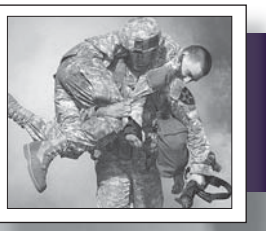
VOL. 14 • NO. 7
NOVEMBER 2007

MSMR

A publication of the Armed Forces Health Surveillance Center





MEDICAL SURVEILLANCE MONTHLY REPORT

INSIDE THIS ISSUE:

Read the MSMR online at: http://amsa.army.mil/msmr.htm

"Indicator" Infectious Illnesses, Staphylococcal Infections, and Penicillin Resistance among Active Component Members, U.S. Armed Forces, January 2002-June 2007

Public health and clinical reports suggest that community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) infections are increasing in incidence in the United States.[1-3] In recent years, MRSA has become the most common identifiable cause of skin and soft-tissue infections among patients treated in U.S. emergency departments.[3]

Outbreaks of CA-MRSA have been documented in U.S. military populations, particularly among trainees. For example, in the late summer and fall of 2002, 235 MRSA cases were documented among recruits at a large training installation in the southeastern United States. The clinical expressions of MRSA infections included abscesses (most common), cellulitis, and folliculitis. Risk factors were thought to be close contact, physical stress, and limited opportunities for personal hygiene — to some extent, all are inherent to military recruit and field training.[4] In the late summer-fall of 2002, there was an outbreak of MRSA skin and soft tissue infections among participants in a physically rigorous 26-week military training course in San Diego, California. The major risk factor for MRSA was having a roommate with a prior skin infection.[5] A recent study of the natural history of CA-MRSA among military trainees in Texas found that colonization before starting training increased risk of soft-tissue infections during 8-10 weeks of follow-up. The findings suggested that MRSA strains were more virulent than methicillin-sensitive *S. aureus* (MSSA) strains.[6]

In the U.S. Military Health System, cases of CA-MRSA are not reportable medical events. Also, there is not an ICD-9-CM diagnostic code that is specific for MRSA. Thus, it is difficult to estimate the current status and trends of the distribution, concentration, and clinical effects of CA-MRSA in U.S. military populations.

To gain some insights into the scope, magnitude, and trends of MRSA-related morbidity in the U.S. military, several "indicator diagnoses" were used to identify episodes of infectious illnesses potentially caused by MRSA among U.S. military members. Infectious illnesses documented with indicator diagnoses were further examined to determine those that were reported as "staphylococcus-related" and/or "resistant to penicillin."

Methods:

The surveillance period was 1 January 2002 through 30 June 2007. The surveillance population included all

Table 1. Incident reports per calendar year of skin and other infectious illnesses potentially related to MRSA ("indicator diagnoses"), active components, U.S. Armed Forces, January 2002-June 2007

			With ICD-9-CM: 041.1 "staphylococcus in condition classified elsewhere"			With ICD-9-CM: v090.0 "resistant to penicillin"			Ratio, penicillin resistant versus staphylococcus-related
	Incident diagnoses per year	Number per year relative to 2002	No.	% of indicator diagnoses	Number per year relative to 2002	No.	% of indicator diagnoses	Number per year relative to 2002	
Skin-related indicator diagnoses									
2002	37,592	ref	592	1.6	ref	201	0.5	ref	0.34
2003	39,768	1.06	908	2.3	1.53	507	1.3	2.52	0.56
2004	46,552	1.24	1,304	2.8	2.20	886	1.9	4.41	0.68
2005	47,985	1.28	1,334	2.8	2.25	1,176	2.5	5.85	0.88
2006	50,959	1.36	1,562	3.1	2.64	1,316	2.6	6.55	0.84
2007 (estimate based on Jan-Jun)	50,662	1.35	1,390	2.7	2.35	1,236	2.4	6.15	0.89
Total (estimated)	273,518		7,090	2.6		5,322	1.9		0.75
Other (non-skin) indicator diagnoses									
2002	555	ref	178	32.1	ref	40	7.2	ref	0.22
2003	691	1.25	223	32.3	1.25	44	6.4	1.10	0.20
2004	781	1.41	267	34.2	1.50	69	8.8	1.73	0.26
2005	811	1.46	314	38.7	1.76	100	12.3	2.50	0.32
2006	868	1.56	304	35.0	1.71	113	13.0	2.83	0.37
2007 (estimate based on Jan-Jun)	1,058	1.91	322	30.4	1.81	98	9.3	2.45	0.30
Total (estimated)	4,764		1,608	33.8		464	9.7		0.29

individuals who served in the U.S. Armed Forces any time during the surveillance period. All data were derived from records routinely maintained in the Defense Medical Surveillance System (DMSS).

For surveillance purposes, the following diagnoses were considered "indicators" of skin infections potentially caused by MRSA: "carbuncle and furuncle" (ICD-9-CM: 680), "cellulitis and abscess of finger and toe" (ICD-9-CM: 681), and "other cellulitis and abscess" (ICD-9-CM: 682). The following diagnoses were considered "indicators" of virulent infections potentially caused by MRSA: "staphylococcal septicemia" (ICD-9-CM: 038.1), "staphylococcal meningitis" (ICD-9-CM: 320.3), "bacterial endocarditis" (ICD-9-CM: 421.0), "pneumonia due to staphylococcus" (ICD-9-CM: 482.4), "osteomyelitis" (ICD-9-CM: 730.0, 730.2, 730.8) "toxic shock syndrome" (ICD-9-CM: 040.82), and "septic shock" (ICD-9-CM: 785.52).

During each calendar year of the surveillance period, all members of the surveillance population who had at least one medical encounter with an indicator diagnosis in any diagnostic position on the clinical record were identified. For each indicator diagnosis, only one episode of care per individual per calendar year was included for analyses. A separate analysis of indicator diagnoses reported during hospitalizations was conducted.

For analysis purposes, infectious illnesses documented with "indicator diagnoses" were considered "staphylococcus-related" and/or "resistant to penicillin" if diagnoses specific for the conditions were reported during or soon after index encounters. To this end, all medical encounters of each individual with an indicator diagnosis were reviewed to identify reports of the following diagnoses within 30 days of the index encounter: "staphylococcus infection in conditions classified elsewhere and of unspecified site" (ICD-9-CM: 040.82); and/or "infection with microorganisms resistant to penicillins — includes methicillin-resistant Staphylococcus aureus (MRSA)" (ICD-9-CM: V09.0).

The locations of medical treatment facilities where indicator diagnoses were first reported were used to estimate locations and settings where infections of interest were acquired. Finally, for trend analyses, infections of interest during calendar year 2007 were estimated based on the experience during the first six months of the year.

Results:

During the 6.5-year surveillance period, there were 248,187 incident per year indicator diagnoses of skin infections and 4,235 incident per year indicator diagnoses of other infections of surveillance interest.

Medical encounters, overall: Episodes of indicator skin infections increased by approximately one-third during the period — from 3,133 per month in 2002 to 4,222 per month in 2007 **(Table 1, Figure 1).** Episodes of "other" indicator infections nearly doubled during the period — from 46.3 per month in 2002 to 88.2 per month in 2007 **(Table 1, Figure 2).**

The only specific indicator diagnosis that decreased in incidence during the period was "cellulitis and abscess of the finger and toe" (incident diagnoses per month, 2002: 726; 2007: 649; % change: -10.6%) (data not shown). Of note,

Figure 1. Incident per year diagnoses of indicator infectious illnesses of skin, by reported relationship to staphylococcus, by calendar year, 2002-2007

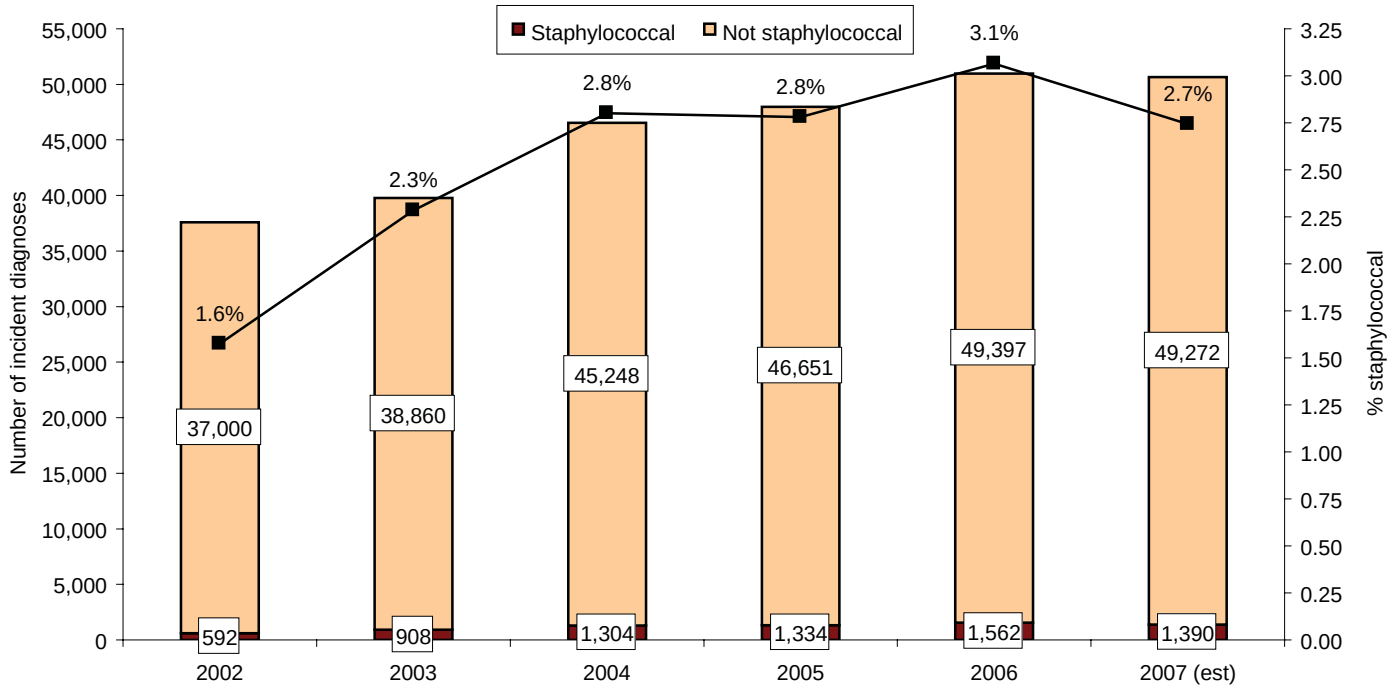
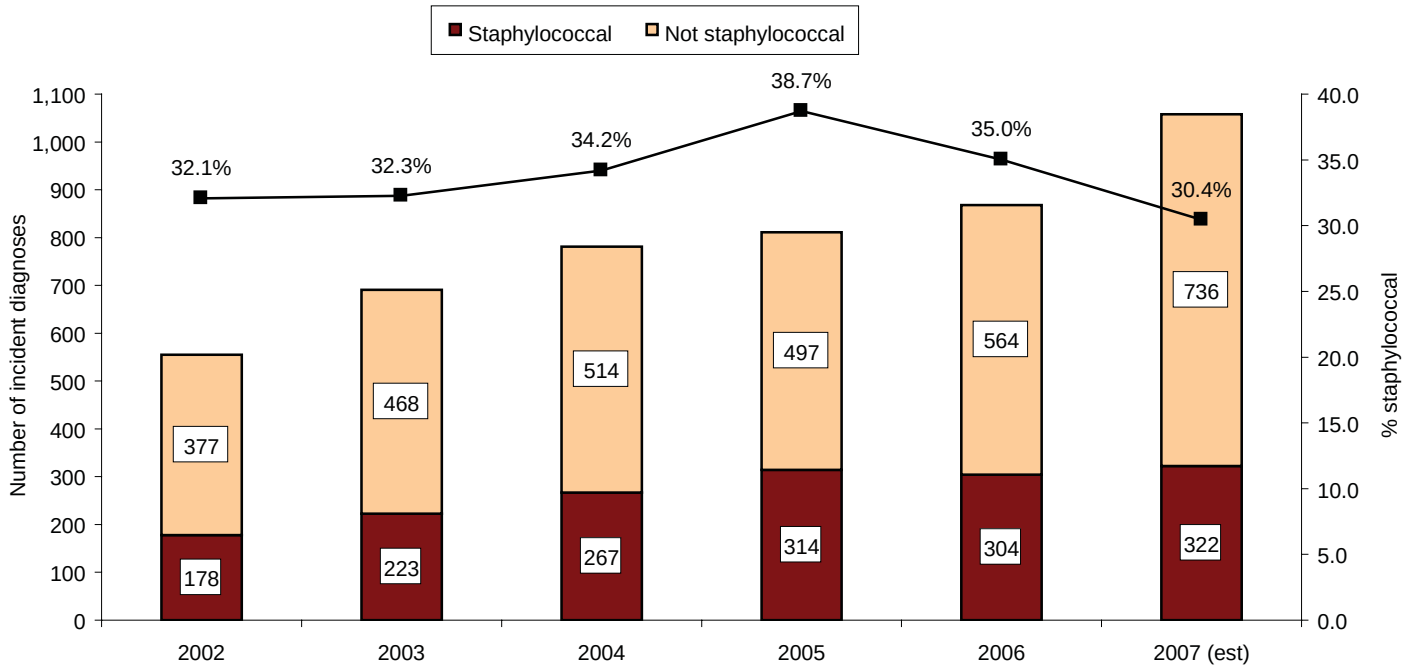


Figure 2. Incident per year diagnoses of "other" (non-skin) indicator infectious illnesses, by reported relationship to staphylococcus, by calendar year, 2002-2007



diagnoses of "other cellulitis and abscess" sharply increased during the period (incident diagnoses per month, 2002: 2,142; 2007: 2,912; % change: +35.9%) (data not shown).

Among all indicator skin infections, the percentages that were temporally associated with a diagnosis of "staphylococcus" increased from 2002 (1.6%) to 2004 (2.8%) and were relatively stable thereafter **(Table 1, Figure 1).** Between 2002 and 2006, incident reports of indicator skin infections that were "staphylococcus-related" more than doubled, while those reported as "resistant to penicillin" increased more than six-fold **(Table 1, Figure 1).** Thus, among indicator skin infections, the ratio of those reported as "penicillin resistant" to those reported as "staphylococcus-related" increased sharply during the period, particularly from 2002 (0.34) to 2005 (0.88) **(Table 1).**

Approximately 90% of all "other" (non-skin) indicator infections were due to "osteomyelitis" (n=2,917; 68.9%), "staphylococcal septicemia" (n=588; 13.9%), and "pneumonia due to staphylococcus" (n=287; 6.8%) (data not shown). During the period, the percentages of other indicator infections that were reported as "staphylococcus-related" remained fairly stable (range, % staphylococcus-related: 30.4%-38.7%) — however, the number that were reported as "staphylococcus-related" increased by 81% (incident diagnoses per month, 2002: 14.8; 2007: 26.8), and the number reported as "resistant to penicillin" increased nearly three-fold (diagnoses per month, 2002: 3.3; 2006: 9.4; % change: +285%) **(Table 1, Figure 2).** Thus, among other indicator infections, the ratio of those reported as "penicillin resistant" to those reported as "staphylococcus-related" increased from 0.22 in 2002 to 0.37 in 2006 **(Figure 2).**

Hospitalizations: During the surveillance period, there were 11,690 hospitalizations with indicator diagnoses of skin infections and 1,315 hospitalizations with indicator diagnoses of other infections **(Table 2).**

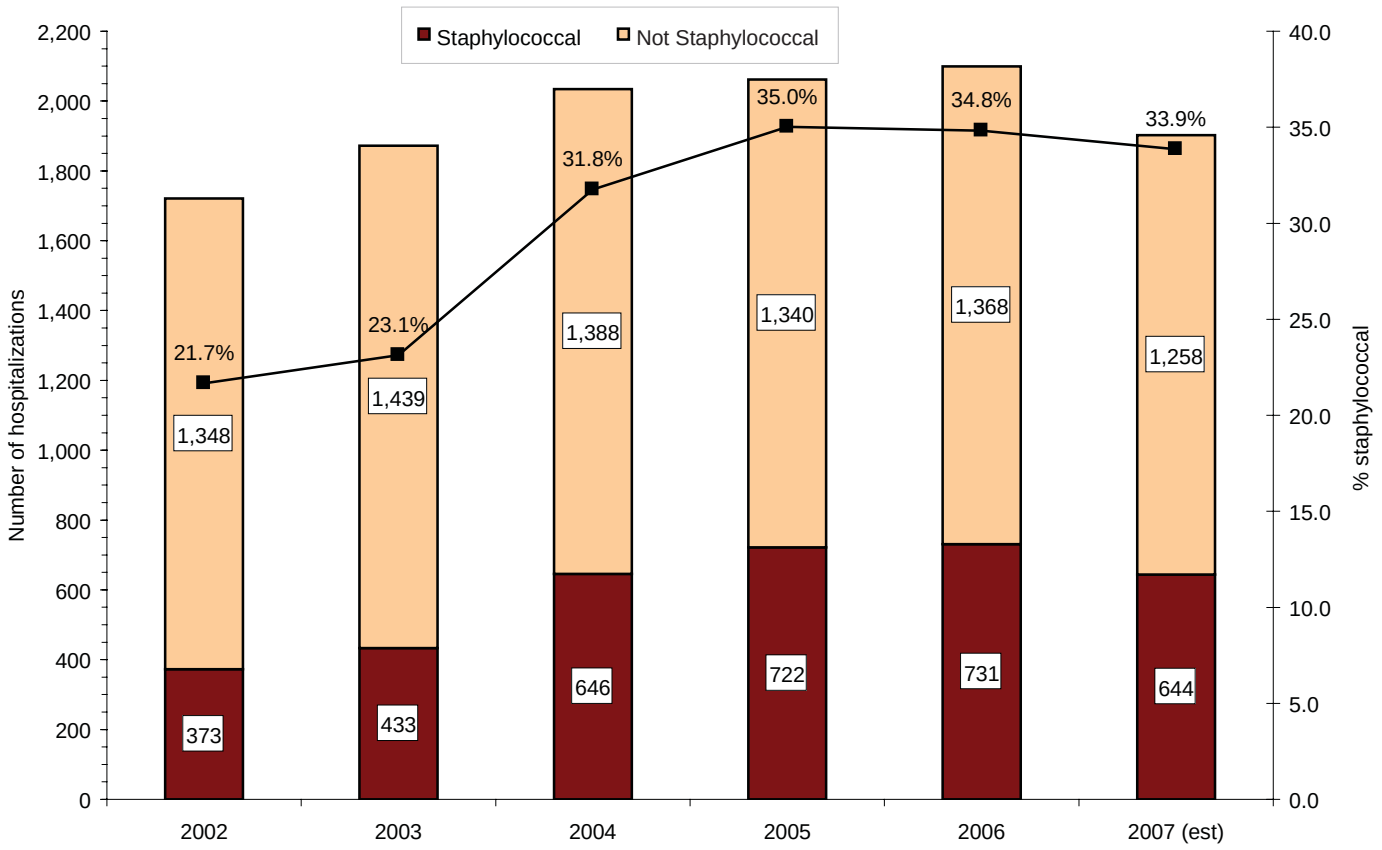
The number of hospitalizations for indicator skin infections increased by nearly 20% from 2002 to 2004 and then were relatively stable **(Table 2, Figure 3).** However, between 2002 and 2006, the number of hospitalized cases of indicator skin infections that were "staphylococcus-related" approximately doubled (hospitalizations per month, 2002: 31.1; 2006: 60.9; % change: +96%), while the number reported as "resistant to penicillin" increased more than four-fold (hospitalizations per month, 2002: 11.6; 2006: 47.2; % change: +407%) **(Table 2, Figure 3).** Thus, of indicator skin infections diagnosed during hospitalizations, the ratio of those reported as "penicillin resistant" to those reported as "staphylococcus-related" sharply increased — from 0.37 in 2002 to 0.79 in 2007 **(Table 2).**

More than 90% of all inpatient diagnoses of "other" indicator infectious illnesses were due to "osteomyelitis" (n=691; 58.9%), "staphylococcal septicemia" (n=215; 18.3%), and "pneumonia due to staphylococcus" (n=186; 15.8 %) (data not shown). Overall, inpatient diagnoses of other indicator infectious illnesses steadily increased and nearly doubled from 2002 to 2007 **(Table 2, Figure 4).** During the period, the number of hospitalized cases of other indicator illnesses that were "staphylococcus-related" increased by 55%, while the number reported as "resistant to penicillin" doubled **(Table 2, Figure 4).** Thus, of other indicator infections diagnosed during hospitalizations, the ratio of those reported as "penicillin resistant" to those reported as "staphylococcus-

Table 2. Incident hospitalizations per calendar year with diagnoses of skin and other infectious illnesses potentially related to MRSA ("indicator diagnoses"), active components, U.S. Armed Forces, January 2002-June 2007

			With ICD-9-CM: 041.1 "staphylococcus in condition classified elsewhere"			With ICD-9-CM: v090.0 "resistant to penicillin"			Ratio, penicillin resistant versus staphylococcus-related
	Incident hospitalizations per year	Number per year relative to 2002	No.	% of indicator diagnoses	Number per year relative to 2002	No.	% of indicator diagnoses	Number per year relative to 2002	
Skin-related indicator diagnoses									
2002	1,721	ref	373	21.7	ref	139	8.1	ref	0.37
2003	1,872	1.09	433	23.1	1.16	208	11.1	1.50	0.48
2004	2,034	1.18	646	31.8	1.73	378	18.6	2.72	0.59
2005	2,062	1.20	722	35.0	1.94	530	25.7	3.81	0.73
2006	2,099	1.22	731	34.8	1.96	566	27.0	4.07	0.77
2007 (estimate based on Jan-Jun)	1,902	1.11	644	33.9	1.73	508	26.7	3.65	0.79
Total (estimated)	11,690		3,549	30.4		2,329	19.9		0.66
Other (non-skin) indicator diagnoses									
2002	144	ref	93	64.6	ref	25	17.4	ref	0.27
2003	190	1.32	114	60.0	1.23	26	13.7	1.04	0.23
2004	211	1.47	122	57.8	1.31	35	16.6	1.40	0.29
2005	236	1.64	139	58.9	1.49	39	16.5	1.56	0.28
2006	252	1.75	144	57.1	1.55	50	19.8	2.00	0.35
2007 (estimate based on Jan-Jun)	282	1.96	144	51.1	1.55	48	17.0	1.92	0.33
Total (estimated)	1,315		756	57.5		223	17.0		0.29

Figure 3. Hospitalizations for indicator skin infectious illnesses, by reported relationship to staphylococcal infection, by calendar year, 2002-2007



related" increased from 0.27 in 2002 to 0.35 in 2006 (notably less than for skin infections) **(Table 2)**.

Geographic distribution: During the surveillance period, 395 medical treatment facilities worldwide reported at least one case of an indicator infectious illness that was "staphylococcus-related." Of hospitals and clinics with any cases, 15 reported at least 100 cases each — these facilities were located throughout the continental United States and in Hawaii and included three Army and two Navy medical centers, five facilities that directly support recruit training, and five hospitals located on the largest Army and Marine Corps installations in the United States.

Also, during the period, 331 medical treatment facilities worldwide reported at least one case of an indicator infectious illness that was "resistant to penicillin." Eleven facilities reported at least 100 cases each — and of these, ten (located in the south-eastern U.S., southern California, and Texas) also reported at least 100 cases of staphylococcus-related indicator infectious illnesses. Of note, the facility that reported the most penicillin resistant cases (n=314) reported relatively few (n=27) "staphylococcus-related" cases.

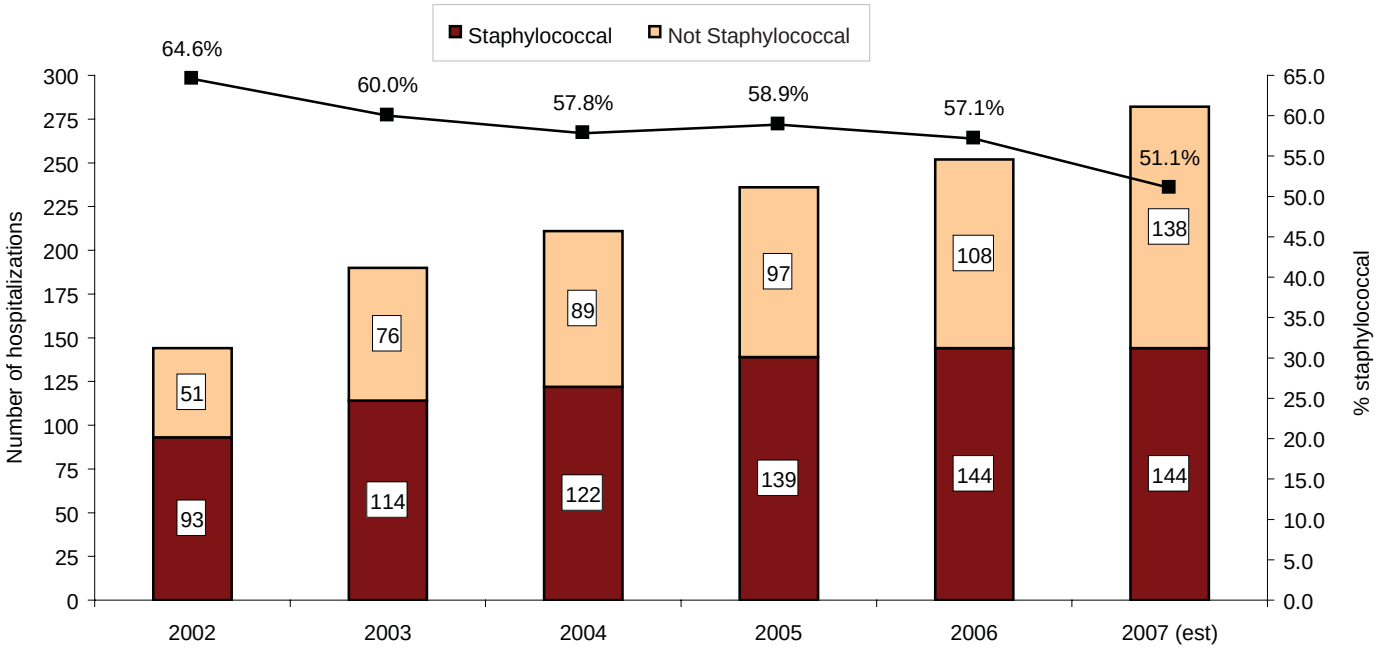
Editorial comment:

There are no direct methods of monitoring the nature, distribution, or clinical effects of CA-MRSA infections in U.S. military populations. This report summarizes the recent experience of U.S. military members in relation to infectious illnesses that were potentially caused by CA-MRSA ("indicator diagnoses"). While the results are not precise estimates of CA-MRSA-related morbidity in the U.S. military, they may be informative and useful for public health surveillance purposes.

The numerous and varied obstacles to complete and accurate ascertainment of CA-MRSA cases must be considered when interpreting the findings. For example, many infectious illnesses caused by CA-MRSA may not be documented with bacterial cultures. Also, results of bacterial cultures positive for MRSA may not be available (hence, are not reported) when standardized summary records of outpatient medical encounters are completed. In addition, this analysis only included records of hospitalizations and ambulatory visits in fixed (e.g., not deployed or at sea) hospitals and clinics of the U.S. Military Health System; hence, indicator infectious illnesses that affected service members in Iraq and Afghanistan, for example, were not included. Also, the "indicator" infectious illnesses that were used for this analysis undoubtedly excluded some illnesses that were caused by CA-MRSA. On the other hand, during the surveillance period, there may have been increases in the ascertainment and reporting of the "staphylococcal" etiologies and of "resistance to penicillin" of underlying infections as awareness and concern regarding CA-MRSA risk increased. Finally, for this report, there was no attempt to determine if presumed or culture confirmed MRSA infections were hospital or community acquired.

During the 6.5-year surveillance period, medical encounters for indicator skin infections such as cellulitis and abscesses increased by approximately one-third overall (slightly less among hospitalized cases). However, during the period, indicator skin infections that were reported as "staphylococcus-related" and "resistant to penicillin"

Figure 4. Hospitalizations for "other" (non-skin) indicator infectious illnesses, by reported relationship to staphylococcal infection, by calendar year, 2002-2007



increased more than two-fold and six-fold, respectively; and of cases diagnosed during hospitalizations, those that were "staphylococcus-related" and "resistant to penicillin" increased approximately two-fold and four-fold, respectively. Thus, skin and soft tissue infections in general modestly increased from 2002 — but those specifically associated with staphylococcus and penicillin resistance increased much more rapidly. The finding suggests that, since 2002, CA-MRSA skin infections have sharply increased among U.S. service members.

In addition, the number of other indicator infectious illnesses that were reported as "resistant to penicillin" doubled among hospitalized cases and increased approximately three-fold among "other" cases overall during the period. The finding suggests that the incidence of invasive staphylococcal infections in general — and invasive penicillin resistant staphylococcal infections in particular — have markedly increased since 2002. The interpretation is consistent with observations of others that MRSA strains are more virulent than MSSA strains.

Medical encounters and hospitalizations for "other" indicator infectious illnesses — mainly, osteomyelitis, staphylococcal septicemia, and staphylococcal pneumonia — nearly doubled during the period. Undoubtedly, the increase in battle casualties from Iraq and Afghanistan since 2002 accounted for some of the increase in hospitalized cases of other indicator infectious illnesses (e.g., osteomyelitis) during the surveillance period.

During the surveillance period, from 30-40% of other indicator infectious illnesses were reported as "staphylococcus-related" — much higher than for indicator skin infections. The finding reflects the fact that several of the "other" (in contrast to skin-related) indicator diagnoses are inherently staphylococcus-related, e.g., "pneumonia due to staphylococcus," "staphylococcal meningitis," "staphylococcal septicemia."

It is clear from this analysis that penicillin resistant staphylococcal infections are widely distributed throughout U.S. military installations. This is not surprising because many military members live and work in close quarters; military populations are very mobile; many military occupations are physically demanding and occasionally dangerous; and in many situations, there are limited time and opportunities for personal hygiene practices. In recent years, most cases of possible MRSA have been diagnosed and reported at hospitals and clinics that serve training bases (where most MRSA infections are likely community acquired); large medical centers (where many MRSA infections are likely hospital acquired); and at hospitals that serve the largest Army and Marine Corps installations in the continental United States (where both community and hospital acquired infections are likely). The unique circumstances and settings of many military activities and the mobility of military members and many military patients increase risks of acquiring and spreading MRSA infections throughout military installations and the Military Health System.

Several actions are indicted to counter the growing and spreading CA-MRSA threat to U.S. military members. For example, strict infection control practices (including monitoring of antibiotic resistance patterns) should be instituted and rigidly enforced in all medical treatment facilities. Care providers should aggressively evaluate suspicious injuries and, when indicated, treat them with antibiotics likely to be effective against locally circulating MRSA strains. Care providers and medical administrators should ensure that MRSA cases are documented with diagnostic codes that specify not only the clinical manifestations but also the staphylococcal etiologies and the antibiotic resistance of underlying infections.

Military leaders at all levels should closely monitor those whom they supervise, particularly those engaged in physically demanding training activities — such as recruit, special operations, advanced infantry, and other field training exercises — to identify those with minor injuries that may be infected with or susceptible to MRSA. Service members should be directed to seek medical care immediately for minor injuries — including scratches, lacerations, puncture wounds, "sores," and "spider bites"[7] — that are inflamed. Personal hygiene practices — such as handwashing, showering, wearing clean clothing, using clean bedding, avoiding the sharing of personal items (e.g. towels, razors) — should be rigidly enforced, particularly in settings where time and resources for such activities are limited.

Data summaries conducted by Stephen B. Taubman, PhD, Analysis Group, Army Medical Surveillance Activity.

References:

1. Klevens RM, Morrison MA, Nadle J, et al. Invasive methicillin-resistant *Staphylococcus aureus* infections in the United States. *JAMA*. 2007 Oct 17;298(15):1763-71.
2. Fridkin SK, Hageman JC, Morrison M, et al. Methicillin-resistant *Staphylococcus aureus* disease in three communities. *N Engl J Med*. 2005 Apr 7;352(14):1436-44.
3. King MD, Humphrey BJ, Wang YF, et al. Emergence of community-acquired methicillin-resistant *Staphylococcus aureus* USA 300 clone as the predominant cause of skin and soft-tissue infections. *Ann Intern Med*. 2006 Mar 7;144(5):309-17.
4. Zinderman CE, Conner B, Malakooti MA, et al. Community-acquired methicillin-resistant *Staphylococcus aureus* among military recruits. *Emerg Infect Dis*. 2004 May;10(5):941-4.
5. Campbell KM, Vaughn AF, Russell KL, et al. Risk factors for community-associated methicillin-resistant *Staphylococcus aureus* infections in an outbreak of disease among military trainees in San Diego, California, in 2002. *J Clin Microbiol*. 2004 Sep;42(9):4050-3.
6. Ellis MW, Hospenthal DR, Dooley DP, Gray PJ, Murray CK. Natural history of community-acquired methicillin-resistant *Staphylococcus aureus* colonization and infection in soldiers. *Clin Infect Dis*. 2004 Oct 1;39(7):971-9.
7. Pagac BB, Reiland RW, Bolesh DT, Swanson DL. Skin lesions in barracks: consider community-acquired methicillin-resistant *Staphylococcus aureus* infection instead of spider bites. *Mil Med.* 2006 Sep;171(9):830-2.

Mental Health-related Clinical Experiences in relation to Responses to Health Assessments after Returning from Operation Iraqi Freedom in 2005, U.S. Armed Forces

As part of its Force Health Protection program, the U.S. military requires Post-Deployment Health Assessments (PDHA) of all service members when they return from overseas deployments.[1] The PDHA questionnaire (DD Form 2796), typically completed within a month of returning, includes a screen for symptoms associated with post-traumatic stress disorder (PTSD).[1,2]

Because the clinical manifestations of PTSD are often delayed until weeks to months after psychologically traumatic experiences, symptoms may not be evident when service members complete the PDHA questionnaire.[3,4] Also, individuals may develop transient symptoms characteristic of PTSD as natural responses to traumatizing experiences that never fulfill the clinical criteria (e.g., persistence of symptoms) for the diagnosis of PTSD. For these reasons, the PDHA screen should be considered a useful but not sufficient assessment of deployment-related PTSD risk.

In light of the natural progression of PTSD, service members also complete a Post-Deployment Health Reassessment (PDHRA, Form DD 2900) approximately three to six months after returning from deployment.[5] The PDHRA contains items similar to the PDHA, including the screen for PTSD, and allows service members to meet again with a health care provider to consider referral for health (including mental health) concerns. In addition, in the months between the PDHA and PDHRA, many service members seek mental health care and/or receive diagnoses of PTSD, irrespective of screening or referral histories.[2]

The previous issue of the *MSMR* (September/October 2007) reported the proportions of service members who returned from Operation Iraqi Freedom (OIF) in 2005 who screened positive and/or were referred for health concerns (overall and expressly for mental health) during their PDHAs. The report revealed that of those who received clinical diagnoses of PTSD within six months after returning from deployment, approximately half screened positive for PTSD and more than one-fourth were referred for mental health care during their PDHAs.

In this report, the mental health-related clinical experiences (e.g., PTSD diagnoses, mental health clinic visits) of redeployers within six months after returning from OIF are summarized in relation to responses to PTSD-related screening questions on PDHAs. Also, relationships between responses to PTSD-related screening questions on PDHAs and PDHRAs are summarized.

Methods:

All data were obtained from records routinely maintained in the Defense Medical Surveillance System (DMSS).[6] Service members were included in the surveillance cohort if they returned from an OIF-related deployment in 2005. The last PDHA that each cohort member completed within 60 days of return from their last OIF-related deployment in 2005 was used for analysis. Responses to the PDHRA questionnaire (DD Form 2900) were included if the date of departure from the theater of operations (as reported on the questionnaire) was within 60 days of the deployment end date. The PDHRA with the latest reported departure date (within 60 days of the deployment end) was used for service members who had completed more than one PDHRA.

Clinical diagnoses of PTSD were ascertained from records of hospitalizations and ambulatory visits within six months following return from OIF. For surveillance purposes, a case of PTSD was defined as a hospitalization or outpatient visit with a PTSD diagnosis (ICD-9-CM code: 309.81) in any diagnostic position. A positive screen for PTSD was defined as a returned deployer who endorsed at least 2 of 4 PTSD-specific items on a PDHA questionnaire. The proportions of service members who endorsed at least 2 of 4 PTSD-related items on the PDHRA were also evaluated.

Finally, all outpatient mental health clinic visits (regardless of diagnoses) of each deployer within six months after returning from deployment were enumerated. For this analysis, a mental health clinic visit was defined as an outpatient record with an expense accounting (MEPRS) code indicating psychiatric or mental health care.

Results:

In 2005, 289,355 U.S. service members returned from deployments in support of OIF. Of these, approximately three-fourths (76.8%) completed PDHAs and one-third (33.5%) completed PDHRAs that met the inclusion criteria for this analysis **(Table 1)**. Of deployers who completed PDHRAs, most (n=91,408, 94.4%) also completed PDHAs. Deployers who were female, in the Army or Air Force, in the Reserve component, and in non-combat-specific occupations were more likely than their respective counterparts to have completed PDHAs and PDHRAs **(Table 1)**.

Within six months after returning from OIF, deployers had 122,594 documented encounters in mental health clinics (mean: 0.42 visits per deployer) **(Table 2)**. Within the same period, 3,581 (1.2%) deployers received clinical diagnoses of PTSD, and 16,500 (5.7%) visited mental health clinics two or more times **(Table 2)**.

The proportions of deployers who received PTSD clinical diagnoses within six months after returning from OIF did

Table 1. Demographic and military characteristics of surveillance cohort, overall and in relation to completion of a Post Deployment Health Assessment (PDHA) and/or Post Deployment Health Reassessment (PDHRA) after returning from deployment in support of Operation Iraqi Freedom (OIF) in 2005

	Total		With PDHA		With PDHRA*	
Demographic/military subgroup	No.	Column %	No.	Column %	No.	Column %
Sex						
Male	260,370	90.0	198,989	89.6	85,822	88.6
Female	28,985	10.0	23,194	10.4	11,002	11.4
Age						
under 20	5,595	1.9	4,087	1.8	1,588	1.6
20-24	102,215	35.3	79,371	35.7	31,857	32.9
25-29	63,538	22.0	49,596	22.3	21,133	21.8
30-34	41,585	14.4	31,717	14.3	15,109	15.6
35-39	35,907	12.4	26,919	12.1	13,322	13.8
40+	40,515	14.0	30,493	13.7	13,815	14.3
Service						
Army	175,525	60.7	150,218	67.6	71,026	73.4
Air Force	51,618	17.8	40,404	18.2	21,906	22.6
Marine Corps	43,672	15.1	25,024	11.3	2,360	2.4
Navy/Coast Guard	18,540	6.4	6,537	2.9	1,532	1.6
Component						
Active	180,507	62.4	135,047	60.8	54,741	56.5
Reserve	108,848	37.6	87,136	39.2	42,083	43.5
Grade						
Enlisted, junior (E1-E4)	121,452	42.0	94,895	42.7	37,545	38.8
Enlisted, mid-grade (E5-E6)	104,201	36.0	80,986	36.5	37,857	39.1
Enlisted, senior (E7-E9)	25,679	8.9	19,273	8.7	8,870	9.2
Officer (incl. warrant)	38,023	13.1	27,029	12.2	12,552	13.0
Occupation						
Combat	182,332	63.0	136,764	61.6	58,331	60.2
Health care	16,702	5.8	13,206	5.9	6,389	6.6
Other	90,321	31.2	72,213	32.5	32,104	33.2
Total	289,355	100.0	222,183	100.0	96,824	100.0

*Of service members with PDHRA, 94.4% (n=91,408) had a PDHA.

not significantly vary in relation to gender, age, or component **(Table 2)**. However, deployers from the Army were much more likely to be clinically diagnosed with PTSD than those from the other services; and enlisted deployers compared to officers and those in health-related compared to combat or "other" occupations were more than twice as likely to receive PTSD diagnoses within six months after returning from OIF **(Table 2)**.

Deployers who were in health care occupations (8.6%), female (7.4%), members of the Army (7.4%), junior enlisted (6.9%), members of the active component (6.8%), and the youngest aged (6.5%) were more likely than their respective counterparts to have multiple mental health clinic visits within six months of return. **(Table 2)**. The means of mental health clinic visits per deployer were highest (>0.50 per deployer) in the same subgroups **(Table 2)**.

Overall, approximately one of ten (n=23,368, 10.5%) PDHA respondents screened positive for PTSD. Of these, approximately one of 18 (5.5%) received a clinical diagnosis of PTSD and approximately one of seven (14.0%) had two or more mental health clinic visits within six months of return from OIF **(Tables 2,3)**. Among PTSD screen-positives, the mean number of mental health clinic visits within six months was 1.09 per deployer — more than 2.5-times higher than for the surveillance cohort overall.

Compared to deployers who screened negative for PTSD on the PDHA, those who screened positive were nearly eight times more likely to receive a clinical diagnosis of PTSD and nearly three times more likely to have multiple mental health clinic visits within six months of return **(Table 3)**. The mean number of mental health clinic visits was 3.3-times higher among those who screened positive versus negative for PTSD on the PDHA **(Table 3)**.

Relationships between results of PTSD screening on the PDHA and clinical diagnosis of PTSD varied across demographic and military subgroups. For example, in the Air Force and Navy/Coast Guard, those who screened positive versus negative for PTSD were approximately 30 times and 11 times more likely, respectively, to receive clinical diagnoses of PTSD within six months after returning from OIF **(Table 3)**. In general, the strength of the relationship between screening positive for PTSD and subsequent diagnosis of PTSD increased with increasing age **(Table 3)**. In turn, among senior enlisted and officer deployers, those who screened positive versus negative for PTSD were 10.6 and 16.6 times more likely, respectively, to be clinically diagnosed with PTSD

Table 2. Numbers and proportions of U.S. service members who received clinical diagnoses of PTSD and/or had 2 or more outpatient mental health clinic visits, and numbers of their mental health clinic visits, within six months after returning from deployment in support of Operation Iraqi Freedom (OIF) in 2005

	PTSD diagnosis within 6 months			Two or more outpatient mental health visits within 6 months			Mental health clinic visits within 6 months		
Demographic/military subgroup	No.	% of all subgroup members	Relative %	No.	% of all subgroup members	Relative %	Total visits	Visits per person	Relative visits per person
Sex									
Male	3,201	1.2	ref	14,354	5.5	ref	107,195	0.41	ref
Female	380	1.3	1.07	2,146	7.4	1.34	15,399	0.53	1.29
Age									
under 20	70	1.3	ref	366	6.5	ref	2,776	0.50	ref
20-24	1,202	1.2	0.94	6,229	6.1	0.93	46,804	0.46	0.92
25-29	747	1.2	0.94	3,858	6.1	0.93	27,810	0.44	0.88
30-34	549	1.3	1.06	2,409	5.8	0.89	17,759	0.43	0.86
35-39	426	1.2	0.95	1,729	4.8	0.74	12,517	0.35	0.70
40+	587	1.5	1.16	1,909	4.7	0.72	14,928	0.37	0.74
Service									
Army	2,807	1.6	ref	12,926	7.4	ref	98,563	0.56	ref
Air Force	186	0.4	0.23	1,989	3.9	0.52	12,852	0.25	0.45
Marine Corps	371	0.9	0.53	941	2.2	0.29	6,610	0.15	0.27
Navy/Coast Guard	217	1.2	0.73	644	3.5	0.47	4,569	0.25	0.45
Component									
Active	2,198	1.2	ref	12,347	6.8	ref	90,459	0.50	ref
Reserve	1,383	1.3	1.04	4,153	3.8	0.56	32,135	0.30	0.60
Grade									
Enlisted, junior (E1-E4)	1,731	1.4	ref	8,335	6.9	ref	63,719	0.52	ref
Enlisted, mid-grade (E5-E6)	1,400	1.3	0.94	6,017	5.8	0.84	43,316	0.42	0.81
Enlisted, senior (E7-E9)	266	1.0	0.73	1,004	3.9	0.57	7,398	0.29	0.56
Officer (incl. warrant)	184	0.5	0.34	1,144	3.0	0.44	8,161	0.21	0.40
Occupation									
Combat	2,071	1.1	ref	9,963	5.5	ref	75,810	0.42	ref
Health care	427	2.6	2.25	1,443	8.6	1.58	9,850	0.59	1.40
Other	1,083	1.2	1.05	5,094	5.6	1.03	36,934	0.41	0.98
Total	3,581	1.2		16,500	5.7		122,594	0.42	

within six months of return from OIF **(Table 3)**.

The natures of relationships between PTSD screening results and mental health clinic visits were generally similar to, but not as strong as, those between screening results and PTSD clinical diagnoses. For example, across all subgroups, deployers who screened positive versus negative for PTSD were approximately two to five times more likely to have multiple mental health clinic visits; and on average, they had approximately two to five times more mental health clinic visits per person **(Table 3)**.

Of note, among all deployers who screened positive for PTSD on PDHAs, those from the Marine Corps were the least likely to receive a clinical diagnosis of PTSD (2.7%) or to have multiple mental health clinic visits (3.8%) within six months after returning from OIF **(Table 3)**. Marines who screened positive for PTSD had an average of 0.26 mental health clinic visits per person — far fewer than screen-positives from any other subgroup **(Table 3)**.

Overall, approximately one of 6 (17.2%) deployers who completed both a PDHA and a PDHRA endorsed 2 or more PTSD-related screening questions on the PDHRA **(Table 4)**. The most likely to endorse 2 or more PTSD-related screening questions on the PDHRA were members of the Reserve component (23.2%) and the Army (21.6%) — the least likely by far were members of the Air Force (3.6%) **(Table 4)**.

More than half (54.4%) of all deployers who were PTSD screen-positive on the PDHA, compared to 13.4% of those who were PTSD screen-negative, endorsed 2 or more PTSD-related screening questions on the PDHRA **(Table 4)**. Among PTSD screen-positives on the PDHA, the likelihood of endorsing 2 or more PTSD screening questions on the PDHRA monotonically increased with age — in turn, the most likely to endorse 2 or more PTSD screening questions on the PDHRA were those older than 40 (62.8%) and members of the Reserve component (61.1%) **(Table 4)**. The least likely by far to endorse multiple PTSD screening questions on the PDHRA were members of the Air Force (28.9%) **(Table 4)**.

Among deployers who were PTSD screen-negative on the PDHA, the most likely to endorse at least 2 PTSD screening questions on the PDHRA were members of the Reserve

Table 3. Numbers and proportions of U.S. service members who received clinical diagnoses of PTSD and/or had 2 or more outpatient mental health clinic visits, and numbers of their mental health clinic visits, within six months after returning from deployment in support of Operation Iraqi Freedom (OIF) in 2005, by responses to PTSD-related screening questions on post-deployment health assessments (PDHA)

	Clinical diagnosis of PTSD					2 or more mental health clinic visits					Number of mental health clinic visits				
	Among PTSD screen positives		Among PTSD screen negatives		Ratio, % of PTSD screen (+) vs % of PTSD screen (-)	Among PTSD screen positives		Among PTSD screen negatives		Ratio, % of PTSD screen (+) vs % of PTSD screen (-)	Among PTSD screen positives		Among PTSD screen negatives		Ratio, visits per person, PTSD screen (+) vs PTSD screen (-)
Demographic/military subgroup	No.	% of screen positives	No.	% of screen negatives		No.	% of screen positives	No.	% of screen negatives		Total visits	Visits per person	Total visits	Visits per person	
Sex															
Male	1,152	5.5	1,228	0.7	8.0	2,869	13.7	8,444	4.7	2.9	22,164	1.06	57,500	0.32	3.3
Female	136	5.7	160	0.8	7.4	408	17.1	1,302	6.3	2.7	3,222	1.35	8,402	0.40	3.3
Age															
under 20	19	4.7	29	0.8	5.9	58	14.3	191	5.2	2.7	362	0.89	1,225	0.33	2.7
20-24	395	4.5	487	0.7	6.6	1,144	13.1	3,789	5.4	2.4	9,188	1.05	25,983	0.37	2.9
25-29	275	5.0	296	0.7	7.5	778	14.3	2,308	5.2	2.7	5,539	1.02	15,428	0.35	2.9
30-34	214	6.3	195	0.7	9.2	522	15.4	1,432	5.1	3.1	4,129	1.22	9,369	0.33	3.7
35-39	158	6.1	169	0.7	8.7	351	13.5	1,024	4.2	3.2	2,653	1.02	6,822	0.28	3.6
40+	227	8.1	212	0.8	10.6	424	15.2	1,002	3.6	4.2	3,515	1.26	7,075	0.26	4.9
Service															
Army	1,095	5.7	1,105	0.8	6.8	2,973	15.5	7,676	5.9	2.6	23,315	1.21	52,561	0.40	3.0
Air Force	52	6.9	90	0.2	30.2	111	14.6	1,488	3.8	3.9	750	0.99	9,552	0.24	4.1
Marine Corps	77	2.7	133	0.6	4.6	106	3.8	396	1.8	2.1	724	0.26	2,582	0.12	2.2
Navy/Coast Guard	64	11.0	60	1.0	10.9	87	14.9	186	3.1	4.8	597	1.02	1,207	0.20	5.1
Component															
Active	761	5.8	920	0.8	7.6	2,244	17.0	7,660	6.3	2.7	17,658	1.34	51,573	0.42	3.2
Reserve	527	5.2	468	0.6	8.5	1,033	10.2	2,086	2.7	3.7	7,728	0.76	14,329	0.19	4.1
Grade															
Enlisted, junior (E1-E4)	594	5.2	681	0.8	6.4	1,650	14.5	4,907	5.9	2.5	13,482	1.19	33,545	0.40	3.0
Enlisted, mid-grade (E5-E6)	520	5.9	531	0.7	8.1	1,271	14.5	3,505	4.9	3.0	9,136	1.04	23,624	0.33	3.2
Enlisted, senior (E7-E9)	100	6.6	110	0.6	10.6	183	12.1	608	3.4	3.5	1,485	0.98	4,024	0.23	4.3
Officer (incl. warrant)	74	4.3	66	0.3	16.6	173	10.1	726	2.9	3.5	1,283	0.75	4,709	0.19	4.0
Occupation															
Combat	739	5.1	787	0.6	8.0	1,952	13.6	5,795	4.7	2.9	15,269	1.06	40,273	0.33	3.2
Health care	168	9.2	139	1.2	7.5	382	20.8	792	7.0	3.0	2,818	1.53	4,946	0.44	3.5
Other	381	5.3	462	0.7	7.5	943	13.2	3,159	4.9	2.7	7,299	1.02	20,683	0.32	3.2
PDHA completed after return from deployment															
No	717	4.7	864	0.6	7.3	1,735	11.3	5,890	4.3	2.6	14,041	0.91	40,064	0.29	3.1
Yes	571	7.2	524	0.8	8.6	1,542	19.4	3,856	6.2	3.1	11,345	1.42	25,838	0.41	3.4
Total	1,288	5.5	1,388	0.7	7.9	3,277	14.0	9,746	4.9	2.9	25,386	1.09	65,902	0.33	3.3

Table 4. Numbers and proportions of U.S. service members who endorsed 2 or more PTSD-related screening questions on post-deployment health reassessments (PDHRA) after returning from deployment in support of Operation Iraqi Freedom (OIF) in 2005, by responses to PTSD-related screening questions on post-deployment health assessments (PDHA)

		Endorsement of ≥2 PTSD-related screening questions on PDHRA						
		Overall		Among PTSD screen (+) on PDHA		Among PTSD screen (-) on PDHA		Ratio, % of PTSD screen (+) vs % of PTSD screen (-)
Demographic/military subgroup	Total with PDHA and PDHRA	No.	%	No.	%	No.	%	
Sex								
Male	80,866	14,078	17.4	4,209	54.2	9,869	13.5	4.0
Female	10,542	1,677	15.9	494	53.7	1,183	12.3	4.4
Age								
under 20	1,465	227	15.5	73	47.4	154	11.8	4.0
20-24	29,970	5,016	16.7	1,458	49.4	3,558	13.2	3.8
25-29	20,109	3,352	16.7	1,072	53.2	2,280	12.6	4.2
30-34	14,291	2,451	17.2	771	55.1	1,680	13.0	4.2
35-39	12,567	2,234	17.8	661	59.8	1,573	13.7	4.4
40+	13,006	2,475	19.0	668	62.8	1,807	15.1	4.1
Service								
Army	67,409	14,562	21.6	4,458	55.6	10,104	17.0	3.3
Air Force	21,402	766	3.6	114	28.9	652	3.1	9.3
Marine Corps	1,547	259	16.7	94	48.0	165	12.2	3.9
Navy/Coast Guard	1,050	168	16.0	37	48.1	131	13.5	3.6
Component								
Active	52,001	6,606	12.7	2,060	47.3	4,546	9.5	5.0
Reserve	39,407	9,149	23.2	2,643	61.1	6,506	18.6	3.3
Grade								
Enlisted, junior (E1-E4)	35,262	6,608	18.7	2,025	53.6	4,583	14.6	3.7
Enlisted, mid-grade (E5-E6)	35,832	6,673	18.6	1,999	55.9	4,674	14.5	3.9
Enlisted, senior (E7-E9)	8,401	1,320	15.7	349	58.5	971	12.4	4.7
Officer (incl. warrant)	11,913	1,154	9.7	330	44.7	824	7.4	6.1
Occupation								
Combat	54,749	9,235	16.9	2,852	54.1	6,383	12.9	4.2
Health care	6,042	1,141	18.9	414	52.5	727	13.8	3.8
Other	30,617	5,379	17.6	1,437	54.6	3,942	14.1	3.9
PDHA completed after redeployment								
No	53,459	8,553	16.0	2,405	52.9	6,148	12.6	4.2
Yes	37,949	7,202	19.0	2,298	55.6	4,904	14.5	3.8
Total	91,408	15,755	17.2	4,703	54.1	11,052	13.4	4.1

component (18.6%) and Army (17.0%), while the least likely were members of the Air Force (3.1%) and officers (7.4%) **(Table 4).**

Interestingly, the association between endorsing 2 or more PTSD screening questions on the PDHA and also the PDHRA was strongest among members of the Air Force and officers and weakest among members of the Reserve component and Army **(Table 4).** Compared to their respective counterparts, airmen and officers who screened positive on the PDHA were 9.3 and 6.1 times more likely, respectively, to endorse 2 or more PTSD related screening questions on the PDHRA; in contrast, Reserve component members and soldiers who screened positive for PTSD on the PDHA were only 3.3 times more likely than their counterparts to endorse at least 2 PTSD screening questions on the PDHRA **(Table 4).**

Editorial comment:

This report documents the natures and strengths of relationships between responses to PTSD-related screening questions on the PDHA and clinical diagnoses of PTSD, mental health clinic utilization, and PTSD symptom endorsement on PHDRAs among service members who returned from OIF in 2005. Overall, those who screened positive versus negative for PTSD symptoms on the PDHA were approximately eight times more likely to receive clinical diagnoses of PTSD and approximately twice as likely to have two or more mental health clinic visits (accounting for twice as many mental health clinic visits per person) within six months after returning from OIF. In addition, those who screened positive for PTSD on the PDHA were four times more likely to endorse 2 or more PTSD-related symptoms on the PDHRA. Thus, in this cohort, responses to PTSD-related screening questions at the end of combat-related deployments were related to rates of clinical diagnoses of PTSD and mental health clinical service use and the prevalence of PTSD-related symptoms over the next several months.

A positive PTSD screen on the PDHA means a service

member reported experiencing symptoms characteristic of PTSD within the preceding month. The four-item screening instrument used on the PDHA has been validated for its ability to detect and distinguish clinical PTSD[7] — however, it does not diagnose PTSD. Notably, the PDHA may be conducted before symptoms of PTSD are fully expressed in future "full blown" cases ("false negative"). On the other hand, the PDHA may be conducted during a phase of acute distress when PTSD-like symptoms represent normal, self-limited responses to psychologically traumatic experiences ("false positive").[3,8] The latter clinical course is reflected in the finding that nearly half of deployers who screened positive for PTSD during the PDHA failed to endorse 2 or more PTSD symptoms during PDHRAs three to six months later. Still, the identification of PTSD-characteristic symptoms — even if transient and self-limited — as soon as possible after psychologically traumatic deployment-related experiences may be useful to care providers, service members, military unit leaders, and family members.

This analysis suggests that strengths of associations between results of PTSD screening on the PDHA and short-term mental health-related clinical outcomes vary considerably across demographic (e.g., age) and military (e.g., service, component, rank, occupation) subgroups. For example, members of the Air Force who screened positive for PTSD on the PDHA were approximately 30 times more likely than those who screened negative to receive clinical diagnoses of PTSD; however, Marines who screened positive were less than five times more likely than those who screened negative to be diagnosed with PTSD. The reasons for such sharp differences are unclear; however, they should be considered when assessing the operating characteristics of PTSD screening during routine post-deployment health assessments on population levels and when assessing responses of specific individuals.

This report complements that in the previous *MSMR* that measured how well the PTSD screen and PDHA referral process detected and responded to those who received clinical diagnoses of PTSD. As was emphasized in the editorial comment of that report, there are multiple and significant limitations to the completeness and reliability of PDHA and PDHRA data and of mental health-related clinical data that are collected for administrative/public health surveillance purposes. For example, at the individual level, many factors (discussed in prior *MSMR* and other published reports) influence the completeness and reliability of PDHA information, the likelihood of accessing mental health care when indicated or desired (e.g., real and perceived peer and supervisor stigmas), and the completeness and accuracy of clinical reporting.[9,10] Also, circumstances outside the ambit of public health surveillance, such as unit morale and family conflicts, can be important forces dictating whether and how a service member develops, reports, and responds to mental distress.[11] Clearly, the findings of this report must be interpreted cautiously with such limitations in mind.

In summary, this report documents the natures and strengths of associations between responses to PTSD screening questions during routine post-deployment health assessments and PTSD diagnoses and mental health clinic usage in the next six months. The results indicate that, among those who returned from OIF and were screened in 2005, the PTSD screen was "positive" for approximately half of those who were clinically diagnosed with PTSD; in addition, a positive screen was associated with an eight-fold increased risk of a PTSD diagnosis and a three-fold increase in mental health clinic utilization. Finally, there is significant variability across military and demographic subgroups in rates of PTSD screening outcomes and in the natures and strengths of relationships between PTSD screening outcomes and short-term PTSD and other mental health-related clinical experiences. The findings should be informative and potentially useful to service members, their supervisors, and those who plan for and provide their health care.

Analysis and report by Christopher B. Martin, MHS, Army Medical Surveillance Activity.

References:

1. US Department of Defense. Enhanced postdeployment health assessment process (DD Form 2796). Available at: http://www.pdhealth.mil/dcs/dd_form_2796.asp. Accessed October 23, 2007.
2. Hoge CW, Auchterlonie JL, Milliken CS. Mental health problems, use of mental health services, and attrition from military service after returning from deployment to Iraq or Afghanistan. *JAMA*. 2006;295:1023-32.
3. Harvey AG, Bryant RA. Two-year prospective evaluation of the relationship between acute stress disorder and posttraumatic stress disorder following mild traumatic brain injury. *Am J Psychiatry*. 2000;157:626-8.
4. Andrews B, Brewin CR, Philpott R, Stewart L. Delayed-onset posttraumatic stress disorder: a systematic review of the evidence. *Am J Psychiatry*. 2007 Sep;164(9):1319-26.
5. Winkenwerder W. Post-deployment health reassessment [memorandum]. Washington, DC: Department of Defense; March 10, 2005. HA Policy 05-011. Available at: http://www.ha.osd.mil/policies/2005/05-011.pdf
6. Rubertone MV, Brundage JF. The Defense Medical Surveillance System and Department of Defense serum repository: glimpses of the future of public health surveillance. *Am J Public Health*. 2002;92:1900-4.
7. Prins A, Ouimette P, Kimerling R, et al. The primary care PTSD screen (PC-PTSD): development and operating characteristics. *Primary Care Psychiatry*. 2004;9:9-14.
8. Yehuda R, McFarlane AC. Conflict between current knowledge about posttraumatic stress disorder and its original conceptual basis. *Am J Psychiatry*. 1995;152:1705-13.
9. Hoge CW, Castro CA, Messer SC, et al. Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *N Engl J Med*. 2004;351(1):13-22.
10. Greene-Shortridge TM, Britt TW, Castro CA. The stigma of mental health problems in the military. *MilMed*. 2007;172:157-61.
11. Browne T, Hull L, Horn O, et al. Explanations for the increase in mental health problems in UK reserve forces who have served in Iraq. *Br J Psychiatry*. 2007;190:484-9.

Update: Deployment Health Assessments, U.S. Armed Forces, January 2003-October 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 return from deployment.[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, 1,805,941 pre-deployment health assessment forms, 1,810,421 post-deployment health assessment forms, and 443,326 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, November 2006-October 2007: mean: 23,258; range: 15,281-36,287) **(Figure 1, Table 1)**.

Between November 2006 and October 2007, nearly three-

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

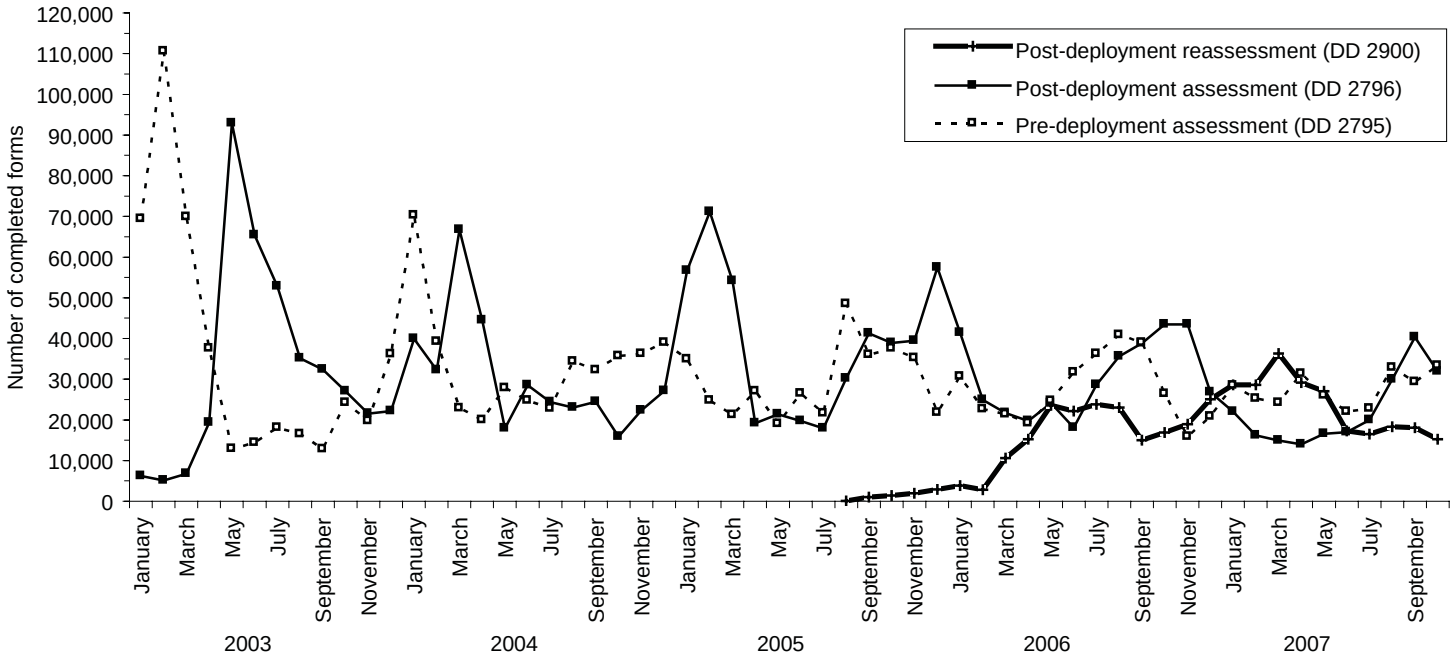


Table 1. Deployment-related health assessment forms, by month, U.S. Armed Forces, November 2006-October 2007

	Pre-deployment assessment DD2795		Post-deployment assessment DD2796		Post-deployment reassessment DD2900	
	No.	%	No.	%	No.	%
Total	**312,164**	**100**	**293,025**	**100**	**279,098**	**100**
2006						
November	15,849	5.1	43,443	14.8	18,950	6.8
December	20,863	6.7	26,764	9.1	25,036	9.0
2007						
January	28,418	9.1	22,023	7.5	28,588	10.2
February	25,212	8.1	16,186	5.5	28,567	10.2
March	24,207	7.8	14,899	5.1	36,287	13.0
April	31,376	10.1	14,009	4.8	29,141	10.4
May	26,033	8.3	16,580	5.7	27,049	9.7
June	22,000	7.0	16,957	5.8	17,269	6.2
July	22,787	7.3	19,985	6.8	16,489	5.9
August	32,810	10.5	29,908	10.2	18,342	6.6
September	29,294	9.4	40,343	13.8	18,099	6.5
October	33,315	10.7	31,928	10.9	15,281	5.5

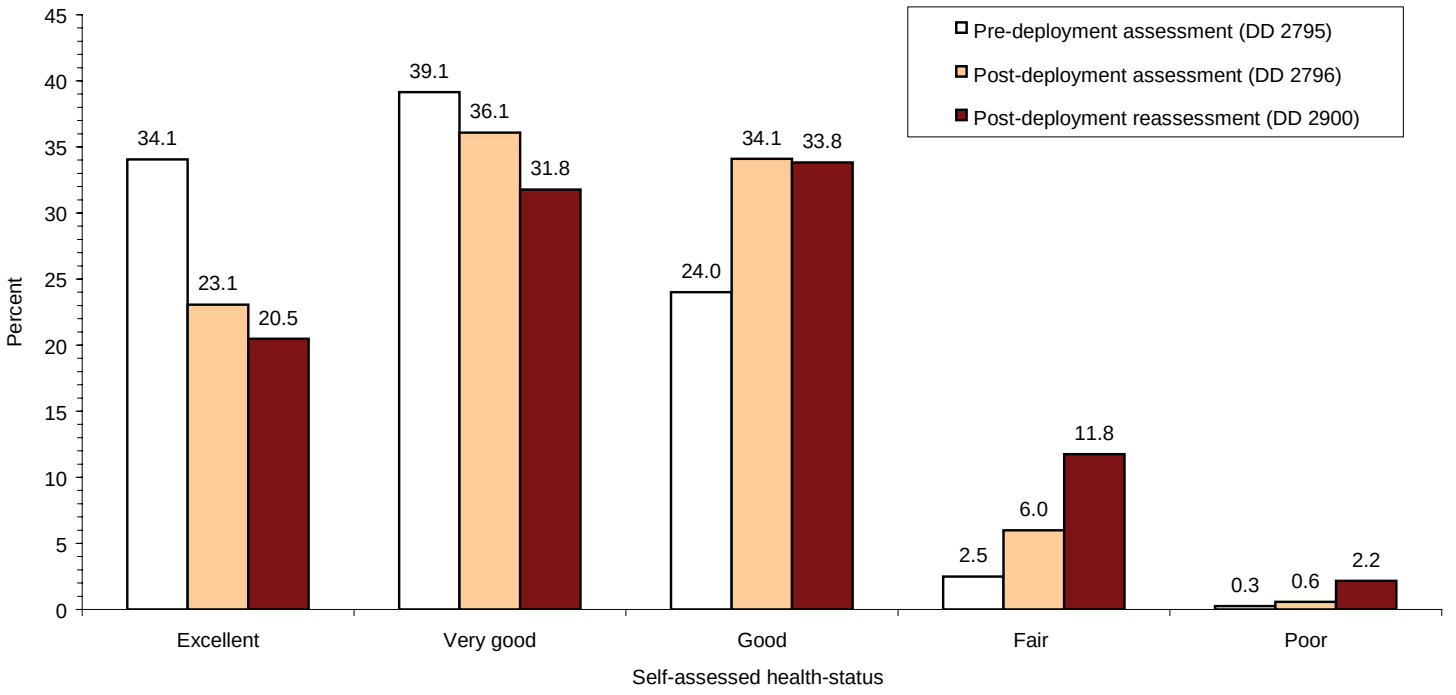
fourths (73.2%) of deployers rated their "health in general" as "excellent" or "very good" during pre-deployment health assessments **(Figure 2).** During the same period, only 59.1% and 52.3% of redeployers rated their general health as "excellent" or "very good" during post-deployment assessments and 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 (2.8%) deployers rated their health as "fair" or "poor"; however, 3-6 months after returning from deployment (during post-deployment reassessments), approximately one of seven (13.9%) respondents rated their health as "fair" or "poor" **(Figure 2).**

From January 2003 through October 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-October 2007, by month: mean: 2.4% [range: 1.5-3.5%]) **(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-October 2007, by month: mean: 7.0% [range: 3.0-10.2%]) **(Figure 3).** Finally, from January 2006 through October 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-October 2007, by month: mean: 13.6% [range: 11.8-17.2%]) **(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, November 2006-October 2007



deploying, but usually by 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 November 2006 and October 2007 (mean: 1.4%, range:1.1-1.7%) **(Figure 4).** The proportions of service members whose self-assessed health declined by more than one category was relatively stable between November 2006 and March 2007, declined between March and September 2007, and increased in October 2007 (mean: 16.3, range 13.1-19.0%) **(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, Navy, and Marine Corps (but not Air Force) **(Table 2, Figure 5).** Of note in this regard, the largest absolute increase in mental health referrals from redeployment to 3-6 months later was for Reserve component members of the Army (post-deployment: 4.7%; reassessment: 12.9%) **(Table 2, Figure 5).**

Finally, over the past three years, Reserve component members have been approximately twice as likely as active to report "exposure concerns" on post-deployment health assessments (DD2796) (%"exposure concerns," post-deployment assessments, by month, November 2004-October 2007: Reserve: mean: 26.3%, range: 19.3-33.1%; active: mean: 13.0%; range: 7.3-20.0%) **(Figures 6,7).** 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-October 2007: Reserve: mean: 37.5%, range: 31.0-48.3%; active: mean: 19.1%; 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-deployment, are higher among members of the Army than the other Services, and are higher among Reserve than the active

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

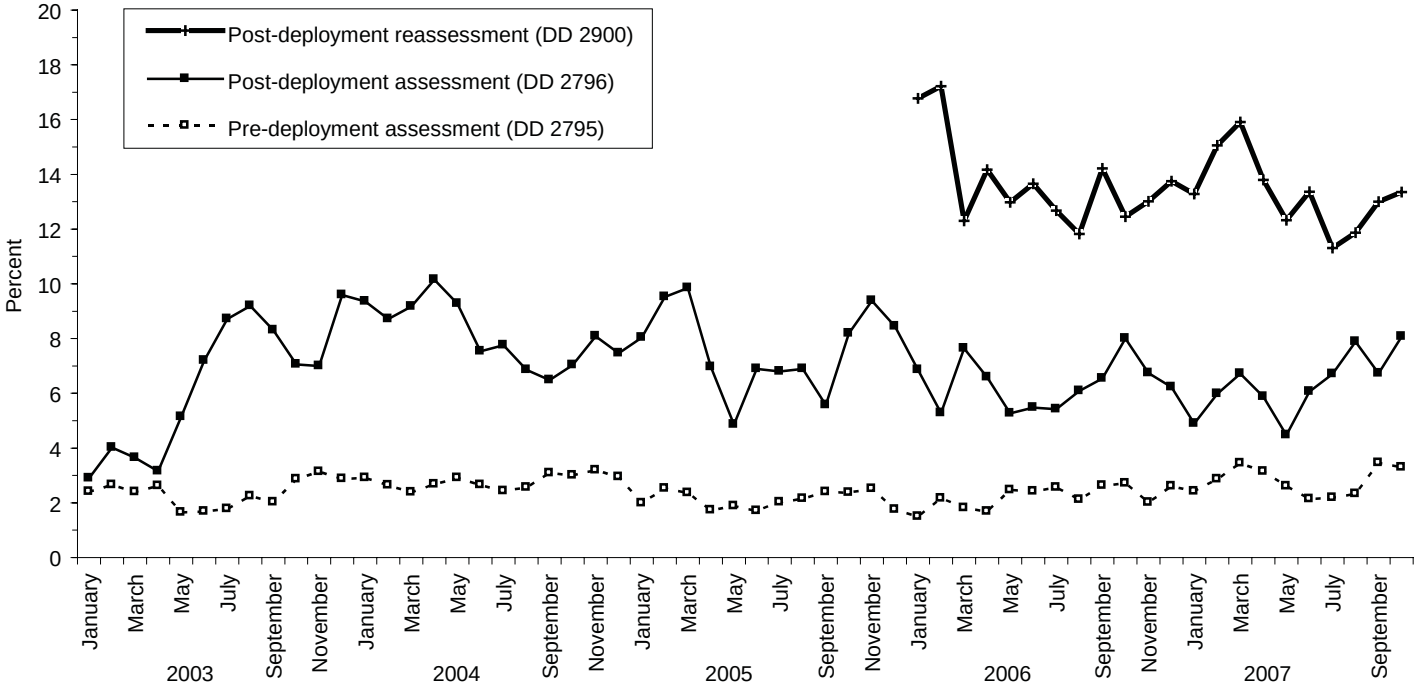


Figure 4. Proportion of service members whose self-assessed health status improved ("better") or declined ("worse") (by 2 or more categories on 5-category scale) from pre-deployment to reassessment, by month, U.S. Armed Forces, November 2006-October 2007

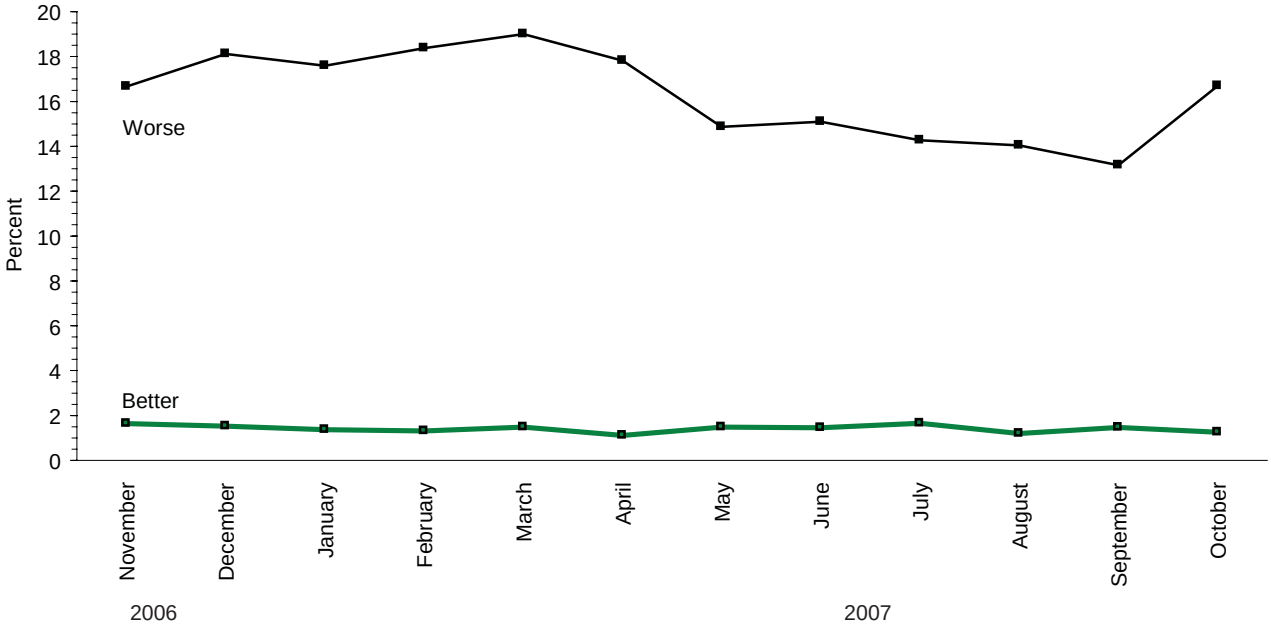


Figure 5. Percent of deployers with mental or behavioral health referrals, by Service and component, by timing of health assessment, U.S. Armed Forces, November 2006-October 2007

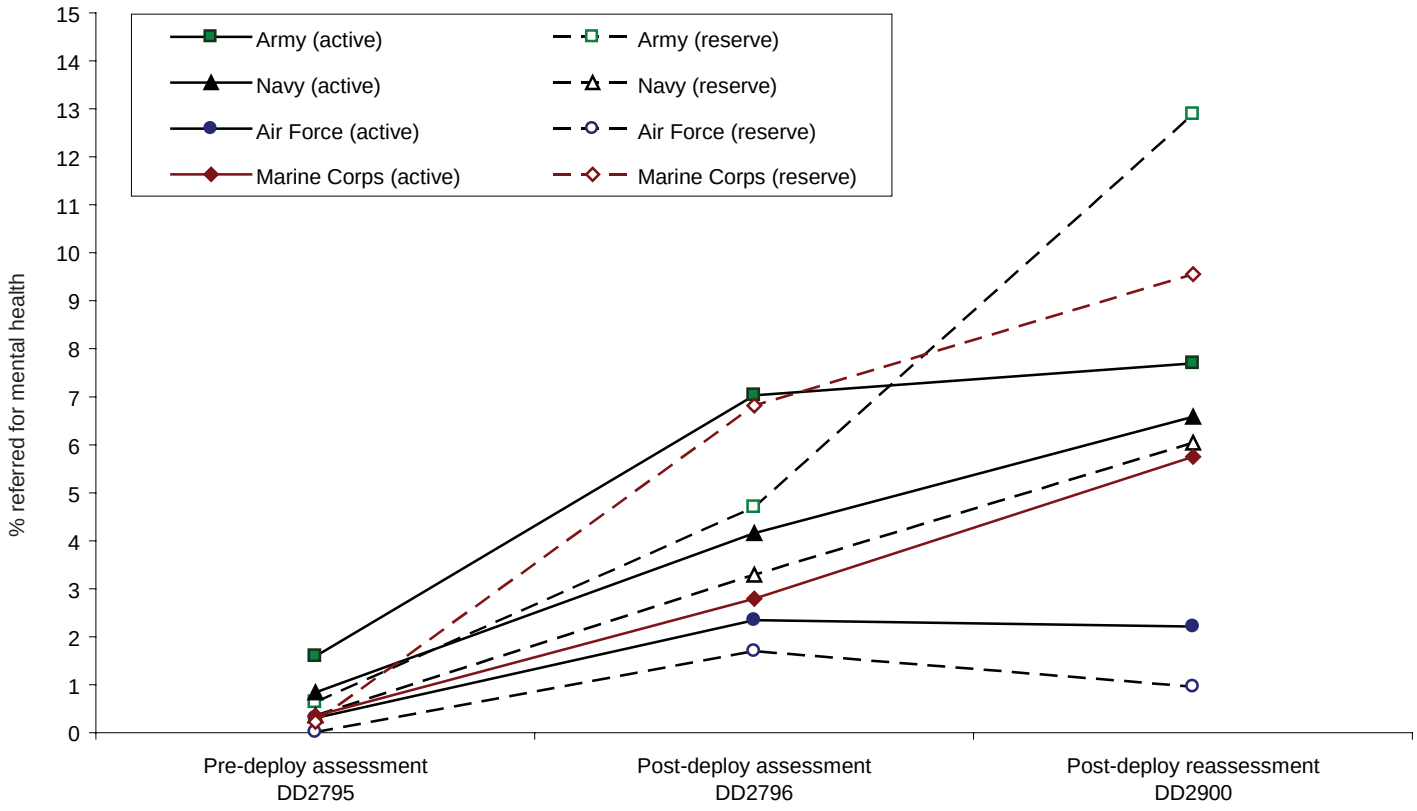


Table 2. Percentage of service members who endorsed selected questions/received referrals on health assessment forms, U.S. Armed Forces, November 2006-October 2007

	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=152,295	n=123,741	n=94,511	n=8,222	n=5,361	n=7,215	n=64,258	n=56,859	n=56,792	n=12,431	n=15,969	n=20,022	n=237,206	n=201,930	n=178,540
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	4.4	7.9	18.0	1.6	2.2	7.0	0.5	2.0	5.2	1.8	3.2	9.5	3.1	5.7	12.5
Health concerns, not wound or injury	13.3	24.2	41.4	5.8	10.3	22.6	4.6	13.8	16.8	4.1	8.5	25.9	10.2	19.6	31.1
Health worse now than before deployed	na	21.3	28.4	na	9.0	15.6	na	7.7	10.6	na	11.8	19.2	na	16.4	21.2
Exposure concerns	na	20.7	25.5	na	8.8	13.7	na	6.2	12.8	na	7.0	16.6	na	15.2	20.0
PTSD symptoms (2 or more)	na	16.7	17.4	na	6.4	9.6	na	2.7	3.2	na	7.8	12.4	na	11.8	12.0
Depression symptoms	na	30.9	10.5	na	19.6	7.6	na	8.9	2.8	na	25.1	9.5	na	24.0	7.8
Referral indicated by provider (any)	7.6	28.7	25.0	7.2	18.7	20.9	1.6	13.0	8.6	2.7	15.6	19.8	5.7	23.0	19.0
Mental health referral indicated*	1.6	7.0	7.7	0.8	4.2	6.6	0.3	2.3	2.2	0.4	2.8	5.8	1.2	5.3	5.7
Medical visit following referral†	93.1	99.0	98.8	92.6	88.7	91.4	80.0	94.5	96.1	62.2	76.2	83.5	91.7	96.3	97.0
Reserve 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=52,360	n=69,798	n=70,154	n=2,754	n=850	n=6,009	n=17,554	n=14,675	n=19,007	n=1,777	n=836	n=5,388	n=74,445	n=86,159	n=100,558
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	1.9	10.2	19.1	0.7	4.8	9.7	0.3	2.1	4.4	2.4	4.3	12.8	1.5	8.7	15.4
Health concerns, not wound or injury	14.7	36.8	57.6	3.6	23.3	41.6	1.7	23.1	17.8	4.4	20.7	45.2	10.9	34.2	48.4
Health worse now than before deployed	na	28.7	38.1	na	18.6	25.4	na	10.8	10.4	na	25.1	27.5	na	25.5	31.5
Exposure concerns	na	32.7	40.5	na	20.7	30.2	na	9.1	18.1	na	21.2	29.2	na	28.4	35.0
PTSD symptoms (2 or more)	na	13.6	23.7	na	5.5	13.4	na	2.1	3.3	na	13.2	21.3	na	11.6	19.1
Depression symptoms	na	27.7	12.5	na	13.4	8.5	na	8.0	2.6	na	36.6	9.9	na	24.3	10.3
Referral indicated by provider (any)	10.8	30.5	51.8	4.9	27.1	35.5	0.2	12.1	27.2	4.8	27.8	51.4	8.0	27.3	46.1
Mental health referral indicated*	0.6	4.7	12.9	0.4	3.3	6.0	0.0	1.7	1.0	0.2	6.8	9.6	0.5	4.2	10.0
Medical visit following referral†	98.9	97.9	28.1	98.0	92.4	30.0	9.1	56.5	23.9	12.5	57.8	20.7	98.3	92.4	27.1

*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, November 2006-October 2007

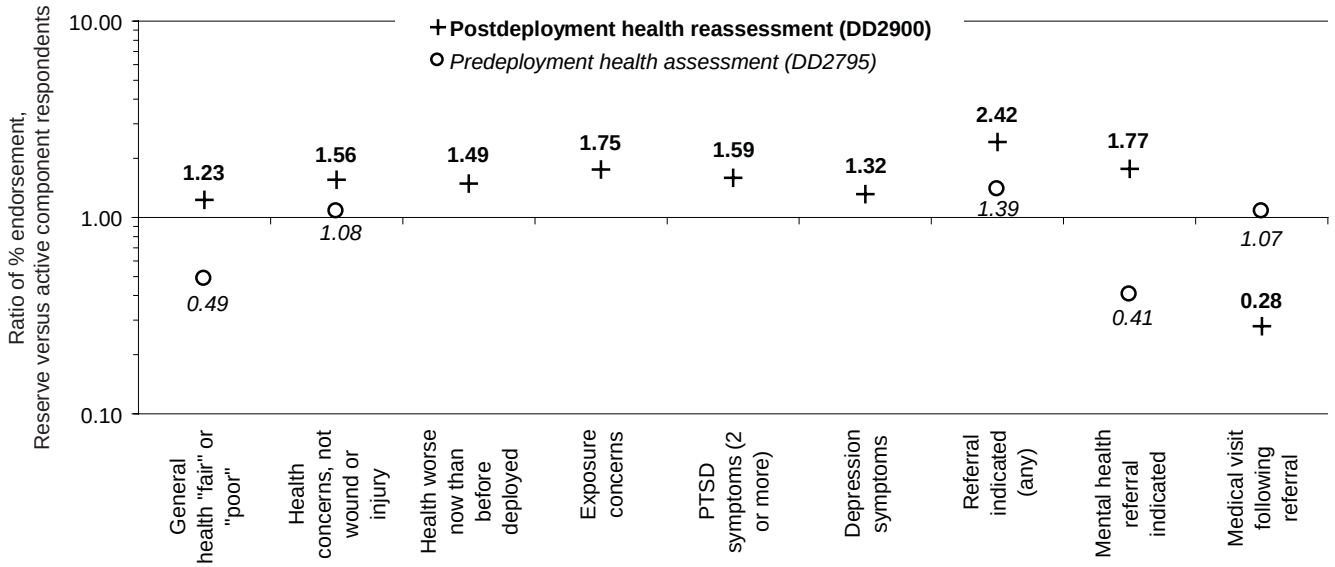
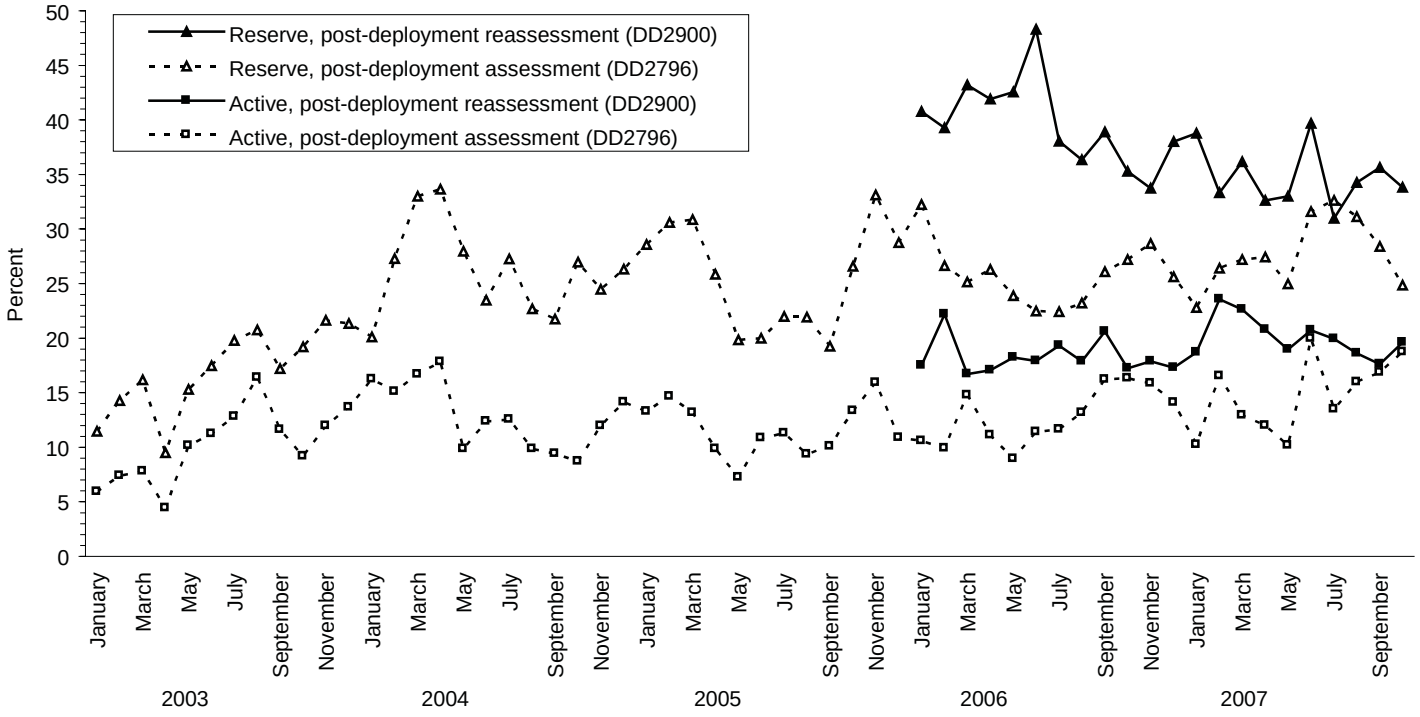


Figure 7. Proportion of service members who endorse exposure concerns on post-deployment health assessments, U.S. Armed Forces, January 2003-October 2007



component members.

Regardless of the Service or component, deployers often rate their general health worse when they return 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 returning; 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 returning from deployment.

References:

1. Undersecretary of Defense for Personnel and Readiness. Department of Defense Instruction (DODI) Number 6490.3. Subject: Deployment health, dated 11 August 2006. Accessed on 19 March 2007 at: http://www.dtic.mil/whs/directives/corres/pdf/649003p.pdf.

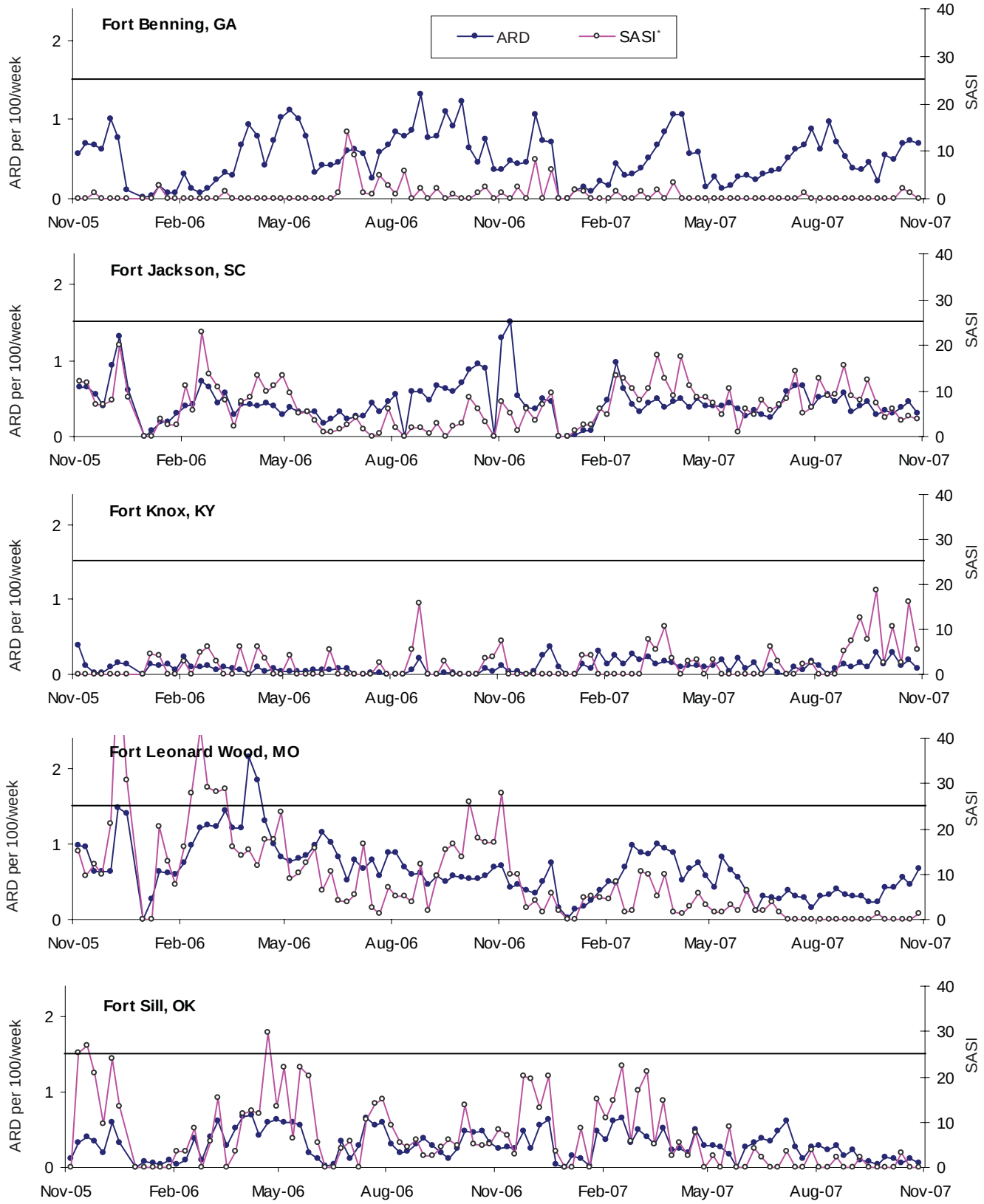
2. Assistant Secretary of Defense (Health Affairs). Memorandum for the Assistant Secretaries of the Army (M&RA), Navy (M&RA), and Air Force (M&RA), subject: Post-deployment health reassessment (HA policy: 05-011), dated 10 March 2005. Washington, DC. http://www.ha.osd.mil/policies/2005/05-011.pdf. Accessed 18 October 2006.

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.

4. Hoge CW, Terhakopian A, Castro CA, Messer SC, Engel CC. Association of posttraumatic stress disorder with somatic symptoms, health care visits, and absenteeism among Iraq war veterans. *Am J Psychiatry*. 2007 Jan;164(1):150-3.

5. Browne T, Hull L, Horn O, et al. Explanations for the increase in mental health problems in UK reserve forces who have served in Iraq. *Br J Psychiatry*. 2007 Jun;190:484-489.

Acute respiratory disease (ARD) and streptococcal pharyngitis rates (SASI*), basic combat training centers, U.S. Army, by week, November 2005-November 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,* January-October 2006 and January-October 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	1,241	1	2	.	2	2	7	.	.	.	.	1	6	2	7
Air Education & Training Cmd	295	608	.	1	1	1	7	15	.	9	.	.	1	4	3	10
Lackland, TX	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USAF Academy, CO	83	40	.	.	.	.	.	2	.	.	.	.	.	.	.	.
Air Force Dist. of Washington	32	21	.	.	.	.	.	.	.	1	.	.	.	1	.	.
Air Force Materiel Cmd	314	467	1	.	1	2	2	19	.	2	.	.	2	.	2	2
Air Force Special Ops Cmd	75	153	.	.	.	.	5	1	5	1	.	.	.	.	.	.
Air Force Space Cmd	209	253	.	2	.	1	3	6	.	1	.	.	1	2	.	1
Air Mobility Cmd	456	608	.	1	3	1	5	11	8	2	.	.	4	4	1	3
Pacific Air Forces	315	437	.	1	1	2	5	4	.	1	.	.	2	4	.	10
PACAF Korea	111	68	.	.	.	.	.	.	.	.	.	.	.	.	.	1
U.S. Air Forces in Europe	204	230	.	3	1	.	.	.	.	1	.	.	.	.	2	.
Total	**2,765**	**4,126**	**2**	**10**	**7**	**9**	**29**	**65**	**13**	**18**	**0**	**0**	**11**	**21**	**10**	**34**

*Events reported by Nov 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	11	.	.	599	814	40	72	3	4	.	3	3	.	1	6
Air Education & Training Cmd	.	2	1	.	216	472	32	63	1	.	.	.	.	1	.	1
Lackland, TX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USAF Academy, CO	.	.	1	.	38	34	.	2	.	.	.	.	2	.	1	.
Air Force Dist. of Washington	.	.	.	.	23	18	3	1	.	.	.	.	.	.	.	.
Air Force Materiel Cmd	.	5	1	1	210	371	40	48	1	1	.	.	.	.	.	.
Air Force Special Ops Cmd	.	.	.	.	49	120	14	19	.	.	.	.	.	.	.	12
Air Force Space Cmd	1	1	.	.	166	219	6	13	.	1	.	.	1	.	.	.
Air Mobility Cmd	6	5	1	.	342	510	18	40	1	1	.	.	.	.	.	3
Pacific Air Forces	.	2	2	1	270	364	21	25	.	.	.	.	2	.	.	.
PACAF Korea	.	.	.	.	91	55	12	2	.	2	.	.	.	.	.	.
U.S. Air Forces in Europe	2	2	1	.	134	182	15	13	1	.	.	.	.	.	.	.
Total	**10**	**28**	**7**	**2**	**2,138**	**3,159**	**201**	**298**	**7**	**9**	**0**	**3**	**8**	**1**	**2**	**22**

‡Primary and secondary.

§Urethritis, non-gonococcal (NGU).

Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers,* January-October 2006 and January-October 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	246	245	4	1	3	3	3	7	.	1	.	.	1	6	.	1
Aberdeen, MD	11	19	.	.	.	1	.	.	.	.	.	.	.	.	.	.
FT Belvoir, VA	303	215	11	8	1	2	9	8	2	3	.	.	.	.	5	1
FT Bragg, NC	1,521	1,165	11	2	.	.	29	19	.	2	.	.	.	.	.	.
FT Drum, NY	180	192	.	.	.	.	.	.	.	.	.	.	.	2	.	.
FT Eustis, VA	211	174	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Knox, KY	258	226	.	2	2	.	.	2	1	2	.	.	.	2	.	.
FT Lee, VA	311	320	.	.	.	1	.	1	.	1	.	.	.	2	3	1
FT Meade, MD	102	76	.	.	.	.	2	1	.	.	.	.	1	.	.	.
West Point, NY	54	42	.	.	.	.	1	.	.	.	.	.	3	3	.	.
GREAT PLAINS																
FT Sam Houston, TX	468	488	.	1	2	2	10	5	2	1	.	.	2	4	1	7
FT Bliss, TX	296	204	.	.	1	.	2	.	.	.	.	.	5	2	.	.
FT Carson, CO	724	576	1	3	3	5	4	1	.	.	.	.	.	.	.	.
FT Hood, TX	1,469	1,951	5	14	2	3	12	14	13	9	.	.	.	.	1	1
FT Huachuca, AZ	86	91	.	1	.	.	11	6	.	.	.	.	.	.	.	.
FT Leavenworth, KS	48	46	.	1	4	.	.	.	.	2	.	.	.	.	.	.
FT Leonard Wood, MO	285	329	.	.	5	1	2	1	.	1	.	.	.	.	6	11
FT Polk, LA	214	204	2	.	1	3	1	5	.	.	.	.	.	.	.	1
FT Riley, KS	212	326	2	2	.	.	.	5	.	.	.	.	.	.	.	2
FT Sill, OK	215	163	.	.	.	.	1	2	.	.	.	.	.	.	2	1
SOUTHEAST																
FT Gordon, GA	402	605	.	.	.	.	.	6	.	.	.	.	11	1	1	.
FT Benning, GA	422	371	2	1	1	1	12	5	2	5	.	.	.	1	.	1
FT Campbell, KY	551	700	1	1	.	.	1	.	.	3	.	.	.	.	.	.
FT Jackson, SC	242	288	.	.	.	.	.	2	.	.	.	.	1	1	1	.
FT Rucker, AL	74	83	1	1	.	.	3	1	.	13	.	.	.	2	.	.
FT Stewart, GA	731	901	.	2	.	.	7	26	5	10	.	.	8	3	3	2
WESTERN																
FT Lewis, WA	527	693	.	3	.	3	5	1	.	1	.	.	1	.	1	1
FT Irwin, CA	96	89	1	1	.	.	.	2	1	1	.	.	.	.	.	.
FT Wainwright, AK	173	221	.	1	.	.	3	1	.	1	.	.	.	.	1	.
OTHER LOCATIONS																
Hawaii	842	670	36	24	1	2	11	14	2	.	.	.	.	1	2	.
Germany	786	763	12	6	2	1	22	8	.	11	.	.	2	.	1	1
Korea	521	574	.	.	.	.	.	.	.	.	.	.	3	.	5	2
Total	**12,581**	**13,010**	**89**	**75**	**28**	**28**	**151**	**143**	**28**	**67**	**0**	**0**	**38**	**30**	**33**	**33**

*Events reported by Nov 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,* January-October 2006 and January-October 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	11	2	5	141	137	23	22	3	5	1	.	.	.	.	.
Aberdeen, MD	.	.	.	.	8	10	1	3	.	.	.	.	.	.	.	.
FT Belvoir, VA	2	1	.	1	166	152	39	21	.	2	.	.	.	.	.	.
FT Bragg, NC	2	1	21	4	1,040	792	154	139	4	2	115	68	2	1	135	131
FT Drum, NY	.	2	.	2	161	131	19	24	.	.	.	.	.	.	.	.
FT Eustis, VA	.	1	.	.	140	141	43	11	.	.	.	.	.	.	19	10
FT Knox, KY	6	1	.	1	179	178	43	29	2	.	.	.	3	.	11	2
FT Lee, VA	.	3	.	.	238	248	40	33	.	3	.	.	.	1	3	12
FT Meade, MD	.	1	.	.	84	62	13	9	.	1	1	1	.	1	.	.
West Point, NY	16	22	.	.	24	13	.	.	.	.	.	.	1	.	2	.
GREAT PLAINS																
FT Sam Houston, TX	.	1	1	.	266	260	48	56	4	3	.	.	.	.	9	6
FT Bliss, TX	.	1	.	.	218	153	53	36	5	1	.	.	.	.	1	.
FT Carson, CO	.	.	.	1	519	410	86	56	.	1	36	12	.	1	.	.
FT Hood, TX	.	2	1	5	976	1,421	229	273	.	2	36	92	.	.	32	27
FT Huachuca, AZ	.	.	.	.	66	65	8	18	.	1	.	.	1	.	.	.
FT Leavenworth, KS	.	1	.	.	39	37	5	5	.	.	.	.	.	.	.	.
FT Leonard Wood, MO	.	1	.	.	196	223	19	33	.	1	.	.	.	2	15	20
FT Polk, LA	.	.	.	15	117	100	33	33	2	1	.	.	.	.	58	43
FT Riley, KS	.	.	.	.	168	241	30	21	.	.	.	.	.	.	10	20
FT Sill, OK	.	.	.	1	65	88	24	22	2	2	.	.	.	1	58	34
SOUTHEAST																
FT Gordon, GA	.	1	.	.	288	439	64	85	.	4	3	.	.	.	4	6
FT Benning, GA	.	.	1	2	246	229	73	64	.	.	.	.	.	1	76	45
FT Campbell, KY	.	.	.	.	386	539	53	79	.	.	.	.	.	.	33	15
FT Jackson, SC	.	.	.	.	200	153	36	40	.	3	.	.	.	.	.	87
FT Rucker, AL	.	.	.	.	53	54	5	3	1	1	.	.	.	.	10	5
FT Stewart, GA	3	.	3	.	445	629	130	117	2	3	18	.	1	.	87	63
WESTERN																
FT Lewis, WA	.	.	10	3	407	593	66	74	1	.	25	8	.	.	.	.
FT Irwin, CA	.	1	.	1	71	57	9	5	3	.	.	.	.	.	10	18
FT Wainwright, AK	.	.	17	.	113	157	14	11	.	.	.	.	15	21	.	.
OTHER LOCATIONS																
Hawaii	.	1	6	.	598	508	75	54	.	.	.	.	.	.	34	3
Germany	30	25	14	9	500	458	149	149	4	2	1	3	.	.	5	38
Korea	.	.	13	13	407	471	68	57	3	1	.	1	2	20	12	9
Total	**62**	**77**	**89**	**63**	**8,525**	**9,149**	**1,652**	**1,582**	**36**	**39**	**236**	**185**	**25**	**49**	**624**	**594**

‡Primary and secondary.

§Urethritis, non-gonococcal (NGU).

Sentinel reportable events for service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers,* January-October 2006 and January-October 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	29	0	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Bethesda, MD	85	35	5	1	7	.	3	2	2	.	.	.	.	1	.	.
Patuxent River, MD	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE EAST																
Albany, GA	7	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Atlanta, GA	13	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Beaufort, SC	95	251	.	.	.	.	2	.	.	1	.	.	.	.	.	.
Camp Lejeune, NC	524	305	1	.	.	.	21	7	.	.	.	.	.	.	1	.
Cherry Point, NC	107	115	.	.	1	.	3	2	.	.	.	.	.	.	.	3
Great Lakes, IL	0	170	.	.	.	1	.	3	.	.	.	.	.	.	.	.
Jacksonville, FL	157	198	.	1	.	.	9	11	1	3	.	.	1	.	.	.
Mayport, FL	33	24	.	1	.	.	4	4	.	.	.	.	.	.	.	.
NABLC Norfolk, VA	43	60	.	.	.	.	1	.	.	.	.	.	.	.	.	.
NBMC Norfolk, VA	200	361	.	.	.	.	.	.	.	.	.	.	1	.	.	.
NEHC Norfolk, VA	2	4	.	.	.	.	.	.	.	.	.	.	.	.	.	2
North Charleston, SC	0	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pensacola, FL	80	80	.	.	.	2	3	4	.	3	.	.	.	.	.	5
Portsmouth, VA	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Washington, DC	1	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Guantanamo Bay, Cuba	0	4	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Europe	31	22	9	.	1	.	1	.	1	.	.	.	.	.	.	.
NAVY MEDICINE WEST																
Camp Pendleton, CA	44	12	.	.	.	.	3	1	.	.	.	.	2	.	.	.
Corpus Christi, TX	1	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fallon, NV	3	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ingleside, TX	4	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lemoore, CA	66	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pearl Harbor, HI	10	0	3	.	.	.	.	.	.	.	.	.	.	.	.	.
San Diego, CA	82	313	.	3	1	2	8	3	1	2	.	.	5	28	.	.
Guam	82	31	4	.	.	.	6	1	.	.	.	.	.	.	.	.
Japan	109	81	.	.	.	.	3	.	.	.	.	.	.	.	.	1
NAVAL SHIPS																
COMNAVAIRLANT/CINCLANTFLEET	93	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	44	29	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Total	**1,947**	**2,125**	**22**	**6**	**11**	**5**	**67**	**39**	**5**	**9**	**0**	**0**	**9**	**29**	**1**	**12**

*Events reported by Nov 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,* January-October 2006 and January-October 2007

Navy

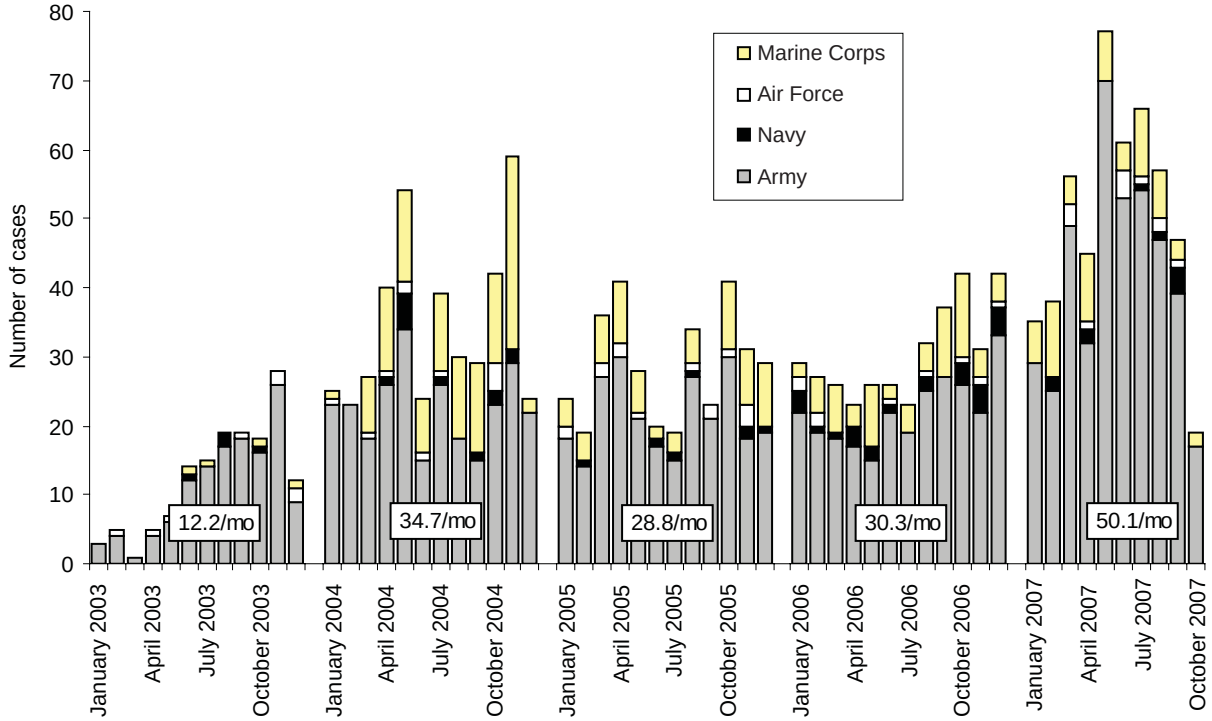
Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NATIONAL CAPITOL AREA																
Annapolis, MD	.	.	.	.	23	.	4	.	.	.	.	.	.	.	.	.
Bethesda, MD	3	4	.	.	42	20	4	2	.	1	.	.	.	.	.	.
Patuxent River, MD	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE EAST																
Albany, GA	.	.	.	.	7	.	.	.	.	.	.	.	.	.	.	.
Atlanta, GA	.	.	.	.	8	1	5	1	.	1	.	.	.	.	.	.
Beaufort, SC	.	.	.	.	36	166	.	18	.	2	.	.	.	.	56	57
Camp Lejeune, NC	2	12	.	1	384	235	80	30	.	.	.	.	.	.	28	17
Cherry Point, NC	1	.	.	.	90	92	6	8	.	1	.	.	.	.	6	3
Great Lakes, IL	.	.	.	.	.	143	.	16	.	.	.	.	.	.	.	.
Jacksonville, FL	.	.	.	.	91	136	10	21	3	2	.	.	.	.	6	8
Mayport, FL	.	.	.	.	27	16	2	.	.	1	.	.	.	.	.	.
NABLC Norfolk, VA	.	.	.	.	33	52	8	8	.	.	.	.	.	.	1	.
NBMC Norfolk, VA	.	1	.	.	160	297	33	61	1	.	.	.	.	.	.	.
NEHC Norfolk, VA	.	.	.	.	.	2	.	.	.	.	.	.	1	.	1	.
North Charleston, SC	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.
Pensacola, FL	.	.	.	.	72	46	1	5	.	.	.	.	.	.	2	12
Portsmouth, VA	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Washington, DC	.	.	.	.	1	5	.	.	.	1	.	.	.	.	.	.
Guantanamo Bay, Cuba	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.
Europe	.	.	1	.	15	21	1	1	.	.	.	.	.	.	.	.
NAVY MEDICINE WEST																
Camp Pendleton, CA	.	.	.	.	38	9	1	1	.	1	.	.	.	.	.	.
Corpus Christi, TX	.	.	.	.	1	3	.	1	.	.	.	.	.	.	.	.
Fallon, NV	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.
Ingleside, TX	.	.	.	.	4	3	.	.	.	.	.	.	.	.	.	.
Lemoore, CA	.	.	.	.	24	.	4	.	.	.	.	.	.	.	.	.
Pearl Harbor, HI	.	.	.	.	4	.	1	.	.	.	.	.	.	.	.	.
San Diego, CA	.	1	1	.	48	197	8	35	1	5	.	.	.	.	.	.
Guam	.	.	1	.	59	25	9	4	.	.	.	.	.	.	1	.
Japan	.	.	.	.	96	57	9	10	.	.	.	.	.	.	1	9
NAVAL SHIPS																
COMNAVAIRLANT/CINCLANTFLEET	2	.	.	.	71	9	18	2	2	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	.	.	.	.	6	18	35	9	.	.	3	.	.	.	.	1
Total	**8**	**18**	**3**	**1**	**1,345**	**1,559**	**239**	**233**	**7**	**15**	**3**	**0**	**1**	**0**	**102**	**107**

‡Primary and secondary.

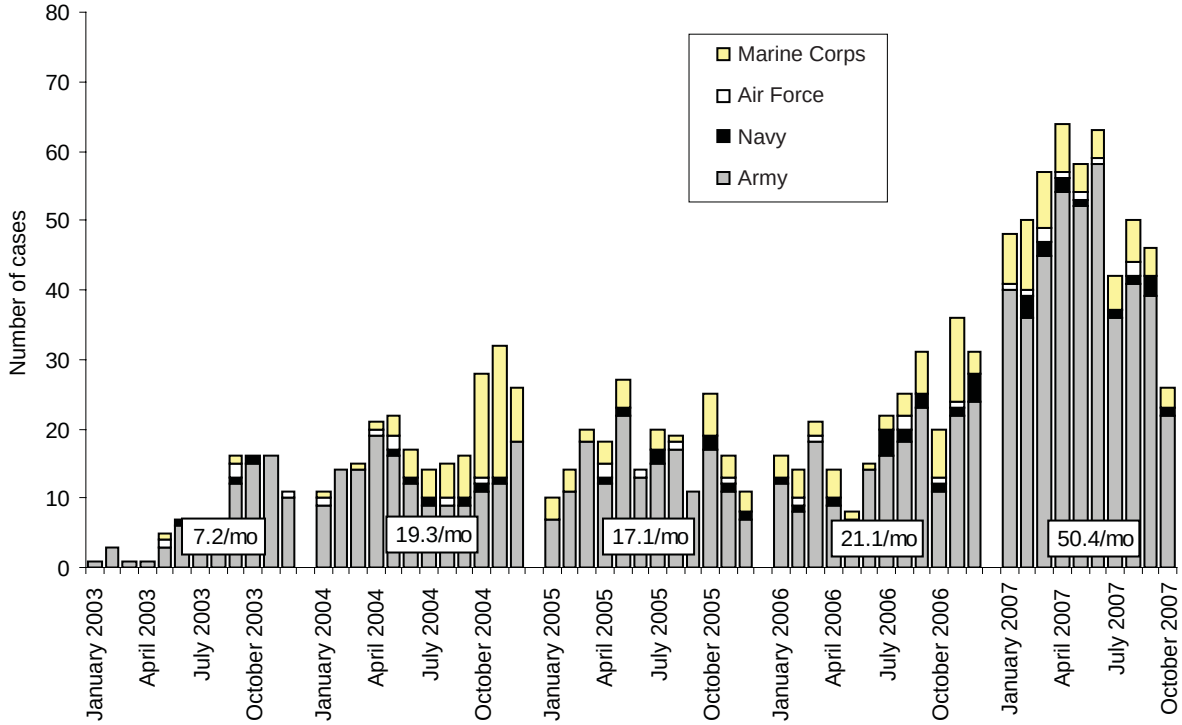
§Urethritis, non-gonococcal (NGU).

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

Traumatic brain injury, hospitalizations (ICD-9: 800-804, 850-854, 959.01)*



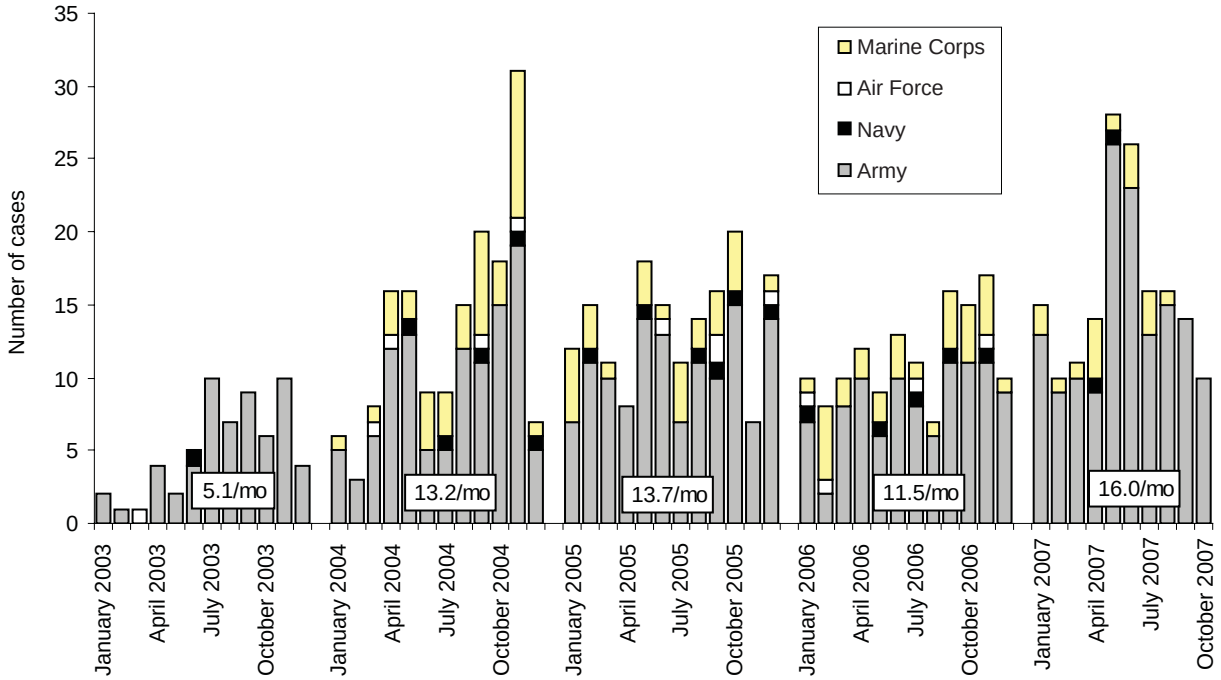
Traumatic brain injury, multiple ambulatory visits (without hospitalization), (ICD-9: 800-804, 850-854, 959.01)†



Reference: Army Medical Surveillance Activity. Traumatic brain injury among members of active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):2-6.
*Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 365 days of returning from OEF/OIF.
†Two or more ambulatory visits at least 7 days apart while deployed to/within 365 days of returning from OEF/OIF.

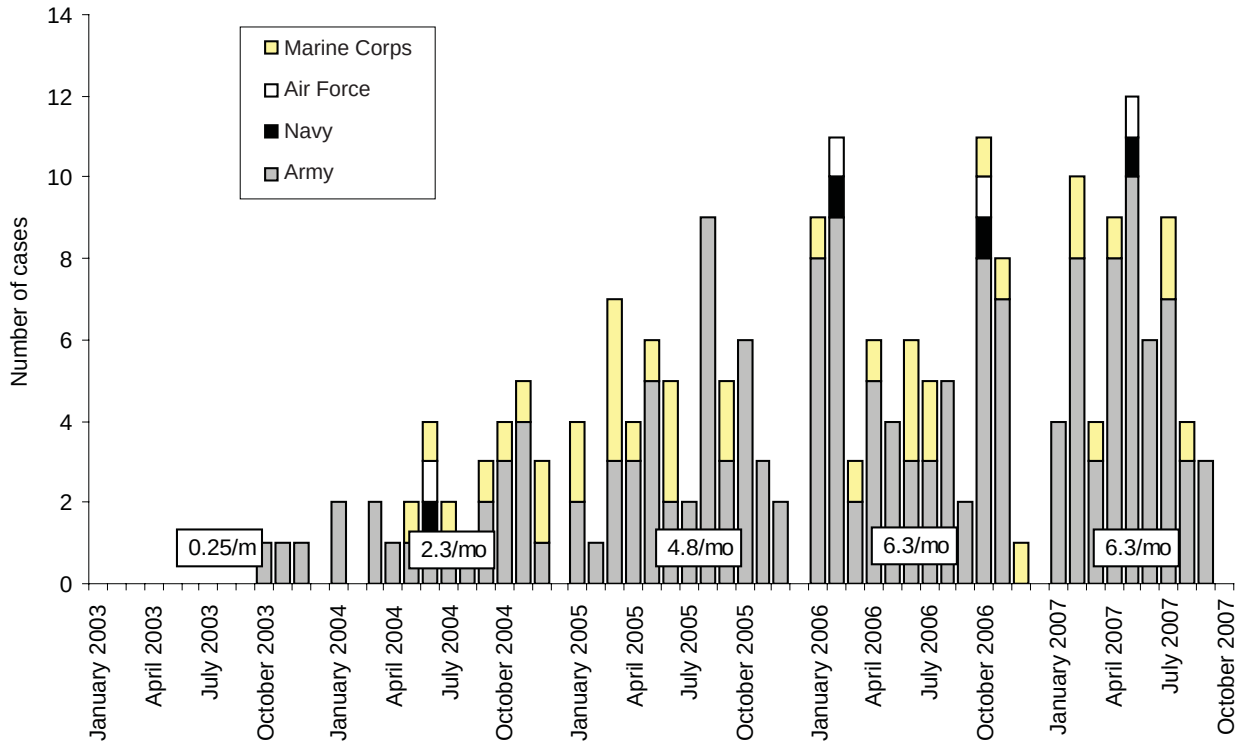
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003-October 2007

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 365 days of returning from OEF/OIF.

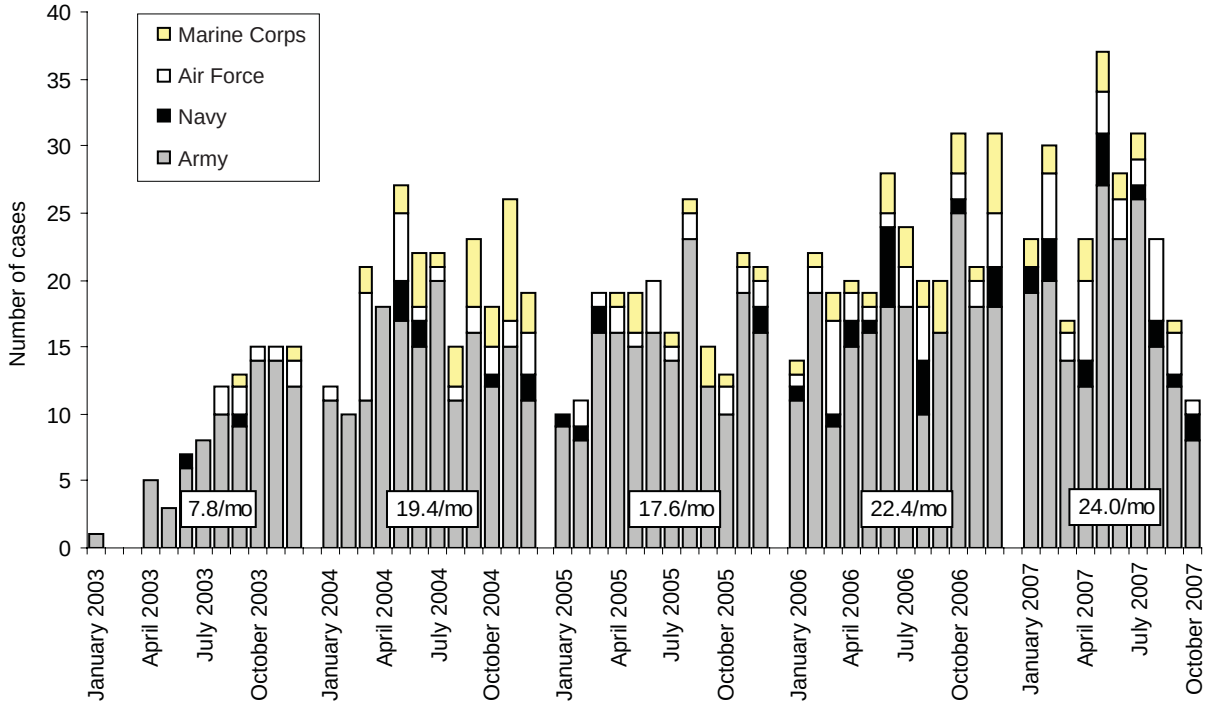
Heterotopic ossification (ICD-9: 728.12, 728.13, 728.19)†



Reference: Army Medical Surveillance Activity. Heterotopic ossification, active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):7-9.
†One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart while deployed to/within 365 days of returning from OEF/OIF.

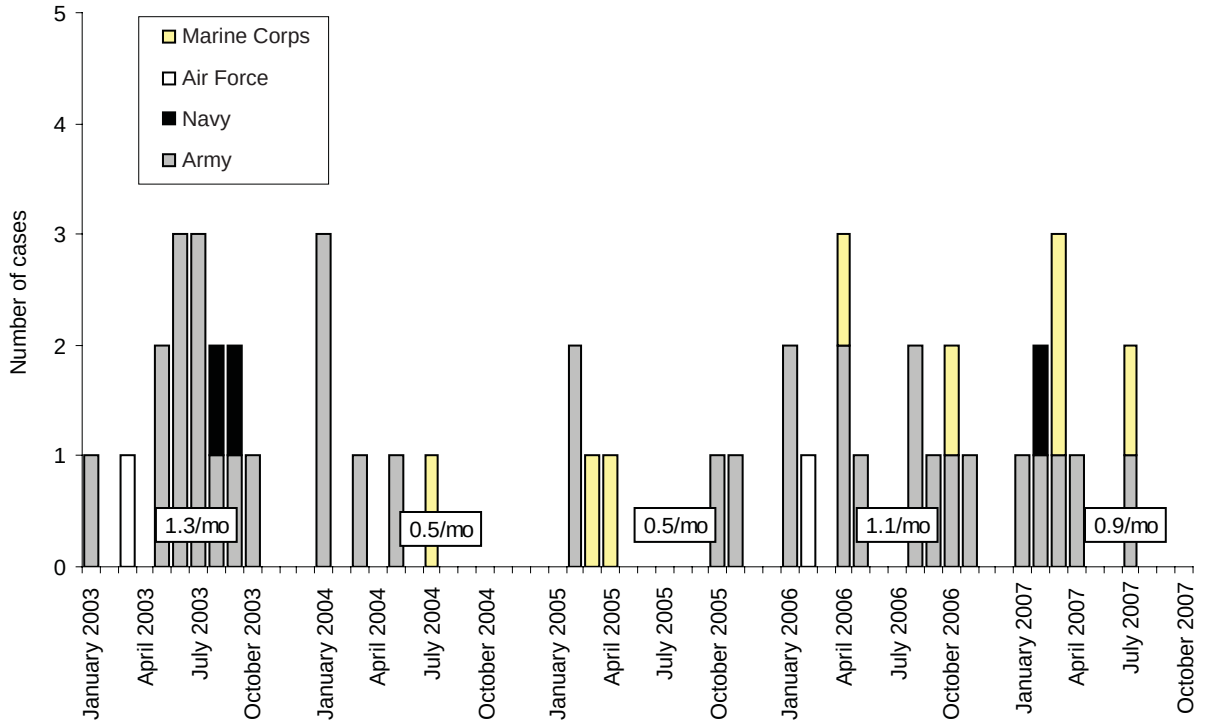
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003-October 2007

Deep vein thrombophlebitis/pulmonary embolus (ICD-9: 415.1, 451.1, 451.81, 451.83, 451.89, 453.2, 453.40 to 453.42 and 453.8)*



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 while deployed to/within 90 days of returning from OEF/OIF.

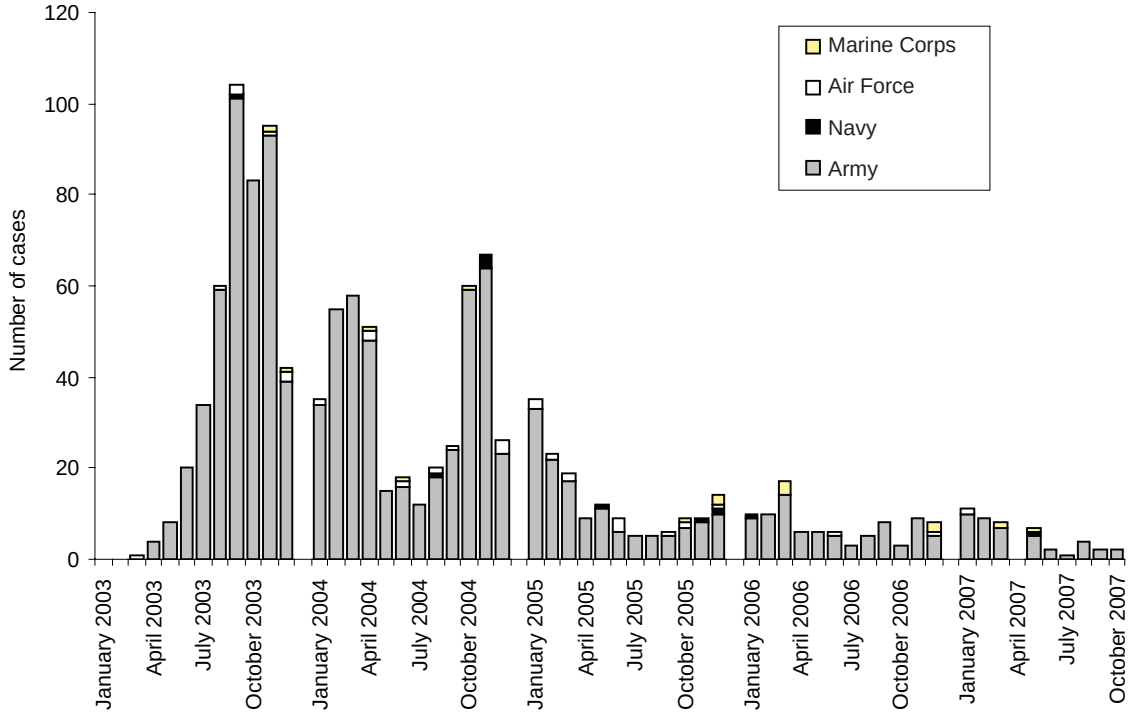
Severe acute pneumonia (ICD-9: 518.81, 518.82, 518.3, 480-487, 786.09)†



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.
†Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit 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-October 2007

Leishmaniasis (ICD-9: 085.0 to 085.9)*



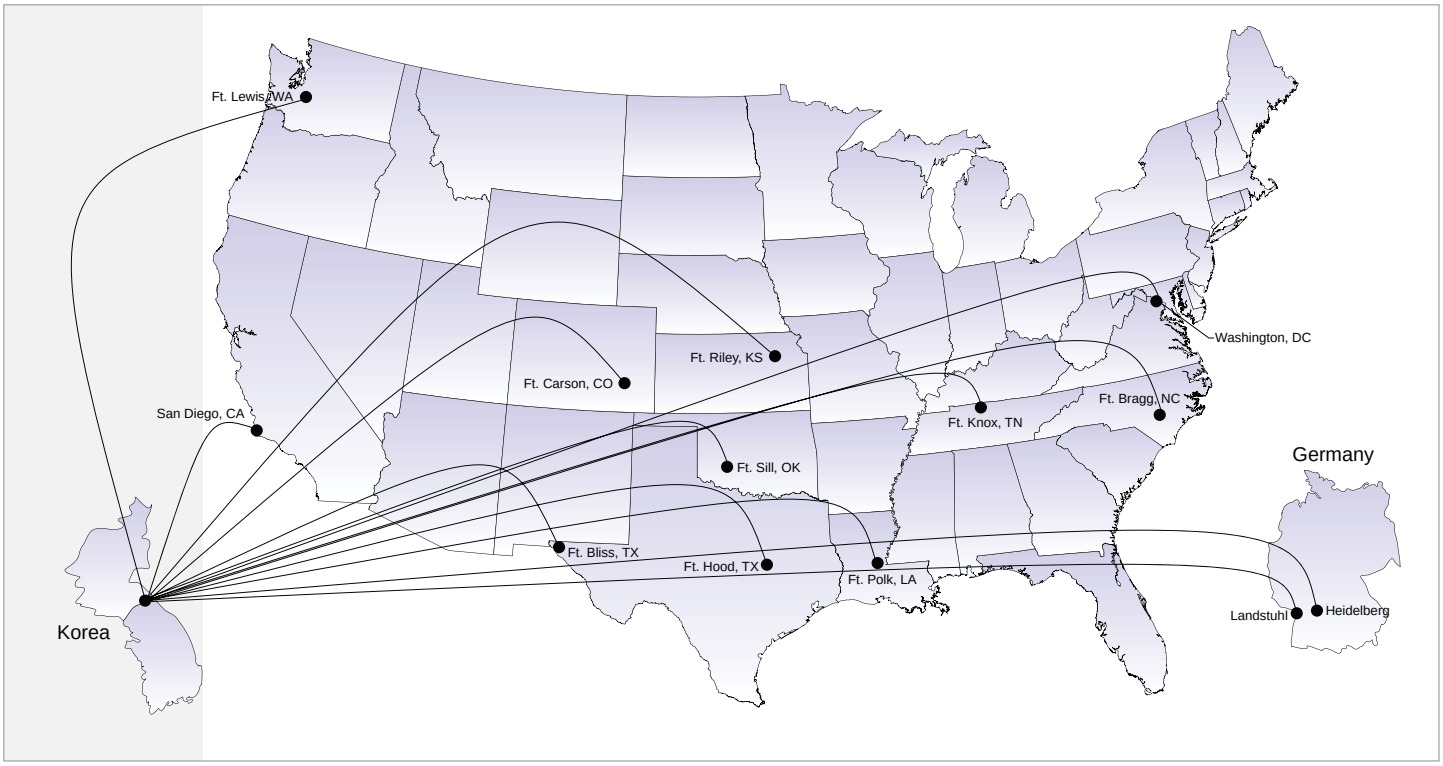
Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: leishmaniasis. Leishmaniasis among U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):2-4.

*Indicator diagnosis (one per individual) during a hospitalization, ambulatory visit, and/or from a notifiable medical event during/after service in OEF/OIF.

In the next *MSMR*:

Korea-acquired malaria, U.S. Army, 1998-2007

Geographic distribution of cases of *P. vivax* malaria of Korean origin (presumed), U.S. Army, 10 May - 30 September 2007



Commander
U.S. Army Center for Health Promotion
and Preventive Medicine
ATTN: MCHB-TS-EDM
5158 Blackhawk Road
Aberdeen Proving Ground, MD 21010-5422

STANDARD
U.S. POSTAGE
PAID
APG, MD
PERMIT NO. 1

OFFICIAL BUSINESS

The *Medical Surveillance Monthly Report* (MSMR) is prepared by the Army Medical Surveillance Activity (AMSA), Directorate of Epidemiology and Disease Surveillance, US Army Center for Health Promotion and Preventive Medicine (USACHPPM).

Data in the MSMR are provisional, based on reports and other sources of data available to AMSA.

Inquiries regarding content or material to be considered for publication should be directed to: Editor, Army Medical Surveillance Activity, 2900 Linden Lane, Suite 200 (Attn: MCHB-TS-EDM), Silver Spring, MD 20910. E-mail: msmr@amsa.army.mil

To be added to the mailing list, contact the Army Medical Surveillance Activity at (301) 319-3240. E-mail: msmr.amsa@amedd.army.mil