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Cold Weather-related Injuries, U.S. Armed Forces, July 2003-June 2008

Prolonged and/or intense exposures to cold can significantly impact the health, well-being and operational effectiveness of service members and their units.¹⁻⁴ Because U.S. military operations are conducted in diverse geographic and weather conditions, the U.S. military has developed extensive countermeasures against threats associated with training and operating in cold environments.¹⁻⁵

In recent years, rates of hospitalization for cold weather-related injuries of U.S. military members have generally declined — at least in part, because of improvements in clothing, equipment, policies, and practices.² Still, cold injuries (many of them preventable) affect hundreds of service members each year. This report summarizes frequencies, rates, and correlates of risk of cold injuries among members of active and reserve components of the U.S. Armed Forces during the past five years.

Methods:

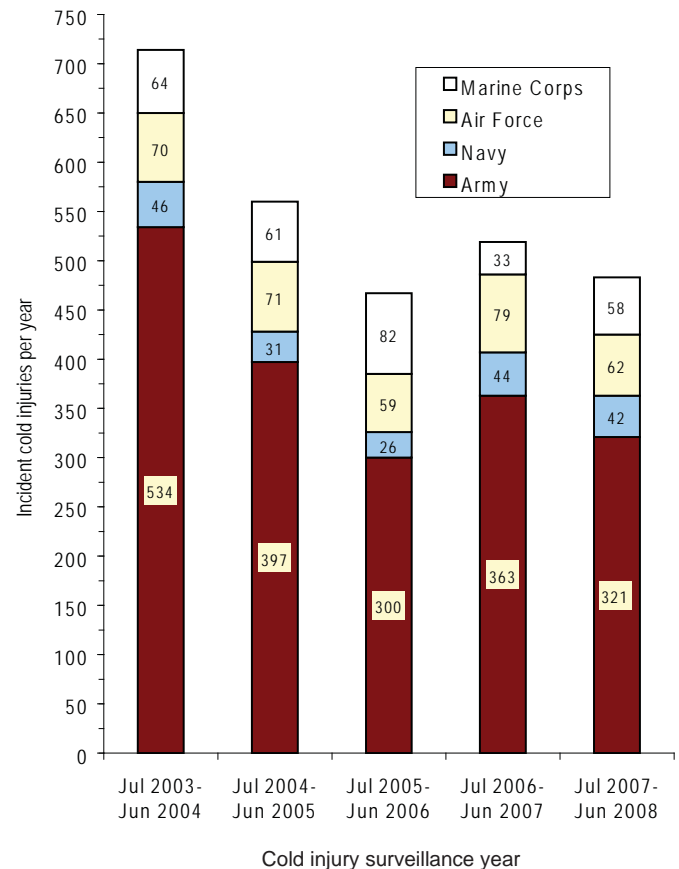
The surveillance period was 1 July 2003 to 30 June 2008. The surveillance population included all individuals who served in an active and/or reserve component of the U.S. Armed Forces any time during the surveillance period. For analysis purposes, years were divided into 1 July through 30 June intervals so that complete “cold weather seasons” could be represented in year-to-year summaries.

Inpatient, outpatient, and reportable medical event records in the Defense Medical Surveillance System (DMSS) were searched to identify all primary (first-listed) diagnoses of “frostbite” (ICD-9-CM codes: 991.0-991.3), “immersion foot” (ICD-9-CM: 991.4), “hypothermia”(ICD-9-CM: 991.6), and “other specified/unspecified effects of reduced temperature” (ICD-9-CM: 991.8-991.9). To exclude follow-up encounters for single cold injury episodes, only one of each type of cold injury per individual per year was included. If multiple medical encounters for cold injuries occurred on the same day, only one was used for analysis (hospitalizations were prioritized over ambulatory visits).

Results:

From July 2007 through June 2008, 483 members of the U.S. Armed Forces had at least one medical encounter with a primary diagnosis of cold injury — approximately one-fifth (n=96) of all cases affected members of the Reserve component. The number of cold injuries in the past year was similar to the numbers each year from July 2005-June 2007 and fewer than the numbers each year from July 2003-June 2005 (Figure 1).

Figure 1. Cold injuries among members of active and reserve components, U.S. Armed Forces, by service and year, July 2003-June 2008



During the 2007-8 season, among all active component members, there were fewer incident cases of immersion foot, hypothermia, and cold injuries (all types) than during any other year of the 5-year surveillance period. Among the Services, the rate of cold injuries in the Army (44.8 per 100,000 person-years [p-yrs]) was approximately 50% higher than in the Marine Corps (29.6 per 100,000 p-yrs), 2.7-times higher than in the Air Force (16.6 per 100,000 p-yrs), and 3.8-times higher than in the Navy (11.7 per 1,000 p-yrs). During the year, soldiers accounted for nearly two-thirds (61.5%) of all cold injuries among active component members (Tables 1a-d).

During the past cold season, in each Service, the most frequently reported cold injury was frostbite. In the Army, rates of cold injuries overall — and of frostbite, immersion foot, and cold injuries (other/unspecified), specifically — were lower in 2007-8 than any other year of the period (Table 1a). In the Navy and Marine Corps, there were sharply fewer cases and lower rates of hypothermia in 2007-8 than in recent years (Tables 1b,d).

Figure 2. Annual number of cold injuries, 2007-8 and mean during 2003-7, at locations with at least 30 cold injuries during the surveillance period, active component members, U.S. Armed Forces, July 2003-June 2008

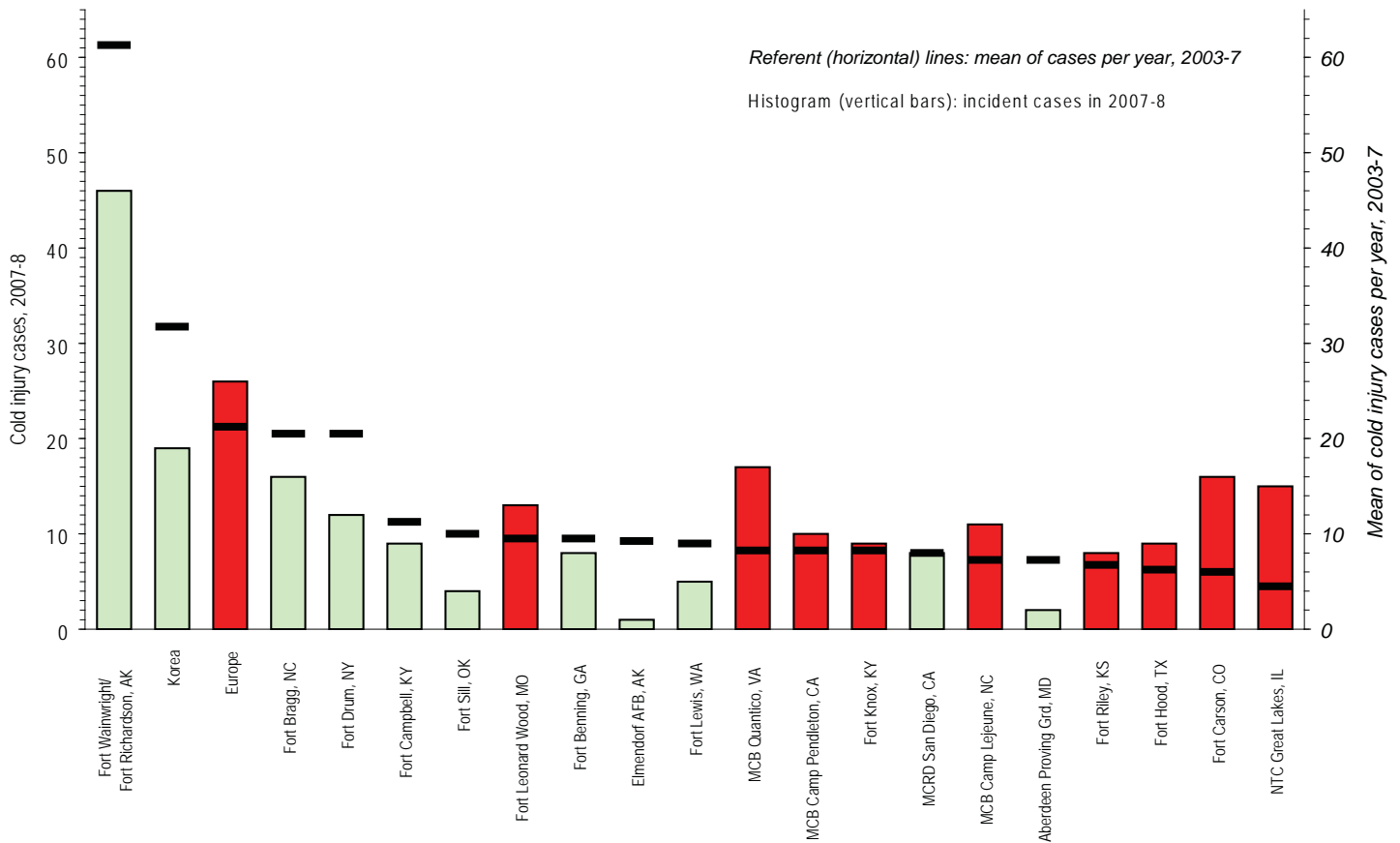


Table 1a. Incident diagnoses of cold injuries, by type, active component, U.S. Army, July 2003-June 2008

	Frostbite		Immersion Foot		Hypothermia		Unspecified		All cold injuries	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Total	723	28.9	194	7.8	110	4.4	389	15.6	1,416	56.6
Sex										
Male	531	24.7	163	7.6	96	4.5	244	11.4	1,034	48.2
Female	192	53.9	31	8.7	14	3.9	145	40.7	382	107.3
Race/ethnicity										
White, non-Hispanic	291	19.2	130	8.6	68	4.5	157	10.3	646	42.5
Black, non-Hispanic	328	60.8	42	7.8	34	6.3	169	31.3	573	106.3
Other	104	23.4	22	5.0	8	1.8	63	14.2	197	44.4
Age										
<20	80	46.5	23	13.4	24	13.9	56	32.5	183	106.3
20-24	282	33.9	97	11.7	48	5.8	150	18.0	577	69.4
25-29	145	26.1	37	6.7	21	3.8	80	14.4	283	50.9
30-34	109	29.0	22	5.8	9	2.4	49	13.0	189	50.2
35-39	67	21.4	11	3.5	7	2.2	35	11.2	120	38.4
40-44	22	13.0	2	1.2	1	0.6	11	6.5	36	21.2
45+	18	21.8	2	2.4	0	0	8	9.7	28	33.9
Rank										
Enlisted	678	32.4	163	7.8	102	4.9	359	17.2	1,302	62.3
Officer	45	10.9	31	7.5	8	1.9	30	7.3	114	27.7
Cold year (Jul-Jun)										
2003-2004	174	35.3	49	9.9	27	5.5	74	15.0	324	65.8
2004-2005	166	33.9	43	8.8	18	3.7	85	17.4	312	63.7
2005-2006	110	22.7	39	8.0	15	3.1	72	14.8	236	48.6
2006-2007	154	30.6	37	7.4	27	5.4	88	17.5	306	60.8
2007-2008	119	22.4	26	4.9	23	4.3	70	13.2	238	44.8

* Rate per 100,000 person-years

Table 1b. Incident diagnoses of cold injuries, by type, active component, U.S. Navy, July 2003-June 2008

	Frostbite		Immersion Foot		Hypothermia		Unspecified		All cold injuries	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Total	58	3.2	34	1.9	52	2.9	31	1.7	175	9.8
Sex										
Male	50	3.3	32	2.1	45	2.9	24	1.6	151	9.8
Female	8	3.1	2	0.8	7	2.7	7	2.7	24	9.3
Race/ethnicity										
White, non-Hispanic	29	2.8	24	2.3	31	3.0	17	1.7	101	9.8
Black, non-Hispanic	13	4.0	3	0.9	9	2.8	4	1.2	29	9.0
Other	16	3.7	7	1.6	12	2.7	10	2.3	45	10.3
Age										
<20	14	12.2	9	7.8	4	3.5	5	4.4	32	27.8
20-24	23	3.9	12	2.1	24	4.1	11	1.9	70	12.0
25-29	11	2.8	7	1.8	12	3.1	7	1.8	37	9.5
30-34	3	1.1	4	1.5	9	3.4	6	2.3	22	8.3
35-39	3	1.3	2	0.8	1	0.4	1	0.4	7	3.0
40-44	1	0.8	0	0	1	0.8	0	0	2	1.5
45+	3	4.4	0	0	1	1.5	1	1.5	5	7.3
Rank										
Enlisted	53	3.5	31	2.1	45	3.0	28	1.9	157	10.4
Officer	5	1.8	3	1.1	7	2.5	3	1.1	18	6.5
Cold year (Jul-Jun)										
2003-2004	14	3.7	10	2.7	8	2.1	7	1.9	39	10.4
2004-2005	5	1.4	3	0.8	16	4.4	4	1.1	28	7.7
2005-2006	4	1.1	5	1.4	8	2.3	7	2.0	24	6.8
2006-2007	15	4.3	7	2.0	17	4.9	4	1.2	43	12.3
2007-2008	20	5.7	9	2.6	3	0.9	9	2.6	41	11.7

* Rate per 100,000 person-years

Table 1c. Incident diagnoses of cold injuries, by type, active component, U.S. Air Force, July 2003-June 2008

	Frostbite		Immersion Foot		Hypothermia		Unspecified		All cold injuries	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Total	184	10.5	35	2.0	43	2.4	51	2.9	313	17.8
Sex										
Male	148	10.5	30	2.1	36	2.5	39	2.8	253	17.9
Female	36	10.4	5	1.5	7	2.0	12	3.5	60	17.4
Race/ethnicity										
White, non-Hispanic	120	9.6	26	2.1	32	2.6	29	2.3	207	16.6
Black, non-Hispanic	37	14.4	6	2.3	7	2.7	16	6.2	66	25.7
Other	27	10.5	3	1.2	4	1.6	6	2.3	40	15.5
Age										
<20	23	26.2	3	3.4	3	3.4	10	11.4	39	44.4
20-24	85	16.4	16	3.1	27	5.2	22	4.2	150	28.9
25-29	30	7.6	7	1.8	4	1.0	12	3.0	53	13.4
30-34	19	7.2	3	1.1	3	1.1	4	1.5	29	11.0
35-39	11	4.4	6	2.4	2	0.8	0	0	19	7.5
40-44	11	6.4	0	0	1	0.6	3	1.8	15	8.8
45+	5	7.4	0	0	3	4.5	0	0	8	11.9
Rank										
Enlisted	162	11.6	33	2.4	39	2.8	44	3.1	278	19.8
Officer	22	6.2	2	0.6	4	1.1	7	2.0	35	9.8
Cold year (Jul-Jun)										
2003-2004	44	11.8	5	1.3	9	2.4	6	1.6	64	17.1
2004-2005	45	12.3	8	2.2	6	1.7	11	3.0	70	19.2
2005-2006	19	5.5	9	2.6	12	3.5	14	4.0	54	15.5
2006-2007	43	12.6	7	2.1	10	2.9	10	2.9	70	20.5
2007-2008	33	10.0	6	1.8	6	1.8	10	3.0	55	16.6

* Rate per 100,000 person-years

Table 1d. Incident diagnoses of cold injuries, by type, active component, U.S. Marine Corps, July 2003-June 2008

	Frostbite		Immersion Foot		Hypothermia		Unspecified		All cold injuries	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Total	76	8.4	85	9.4	84	9.3	37	4.1	282	31.2
Sex										
Male	66	7.8	78	9.2	77	9.1	31	3.7	252	29.7
Female	10	18.1	7	12.7	7	12.7	6	10.8	30	54.2
Race/ethnicity										
White, non-Hispanic	46	7.8	56	9.4	47	7.9	20	3.4	169	28.5
Black, non-Hispanic	15	14.9	10	9.9	12	11.9	9	9.0	46	45.7
Other	15	7.1	19	9.0	25	11.8	8	3.8	67	31.7
Age										
<20	21	16.4	38	29.7	30	23.4	9	7.0	98	76.5
20-24	37	8.6	38	8.8	40	9.3	22	5.1	137	31.9
25-29	7	4.4	8	5.1	9	5.7	5	3.2	29	18.4
30-34	8	9.2	1	1.2	4	4.6	1	1.2	14	16.1
35-39	2	3.3	0	0	0	0	0	0	2	3.3
40-44	0	0	0	0	1	3.5	0	0	1	3.5
45+	1	8.1	0	0	0	0	0	0	1	8.1
Rank										
Enlisted	52	6.4	83	10.3	79	9.8	32	4.0	246	30.4
Officer	24	25.0	2	2.1	5	5.2	5	5.2	36	37.5
Cold year (Jul-Jun)										
2003-2004	11	6.2	19	10.7	22	12.4	4	2.3	56	31.6
2004-2005	11	6.2	19	10.7	22	12.4	4	2.3	56	31.6
2005-2006	15	8.5	20	11.3	25	14.1	19	10.7	79	44.6
2006-2007	7	3.9	9	5.1	11	6.2	0	0	27	15.2
2007-2008	26	14.5	17	9.5	5	2.8	5	2.8	53	29.6

* Rate per 100,000 person-years

During the past five years, in the Army and Marine Corps, rates of frostbite, cold injuries (other/unspecified), and cold injuries overall were sharply higher among females than males (Tables 1a,d). Of note, in the Air Force and Navy, there were no clear relationships between gender and cold injury risk (Tables 1b,c).

In the Army, Air Force, and Marine Corps, rates of cold injuries overall — and frostbite, in particular — were sharply higher among Black non-Hispanic than other racial-ethnic group members. In the Navy, there were no clear relationships between race-ethnicity and cold injury risk (Table 1a-d).

In general, rates of cold injuries were higher among the youngest aged (<20 years old) and enlisted members relative to their respective counterparts. However, in the Navy and Air Force, rates of hypothermia were higher among 20-24 years olds than those younger or older; and in the Marine Corps, rates of frostbite were nearly 4-times higher among officers than enlisted (Tables 1a-d).

During the five year surveillance period, 30 or more cold injuries occurred at each of 22 locations worldwide. Of these locations, 10 had more and 11 had fewer cold injuries in 2007-8 than the mean annual number of cases at the respective locations during the prior four years (Figure 2). Among U.S. military installations in the past year, Fort Wainwright (n=23) and Fort Richardson in Alaska (n=23), Marine Corps Base Quantico, Virginia (n=17), Fort Bragg, North Carolina (n=16), and Fort Carson, Colorado (n=16) had the most cold

injuries among active component members (Figure 2). Only one installation reported more than five cold injuries among reserve component members during 2007-8 (Fort Leonard Wood, Missouri; n=9) (data not shown).

Editorial comment:

In general, during the past cold season, numbers, rates, and types of cold injuries among U.S. service members were similar to those in recent years.

As in the past, the largest numbers and highest rates of cold injuries affect the Army. At least in part, this reflects differences in the natures, locations, and circumstances of the training and operations of the Services; it also may reflect differences in the ascertainment of cold injury cases (e.g., records of medical encounters during field exercises, deployment operations, and aboard Navy ships are not routinely available for health surveillance purposes).

In general, the youngest aged, female, enlisted, and Black non-Hispanic service members have the higher rates of cold injuries — particularly frostbite. Other reports have documented that African American soldiers and individuals with cold injuries in the past have increased susceptibilities to cold injuries during prolonged or intense cold exposures.^{2,3} Special vigilance by individuals, line supervisors, commanders, and medical staffs is indicated to prevent cold injuries among those with known or suspected increased susceptibilities.

Commanders and supervisors at all levels should implement appropriate countermeasures to prevent cold injuries, including proper clothing and equipment, wind chill temperature monitoring and awareness training.^{1,4} Service members who train in wet and freezing conditions should know the signs of cold injury, obtain adequate hydration, and avoid tobacco, caffeine and vasoconstrictive medications.^{1,4,5} Up-to-date cold injury prevention materials (including posters, presentation outlines, policies, regulations, and technical bulletins) are available online: <http://chppm-www.apgea.army.mil/coldinjury/> and <http://www.usariem.army.mil/download.htm>.

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CORRECTION

Numbers and rates of syncope after immunization for male and female service members were incorrectly reported in the September 2008 issue of the *MSMR* (Table 1, page 3). The corrected numbers and rates appear below.

Table 1. Syncope after immunization, frequency and rate per 10,000 vaccination episodes, by year, U.S. Armed Forces, 1998-2007

	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		Total (1998-2007)		
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	Rate ratio (unadjusted)
Total	113	0.44	143	0.47	151	0.71	173	0.69	236	0.75	403	0.77	324	0.89	271	0.80	403	1.34	395	1.14	2,612	0.81	
Component																							
Active	100	0.48	129	0.53	125	0.74	138	0.73	195	0.80	281	0.76	241	0.96	206	0.84	323	1.48	318	1.25	2,056	0.86	1.26
Reserve	13	0.29	14	0.23	26	0.60	35	0.56	41	0.57	122	0.79	83	0.74	65	0.71	80	0.98	77	0.82	556	0.68	ref
Gender																							
Male	80	0.36	100	0.38	116	0.64	121	0.57	167	0.62	306	0.68	251	0.80	199	0.69	300	1.17	285	0.96	1,925	1.51	2.17
Female	33	0.96	43	1.06	35	1.12	52	1.36	69	1.48	97	1.33	73	1.53	72	1.52	103	2.35	110	2.14	687	0.70	ref
Age																							
<20	32	1.03	58	1.41	52	1.39	58	1.39	72	1.46	115	1.75	102	1.94	79	1.73	138	3.11	122	2.63	828	1.82	4.12
20-24	40	0.56	42	0.48	52	0.83	61	0.83	92	0.90	163	0.91	113	0.89	91	0.82	155	1.57	138	1.13	947	0.92	2.08
25-29	20	0.41	19	0.35	15	0.42	22	0.55	30	0.57	47	0.52	43	0.69	39	0.65	50	0.93	56	0.85	341	0.61	1.38
30-34	6	0.14	10	0.22	11	0.37	13	0.38	18	0.44	28	0.41	28	0.63	21	0.51	21	0.61	19	0.49	175	0.42	0.94
35-39	9	0.26	7	0.17	13	0.50	10	0.32	11	0.30	22	0.37	21	0.57	17	0.47	18	0.58	29	0.84	157	0.43	0.97
40+	6	0.23	7	0.21	8	0.37	9	0.30	13	0.37	28	0.45	17	0.42	24	0.56	21	0.56	31	0.76	164	0.44	ref
Race/ethnicity																							
White, non-Hispanic	85	0.47	109	0.51	115	0.78	134	0.76	198	0.89	327	0.88	256	0.99	213	0.88	322	1.48	314	1.23	2,073	0.91	1.65
Black, non-Hispanic	15	0.33	20	0.37	24	0.63	22	0.50	27	0.49	50	0.55	36	0.61	42	0.80	43	0.93	47	0.87	326	0.61	1.10
Other	13	0.46	14	0.38	12	0.45	17	0.55	11	0.28	26	0.41	32	0.71	16	0.39	38	1.06	34	0.86	213	0.55	ref
Service																							
Army	18	0.30	27	0.36	27	0.45	44	0.58	84	0.72	191	0.80	162	0.96	103	0.74	132	1.05	144	0.89	932	0.76	ref
Navy	17	0.30	24	0.37	19	0.46	26	0.60	32	0.60	42	0.46	40	0.60	27	0.43	45	0.71	56	0.90	328	0.54	0.71
Air Force	63	0.60	65	0.59	79	1.00	76	0.79	98	0.99	130	1.06	91	1.31	103	1.25	187	2.86	152	2.12	1,044	1.16	1.52
Marine Corps	15	0.45	27	0.51	26	0.86	26	0.78	21	0.47	35	0.54	30	0.57	30	0.66	29	0.75	25	0.56	264	0.60	0.79
Coast Guard	0	0.00	0	0.00	0	0.00	1	0.41	1	0.29	5	0.72	1	0.19	8	1.19	10	1.48	18	2.70	44	1.00	1.32
Grade																							
Enlisted	102	0.47	134	0.51	136	0.74	148	0.68	205	0.74	373	0.82	296	0.92	244	0.83	357	1.37	356	1.18	2,351	0.84	ref
Officer	11	0.30	9	0.21	15	0.53	25	0.76	31	0.76	30	0.45	28	0.65	27	0.61	46	1.16	39	0.87	261	0.62	0.74
Military occupation																							
Combat	12	0.26	16	0.28	15	0.37	22	0.47	35	0.54	54	0.49	45	0.56	61	0.73	78	0.94	67	0.80	405	0.58	ref
Health care	2	0.10	10	0.46	9	0.52	18	0.85	17	0.64	27	0.67	14	0.53	14	0.59	18	0.83	16	0.61	145	0.59	1.02
Other	99	0.53	117	0.52	127	0.82	133	0.73	184	0.82	322	0.86	265	1.04	196	0.86	307	1.57	312	1.31	2,062	0.91	1.57

Clinically Significant Carbon Monoxide Poisoning, Active and Reserve Components, U.S. Armed Forces, July 1998 - June 2008

In the United States, there are more than 400 deaths each year due to unintentional carbon monoxide (CO) poisoning¹ – approximately 7% of these are attributable to occupational inhalations.^{2,3} For each unintentional death from CO poisoning, there are more than two CO-related suicides.⁴ Poisonings with CO are most often related to motor vehicles (e.g., automobiles, trucks, tractors, fork lifts, motorboats), malfunctioning and/or inadequately ventilated heating or cooking devices (e.g., furnaces, fireplaces, stoves, barbecues, water heaters), and gasoline-powered tools (e.g., pumps, compressors, power generators).^{4,6} By their natures, many military activities, materials, and settings⁷⁻⁹ pose CO hazards. In recent years, CO intoxication has been a reportable medical event in the U.S. Military Health System.

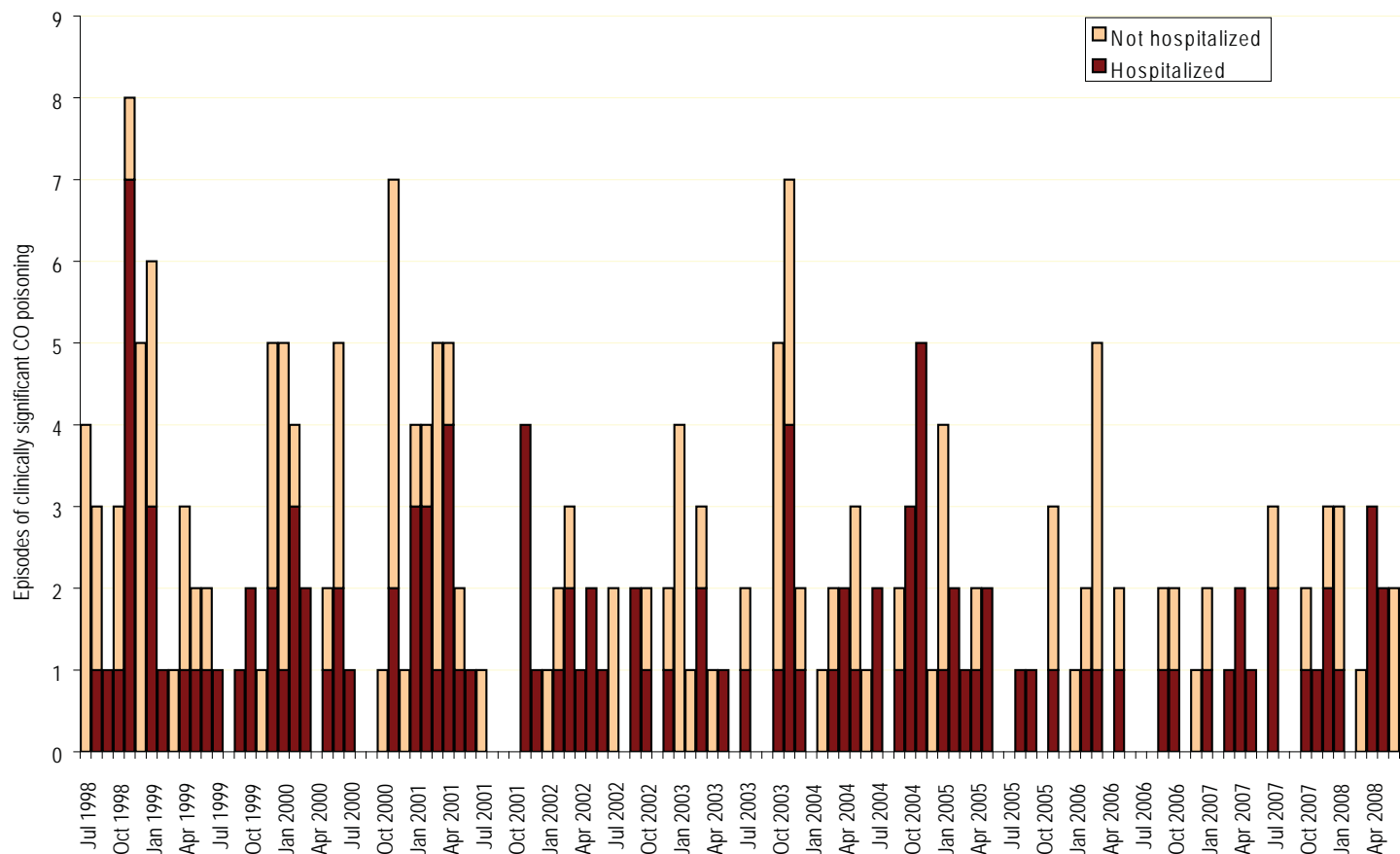
This report updates previous reports in the MSMR regarding episodes of CO intoxication among members of the U.S. Armed Forces.¹⁰⁻¹⁴ For this analysis, intentional and unintentional CO intoxication episodes that resulted in hospitalizations, lost duty time (e.g., limited duty or convalescence in quarters dispositions), and/or were reported

as notifiable medical events among active and Reserve component members were ascertained from records routinely maintained in the Defense Medical Surveillance System.

Methods:

The surveillance period was 1 July 1998 to 30 June 2008. The surveillance population included all individuals who served in the U.S. Armed Forces any time during the surveillance period. For analysis purposes, a case was defined as a hospitalization, ambulatory visit, or reportable medical event case report that included a diagnosis of “toxic effect of carbon monoxide” (ICD-9 code 986) among the first four diagnoses listed. Cases were excluded if the primary (first-listed) diagnosis was not a condition directly related to or likely caused by acute CO intoxication (e.g., headache, syncope). To separate true CO intoxication cases from evaluations following possible CO exposures, ambulatory visits with dispositions of “released without limitations” were excluded. To exclude follow-up encounters for single CO

Figure 1 Episodes of clinically significant carbon monoxide poisoning*, by month, U.S. Armed Forces, July 1998-June 2008



*Includes hospitalizations, ambulatory visits with limited duty or confinement to quarters dispositions, and/or reportable medical events.

intoxication episodes, only one episode per individual per year was included. As CO poisonings are more frequent in the fall and winter, a surveillance year was defined as 1 July through 30 June for analysis purposes.

Results:

During the surveillance period, 227 service members were either reported with, hospitalized for, or placed on limited duty due to carbon monoxide intoxication. More than one-half ($n=121$, 53%) of all cases were hospitalized, and 9 cases (4.0%) were reported as fatal. The number of cases per year generally declined during the period — from 39 in 1998-1999 to 20 in 2007-2008 (Figure 1). In regard to season, case counts generally increased from late summer through early fall, were highest in late fall and early winter, decreased from late winter through early spring, and were lowest in late spring and early summer (Figures 1, 2).

Service members affected by CO intoxication generally reflected the demographic composition of U.S. military members in general. Of note, service members with combat and health care occupations accounted for less than one-third (30.4%) of CO intoxication cases overall. Fifteen percent of cases were among members of The Reserve or National Guard (Table 1).

Table 1. Episodes of clinically significant carbon monoxide poisoning, U.S. Armed Forces, July 1998-June 2008

	No.	%
Total	227	100.0
<i>Component</i>		
Active	193	85.0
Reserve/Guard	34	15.0
<i>Service</i>		
Army	127	56.0
Navy	32	14.1
Air Force	54	23.8
Marine Corps	14	6.2
<i>Sex</i>		
Male	185	81.5
Female	42	18.5
<i>Race ethnicity</i>		
Black, non-hispanic	39	17.2
Hispanic	20	8.8
Other	18	7.9
White, non-hispanic	150	66.1
<i>Age</i>		
< 20	9	4.0
20-24	90	39.7
25-29	61	26.9
30-34	33	14.5
35-39	21	9.3
>=40	13	5.7
<i>Military occupation</i>		
Combat	51	22.5
Health care	18	7.9
Other	158	69.6

CO poisoning cases were widely distributed among units and installations in the United States and overseas. Two large Army installations — Fort Hood, Texas (13 cases) and Fort Lewis, Washington (12 cases) — accounted for more than 5% each of all clinically significant CO intoxication cases (Table 2). One-fifth ($n=46$, 20.3%) of all cases affected service members assigned outside the United States (data not shown).

NATO Standardized Agreement (STANAG) cause-of-injury codes were reported in relation to nearly two-thirds ($n=77$) of all hospitalized cases. Of those, 33 (42.9%) were reported as “intentionally self-inflicted.” Of 26 outpatient cases with external cause of injury codes, approximately one-fifth ($n=5$, 19.2%) indicated that the intoxication was intentionally self-inflicted.

Editorial comment:

During the ten-year surveillance period, there were more than 1,000 medical encounters with “toxic effect of carbon monoxide” as a diagnosis. For most of these cases, the affected service members were returned to duty without limitations. Because such cases likely include “rule outs” of potential/suspected intoxications and otherwise clinically insignificant exposures to CO, they were not counted as cases for this analysis.

Figure 2. Episodes of clinically significant carbon monoxide poisoning, by month, U.S. Armed Forces, July 1998-June 2008

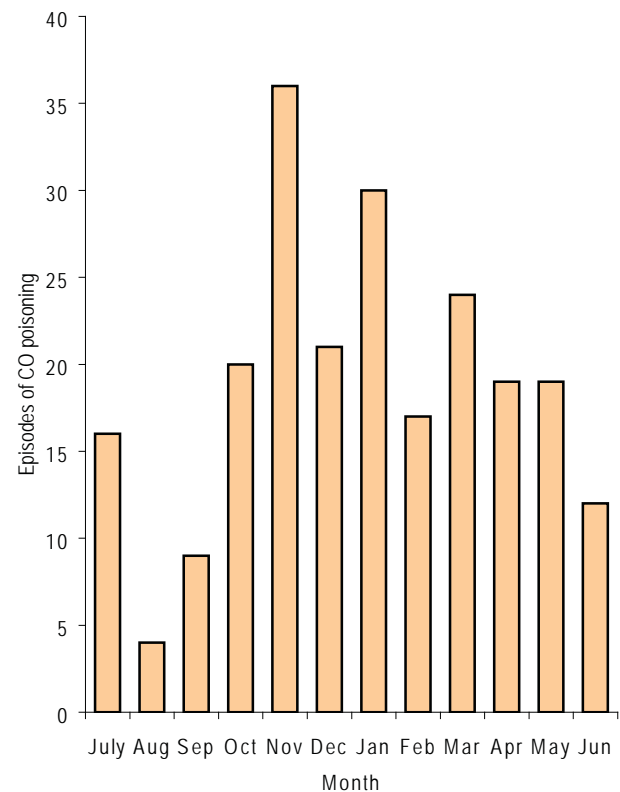


Table 2. Episodes of clinically significant carbon monoxide poisoning, by location, U.S. Armed Forces, 1998-2008

Installation	Jul 1998- Jun 1999	Jul 1999- Jun 2000	Jul 2000- Jun 2001	Jul 2001- Jun 2002	Jul 2002- Jun 2003	Jul 2003- Jun 2004	Jul 2004- Jun 2005	Jul 2005- Jun 2006	Jul 2006- Jun 2007	Jul 2007- Jun 2008	Total	
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	%
Fort Hood, TX	2	3	1	1	.	1	1	1	2	1	13	5.7
Fort Lewis, WA	1	.	3	.	2	1	.	2	2	1	12	5.3
Fort Carson, CO	2	2	1	.	1	1	.	.	.	.	7	3.1
Fort Sill, OK	1	.	3	.	.	.	3	.	.	.	7	3.1
Fort Bliss, TX	.	1	.	1	.	1	.	1	1	2	7	3.1
Fort Bragg, NC	.	2	2	.	1	.	2	.	.	.	7	3.1
Spangdahlem AB, Germany	.	.	.	.	.	3	1	1	.	1	6	2.6
Holloman AFB, NM	3	2	.	.	1	.	.	.	.	.	6	2.6
Other	30	18	21	14	13	18	17	10	6	15	162	71.4
Total	39	28	31	16	18	25	24	15	11	20	227	100.0

This report included cases that were reported during hospitalizations, ambulatory visits with limited duty or confinement to quarters dispositions, and/or as reportable medical events. In the past ten years, there have been 227 clinically significant carbon monoxide intoxications — an average of 23 per year — among U.S. service members. The number of cases per year has generally declined.

This report also documents that CO-related risks increase through the late summer and early fall and are highest during the late fall and early winter. This seasonal pattern generally corresponds with trends in ambient outdoor temperatures and uses of indoor heating. The Consumer Products Safety Commission has published prevention guidelines that address, for example, hazards associated with furnaces and other heating devices.¹⁵

As usual, the results of this analysis should be interpreted with consideration of some inherent shortcomings. For example, cases for this report were ascertained from standardized clinical records and notifiable medical event reports that are routinely submitted from fixed medical treatment facilities. Thus, cases diagnosed and treated in deployed settings (e.g., field hospitals, Navy ships) and fatal cases that did not present premortem to the Military Health System are not included. Also, cases among Reserve and National Guard members that were diagnosed in their civilian communities outside of the Military Health System were not included.

In summary, service members, unit leaders, and supervisors at all levels should be aware of and responsive to the dangers of CO poisoning; CO hazards related to residential, recreational, occupational, and military operational circumstances, equipment, and activities; and appropriate preventive measures. This is especially important for service members who repair or maintain their own and/or military vehicles.³ Finally, primary medical care providers (including unit medics and emergency medical technicians) should be knowledgeable of and sensitive to the early clinical manifestations of CO intoxication.

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Variation across Evaluation Sites in Clinical Referrals of Service Members after Returning from Deployment, Active Component, U.S. Armed Forces, 2005-2007

In March 2005, the Department of Defense launched the Post-Deployment Health Reassessment (PDHRA) program to identify and respond to health concerns — with a specific emphasis on mental health — that persisted for or emerged within three to six months after service members returned from deployments.¹

The PDHRA program mandates that all service members who have returned from operational deployments complete an electronic or web-enabled version of the Post-Deployment Health Reassessment (DD Form 2900), ideally within three to four months (but up to 180 days) of return. After completing the form, the service member visits a healthcare provider who reviews information on the form and conducts a brief behavioral risk assessment. The care provider may refer the service member to healthcare or community-based services for further evaluation or treatment.

The objective of this analysis was to document the variability and determinants of differences across military treatment facilities (MTFs) — while simultaneously accounting for individual differences — in the percentages of returning deployers who received clinical referrals after PDHRAs.

Methods:

The DMSS was searched to identify all PDHRA forms that were completed between 1 January 2005 and 31 December 2007 by members of the active components of the Army, Navy, Air Force and Marine Corps. The proportions of forms that indicated recommendations for referrals to a clinic or specialty provider were calculated overall and for each screening site (estimated based on the medical treatment facilities where respondents received medical care around the time of their PDHRAs).

Analyses were designed to estimate the effects of individual and MTF-specific characteristics on the likelihood of clinical referral. First, the distribution of the percentages of referrals across all MTF screening sites was assessed. Next, the overall variance in clinical referrals due to medical site was assessed in a multivariate model (model 1). A second multivariate model (model 2) was used to estimate the variance in clinical referrals due to medical site while controlling for individual characteristics (including responses to PTSD screening questions). A final two-level model (model 3) estimated the variance due to medical site after accounting for individual characteristics to assess whether factors such as PTSD score and Service were considered similarly during evaluations across sites. Analyses were conducted using PROC LOGISTIC and PROC GLIMMIX provided by version 9.1 SAS/STAT®.

Results:

During the three-year period, 322,510 post-deployment health reassessments were completed at 238 MTF screening sites. Across sites, there was significant variation in the proportions of PDHRA forms that included indications for referrals (% with referrals, by site: median: 16.5%; range: 3%-88%) (Figure 1).

There were significant differences in the likelihood of referral based on the Service, race, age, and military occupation of respondents as well as their responses to PTSD screening questions. However, the variation in percentages of referrals across screening sites was not entirely attributable to differences in individual characteristics of respondents. A multivariate model (model 2) suggested that approximately 10% of the total variability in referrals was attributable to the medical screening site (estimated variability due to screening site: 0.367; overall variability in referral patterns: 3.287) (Table 1).

A final model (model 3) assessed whether responses to PTSD screening questions and Service assignment were

Table 1. Relationships between individual and screening site (MTF)-specific characteristics and the likelihood of referral after completing a post-deployment health reassessment (DD2900), among active component members who return from deployment, U.S. Armed Forces, 2005-2007 (model 2)

	Odds ratio
Age group	
Age	0.99
Service	
Army	3.25*
Marine Corps/Navy	1.98*
Air Force	Referent
Occupational group	
Combat	0.87*
Health care	0.99*
Other	Referent
PTSD screen	
Age * PTSD	1.01
PTSD score: screen negative	0.15*
Race	
White	0.86*
Black	1.04*
Other	Referent
Deployment experience	
Multiple deployments	1.15*
Variance estimate	
Across MTF screening sites	
Between locations	0.367*

*p<.01

Overall variance, standard logistic distribution: 3.287

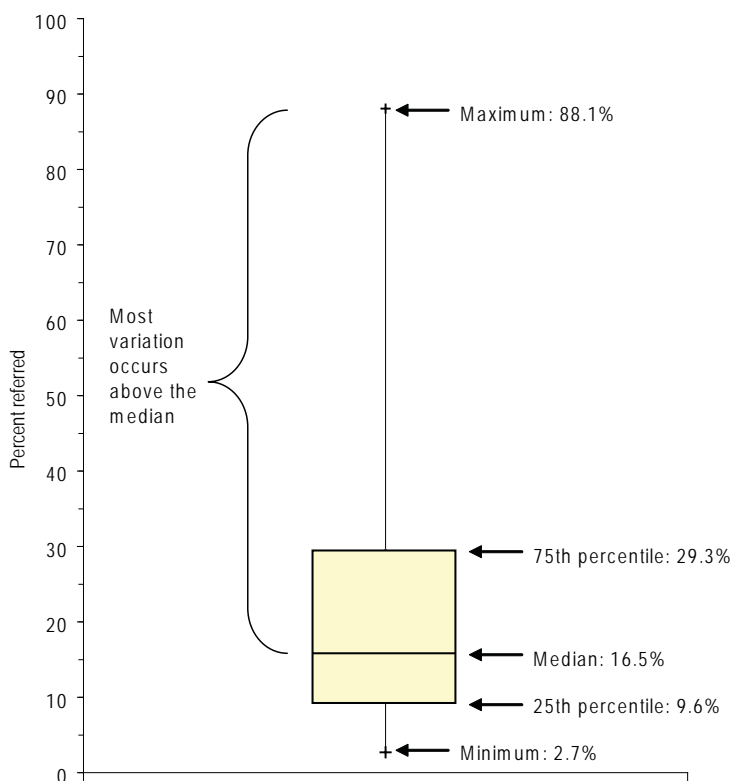
considered similarly during evaluations across sites. The results suggest that assignment in the Army accounted for approximately 23% and PTSD score approximately 12% of the overall variation in referral patterns across sites (results not shown).

In general, the analyses indicate that assignment in the Army and endorsement of two or more PTSD screening questions were strong independent predictors of clinical referral after PDHRA. However, the strengths of the associations between these factors and the likelihood of referral differed across sites. Thus, for example, the PTSD score was a significant predictor of clinical referral in general; however, the PTSD score was considered differently relative to other factors during evaluations at different sites. Of note, no MTF screening site-specific characteristics (e.g., region of the U.S., number of assessments conducted) were significant independent predictors of clinical referral (results not shown).

Editorial comment:

This report documents that the proportion of service members who were referred for further evaluations at the time of their post-deployment health reassessments varied

Figure 1. Distribution of percentages of post-deployment health reassessment forms (DD2900) with indications for clinical referrals/follow-ups, across military treatment facility screening sites, among active component members who return from deployment, U.S. Armed Forces, January 2005-December 2007



in relation to the medical sites at which they were assessed. After accounting for the effects of individual characteristics, the assessment site still accounted for approximately 10% of the total variation in referral probability. Of particular note, the strengths of the associations between Army service and PTSD score and the likelihood of referral significantly varied across sites.

Variation in the percentages of referrals across sites may reflect different types and/or degrees of deployment-related experiences, health concerns, injuries, and illnesses in different Army units. It may also reflect differences in assessment and documentation methods and/or referral criteria of healthcare providers at various sites. For example, the natures of deployment missions and in-theater locations significantly vary across units; thus, the probability of actual or perceived health problems would be expected to vary across returning units — and in turn, the installations where they are permanently garrisoned. Likewise, providers become familiar with the prevailing health concerns and clinical problems of service members at their installations; also, the clinical experiences of providers with service members who returned from deployments in the past can influence their judgments regarding clinical referral of recently returning deployers. Finally, differences in the kinds of information (both official and unofficial) that are prevalent among units and across garrisons may influence responses of service members and assessments of providers during post-deployment health reassessments.

The many factors that determine thresholds for clinical referrals at various sites underlie the differences across sites in referrals of Army relative to other Service members and among those with similar PTSD scores. Analyses of the experiences of service members who endorsed PTSD screening questions — whether or not referred — could illuminate differences in referral thresholds across units and deployment periods (with control of the effects of other factors independently associated with referral), compliance with clinical referrals among those who received them, and the clinical courses of returned deployers subsequent to PDHRA administration.

Analysis and report by Pablo Aliaga, MPH; Bruno Petruccelli, MD, MPH; and Lt. Col. Sean Moore, MD, MS, USAF, Armed Forces Health Surveillance Center.

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Update: Deployment Health Assessments, U.S. Armed Forces, September 2008

The force 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 until or emerged within three to six months after returning 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 predeployment to postdeployment.

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:

During the 12-month period from October 2007 to September 2008, there were 397,538 pre-deployment health assessments, 350,988 post-deployment health assessments, and 295,144 post-deployment health reassessments completed at field sites, forwarded to the Armed Forces Health Surveillance Center, and archived in the Defense Medical Surveillance System (Table 1).

Between January 2003 and September 2008, there were peaks and troughs in the numbers of pre-deployment and post-deployment health assessments that generally corresponded to times of departure and return of large numbers of deployers (Figure 1). Since April 2006, the numbers of post-deployment health reassessments (PDHRA) completed per month have fluctuated in a range between approximately 17,000 and 37,000 (Figure 1, Table 1).

From October 2007 to September 2008, nearly three-fourths (72.9%) of deployers rated their "health in general" as "excellent" or "very good" during pre-deployment health assessments. Smaller proportions of returned deployers rated their health as "excellent" or "very good" during post-deployment assessments (58.1%) and post-deployment reassessments (52.6%). There were increases in the proportions of deployers who rated their health as "fair" or "poor" from pre-deployment to post-deployment and from

Figure 1. Total deployment health assessment and reassessment forms, by month, U.S. Armed Forces, January 2003-September 2008

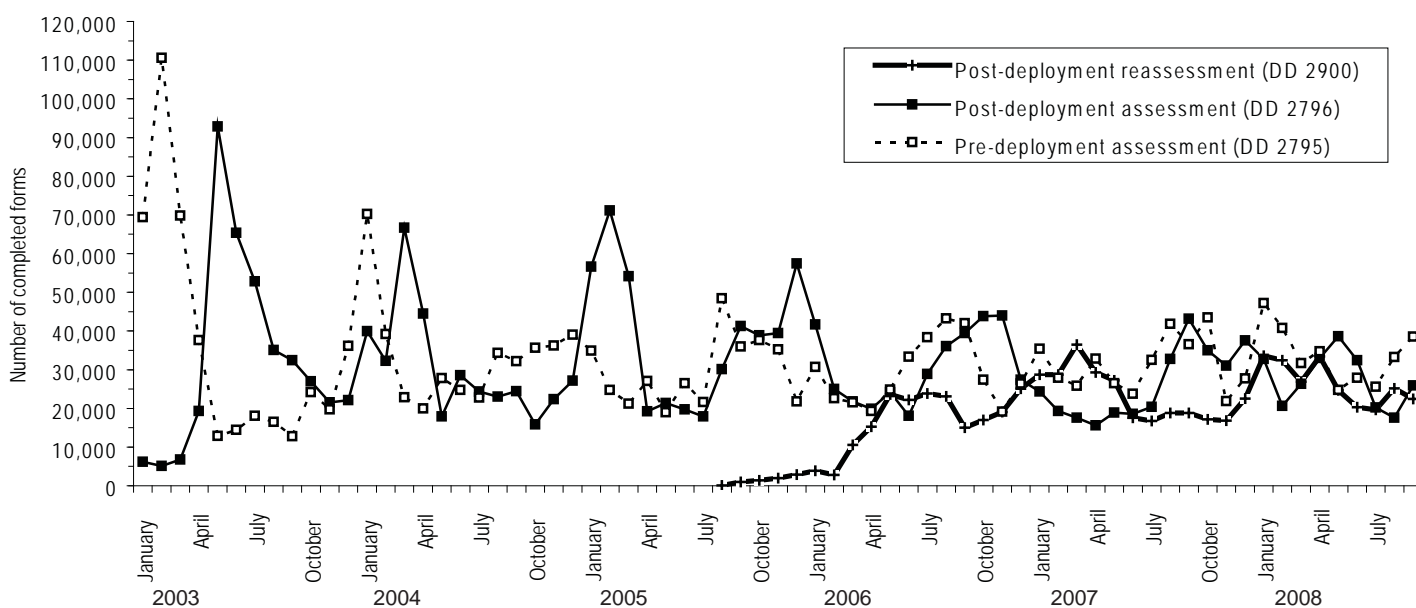


Table 1. Deployment-related health assessment forms, by month, U.S. Armed Forces, October 2007-September 2008

	Pre-deployment assessment DD2795		Post-deployment assessment DD2796		Post-deployment reassessment DD2900	
	No.	%	No.	%	No.	%
Total	397,538	100	350,988	100	295,144	100
2007						
October	43,454	10.9	34,952	10.0	17,169	5.8
November	21,893	5.5	31,029	8.8	16,865	5.7
December	27,764	7.0	37,559	10.7	22,504	7.6
2008						
January	47,203	11.9	32,740	9.3	33,550	11.4
February	40,745	10.2	20,641	5.9	32,466	11.0
March	31,664	8.0	26,300	7.5	26,876	9.1
April	34,763	8.7	33,000	9.4	33,465	11.3
May	24,772	6.2	38,641	11.0	24,690	8.4
June	27,865	7.0	32,402	9.2	20,321	6.9
July	25,616	6.4	20,217	5.8	19,652	6.7
August	33,236	8.4	17,559	5.0	25,174	8.5
September	38,563	9.7	25,948	7.4	22,412	7.6

immediate post-deployment to 3-6 months after returning. For example, prior to deploying, less than one of 40 (2.6%) deployers rated their health as “fair” or “poor”; upon returning from deployment, one of 14 (7.5%) deployers rated their health as “fair” or “poor”; and 3-6 months after returning, one of 7 (13.8%) deployers rated their health as “fair” or “poor” (Figure 2).

In the past 12 months, the proportion of deployers who assessed their general health as “fair” or “poor” was consistently low before deployment (mean, by month: 2.6%), higher at return from deployment (mean, by month: 7.5%), and highest 3-6 months after return from deployment (mean, by month: 13.6%) (Figure 3). From month to month, there was relatively little variability in the proportions of deployers who rated their health as “fair” or “poor” on predeployment, post-deployment, and post-deployment reassessment questionnaires (Figure 3). Of deployers who completed health assessments prior to and 3-6 months after returning from deployment, approximately one of 6 (16.4%) indicated significant declines (i.e., change of 2 or more categories on a 5-category scale) in their perceived general health states between the assessments (Figure 4).

In general, on post-deployment assessments and reassessments, deployers in the Army and in Reserve components were more likely than their respective counterparts to report health and exposure-related concerns. Among Reserve component members of the Army and Marine Corps, health and exposure-related concerns and indications for referrals were much greater 3-6 months after return from deployment (DD2900) than at the time of return deployment (DD2796). Of note, at the time of return, active component soldiers were the most likely of all deployers to receive mental health referrals; however, 3-6 months after returning, Reserve component members of the Army and Marine Corps were the most likely of all deployers to receive mental health referrals (Table 2, Figures 5,6).

Finally, in general, soldiers and Reserve component members were more likely than their respective counterparts

Figure 2. Percent distributions of self-assessed health status as reported on deployment health assessment forms, U.S. Armed Forces, October 2007-September 2008

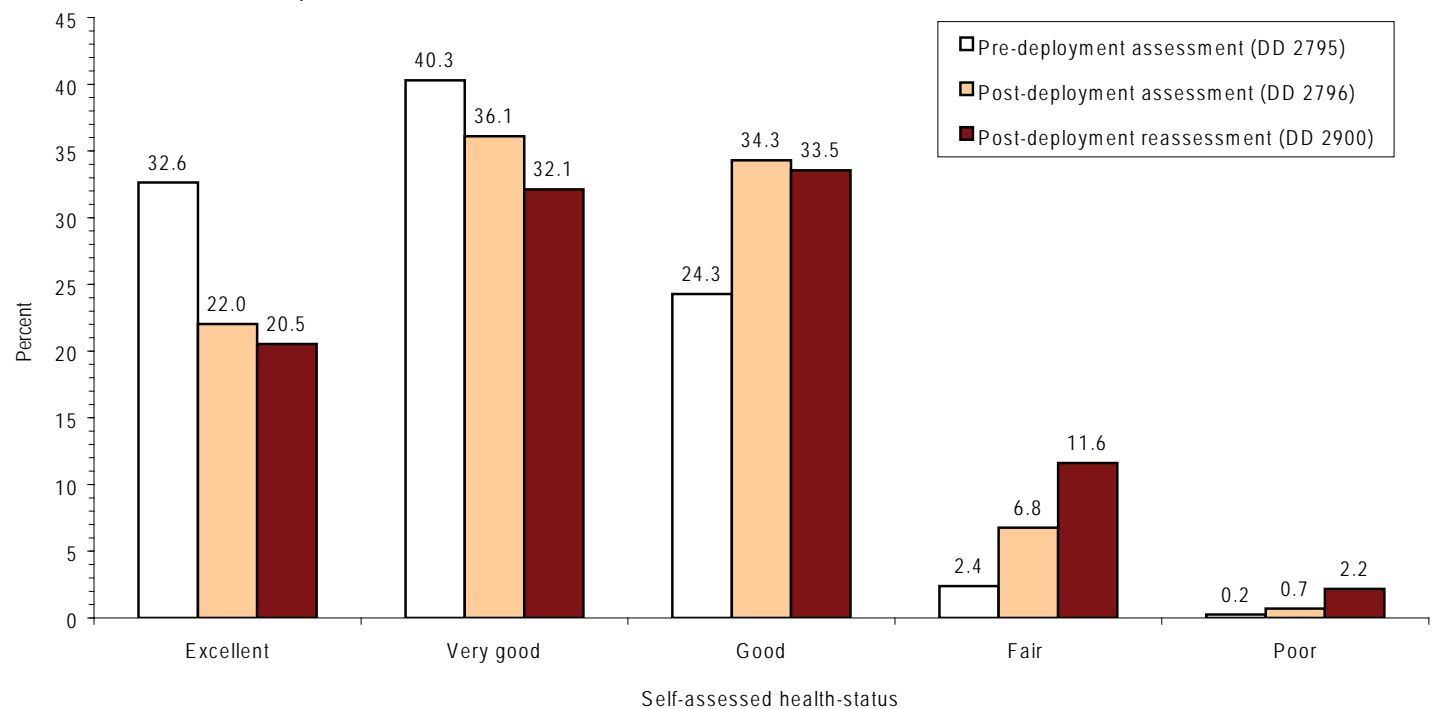
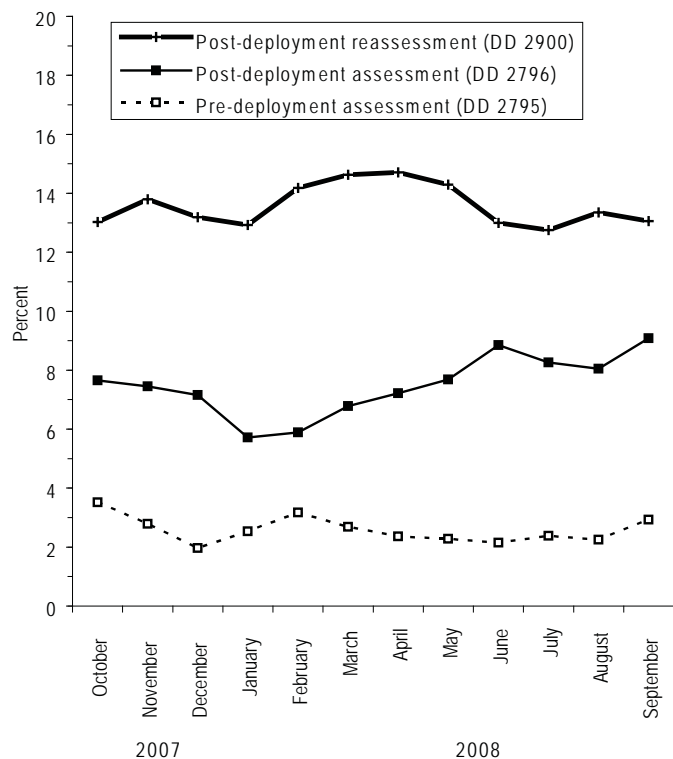


Figure 3. Proportion of deployment health assessment forms with self-assessed health status as “fair” or “poor”, U.S. Armed Forces, October 2007-September 2008



to report “exposure concerns”; and both active and Reserve component members were more likely to report “exposure concerns” 3-6 months after compared to the time of return from deployment (Table 2, Figures 6,7).

Editorial comment:

A consistent finding of deployment-related health assessments is that deployers rate their general health worse when they return from deployment compared to before deploying, regardless of the Service or component. Deployments are inherently physically and psychologically demanding; and there are more – and more significant – threats to the physical and mental health of service members when they are conducting 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).

Another consistent finding of deployment-related health surveillance is that, as a group, returned service members rate their general health worse and are more likely to report exposure concerns 3-6 months after returning from deployment compared to the time of return. Symptoms of post deployment 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 return from deployment.⁴ Among British veterans of the Iraq war, Reservists reported more “ill health” than their active counterparts. 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

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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, October 2007-September 2008

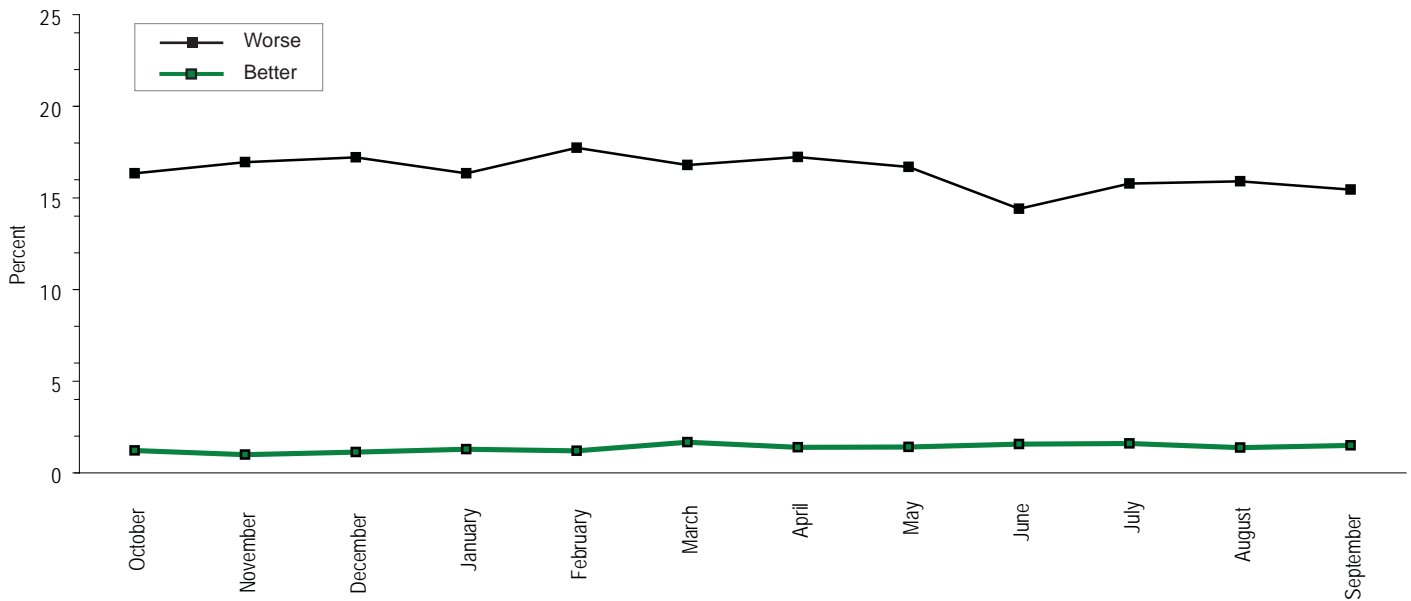


Figure 5. Percent of deployers with mental or behavioral health referrals, by Service and component, by timing of health assessment, U.S. Armed Forces, October 2007-September 2008

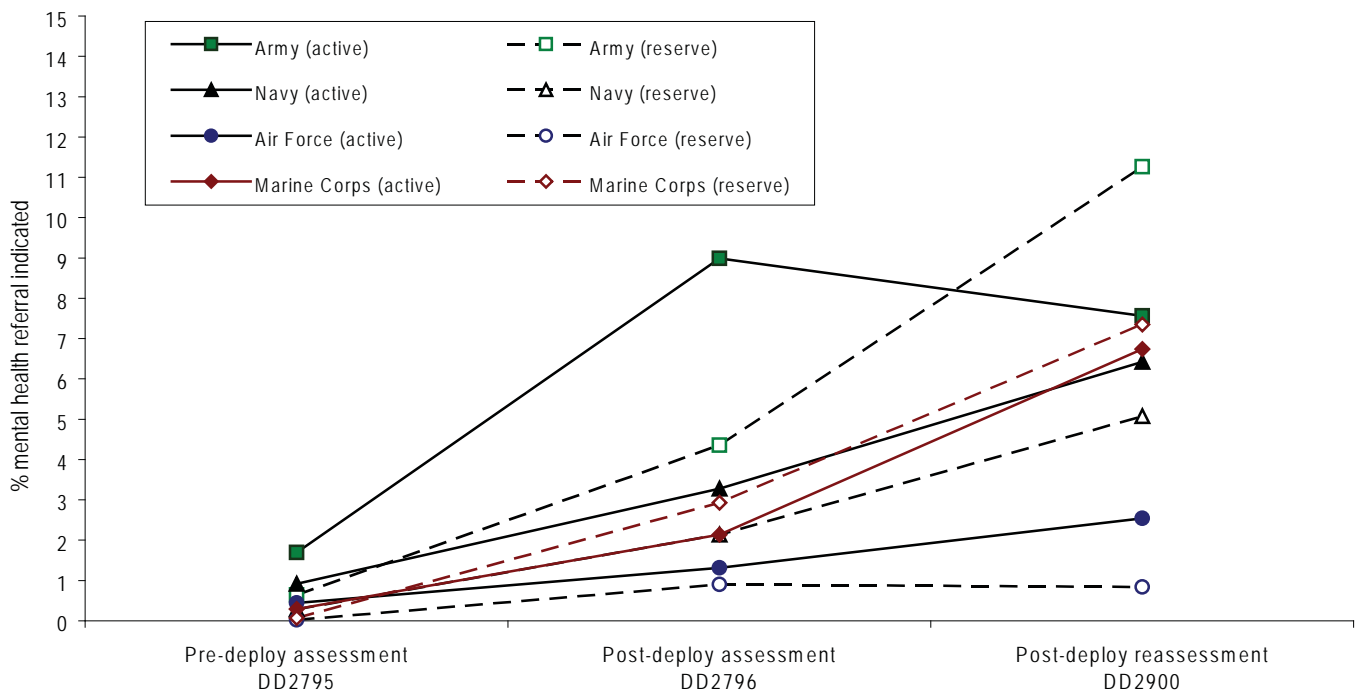


Table 2. Percentage of service members who endorsed selected questions/received referrals on health assessment forms, U.S. Armed Forces, October 2007-September 2008

	Army		Navy		Air Force		Marine Corps		All service members	
	Pre-deploy DD2795	Post-deploy/Reassessment DD2900	Pre-deploy DD2795	Post-deploy/Reassessment DD2900	Pre-deploy DD2795	Post-deploy/Reassessment DD2900	Pre-deploy DD2795	Post-deploy/Reassessment DD2900	Pre-deploy DD2795	Post-deploy/Reassessment DD2900
Active component	n=134,919	n=124,776	n=94,595	n=8,285	n=58,589	n=51,268	n=30,930	n=27,307	n=40,743	n=240,481
	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	4.2	9.0	17.2	6.9	0.5	2.8	1.9	3.3	10.3	2.8
Health concerns, not wound or injury	12.1	28.7	37.4	20.8	2.9	10.7	3.8	7.8	27.8	8.3
Health worse now than before deployed	na	16.3	29.1	14.5	na	4.8	na	4.9	20.3	0.0
Exposure concerns	na	22.1	25.0	16.2	na	8.4	na	6.7	22.0	0.0
PTSD symptoms (2 or more)	na	15.3	18.8	9.3	na	2.9	na	3.4	11.6	0.0
Depression symptoms (any)	na	22.6	37.7	27.5	na	5.3	na	9.9	34.0	0.0
Referral indicated by provider (any)	6.4	33.4	24.7	21.7	1.6	11.7	5.6	12.8	28.8	5.1
Mental health referral indicated*	1.7	9.0	7.6	6.4	0.4	1.3	2.5	2.1	6.7	1.2
Medical visit following referral†	98.6	99.0	97.4	92.7	78.2	95.0	72.9	74.2	72.9	91.2
	%	%	%	%	%	%	%	%	%	%
Reserve component	n=67,781	n=50,870	n=75,284	n=4,724	n=15,113	n=14,152	n=2,731	n=3,137	n=3,155	n=89,461
	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	2.3	10.0	19.5	9.6	0.3	3.2	1.3	5.3	10.4	1.9
Health concerns, not wound or injury	13.3	39.1	54.2	34.8	1.4	16.2	3.9	23.8	40.0	10.6
Health worse now than before deployed	na	21.8	38.0	23.5	na	6.9	na	6.7	25.6	0.0
Exposure concerns	na	28.2	37.7	29.0	na	12.0	na	15.5	30.6	0.0
PTSD symptoms (2 or more)	na	12.1	24.8	12.8	na	1.8	na	3.1	16.6	0.0
Depression symptoms (any)	na	21.0	40.1	26.9	na	4.3	na	10.6	30.9	0.0
Referral indicated by provider (any)	5.4	28.3	34.5	18.7	0.8	13.1	6.1	28.0	29.2	4.6
Mental health referral indicated*	0.6	4.4	11.3	5.1	0.0	0.9	0.8	2.9	7.4	0.5
Medical visit following referral†	95.3	97.2	32.5	32.2	51.4	61.4	31.0	61.9	28.0	92.5
	%	%	%	%	%	%	%	%	%	%

*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, October 2007-September 2008

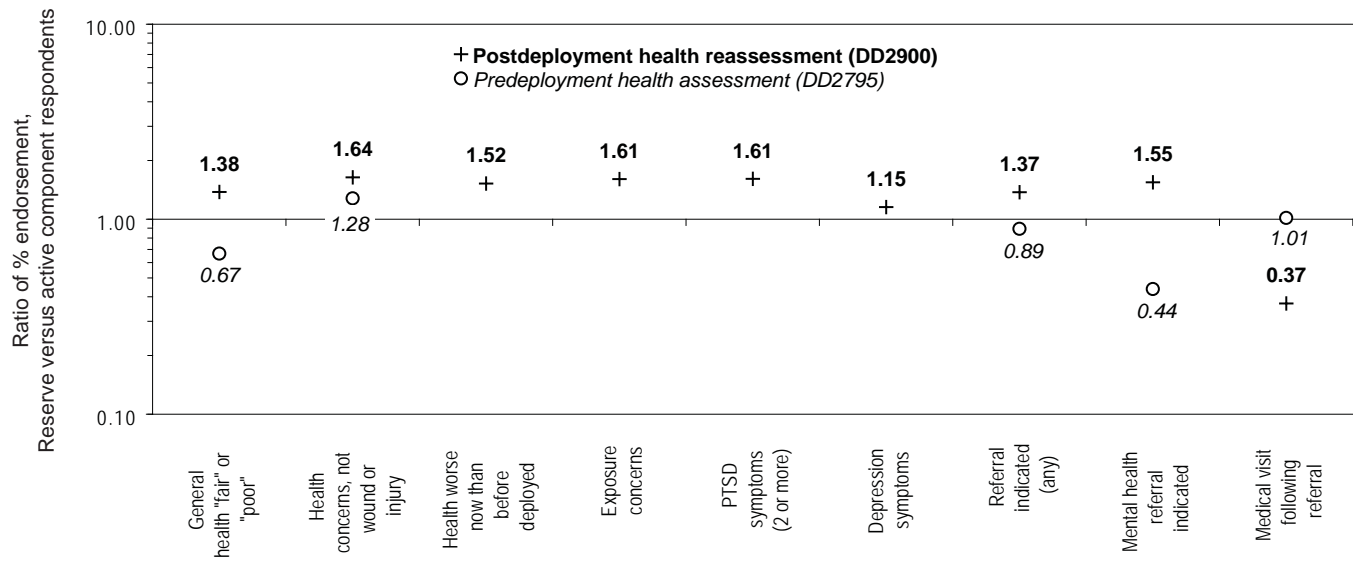
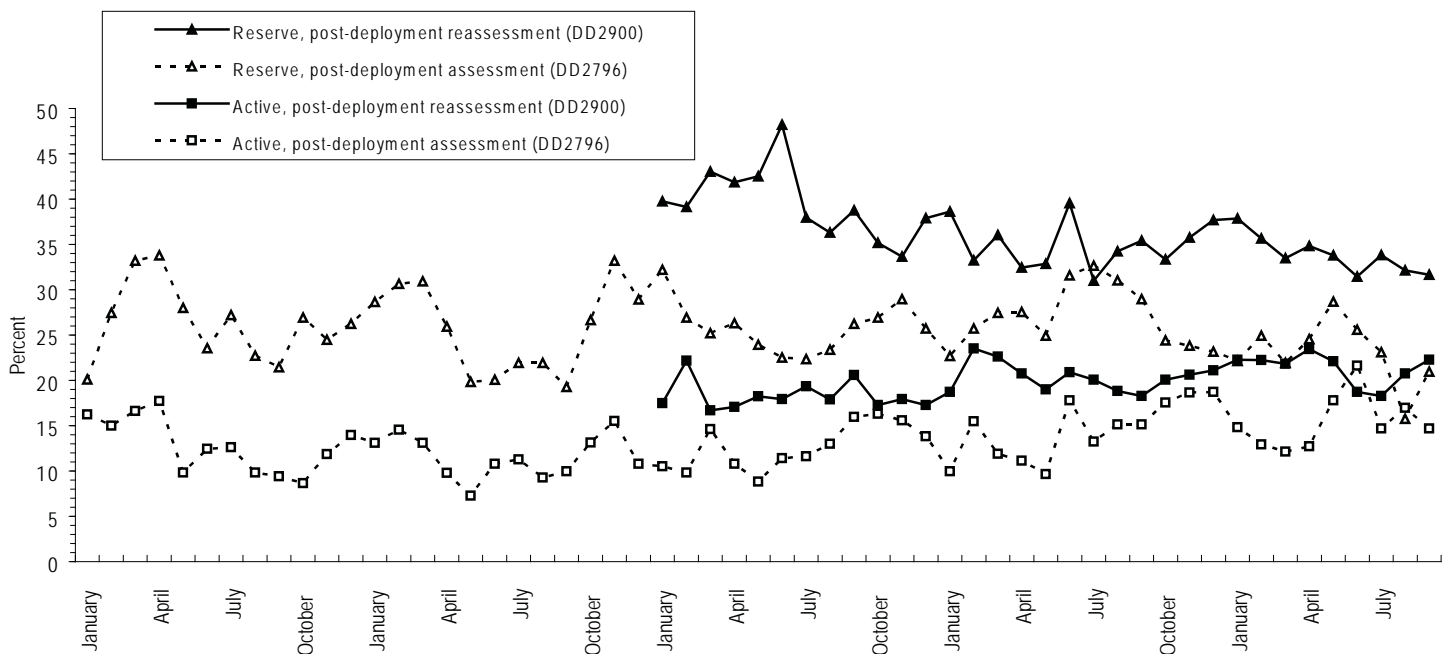


Figure 7. Proportion of service members who endorse exposure concerns on post-deployment health assessments, U.S. Armed Forces, January 2004-September 2008



Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers* for calendar years through 30 September 2007 and 30 September 2008



Army

Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
NORTH ATLANTIC																
Washington, DC area	226	269	.	2	3	4	6	1	1	1	.	.	6	2	1	6
Aberdeen, MD	19	76	.	.	1	.	.	.	.	.	.	.	.	.	.	.
FT Belvoir, VA	197	210	8	7	2	.	5	12	3	3	.	.	.	.	1	.
FT Bragg, NC	1,006	1,243	2	.	.	.	18	14	2	.	.	.	.	.	.	.
FT Drum, NY	185	217	.	.	.	.	.	.	.	.	.	.	2	.	.	.
FT Eustis, VA	156	480	.	1	.	.	.	1	.	.	.	.	.	.	.	1
FT Knox, KY	208	465	2	2	.	.	2	1	1	.	.	.	2	.	.	.
FT Lee, VA	287	259	.	.	1	.	1	.	1	.	.	.	2	4	1	1
FT Meade, MD	66	213	.	.	.	1	1	.	.	1	.	.	.	.	.	.
West Point, NY	31	85	.	.	.	.	.	.	.	.	.	.	3	1	.	.
GREAT PLAINS																
FT Sam Houston, TX	442	612	.	.	1	1	4	8	.	12	.	.	4	.	6	.
FT Bliss, TX	132	425	.	.	.	.	.	11	.	.	.	.	.	.	.	.
FT Carson, CO	520	659	3	3	3	4	1	3	.	.	.	.	1	.	.	.
FT Hood, TX	1,682	1,795	10	6	3	3	9	30	9	5	.	.	.	.	1	2
FT Huachuca, AZ	87	81	1	.	.	.	6	1	.	2	.	.	.	1	.	.
FT Leavenworth, KS	45	40	1	.	.	.	.	.	2	.	.	.	.	.	.	.
FT Leonard Wood, MO	310	410	.	2	1	2	1	1	1	1	.	.	.	1	11	1
FT Polk, LA	191	149	.	1	3	.	5	.	.	1	.	.	.	.	1	1
FT Riley, KS	285	440	2	3	.	1	5	2	.	.	.	.	2	2	2	.
FT Sill, OK	150	177	.	.	.	.	2	.	.	.	.	.	.	.	1	.
SOUTHEAST																
FT Gordon, GA	555	716	.	1	.	.	5	13	.	14	.	.	1	1	.	2
FT Benning, GA	324	328	1	2	1	1	3	5	1	1	.	.	1	.	1	.
FT Campbell, KY	587	256	1	1	.	.	.	.	2	2	.	.	.	.	.	.
FT Jackson, SC	265	274	.	.	.	.	.	.	.	.	.	.	1	1	.	.
FT Rucker, AL	74	68	.	1	.	2	1	4	13	.	.	.	1	.	.	.
FT Stewart, GA	832	688	2	3	.	1	19	22	9	1	.	.	2	7	2	.
WESTERN																
FT Lewis, WA	598	952	3	9	4	.	1	3	1	2	.	.	.	.	1	.
FT Irwin, CA	77	67	1	.	.	.	2	3	1	1	.	.	.	.	.	.
FT Wainwright, AK	181	298	.	4	.	.	1	1	.	.	.	.	.	.	.	.
OTHER LOCATIONS																
Hawaii	585	713	22	32	2	3	12	14	.	3	.	.	1	4	.	.
Germany	662	988	6	9	1	2	7	20	8	5	.	.	.	5	1	2
Korea	497	614	.	.	.	.	.	1	.	.	.	.	.	.	2	1
Other	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Total	11,462	14,267	65	89	26	25	117	171	55	55	0	0	26	30	32	17

*Events reported by October 7, 2007 and 2008

†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 30 September 2007 and 30 September 2008



Army

Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis [‡]		Urethritis [§]		Cold		Heat	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
NORTH ATLANTIC																
Washington, DC area	11	16	4	1	126	111	19	23	5	6	.	.	.	.	.	15
Aberdeen, MD	.	3	.	.	10	11	3	3	.	.	.	.	.	.	.	.
FT Belvoir, VA	1	.	1	.	139	122	20	10	2	.	.	.	.	.	.	.
FT Bragg, NC	1	1	4	9	675	798	116	168	2	1	59	60	1	.	122	100
FT Drum, NY	2	3	2	.	124	159	24	14	.	.	.	.	.	.	.	.
FT Eustis, VA	1	.	.	.	127	160	8	26	.	4	.	.	.	.	10	1
FT Knox, KY	1	2	1	.	165	163	25	37	.	2	.	.	.	.	2	2
FT Lee, VA	3	2	.	1	221	171	28	62	2	2	.	.	1	.	12	5
FT Meade, MD	1	1	.	.	53	46	8	4	1	.	1	.	1	.	.	.
West Point, NY	14	31	.	.	11	25	.	.	.	.	.	.	.	.	.	.
GREAT PLAINS																
FT Sam Houston, TX	1	.	.	2	233	276	48	66	3	18	.	.	.	1	4	5
FT Bliss, TX	.	.	.	.	101	296	23	58	1	6	.	.	.	.	.	.
FT Carson, CO	.	.	1	.	363	475	51	47	1	.	10	13	1	.	.	.
FT Hood, TX	2	1	5	1	1,235	1,277	224	282	2	1	75	64	.	.	27	.
FT Huachuca, AZ	.	1	.	.	63	61	16	10	1	.	.	.	.	1	.	3
FT Leavenworth, KS	1	1	.	.	36	35	5	4	.	.	.	.	.	.	.	.
FT Leonard Wood, MO	.	.	.	.	208	150	31	17	1	.	.	.	2	3	20	7
FT Polk, LA	.	.	15	.	92	93	29	30	1	2	.	.	.	.	43	20
FT Riley, KS	.	4	.	1	204	267	19	30	.	1	.	1	.	1	19	8
FT Sill, OK	.	.	1	.	78	62	19	12	2	.	.	.	1	.	34	9
SOUTHEAST																
FT Gordon, GA	1	.	.	.	401	388	75	87	4	.	.	.	.	.	6	1
FT Benning, GA	.	.	2	.	199	203	56	68	.	1	.	.	1	.	42	20
FT Campbell, KY	.	1	.	.	440	141	66	11	.	1	.	.	.	.	15	6
FT Jackson, SC	.	.	.	.	136	216	37	34	2	1	.	1	.	.	87	20
FT Rucker, AL	.	2	.	.	48	44	2	9	1	2	.	.	.	.	5	2
FT Stewart, GA	.	2	.	2	579	493	106	94	3	2	1	.	.	.	63	39
WESTERN																
FT Lewis, WA	.	.	3	5	512	769	60	80	.	1	8	14	.	.	.	.
FT Irwin, CA	1	.	1	.	45	43	5	9	.	.	.	.	.	.	18	11
FT Wainwright, AK	.	1	.	.	146	210	9	27	.	1	.	.	10	12	.	1
OTHER LOCATIONS																
Hawaii	1	.	.	1	443	531	44	59	.	.	.	1	.	.	3	2
Germany	19	30	7	14	398	571	128	119	2	7	3	.	.	8	34	18
Korea	.	.	11	.	407	529	47	65	1	4	1	.	20	.	8	4
Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Total	61	102	58	37	8,018	8,896	1,351	1,565	37	63	158	154	38	26	574	299

‡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 30 September 2007 and 30 September 2008



Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
NATIONAL CAPITOL AREA																
Annapolis, MD	0	31	.	1	.	.	.	1	.	.	.	.	.	.	.	.
Bethesda, MD	36	91	1	2	.	1	2	8	.	.	.	.	1	1	.	.
Patuxent River, MD	14	19	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE EAST																
Albany, GA	0	3	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Atlanta, GA	3	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Beaufort, SC	262	81	.	.	.	.	.	1	1	.	.	.	.	.	.	.
Camp Lejeune, NC	293	329	.	.	.	.	5	11	.	.	.	.	.	.	.	.
Cherry Point, NC	135	145	.	.	.	.	2	4	.	.	.	.	.	.	3	.
Great Lakes, IL	170	476	.	.	1	.	3	.	.	.	.	.	7	.	1	.
Jacksonville, FL	201	116	1	.	.	.	13	20	5	1	.	.	.	1	.	2
Mayport, FL	24	66	1	.	.	.	4	12	.	2	.	.	.	.	.	.
NABLC Norfolk, VA	64	111	.	.	.	.	.	.	.	2	.	.	.	.	.	.
NBMC Norfolk, VA	346	275	.	.	.	.	.	.	.	.	.	.	.	1	.	.
NEHC Norfolk, VA	4	0	.	.	.	.	.	.	.	.	.	.	.	.	2	.
North Charleston, SC	3	36	.	.	.	.	.	1	.	1	.	.	.	.	.	.
Pensacola, FL	84	90	.	1	3	.	5	4	3	1	.	.	.	.	5	.
Portsmouth, VA	0	43	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Washington, DC	6	9	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Guantanamo Bay, Cuba	4	8	.	.	.	1	1	.	.	.	.	.	.	.	.	.
Europe	22	69	.	5	.	.	.	3	.	.	.	.	.	1	.	.
NAVY MEDICINE WEST																
Camp Pendleton, CA	13	167	.	2	.	1	1	3	.	1	.	.	.	.	.	.
Corpus Christi, TX	4	3	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Fallon, NV	0	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ingleside, TX	4	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lemoore, CA	1	27	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pearl Harbor, HI	0	88	.	.	.	.	.	.	.	.	.	.	.	.	.	.
San Diego, CA	335	340	3	.	2	.	3	2	2	1	.	.	28	14	.	1
Guam	31	61	.	.	.	.	1	.	.	.	.	.	.	.	.	2
Japan	72	116	.	.	.	1	.	.	.	.	.	.	.	2	1	.
NAVAL SHIPS																
COMNAVAIRLANT/CINCLANTFLEET	10	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	29	45	.	.	.	.	.	2	.	.	.	.	.	.	1	.
OTHER LOCATIONS																
Other	29	462	.	1	.	.	4	6	.	.	.	.	.	1	.	2
Total	2,199	3,324	6	12	6	5	44	78	11	10	0	0	29	32	12	8

*Events reported by October 7, 2008

†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 30 September 2007 and 30 September 2008



Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
NATIONAL CAPITOL AREA																
Annapolis, MD	.	6	.	.	.	16	.	1	1
Bethesda, MD	4	8	.	2	21	49	2	6	1	1	.	.	.	.	.
Patuxent River, MD	.	3	.	.	13	13	.	1	.	.	.	.	.	.	.
NAVY MEDICINE EAST																
Albany, GA	1
Atlanta, GA	1	4	1	1	1	.	.	.	.	.	.
Beaufort, SC	.	1	.	.	177	10	18	.	2	.	.	.	.	57	67
Camp Lejeune, NC	12	.	1	.	226	167	30	47	.	.	38	.	.	17	63	
Cherry Point, NC	.	1	.	.	112	98	7	19	1	.	.	.	.	3	4
Great Lakes, IL	143	425	16	38	.	2	.	.	.	.	.
Jacksonville, FL	135	62	22	4	2	2	.	.	.	8	.	
Mayport, FL	16	39	.	5	1	.	.	.	.	.	.
NABLC Norfolk, VA	.	.	.	1	56	87	8	21	.	.	.	.	.	.	.
NBMC Norfolk, VA	.	1	.	.	285	223	59	43	.	1	.	.	.	.	.
NEHC Norfolk, VA	2	.	.	.	.	.	.	.	.	.	.
North Charleston, SC	.	1	.	.	3	25	.	3	.	1	.	.	.	.	1
Pensacola, FL	47	60	5	6	.	.	.	.	.	12	10	
Portsmouth, VA	26	.	11	.	1	.	.	.	.	.
Washington, DC	.	1	.	.	5	7	.	.	1	.	.	.	.	.	.
Guantanamo Bay, Cuba	3	7	.	.	.	.	.	.	.	.	.
Europe	.	.	.	1	21	56	1	3	.	.	.	.	.	.	.
NAVY MEDICINE WEST																
Camp Pendleton, CA	10	136	1	18	1	.	.	.	.	.	.
Corpus Christi, TX	3	.	1	2	.	.	.	.	.	.	.
Fallon, NV	8	.	.	.	.	.	.	.	.	.
Ingleside, TX	4	2	.	.	.	.	.	.	.	.	.
Lemoore, CA	.	2	.	.	.	16	.	.	.	.	.	.	.	.	.
Pearl Harbor, HI	81	.	3	.	1	.	.	.	.	.
San Diego, CA	1	3	.	1	217	259	36	28	5	3	.	.	.	.	1
Guam	.	.	.	3	25	41	4	13	.	.	.	.	.	.	.
Japan	.	.	.	1	52	87	10	15	.	.	.	.	.	6	5
NAVAL SHIPS																
COMNAVAIRLANT/CINCLANTFLEET	8	2	2	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	18	27	9	9	.	.	7	.	.	1	.	
OTHER LOCATIONS																
Other	1	26	1	3	17	306	5	33	1	4	.	.	.	1	53	
Total	18	53	2	12	1,620	2,340	237	330	16	16	0	45	0	1	104	205

‡Primary and secondary.

§Urethritis, non-gonococcal (NGU).

Sentinel reportable events for service members and beneficiaries at U.S. Air Force medical facilities, cumulative numbers* for calendar years through 30 September 2007 and 30 September 2008



Air Force

Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Air Combat Cmd	1,234	1,297	2	2	2	3	7	13	.	4	.	.	9	28	6	3
Air Education & Training Cmd	585	737	1	1	1	5	14	9	5	1	.	.	4	1	9	7
Lackland, TX	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USAF Academy, CO	42	31	.	1	.	.	2	.	.	.	.	.	.	.	.	.
Air Force Dist. of Washington	26	23	.	.	.	.	.	.	1	.	.	.	1	.	.	.
Air Force Materiel Cmd	447	571	.	2	2	1	17	7	2	8	.	.	.	.	2	.
Air Force Special Ops Cmd	138	211	.	.	.	.	.	3	1	.	.	.	.	3	.	.
Air Force Space Cmd	295	362	2	1	2	2	7	6	1	1	.	.	2	2	1	1
Air Mobility Cmd	570	828	1	1	1	2	10	7	2	2	.	.	4	7	2	8
Pacific Air Forces	433	457	1	7	2	4	4	4	1	.	.	.	5	8	10	3
PACAF Korea	116	161	.	.	.	.	.	.	.	.	.	.	6	1	1	.
U.S. Air Forces in Europe	215	341	3	1	.	.	.	7	1	.	.	.	1	3	.	1
Other	633	731	4	4	2	5	9	14	.	8	.	.	2	1	1	1
Total	4,734	5,750	14	20	12	22	70	70	14	24	0	0	34	54	32	24

*Events reported by October 7, 2008

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

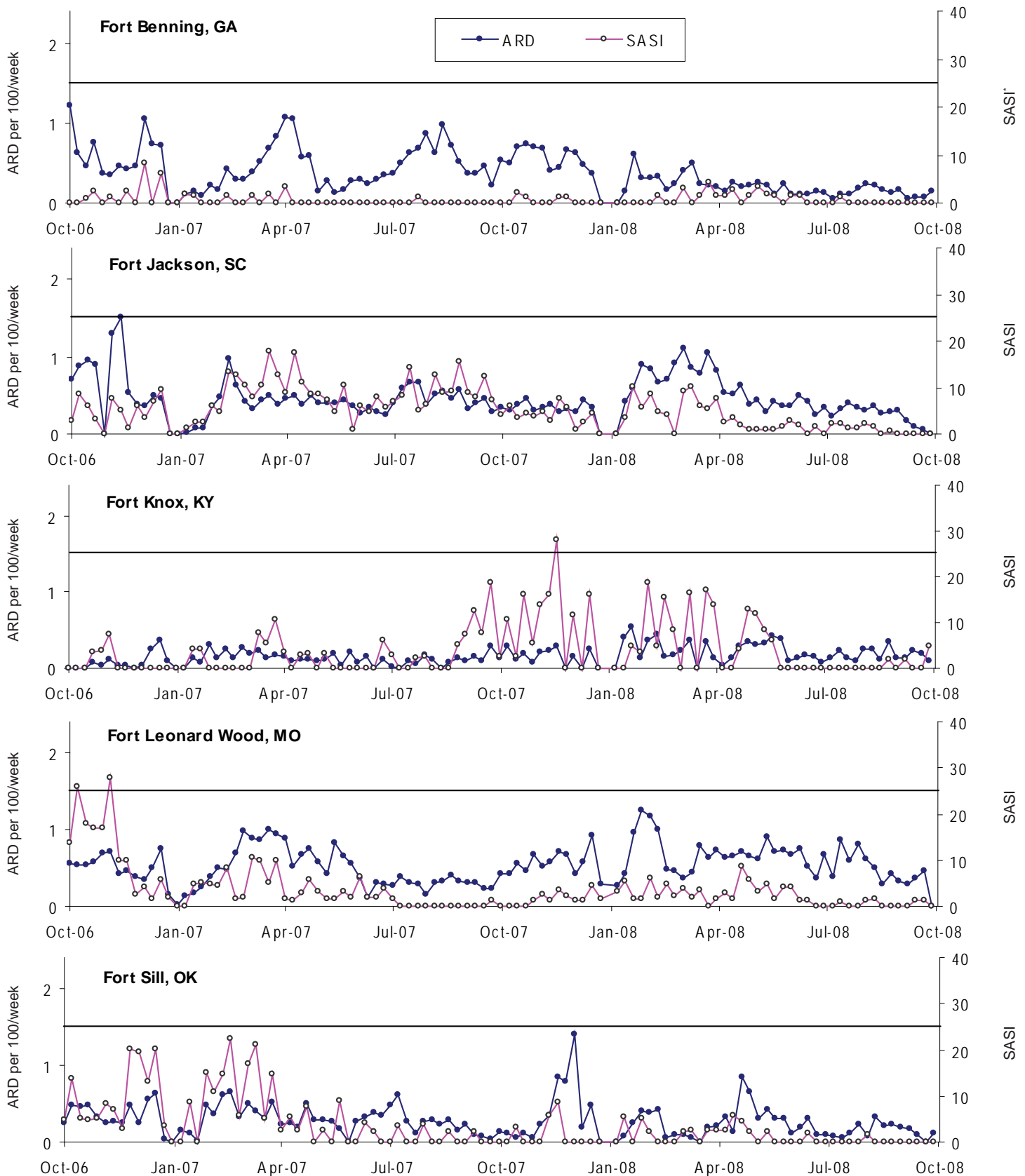
Note: Completeness and timeliness of reporting vary by facility

Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Air Combat Cmd	10	3	.	.	813	788	66	65	2	2	3	3	.	4	6	.
Air Education & Training Cmd	2	4	.	.	451	454	59	41	.	5	.	.	1	1	1	3
Lackland, TX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USAF Academy, CO	.	.	.	.	35	28	3	.	.	.	.	.	.	1	.	.
Air Force Dist. of Washington	.	1	.	.	23	15	1	1	.	.	.	.	.	.	.	.
Air Force Materiel Cmd	7	9	1	1	352	358	46	51	1	3	.	.	.	.	.	.
Air Force Special Ops Cmd	.	1	.	1	109	165	16	27	.	1	.	.	.	.	12	.
Air Force Space Cmd	1	5	.	.	251	256	20	14	1	.	.	.	.	.	.	.
Air Mobility Cmd	6	7	.	.	477	570	34	64	3	4	.	.	.	4	3	7
Pacific Air Forces	2	.	1	.	358	369	24	23	.	1	.	.	1	1	.	.
PACAF Korea	.	.	.	.	84	132	5	4	4	.	.	.	2	.	1	.
U.S. Air Forces in Europe	3	10	.	2	165	256	13	28	.	.	.	.	.	.	.	.
Other	2	6	.	.	554	587	35	39	2	1	.	.	.	.	.	8
Total	33	46	2	4	3,672	3,978	322	357	13	17	3	3	4	11	23	18

‡Primary and secondary.

§Urethritis, non-gonococcal (NGU).

Acute respiratory disease (ARD) and streptococcal pharyngitis rates (SASI*), basic combat training centers, U.S. Army, by week, October 2006-October 2008



* 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

NOTICE TO READERS

New Surveillance Case Definitions for Traumatic Brain Injury (TBI)

In each issue of the *MSMR*, numbers of cases of selected deployment-related conditions of special surveillance interest are summarized, by month and Service, in a series of histograms. Since August 2007, traumatic brain injury (TBI) has been included as a condition of special interest for the *MSMR*.

In recent months, there has been increasing interest and concern — including in the Departments of Defense, Veterans Affairs, and Health and Human Services — regarding “traumatic brain injury” among U.S. service members who have served in Afghanistan and Iraq.¹ Collaborations among policy makers and medical experts from all Services and various agencies — most notably, the Defense and Veterans Brain Injury Center Working Group, the Traumatic Brain Injury Task Force, and the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury — have resulted in a standardized case definition for surveillance of TBI. The “new” surveillance case definition differs from the definition that has been used for tracking TBI in the *MSMR*. The differences in case defining diagnosis (ICD-9-CM) codes between the “new” and “old” definitions are shown in the table below.

ICD-9-CM code	Description	Old definition	New definition
310.2	Postconcussion syndrome		X
800-801	Fracture, vault or base of skull	X	X
802	Fracture of face bones	X	
803-804	Other/multiple fractures of skull	X	X
850-854	Intracranial injury w/o with skull fracture	X	X
950.1-950.3	Injury to optic chiasm, optic pathways, visual cortex		X
959.01	Head injury, unspecified	X	X
V15.5_1-9, V15.5_A-F	Personal history of TBI		X

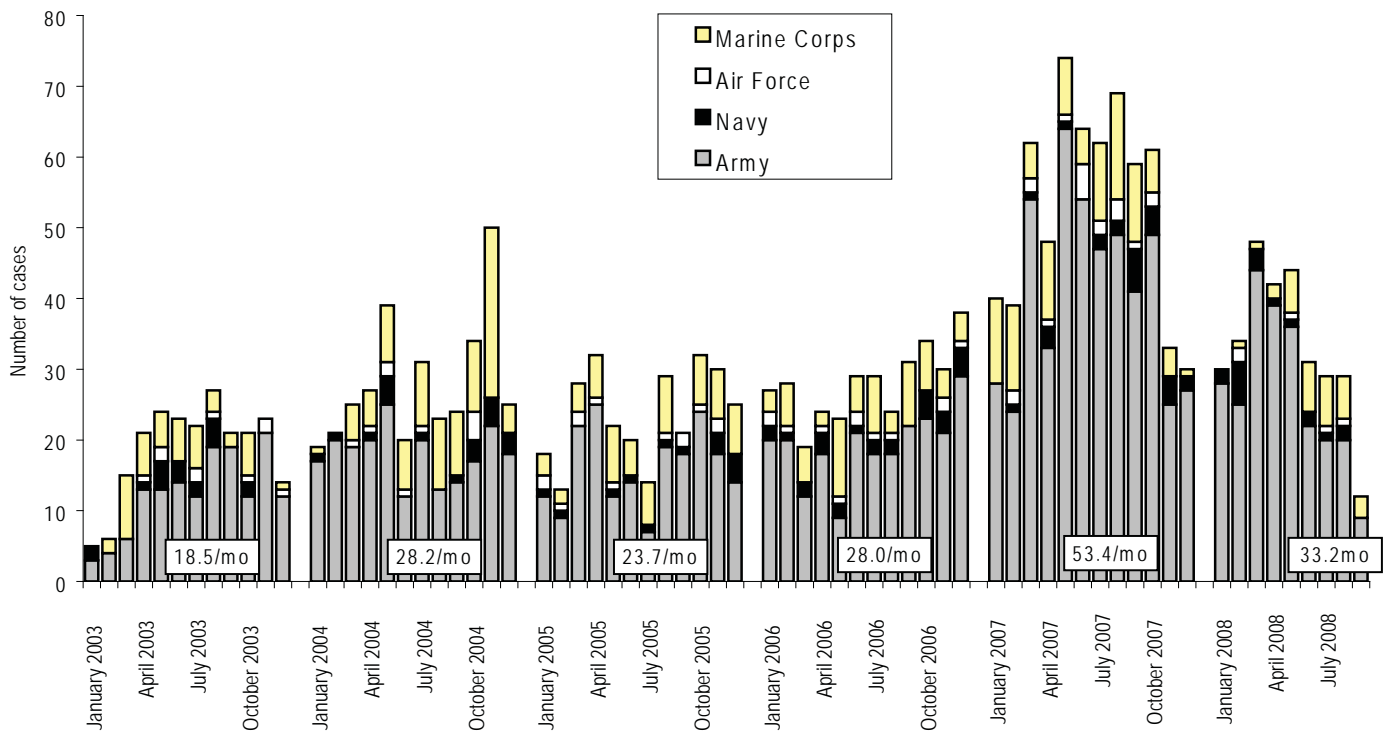
The most significant differences between the “old” and “new” surveillance case definitions are a) the new definition does not include ICD-9-CM: 802 “fracture of face bones”; and b) the old definition did not include ICD-9-CM: V15.5 “history of injury.” Compared to the “old” definition, the “new” surveillance case definition significantly increases the numbers of TBI cases ascertained for routine surveillance. The figures in the following section are based on the “new” surveillance case definition of TBI.

References:

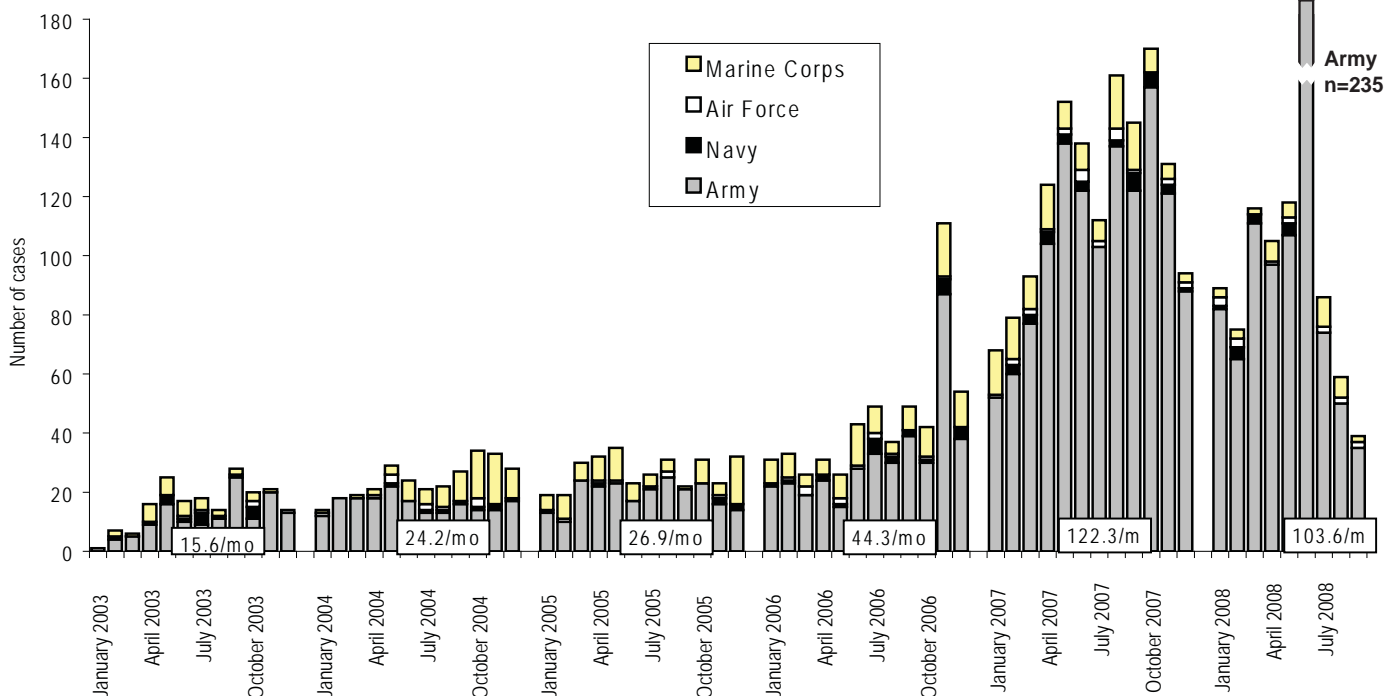
1. Bradshaw D, et al. Report to the Surgeon General: Traumatic Brain Injury Task Force, dated 15 May 2007. The Surgeon General, Department of the Army. Washington, Dc. Accessed on-line on 28 October 2008 at: <http://www.armymedicine.army.mil/reports/tbi/TBITaskForceReportJanuary2008.pdf>

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - September 2008

Traumatic brain injury, hospitalizations (ICD-9: 310.2, 800-801, 803-804, 850-854, 950.1-950.3, 959.01, V15.5_1-9, V15.5_A-F)*



Traumatic brain injury, multiple ambulatory visits (without hospitalization), (ICD-9: 310.2, 800-801, 803-804, 850-854, 950.1-950.3, 959.01, V15.5_1-9, V15.5_A-F)†



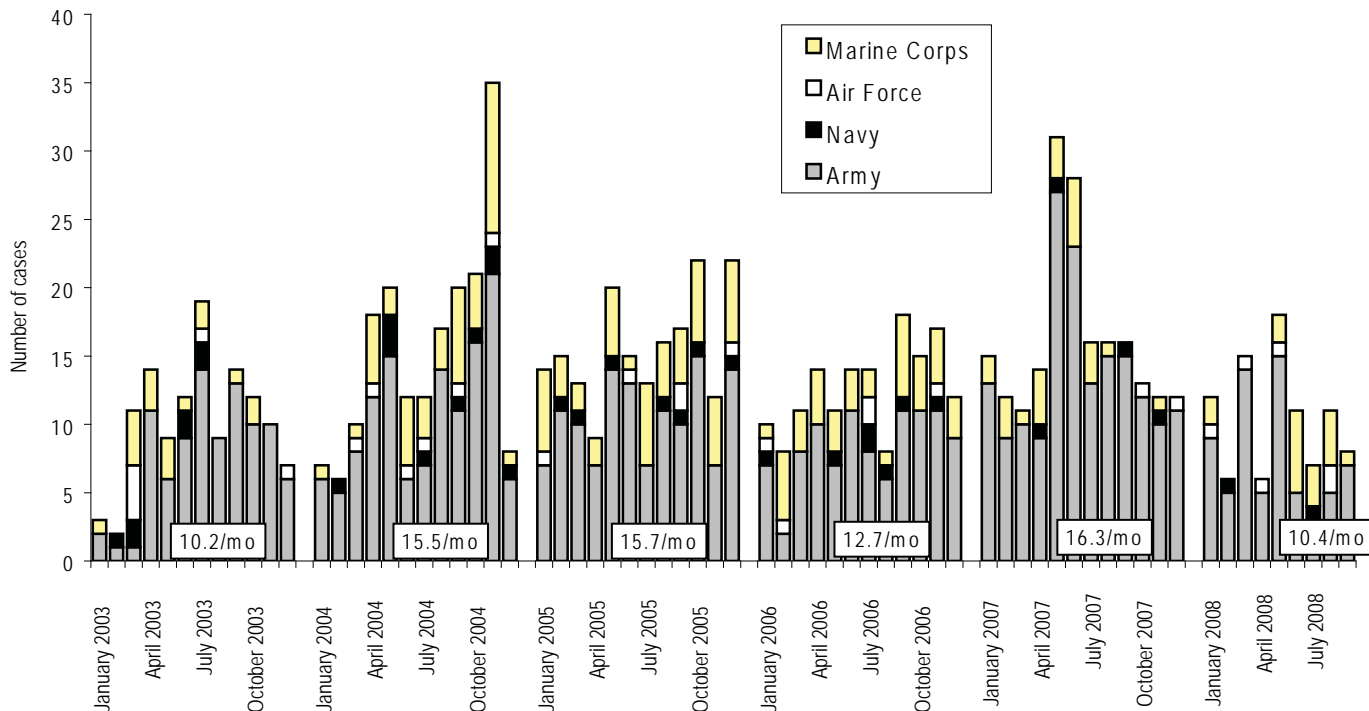
Reference: Army Medical Surveillance Activity. Traumatic brain injury among members of active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):2-6.

*Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 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 - September 2008

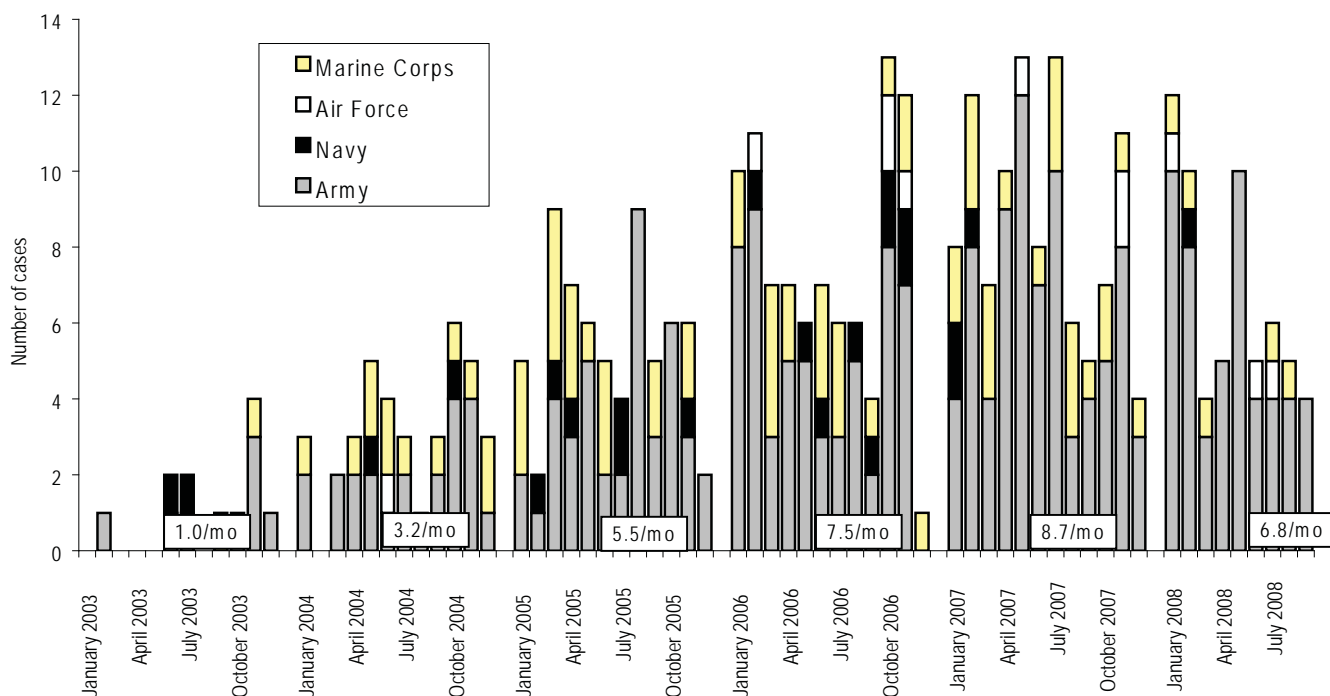
Amputations (ICD-9: 887, 896, 897, V49.6 to V49.7, PR 84.0 to PR 84.1)*



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.

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

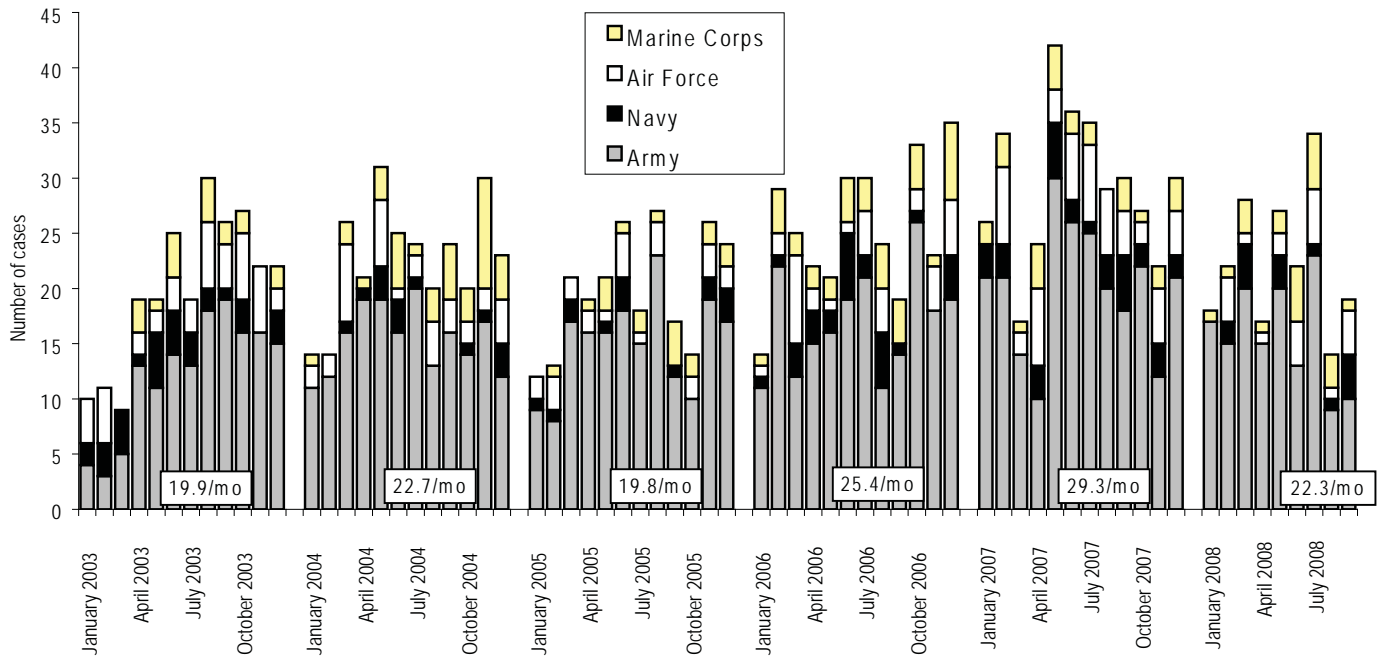


Reference: Army Medical Surveillance Activity. Heterotopic ossification, active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):7-9.

†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 - September 2008

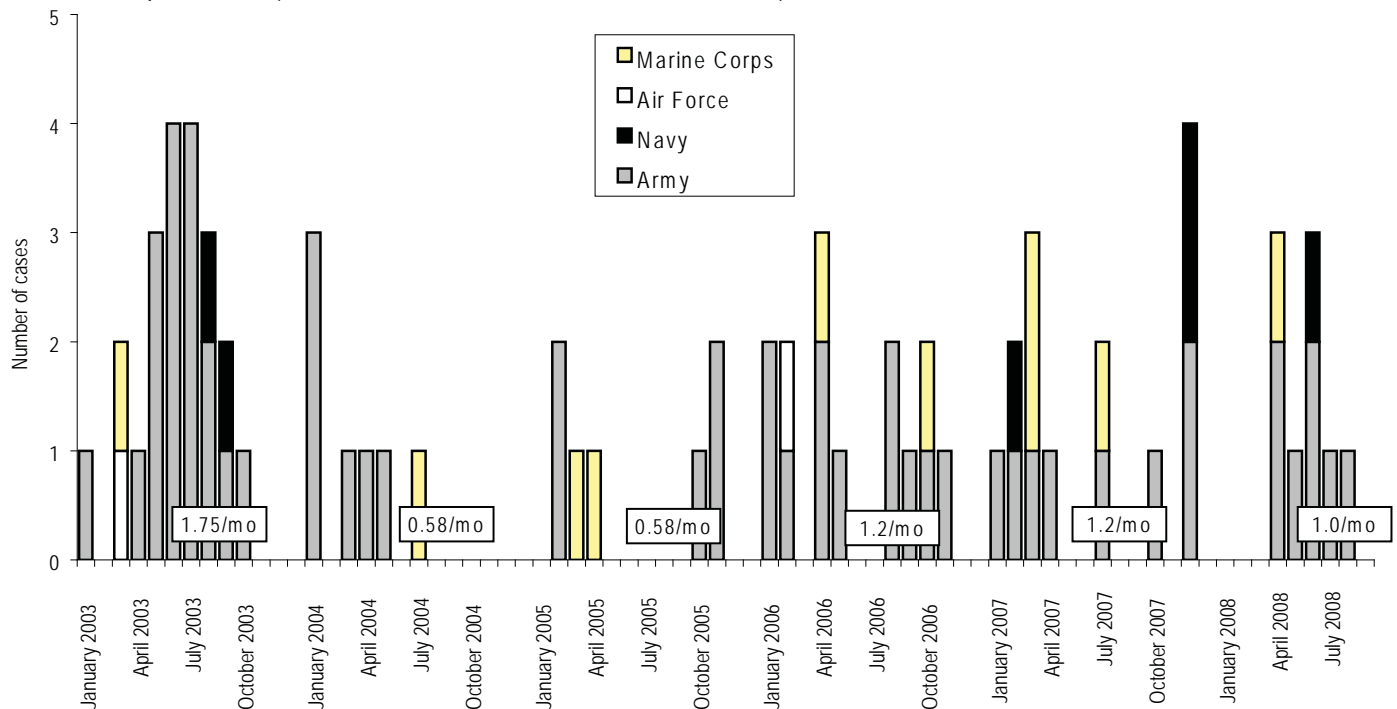
Deep vein thrombophlebitis/pulmonary embolus (ICD-9: 415.1, 451.1, 451.81, 451.83, 451.89, 453.2, 453.40 to 453.42 and 453.8)*



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.

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