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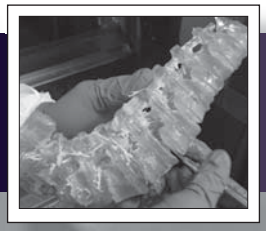
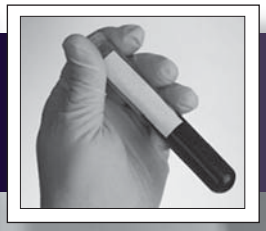

MEDICAL SURVEILLANCE MONTHLY REPORT

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Traumatic Brain Injury among Members of Active Components, U.S. Armed Forces, 1997-2006

U.S. military members constitute a generally healthy, physically active, universally employed, young adult population. However, many military and recreational activities of service members are inherently risky. Not surprisingly, injuries and their sequelae account for more hospitalizations, outpatient encounters, lost duty time and deaths among military members than any other major cause of morbidity or mortality.[1,2]

During peacetime, injuries to the head—for example, from falls, parachute landings, vehicle crashes, athletic activities, fighting—occur relatively frequently among military members. Of course, injuries to the head also affect the brain ("traumatic brain injury" [TBI]). A recent report documented sharply decreasing rates of TBI-related hospitalizations among U.S. Army soldiers during the 1990s.[3] By the end of the decade, TBI-related hospitalization rates among U.S. soldiers were lower than comparable rates among U.S. civilians.[3]

During combat operations, risks of injury to the head—and, in turn, the brain—increase. During the Vietnam war, for example, an estimated 12-14% of all combat casualties had brain injuries (an additional 2-4% had brain injuries plus lethal wounds to other sites).[4] Because mortality after combat-related brain injuries was very high in Vietnam, and because there was relatively little knowledge or clinical interest in evaluating and treating mild TBIs, relatively few casualties of the Vietnam war were treated for traumatic brain injuries in military hospitals.[4]

During the first years of combat operations in Afghanistan and Iraq, approximately 22% of wounded service members who were medically evacuated out of the operational theater had injuries to the head, face, or neck—and likely also, to some degree, the brain.[4,5] Many other combat veterans of Afghanistan and Iraq had mild TBIs that were managed in theater without hospitalization or medical evacuation.[5]

Several factors contribute to the relatively high numbers and proportions of TBIs during operations in Afghanistan and Iraq. Personal protective equipment ("body armor"), including Kevlar helmets and vests, provide better ballistic protection to vital organs (including the brain) now compared to previously.[4] As a result, injuries that may have been lethal before are now survivable and treatable. Also, there is greater clinical awareness of the spectrum of acute effects and the potential long-term effects of even mild TBIs.[4,5] Finally, there are many more blast injuries—primarily, from improvised explosive devices (IEDs)— in this war compared to others.[4,5] By one account, approximately two-thirds of medical evacuations from the operational theater and nearly nine of ten injuries treated at a second echelon medical facility in the theater were related to blast injuries.[5] Explosions (such as those produced by IEDs) cause sudden increases in air pressure which radiate in high pressure ("blast") waves. Blast waves can cause direct damage to internal organs, such as the lungs, gastrointestinal tract, and brain—and indirect damage by producing collisions between individuals and objects put in motion by the overpressure wave.[5]

This report summarizes the number and characteristics of active component service members who received medical care for, and estimates incidence rates and trends of, TBIs from 1997 to 2006. It also compares the reported causes of TBIs that resulted in hospitalizations prior to and since the beginning of the global war on terror.

Methods:

The surveillance period was 1 January 1997 through 31 December 2006. The surveillance population included all individuals who served in an active component of the U.S. Armed Forces any time during the surveillance period. For surveillance purposes, a case of traumatic brain injury (TBI) was defined as any hospitalization or ambulatory visit of an active component service member with a diagnosis (in any position) indicative of a TBI: "skull fracture" (ICD-9-CM codes: 800-804), "intracranial injury" (ICD-9-CM codes: 850-854), and "unspecified head injury" (ICD-9-CM code: 959.01). All data used for analyses were extracted from records routinely maintained in the Defense Medical Surveillance System (DMSS).

Incidence rates and trends of TBI were based on the first documented TBI-related medical encounter per service member during the surveillance period. Causes and circumstances of injuries that resulted in TBI-related hospitalizations were assessed based on NATO Standardization Agreement "cause of injury" (STANAG 2050) and ICD-9-CM "external cause of injury" codes. All TBI-related hospitalizations (including multiple per person, if applicable) were included in cause of injury analyses.

Results:

During the 10-year surveillance period, there were 110,392 active component service members who had at least one TBI-related medical encounter **(Table 1, Figure 1)**. Approximately one of nine (11.6%) first TBI-related (incident) medical encounters were hospitalizations **(Figure**

1). The proportion of incident diagnoses of TBI that were associated with hospitalizations declined by nearly two-thirds from the beginning to the end of the period (1997: 19.2%; 2006: 7.7%).

For the entire period, the overall incidence rate of TBI was 7.97 per 1,000 service members per year (p-yrs). Annual incidence cases and rates sharply increased from 1997 (4.68 per 1,000 p-yrs) to 2001 (9.19 per 1,000 p-yrs) and were relatively stable thereafter (except for a transient decline in 2005) **(Table 1, Figure 1).** The highest annual incidence rate during the 10-year period was in 2006 (10.26 per 1,000 p-yrs).

The overall incidence rate trend generally reflected the trend of incident diagnoses in ambulatory settings. For example, incident diagnoses of TBI that presented in ambulatory settings more than doubled from 1997 to 2001, were relatively stable from 2001 to 2004, transiently declined in 2005, and sharply increased to the highest annual rate of the period in 2006 **(Figure 1).** In contrast, incident diagnoses of TBI that presented during hospitalizations slightly increased from 1997 to 2000, remained relatively stable from 2000 to 2004, and then declined in 2005 and 2006 (to the lowest annual rate of the period) **(Figure 1).**

Among the Services, the rates of incident TBI in the Marine Corps (10.95 per 1,000 p-yrs) and Army (9.39 per 1,000 p-yrs) were sharply higher than the rates in the Air Force (5.99 per 1,000 p-yrs) and Navy (6.65 per 1,000 p-yrs) **(Table 1).** In general, incidence rates of TBI declined sharply with age, were 21% higher among males than females, and were 26% higher among White than Black service members (and intermediate among "others") **(Table 1).**

During the 10-year period, there were a total (incident, recurrent, and followup) of 15,732 hospitalizations that included TBI-related diagnoses **(Table 2).** Prior to and after September 2001, on average, there were 124.6 and 136.8 TBI-related hospitalizations per month, respectively. Thus, since the beginning of the global war on terror compared to the previous 56 months, there were approximately 12 additional (10% more) TBI-related hospitalizations per month.

Nearly one-third of all TBI-related hospitalizations had missing or invalid "cause of injury" codes. Among the others, the most frequently reported causes of injuries that resulted in TBI-related hospitalizations were "falls and miscellaneous" (n=3,569, 33.5%) and "land transport" accidents (n=3,122; 29.3%) **(Table 2).**

The nature and causes of injuries that resulted in TBI-related hospitalizations in the pre-war period differed from those during wartime. Among TBI-related hospitalizations with valid cause of injury codes, prior to September 2001, the most frequently reported causes of injuries were related to "land transport" accidents (n=1,764; 33.8%); after September 2001, the most frequently reported causes of injury were

Figure 1. Number of service members with traumatic brain injury-related medical encounters, by year and clinical setting of the first encounter per person, active components, U.S. Armed Forces, 1997-2006

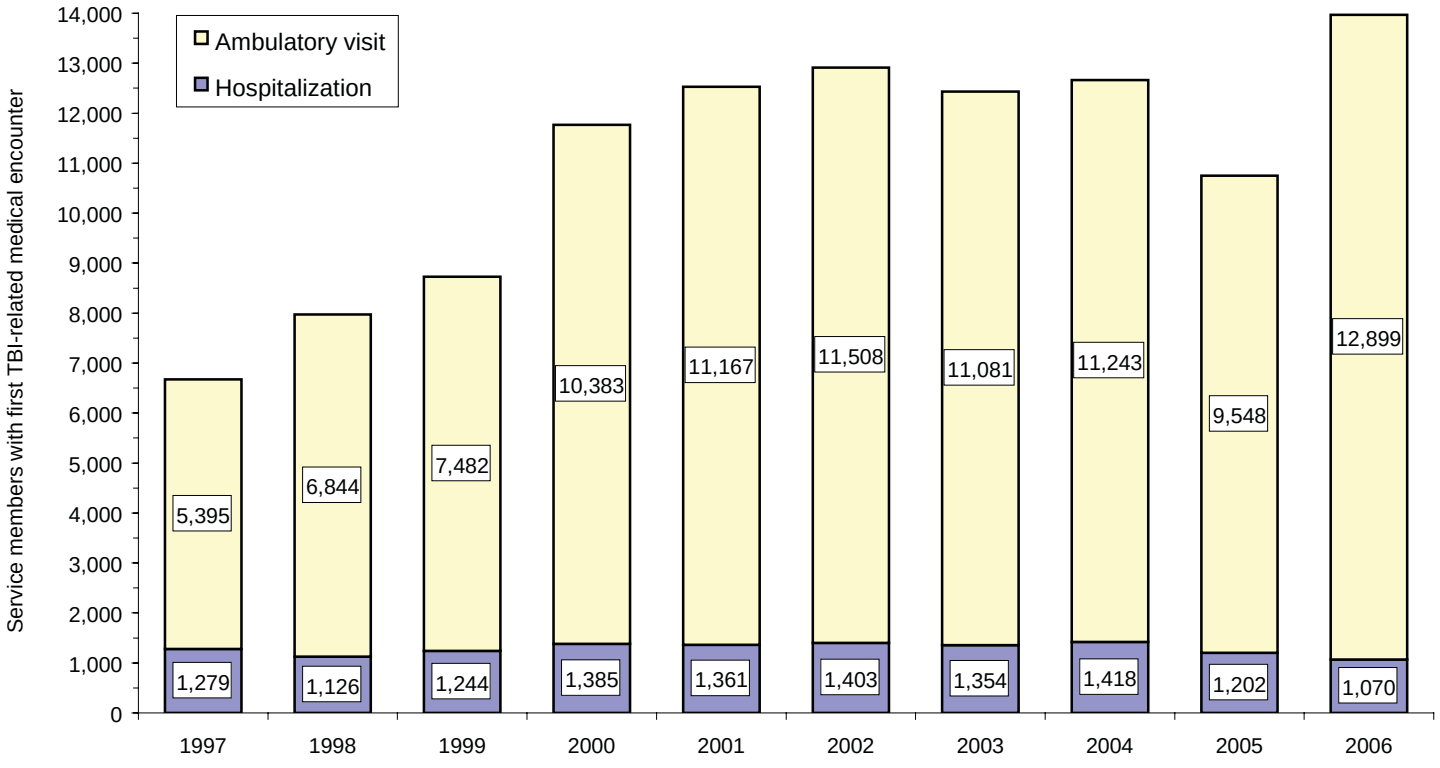

Table 1. Frequencies and rates* of incident medical encounters indicative of traumatic brain injury†, U.S. Armed Forces, 1997-2006

	1997		1998		1999		2000		2001		2002	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Total diagnoses	6,674	4.68	7,970	5.73	8,726	6.41	11,768	8.65	12,528	9.19	12,911	9.29
Service												
Army	2,721	5.65	3,528	7.39	3,602	7.68	4,663	9.86	4,957	10.45	4,979	10.35
Navy	1,633	4.14	1,850	4.90	1,910	5.25	2,738	7.51	2,746	7.45	3,040	8.06
Air Force	1,240	3.30	1,364	3.74	1,609	4.51	2,362	6.73	2,618	7.51	2,577	7.15
Marine Corps	1,080	6.24	1,228	7.17	1,605	9.37	2,005	11.71	2,207	12.85	2,315	13.45
Gender												
Men	5,807	4.72	6,934	5.79	7,652	6.56	10,277	8.84	11,050	9.52	11,272	9.54
Women	867	4.48	1,036	5.35	1,074	5.57	1,491	7.57	1,478	7.33	1,639	7.88
Age (years)												
<20	997	9.08	1,338	11.85	1,320	11.29	2,010	16.15	2,053	16.10	2,029	16.45
20-24	3,008	7.00	3,589	8.56	4,078	9.82	5,480	12.87	6,080	13.72	6,419	13.83
25-29	1,302	4.27	1,533	5.21	1,626	5.78	2,061	7.59	2,115	8.07	2,137	7.97
30-34	667	2.72	695	3.01	809	3.75	1,075	5.20	1,090	5.39	1,059	5.23
35-39	443	2.17	530	2.60	560	2.77	676	3.39	768	3.97	791	4.18
>=40	257	1.97	285	2.20	333	2.58	466	3.54	422	3.13	476	3.33
Race/ethnicity												
Black	1,192	4.21	1,444	5.17	1,494	5.43	2,106	7.60	2,172	7.79	2,205	7.93
White	4,867	4.86	5,668	5.87	6,289	6.73	8,314	8.99	8,887	9.65	9,193	9.76
Other	493	4.48	658	5.84	743	6.42	1,004	8.26	1,116	8.64	1,233	8.99

*Rates expressed as incident (first per person) TBI-related medical encounters per 1,000 person-years.
†Traumatic brain injuries (TBIs) defined as diagnoses (in any position) coded as ICD-9-CM: 800-804 ("skull fracture"), 850-854 ("intracranial injury"), 959.01 ("unspecified head injury").

related to "falls and miscellaneous" (n=1,882; 34.7%) **(Table 2)**. "Battle casualties" accounted for 0.4% and 5.2% of all TBI-related hospitalizations with valid cause of injury codes before and after September 2001, respectively **(Table 2)**.

The largest relative increases in causes of TBI-related hospitalizations from before to after September 2001 were related to "battle casualties" (ratio, TBI-related hospitalizations per month, post:pre Sep 2001: 12.4) and weapons accidents, including "accidents in connection with own instruments of war" and "guns, explosives, and related agents, when not used as instruments of war" (ratio, TBI-related hospitalizations per month, post:pre Sep 2001: 9.4) **(Table 2)**. The largest relative decreases in causes of TBI-related hospitalizations from before to after September 2001 were related to "athletics and sports" (ratio, TBI-related hospitalizations per month, post:pre Sep 2001: 0.55), "intentionally self-inflicted injuries" (ratio, hospitalizations per month, post:pre Sep 2001: 0.65), and "land transport" accidents (ratio, hospitalizations per

Table 2. Traumatic brain injury hospitalizations by cause, U.S. Armed Forces, 1997-2006

	Total		Jan 1997-Aug 2001			Sep 2001-Dec 2006		
	No.	%	No.	%	Mean (per month)	No.	%	Mean (per month)
Unintentional								
Land transport	3,122	19.8	1,764	25.3	31.5	1,358	15.5	21.2
Falls and miscellaneous	3,569	22.7	1,687	24.2	30.1	1,882	21.5	29.4
Athletics and sports	1,026	6.5	629	9.0	11.2	397	4.5	6.2
Weapons accident	526	3.3	45	0.6	0.8	481	5.5	7.5
Intentional								
Assault, non-battle	1,231	7.8	621	8.9	11.1	610	7.0	9.5
Battle casualty/enemy weapon	303	1.9	20	0.3	0.4	283	3.2	4.4
Self-inflicted	113	0.7	65	0.9	1.2	48	0.5	0.8
Other	748	4.8	386	5.5	6.9	362	4.1	5.7
Missing/invalid code	5,094	32.4	1,763	25.3	31.5	3,331	38.1	52.0
Total	15,732	100	6,980	100	124.6	8,752	100	136.8

Table 1 continued. Frequencies and rates* of incident medical encounters indicative of traumatic brain injury†, U.S. Armed Forces, 1997-2006

	2003		2004		2005		2006		Total		
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	Rate ratio
Total diagnoses	12,435	8.81	12,661	8.97	10,750	7.81	13,969	10.26	110,392	7.97	na
Service											
Army	4,503	9.18	5,212	10.60	4,639	9.54	6,417	13.03	45,221	9.39	1.57
Navy	2,997	7.95	2,695	7.27	2,310	6.44	2,660	7.69	24,579	6.65	1.11
Air Force	2,765	7.52	2,617	7.01	1,962	5.55	2,419	7.02	21,533	5.99	1.00
Marine Corps	2,170	12.27	2,137	12.13	1,839	10.30	2,473	13.88	19,059	10.95	1.83
Gender											
Men	10,861	9.05	11,104	9.24	9,474	8.06	12,415	10.67	96,846	8.18	1.21
Women	1,574	7.43	1,557	7.41	1,276	6.34	1,554	7.86	13,546	6.75	1.00
Age (years)											
<20	1,755	15.27	1,667	15.05	1,265	12.87	1,634	13.42	16,068	13.84	4.31
20-24	6,204	12.82	6,319	12.99	5,071	10.79	6,830	14.36	53,078	11.76	3.66
25-29	2,125	7.58	2,366	8.17	2,107	7.14	2,896	10.15	20,268	7.16	2.23
30-34	1,112	5.48	1,082	5.36	1,031	5.20	1,221	6.35	9,841	4.69	1.46
35-39	737	4.04	704	4.04	745	4.43	786	4.87	6,740	3.59	1.12
>=40	502	3.40	523	3.52	531	3.60	602	4.82	4,397	3.22	1.00
Race/ethnicity											
Black	2,010	7.32	1,951	7.34	1,642	6.52	1,839	7.61	18,055	6.67	1.00
White	8,998	9.34	9,347	9.61	7,875	8.24	10,609	11.17	80,047	8.40	1.26
Other	1,187	8.31	1,114	7.86	996	7.21	1,223	7.20	9,767	7.40	1.11

month, post:pre Sep 2001: 0.67) **(Table 2).**

From before to after September 2001, the largest absolute increases in TBI-related hospitalizations per month were those with "missing/invalid" cause of injury codes (TBI-related hosps/mo, post-to-pre Sep 2001: +20.6) **(Table 2).** Of those with valid cause of injury codes, the largest increases were related to weapons accidents (TBI-related hospitalizations per month, post-to-pre Sep 2001: +6.7) and battle casualties (TBI-related hosps/mo, post-to-pre Sep 2001: +4.1); while the largest decreases were for land transport accidents (TBI-related hospitalizations per month, post-to-pre Sep 2001: -10.3) and athletics (TBI-related hospitalizations per month, post-to-pre Sep 2001: -5.0) **(Table 2).**

Editorial comment:

The Centers for Disease Control and Prevention (CDC) has estimated that at least 1.4 million clinically significant TBIs occur annually in the U.S. and that 5.3 million Americans require long-term assistance in performing daily activities as a result of TBIs.[6,7] Yet, in recent months, concerns about the short and long term effects of TBIs have sharply broadened and heightened—among care providers, researchers, policymakers, legislators, government agencies, advocates, and journalists.[8-11]—largely in relation to TBIs from blast among service members in Afghanistan and Iraq. Recent initiatives have focused on improving public awareness, surveillance, clinical detection, assessment, management, and rehabilitation of the short and long term effects of TBIs.

This report puts the problem of TBIs among service members in a broader context than war-related injuries. This report clearly documents that head injuries and associated TBIs have been a major problem among military members for a long time; those suffered during service in Afghanistan and Iraq are a significant number but not the majority of TBIs suffered by military members each year. However, to a great extent, TBIs associated with ongoing combat operations have relatively unique causes, significant comorbidities, and severe clinical and rehabilitation consequences.

For this report, TBIs were estimated from indicator diagnoses—skull fractures; intracranial injuries, including concussions, contusions, lacerations, and hemorrhages; and unspecified head injuries—that were reported on standardized records of ambulatory visits and hospitalizations in fixed (e.g., not deployed or at sea) health care facilities. Because some head injuries do not produce clinically significant brain injuries, some cases of TBI included in this report may have been "false positive" TBIs. On the other hand, cases diagnosed and treated in deployed facilities—but not followed up in fixed facilities after deployment—were not ascertained. Also, the ICD-9-CM codes used to identify cases for this summary were based on the CDC's standard TBI case definition for data systems.[6] Cases not documented with TBI-specific ICD-9-CM codes—as, for example, blast-related TBIs that present with headache, tinnitus, sleep disturbance, abdominal pain, acute stress reaction, and/or PTSD—were not included

as cases for this summary. Finally, service members who did not seek care in fixed military medical facilities for their TBI-associated symptoms were not included. Overall, cases of TBI summarized in this report likely represent the tip of the iceberg of overall TBI-related morbidity among U.S. service members.

This report documents that rates of incident medical encounters for TBIs rose during the first few years and were relatively stable during the remainder of the 10-year surveillance period. In addition, since September 2001, the background of TBIs—largely related to falls and motor vehicle accidents—significantly outnumbered those related to combat service. Clearly, TBIs from causes unrelated to combat continue to be large prevention, treatment, and rehabilitation concerns for the military.

As expected, the absolute and relative numbers of TBIs associated with battle injuries and "instrumentalities of war" sharply increased after September 2001 compared to before. In addition, however, the absolute and relative numbers of TBIs associated with land transportation accidents and athletic injuries declined after September 2001. In both military and civilian populations, young adult males have the highest motor vehicle accident (MVA) fatality rates.[12] Also, veterans of the Vietnam and first Gulf wars had higher MVA fatality rates than their respective counterparts[12]; and among Gulf war era veterans, characteristics of victims of fatal MVAs after the war generally reflected those of deployers to the war.[12] Finally, male U.S. Army soldiers who died from accidents (all causes) were more likely to have combat-specific occupations (e.g., infantry, armor, artillery) and to be veterans of recent deployments than their counterparts.[13] Findings of the current surveillance and relevant recent studies suggest that, in general, deployers to combat are risk-takers; and since September 2001, many service members at relatively high risk of MVAs (and perhaps, athletic injuries) were deployed overseas—and while deployed, they are at low risk of non-combat-related TBIs from motor vehicle accidents and athletic injuries.

In summary, TBIs have been and continue to be a significant source of morbidity among U.S. service members. Young enlisted males—particularly in the Army and Marine Corps—are at highest risk. Prevention measures should focus not only on countering the effects of blast injuries during combat operations but also on safety before and after deployments.

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Heterotopic Ossification, U.S. Armed Forces, 2002-2007

Heterotopic ossification (HO) is the abnormal formation of mature bone in soft tissue. Heterotopic bone causes pain, slows wound healing, limits range of motion, and interferes with the fit and function of limb prostheses.

HO is a somewhat rare complication of severe trauma to the nervous system (e.g., spinal cord, brain), bones (e.g., fractures, amputations, hip surgery), or soft tissue (e.g., severe burns).[1,2] The pathophysiologic mechanisms that produce HO are unclear; it appears, however, that in response to certain stimuli, osteogenic precursor cells differentiate into osteoblasts which produce bone during inflammatory responses to severe trauma (e.g., combat/assault-related, accidental, surgical).[3]

HO was documented as a complication of combat-related amputations and spinal injuries in the American Civil War and World War I. However, it was not highlighted as a significant concern among combat wounded veterans of more recent wars and conflicts.[4] Recently, HO has emerged as a frequent and concerning clinical and rehabilitation problem among service members with severe traumatic injuries sustained in Iraq and Afghanistan. Military orthopedic surgeons report that HO has complicated more than half of combat-related amputations since September 11, 2001.[4,5] In many recent cases managed at U.S. military hospitals, surgical excisions of heterotopic bone have been necessary for prosthetic fitting and long-term rehabilitation.[4]

This report summarizes the numbers, rates, and correlates of risk of HO among U.S. service members since the beginning of combat operations in Iraq and Afghanistan.

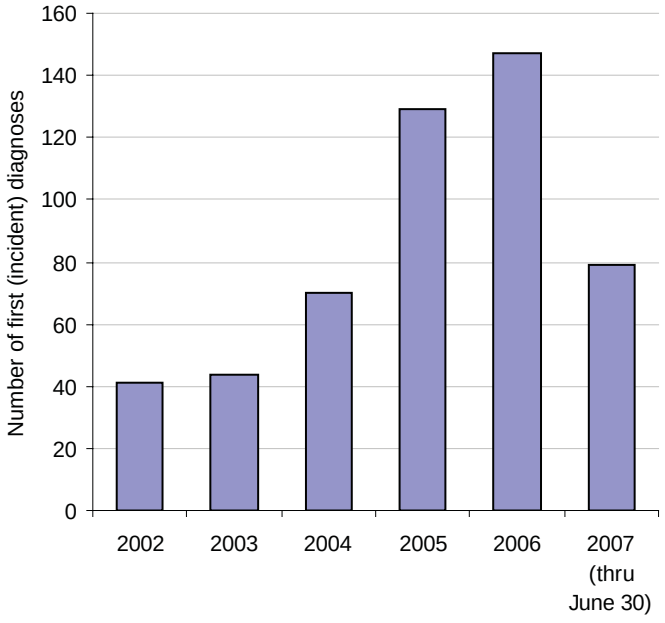
Table 1. Characteristics of service members diagnosed with heterotopic ossification, active components, U.S. Armed Forces, January 2002-June 2007

	No.	%
Total	510	100.0
Service		
Army	281	55.1
Navy	69	13.5
Air Force	46	9.0
Marine Corps	106	20.8
Coast Guard	8	1.6
Component		
Active	426	83.5
Reserve/Guard	84	16.5
Sex		
Female	21	4.1
Male	489	95.9
Race ethnicity		
Black non-Hispanic	128	25.1
White non-Hispanic	297	58.2
Other	85	16.7
Age		
<20	3	0.6
20-24	124	24.3
25-29	141	27.7
30-34	155	30.4
35-39	75	14.7
40+	12	2.4
Military occupation		
Combat	184	36.1
Health care	37	7.3
Other	289	56.7
Deployed to OIF/OEF		
Yes	249	48.8
No	261	51.2

Methods:

Medical records routinely maintained in the Defense Medical Surveillance System were searched to identify all U.S. military members with diagnoses of heterotopic ossification (ICD-9-CM: 728.12, 728.13 and 728.19, in any diagnostic position) between January 2002 and June 2007. Basic demographic and military characteristics of service members with at least one HO-related hospitalization or two or more HO-related ambulatory visits at least 7

Figure 1. Incident diagnoses of heterotopic ossification, U.S. Armed Forces, 2002-2007



days apart were summarized for this report. To assess the natures of precipitating and/or complicating injuries, all hospitalizations that included injury-specific diagnoses (in any diagnostic position) that occurred after January 2001 and more than 7 days before each affected individual's first HO-related medical encounter were assessed by type, cause, and anatomic site of injury (for each injury type, only one prior inpatient diagnosis per person was included).

Results:

Between January 2002 and June 2007, 510 service members had records of hospitalizations and/or multiple ambulatory visits with HO-specific diagnoses **(Table 1).** Incident diagnoses of HO more than tripled between 2002 (n=41) and 2006 (n=147) **(Figure 1).** During the first half of 2007, there were 80 incident diagnoses of HO suggesting a continuing high or still increasing incidence rate **(Figure 1).**

Of affected service members, most were males (96%), between 20 and 34 years old (82%) and white (58%); approximately one-sixth (16.5%) were members of the Reserve component; and approximately three-fourths were in the Army (55%) or Marine Corps (21%) **(Table 1).** Of note, fewer than 40% of cases had combat-related occupations, and only one-half had deployed to Iraq or Afghanistan prior to their HO diagnoses.

Fractures accounted for approximately one-third (n=233) of the 718 injury-specific diagnoses reported during hospitalizations prior to initial HO diagnoses **(Table 2).** Wounds (n=150); amputations of limbs, hands, and/or feet (n=84); and spinal and/or traumatic brain injuries (n=73) also accounted for significant numbers of inpatient treated injuries prior to HO diagnoses **(Table 2).** Sprains, strains, and joint dislocations (n=35) and burns (n=34) were also documented during hospitalizations of service members preceding HO diagnoses **(Table 2).** A variety of other injury types accounted for approximately 15% (n=109) of all injury-specific diagnoses prior to HO **(Table 2).** A review of non-injury-related hospitalizations prior to HO diagnoses did not reveal illnesses associated with HO risk in other populations (data not shown). Of note, more than one-fifth (n=109) of affected service members had no documented hospitalizations of any kind prior to their HO diagnoses.

Of the 718 inpatient injury diagnoses prior to HO, more than one-third (n=248) affected the lower limb or hip **(Table 3).** Injuries of the upper limb (n=187), trunk, vertebrae, and/or pelvis (n=148); and face and/or head (n=114) also frequently preceded HO diagnoses **(Table 3).** Locations of other injuries (n=21) that preceded HO diagnoses could not be identified from available hospitalization records **(Table 3).**

Battle casualties accounted for more than one-half (n=278) of the 514 injury-related hospitalizations prior to HO **(Table 4).** Weapons accidents (with own instruments of war and "guns, explosives, and related agents, when not used as instruments of war") were also significant causes of injury-related hospitalizations (n=87) preceding HO. Motor vehicle accidents (n=37), "falls and miscellaneous" (n=20), and athletic injuries (n=10) caused smaller numbers of injury-related hospitalizations prior to HO diagnoses **(Table 4).**

Data summaries by Vicki N. Jeffries, Analysis Group, Army Surveillance Medical Activity.

Editorial comment:

HO is a significant obstacle to the rehabilitation of service members with severe traumatic injuries, particularly amputations. Since the beginning of the global war on terror, diagnoses of HO have sharply increased (and may still be increasing) among U.S. service members.

Recent reports by U.S. military surgeons have noted that service members with traumatic amputations from blast injuries in Afghanistan or Iraq may be at higher risk of HO than those with similar injuries from other causes (e.g., penetrating gunshot wounds)[4,5]. Soft tissues (e.g., blood vessels, nerves)

Table 2. Inpatient injury diagnoses prior to heterotopic ossification, by type of injury, U.S. Armed Forces, 2002-2007

Inpatient diagnosis prior to HO	No.	%
Fracture (except skull, vertebrae)	233	32.5
Wound (includes amputation of digits)	150	20.9
Amputation (of limb, hand or foot)	84	11.7
Traumatic brain injury/spinal injury	73	10.2
Sprain, strain or dislocation	35	4.9
Burn	34	4.7
Other injuries	109	15.2

Table 3. Inpatient injury diagnoses prior to heterotopic ossification, by anatomic site of injury, U.S. Armed Forces, 2002-2007

Anatomic location of precipitating injury	No.	%
Lower limb, hip	248	34.5
Upper limb	187	26.0
Trunk/vertebrae/pelvis	148	20.6
Head/face	114	15.9
Unspecified/unknown	21	2.9

around bones may be more severely damaged by blast than by other more concentrated (e.g., bullets, shrapnel) traumatizing forces. The pathophysiologic mechanisms that underlie the formation of bone in severely traumatized soft tissues are not well understood. Non-steroidal anti-inflammatory drugs and localized radiation therapy have been effective for the primary prevention of HO, mainly after major surgical procedures of the hip[4]. However, primary prophylaxis of HO after major combat-related traumatic injuries is not always practical or medically feasible[4]. The recent experience of U.S. military surgeons indicates that the excision of heterotopic bone provides significant short- and long-term benefits[4].

During the surveillance period, many service members affected by HO had multiple, severe injuries and/or multiple injury-related hospitalizations prior to their first HO diagnoses. Because of the multiple sites and complex natures of the underlying injuries of many HO-affected individuals, the risks in relation to the natures, anatomic locations, causes, or severities of specific injuries are not easily assessed. However, the results of this surveillance suggest that HO occurs more often after severe, blast-related trauma than after severe injuries from motor vehicle accidents, falls, and athletic injuries, for example. It is likely that improved personal protective equipment and battlefield medical care have increased not only survival after severe combat-related trauma but also the incidence of complications of severe trauma, such as HO.

Finally, approximately one-fifth of all service members with HO had no documented prior hospitalizations. These cases were distributed across all Services, components, and years of the surveillance period. Some of these cases may represent HO complications of surgical procedures done in ambulatory settings or trauma cases treated in military treatment facilities (e.g., deployed, at sea) that do not routinely provide standardized records of care to the DMSS. Because there were no prior hospitalization records for these cases, the precipitating causes of the subsequent HO could not be assessed.

Table 4. Injury hospitalizations prior to diagnosis of heterotopic ossification, by causal agent,* U.S. Armed Forces, 2002-2007

Cause	No.	%
Unintentional		
Falls and miscellaneous	20	3.9
Medical/surgical complications, late effects	22	4.3
Weapons accident	87	16.9
Land transport	37	7.2
Machinery, tools	2	0.4
Athletics	10	1.9
Intentional		
Battle casualty	278	54.1
Non-battle, inflicted by other (e.g., assault)	3	0.6
Other	4	0.8
Missing/invalid code	51	9.9

*Causal agents were determined by codes IAW STANAG 2050 and E codes (ICD-9-CM)

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Routine Screening for Antibodies to HIV-1, U.S. Army, Navy, Marine Corps, and Civilian Applicants for U.S. Military Service, January 1990-June 2007

Since October 1985, the U.S. military has conducted routine screening for antibodies to HIV-1 among civilian applicants for U.S. military service. Since 1986, all members of the active and reserve components of the U.S. Armed Forces have been periodically screened for antibodies to HIV-1. This report summarizes prevalences and trends of HIV-1 antibody seropositivity among civilian applicants for military service and members of the Army, Navy, and Marine Corps who have been screened since 1990.

Methods:

For members of the Army, Navy, and Marine Corps and civilian applicants for U.S. military service, prevalences of HIV-1 antibody seropositivity were identified by matching specimen numbers, dates, and test results with identifiers and demographic characteristics of related tested subjects. For members of the Army and civilian applicants for service, all data were accessed from records routinely maintained in the Defense Medical Surveillance System. Results from testing of members of the Navy and Marine Corps were provided by the Navy Central HIV Service, Bethesda, MD (data from 2000-2006 were provided by ViroMED Laboratories, Inc., Minneapolis, MN, the Navy's contract testing laboratory).

For this summary, an incident diagnosis of HIV-1 antibody seropositivity was defined as two "positive" results from assays of two different specimens from the same individual or one "positive" result if it was the last on record for the individual. For calendar year summaries, denominators were the number of individuals from the service and component of interest who were tested at least once during the subject year. Annual HIV-1 prevalences among civilian applicants for service were calculated by dividing the number of applicants who were identified as HIV-1 antibody seropositive by the number of applicants who were tested during each year.

Results:

U.S. Army

Active component: From January 2006 to June 2007, 618,596 tests for antibodies to HIV-1 were conducted among 525,718 soldiers in the active component of the U.S. Army **(Table 1)**. During the period, 90 soldiers were diagnosed with HIV-1 infections **(Table 1)**.

During calendar year 2006, the overall prevalence of antibodies to HIV-1 was 0.18 per 1,000 soldiers tested; on average, one new HIV-1 infected soldier was detected per 6,876 screening tests **(Table 1)**.

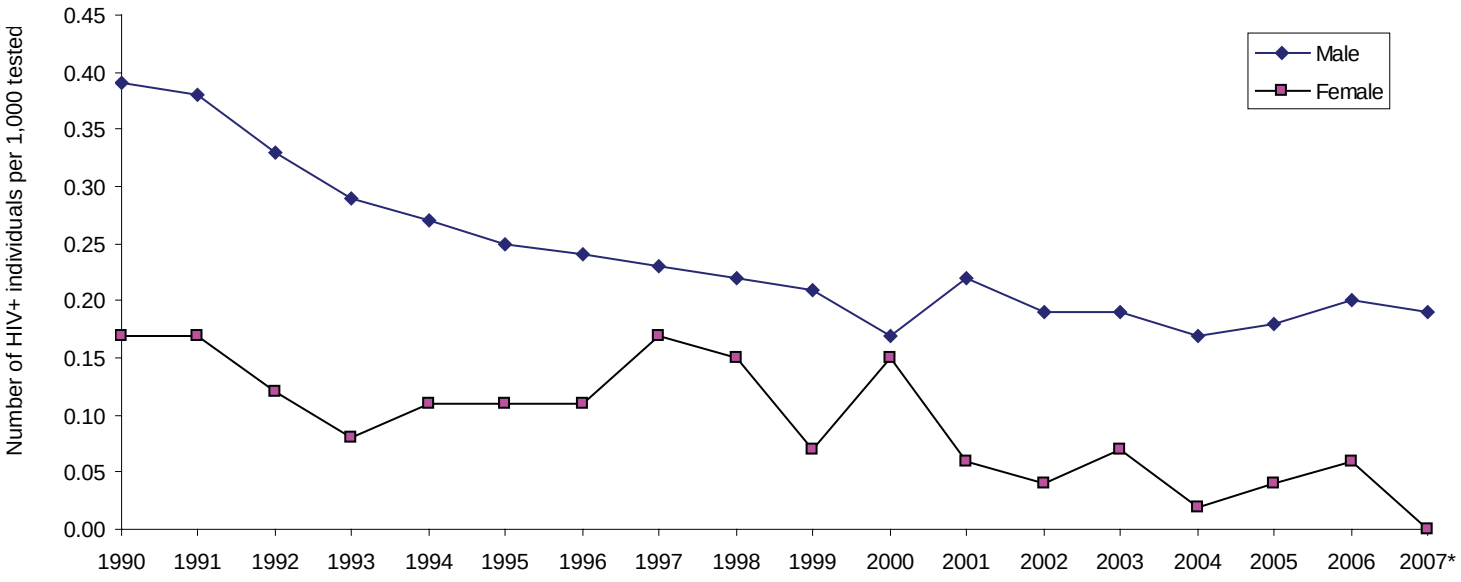
From 1990 to 2000, prevalences of seropositivity to HIV-1 declined by more than half (from 0.36 per 1,000 in 1990 to 0.17 per 1,000 in 2000); and since 2000, seroprevalences have been fairly stable **(Table 1)**. The seroprevalence trend among male soldiers generally reflects the overall trend **(Figure 1)**. However, among females soldiers, seroprevalences were relatively low and stable from 1990 to 2000 (0.13 per 1,000 tested from 1990-2000) — and were even lower and relatively stable from 2001 to 2006 (0.05 per 1,000 tested from 2001-2006) **(Figure 1)**. Of the 1,349 active component soldiers diagnosed with HIV-1 infections since 1990, 362 (26.8%) remain in active service **(Table 1)**.

Table 1. Results of screening for antibodies to HIV-1, by gender, active component, U.S. Army, January 1990-June 2007

Year	Total HIV tests	Total persons tested	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+) Male	New HIV-1 (+) Female	Overall, HIV+ per 1000 tested	Male, HIV+ per 1000 tested	Female, HIV+ per 1000 tested	HIV-1(+) still in AD at year 2007
1990	505,957	422,993	369,698	53,186	154	145	9	0.36	0.39	0.17	3
1991	448,046	384,745	336,342	48,299	135	127	8	0.35	0.38	0.17	4
1992	499,636	418,598	366,584	51,903	126	120	6	0.30	0.33	0.12	7
1993	447,511	363,935	315,863	48,001	95	91	4	0.26	0.29	0.08	7
1994	414,175	339,050	292,082	46,906	84	79	5	0.25	0.27	0.11	8
1995	464,641	340,445	292,895	47,487	78	73	5	0.23	0.25	0.11	13
1996	405,271	307,230	261,449	45,739	68	63	5	0.22	0.24	0.11	12
1997	402,221	299,608	252,948	46,610	67	59	8	0.22	0.23	0.17	15
1998	375,725	301,276	253,077	48,146	62	55	7	0.21	0.22	0.15	16
1999	347,281	287,900	241,823	46,032	54	51	3	0.19	0.21	0.07	13
2000	352,215	288,861	241,808	47,014	48	41	7	0.17	0.17	0.15	20
2001	383,311	311,480	261,559	49,914	61	58	3	0.20	0.22	0.06	22
2002	419,527	331,289	278,450	52,826	56	54	2	0.17	0.19	0.04	30
2003	495,776	364,720	307,587	57,124	61	57	4	0.17	0.19	0.07	32
2004	477,908	371,504	316,921	54,583	54	53	1	0.15	0.17	0.02	38
2005	434,265	346,750	295,657	51,093	56	54	2	0.16	0.18	0.04	43
2006	446,918	367,108	315,461	51,644	65	62	3	0.18	0.20	0.06	54
2007*	171,678	158,610	133,303	25,307	25	25	0	0.16	0.19	0.00	25
Total	**7,492,062**	**6,006,102**	**5,133,507**	**871,814**	**1,349**	**1267**	**82**				**362**

*Through 30 June 2007

Figure 1. Prevalence of antibodies to HIV-1 during screening, active component, U.S. Army, by gender, January 1990-June 2007



Army National Guard: From January 2006 through June 2007, 221,948 tests for antibodies to HIV-1 were conducted among 200,960 soldiers of the U.S. Army National Guard **(Table 2)**. During the period, 43 soldiers were detected with antibodies to HIV-1 **(Table 2)**.

During calendar year 2006, the overall seroprevalence (0.20 per 1,000 tested) was slightly higher than in 2005 but the second lowest of any year since 1990 **(Table 2)**. In 2006, on average, one new HIV-1 infected soldier was detected per 5,639 screening tests **(Table 2)**.

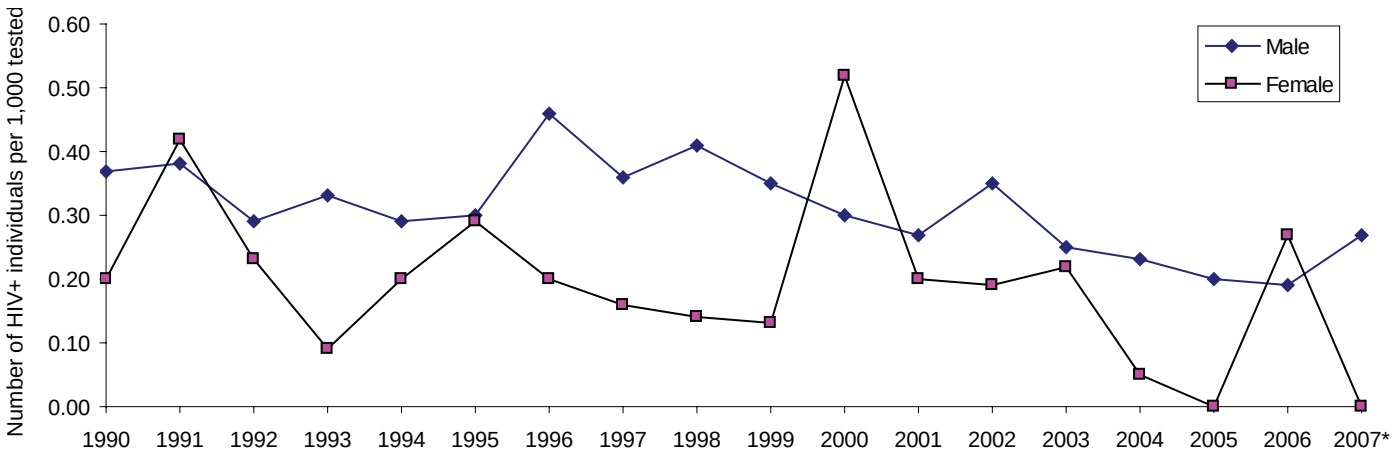
Among male soldiers, the seroprevalence in 2006 (0.19 per 1,000 tested) was the lowest of any year since 1990 **(Table 2, Figure 2)**. Of 14,592 female soldiers who were tested in 2006, four were seropositive. (Between zero and five new HIV-1 seropositive females have been identified each year since 1990 **(Table 2)**. Of 700 National Guard soldiers diagnosed with HIV-1 infections since 1990, 121 (17.3%) remain in service **(Table 2)**.

Table 2. Results of screening for antibodies to HIV-1, by gender, U.S. Army National Guard, January 1990-June 2007

Year	Total HIV tests	Total persons tested	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+) Male	New HIV-1 (+) Female	Overall, HIV+ per 1000 tested	Male, HIV+ per 1000 tested	Female, HIV+ per 1000 tested	HIV-1(+) still in AD at year 2007
1990	231,073	213,980	198,891	15,083	76	73	3	0.36	0.37	0.20	0
1991	191,317	178,737	166,968	11,765	68	63	5	0.38	0.38	0.42	2
1992	252,643	236,043	218,723	17,317	68	64	4	0.29	0.29	0.23	1
1993	168,453	158,645	146,952	11,690	49	48	1	0.31	0.33	0.09	0
1994	199,873	186,404	171,715	14,689	52	49	3	0.28	0.29	0.20	4
1995	147,634	140,498	130,151	10,345	42	39	3	0.30	0.30	0.29	6
1996	62,499	59,124	54,231	4,893	26	25	1	0.44	0.46	0.20	1
1997	71,678	68,281	61,878	6,403	23	22	1	0.34	0.36	0.16	1
1998	79,236	75,878	68,765	7,112	29	28	1	0.38	0.41	0.14	2
1999	86,380	81,501	73,669	7,830	27	26	1	0.33	0.35	0.13	4
2000	77,139	73,270	65,591	7,679	24	20	4	0.33	0.30	0.52	6
2001	103,796	95,517	85,758	9,757	25	23	2	0.26	0.27	0.20	2
2002	116,290	105,974	95,321	10,653	35	33	2	0.33	0.35	0.19	6
2003	229,038	176,414	158,032	18,380	43	39	4	0.24	0.25	0.22	14
2004	215,653	174,267	156,005	18,260	37	36	1	0.21	0.23	0.05	13
2005	225,395	184,936	166,547	18,387	33	33	0	0.18	0.20	0.00	21
2006	146,625	129,641	115,048	14,592	26	22	4	0.20	0.19	0.27	21
2007*	75,323	71,319	63,373	7,946	17	17	0	0.24	0.27	0.00	17
Total	**2,680,045**	**2,410,429**	**2,197,618**	**212,781**	**700**	**660**	**40**				**121**

*Through 30 June 2007

Figure 2. Prevalence of antibodies to HIV-1 during screening, by gender, U.S. Army National Guard, January 1990-June 2007



Army Reserve: From January 2006 through June 2007, 123,629 tests for antibodies to HIV-1 were conducted among 110,941 soldiers in the U.S. Army Reserve **(Table 3)**. During the period, 50 soldiers were detected with antibodies to HIV-1 **(Table 3)**.

During calendar year 2006, the overall seroprevalence (0.42 per 1,000 tested) was higher than in 2004 and 2005 but lower than in 2001 through 2003 **(Table 3)**. In 2006, on average, one new HIV-1 infected soldier was detected per 2,725 screening tests **(Table 3)**.

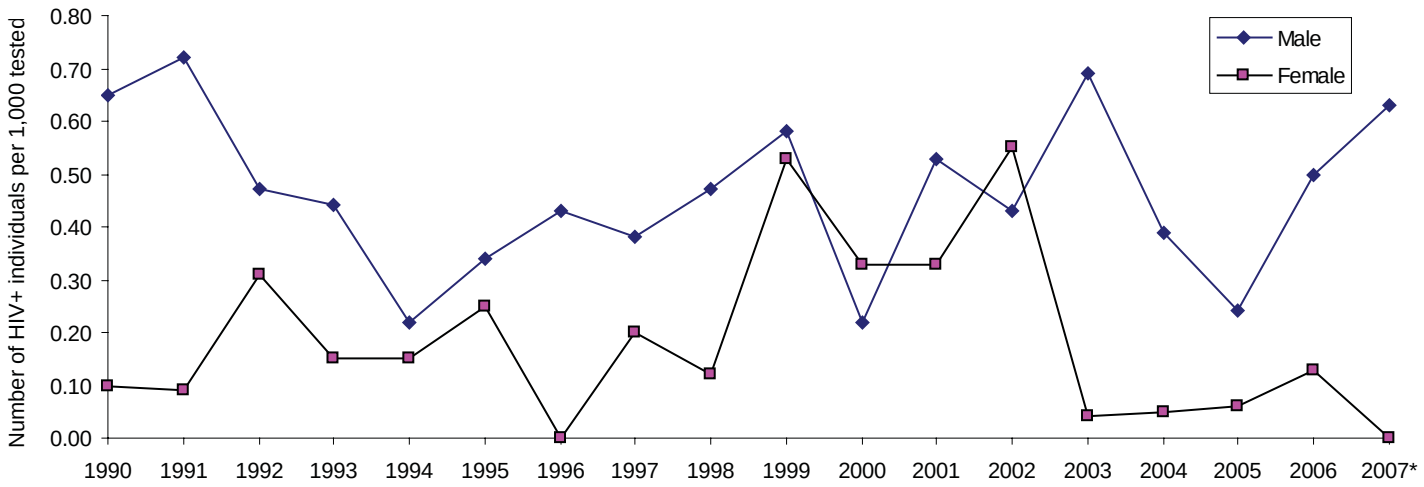
Since 1990, seroprevalences among both male and female Reservists have been unstable with no clear, long-term trends **(Table 3, Figure 3)**. Of 609 Reservists diagnosed with HIV-1 since 1990, 135 (22.2%) are still serving **(Table 3)**.

Table 3. Results of screening for antibodies to HIV-1, by gender, U.S. Army Reserve, January 1990-June 2007

Year	Total HIV tests	Total persons tested	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+) Male	New HIV-1 (+) Female	Overall, HIV+ per 1000 tested	Male, HIV+ per 1000 tested	Female, HIV+ per 1000 tested	HIV-1(+) still in AD at year 2007
1990	176,258	153,368	122,350	31,008	82	79	3	0.53	0.65	0.10	0
1991	122,997	111,831	89,178	22,642	66	64	2	0.59	0.72	0.09	0
1992	183,691	160,740	128,095	32,638	70	60	10	0.44	0.47	0.31	2
1993	147,078	130,270	103,972	26,297	50	46	4	0.38	0.44	0.15	0
1994	137,322	122,984	96,909	26,070	25	21	4	0.20	0.22	0.15	0
1995	106,003	95,992	75,651	20,333	31	26	5	0.32	0.34	0.25	2
1996	52,146	48,141	37,534	10,604	16	16	0	0.33	0.43	0.00	2
1997	45,231	42,064	31,979	10,085	14	12	2	0.33	0.38	0.20	1
1998	37,592	35,995	27,384	8,610	14	13	1	0.39	0.47	0.12	1
1999	41,606	38,682	29,313	9,369	22	17	5	0.57	0.58	0.53	3
2000	39,008	36,214	27,180	9,034	9	6	3	0.25	0.22	0.33	4
2001	54,632	49,930	37,840	12,090	24	20	4	0.48	0.53	0.33	8
2002	62,718	56,384	43,720	12,664	26	19	7	0.46	0.43	0.55	11
2003	156,752	112,595	87,800	24,795	62	61	1	0.55	0.69	0.04	24
2004	118,007	98,314	76,883	21,431	31	30	1	0.32	0.39	0.05	17
2005	99,303	85,678	67,797	17,881	17	16	1	0.20	0.24	0.06	13
2006	79,016	68,847	54,028	14,819	29	27	2	0.42	0.50	0.13	26
2007*	44,613	42,094	33,106	8,988	21	21	0	0.50	0.63	0.00	21
Total	**1,703,973**	**1,490,123**	**1,170,719**	**319,358**	**609**	**554**	**55**				**135**

*Through 30 June 2007

Figure 3. Prevalence of antibodies to HIV-1 during screening, by gender, U.S. Army Reserve, January 1990-June 2007



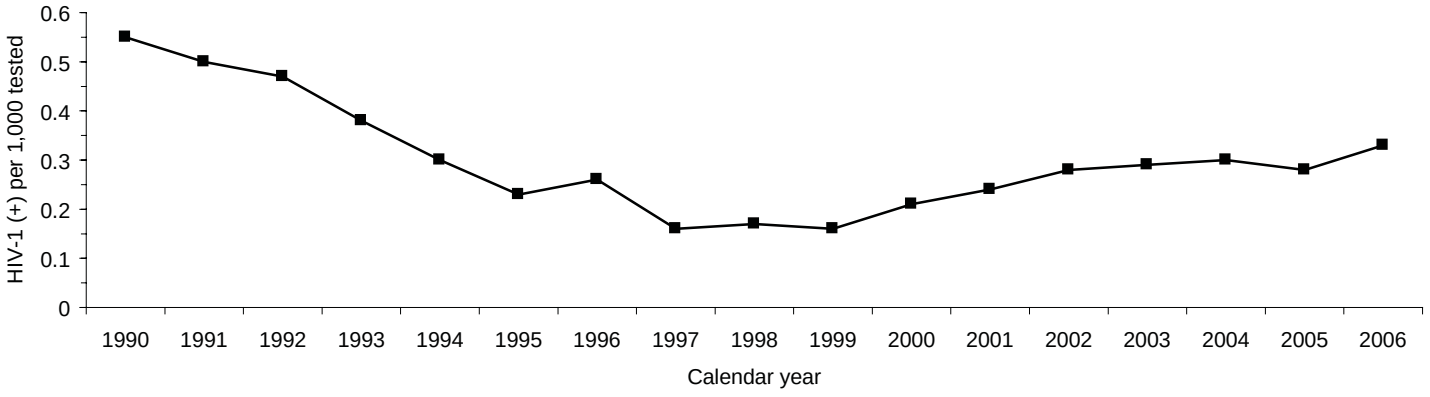
U.S. Navy

During 2006, 260,703 active duty sailors were screened for antibodies to HIV-1. Of these, 85 (0.33 per 1,000) were detected with antibodies to HIV-1 **(Table 4).** The seroprevalence in 2006 was the highest of any year in the Navy since 1994 and was approximately two-fold higher than the annual seroprevalences in the Navy from 1997 through 1999 **(Table 4, Figure 4).**

Table 4. Results of screening for antibodies to HIV-1, active members, U.S. Navy, 1990-2006

Year	HIV-1 (+)	Number tested	HIV-1 (+) per 1,000 tested
1990	249	454,253	0.55
1991	186	375,243	0.50
1992	183	385,446	0.47
1993	161	423,950	0.38
1994	118	388,255	0.30
1995	87	384,573	0.23
1996	94	357,477	0.26
1997	61	363,779	0.16
1998	58	342,431	0.17
1999	57	349,455	0.16
2000	77	348,686	0.21
2001	85	357,470	0.24
2002	84	304,600	0.28
2003	87	303,718	0.29
2004	84	275,568	0.30
2005	79	279,203	0.28
2006	85	260,703	0.33
Total	**1,835**	**5,954,810**	

Figure 4. Prevalence of antibodies to HIV-1 during screening, active members, U.S. Navy, 1990-2006



Data sources: Navy Central HIV Service, Bethesda, MD; ViroMED Laboratories, Inc., Minneapolis, MN (contract laboratory, 2000-2006).

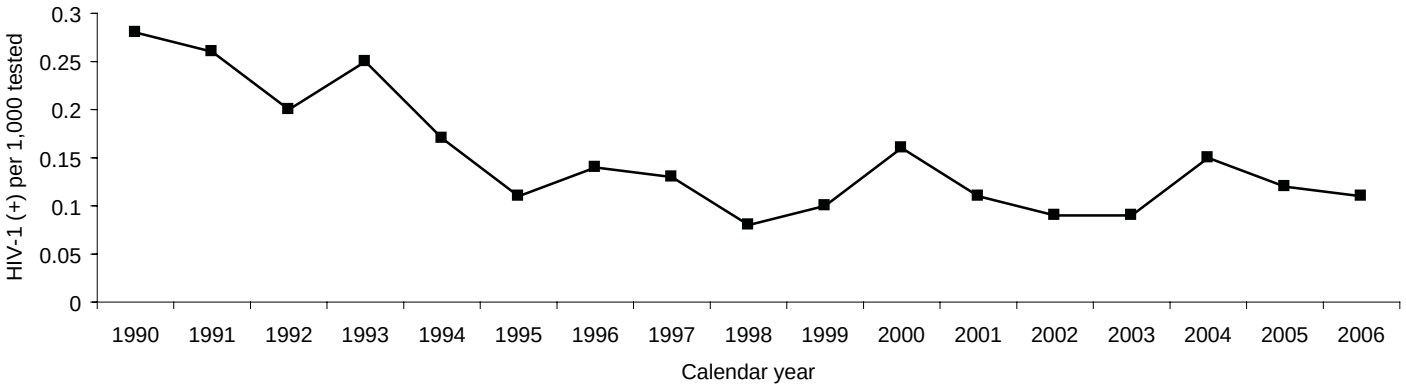
U.S. Marine Corps

During 2006, 132,380 active duty Marines were screened for antibodies to HIV-1. Of these, 15 (0.11 per 1,000) were detected with antibodies to HIV-1 **(Table 5).** The seroprevalence in 2006 continued a trend of relatively low seroprevalences since 1995 (range of seroprevalences, 1995-2006: 0.08-0.16 per 1,000) **(Table 5, Figure 5).**

Table 5. Results of screening for antibodies to HIV-1, active members, U.S. Marine Corps 1990-2006

Year	HIV-1 (+)	Number tested	HIV-1 (+) per 1,000 tested
1990	49	178,103	0.28
1991	37	140,513	0.26
1992	29	143,976	0.20
1993	41	165,974	0.25
1994	28	161,539	0.17
1995	18	167,662	0.11
1996	22	160,239	0.14
1997	22	168,892	0.13
1998	13	173,200	0.08
1999	14	145,265	0.10
2000	23	139,809	0.16
2001	16	142,957	0.11
2002	13	137,567	0.09
2003	13	140,636	0.09
2004	18	122,672	0.15
2005	16	135,020	0.12
2006	15	132,380	0.11
Total	**387**	**2,556,404**	

Figure 5. Prevalence of antibodies to HIV-1 during screening, active members, U.S. Marine Corps, 1990-2006



Data sources: Navy Central HIV Service, Bethesda, MD; ViroMED Laboratories, Inc., Minneapolis, MN (contract laboratory, 2000-2006).

Civilian applicants for U.S. Military service

From January 2006 to June 2007, 462,341 tests for antibodies to HIV-1 were conducted among 385,995 civilian applicants for military service **(Table 6).** During the period, 177 applicants were detected with antibodies to HIV-1 **(Table 6).**

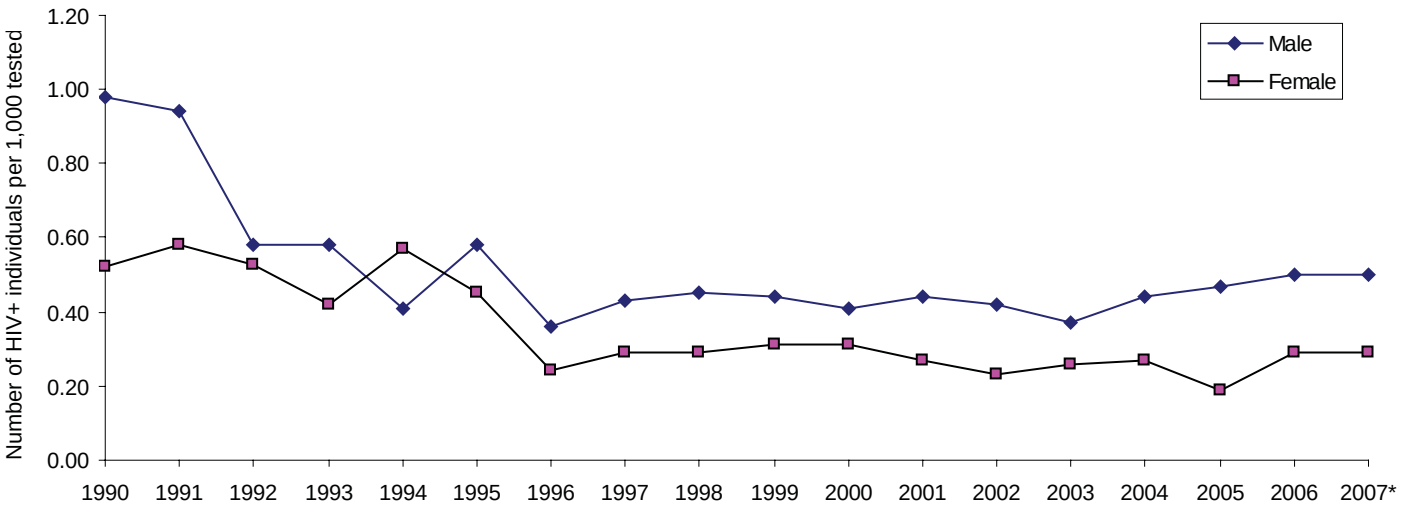
The seroprevalence among applicants for service has increased each year since 2003 **(Table 6).** The seroprevalence in 2006 (0.46 per 1,000 applicants tested) was the highest annual seroprevalence since 1995 and was approximately 35% higher than in 2003 **(Table 6).** The seroprevalence among female applicants has been relatively stable for the past ten years; however, among male applicants, the seroprevalence has increased each year since 2003 and was higher in 2006 than in any other year since 1995 **(Table 6, Figure 6).** In addition, in 2006, the seroprevalence among Black non-

Table 6. Diagnoses of HIV-1 infections by gender, civilian applicants for U.S. military service, January 1990-June 2007

Year	Total HIV tests	Total persons tested	Male tested	Female tested	Total HIV-1 (+)	HIV-1(+) Male	HIV-1(+) Female	Overall, HIV+ per 1000 tested	Male, HIV+ per 1000 tested	Female, HIV+ per 1000 tested
1990	396,479	369,856	313,767	56,089	337	308	29	0.91	0.98	0.52
1991	374,615	345,327	295,305	50,015	307	278	29	0.89	0.94	0.58
1992	336,695	307,514	252,403	55,104	176	147	29	0.57	0.58	0.53
1993	345,957	311,380	253,978	57,402	172	148	24	0.55	0.58	0.42
1994	319,095	284,981	226,969	58,012	125	92	33	0.44	0.41	0.57
1995	288,679	243,860	193,269	50,590	135	112	23	0.55	0.58	0.45
1996	320,420	274,422	215,787	58,627	91	77	14	0.33	0.36	0.24
1997	339,682	297,735	235,922	61,810	120	102	18	0.40	0.43	0.29
1998	329,476	289,747	227,405	62,342	121	103	18	0.42	0.45	0.29
1999	357,034	312,523	245,178	67,344	129	108	21	0.41	0.44	0.31
2000	380,816	334,467	261,202	73,263	130	107	23	0.39	0.41	0.31
2001	406,445	349,084	275,557	73,525	140	120	20	0.40	0.44	0.27
2002	412,190	360,517	283,234	77,281	137	119	18	0.38	0.42	0.23
2003	360,043	315,963	253,326	62,637	109	93	16	0.34	0.37	0.26
2004	306,284	264,705	212,584	52,121	107	93	14	0.40	0.44	0.27
2005	317,202	267,454	214,638	52,816	111	101	10	0.42	0.47	0.19
2006	346,573	295,057	236,176	58,881	135	118	17	0.46	0.50	0.29
2007*	115,768	90,938	73,546	17,390	42	37	5	0.46	0.50	0.29
Total	**6,053,453**	**5,315,530**	**4,270,246**	**1,045,249**	**2,624**	**2,263**	**361**			

*Through 30 June 2007

Figure 6. Prevalence of antibodies to HIV-1 among civilian applicants for U.S. military service, by gender, January 1990-June 2007



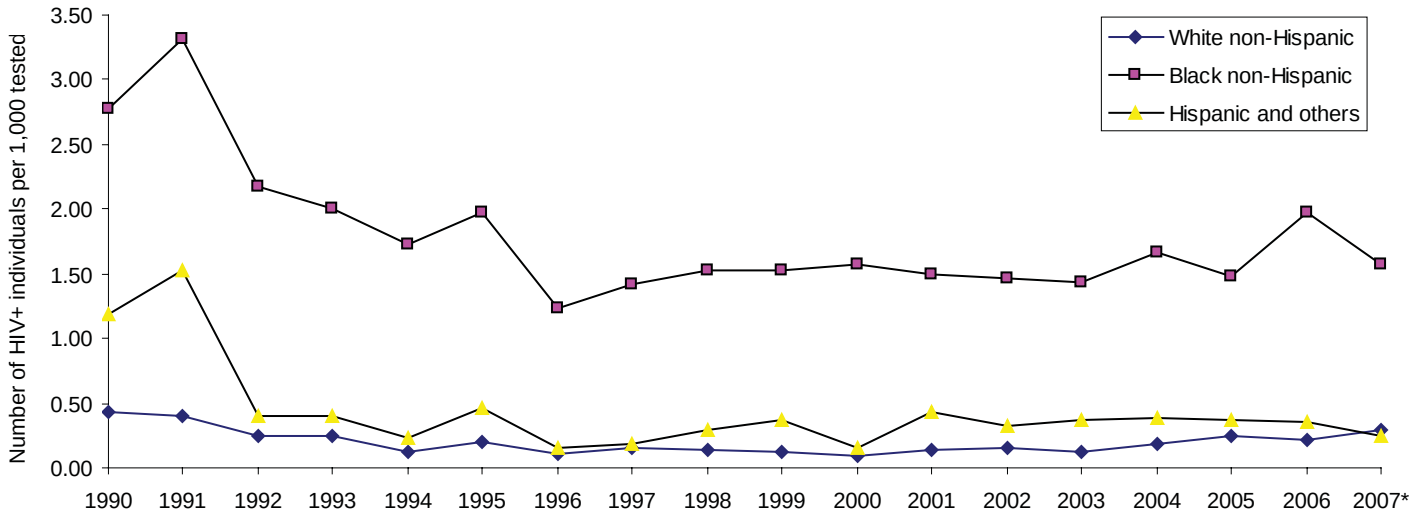
Hispanic applicants (1.97 per 1,000) was higher than in any other year since 1995; and the seroprevalence among White non-Hispanic applicants (0.22 per 1,000) was higher than in any other year but one since 1993 **(Table 7, Figure 7).** Finally, seroprevalences among Hispanic and other non-White, non-Black applicants have been stable since 2001 **(Table 7, Figure 7).**

Table 7. Diagnoses of HIV-1 infections by race/ethnicity, civilian applicants for U.S. military service, January 1990-June 2007

Year	Total HIV tests	Total persons tested	White non-Hispanic tested	Black non-Hispanic tested	Hispanic and others tested	Total HIV-1 (+)	White non-Hispanic, HIV-1(+)	Black non-Hispanic, HIV-1(+)	Hispanic and others, HIV-1(+)	Overall, HIV+ per 1000 tested	White non-Hispanic, HIV+ per 1000 tested	Black non-Hispanic, HIV+ per 1000 tested	Hispanic and others, HIV+ per 1000 tested
1990	396,479	369,856	277,565	68,515	23,776	337	119	190	28	0.91	0.43	2.77	1.18
1991	374,615	345,327	274,216	50,122	20,989	307	109	166	32	0.89	0.40	3.31	1.52
1992	336,695	307,514	236,481	51,210	19,823	176	57	111	8	0.57	0.24	2.17	0.40
1993	345,957	311,380	238,918	52,239	20,223	172	59	105	8	0.55	0.25	2.01	0.40
1994	319,095	284,981	210,395	53,232	21,354	125	28	92	5	0.44	0.13	1.73	0.23
1995	288,679	243,860	177,676	45,058	21,126	135	36	89	10	0.55	0.20	1.98	0.47
1996	320,420	274,422	194,688	52,709	27,025	91	22	65	4	0.33	0.11	1.23	0.15
1997	339,682	297,735	209,008	57,939	30,788	120	32	82	6	0.40	0.15	1.42	0.19
1998	329,476	289,747	204,325	54,692	30,730	121	29	83	9	0.42	0.14	1.52	0.29
1999	357,034	312,523	221,028	59,027	32,468	129	27	90	12	0.41	0.12	1.52	0.37
2000	380,816	334,467	238,685	64,344	31,438	130	24	101	5	0.39	0.10	1.57	0.16
2001	406,445	349,084	258,624	60,273	30,187	140	37	90	13	0.40	0.14	1.49	0.43
2002	412,190	360,517	272,485	58,167	29,865	137	42	85	10	0.38	0.15	1.46	0.33
2003	360,043	315,963	234,825	48,323	32,815	109	28	69	12	0.34	0.12	1.43	0.37
2004	306,284	264,705	197,312	36,174	31,219	107	35	60	12	0.40	0.18	1.66	0.38
2005	317,202	267,454	203,980	33,877	29,597	111	50	50	11	0.42	0.25	1.48	0.37
2006	346,573	295,057	225,704	38,147	31,206	135	49	75	11	0.46	0.22	1.97	0.35
2007*	115,768	90,938	66,789	12,123	12,026	42	20	19	3	0.46	0.30	1.57	0.25
Total	**6,053,453**	**5,315,530**	**3,942,704**	**896,171**	**476,655**	**2,624**	**803**	**1,622**	**199**				

*Through 30 June 2007

Figure 7. Prevalence of antibodies to HIV-1 among civilian applicants for U.S. military service, by race/ethnicity, January 1990-June 2007



Editorial comment:

The U.S. military began routine screening for antibodies to HIV-1 among civilian applicants for and all members of the Services more than 20 years ago. When routine screening began in the late 1980s, detections of "new" infections were relatively frequent because most service members had never been screened—thus, both longstanding (prevalent) and recently acquired (incident) infections were subject to detection for the first time. By 1990, however, nearly all service members had been tested at least once; as a result, screening was detecting infections acquired since the last negative test of respective service members.

Results of routine, periodic screening for HIV-1 in dynamic (i.e., continuously changing) military populations must be interpreted carefully — particularly comparisons of seroprevalences from year to year in the same or across Services and components. Observed seroprevalences in repeatedly screened populations reflect not only infection incidence rates (i.e., rates of acquisition of new HIV-1 infections) but also testing frequencies. Thus, for example, increases or declines in observed seroprevalences during routine periodic screening could reflect changes in rates of infection acquisition and/or decreases or increases, respectively, in test intervals. In turn, differences in observed seroprevalences across Services or components could reflect differences in infection risks and/or differences in testing policies and practices.

With the above caveats in mind, the monitoring of results and trends of HIV-1 seroprevalences in various military populations can help target and focus prevention initiatives. In active component and National Guard members of the Army and in active duty members of the Marine Corps, seroprevalences during routine HIV-1 screening have been slightly declining or relatively stable for a number of years. In the Army Reserve, it is difficult to discern a long-term trend because of variability in seroprevalences from year to year. Finally, among active duty members of the Navy and male civilian applicants for service, seroprevalences in 2006 were relatively high compared to recent prior years and continued several year trends of gradually increasing seroprevalences.

Update: Deployment Health Assessments, U.S. Armed Forces, January 2003-July 2007

The health protection strategy of the U.S. Armed Forces is designed to deploy healthy, fit, and medically ready forces, to minimize illnesses and injuries during deployments, and to evaluate and treat physical and psychological problems (and deployment-related health concerns) following deployment.

In 1998, the Department of Defense initiated health assessments of all deployers prior to and after serving in major operations outside of the United States. [1] In March 2005, the Post-Deployment Health Reassessment (PDHRA) program was begun to identify and respond to health concerns that persisted for or emerged within three to six months after redeployment. [2]

This report summarizes responses to selected questions on deployment health assessments completed since 2003. In addition, it documents the natures and frequencies of changes in responses from before to after deployments.

Methods:

Completed deployment health assessment forms are transmitted to the Armed Forces Health Surveillance Center (AFHSC) where they are incorporated into the Defense Medical Surveillance System (DMSS).[3] In the DMSS, data recorded on health assessment forms are integrated with data that document demographic and military characteristics and medical encounters (e.g. hospitalizations, ambulatory visits) at fixed military and other (contracted care) medical facilities of the Military Health System. For this analysis, DMSS was searched to identify all pre (DD2795) and post (DD2796) deployment health assessment forms completed since 1 January 2003 and all post-deployment health reassessment (DD2900) forms completed since 1 August 2005.

Results:

Since January 2003, 1,705,787 pre-deployment health assessment forms, 1,705,344 post-deployment health assessment forms, and 376,975 post-deployment health reassessment forms were completed at field sites, transmitted to the AFHSC, and integrated into the DMSS **(Figure 1).** Throughout the period, there were intervals of approximately 2-4 months between peaks of pre-deployment and post-deployment health assessments (that were completed by different cohorts of deployers) **(Figure 1).** Post-deployment health reassessments rapidly increased between February and May 2006 **(Figure 1).** Since then, numbers of reassessment forms per month have been relatively stable (reassessment forms per month, August 2006-July 2007: mean: 26,539; range: 13,920-35,213) **(Figure 1, Table 1).**

Between August 2006 and July 2007, nearly three-fourths

Figure 1. Total deployment health assessment and reassessment forms, by month, U.S. Armed Forces, January 2003-July 2007

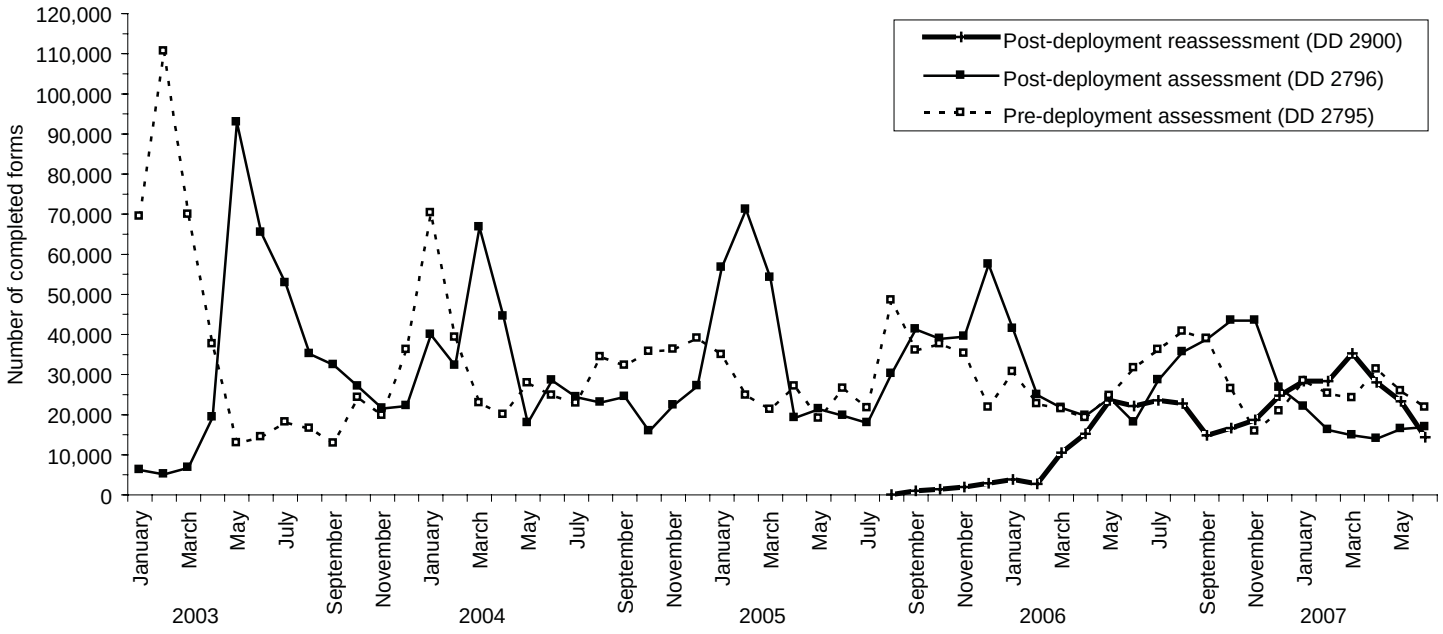


Table 1. Deployment-related health assessment forms, by month, U.S. Armed Forces, August 2006-July 2007

	Pre-deployment assessment DD2795		Post-deployment assessment DD2796		Post-deployment reassessment DD2900	
	No.	%	No.	%	No.	%
Total	**318,465**	**100**	**305,875**	**100**	**267,956**	**100**
2006						
August	40,724	12.8	35,613	11.6	22,769	8.5
September	38,926	12.2	38,839	12.7	14,886	5.6
October	26,384	8.3	43,435	14.2	16,687	6.2
November	15,832	5.0	43,437	14.2	18,721	7.0
December	20,838	6.5	26,756	8.7	24,752	9.2
2007						
January	28,393	8.9	22,004	7.2	28,387	10.6
February	25,195	7.9	16,174	5.3	28,370	10.6
March	24,163	7.6	14,868	4.9	35,276	13.2
April	31,280	9.8	13,987	4.6	28,067	10.5
May	25,845	8.1	16,447	5.4	23,344	8.7
June	21,756	6.8	16,890	5.5	14,377	5.4
July	19,129	6.0	17,425	5.7	12,320	4.6

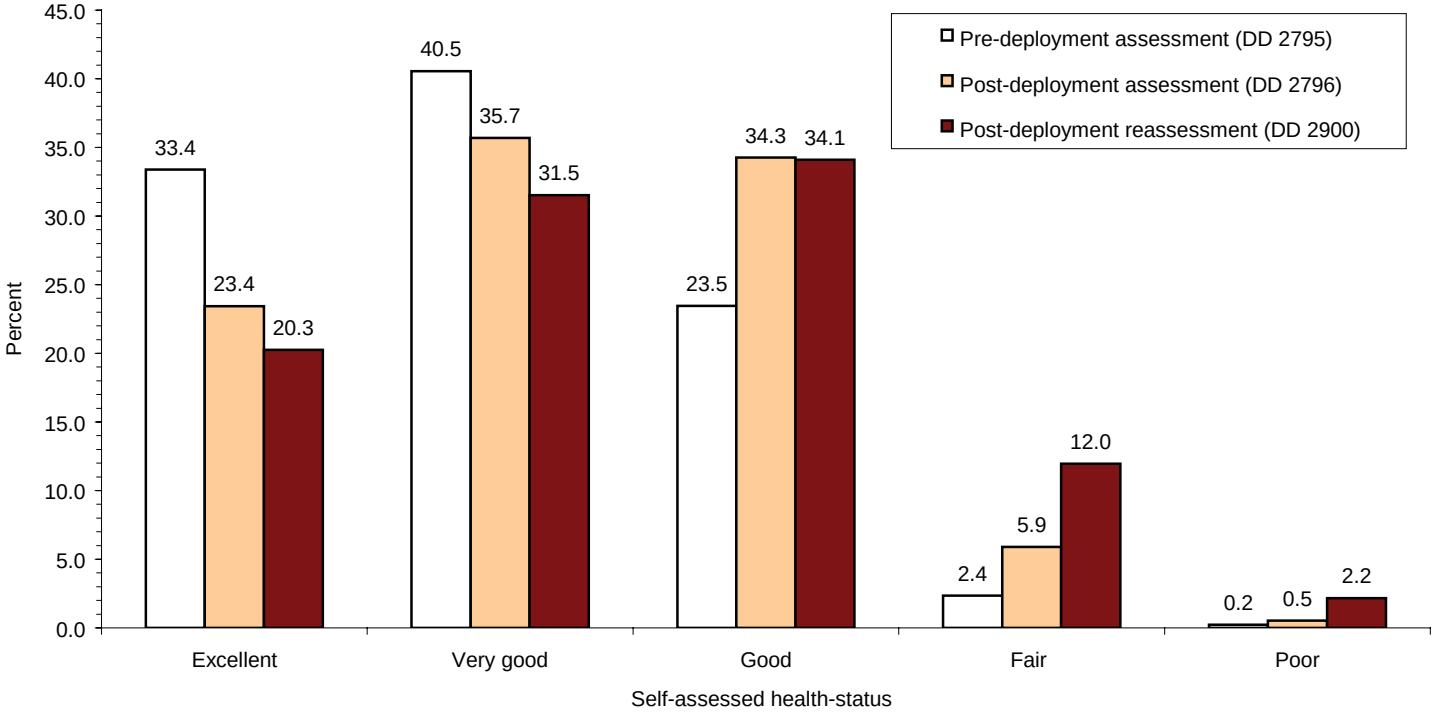
(73.9%) of deployers rated their "health in general" as "excellent" or "very good" during pre-deployment health assessments **(Figure 2).** During the same period, only 59.1% and 51.8% of redeployers rated their general health as "excellent" or "very good" during post-deployment assessments and post-deployment reassessments, respectively **(Figure 2).**

From pre-deployment to post-deployment to post-deployment reassessments, there were sharp increases in the proportions of deployers who rated their health as "fair" or "poor" **(Figure 2).** For example, prior to deployment, approximately one of 40 (2.6%) deployers rated their health as "fair" or "poor"; however, 3-6 months after redeploying (during post-deployment reassessments), approximately one of seven (14.2%) respondents rated their health as "fair" or "poor" **(Figure 2).**

From January 2003 through July 2007, the proportion of deployers who assessed their general health as "fair" or "poor" before deploying remained consistently low (% "fair" or "poor" "health in general," pre-deployment health assessments, January 2003-July 2007, by month: mean: 2.4% [range: 1.5-3.4%]) **(Figure 3).** During the same period, the proportion of redeployers who assessed their general health as "fair" or "poor" around times of redeployment was consistently and clearly higher than before deploying (% "fair" or "poor" "health in general," post-deployment health assessments, January 2003-July 2007, by month: mean: 7.0% [range: 3.0-10.2%]) **(Figure 3).** Finally, from January 2006 through July 2007, the proportion of redeployers who assessed their general health as "fair" or "poor" 3-6 months after redeploying was sharply higher than at redeployment (% "fair" or "poor" "health in general," post-deployment health reassessments, January 2006-July 2007, by month: mean: 13.8% [range: 11.9-17.2%]) **(Figure 3).**

More than half of service members who rated their overall health before deployment chose a different descriptor after

Figure 2. Percent distributions of self-assessed health status as reported on deployment health assesment forms, U.S. Armed Forces, August 2006-July 2007



deploying, but usually by only a single category (on a five category scale). The proportions of deployers whose self-rated health improved by more than one category from pre-deployment to reassessment remained relatively stable between August 2006 and July 2007 (mean: 1.5%, range:1.1-1.7%) **(Figure 4).** The proportions of service members whose self-assessed health declined by more than one category increased between October 2006 and March 2007 and then declined to the August 2006 level (mean: 16.7, range 14.8-19.0%) **(Figure 4).**

In general, on post-deployment assessments and reassessments, members of Reserve components and members of the Army were much more likely than their respective counterparts to report mental health-related symptoms and health and exposure-related concerns – and in turn, to have indications for medical and mental health follow-ups ("referrals") **(Table 2).**

Among Reserve versus active component members, relative excesses of health-related concerns and provider-indicated referrals were much greater 3-6 months after redeployment (DD2900) than either before deploying (DD2795) or at redeployment (DD2796) **(Table 2, Figures 5,6).** For example, among both active and Reserve component members of all Services, mental or behavioral health referrals were more common after deployment than before **(Figure 5).** However, from the time of redeployment to 3-6 months later, mental health referrals sharply increased among active and Reserve component members of the Army and Marine Corps and among Reserve component members of the Navy (but not among active component members of the Navy or members of the Air Force) **(Table 2, Figure 5).** Of note in this regard, the largest absolute increases in mental health referrals from redeployment to 3-6 months later were for Reserve component members of the Army (post-deployment: 4.3%; reassessment: 13.6%) and Navy (post-deployment: 2.4%; reassessment: 7.5%) **(Table 2, Figure 5).**

Finally, over the past three years, Reserve versus active component members have been approximately twice as likely to report "exposure concerns" on post-deployment health assessments (DD2796) (% "exposure concerns," post-deployment assessments, by month, August 2004-July 2007: Reserve: mean: 25.8%, range: 19.2-33.1%; active: mean: 12.5%; range: 8.7-21.7%) **(Figures 6,7).** Of interest regarding exposure concerns, sharply higher proportions of both Reserve and active component members endorsed exposure concerns 3-6 months after (DD2900) compared to around times (DD2796) of redeployment (% "exposure concerns," post-deployment reassessments, by month, January 2006-July 2007: Reserve: mean: 38.1%, range: 31.2-48.9%; active: mean: 19.2%; range: 16.7-23.6%) **(Figure 7).**

Editorial comment:

In general, since 2003, proportions of U.S. deployers to Iraq and Afghanistan who report medical or mental health-related symptoms (or have indications for medical or mental health referrals) on deployment-related health assessments increased from pre-deployment to post-deployment to 3-6 months post-

Figure 3. Proportion of deployment health assessment forms with self-assessed health status as "fair" or "poor", U.S. Armed Forces, January 2003-July 2007

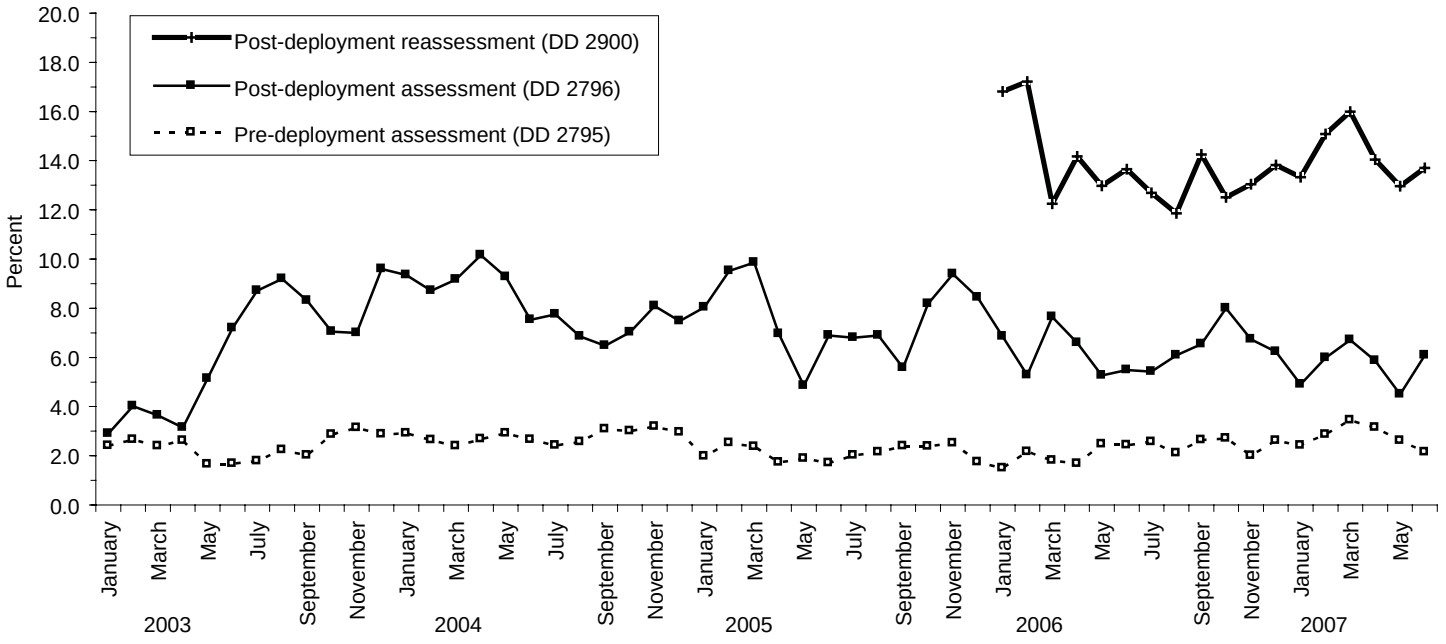


Figure 4. Proportion of service members whose self-assessed health status improved ("better") or declined ("worse") (by 2 or more categories on 5-category scale) from pre-deployment to reassessment, by month, U.S. Armed Forces, August 2006-July 2007

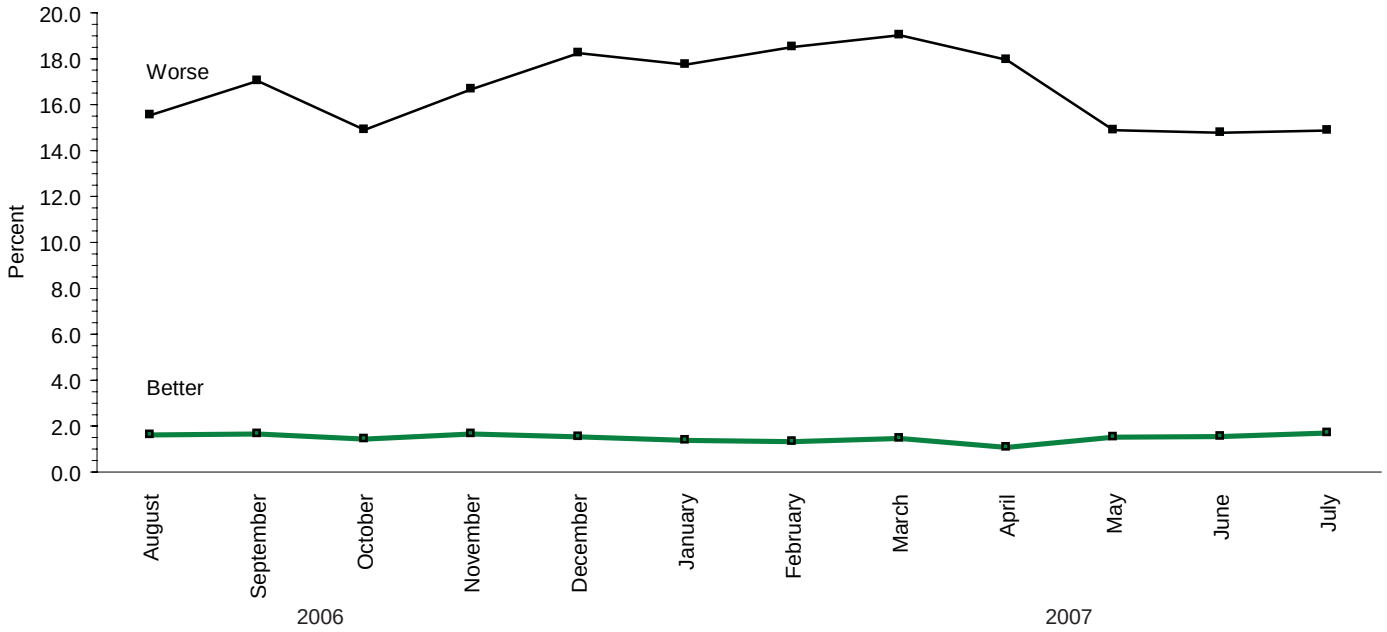
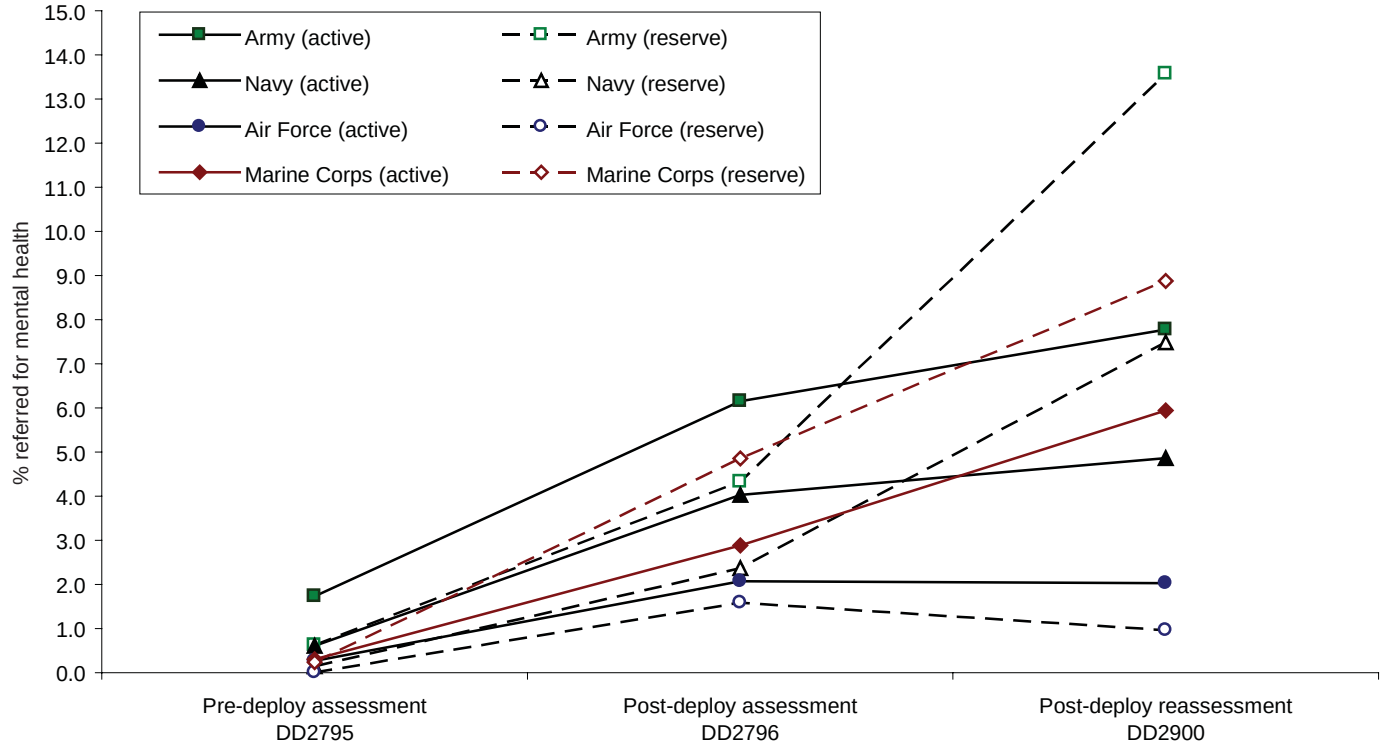


Figure 5. Percent of deployers with mental or behavioral health referrals, by Service and component, by timing of health assessment, U.S. Armed Forces, August 2006-July 2007



deployment, are higher among members of the Army than the other Services, and are higher among Reserve than the active component members.

Regardless of the Service or component, deployers often rate their general health worse when they redeploy compared to before deploying. This is not surprising because deployments are inherently physically and psychologically demanding. Clearly, there are many more – and more significant – threats to the physical and mental health of service members when they are conducting or supporting combat operations away from their families in hostile environments compared to when serving at their permanent duty stations (active component) or when living in their civilian communities (Reserve component).

However, many redeployed service members rate their general health worse 3-6 months after returning from deployment compared to earlier. This finding may be less intuitively understandable. Symptoms of post-traumatic stress disorder (PTSD) may emerge or worsen within several months after a life threatening experience (such as military service in a war zone). PTSD among U.S. veterans of combat duty in Iraq has been associated with higher rates of physical health problems after redeployment.[4] The post-deployment health reassessment at 3-6 months post-deployment is designed to detect service members with symptoms not only of PTSD but also persistent or emerging deployment-related medical and mental health problems.

Among British veterans of the Iraq war, Reservists reported more "ill health" than their active counterparts.[5] Roles, traumatic experiences, and unit cohesion while deployed were associated with medical outcomes after redeployment; however, PTSD symptoms were more associated with problems at home (e.g, reintegration into family, work, and other aspects of civilian life) than with events in Iraq.[5] The finding may explain, at least in part, the large differences in prevalences of mental health symptoms, medical complaints, and provider-indicated mental health referrals among Reserve compared to active members — particularly in the Army and Navy — 3-6 months after returning from deployment compared to earlier.

Post-deployment health assessments may be more reliable several months after redeployment compared to earlier. Commanders, supervisors, family members, peers, and providers of health care to redeployed service members should be alert to emerging or worsening symptoms of physical and psychological problems for several months, at least, after redeployment.

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3. Rubertone MV, Brundage JG. The Defense Medical Surveillance System and the Department of Defense Serum Repository: Glimpses of the Future of Public Health Surveillance. *Am J Public Health* 2002 Dec;92, (12):1900-04.

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Table 2. Percentage of service members who endorsed selected questions/received referrals on health assessment forms, U.S. Armed Forces, August 2006-July 2007

	Army			Navy			Air Force			Marine Corps			All service members		
Active component	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900
	n=150,478	n=142,648	n=97,829	n=7,258	n=7,292	n=6,872	n=64,941	n=55,021	n=57,547	n=8,641	n=18,419	n=11,593	n=231,318	n=223,380	n=173,841
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	4.2	7.8	17.7	1.5	2.8	6.8	0.6	1.8	5.4	1.7	3.3	9.1	3.0	5.8	12.6
Health concerns, not wound or injury	12.9	22.0	41.1	5.2	9.3	18.5	4.3	11.7	16.9	3.8	8.5	24.2	9.9	18.0	31.1
Health worse now than before deployed	na	20.5	28.2	na	8.3	13.1	na	6.9	11.0	na	11.7	18.3	na	16.0	21.2
Exposure concerns	na	20.0	25.6	na	7.8	11.8	na	5.5	12.6	na	7.0	14.4	na	14.9	20.0
PTSD symptoms (2 or more)	na	14.7	17.1	na	6.1	7.7	na	2.4	3.1	na	8.4	12.4	na	10.9	11.8
Depression symptoms	na	28.8	10.3	na	21.3	7.0	na	8.4	2.9	na	26.0	9.8	na	23.3	7.7
Referral indicated by provider (any)	7.8	27.7	25.8	5.3	16.7	17.4	1.5	12.5	8.1	3.2	14.1	19.1	5.8	22.5	19.1
Mental health referral indicated*	1.7	6.2	7.8	0.6	4.0	4.9	0.3	2.1	2.0	0.3	2.9	5.9	1.2	4.8	5.6
Medical visit following referral†	94.3	99.4	97.9	89.1	83.3	87.0	78.0	94.4	96.0	38.5	73.4	76.3	92.4	97.4	95.0
	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900
Reserve component	n=65,761	n=62,672	n=67,883	n=2,752	n=2,534	n=3,767	n=17,166	n=14,633	n=17,439	n=841	n=2,368	n=5,026	n=86,520	n=82,207	n=94,115
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	1.8	9.8	19.5	0.7	5.3	11.8	0.3	2.0	4.1	1.1	5.7	11.3	1.5	8.2	15.9
Health concerns, not wound or injury	13.9	35.0	58.7	3.3	22.5	44.0	1.6	21.6	16.7	3.3	27.1	41.1	11.0	32.0	49.4
Health worse now than before deployed	na	27.8	38.5	na	19.4	27.4	na	9.9	9.8	na	25.1	26.0	0.0	24.3	32.1
Exposure concerns	na	31.6	41.3	na	24.5	32.2	na	7.8	17.2	na	24.0	27.7	0.0	26.9	35.7
PTSD symptoms (2 or more)	na	12.0	23.5	na	5.9	14.9	na	1.9	3.0	na	16.2	20.2	0.0	10.2	19.2
Depression symptoms	na	26.1	12.7	na	19.7	8.8	na	7.5	2.4	na	36.5	9.1	0.0	22.9	10.4
Referral indicated by provider (any)	10.5	31.1	55.1	3.6	22.6	41.8	0.2	12.6	29.8	1.7	22.4	49.2	8.2	27.3	49.5
Mental health referral indicated*	0.6	4.3	13.6	0.1	2.4	7.5	0.0	1.6	1.0	0.2	4.9	8.9	0.5	3.8	10.7
Medical visit following referral†	96.5	97.6	25.6	93.8	87.4	28.8	40.0	54.9	23.0	100.0	53.0	17.7	96.2	93.1	25.1

*Includes behavioral health, combat stress and substance abuse referrals
†Record of inpatient or outpatient visit within 6 months after referral

Figure 6. Ratio of percents of deployers who endorse selected questions, Reserve versus active component, on pre-deployment health assessments (DD2795) and post-deployment health reassessments (DD2900), U.S. Armed Forces, August 2006-July 2007

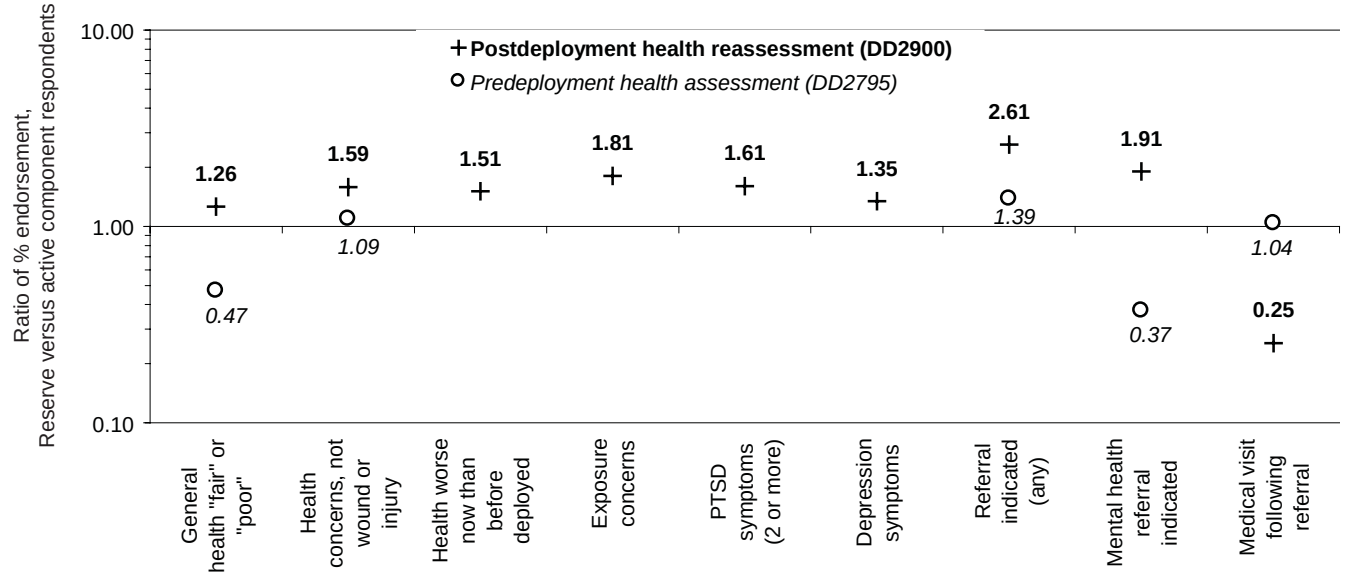
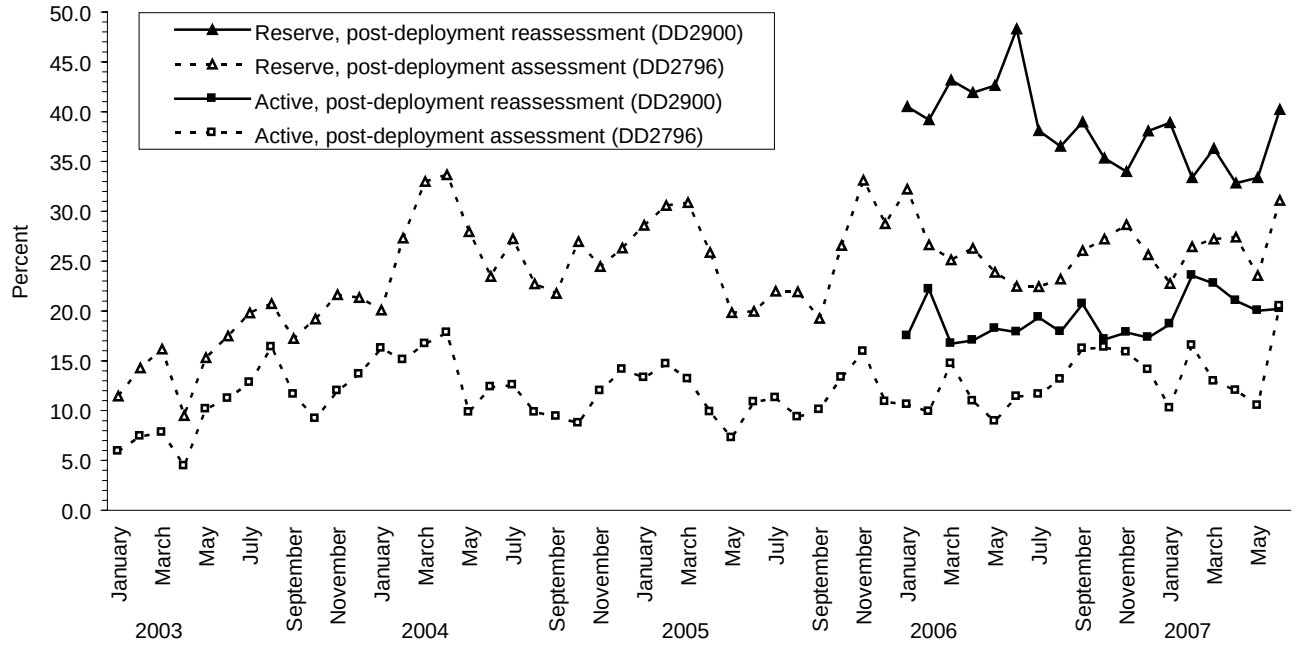
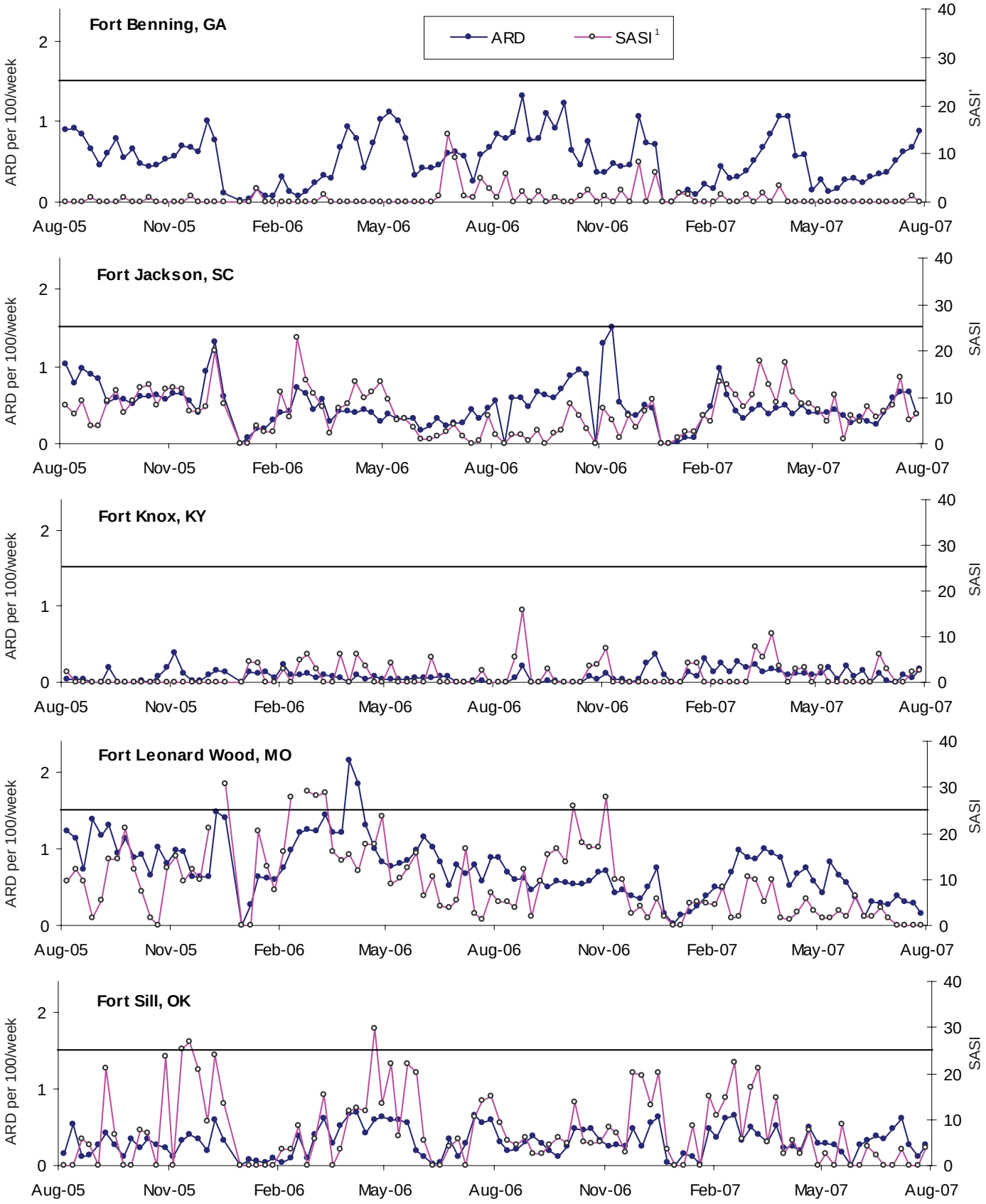


Figure 7. Proportion of service members who endorse exposure concerns on post-deployment health assessments, U.S. Armed Forces, 2003-2007



Acute respiratory disease (ARD) and streptococcal pharyngitis rates (SASI*), basic combat training centers, U.S. Army, by week, August 2005-August 2007



* Streptococcal-ARD surveillance index (SASI) = ARD rate x % positive culture for group A streptococcus
ARD rate = cases per 100 trainees per week
ARD rate ≥ 1.5 or SASI ≥ 25.0 for 2 consecutive weeks are surveillance indicators of epidemics

Sentinel reportable events for service members and beneficiaries at U.S. Air Force medical facilities, cumulative numbers* for calendar years through July 2006 and July 2007

Air Force

Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Air Combat Cmd	671	845	1	2	.	1	2	3	.	.	.	.	1	4	2	6
Air Education & Training Cmd	295	369	.	.	1	.	7	9	.	3	.	.	1	3	3	4
Lackland, TX	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USAF Academy, CO	83	26	.	.	.	.	.	2	.	.	.	.	.	.	.	.
Air Force Dist. of Washington	32	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Air Force Materiel Cmd	314	268	1	.	1	.	2	8	.	1	.	.	2	.	2	1
Air Force Special Ops Cmd	69	76	.	.	.	.	3	.	5	1	.	.	.	.	.	.
Air Force Space Cmd	209	152	.	1	.	1	3	5	.	1	.	.	1	2	.	1
Air Mobility Cmd	456	395	.	.	3	.	5	7	8	2	.	.	4	4	1	2
Pacific Air Forces	315	287	.	1	1	1	5	4	.	1	.	.	2	2	.	8
PACAF Korea	111	61	.	.	.	.	.	.	.	.	.	.	.	.	.	1
U.S. Air Forces in Europe	204	158	.	3	1	.	.	.	.	.	.	.	.	.	2	.
Total	**2,759**	**2,647**	**2**	**7**	**7**	**3**	**27**	**38**	**13**	**9**	**0**	**0**	**11**	**15**	**10**	**23**

*Events reported by July 7, 2006 and 2007

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Air Combat Cmd	1	5	.	.	599	480	40	40	3	.	.	2	3	.	1	6
Air Education & Training Cmd	.	.	1	.	216	298	32	32	1	.	.	.	.	.	.	.
Lackland, TX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USAF Academy, CO	.	.	1	.	38	21	.	1	.	.	.	.	2	.	1	.
Air Force Dist. of Washington	.	.	.	.	23	9	3	1	.	.	.	.	.	.	.	.
Air Force Materiel Cmd	.	3	1	1	210	211	40	30	1	.	.	.	.	.	.	.
Air Force Special Ops Cmd	.	.	.	.	47	67	12	8	.	.	.	.	.	.	.	.
Air Force Space Cmd	1	.	.	.	166	126	6	11	.	.	.	.	1	.	.	.
Air Mobility Cmd	6	4	1	.	342	329	18	22	1	1	.	.	.	.	.	2
Pacific Air Forces	.	.	2	.	270	241	21	10	.	.	.	.	2	.	.	.
PACAF Korea	.	.	.	.	91	49	12	1	.	2	.	.	.	.	.	.
U.S. Air Forces in Europe	2	1	1	.	134	117	15	9	1	.	.	.	.	.	.	.
Total	**10**	**13**	**7**	**1**	**2,136**	**1,948**	**199**	**165**	**7**	**3**	**0**	**2**	**8**	**0**	**2**	**8**

‡Primary and secondary.

§Urethritis, non-gonococcal (NGU).

Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers* for calendar years through July 2006 and July 2007

Army

Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NORTH ATLANTIC																
Washington, DC Area	148	159	4	.	1	3	2	2	.	.	.	.	1	5	.	1
Aberdeen, MD	11	19	.	.	.	1	.	.	.	.	.	.	.	.	.	.
FT Belvoir, VA	196	132	6	8	.	2	4	4	1	1	.	.	.	.	.	1
FT Bragg, NC	870	646	5	2	.	.	6	11	.	2	.	.	.	.	.	.
FT Drum, NY	122	126	.	.	.	.	.	.	.	.	.	.	.	2	.	.
FT Eustis, VA	113	98	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Knox, KY	134	146	.	.	.	.	.	2	.	1	.	.	.	1	.	.
FT Lee, VA	206	226	.	.	.	1	.	1	.	1	.	.	.	2	.	.
FT Meade, MD	61	29	.	.	.	.	.	.	.	.	.	.	.	.	.	.
West Point, NY	26	16	.	.	.	.	1	.	.	.	.	.	1	3	.	.
GREAT PLAINS																
FT Sam Houston, TX	313	347	.	.	2	1	3	2	1	.	.	.	.	2	1	6
FT Bliss, TX	180	200	.	.	.	.	.	.	.	.	.	.	1	2	.	.
FT Carson, CO	468	370	.	1	.	2	3	.	.	.	.	.	.	.	.	.
FT Hood, TX	942	1,066	2	3	1	2	5	5	5	8	.	.	.	.	1	1
FT Huachuca, AZ	27	54	.	.	.	.	.	5	.	.	.	.	.	.	.	.
FT Leavenworth, KS	20	27	.	1	.	.	.	.	.	.	.	.	.	.	.	.
FT Leonard Wood, MO	153	218	.	.	2	.	1	1	.	1	.	.	.	.	6	8
FT Polk, LA	115	106	2	.	1	3	.	2	.	.	.	.	.	.	.	1
FT Riley, KS	85	183	2	2	.	.	.	3	.	.	.	.	.	.	.	.
FT Sill, OK	126	98	.	.	.	.	1	1	.	.	.	.	.	.	1	1
SOUTHEAST																
FT Gordon, GA	252	361	.	.	.	.	.	1	.	.	.	.	9	1	.	.
FT Benning, GA	246	215	2	1	1	1	2	3	.	1	.	.	.	1	.	1
FT Campbell, KY	340	289	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Jackson, SC	136	112	.	.	.	.	.	.	.	.	.	.	.	1	.	.
FT Rucker, AL	37	42	1	.	.	.	.	.	.	9	.	.	.	1	.	.
FT Stewart, GA	379	536	.	1	.	.	2	9	3	9	.	.	4	2	3	1
WESTERN																
FT Lewis, WA	333	353	.	1	.	3	1	1	.	1	.	.	.	.	1	1
FT Irwin, CA	54	56	.	1	.	.	.	2	.	1	.	.	.	.	.	.
FT Wainwright, AK	106	172	.	1	.	.	1	.	.	1	.	.	.	.	.	.
OTHER LOCATIONS																
Hawaii	532	384	17	15	1	1	9	8	1	.	.	.	.	1	.	.
Germany	495	431	10	5	.	1	10	5	.	6	.	.	1	.	1	1
Korea	268	314	.	.	.	.	.	.	.	.	.	.	3	.	4	2
Total	**7,494**	**7,531**	**51**	**42**	**9**	**21**	**51**	**68**	**11**	**42**	**0**	**0**	**20**	**24**	**18**	**25**

*Events reported by July 7, 2006 and 2007

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers* for calendar years through July 2006 and July 2007

Army

Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NORTH ATLANTIC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Washington, DC Area	.	3	1	2	76	87	12	14	2	4	1	.	.	.	.	.
Aberdeen, MD	.	.	.	.	8	10	1	3	.	.	.	.	.	.	.	.
FT Belvoir, VA	.	.	.	1	97	87	22	11	.	2	.	.	.	.	.	.
FT Bragg, NC	.	.	9	2	622	466	88	80	3	.	77	46	1	1	53	34
FT Drum, NY	.	2	.	2	108	76	14	13	.	.	.	.	.	.	.	.
FT Eustis, VA	.	.	.	.	80	82	22	2	.	.	.	.	.	.	2	5
FT Knox, KY	5	1	.	.	94	117	19	20	.	.	.	.	3	.	4	.
FT Lee, VA	.	1	.	.	153	176	26	26	.	.	.	.	.	1	.	3
FT Meade, MD	.	.	.	.	53	21	7	6	.	1	1	.	.	1	.	.
West Point, NY	2	3	.	.	15	9	.	.	.	.	.	.	1	.	.	.
GREAT PLAINS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Sam Houston, TX	.	1	1	.	164	169	29	33	2	2	.	.	.	.	.	1
FT Bliss, TX	.	.	.	.	139	154	31	32	2	2	.	.	.	.	1	.
FT Carson, CO	.	.	.	.	303	238	62	35	.	1	25	7	.	1	.	.
FT Hood, TX	.	.	.	2	584	791	151	124	.	1	19	56	.	.	19	1
FT Huachuca, AZ	.	.	.	.	24	41	2	8	.	.	.	.	1	.	.	.
FT Leavenworth, KS	.	.	.	.	18	22	2	4	.	.	.	.	.	.	.	.
FT Leonard Wood, MO	.	.	.	.	102	143	9	24	.	1	.	.	.	2	4	5
FT Polk, LA	.	.	.	14	70	59	22	14	1	1	.	.	.	.	19	11
FT Riley, KS	.	.	.	.	74	131	9	9	.	.	.	.	.	.	.	3
FT Sill, OK	.	.	.	.	37	65	13	16	2	.	.	.	.	1	16	9
SOUTHEAST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Gordon, GA	.	.	.	.	174	255	35	41	.	2	3	.	.	.	2	1
FT Benning, GA	.	.	.	1	158	130	39	42	.	.	.	.	.	1	39	18
FT Campbell, KY	.	.	.	.	232	194	37	32	.	.	.	.	.	.	9	.
FT Jackson, SC	.	.	.	.	123	87	13	22	.	2	.	.	.	.	.	.
FT Rucker, AL	.	.	.	.	30	26	3	1	.	.	.	.	.	.	2	4
FT Stewart, GA	3	.	2	.	241	386	81	81	1	2	10	.	1	.	13	5
WESTERN	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Lewis, WA	.	.	2	1	260	303	38	30	.	.	22	7	.	.	.	.
FT Irwin, CA	.	1	.	.	42	33	7	4	2	.	.	.	.	.	3	11
FT Wainwright, AK	.	.	11	.	61	116	9	6	.	.	.	.	15	22	.	.
OTHER LOCATIONS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hawaii	.	.	2	.	398	272	46	30	.	.	.	.	.	.	2	3
Germany	8	10	7	4	316	259	102	82	1	2	1	3	.	.	.	11
Korea	.	.	5	2	196	253	46	35	2	.	.	1	2	20	2	1
Total	**18**	**22**	**40**	**31**	**5,052**	**5,258**	**997**	**880**	**18**	**23**	**159**	**120**	**24**	**50**	**190**	**126**

‡Primary and secondary.

§Urethritis, non-gonococcal (NGU).

Sentinel reportable events for service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers* for calendar years through July 2006 and July 2007

Navy

Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NATIONAL CAPITOL AREA	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Annapolis, MD	16	0	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Bethesda, MD	37	16	3	1	3	.	1	1	.	.	.	.	.	.	.	.
Patuxent River, MD	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE EAST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Albany, GA	6	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Atlanta, GA	5	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Beaufort, SC	75	108	.	.	.	.	1	.	.	1	.	.	.	.	.	.
Camp Lejeune, NC	213	169	.	.	.	.	2	1	.	.	.	.	.	.	.	.
Cherry Point, NC	42	57	.	.	1	.	2	.	.	.	.	.	.	.	.	2
Great Lakes, IL	0	148	.	.	.	1	.	2	.	.	.	.	.	.	.	.
Jacksonville, FL	74	109	.	1	.	.	4	2	.	2	.	.	.	.	.	.
Mayport, FL	16	24	.	1	.	.	1	4	.	.	.	.	.	.	.	.
NABLC Norfolk, VA	10	26	.	.	.	.	1	.	.	.	.	.	.	.	.	.
NBMC Norfolk, VA	117	48	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NEHC Norfolk, VA	2	4	.	.	.	.	.	.	.	.	.	.	.	.	.	2
North Charleston, SC	0	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pensacola, FL	23	53	.	.	.	.	.	.	.	3	.	.	.	.	.	5
Portsmouth, VA	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Washington, DC	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Guantanamo Bay, Cuba	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Europe	4	11	1	.	.	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE WEST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Camp Pendleton, CA	37	11	.	.	.	.	3	.	.	.	.	.	2	.	.	.
Corpus Christi, TX	1	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fallon, NV	3	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ingleside, TX	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lemoore, CA	66	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pearl Harbor, HI	3	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
San Diego, CA	43	292	.	2	1	2	6	3	1	2	.	.	1	28	.	.
Guam	32	27	1	.	.	.	2	1	.	.	.	.	.	.	.	.
Japan	62	22	.	.	.	.	3	.	.	.	.	.	.	.	.	1
NAVAL SHIPS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
COMNAVAIRLANT/CINCLANTFLEET	59	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	15	19	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Total	**963**	**1,159**	**5**	**5**	**6**	**3**	**26**	**14**	**1**	**8**	**0**	**0**	**3**	**28**	**0**	**11**

*Events reported by July 7, 2006 and 2007

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

Sentinel reportable events for service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers* for calendar years through July 2006 and July 2007

Navy

Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NATIONAL CAPITOL AREA	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Annapolis, MD	.	.	.	.	13	.	2	.	.	.	.	.	.	.	.	.
Bethesda, MD	.	.	.	.	12	9	2	1	.	1	.	.	.	.	.	.
Patuxent River, MD	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE EAST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Albany, GA	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.	.
Atlanta, GA	.	.	.	.	3	1	2	1	.	1	.	.	.	.	.	.
Beaufort, SC	.	.	.	.	36	86	.	6	.	2	.	.	.	.	38	7
Camp Lejeune, NC	1	8	.	.	167	127	34	19	.	.	.	.	.	.	6	14
Cherry Point, NC	.	.	.	.	35	46	4	5	.	1	.	.	.	.	.	1
Great Lakes, IL	.	.	.	.	.	126	.	13	.	.	.	.	.	.	.	.
Jacksonville, FL	.	.	.	.	29	84	4	12	2	2	.	.	.	.	.	.
Mayport, FL	.	.	.	.	15	16	.	.	.	1	.	.	.	.	.	.
NABLC Norfolk, VA	.	.	.	.	7	24	2	2	.	.	.	.	.	.	.	.
NBMC Norfolk, VA	.	.	.	.	91	39	21	8	1	.	.	.	.	.	.	.
NEHC Norfolk, VA	.	.	.	.	.	2	.	.	.	.	.	.	1	.	1	.
North Charleston, SC	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.
Pensacola, FL	.	.	.	.	22	31	1	3	.	.	.	.	.	.	.	8
Portsmouth, VA	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Washington, DC	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Guantanamo Bay, Cuba	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Europe	.	.	1	.	2	10	.	1	.	.	.	.	.	.	.	.
NAVY MEDICINE WEST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Camp Pendleton, CA	.	.	.	.	32	9	.	1	.	1	.	.	.	.	.	.
Corpus Christi, TX	.	.	.	.	1	2	.	1	.	.	.	.	.	.	.	.
Fallon, NV	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.
Ingleside, TX	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Lemoore, CA	.	.	.	.	24	.	4	.	.	.	.	.	.	.	.	.
Pearl Harbor, HI	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.
San Diego, CA	.	1	.	.	26	181	5	34	.	4	.	.	.	.	.	.
Guam	.	.	.	.	23	23	5	3	.	.	.	.	.	.	.	.
Japan	.	.	.	.	53	16	6	4	.	.	.	.	.	.	.	.
NAVAL SHIPS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
COMNAVAIRLANT/CINCLANTFLEET	1	.	.	.	48	4	9	.	1	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	.	.	.	.	6	13	6	5	.	.	3	.	.	.	.	.
Total	**2**	**9**	**1**	**0**	**657**	**854**	**108**	**119**	**4**	**13**	**3**	**0**	**1**	**0**	**45**	**30**

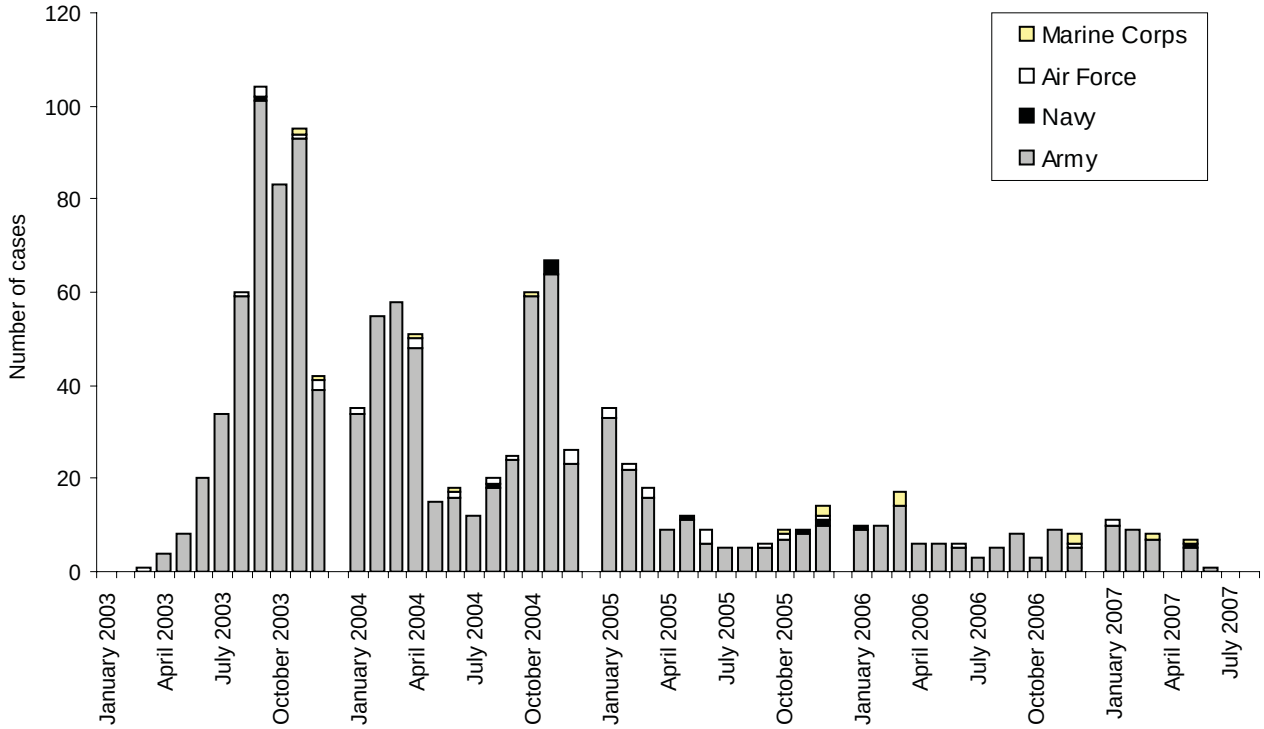
‡Primary and secondary.

§Urethritis, non-gonococcal (NGU).

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - July 2007

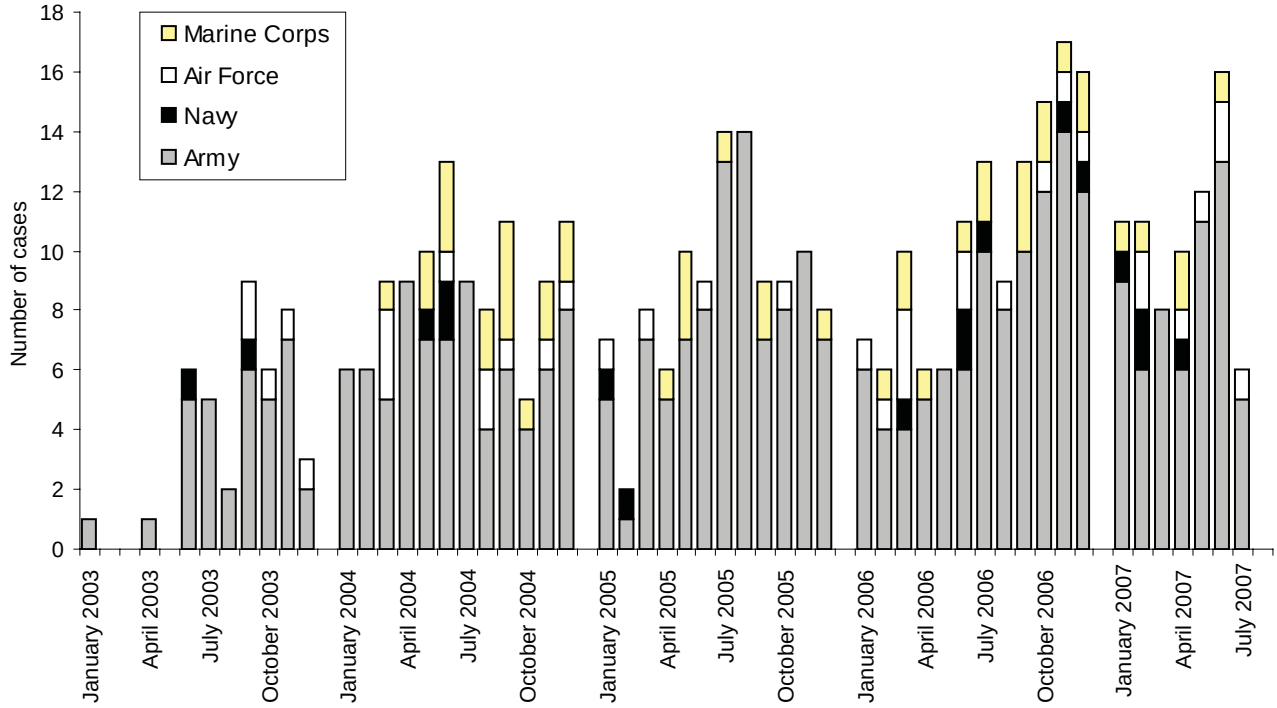
Leishmaniasis (ICD-9: 085.0 to 085.9)*

Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: leishmaniasis. Leishmaniasis among U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):2-4.



Deep vein thrombophlebitis/pulmonary embolus (ICD-9: 415.1, 451.1, 451.81)†

Reference: Isenbarger DW, Atwood JE, Scott PT, et al. Venous thromboembolism among United States soldiers deployed to Southwest Asia. *Thromb Res*. 2006;117(4):379-83.

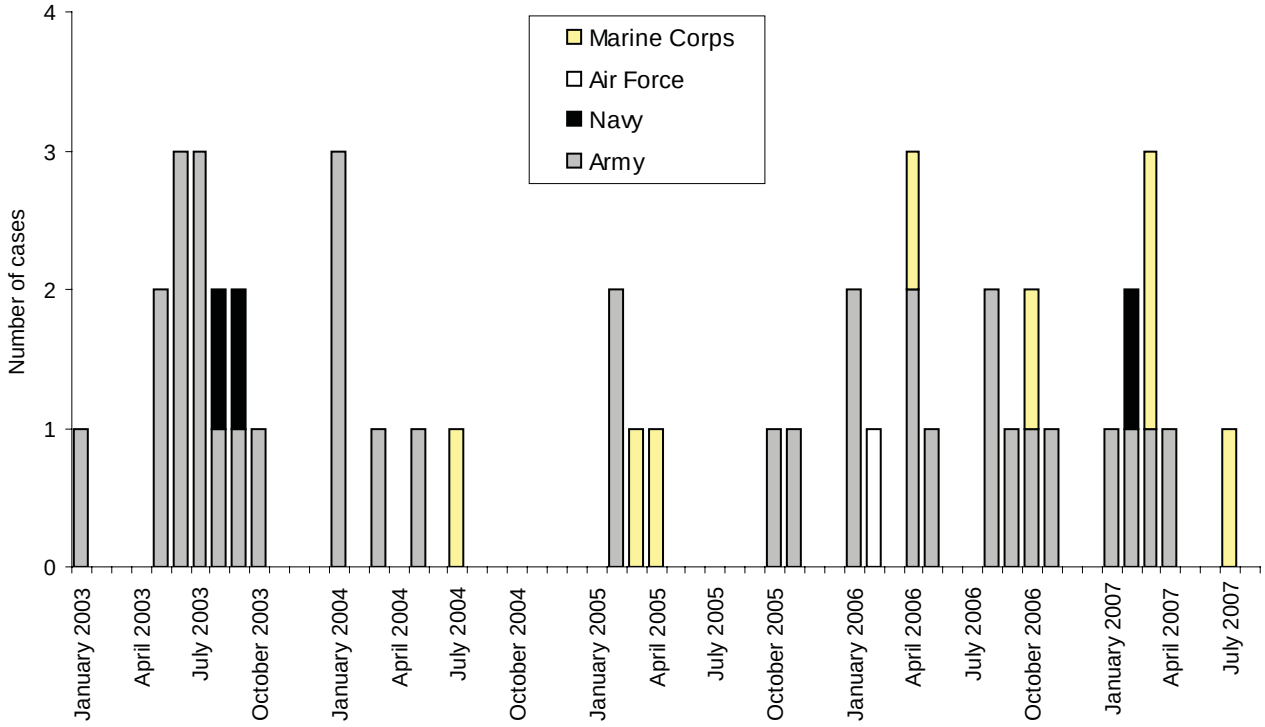


* Indicator diagnosis (one per individual) during a hospitalization, ambulatory visit, and/or from a notifiable medical event during/after service in OEF/OIF.
† Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 days of returning from OEF/OIF.

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - July 2007

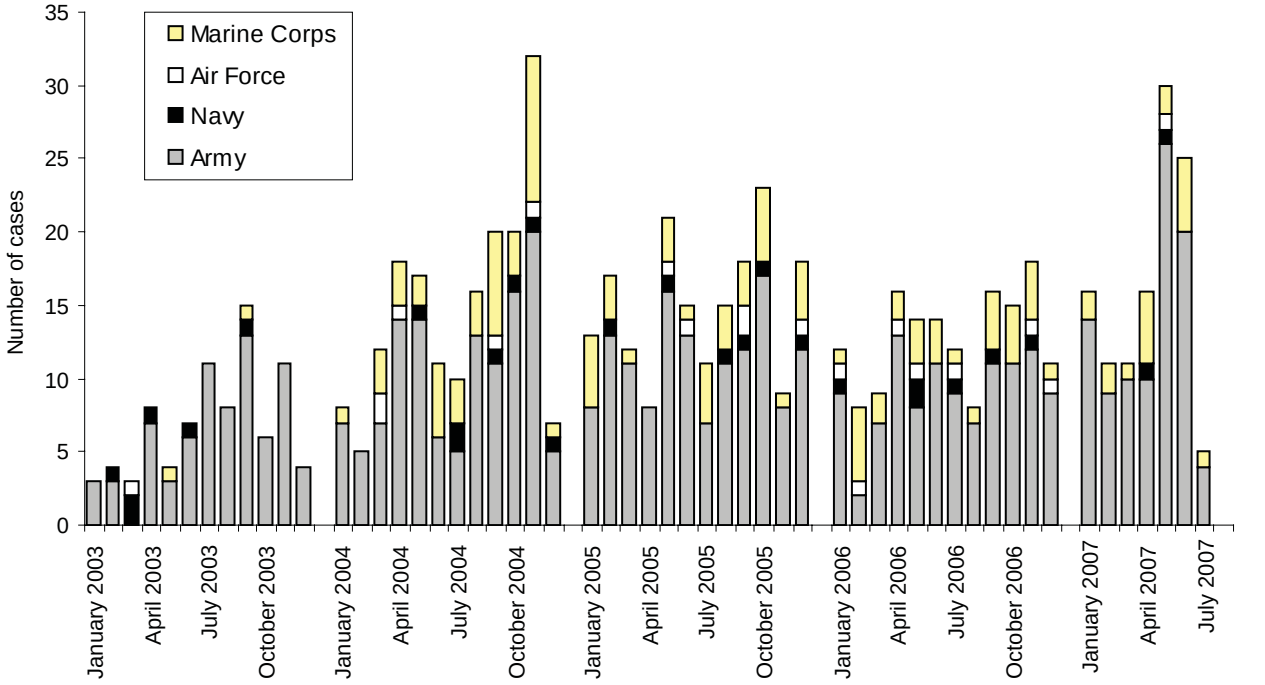
Severe acute pneumonia* (ICD-9: 518.81, 518.82, 518.3, 480-487, 786.09)[‡]

Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: severe acute pneumonia. Hospitalizations for acute respiratory failure (ARF)/acute respiratory distress syndrome (ARDS) among participants in Operation Enduring Freedom/Operation Iraqi Freedom, active components, U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):6-7.



Amputations (ICD-9: 887, 896, 897, V49.6 to V49.7, PR 84.0 to PR 84.1)[§]

Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: amputations. Amputations of lower and upper extremities, U.S. Armed Forces, 1990-2004. *MSMR*. Jan 2005;11(1):2-6.



[‡] Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit while deployed to/within 30 days of returning from OEF/OIF.
[§] Indicator diagnosis (one per individual) during a hospitalization of a servicemember during/after service in OEF/OIF.

SURVEILLANCE SNAPSHOT:

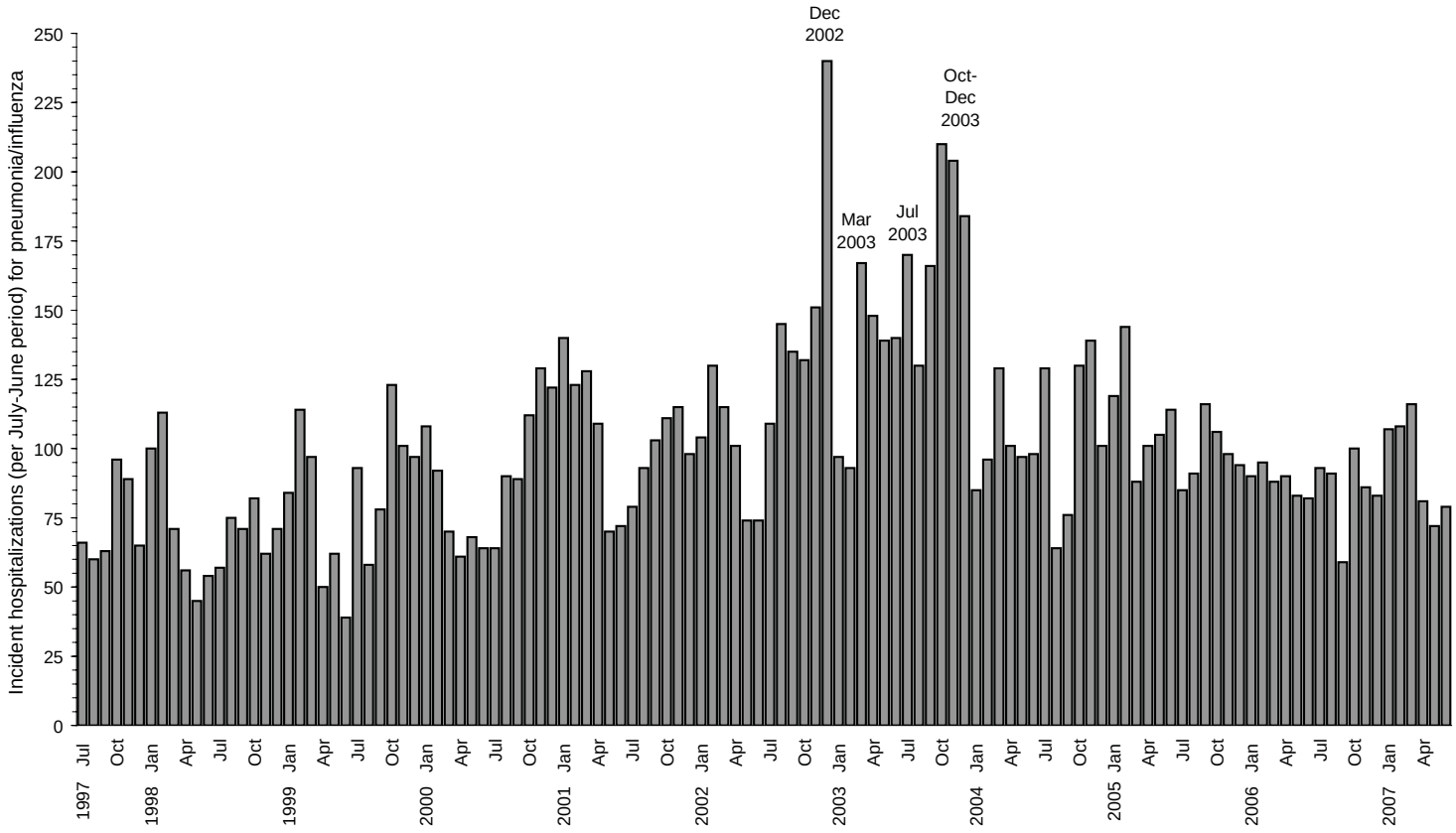
Influenza and pneumonia among U.S. servicemembers, July 1997-June 2007

In September-October 1918, all large military installations in the United States were suddenly and catastrophically attacked by a virulent strain of influenza. Within a few months, more U.S. service members had died from influenza or pneumonia than from wounds on the Western Front.

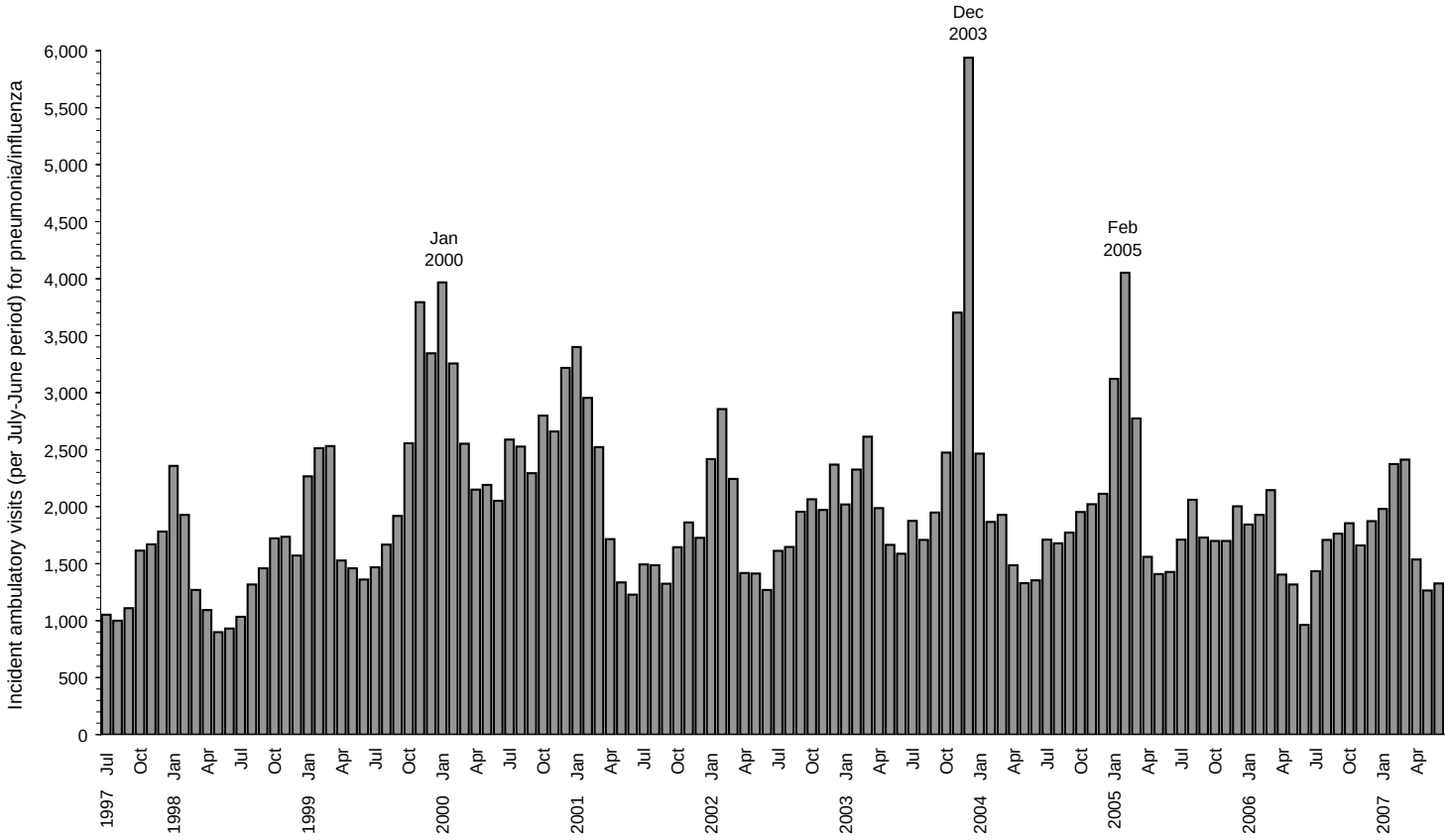
For many reasons, military forces — particularly, recruits — are at high risk of acute respiratory infectious diseases. Debilitating outbreaks can strike quickly and without warning. Recruits should receive the current year's influenza vaccine during their medical in-processing. All other service members should be immunized against influenza during the fall of each year.

The figures below show the numbers of U.S. service members who had hospitalizations and ambulatory visits for "pneumonia and influenza" (primary diagnosis of ICD-9-CM: 480-487) during each July-June period from July 1997-June 2007.

Number of service members with >1 hospitalization per year for "pneumonia/influenza," by month of first hospitalization per July-June period, July 1997-June 2006



Number of service members with >1 ambulatory visit per year for “pneumonia/influenza,” by month of first visit per July-June period, July 1997-June 2006



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