# Chapter 4

# MORBIDITY AND ATTRITION RELATED TO MEDICAL CONDITIONS IN RECRUITS

DAVID W. NIEBUHR, MD, MPH, MSC[*]; TIMOTHY E. POWERS, MSC[†]; YUANZHANG LI, PHD[‡]; AND AMY M. MILLIKAN, MD, MPH[§]



[*] *Lieutenant Colonel, Medical Corps, US Army, Preventive Medicine Physician, Division of Preventive Medicine, Walter Reed Army Institute of Research, 503 Robert Grant Ave., Silver Spring, Maryland 20910-5000*
[†] *Senior Analyst, Division of Preventive Medicine, Walter Reed Army Institute of Research*
[‡] *Senior Statistician, Division of Preventive Medicine, Walter Reed Army Institute of Research*
[§] *Preventive Medicine Physician, Division of Preventive Medicine, Walter Reed Army Institute of Research*

## INTRODUCTION

Medical morbidity and attrition among new enlistees is a complex and costly problem for the US military, and one for which there is no single, simple solution. The desire to reduce early attrition and its associated costs must be balanced against the need to acquire a sufficient number of recruits to maintain force readiness.

As will be detailed in this chapter, morbidity requiring hospitalization is relatively common among first-year enlistees, with hospitalization rates among demographic subgroups ranging from 3.7% to almost 7.3%. In addition to the direct cost of these hospitalizations, some of the more common conditions leading to hospitalization lead to almost certain discharge from service, resulting in considerable cost for recruiting and training replacements.

Also unfortunately common are discharges related to medical conditions that existed prior to service (EPTS). Between 1997 and 2002, at least 4% of all accessions resulted in an EPTS discharge. Most of these discharges are related to a condition either unknown to or undisclosed by the applicant, rather than one for which a waiver was granted. Disability discharges are much less common among early-enlisted personnel.

Several studies of the accession medical process have been conducted to ascertain whether the medical qualification standards and waiver policies are providing effective guidance for predictable medical attrition. This chapter summarizes much of that research, focusing on hospitalizations, EPTS, and all-cause discharges. The chapter then interprets the research results in the context of their implications for policy on accession medical standards.

## INITIAL ENTRY TRAINING MORBIDITY AND ATTRITION

Morbidity and attrition during the first tour of duty are very costly problems for the military. Roughly one third of all first-time enlistees are discharged before completing their first tour of duty, and 5% of first-time enlistees have at least one inpatient hospitalization during the first year of service.[1] Each lost recruit must be replaced in order to meet military manpower needs. The cost of recruiting, processing, and training a new enlistee through basic combat and advanced individual training was estimated in federal year (FY) 2003 to be as high as $35,000.[2,3] In addition, hospitalization early in service for some conditions has been shown to be a precursor to early attrition.

Historical attrition percentages at various stages of the first term of duty, as well as some of the more common reasons for this attrition, are shown in Figure 4-1. Overall attrition from basic and advanced individual training is roughly 14%. Approximately one third of the 14%, or 4% to 5% of all enlistees, are discharged for complications of an EPTS medical, and a similar percentage are discharged for failure to meet performance criteria.

The financial and resource burden caused by current rates of attrition has prompted numerous research studies of social and medical factors related to early service loss[4–8] in both the commissioned corps officers and enlistees.[9,10] Much research has focused on describing patterns and causes of attrition among enlistees during their first year of service.[11]

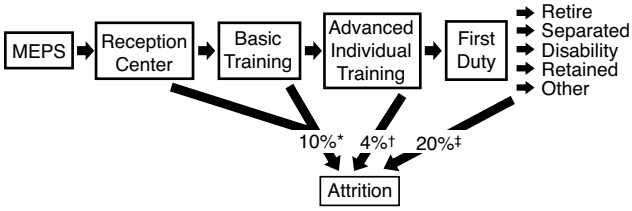


**Fig. 4-1.** The active duty enlisted process with associated attrition from accession and training through the first tour of duty. Total 36-month attrition is approximately 34%.
*Approximately 0 to 3 months of service attrition.
†Approximately 3 to 6 months of service attrition.
‡Approximately 6 to 36 months of service attrition.
MEPS: medical entrance processing stations
Data source: *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.

## HOSPITALIZATION IN ACTIVE DUTY ENLISTEES

Hospitalizations among new military enlistees are costly to the military and can often be precursors to early attrition. This section describes hospitalization trends for the years 1996 through 2001 by branch of service and by demographic characteristics. During this time period, the 6-year (1996–2001) annual average number of active duty enlisted hospitalizations within the first year of service was approximately 8,200. This corresponds to 7,200 unique persons, for a hospitalization rate of 4.6% within the first year of service.[12]

Table 4-1 summarizes the numbers of hospitalizations and numbers of enlistees hospitalized within 1 year of accession by demographic group as a 6-year (1996-2001) annual average. Relative risks and 95% confidence intervals of the number of persons hospitalized per year are presented to compare the likelihood of hospitalization across demographic groups. A baseline group is chosen for each comparison (indicated by a relative risk of 1.00 and no confidence interval), and in most cases is the largest group. One exception is the Armed Forces Qualification Test (AFQT) category, where the group who scored in the highest percentile (93%–99%) is the baseline comparison group. The relative risk for a particular demographic group can be interpreted as

**TABLE 4-1**

**YEARLY FREQUENCIES AND RISK OF HOSPITALIZATION DURING THE FIRST YEAR OF ENLISTED ACCESSION BY SELECTED DEMOGRAPHIC CHARACTERISTICS: 1996–2001**

| | Enlisted Accessions | Hospital Admissions | Persons Hospitalized | | | |
|---|---|---|---|---|---|---|
| | | | Count | % | Relative Risk | 95% CI |
| **Service** | | | | | | |
| Army | 55,724 | 3,960 | 3,143 | 5.64 | 1.00 | |
| Navy | 41,798 | 1,866 | 1,548 | 3.70 | 0.66 | 0.62–0.70 |
| Marine Corps | 29,803 | 1,339 | 1,099 | 3.69 | 0.65 | 0.61–0.70 |
| Air Force | 29,754 | 1,758 | 1,448 | 4.87 | 0.86 | 0.81–0.92 |
| **Gender** | | | | | | |
| Male | 128,455 | 6,499 | 5,309 | 4.13 | 1.00 | |
| Female | 28,624 | 2,424 | 2,085 | 7.28 | 1.76 | 1.68–1.85 |
| **Age** | | | | | | |
| 17–20 | 122,780 | 6,615 | 5,402 | 4.40 | 1.00 | |
| 21–25 | 27,921 | 1,803 | 1,444 | 5.17 | 1.18 | 1.11–1.24 |
| 26–30 | 5,092 | 396 | 308 | 6.05 | 1.37 | 1.23–1.54 |
| > 30 | 1,287 | 108 | 83 | 6.41 | 1.46 | 1.30–1.63 |
| **Race** | | | | | | |
| White | 110,474 | 6,319 | 5,126 | 4.64 | 1.00 | |
| Black | 29,986 | 1,786 | 1,440 | 4.80 | 1.03 | 0.98–1.10 |
| Other | 15,903 | 775 | 637 | 4.00 | 0.86 | 0.80–0.94 |
| **Education** | | | | | | |
| Below high school | 6,900 | 414 | 334 | 4.85 | 1.00 | |
| High school graduate | 142,688 | 8,085 | 6,557 | 4.60 | 0.95 | 0.85–1.06 |
| Some college | 4,917 | 283 | 232 | 4.72 | 0.97 | 0.83–1.15 |
| Bachelor's | 2,470 | 134 | 110 | 4.45 | 0.92 | 0.78–1.08 |
| **AFQT Score** | | | | | | |
| 93–99 | 6,922 | 338 | 278 | 4.02 | 1.00 | |
| 65–92 | 51,029 | 2,831 | 2,307 | 4.52 | 1.12 | 1.00–1.27 |
| 50–64 | 39,656 | 2,362 | 1,899 | 4.79 | 1.19 | 1.05–1.35 |
| 30–49 | 41,601 | 2,338 | 1,891 | 4.55 | 1.13 | 1.00–1.28 |
| 0–29 | 17,837 | 1,053 | 861 | 4.83 | 1.20 | 1.05–1.37 |

AFQT: Armed Forces Qualification Test
CI: confidence interval
Data source: *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.

the risk of first-year hospitalization among members of that group relative to the risk among the members of the baseline group. A relative risk estimate for females of 1.76 means that females are estimated to have 1.76 times the risk of males for hospitalization. Confidence intervals can be loosely interpreted as the plausible range of the true relative risk, accounting for variability in the estimation. If the interval does not contain the value 1.00, then the risk in that particular group is considered to be significantly different from that in the baseline group. For example, a confidence interval of 1.68 to 1.85 means that the actual relative risk of hospitalization among females is quite likely to be in the range from 1.68 to 1.85. Females would thus be considered to have a significantly higher risk than males of hospitalization during the first year of service. More rigorous descriptions of the interpretation of confidence intervals can be found in an introductory statistics textbook.

Compared with other services, US Army enlistees were most likely to be hospitalized. Service-wide, females and older recruits had a higher likelihood of hospitalization. There was no significant difference in likelihood of hospitalization between whites and blacks, but whites and blacks had a higher likelihood than other races. There was no significant difference in likelihood of hospitalization by education level. Finally, recruits in the 93–99 percentile group on the AFQT had a lower likelihood of hospitalization than those scoring in the lower percentile groups, although these differences were not large in magnitude.

Figure 4-2 shows the most common medical diagnostic categories for hospitalizations and the numbers of admissions in each category among active duty recruits accessed from 1996 through 2001. Medical categories are those specified in *International Classification of Diseases*, 9th Revision (ICD-9). The most common category of hospitalizations, "psychiatric" disorders, includes adjustment reactions, anxiety disorders, and personality disorders. Not surprisingly, "injuries" is the next most common (8%), reflecting the physical demands of basic training and early-enlisted service. Injuries sustained during initial military training are associated not only with increased healthcare utilization but also with high levels of attrition.[13,14] Viral infections, pneumonia, and respiratory illnesses combined account for 14% of admissions.

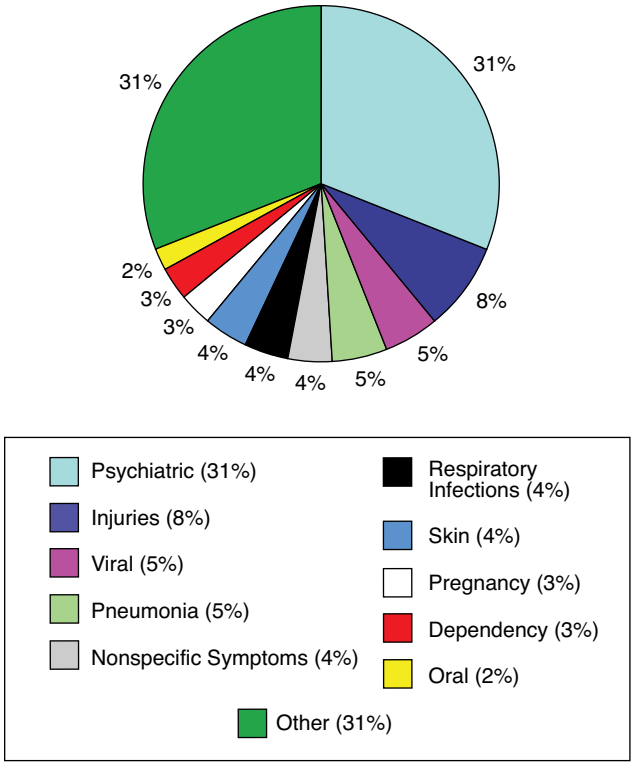


**Fig. 4-2.** Hospital admissions by diagnostic category within the first year of service from 1996 to 2001*: all services.
*Mean = 15,353 hospitalizations per year.
Data source: *Accession Medical Standards Analysis and Research Activity Annual Report 2003*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2004. AD-A427738. Available at: http://www.amsara.amedd.army.mil. Accessed September 27, 2005.

## EXISTED-PRIOR-TO-SERVICE DISCHARGES OF ENLISTEES

A discharge for a medical condition can be classified as EPTS if the condition was verified to have existed before the recruit began service and if the complications leading to discharge arose no more than 180 days after the recruit began duty. EPTS data reporting has varied both by site and over time within sites (see the attachment, Data Sources and Limitations, and Table 4-2). The numbers shown below should be reviewed in the context of these data shortcomings.

The 6-year average for EPTS discharges among recruits accessed from 1997 through 2002 was 6,400 per year, for an EPTS yearly discharge rate of about 4% of all accessions.[12] According to the categorization performed by the US Military Entrance Command (USMEPCOM), most EPTS discharges were attributed to the applicant's nondisclosure (56%) or unawareness (25%) of his or her medical condition. Errors in screening or in judgment made at medical entrance processing stations (MEPS) regarding qualification status accounted for less than 5% of the cases, and fewer than 5% of the individuals were granted a medical waiver for the condition.

**TABLE 4-2**

**EXISTED-PRIOR-TO-SERVICE DISCHARGE DATA REPORTED TO USMEPCOM BY TRAINING SITE AND YEAR (ACTIVE DUTY)***

| Site | 1997 | 1998 | 1999 | 2000† | 2001† | 2002 | Total |
|---|---|---|---|---|---|---|---|
| **Air Force** | | | | | | | |
| Lackland AFB, Tex | 1,000 | 1,070 | 994 | 105 | 228 | 784 | 4,181† |
| **Army** | | | | | | | |
| Fort Jackson, SC | 1,913 | 1,767 | 712 | 354 | 676 | 821 | 6,243 |
| Fort Leonard Wood, Mo | 1,426 | 1,455 | 1,243 | 1,575 | 1,485 | 862 | 8,046 |
| Fort Benning, Ga | 387 | 535 | 890 | 1,212 | 1,127 | 1,368 | 4,718 |
| Fort Sill, Okla | 333 | 464 | 713 | 794 | 147 | 314 | 5,394 |
| Fort Knox, Ky | 666 | 653 | 506 | 599 | 649 | 582 | 3,655 |
| **Marine** | | | | | | | |
| MCRD Parris Island, SC | 1,069 | 1,054 | 808 | 551 | 745 | 1,080 | 5,307 |
| MCRD San Diego, Calif | 743 | 492 | 526 | 656 | 193 | 116 | 2,726 |
| **Navy** | | | | | | | |
| Great Lakes NTC, Ill | 3,542 | 5,343 | 2,664 | 1,913 | 1,865 | 1,873 | 17,200 |
| **Total** | 11,079 | 12,833 | 9,056 | 7,759 | 7,115 | 7,800 | 57,470 |

* Numbers may not add up to totals shown in the text because information from specific training sites is incomplete and other requirements for records vary.
† Air Force did not provide data from April 2000 to September 2001.
AFB: Air Force Base
MCRD: Marine Corps Recruit Depot
NTC: Naval Training Center
USMCPCOM: US Military Entrance Processing Command
Data source: *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.

Discharge numbers reflect only discharges of individuals who had an accession record. Relative risks are used to compare the likelihood of EPTS discharge among demographic groups. The interpretation of relative risks and associated 95% confidence intervals is analogous to that described previously for relative risk of hospitalization. All comparisons, particularly those by service branch, should be reviewed in light of the EPTS data reporting fluctuations by service and over time (see Table 4-2).

Table 4-3 shows numbers of accessions and subsequent EPTS discharges averaged annually from 1997 through 2002 and reported by selected demographic characteristics. Relative to US Army enlistees, the percentage of accessions ending in a reported EPTS discharge is significantly higher among Navy enlistees and significantly lower among Marines and Air Force enlistees. However, EPTS reporting is not uniform across all services or even across different basic training sites within the same service. Moreover, the services classify EPTS discharges in different ways. Differences observed among services, therefore, may reflect procedural or reporting differences more than actual differences in EPTS discharge numbers. Despite these limitations the data clearly shows that the relative risk of EPTS discharges is higher among enlistees who are female, older, white, have less than a high school diploma, and have a lower AFQT score.

The medical causes of EPTS discharges for each service are presented in Figures 4-3, 4-4, 4-5, and 4-6 according to the primary EPTS discharge diagnosis category. The analyses are presented as a 5-year annual average for active duty enlistees from 1998 through 2002 because detailed diagnosis codes were unavailable before 1998.

Figure 4-3 shows the 5-year annual average of the top 10 diagnostic categories leading to EPTS discharge among US Army active duty enlistees in first year of service beginning duty from 1998 through 2002. Asthma (17%), neurotic conditions (10%), and lower extremity pain (8%) were the most common conditions underlying the reported EPTS discharges. All orthopedic conditions combined accounted for 31% of EPTS discharges. Several research studies have investigated methods for

**TABLE 4-3**

**AVERAGE YEARLY FREQUENCY AND RISK OF EXISTED-PRIOR-TO-SERVICE DISCHARGE AMONG ACCESSIONED ENLISTEES BY SELECTED DEMOGRAPHIC CHARACTERISTICS: 1997–2002**

| | Total No. Accessed | No. Discharged | % Discharged | Relative Risk | 95% CI |
|---|---|---|---|---|---|
| **Service** | | | | | |
| Army | 55,111 | 2,345 | 4.26 | 1.00 | |
| Navy | 41,888 | 2,154 | 5.14 | 1.21 | 1.14-1.28 |
| Marines | 30,127 | 1,018 | 3.38 | 0.79 | 0.74-0.85 |
| Air Force | 30,889 | 812 | 2.63 | 0.62 | 0.57-0.66 |
| **Gender** | | | | | |
| Male | 129,363 | 4,809 | 3.72 | 1.00 | |
| Female | 28,651 | 1,519 | 5.30 | 1.43 | 1.35-1.51 |
| **Age** | | | | | |
| 17–20 | 121,935 | 4,672 | 3.83 | 1.00 | |
| 21–25 | 29,222 | 1,304 | 4.46 | 1.16 | 1.10-1.24 |
| 26–30 | 5,472 | 282 | 5.15 | 1.35 | 1.20-1.51 |
| >30 | 1,385 | 71 | 5.15 | 1.34 | 1.19-1.51 |
| **Race** | | | | | |
| White | 111,774 | 4,847 | 4.34 | 1.00 | |
| Black | 29,575 | 1,001 | 3.38 | 0.78 | 0.73-0.84 |
| Other | 16,665 | 480 | 2.88 | 0.66 | 0.61-0.73 |
| **Education** | | | | | |
| < high school | 8,162 | 409 | 5.01 | 1.00 | |
| High school graduate | 142,412 | 5,698 | 4.00 | 0.80 | 0.72-0.88 |
| Some college | 4,761 | 151 | 3.17 | 0.63 | 0.53-0.76 |
| Bachelor's degree | 2,529 | 68 | 2.70 | 0.54 | 0.45-0.65 |
| **AFQT Score** | | | | | |
| 93–99 | 9,203 | 283 | 3.08 | 1.00 | |
| 65–92 | 67,076 | 2,514 | 3.75 | 1.22 | 1.08-1.37 |
| 50–64 | 51,992 | 2,309 | 4.44 | 1.44 | 1.28-1.63 |
| 30–49 | 54,723 | 2,502 | 4.57 | 1.49 | 1.32-1.68 |
| 1–29 | 1,937 | 96 | 4.96 | 1.61 | 1.29-2.02 |

AFQT: Armed Forces Qualification Test
CI: confidence interval
Data source: *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.

identifying recruits at risk for injuries, both training related and secondary to pre-existing conditions, and for minimizing related attrition.[13–16] The number and specific type of reported discharges fluctuated over these years. Possible reasons for these fluctuations include discharge policy changes, data reporting changes, and random fluctuations in recruit health status.

Figure 4-4 shows the 5-year annual average of the top 10 primary diagnostic categories leading to EPTS discharge among active duty US Navy recruits. Suicidal behavior (11%), asthma (10%), and personality disorders (9%) led the list. All psychiatric conditions combined accounted for 38% of all EPTS discharges and represent a high level of healthcare utilization during the first year of service.[17,18] These numbers should be interpreted with caution, however, because the total number of the

Navy's reported discharges varies significantly during this 5-year period. An informal review of suicide-related behavior records indicated that most were related to suicidal behavior and ideation rather than actual attempts. Anecdotal evidence suggests that the services take a risk-averse approach to suicide threats, preferring to allow release of all who make such threats rather than risk an actual suicide. This policy may lead to increased suicide threats by recruits wanting out of basic training.

Figure 4-5 shows the 5-year annual average of the top 10 primary diagnostic categories leading to EPTS discharge among active duty US Marine Corps recruits. Neurotic disorders (13%), asthma (13%), and suicidal behavior (12%) were the most common categories. All psychiatric conditions combined accounted for 29% of the Marine Corps' EPTS discharges. Again, these numbers should be interpreted with caution due to variability in the total number of reported discharges over the 5-year period. As with the Navy, an informal review of suicide-related behavior records indicated that most discharges were related to suicidal behavior and ideation rather than actual attempts.

Figure 4-6 shows the 5-year annual average top 10 diagnostic categories leading to EPTS discharge among first year of service active duty enlistees in the US Air Force. Asthma (26%), joint pain (10%), and spine disorders (9%) were the most common conditions underlying the reported EPTS discharges. All orthopedic conditions combined accounted for 32% of the Air Force's EPTS discharges. The number and specific type of reported

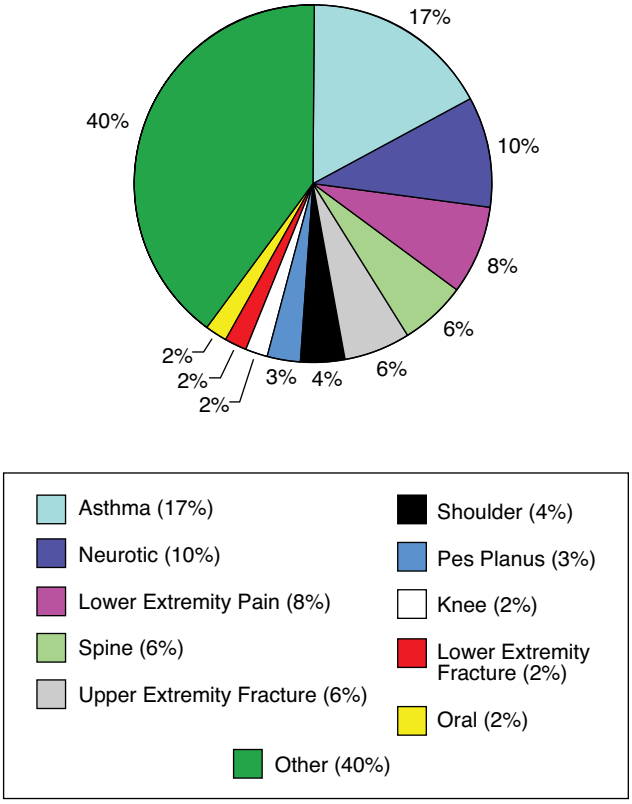


**Fig. 4-3**. EPTS discharges by diagnostic category among first year active duty enlistees 5-year annual average, 1998–2002*: US Army.
*Mean = approximately 2,660 per year.
EPTS: existed prior to service
Data source: *Accession Medical Standards Analysis and Research Activity Annual Report 2003*. Fort 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.

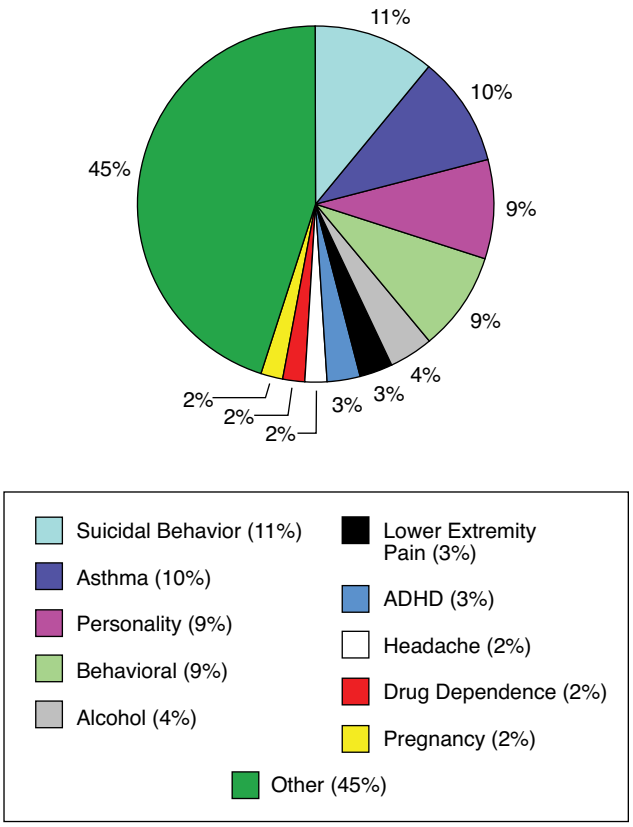


**Fig. 4-4**. EPTS discharges by diagnostic category among first year active duty enlistees 5-year annual average, 1998–2002*: US Navy.
*Mean = approximately 2,330 per year.
EPTS: existed prior to service
ADHD: attention deficit with hyperactivity disorder
Data source: *Accession Medical Standards Analysis 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.

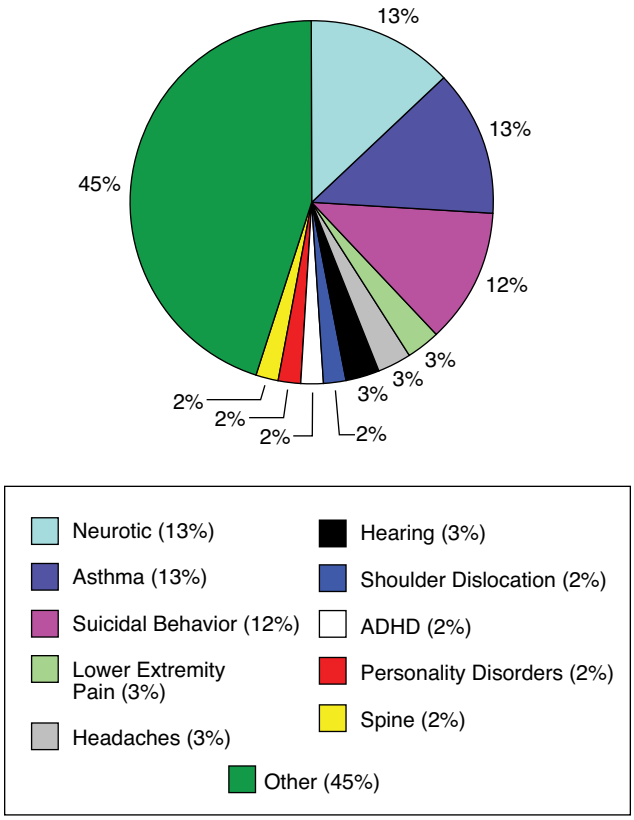


**Fig. 4-5**. EPTS discharges by diagnostic category among first year active duty enlistees 5-year annual average, 1998–2002*: US Marine Corps.
*Mean = approximately 990 per year.
EPTS: existed prior to service
ADHD: attention deficit with hyperactivity disorder
Data source: *Accession Medical Standards 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.

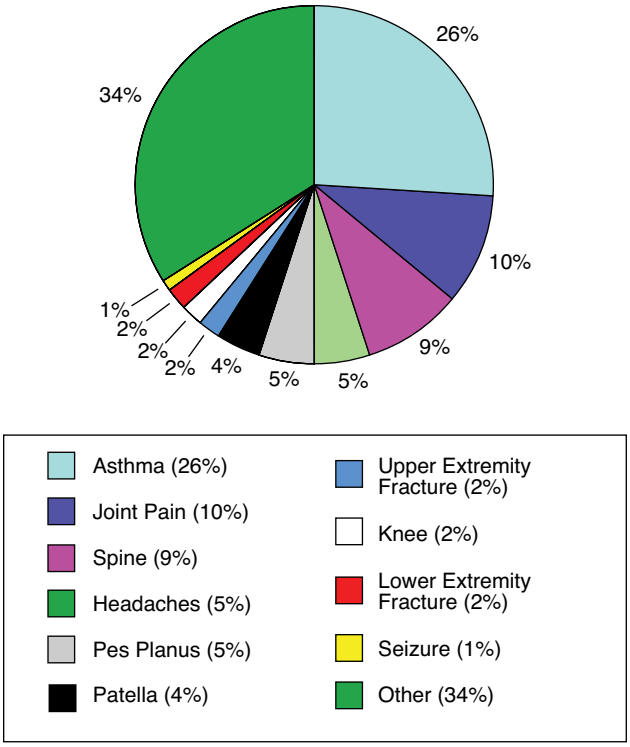


**Fig. 4-6**. EPTS discharges by diagnostic category among first year active duty enlistees 5-year annual average, 1998–2002 (excluding April 2001 to September 2002)*: US Air Force.
*Mean = approximately 770 per year.
EPTS: existed prior to service
Data source: *Accession Medical Standards Analysis and 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.

discharges fluctuated over these years. Possible reasons for these fluctuations include discharge policy changes, data reporting changes, and random fluctuations in recruit health status. Note that no psychiatric conditions appear among the leading causes, most likely because the Air Force categorizes discharges related to psychological conditions as administrative rather than EPTS.

## DISABILITY DISCHARGES IN ACTIVE DUTY ENLISTEES

Disability discharge considerations are compiled separately for each service at its physical disability agency (PDA). The PDA reviews results from Medical Evaluation Boards done at medical treatment facilities, which describe in detail the service member's medical diagnoses and prognoses, and Physical Evaluation Boards done regionally at medical centers, which describe the service member's ability to meet the physical demands of his or her occupation, service, and deployability. A service member's case may receive a variety of dispositions, including separation with severance pay, permanent disability, temporary disability, or return to duty as fit. Disability discharges also include degree of disability and medical condition codes. The medical condition or conditions are described using the condition codes of the Veterans Administration Schedule for Rating Disabilities. Less comprehensive than ICD-9 codes, this set of codes was developed to classify medical conditions for degrees of disability.

Describing the numbers and types of disability

discharges in active duty enlistees is another area of ongoing analysis. Currently, the Accession Medical Standards Analysis and Research Activity (AMSARA) receives disability discharge data from the US Army and Air Force only; therefore, data described below are limited to the two services (see chapter 3 for more information on AMSARA). Approximately 191 disability discharges per year occur in the first-year of service in Army and Air Force combined active duty enlisted accessions, with a 6-year (1996–2001) average rate of 0.4% per year.[12]

The percentages of accessions ending in disability discharge by selected demographic factors are shown in Table 4-4. Relative risks are used to compare the likelihood of disability discharge, based on yearly averages, across demographic groups. The interpretation of relative risks and associated 95% confidence intervals is analogous to that described previously for relative risk of hospitalization. Army enlistees had a higher likelihood of disability discharge than Air Force

**TABLE 4-4**

**AVERAGE YEARLY FREQUENCY AND RISK OF DISABILITY DISCHARGE AMONG ACCESSIONED ENLISTEES BY SELECTED DEMOGRAPHIC CHARACTERISTICS: 1996–2001**

| | Total No. Accessed | No. Discharged Within 1 Year of Accession | % Discharged | Relative Risk | 95% CI |
|---|---|---|---|---|---|
| **Service** | | | | | |
| Army | 55,724 | 323 | 0.58 | 1.00 | |
| Air Force | 29,754 | 125 | 0.42 | 0.72 | 0.59-0.89 |
| **Gender** | | | | | |
| Male | 66,235 | 280 | 0.42 | 1.00 | |
| Female | 19,242 | 168 | 0.87 | 2.06 | 1.70-2.49 |
| **Age** | | | | | |
| 17–20 | 66,330 | 311 | 0.47 | 1.00 | |
| 21–25 | 15,179 | 100 | 0.66 | 1.41 | 1.13-1.76 |
| 26–30 | 3,146 | 26 | 0.82 | 1.76 | 1.18-2.62 |
| >30 | 823 | 11 | 1.37 | 2.92 | 1.96-4.35 |
| **Race** | | | | | |
| White | 59,885 | 335 | 0.56 | 1.00 | |
| Black | 17,810 | 80 | 0.45 | 0.80 | 0.63-1.62 |
| Other | 7,455 | 32 | 0.42 | 0.75 | 0.52-1.09 |
| **Education** | | | | | |
| < high school senior | 4,364 | 19 | 0.44 | 1.00 | |
| High school senior | 75,246 | 397 | 0.53 | 1.20 | 0.76-1.90 |
| High school graduate | 3,930 | 20 | 0.52 | 1.18 | 0.63-2.19 |
| Some college | 1,893 | 10 | 0.54 | 1.22 | 0.65-2.28 |
| **AFQT Score** | | | | | |
| 93–99 | 3,891 | 17 | 0.43 | 1.00 | |
| 65–92 | 28,601 | 154 | 0.54 | 1.24 | 0.76-2.05 |
| 50–64 | 22,838 | 119 | 0.52 | 1.20 | 0.72-2.00 |
| 31–49 | 21,322 | 113 | 0.53 | 1.22 | 0.73-2.02 |
| 1–30 | 8,800 | 44 | 0.50 | 1.15 | 0.66-2.01 |

AFQT: Armed Forces Qualification Test
CI: confidence interval
Data source: *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.

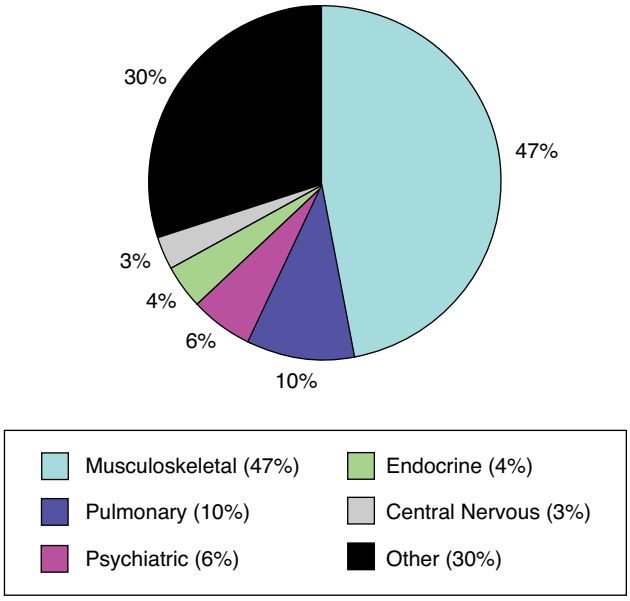


**Fig. 4-7.** Disability discharges by diagnostic category among first year active duty enlistees 1996–2001*: US Air Force
*6-year average = 309 per year.
Data source: *Accession Medical Standards Analysis and Research Activity Annual Report 2003*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2004. AD-A427738.

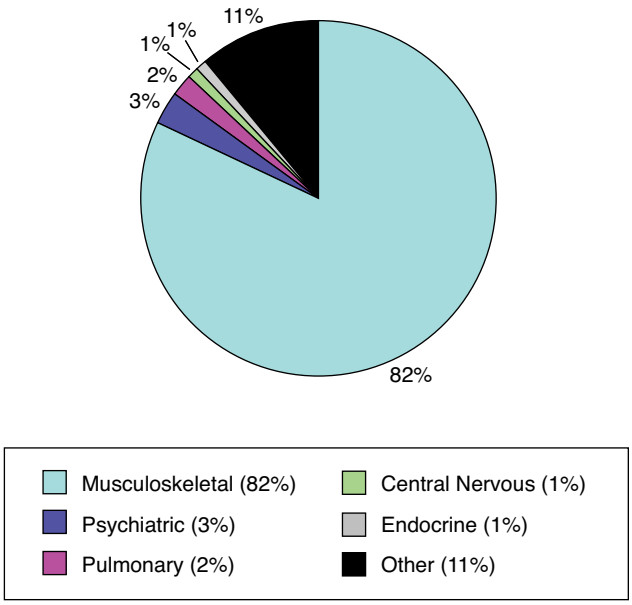


**Fig. 4-8.** Disability discharges by diagnostic category among first year active duty enlistees 1996–2001*: US Army
*6-year average = 2,179 per year.
Data source: *Accession Medical Standards Analysis and Research Activity Annual Report 2003*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2004. AD-A427738. Available at: http://www.amsara.amedd.army.mil. Accessed September 27, 2005.

enlistees, although this result may be influenced by different categorizations by the services. Females had more than double the risk of males for disability discharge. The likelihood of a disability discharge increased with age: enlistees older than 30 years at accession had almost three times the risk of those entering at age 17 to 20 years. There was no significant difference in the likelihood of disability discharge according to race, education level, or AFQT score.

Figures 4-7 and 4-8 show the leading medical categories of disability discharges among first-year enlistees for the 6-year period 1996 through 2001 for the Air Force and Army, respectively. It is important to note that the distribution of these discharges by medical category is not necessarily reflective of all disability discharges. Musculoskeletal system problems, including muscle injuries, were the most common cause of disability discharge for both services, which is consistent with the physical demands of basic training. However, the musculoskeletal percentage differs dramatically by service: 47% for the Air Force versus 83% for the Army. Pulmonary diseases involving the trachea and bronchi, such as asthma, were the second leading cause of first-year disability discharge in the Air Force, accounting for 10% of such discharges for that service branch. Psychiatric disorders, including affective and psychotic disorders, were the second leading category of disability discharge (3%) among first-year Army enlistees, and the third leading cause in the Air Force (6%) of first-year disability discharges.

## MORBIDITY AND ATTRITION RESEARCH

### Early Hospitalization and Subsequent Attrition

From the hospitalization section above it is evident that there is a wide range of causes for hospitalization among first-year active duty enlistees. Some of the more common reasons included psychiatric conditions, injuries, and respiratory conditions. The direct costs associated with these hospitalizations depend on many factors, including the amount of time spent in the hospital (costing for both medical care and lost work days for the hospitalized individual) and the costs of medical treatment provided.

Researchers have investigated whether enlistees experiencing a hospitalization early in service are likely to also experience premature attrition. Figure 4-9 shows estimated military retention probabilities

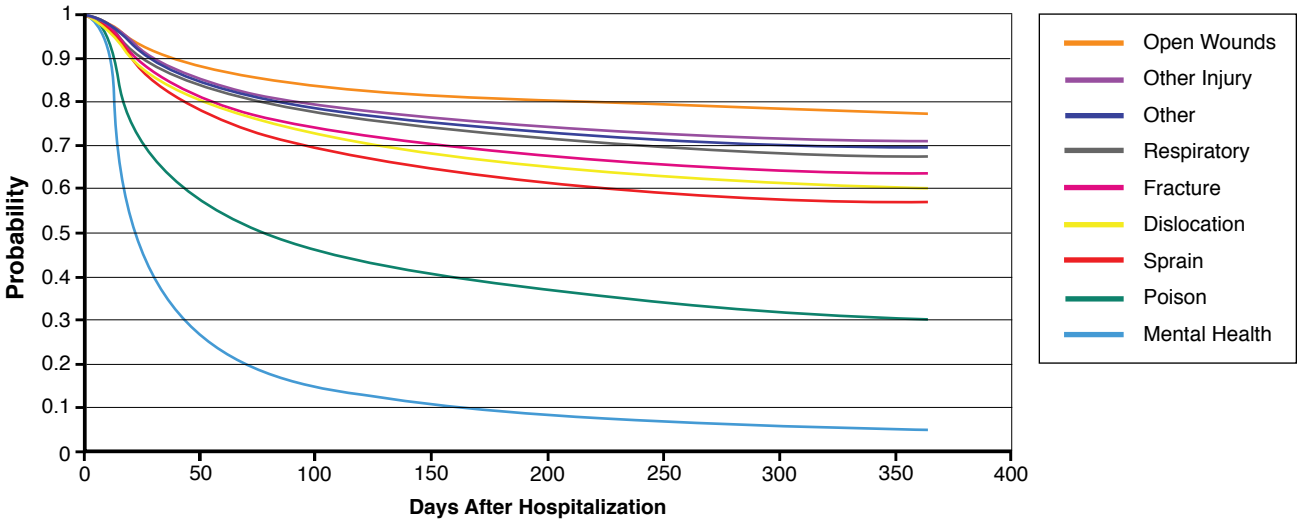


**Fig. 4-9.** Retention probability after hospitalization for various causes during the first 6 months of service: active duty enlistees, 1995–1999. Log-rank test of significance $P < .01$.
Reproduced from: *Accession Medical Standards Analysis and Research Activity Annual Report 2001*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2002. AD-A416840. Available at: http://www.amsara.amedd.army.mil/reports/2001/STUDIES.htm. Accessed September 27, 2005.

of active duty enlistees after hospitalization for various causes during the first 6 months of service.[1] These results are from a study that focused on injury hospitalizations, so injury-related conditions are shown separately, and other categories such as mental health are shown in aggregate. Subjects were tracked for any hospitalization during the first 6 months of service; those who were hospitalized were then followed for up to a year for any-cause attrition. Estimated curves are based on observation of all active duty enlistees who began service from 1995 through 1999.

Over 90% of those with an early hospitalization for a mental health condition were discharged within a year after the hospitalization, with most of the discharges occurring almost immediately after hospitalization; at 50 days after hospitalization less than 30% of these individuals were still in the service. The hospitalization condition next most likely to be followed by discharge was poisoning, although poisoning was a much less common cause of hospitalization. It is possible that poisoning is related to mental health conditions, because some poisonings might be intentional.

The conditions least likely to be followed by early attrition were open wound injuries, injuries not falling into any of the specified categories, and respiratory illness. For these conditions, it is difficult to know how attrition rates over time would compare to the expected rates among enlistees who were never hospitalized. It is clear, however, that most of these hospitalizations are followed by successful retention for at least 1 year after hospitalization.

### EPTS Case Series Reviews

Roughly 5% of all new active duty enlistees (excluding US Air Force recruits) are discharged within 6 months of enlistment due to complications of medical conditions that existed prior to service (see Table 4-3). With the FY 2003 cost to recruit, access, and train a new enlistee estimated to be as high as $35,000,[2] EPTS discharges constitute an expensive problem for the military. While it is possible some of these discharges were given as an expeditious means of discharging a recruit deemed unable to succeed in the military for other reasons, EPTS discharges are nonetheless a significant source of early attrition.

Before progress can be made in reducing EPTS attrition, more must be known about how and why the problem arises. For example, some recruits may experience problems with a condition they were unaware of until it presented under the rigors of basic training. In other cases, the condition may have been known to the recruit, who chose not to reveal it at the time of medical screening at the MEPS. In still other cases, a MEPS medical examiner might have deemed a condition as not disqualifying, or a medically disqualified recruit might have later received an accession medical waiver.

Possible solutions to these scenarios could include revised medical screening procedures, attempts to improve recruit recollection and reporting of medical history, and revised criteria for accession medical waiver approval. Recent and ongoing research focuses

on developing medical and psychosocial history questionnaires that identify recruits at risk for training-related injury or disability and early attrition.[2,19–22] Such measures, however, must be considered in terms of their potential for reducing EPTS, cost, and possibility of unnecessarily eliminating recruits who might have served successfully.

AMSARA has conducted 17 case series reviews of EPTS discharges for relatively common medical conditions. The year these reviews were published in the AMSARA annual report, the study period, and the number of records reviewed are detailed in Table 4-5. In general, each of these reviews is a retrospective descriptive analysis of recruits discharged for a particular pre-existing medical condition. Data were abstracted from the recruits' entrance histories, physical examinations, and medical records from the basic training sites. Factors evaluated typically included age, sex, and race of recruit; duration of diagnosis; whether the condition was detected at MEPS, concealed, or undiagnosed; when and how the condition presented during training; severity of the condition; whether treatment was offered; and presence of any comorbidity. Details of these reviews are available in the electronic versions of the AMSARA Annual Reports on its Web site: www.amsara.amedd.army.mil.

### Accuracy of Initial Entry Training Discharge Classification Types (Fort Leonard Wood Study)

Attrition during initial entry training (IET) results in the loss of one third of recruits before the end of their first enlistment. The most common types of IET Army discharges covered by Army Regulation 635-200 are chapters 5-11, existed prior to service (EPTS); 5-17, other mental and physical (OMP) conditions; and 11, entry level separation (ELS), which includes character, conduct, and performance problems.[23] To document how often multiple causes for discharge coexist within these categories, AMSARA conducted a review of the IET discharges occurring at Fort Leonard Wood (FLW), Missouri, during FY 2003.

**TABLE 4-5**

**EXISTED PRIOR TO SERVICE DISCHARGE CASE SERIES REVIEWS: BY MEDICAL CONDITION, REPORT YEAR, AND NUMBER OF RECORDS REVIEWED**

| Year of Report | Medical Condition | Study Period | Records Reviewed |
|---|---|---|---|
| 2001* | Hernia | 1997–1999 | 139 |
| | Hepatitis | 1997–1999 | 115 |
| | Temporomandibular | 1997–1999 | 103 |
| | Thyroid | 1997–1999 | 75 |
| | Diabetes mellitus | 1997–1999 | 39 |
| | Abnormal pap smear | 1997–1999 | 98 |
| | Varicocele | 1997–1999 | 91 |
| | Enuresis | 1997–1999 | 332 |
| 2002* | Hearing loss | 1998-2000 | 240 |
| | ADHD | 1999 | 137 |
| | Scoliosis | 1999–2000 | 258 |
| | Low back pain | 2001 | 265 |
| 2003† | Depression | 2001 | 210 |
| | Pes planus | 2001 | 202 |
| | Hypertension | 1999–2001 | 164 |
| | Headache | 2001 | 117 |
| | Retropatellar pain | 2001 | 108 |
| 2004‡ | Myopia | 2000–2002 | 143 |

* Available at: http://www.amsara.amedd.army.mil. Accessed September 27, 2005.
† Data source: *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.
‡ To be published in the 2004 AMSARA annual report.
ADHD: attention deficit with hyperactivity disorder

A total of 2,431 soldiers discharged from FLW from 1 October 2002 through 30 September 2003 from within the top three discharge categories (EPTS, OMP, and ELS) were included in this study. A selective record review was conducted of the three discharge types for coexistence of reasons for discharge. In particular, the reviewers looked for evidence of coexisting medical reasons for discharge in OMP and ELS cases and coexisting administrative reasons in OMP and EPTS cases, based on established criteria. Evidence of coexistence was sought from analysis of medical care and diagnoses, as well as counseling statements received by discharged cases.

The review revealed medical coexistence in approximately 13% of ELS discharges and administrative coexistence in none of the EPTS discharges. In OMP cases, 17% revealed medical coexistence, and 10% revealed administrative coexistence. Interestingly, a higher percentage of enlistees discharged for OMP conditions used mental health clinics than those with ELS discharges. Approximately 50% of enlistees discharged for OMP conditions had evidence of nonadjustment mental disorder diagnoses (eg, affective, anxiety, and depressive). Psychiatric conditions, however, accounted for only 2.2% of EPTS diagnoses, an amount less than expected in this population based on historical experience at IET sites.

The results of this study suggest a significant proportion of recruits discharged during IET have more than one potential reason for discharge. In particular, enlistees discharged for OMP conditions may include individuals with either preexisting medical conditions (including mental disorders) or administrative problems that could result in discharge. The complete lack of nonmedical coexistence among those with an EPTS discharge indicates that EPTS may be the least convenient or expeditious means of discharge and is currently used only when there is no other choice. However, relying on discharge classifications to track trends in specific causes, such as mental health disorders, may significantly underestimate the prevalence of various causes. The study results demonstrate that the use of multiple databases and occasionally record reviews, while labor intensive, may more accurately measure the burden of preexisting disease in IET attrition.

**Survival Analyses of Recruits Granted Accession Medical Waivers**

Roughly 6,000 recruits per year begin active duty enlisted service with an accession medical waiver for at least one disqualifying condition. In order to examine the efficacy of the medical disqualification and subsequent waiver processes, several "survival analysis" studies have been conducted of individual waived conditions. In these studies, first-time active duty enlistees with an accession medical waiver for a particular condition are selected, and a matched comparison group of medically qualified enlistees is randomly selected, most often in a 1 to 3 ratio. The comparison subjects are matched to their corresponding waiver subjects on age group, sex, race, service branch, and month of beginning service, factors which have all been documented to affect the likelihood of premature attrition.

All subjects are tracked from the beginning of service for up to 3 years for adverse medical events and loss from the service. Due to variations in discharge classification between services and over time, all-cause attrition is generally used as the primary outcome in attrition studies. Retention ("survival") patterns among the waiver group are compared to those of the matched subject group and examined for both statistical and military significance.

Table 4-6 shows medically disqualifying conditions that have been formally examined by survival analysis. The studies include examinations of several musculoskeletal conditions (knee problems, back problems, pes planus, and scoliosis) and two mental conditions (attention deficit with hyperactivity disorder [ADHD]) and depression and related disorders). These two general medical categories account for a sizable portion of early hospitalizations and medical discharges (although not necessarily among individuals granted waivers) and thus are of high interest for study.

The statistical significance of differences in predicted survival curves are summarized in Table 4-7. Increased attrition is designated as "high" and reduced attrition designated as "low." The most significant results were found in the Army, where individuals waived for knee pain, back pain, skin problems, depression and related disorders, and hearing disorders, all had higher levels of attrition over time than their matched comparison counterparts. On the other hand, Army recruits with a waiver for asthma actually had significantly lower likelihood of attrition over time than their matched counterparts.

The Navy and Marine Corps each showed significantly elevated attrition for four of the specific conditions as well as for all waivers as a whole. The Air Force had few waiver approvals for any of the conditions considered, making it difficult to detect effects on attrition. For all waivers as a whole, however, there was a significantly elevated attrition risk compared with fully qualified personnel.

The above results demonstrate some statistical differences in attrition likelihood between individuals requiring a medical waiver and those fully medically qualified. It is important, however, to look at the degree to which survival differs between the two groups.

**TABLE 4-6**

**WAIVER SURVIVAL STUDIES OF VARIOUS MEDICALLY DISQUALIFYING CONDITIONS**

| Year of Report | Medical Condition | No. of Subjects |
|---|---|---|
| 1998* | Knee | 281 |
| 1999* | Back | 248 |
| | Skin and related tissue | 334 |
| 2000* | Asthma | 1,510 |
| | ADHD | 508 |
| | Depression and related disorders | 502 |
| | Any/all medical waivers | 25,716 |
| 2002* | Hearing deficiency | 2,935 |
| 2003† | Hypertension | 1,039 |
| | Pes planus | 1,499 |
| | Scoliosis | 271 |
| | Headaches | 696 |
| 2004‡ | Myopia | 1,589 |

*Available at: http://www.amsara.amedd.army.mil. Accessed September 27, 2005.
†Data source: *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.
‡To be published in the 2004 AMSARA annual report.
ADHD: attention deficit with hyperactivity disorder

**TABLE 4-7**

**EFFECT ON ATTRITION FOUND IN WAIVER SURVIVAL ANALYSES COMPARING WAIVED AND MATCHED FULLY QUALIFIED ACTIVE DUTY ACCESSIONED ENLISTEES, BY MEDICAL CONDITION AND SERVICE**

| Waiver Condition | DoD | Army | Navy | Marines | Air Force |
|---|---|---|---|---|---|
| Knee | none | high | none | none | none |
| Back | N/A | high | none | none | N/A |
| Skin and related tissue | high* | high* | none* | high* | N/A |
| Asthma | low | none | none | none | none |
| ADHD | none | none | none | none | none |
| Depression and related disorders | high | high | high | high | N/A |
| Hearing deficiency | high | high | high | none | N/A |
| Hypertension | none | none | low | none | N/A |
| Pes planus | high | high | high | high | none |
| Scoliosis | high | high | high | high | N/A |
| Headache | none | none | none | none | none |
| Myopia | none | none | none | none | none |
| Any/all medical waivers | high† | high† | high† | high† | high† |

*Study examined medical outcomes only—hospitalization, existed prior to service discharge, and disability discharge—rather than total attrition as in other studies in this table.
†Comparison subjects were all recruits over the same time period and were not matched.
ADHD: attention deficit with hyperactivity disorder
N/A: not applicable
Data source: *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.

Statistical significance depends in part on sample size and therefore does not always correspond to military significance. Survival curve comparisons, shown below for a few of the more prevalent waiver conditions (hearing deficiency, asthma, and depression), give a more complete picture of the effect of waivers on the likelihood of early attrition.

### *Hearing Deficiency*

Figure 4-10 shows the estimated survival curves of Army recruits with a waiver for hearing deficiency and their matched comparison subjects. Table 4-7 showed that the hearing waiver group had a significantly lower estimated survival rate than the matched comparison group. However, differences in these curves, while statistically significant overall, are not large at any given length of service. For example, the estimated probability of retention at 6 months of service is 82% among those granted waivers for hearing deficiency, as compared to 86% for their matched counterparts. At 1 year of service, the corresponding probability estimates are 78% and 82%, respectively.

The results of the hearing deficiency survival analysis suggest that changes in the disqualification or waiver policy for hearing deficiency might not be warranted. The likelihood of failure among those with hearing deficiency is high enough that the military might not wish to make the hearing accession standard more lenient. An attempt to make the waiver criteria more restrictive for this condition might result in the elimination of recruits who could successfully serve while preventing only a fairly small amount of excess attrition. Under the current climate of shortages in qualified recruits, such a trade-off might not be cost-effective.

### *Asthma*

Figure 4-11 shows the survival curves describing military retention among individuals in all services who were granted an accession waiver for history of asthma and among their matched comparison subjects. Anecdotal evidence from consultations with service waiver authorities suggests that enlistees with waivers for asthma generally do not have active disease as manifest by either symptoms or treatment. The figure shows that the retention likelihood over the first 2 years of service is higher among the waiver group than among the fully qualified group. While this difference was not large, it gives a fairly clear indication that those allowed to serve with a known history of asthma have been retained at least as well as other recruits. Service-specific analyses revealed that this was true regardless of service branch.

These findings, along with input from service

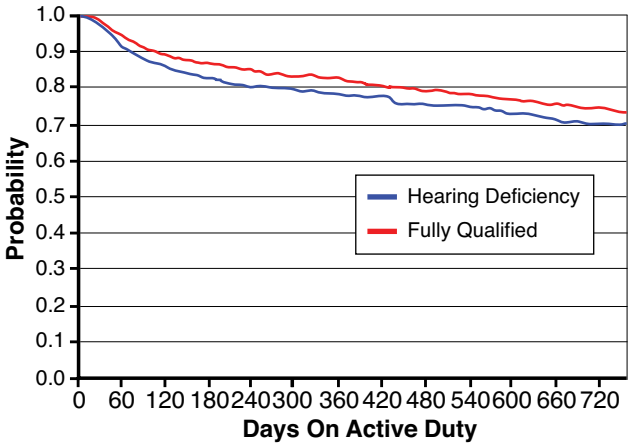


**Fig. 4-10.** Probability of remaining on active duty: active duty enlistees granted accession waivers for hearing deficiency vs matched fully qualified comparison subjects in the US Army, 1995–2000. Log-rank test of significance $P < .01$.
Data source: *Accession Medical Standards Analysis and Research Activity Annual Report 2002*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2003. AD-A416695. Available at: http://www.amsara.amedd.army.mil. Accessed September 27, 2005.

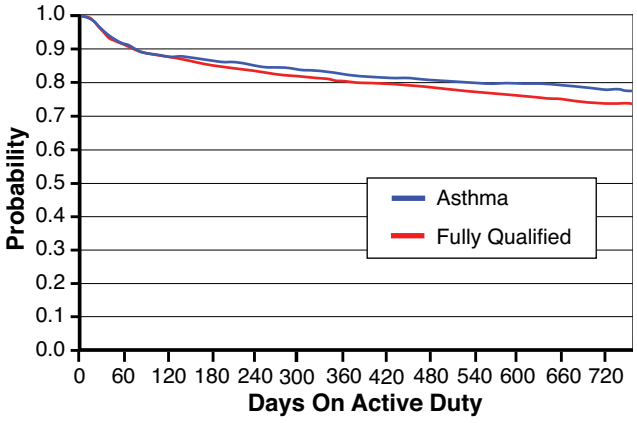


**Fig. 4-11.** Probability of remaining on active duty: active duty enlistees granted accession waivers for history of asthma vs matched fully qualified comparison subjects in all US services, 1995–1999. Log-rank test of significance $P = .05$.
Reproduced from: *Accession Medical Standards Analysis and Research Activity Annual Report 2000*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2001. AD-A397004. Available at: http://www.amsara.amedd.army.mil/reports/2000/STUDIES.htm. Accessed September 27, 2005.

waiver authorities on criteria for granting waivers for asthma history, formed the basis for changes made in 2004 to the accession standard for asthma. In particular, individuals with no asthma symptoms or diagnosis since childhood are currently qualified to enter the service (barring any other disqualifying conditions) without need of an accession waiver. The Navy has commissioned an AMSARA study of the feasibility of retaining enlistees who are found during the course of basic training to have mild asthma (see further discussion of the study below).

### *Depression and Related Disorders*

The only medical condition studied for which attrition was dramatically higher than among matched comparison subjects for all services was "depression and related disorders" (Figure 4-12).[24] It is clear that the survival curve for those granted a waiver for history of depression is considerably lower over time than that for the fully qualified comparison subjects. For example, the estimated probability of retention at 6 months of service is 76% among those granted waivers for depression and related conditions, as compared to 84% for their matched counterparts. At 1 year of service, the corresponding probability estimates are 70% and 81%, respectively. Anecdotal evidence from consultations with service waiver authorities suggests that enlistees with waivers for depression generally do not have active disease as manifest by either symptoms or treatment.

These numbers provide some evidence that waiver criteria for history of depression should perhaps be more restrictive. One difficulty with this approach, however, is that detecting a history of depression often depends on the applicant volunteering that history. If the waiver criteria for this condition are made too restrictive, applicants might be discouraged from revealing any history of depression episodes, thereby taking the decision out of the hands of the medical examiners and waiver authorities. The review of EPTS discharges for depression indicated that concealment is currently quite common for conditions of this nature. (For a detailed discussion of one effort to develop a mechanism for detecting a history of psychiatric disorders, see "Screening for Psychiatric Disorders" in chapter 3.) Complete details on all of the waiver survival studies described in this chapter are available on the AMSARA Web site: www.amsara.amedd.army.mil.

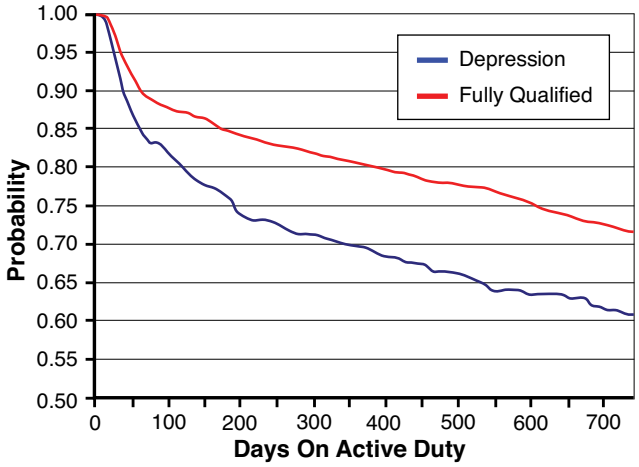


**Fig. 4-12.** Probability of remaining on active duty: active duty enlistees granted accession waivers for history of depression and related disorders vs matched fully qualified comparison subjects in all US services, 1995–1999. Log-rank test of significance $P < .01$.
Data source: *Accession Medical Standards Analysis and Research Activity Annual Report 2001*. Fort Belvoir, Va: Walter Reed Army Institute of Research and Defense Technical Information Center; 2002. AD-A416840. Available at: http://www.amsara.amedd.army.mil. Accessed September 27, 2005.

## EFFICACY TRIAL OF THE US NAVY ACCESSION POLICY ON ASTHMA

Frequently no data exists to help predict the future effects a proposed change in medical accession standards might have on morbidity and attrition. The following study was an attempt to provide such data by prospectively following selected recruits on active duty with mild asthma.

Policies affecting retention on active duty have historically been made in response to economic and political pressures, not always with a careful study of the effect of the policies. A project called "Retention of Mild Asthmatics in the Navy" (REMAIN) was designed to provide outcome measures related to the US Navy's decision to retain mild asthmatics first identified during recruit training. Before this study, the Navy routinely discharged individuals with diagnosed mild, moderate, or severe asthma, resulting in more than 500 discharges per year at an annual cost of more than $3 million.

To evaluate the impact of retaining mild asthmatics on active duty, a nested case-control study was conducted at Great Lakes Naval Training Center, Illinois, from 26 July 2000 through 25 July 2002. Recruits determined to have mild asthma (as defined by the second expert panel of the National Asthma Education and Prevention Program)[25] were started on standard asthma treatment and returned to basic training. Three recruits without asthma were matched to each recruit

with asthma based on gender, age, race, and date of entry onto active duty. Asthma patients and control subjects were monitored for outpatient visits, hospitalizations, and early discharge through August 2003.

During the 2 years of the study, 136 cases and 404 controls were documented. Discharge before graduation from recruit training was significantly higher for recruits retained with mild asthma compared with control subjects: 45% (61/136) and 16% (63/404), respectively. Discharge for persistent asthma symptoms (30/136) and mental health diagnoses (10/136) account for the higher discharge rate among individuals with asthma. However, among recruits who graduated from recruit training, there was no difference in retention between recruits with asthma and control subjects: 72% and 70%, respectively. No hospitalizations or deaths related to asthma occurred during the study.

At the end of the study, 40% of the recruits (54/136) who would have been discharged under the previous policy were still on active duty. Early discharge for asthma was reduced from 500 in 1998 to 140 in 2002, a difference greater than the number of recruits with mild asthma (~65 per year) who were given a trial on active duty since 1999.

Project REMAIN provides evidence that supports the Navy policy of retaining recruits first identified with mild asthma during training. Recruit training is a stressful adjustment period that appears to effectively screen out those who cannot serve successfully in the military because of mental or physical problems. After graduating from basic training, there appears to be no difference among those diagnosed with mild asthma and the matched control subjects. This significant proportion (40%) of recruits remaining on active duty without adverse effect represents an overall cost savings to the military.

## SUMMARY

The US military services depend on a large annual accession population each year to meet force requirements. The accession process requires validated standards, effective screening, and efforts to minimize premature attrition. This chapter has summarized some of the research being conducted to support these efforts.

Among the roughly 170,000–180,000 enlistees since 1999 who begin training each year in the military, approximately 8,900 (5%) experience an inpatient hospitalization during the first year of service. Hospitalization has been more frequent among females than males and has increased in likelihood by age at the time of accession.

Discharges for EPTS conditions and for medical disability among new enlistees in the US Air Force and Army were summarized according to medical condition and demographic factors. The likelihood of EPTS discharge was significantly related to all demographic factors considered, whereas the likelihood of disability discharge was significantly related only to sex and age. There are considerably more EPTS discharges than disability discharges among new enlistees (even when taking into account the lack of disability data for the Marines and Navy), indicating that most medical problems resulting in discharge early in service are attributable to preexisting conditions.

Attrition within the first 6 months after an early hospitalization differs dramatically according to the condition for which the individual was hospitalized. Mental health conditions account for more early hospitalizations than any other medical category, and are strongly related to subsequent attrition. Less than 10% of individuals hospitalized early in service for a mental health condition are still in the service 6 months after hospitalization.

AMSARA research has examined many aspects of the medical attrition problem among new enlistees. A series of studies has focused on discharges for a variety of preexisting medical conditions, yielding information on how individuals were able to join the military with these conditions and on whether changes to the accession process may be warranted to reduce these problems.

Another series of studies has focused on the likelihood of successful retention in the service of enlistees who require an accession medical waiver to begin service. It was seen that the likelihood of retention strongly depends on the medical nature of the disqualifying condition for which a waiver is granted. For example, enlistees who required a waiver for history of ADHD were retained at the same rates as recruits who did not require any waiver. In contrast, enlistees granted a waiver for a history of mental health problems were significantly less likely to be retained than those who required no waiver. It was noted, however, that several factors must be taken into account in considering any changes to the disqualification and accession medical waiver processes as a result of these studies, such as the effects on total manpower and on applicant candidness during accession medical screening.

In summary, interpretation of such studies for policy purposes requires more than an assessment of statistical significance. The numbers of individuals impacted by any revised policy, the potential effect on applicant forthrightness about medical status, and other factors

must be considered. Research has contributed substantially to the advancement of the goal to maximize accession and minimize attrition. Future gains may include improved screening practices, identification of groups at risk of attrition, and intervention efforts to minimize attrition.

## REFERENCES


1. *Accession Medical Standards Analysis and Research Activity Annual Report 2000*. Walter Reed Army Institute of Research and Defense Technical Information Center. Fort Belvoir, Va: 2001. Report AD-A397004.

2. US Department of Defense. *Military Manpower Training Report FY 2002*. Washington, DC: Defense Manpower Data Center; 2002. Report A461104.

3. Bob Clark, Deputy Under Secretary of Defense, Personnel and Readiness, Accession Policy. Personal communication, June 3, 2005.

4 Edwards RJ, Price DR. Descriptive analysis of medical attrition in US Army aviation. *Aviat Space Environ Med*. 1989;60: A92–A97.

5. Booth-Kewley S, Larson GE, Ryan MA. Predictors of Navy attrition. I. Analysis of 1-year attrition. *Mil Med*. 2002;167:760–769.

6. Cigrang JA, Carbone EG, Todd S, Fiedler E. Mental health attrition from Air Force basic military training. *Mil Med*. 1998;163:834–838.

7. Cox KA, Clark KL, Li Y, Powers TE, Krauss MR. Prior knee injury and risk of future hospitalization and discharge from military service. *Am J Prev Med*. 2000;18(suppl 3):112–117.

8. Knapik JJ, Canham-Chervak M, Hauret K, et al. Discharges during US Army basic training: Injury rates and risk factors. *Mil Med*. 2001;166:641–647.

9. Conrad FE, Barry JS, Patterson PH. Stress, adjustment, and attrition at West Point: Clinical aspects. *Mil Med*. 1976;141:864–867.

10. Bronzo AF Jr. Preliminary investigation of AFROTC cadet attrition. *J Psychol*. 1967;66:185–190.

11. Clark KL, Kelley PW, Mahmoud RA, et al. Cost effective syphilis screening in military recruit applicants. *Mil Med*. 1999;164:580–584.

12. *Accession Medical Standards Analysis and Research Activity Annual Report 2002*. Walter Reed Army Institute of Research and Defense Technical Information Center. Fort Belvoir, Va: 2003. Report AD-A416695.

13. Kaufman KR, Brodine S, Shaffer R. Military training-related injuries: Surveillance, research, and prevention. *Am J Prev Med*. 2000;18(suppl 3):54–63.

14. Kelley EW, Bradway LF. A team approach to the treatment of musculoskeletal injuries suffered by Navy recruits: A method to decrease attrition and improve quality of care. *Mil Med*. 1997;162:354–359.

15. Knapik JJ, Hauret KG, Lange JL, Jovag B. Retention in service of recruits assigned to the Army physical fitness test enhancement program in basic combat training. *Mil Med*. 2003;168:490–492.

16. Pope RP, Herbert R, Kirwan JD, Graham BJ. Predicting attrition in basic military training. *Mil Med*. 1999;164:710–714.

17. Cigrang JA, Carbone EG, Todd S, Fiedler E. Mental health attrition from Air Force basic military training. *Mil Med*. 1998;163:834–838.

18. Hoge CW, Lesikar SE, Guevara R, et al. Mental disorders among US military personnel in the 1990s: Association with high levels of health care utilization and early military attrition. *Am J Psychiatry*. 2002;159:1576–1583.

19. Larson GE, Booth-Kewley S, Ryan MA. Predictors of Navy attrition, II: A demonstration of potential usefulness for screening. *Mil Med*. 2002;167:770–776.

20. Ko HC, Lu RB, Shen JJ, Shyu LY. Construction of a screening inventory for major mental disorder in the Army. *Ann Acad Med Singapore*. 1997;26:8–12.

21. Lubin B, Fiedler ER, Van Whitlock R. Mood as a predictor of discharge from Air Force basic training. *J Clin Psychol*. 1996;52:145–151.

22. Larson GE, Booth-Kewley S, Merrill LL, Stander VA. Physical symptoms as indicators of depression and anxiety. *Mil Med*. 2001;166:796–799.

23. US Department of the Army. *Personnel Separations: Active Duty Enlisted Administrative Separations*. Washington, DC: Headquarters, DA; 2004. Army Regulation 635–200.

24. Clark KL, Li Y, Krauss MR, Kelley PW. The asthma accession standard: A survival analysis of military recruits, 1995 to 1997. *Mil Med*. 2000;165:852–854.

25. National Heart, Lung and Blood Institute. *Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma*. Rockville, Md: National Institutes of Health. 1997. Report 97-4051.

## ATTACHMENT: DATA SOURCES AND LIMITATIONS

The results presented in this chapter are from multiple data sources. This section describes these data sources and their limitations for research and analysis.

### Active Duty Enlistee Gain and Loss

Morbidity and attrition are presented in this chapter in terms of percentages of all new active duty enlistees. This provides a basis for comparisons over time and across demographic strata and allows for examination of outcomes according to length of service. Accordingly, each of the analyses in this chapter examines active duty enlistees with an accession record during the time period covered.

The Defense Manpower Data Center (DMDC) provides data on individuals entering military service (gain or accession) and on individuals leaving military service (loss). Gain/loss data are the primary sources of information about who is, or has been, in the military, including the dates an individual began and left duty. From this information, the length of service can be determined for any individual entering and leaving during the periods studied. This information is vital to survival analysis and attrition studies such as those presented later in this chapter.

Gain data include approximately 50 variables, including personal identifiers (eg, name and social security number [SSN]) for linking with other data; demographics (eg, age, education, and Armed Forces Qualification Test [AFQT] score); and service information (eg, date of entry and basic training site). Loss data also include approximately 50 variables, many of which are the same as those found in the gain file but reflecting the individual's status at the time of loss. The variables of primary interest are personal identifiers for linking with other data, loss date for computing length of service, and the interservice separation code as a secondary source of the reason for leaving the military.

A problem with the loss data lies in the classification of the reason for discharge. Considerable anecdotal information from several training sites indicates that a large portion of discharges fail to fit neatly into one discharge category. For example, a trainee with a debilitating medical condition might also be insufficiently motivated to overcome that obstacle. In such a case, the means by which the individual is discharged tends to be the more expeditious one. For example, if medical personnel and resources are scarce, a behavioral discharge might be the preferred route. Conversely, if the behavioral discharge is expected to take longer, the medical discharge route might be taken.

### Hospitalization

The Patient Administration Systems and Biostatistics Activity of the US Army Medical Department has provided hospitalization data on a yearly basis for all services except the Coast Guard. These data contain information on admissions of active duty officers and enlisted personnel to any military hospital. Information on each visit includes SSN, demographics, and details about the hospitalization. In particular, the medical nature of the hospitalization is coded according to the *International Classification of Diseases*, 9th Revision (ICD-9), with up to eight codes per record to describe all conditions found.[1] Date of admission, date of disposition, number of sick days, number of bed days, and indicators of the medical outcome (such as duty, limited duty, and convalescent leave) are also included.

Uncertainty over the coverage and ramifications of the Health Insurance Portability and Accountability Act of 1996 resulted in a delay of hospitalization data transmission for services other than the Army in 2003.[2] Accordingly, hospitalization data are only summarized through 2001.

### Existed Prior to Service Discharges

Discharges during the first 180 days of service for medical conditions that existed prior to service (EPTS) constitute roughly one third of all attrition during initial entry training. Accordingly, these discharges are of vital interest to studies of early attrition. A discharge for a medical condition can be classified as an EPTS discharge if the condition was verified to have existed before the recruit began service and if the complications leading to discharge arose no more than 180 days after the recruit began duty. US Military Entrance Processing Command (USMEPCOM) requests a copy of official paperwork on all EPTS discharges and records certain information about each one. This information includes a rough medical categorization (20 categories) of the reason or reasons for discharge and a judgment on why (eg, concealment, waiver, or unawareness) the person was not rejected for enlistment because of the preexisting condition. Since August 1996, this paperwork has been regularly analyzed for additional data extraction, including more specific coding of medical conditions. However, the provision of EPTS discharge paperwork to USMEPCOM, although encouraged, is not a regulatory requirement, and the data may therefore be incomplete. Furthermore, these records are the only direct source of information on EPTS discharges, so it is difficult to get a reliable estimate of the reporting compliance rates.

See Table 4-2 for a summary of the numbers of records provided to USMEPCOM from 1997 through 2002.[3] The numbers of records have been unstable over time for nearly all basic training sites. Some of this variability may be due to real fluctuations in EPTS discharge rates or to changes in the numbers of at-risk individuals, although accession numbers of active duty personnel at the service level have been fairly stable over this period (data not shown). Another possible source of fluctuation is changes in personnel and medical policies for categorizing discharges.

Underreporting, however, is clearly a major source of fluctuation in the numbers of reported records. For example, Lack-

land Air Force Base, Texas, provided only 105 EPTS records in 2000 and 228 records in 2001 but sent close to 1,000 records in each of the 3 previous years. A similarly dramatic drop in EPTS records from the Marine Corps Recruit Depot San Diego, California, occurred during 2001 and 2002. More generally, all training sites have had fluctuation in EPTS numbers well beyond what could be expected from random variation.

In light of these shortcomings in the data, comparisons of EPTS discharges across services should be interpreted with caution. Disparities may reflect differences in reporting procedures more than actual differences in discharge likelihood. Furthermore, counts of EPTS records are not all EPTS discharges, only discharges for which data were reported.

### Disability Discharges

Data on disability discharge considerations are compiled separately for each service at its disability agency. The US Army agency has provided data on all disability discharge considerations from 1995 to the present. The Air Force also provides such data, but technical difficulties prevented transmission of data for discharges during 2002. The Navy and Marine Corps agency provides data in response to specific diagnosis requests rather than for all actions.

The Army and Air Force physical disability agencies provide information on all disability cases considered, including personal identifiers, program (eg, regular enlisted, Academy, and officer); date of consideration; and disposition (eg, permanent disability, temporary disability, or return to duty as fit). For individuals receiving a disability discharge, medical condition codes and degree of disability are also included.

The medical condition or conditions involved in each case are described using the condition codes of the Veterans Administration Schedule for Rating Disabilities. Less comprehensive than ICD-9 codes, this set of codes was developed to classify medical conditions for degrees of disability. In some cases, the disabling condition does not have an associated code, so the code most closely resembling the true condition is used. Summary tables of disability discharges must therefore only use broad categories of disability condition codes rather than attempting to interpret specific codes.

Sources: (1) Patient Administration Systems and Biostatistics Activity (PASBA) Web site. Available at: http://www.pasba.amedd.army.mil/ Accessed December 28, 2004. (2) The Health Insurance Portability and Accountability Act of 1996. Pub Law No. 104-191. 21 Aug 1996. Available at: http://aspe.hhs.gov/admnsimp/pl104191.htm . Accessed December 28, 2004. (3) *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.