEPS data are also the primary source of demographic information on new accessions into the armed forces. These data are linked to Defense Manpower Data Center (DMDC) gain files (see below) to verify new accessions into the military and provide benchmark descriptive statistics. Linked data are then used in accession and retention research.

DoD Medical Evaluation Review Board

The DoD Medical Examination Review Board (DoDMERB) is the comparable organization to USMEPCOM for officer medical accession examinations. DoDMERB is responsible for medically qualifying officer applicants to the service academies and Reserve Officer Training Corps (ROTC) programs. AMSARA has received DoDMERB applicant data by name and social security number since the fall of 1999. These data include disqualifications by specific diagnosis and remedial actions taken to address them. To date, analysis of officer medical accession has been limited largely by AMSARA staffing limitations.

Defense Manpower Data Center

DMDC provides data on individuals entering military service (gain or accession) and on individuals exiting military service (loss). Gain/loss data, a primary source of information regarding who is or has been in the military, include dates of entering and leaving the military. DMDC data also include approximately 50 variables, many of which are used in AMSARA research. These variables include personal identifiers (eg, name and social security number) for linking with other data; demographic information (eg, age, education, and AFQT score); and service information (eg, date of entry and basic training site). These data are combined with MEPS data to determine accession percentages among applicants by demographics and other variables. This information is vital to survival analyses and attrition studies such as those presented in Chapter 4.

Waiver Data

Waiver data, provided to AMSARA by each service's waiver authority, are often the starting point for accessions research. Each service is responsible for making waiver decisions about its own applicants. Although the specifics of these data vary by service, they generally contain identifiers, demographics, and information about the waiver consideration, such as date the waiver was considered, information about the medical conditions for which the waiver was required, and the decision of the waiver authority. The US Air Force and Army code waiver conditions according to the full *International Classification of Diseases*, 9th Revision (ICD-9) coding scheme, whereas the Navy and Marines use a subset of ICD-9 codes representing medically disqualifying conditions contained in DoD Instruction 6130.4 (accounting for difficulty in comparing conditions across services).

Individuals granted waivers for a particular medically disqualifying condition are then matched to the DMDC gain file to determine their date of entry, if any, into the service, to provide subject pools for specific studies. To make statistical comparisons between groups, follow-up medical and attrition information during military service is included with these subject records.