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Pneumonia and Influenza Among Active Component Members, US Armed Forces, January 2001-October 2005

The influenza pandemic of 1918-1919 accounted for an estimated 40 to 100 million deaths worldwide.[1] The concentration of deaths among previously healthy young adults in both military and general populations was an unusual and concerning characteristic of the pandemic.[2,3]

In September-October 1918, every major military installation in the United States was attacked by influenza.[4] The epidemics that affected the widely dispersed camps were remarkably similar. In general, they had sudden onsets, sharp increases in case rates, nearly as rapid declines, and overall durations of 3 to 6 weeks.[4] Secondary bacterial infections were common and had unusually fulminant clinical expressions.[5] Epidemic curves of secondary pneumonias and deaths lagged those of influenza by 5-10 days. Overall attack rates of clinically significant influenza among soldiers was approximately 23%—of these, approximately one-sixth developed pneumonias of which approximately one-third were fatal.[4]

The recent emergence and international spread of coronavirus-associated SARS, of H5N1 influenza among domestic and migratory avian species, and of highly virulent avian influenza among humans have heightened awareness of the potential effects of and stimulated plans to counter the next influenza pandemic.[2,3] The timely detection and characterization of initial ("herald") attacks of the next influenza pandemic is an important part of pandemic influenza preparedness.

To detect significant perturbations from baseline rates and/or clinical severities of "pneumonia and influenza" in military populations, it is essential to know relevant background experiences. In this report, we summarize recent experiences of U.S. servicemembers in relation to "pneumonia and influenza."

Methods: The surveillance period was defined as 1 January 2001 through 31 October 2005. The surveillance population included all individuals who served in an active component of the U.S. Armed Forces any time during the surveillance period.

Incident cases were ascertained from records in the Defense Medical Surveillance System. An incident case of "pneumonia and influenza" was defined as a medical encounter with a diagnosis (in any position) of "pneumonia and influenza" (ICD-9-CM codes: 480-487). Incident cases were enumerated separately for hospitalized (all episodes) and ambulatory (only one episode per individual per 30 day period) cases.

An incident case of "severe pneumonia and influenza" was defined as a hospitalization with a discharge diagnosis (in any position) of "pneumonia and influenza" (ICD-9-CM codes: 480-487) *plus* one or more of the following diagnosis/procedure codes: "acute respiratory failure" (ICD-9-CM: 518.81), "other disease of the respiratory system" (includes ARDS): (ICD-9-CM: 518.82), "empyema" (ICD-9-CM: 510), "abscess of lung" (ICD-9-CM: 513.0), "other continuous mechanical ventilation" (ICD-9-CM: 96.7). For incidence rate calculations, denominators were the total days of active service of active component members during the surveillance period.

Results:

Ambulatory cases: During the surveillance period, there were 107,295 cases of "pneumonia and influenza" among active component members documented in ambulatory records (Table 1). The mean number of cases per month was 1,850. During the 58 months of the surveillance period, there was nearly a 5-fold difference between the fewest cases and lowest rate in a month (June 2002: n=1,099; rate: 9.61 per 1,000 per-years [p-yrs]) and the most cases and highest rate (December 2003: n=5,233; rate: 43.59 per 1,000 p-yrs) (Figure 1). From year to year, the fewest cases and lowest rates were consistently in June, but the most cases and highest rates varied among December, January, and February (Figure 1).

In every month of the period, rates were highest by far in the youngest age group (<20 years old), intermediate in the 20-24 year old age group, and lowest in older age groups. Of note, the proportion of all cases in the youngest age group was

consistently lowest during winter season spikes and highest during transition periods in late summer-early fall—just after mid-summer troughs and prior to late fall increases (data not shown).

In general, rates were higher among service members who were White non-Hispanic compared to other race/ethnicities and among females compared to males, especially during winter season spikes.

Over the entire period, the nine installations that support recruit training accounted for approximately one-third (n=36,445) of all cases. Among all military installations, those with the most cases were Naval Training Center, Great Lakes, IL (n=7,614); Marine Corps Recruit Depot, San Diego, CA (n=7,065); Marine Corps Recruit Depot, Parris Island, SC (n=5,728); Lackland AFB, San Antonio, TX (n=3,353); Fort Jackson, SC (n= 3,376); and Fort Leonard Wood, MO (n=3,026)—of note, all are recruit training installations (data not shown).

Hospitalized cases: During the surveillance period, there were 7,398 hospitalizations of active component members for "pneumonia and influenza" (Table 1). The mean number of hospitalizations per month was 128. During the 58 months of the period, there was nearly a 5-fold difference between the fewest hospitalizations and lowest rate in a month (August 2004: n=58; rate: 0.48 per 1,000 p-yrs) and the most hospitalizations and highest rate (December 2002: n=258; rate: 2.17 per 1,000 p-yrs) (Figure 2). From year to year, the most cases and highest rates tended to be in October, November, and December. However, there were no clear or consistent seasonal troughs (Figure 2).

Table 1. Incident cases of "pnemonia and influenza," by clinical severity, active components, U.S. Armed Forces, January 2001-October 2005

	Ambulatory cases		Hospitalizations		"Severe" cases	
	Number	% of total	Number	% of total	Number	% of total
Total	107,295	100.0	7,398	100.0	354	100.0
Gender						
Women	17,765	16.6	846	11.4	44	12.4
Men	89,526	83.4	6,551	88.6	310	87.6
Age group (years)						
<20	27,060	25.2	2,234	30.2	77	21.8
20-24	32,719	30.5	2,384	32.2	113	31.9
25-29	16,706	15.6	967	13.1	48	13.6
30-34	11,942	11.1	643	8.7	30	8.5
35-39	10,300	9.6	583	7.9	44	12.4
40 +	8,568	8.0	587	7.9	42	11.9
Race/ethnicity						
White, non-Hispanic	73,025	68.1	5,004	67.6	237	66.9
Black, non-Hispanic	16,460	15.3	1,192	16.1	67	18.9
Hispanic	8,719	8.1	627	8.5	26	7.3
Other	9,091	8.5	575	7.8	24	6.8
Marital status						
Single, never married	58,681	54.7	4,644	62.8	193	54.5
Married	44,776	41.7	2,532	34.2	151	42.7
Other*	3,838	3.6	222	3.0	10	2.8
Grade						
Enlisted: E1-E4	66,338	61.8	5,175	70.0	207	58.5
Enlisted: E5-E9	30,363	28.3	1,751	23.7	120	33.9
Officer: O1-O3 (W1-W3)	5,881	5.5	218	2.9	11	3.1
Officer: O4-O9 (W4-W5)	4,700	4.4	254	3.4	16	4.5

* includes separated, widowed, divorced

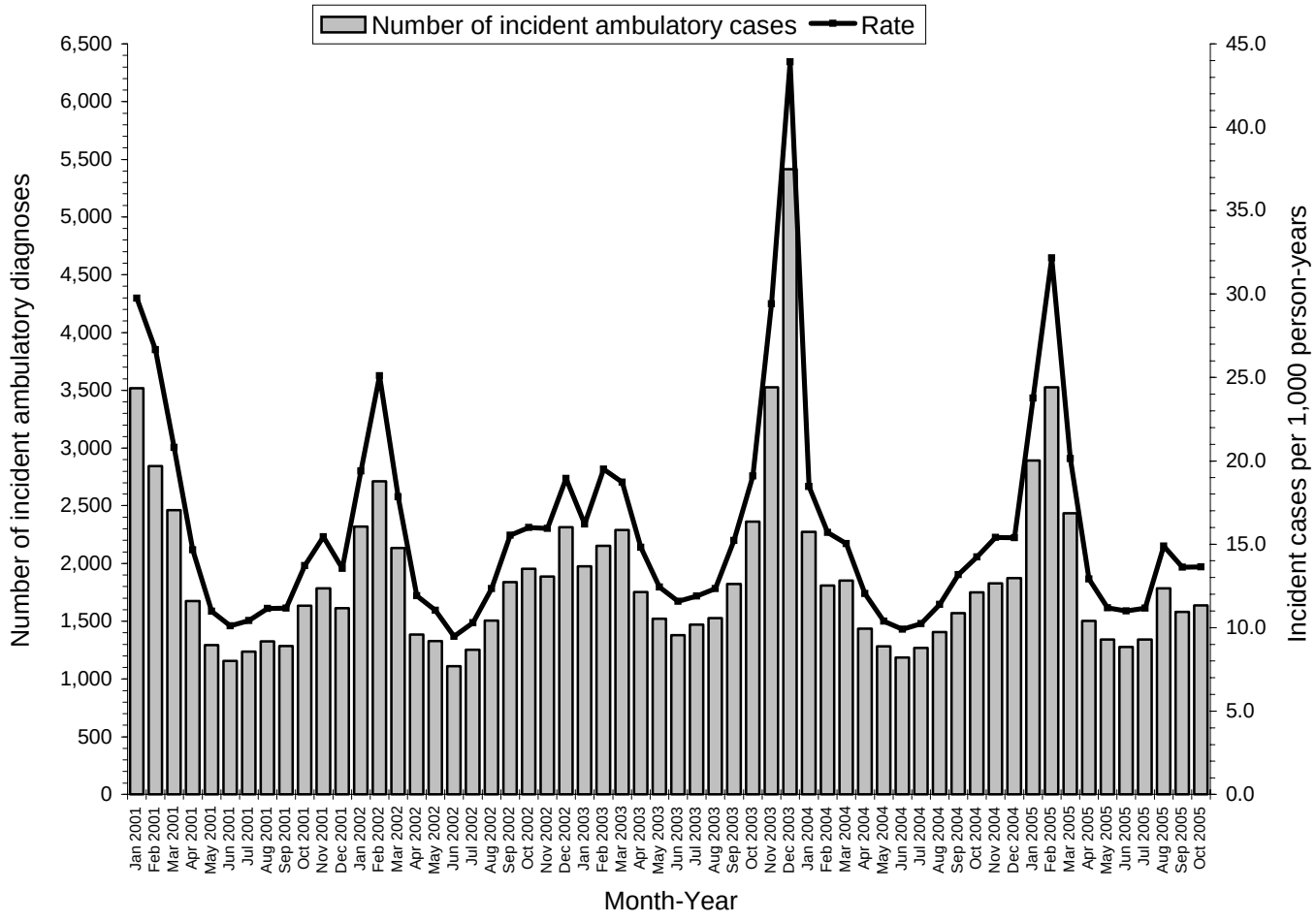
The overall ratio of ambulatory to hospitalized cases of pneumonia and influenza was 14.5-to-1. However, there was not a strong correlation (R^2=0.22) between the crude monthly rates of ambulatory and hospitalized cases (data not shown).

In each month of the period, rates were highest by far in the youngest age group (<20 years old). In addition, each spike in rates overall was attributable almost exclusively to sharp increases in rates in <20 year olds at recruit training installations. Among older members, rates tended to be higher among 20-24 year olds than those older—but not consistently or significantly so (data not shown).

There were not clear or consistent relationships between race/ethnicity and crude monthly rates. Also, in general, there were not clear or consistent differences in crude rates between males and females.

Over the entire period, the nine installations that support recruit training accounted for nearly 40% (n=2,939) of all hospitalizations for "pneumonia and influenza." Among all military installations, those with the most pneumonia and influenza-related hospitalizations were Fort Benning, GA (n=1,141), Marine Corps Recruit Depot, San Diego, CA (n=713); Lackland AFB, San Antonio, TX (n=282); Naval

Figure 1. Incident cases and rates of ambulatory visits for "pneumonia and influenza," active component members, U.S. Armed Forces, by month, January 2001-October 2005.



Training Center, Great Lakes, IL (n=242); Fort Gordon, GA (n=237); and Marine Corps Recruit Depot, Parris Island, SC (n=215) —all except Fort Gordon are recruit training installations.

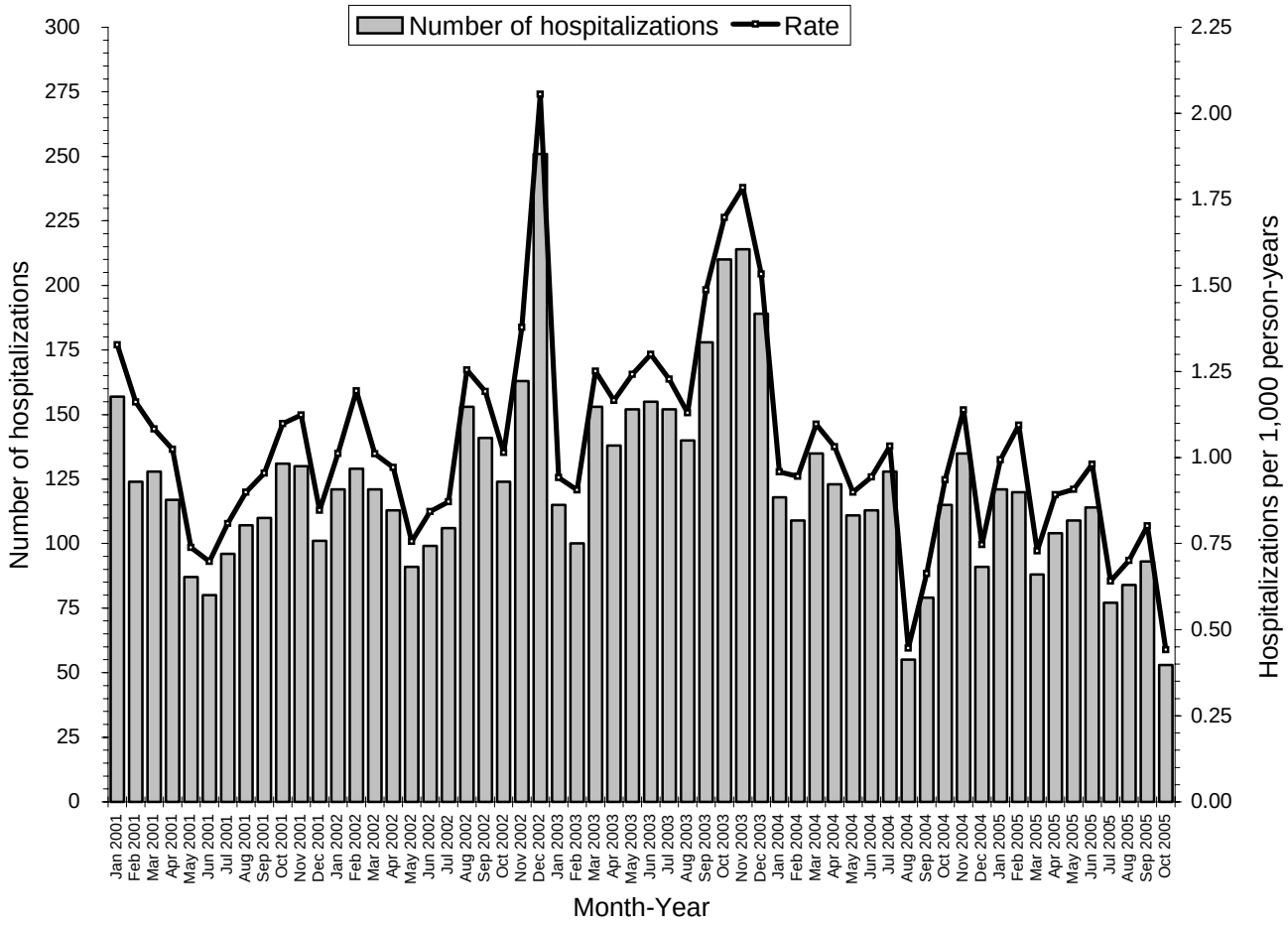
Severe cases: During the surveillance period, there were 354 hospitalizations of active component members for "severe" pneumonia and influenza (Table 1). The mean (and median) number of severe cases per month was 6. The fewest cases in a month (n=1) were in October 2004 and August 2005. The most cases in a month (n=13) were in August 2003 and November 2003. The number of severe cases in a month was not correlated with the numbers of either hospitalized (R^2=0.07) or ambulatory (R^2=0.01) cases in the same month (data not shown).

Recruit training installations accounted for more than one-fifth (n=77; 22.0% of the total) of all severe cases. The installations that accounted for the most severe cases overall were Marine Corps Recruit Depot, Parris Island, SC (n=23); Marine Corps Base, Camp Lejeune, NC (n=17); Fort Benning, GA (n=15);Fort Hood, TX (n=12); and Marine Corps Recruit Depot, San Diego, CA (n=10).

Finally, during 58 months at 161 locations, there were only 12 instances of 2 or more (and only 3 instances of 3 or more) severe cases at a single installation within 14 days.

Editorial comment: Typically, during influenza epidemics in immunologically susceptible

Figure 2. Incident cases and rates of hospitalizations for "pneumonia and influenza," active component members, U.S. Armed Forces, by month, January 2001-October 2005.



populations, there are sudden increases in rates of acute febrile respiratory illnesses and complicating pneumonias. Most influenza cases in previously healthy adults are temporarily debilitating and self-limited. However, a potentially significant proportion of cases may be severe (e.g., acute respiratory distress syndrome, secondary bacterial pneumonia) and life threatening (as during the 1918-9 pandemic).

Each year, members of the active components of the U.S. military are immunized against influenza. As a result, the U.S. Armed Forces are protected from explosive outbreaks of influenza and associated pneumonias to the extent that each year's vaccine is protective against the influenza strains that circulate the same season. In the event of a pandemic, however, there would be widespread immunological susceptibility to influenza among military members in spite of immunization with the current year's vaccine.

In relation to surveillance of epidemic/pandemic influenza in military populations, there are several potentially important findings from this summary. First, the most cases and highest rates of "pneumonia and influenza" overall affect the youngest service members—particularly those in initial training during winter seasons. For decades, recruit training camps have been recognized as extremely high risk settings for respiratory transmitted diseases. In addition, recruit cohorts are composed of daily samples of generally unimmunized, healthy, young adult populations from throughout the United States and its territories. In turn, influenza strains that may be circulating in remote or isolated geographic areas may be transported to, propagated among, and detected in recruit training cohorts. Surveillance of epidemic/pandemic influenza should focus on the Service's initial training centers. Second, there are very few instances of spatiotemporal clusters of "severe" pneumonia and influenza cases among active service members. During the nearly 5-year period covered by this report, there were only 3 installations with 3 or more severe cases of "pneumonia and influenza" among active service members within a two week period.

A hallmark of a future pandemic with a highly virulent strain would be explosive outbreaks of acute febrile respiratory illnesses with rapidly progressing and fulminant clinical courses. Public health officials and clinical care providers at military installations should be extremely vigilant for clusters of "severe" clinical expressions of influenza and pneumonia cases. Such clusters may be the earliest manifestations of evolving epidemics. The natures, magnitudes, and etiologies of all such clusters should be expeditiously and thoroughly investigated.

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Cold Injuries, Active Component Members, US Armed Forces, July 2000-June 2005

U.S. military operations are conducted in diverse weather and geographic conditions. Prolonged and/or intense exposures to cold can significantly degrade the health, well-being, and operational effectiveness of servicemembers and their units. The U.S. military has developed extensive and effective countermeasures against threats associated with training and operating in cold environments.[1]

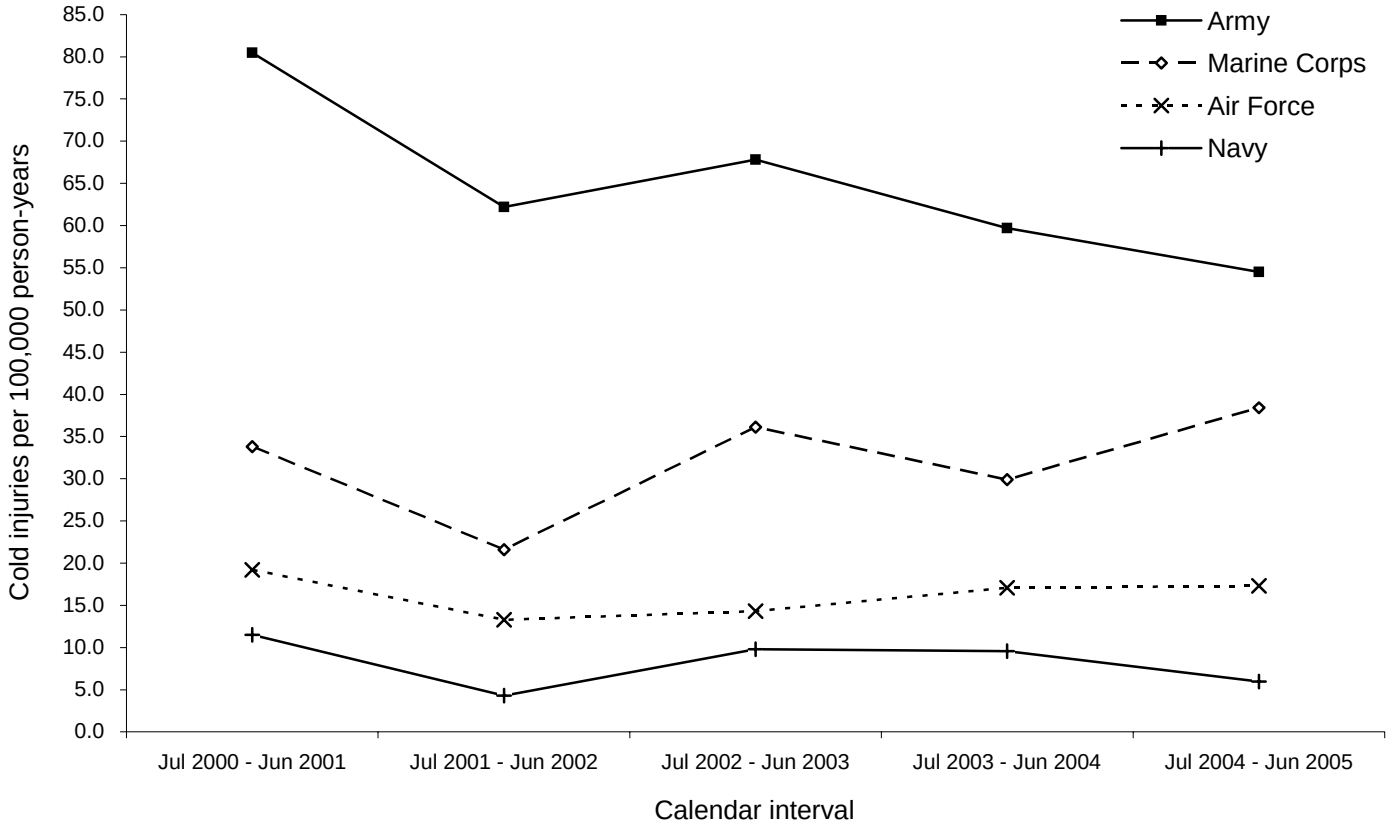
This report summarizes frequencies, rates, and correlates of risk of cold injuries among active component members of the U.S. Armed Forces during the period July 2000 to June 2005.

Methods. The surveillance period was defined as 1 July 1999 to 30 June 2004. The surveillance cohort included all individuals who served in an active component of the U.S. Armed Forces any time during the surveillance period. For summary purposes, years were divided into 1 July through 30 June intervals (to include complete "cold weather seasons" in each yearly interval).

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 code: 991.4), "hypothermia"(ICD-9-CM code: 991.6), and "unspecified effect of reduced temperature" (ICD-9-CM code: 991.9) during the surveillance period.

To exclude follow-up medical encounters, only one of each type of cold injury per individual

Figure 1. Incidence rates of "any cold injury" among active component members, U.S. Armed Forces, by 12-month intervals, July 2000-June 2005.



per year was included. Case counts, rates, and trends were summarized by Service and in relation to general military and demographic characteristics.

Results: During the period July 2004 to June 2005, 365 members of the U.S. Armed Forces had at least one medical encounter with a primary diagnosis of cold injury (Tables 1-4). Compared to the prior four years, rates of cold injuries (of any type) in the past year were lower in the Army, generally similar in the Air Force and Navy, and slightly higher in the Marine Corps (Figure 1, Tables 1-4).

During the past cold season, the highest rates of cold injuries (of any type) were in the Army (54.5 per 100,000 person-years [p-yrs]) and Marines (38.4 per 100,000 p-yrs) (Tables 1-4). Nearly three-fourths (73%) of all servicemembers with cold injuries were in the Army (Table 1).

In the Army and Air Force, the most frequently reported cold injury in the past year was "frostbite." Of note, the rate of "frostbite" in the Army has slowly but consistently declined during the past five years (Table 1).

In the Marines and Navy, the most frequently reported cold injury in the past year was "hypothermia." The rate of "hypothermia" was at least 3-times higher in the Marine Corps than in any other Service (Tables 1-4). Of note, the rate of hypothermia among Marines in the past year was nearly identical to that in the previous year (Table 3).

During the 5-year surveillance period, females had sharply higher rates than males of

Table 1. Incident primary diagnoses of cold injuries by type, active component, US Army, July 2000 - June 2005

		Frostbite		Immersion foot		Hypothermia		Unspecified		Any cold injury	
	Person years	Cases	Rate*	Cases	Rate*	Cases	Rate*	Cases	Rate*	Cases	Rate*
Gender											
Male	2,051,835.6	608	29.6	192	9.4	123	6.0	210	10.2	1,133	55.2
Female	365,232.4	256	70.1	34	9.3	15	4.1	130	35.6	435	119.0
Age group											
<20	124,899.8	50	40.0	27	21.6	18	14.4	43	34.4	138	111.0
20-<30	1,335,121.6	548	41.0	160	12.0	93	7.0	219	16.4	1,020	76.4
30-<40	704,110.1	218	31.0	33	4.7	20	2.8	61	8.7	332	47.2
40-<50	230,313.7	44	19.1	5	2.2	4	1.7	15	6.5	68	29.5
50+	23,800.1	4	16.8	1	4.2	3	12.6	2	8.4	10	42.0
Race/ethnicity											
White non-Hispanic	1,384,739.0	324	23.4	142	10.3	70	5.1	127	9.2	663	47.9
Black non-Hispanic	580,142.6	416	71.7	50	8.6	48	8.3	162	27.9	676	117.0
Hispanic	231,682.4	65	28.1	21	9.1	11	4.7	24	10.4	121	52.2
Other	221,722.9	59	26.6	13	5.9	9	4.1	27	12.2	108	48.7
Military grade											
Junior enlisted (E1-E4)	1,119,675.7	542	48.4	150	13.4	93	8.3	241	21.5	1,026	91.6
Senior enlisted (E5-E9)	907,196.9	275	30.3	42	4.6	29	3.2	84	9.3	430	47.4
Officer	391,414.3	47	12.0	34	8.7	16	4.1	15	3.8	112	28.6
Year											
Jul 2000 - Jun 2001	474,381.0	189	39.8	53	11.2	38	8.0	102	21.5	382	80.5
Jul 2001 - Jun 2002	475,995.7	174	36.6	32	6.7	23	4.8	67	14.1	296	62.2
Jul 2002 - Jun 2003	485,539.9	180	37.1	52	10.7	35	7.2	62	12.8	329	67.8
Jul 2003 - Jun 2004	492,819.7	167	33.9	47	9.5	26	5.3	54	11.0	294	59.7
Jul 2004 - Jun 2005	489,550.6	154	31.5	42	8.6	16	3.3	55	11.2	267	54.5

*Rate calculated per 100,000 person-years
Source: Defense Medical Surveillance System

"frostbite" and "unspecified" injuries in the Army and Marine Corps (Tables 1,3). In contrast, in the Air Force and Navy, there were not strong relationships between gender and cold injury risk, either overall or by type (Tables 2,4).

In all Services, rates of cold injuries of all types were generally highest among the youngest aged (and junior enlisted) members (Tables 1-4). In each Service except the Navy, rates of "frostbite," "hypothermia," "unspecified" injuries, and injuries of any type were significantly higher among Black non-Hispanic members compared to others. Of note, there were not strong relationships between demographic characteristics (other than young age and junior grade) and immersion foot risk (Tables 1-4).

Editorial comment. In general, during the past cold season, rates of cold injuries among U.S. servicemembers were slightly lower than in recent years. The overall decline was largely accounted for by the continuation of a declining trend (especially of "frostbite" and "hypothermia") in the Army.

As in the past, the largest numbers and highest rates of cold injuries by far are reported from the Army. This likely reflects differences in the natures, locations, and circumstances of the training and operations of the Services as well as differences in ascertainment of cold injury cases across the Services (e.g., records of medical encounters during field exercises, deployment operations, and aboard Navy

Table 2. Incident primary diagnoses of cold injuries by type, active component, US Navy, July 2000 - June 2005

		Frostbite		Immersion foot		Hypothermia		Unspecified		Any cold injury	
	Person years	Cases	Rate*	Cases	Rate*	Cases	Rate*	Cases	Rate*	Cases	Rate*
Gender											
Male	1,591,567.6	54	3.4	32	2.0	38	2.4	9	0.6	133	8.4
Female	265,411.1	8	3.0	3	1.1	5	1.9	4	1.5	20	7.5
Age group											
<20	92,646.4	4	4.3	12	13.0	0	0.0	1	1.1	17	18.3
20-<30	998,087.5	45	4.5	16	1.6	31	3.1	8	0.8	100	10.0
30-<40	543,515.5	10	1.8	5	0.9	9	1.7	2	0.4	26	4.8
40-<50	203,617.8	3	1.5	2	1.0	3	1.5	2	1.0	10	4.9
50+	19,104.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Race/ethnicity											
White non-Hispanic	1,109,878.6	32	2.9	25	2.3	31	2.8	6	0.5	94	8.5
Black non-Hispanic	341,759.6	17	5.0	5	1.5	5	1.5	3	0.9	30	8.8
Hispanic	179,006.1	8	4.5	4	2.2	2	1.1	4	2.2	18	10.1
Other	226,338.4	5	2.2	1	0.4	5	2.2	0	0.0	11	4.9
Military grade											
Junior enlisted (E1-E4)	780,852.4	39	5.0	26	3.3	26	3.3	6	0.8	97	12.4
Senior enlisted (E5-E9)	804,397.5	18	2.2	9	1.1	10	1.2	6	0.7	43	5.3
Officer	271,732.8	5	1.8	0	0.0	7	2.6	1	0.4	13	4.8
Year											
Jul 2000 - Jun 2001	365,697.2	15	4.1	14	3.8	8	2.2	5	1.4	42	11.5
Jul 2001 - Jun 2002	373,391.2	7	1.9	1	0.3	6	1.6	2	0.5	16	4.3
Jul 2002 - Jun 2003	377,835.7	22	5.8	7	1.9	8	2.1	0	0.0	37	9.8
Jul 2003 - Jun 2004	375,582.6	14	3.7	10	2.7	8	2.1	4	1.1	36	9.6
Jul 2004 - Jun 2005	364,475.9	4	1.1	3	0.8	13	3.6	2	0.5	22	6.0

*Rate calculated per 100,000 person-years

Source: Defense Medical Surveillance System

ships are not routinely available for health surveillance purposes).

This report documents that, with some exceptions, Black non-Hispanic, the youngest, and the most junior enlisted servicemembers have higher rates of cold injuries—particularly "frostbite"—than their counterparts. Also, in the Army and Marine Corps, females have significantly higher rates of cold injuries in general—and of "frostbite" and "unspecified" injuries in particular. 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.[1-3] 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 ensure that appropriate countermeasures to prevent cold injuries (e.g., training, clothing, equipment) in general are implemented.[4] The Disease Prevention and Control Program of the U.S. Army Center for Health Promotion in collaboration with the U.S. Army Research Institute of Environmental Medicine provide up-to-date cold injury prevention materials (including posters, presentation outlines, policies, regulations, and technical bulletins) at the following website:
http://chppm-www.apgea.army.mil/coldinjury/.

Table 3. Incident primary diagnoses of cold injuries by type, active component, US Air Force, July 2000 - June 2005

		Frostbite		Immersion foot		Hypothermia		Unspecified		Any cold injury	
	Person years	Cases	Rate*	Cases	Rate*	Cases	Rate*	Cases	Rate*	Cases	Rate*
Gender											
Male	1,454,114.4	158	10.9	25	1.7	38	2.6	20	1.4	241	16.6
Female	349,740.2	31	8.9	6	1.7	8	2.3	7	2.0	52	14.9
Age group											
<20	69,131.8	10	14.5	3	4.3	3	4.3	3	4.3	19	27.5
20-<30	895,659.6	140	15.6	18	2.0	30	3.3	21	2.3	209	23.3
30-<40	570,783.4	28	4.9	7	1.2	7	1.2	2	0.4	44	7.7
40-<50	250,762.5	9	3.6	3	1.2	6	2.4	1	0.4	19	7.6
50+	17,513.1	2	11.4	0	0.0	0	0.0	0	0.0	2	11.4
Race/ethicity											
White non-Hispanic	1,250,755.8	114	9.1	22	1.8	35	2.8	16	1.3	187	15.0
Black non-Hispanic	270,371.6	54	20.0	7	2.6	6	2.2	10	3.7	77	28.5
Hispanic	112,448.7	9	8.0	2	1.8	2	1.8	1	0.9	14	12.5
Other	170,288.9	12	7.0	0	0.0	3	1.8	0	0.0	15	8.8
Military grade											
Junior enlisted (E1-E4)	666,760.5	124	18.6	18	2.7	26	3.9	21	3.1	189	28.3
Senior enlisted (E5-E9)	780,547.3	48	6.1	10	1.3	12	1.5	2	0.3	72	9.2
Officer	356,557.3	17	4.8	3	0.8	8	2.2	4	1.1	32	9.0
Year											
Jul 2000 - Jun 2001	349,556.2	36	10.3	5	1.4	14	4.0	12	3.4	67	19.2
Jul 2001 - Jun 2002	352,201.9	37	10.5	5	1.4	4	1.1	1	0.3	47	13.3
Jul 2002 - Jun 2003	363,850.9	29	8.0	8	2.2	13	3.6	2	0.5	52	14.3
Jul 2003 - Jun 2004	373,692.7	44	11.8	5	1.3	9	2.4	6	1.6	64	17.1
Jul 2004 - Jun 2005	364,563.4	43	11.8	8	2.2	6	1.6	6	1.6	63	17.3

*Rate calculated per 100,000 person-years
Source: Defense Medical Surveillance System

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Table 4. Incident primary diagnoses of cold injuries by type, active component, US Marine Corps, July 2000 - June 2005

		Frostbite		Immersion foot		Hypothermia		Unspecified		Any cold injury	
	Person years	Cases	Rate*	Cases	Rate*	Cases	Rate*	Cases	Rate*	Cases	Rate*
Gender											
Male	819,513.50	56	6.8	80	9.8	90	11.0	25	3.1	251	30.6
Female	52,171.20	12	23.0	6	11.5	6	11.5	4	7.7	28	53.7
Age group											
<20	82,852.80	20	24.1	28	33.8	23	27.8	7	8.4	78	94.1
20-<30	591,394.10	38	6.4	56	9.5	65	11.0	22	3.7	181	30.6
30-<40	150,762.90	8	5.3	2	1.3	8	5.3	0	0.0	18	11.9
40-<50	43,710.90	2	4.6	0	0.0	0	0.0	0	0.0	2	4.6
50+	2,964.60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Race/ethnicity											
White non-Hispanic	542,025.10	34	6.3	58	10.7	55	10.1	13	2.4	160	29.5
Black non-Hispanic	113,821.50	24	21.1	10	8.8	19	16.7	8	7.0	61	53.6
Hispanic	123,923.30	4	3.2	13	10.5	8	6.5	3	2.4	28	22.6
Other	91,916.10	6	6.5	5	5.4	14	15.2	5	5.4	30	32.6
Military grade											
Junior enlisted (E1-E4)	522,987.10	46	8.8	72	13.8	76	14.5	23	4.4	217	41.5
Senior enlisted (E5-E9)	256,556.60	13	5.1	4	1.6	15	5.8	5	1.9	37	14.4
Officer	92,142.20	9	9.8	10	10.9	5	5.4	1	1.1	25	27.1
Year											
Jul 2000 - Jun 2001	171,383.30	9	5.3	10	5.8	30	17.5	9	5.3	58	33.8
Jul 2001 - Jun 2002	171,448.30	13	7.6	14	8.2	8	4.7	2	1.2	37	21.6
Jul 2002 - Jun 2003	174,452.50	22	12.6	23	13.2	16	9.2	2	1.1	63	36.1
Jul 2003 - Jun 2004	177,269.30	10	5.6	19	10.7	21	11.8	3	1.7	53	29.9
Jul 2004 - Jun 2005	177,132.60	14	7.9	20	11.3	21	11.9	13	7.3	68	38.4

*Rate calculated per 100,000 person-years
Source: Defense Medical Surveillance System

Update: Pre- and Post-deployment Health Assessments, US Armed Forces, January 2003-October 2005

The June 2003 issue of the *MSMR* summarized the background, rationale, policies, and guidelines related to pre-deployment and post-deployment health assessments of servicemembers.[1-10] Briefly, prior to deploying, the health of each servicemember is assessed to ensure his/her medical fitness and readiness for deployment. At the time of redeployment, the health of each servicemember is again assessed to identify medical conditions and/or exposures of concern to ensure timely and comprehensive evaluation and treatment.

Completed pre- and post-deployment health assessment forms are routinely sent (in hard copy or electronic form) to the Army Medical Surveillance Activity (AMSA) where they are archived in the Defense Medical Surveillance System (DMSS).[11] In the DMSS, data recorded on pre- and post-deployment health assessments are integrated with data that document demographic characteristics, military experiences, and medical encounters of all servicemembers (e.g., hospitalizations, ambulatory visits, immunizations.)[11] The continuously expanding DMSS database can be used to monitor the health of servicemembers who participated in major overseas deployments.[11-13]

The overall success of deployment force health protection efforts depends at least in part on the completeness and quality of pre- and post-deployment health assessments. This report summarizes characteristics of servicemembers who completed pre and post-deployment forms since 1 January 2003, responses to selected questions on pre- and post-deployment forms, and changes in responses of individuals from pre-deployment to post-deployment.

Methods: For this update, the DMSS was searched to identify all pre- and post-deployment health assessments (DD Form 2795 and DD Form 2796, respectively) that were completed after 1 January 2003.

Results: From 1 January 2003 to 31 October 2005, 1,125,963 pre-deployment health assessments and

Table 1. Total pre- and post-deployment health assessments, by month and year, US Armed Forces, January 2003-October 2005

	Pre-deployment		Post-deployment	
	No.	%	No.	%
Total	**1,125,963**	**100.0**	**1,093,212**	**100.0**
2003				
January	69,329	6.2	6,202	0.6
February	110,539	9.8	5,059	0.5
March	69,832	6.2	6,735	0.6
April	37,586	3.3	19,336	1.8
May	12,874	1.1	92,423	8.5
June	14,412	1.3	65,270	6.0
July	18,042	1.6	52,764	4.8
August	16,495	1.5	35,101	3.2
September	12,786	1.1	32,376	3.0
October	24,159	2.1	26,948	2.5
November	19,669	1.7	21,461	2.0
December	36,127	3.2	22,129	2.0
2004				
January	70,117	6.2	39,625	3.6
February	39,178	3.5	32,201	2.9
March	22,830	2.0	65,975	6.0
April	19,914	1.8	44,181	4.0
May	27,789	2.5	17,810	1.6
June	24,509	2.2	28,277	2.6
July	22,750	2.0	24,199	2.2
August	34,247	3.0	22,868	2.1
September	31,633	2.8	24,210	2.2
October	34,969	3.1	15,568	1.4
November	35,625	3.2	21,900	2.0
December	37,752	3.4	26,675	2.4
2005				
January	33,999	3.0	50,531	4.6
February	23,481	2.1	67,378	6.2
March	20,434	1.8	52,464	4.8
April	26,657	2.4	18,406	1.7
May	18,573	1.6	20,608	1.9
June	24,695	2.2	18,732	1.7
July	21,068	1.9	16,287	1.5
August	45,821	4.1	28,009	2.6
September	33,327	3.0	35,943	3.3
October	34,745	3.1	35,561	3.3

1,093,212 post-deployment health assessments were completed at field sites, shipped to AMSA, and integrated in the DMSS database (Table 1).

In general, the distributions of self-assessments of "overall health" were similar among pre- and post-deployment form respondents (Figure 1). For example, both prior to and after deployment, the most frequent descriptor of "overall health" was "very good." However, relatively more pre- (33%) than post- (23%) deployment respondents assessed their overall health as "excellent," while more post- (41%) than pre- (25%) deployment respondents assessed their overall health as "good," "fair," or "poor" (Figure 1).

Among servicemembers (n=550,492) who completed both pre- and a post-deployment health assessments, nearly half (45%) chose the same descriptor of their overall health before and after deploying (Figures 2, 3). Of those (n=301,531) who changed their assessments from pre- to post-deployment, approximately three-fourths (76%) changed by a single category (on a five category scale) (Figure 3). Of those who changed by more than one category, nearly 5-times more indicated a decrement in overall health (n=60,830; 11% of all respondents) as an improvement (n=12,575; 2% of all respondents) (Figure 3).

On post-deployment forms, approximately 21% of active and 39% of Reserve component respondents reported "medical/dental problems" during deployment. Among active component respondents, "medical/dental problems" were more frequently reported by soldiers and Marines than by members of the other Services. Among Reservists, members of the Army, Navy, and Marine Corps were at least twice as likely to report "medical/dental problems" as were Air Force members (Table 2).

Approximately 4% and 6% of active and Reserve component respondents, respectively, reported "mental health concerns." "Mental health concerns" were reported relatively more frequently among soldiers (active: 6%; Reserve: 7%) than members of the other Services (Table 2). From 7% (active component, Navy) to 27% (active component, Army) of post-deployment forms documented that "referrals" were indicated (Table 2); and 88% and 80% of all active and Reserve component respondents, respectively, had hospitalizations and/or medical encounters within 6 months after documented post-deployment referrals (Table 2).

Overall, approximately 16% of all post-deployment forms indicated deployment-related "exposure concerns" (Table 3). The proportions of respondents who reported exposure concerns significantly varied from month to month (Figure 4).

In general, the likelihood of reporting an "exposure concern" was greater among soldiers (21%), Marines (14%); and females (17%) and increased monotonically with age (Tables 3, 4). In all age groups, exposure concerns were more likely among Reserve than active component members (Table 4).

Editorial comment. Since January 2003, approximately three-fourths of U.S. servicemembers have assessed their overall health as "very good" or "excellent" when they are mobilized and/or prior to deploying overseas. Approximately two-thirds have assessed their overall health as "very good" or

Figure 1. Percent distributions of self-assessed health status, pre- and post-deployment, US Armed Forces, January 2003- October 2005.

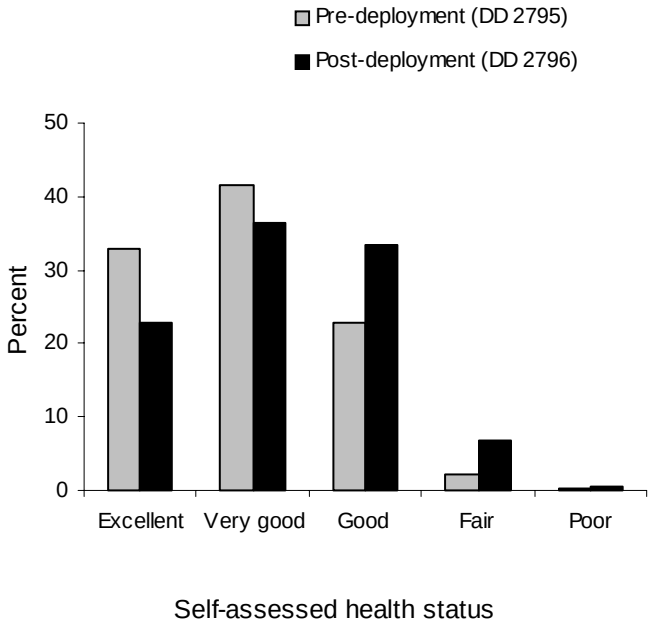

Figure 2. Self-assessed health status on post-deployment form, in relation to self-assessed health status on pre-deployment form, US Armed Forces, January 2003- October 2005.

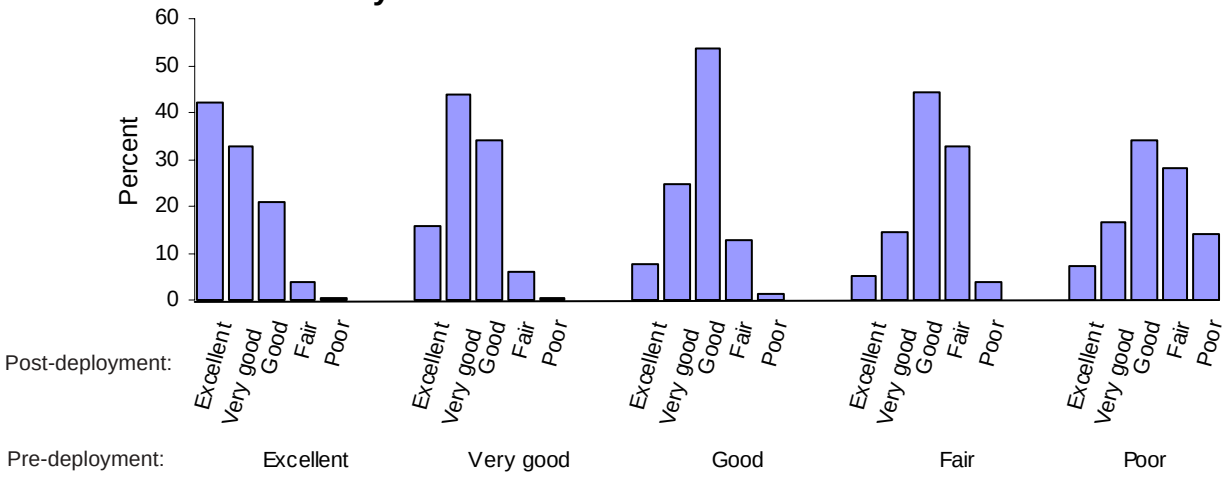

Table 2. Responses to selected questions from post-deployment forms (DD 2796) by service and component, US Armed Forces, January 2003-October 2005

	Army	Navy	Air Force	Marines	Total
Active component					
SMs with DD 2796 at AMSA	**242,860**	**93,246**	**100,108**	**79,498**	**515,712**
Electronic version	70%	3%	61%	7%	46%
General health ("fair" or "poor")	9%	5%	2%	6%	6%
Medical/dental problems during deploy	30%	12%	11%	20%	21%
Currently on profile	10%	2%	2%	3%	6%
Mental health concerns	6%	2%	1%	2%	4%
Exposure concerns	18%	5%	5%	11%	12%
Health concerns	14%	6%	5%	9%	10%
Referral indicated	27%	7%	10%	14%	18%
Med. visit following referral[1]	94%	70%	89%	63%	88%
Post deployment serum[2]	91%	79%	89%	86%	88%
Reserve component					
SMs with DD 2796 at AMSA	**229,785**	**14,476**	**36,360**	**17,353**	**297,974**
Electronic version	65%	16%	48%	9%	57%
General health ("fair" or "poor")	11%	6%	2%	9%	10%
Medical/dental problems during deploy	44%	36%	15%	35%	39%
Currently on profile	15%	4%	2%	3%	12%
Mental health concerns	7%	3%	1%	3%	6%
Exposure concerns	25%	19%	8%	26%	22%
Health concerns	22%	22%	9%	22%	20%
Referral indicated	26%	20%	11%	25%	24%
Med. visit following referral[1]	84%	75%	56%	53%	80%
Post deployment serum[2]	92%	84%	68%	81%	88%

[1] Inpatient or outpatient visit within 6 months after referral.

[2] Only calculated for DD 2796 completed since 1 June 2003.

"excellent" at the end of their deployments. Most of the changes in assessments of overall health from pre- to post-deployment have been relatively minor (i.e., one category on a 5-category scale). However, more than 13% of all post-deployers have indicated relatively significant declines (i.e., two or more categories) in their overall health from pre- to post-deployment. The findings are not surprising considering the extreme physical and psychological stresses associated with mobilization, overseas deployment, and harsh and dangerous living and working conditions.[14,15]

The deployment health assessment process is specifically designed to identify, assess, and follow-up as necessary all servicemembers with concerns regarding their health and/or deployment-related exposures. Overall, for example, approximately one-fifth of all post-deployers had "referral indications" documented on post-deployment health assessments; and of those, most had documented outpatient visits and/or hospitalizations within 6 months after they returned.

Of interest, "exposure concerns" among post-deploying respondents have been consistently higher among Reserve compared to active component members since approximately February 2004 (Figure 4). Among both active and Reserve component members, prevalences of exposure concerns increase with age. In both components, servicemembers older than 40 are approximately twice as likely as those younger than 20 to report exposure concerns; however, in all age groups, Reservists are much more likely to report exposure concerns than their active component counterparts. The reasons for these relationships are not clear.

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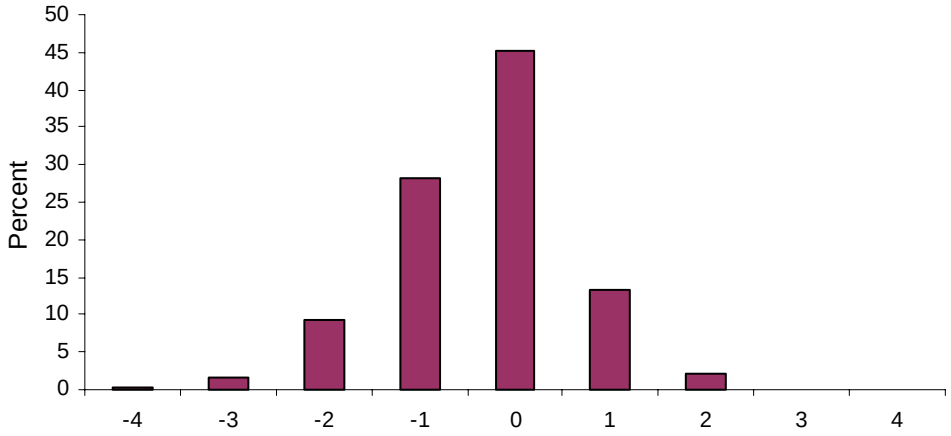
5. DoD instruction 6490.3, subject: Implementation and application of joint medical surveillance for deployments. 7 Aug 1997.
6. 10 USC 1074f, subject: Medical tracking system for members deployed overseas. 18 Nov 1997.
7. ASD (Health Affairs) memorandum, subject: Policy for pre- and post-deployment health assessments and blood samples (HA policy: 99-002). 6 Oct 1998.

Figure 3. Distribution of changes in self-assessed health statuses as reported on pre- and post-deployment forms, US Armed Forces, January 2003-October 2005.



Change in self-assessment of overall health status, pre- to post-deployment, calculated as: post deployment response - pre-deployment response, using the following scale for health status: 1="poor"; 2="fair"; 3="good"; 4="very good"; and 5="excellent".

8. ASD (Health Affairs) memorandum, subject: Updated policy for pre- and post-deployment health assessments and blood samples (HA policy: 01-017). 25 Oct 2001.
9. JCS memorandum, subject: Updated procedures for deployment health surveillance and readiness (MCM-0006-02). 1 Feb 2002.
10. USD (Personnel and Readiness) memorandum, subject: Enhanced post-deployment health assessments. 22 Apr 2003.
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Table 3. Reports of exposure concerns on post-deployment health assessments, US Armed Forces, January 2003-October 2005

	Total[1]	Exposure concerns	% with exposure concerns
Total	**808,185**	**127,592**	**15.8**
Component			
Active	512,210	60,771	13.5
Reserve	295,975	66,821	29.2
Service			
Army	469,956	99,889	21.3
Navy	106,410	7,099	6.7
Air Force	135,831	7,494	5.5
Marine Corps	95,988	13,110	13.7
Age (years)			
<20	23,200	1,850	8.0
20-29	429,461	56,905	13.3
30-39	223,133	39,312	17.6
>39	132,366	29,525	22.3
Gender			
Men	717,349	111,755	15.6
Women	90,833	15,837	17.4
Race/ethnicity			
Black	141,374	24,112	17.1
Hispanic	79,282	13,504	17.0
Other	1,943	215	11.1
White	529,764	81,293	15.3
Grade			
Enlisted	704,499	109,911	15.6
Officer	103,600	17,681	17.1

[1]Totals do not include non-responses/missing data.

Figure 4. Proportion of post-deployment forms that include reports of exposure concerns by month, US Armed Forces, January 2003-October 2005.

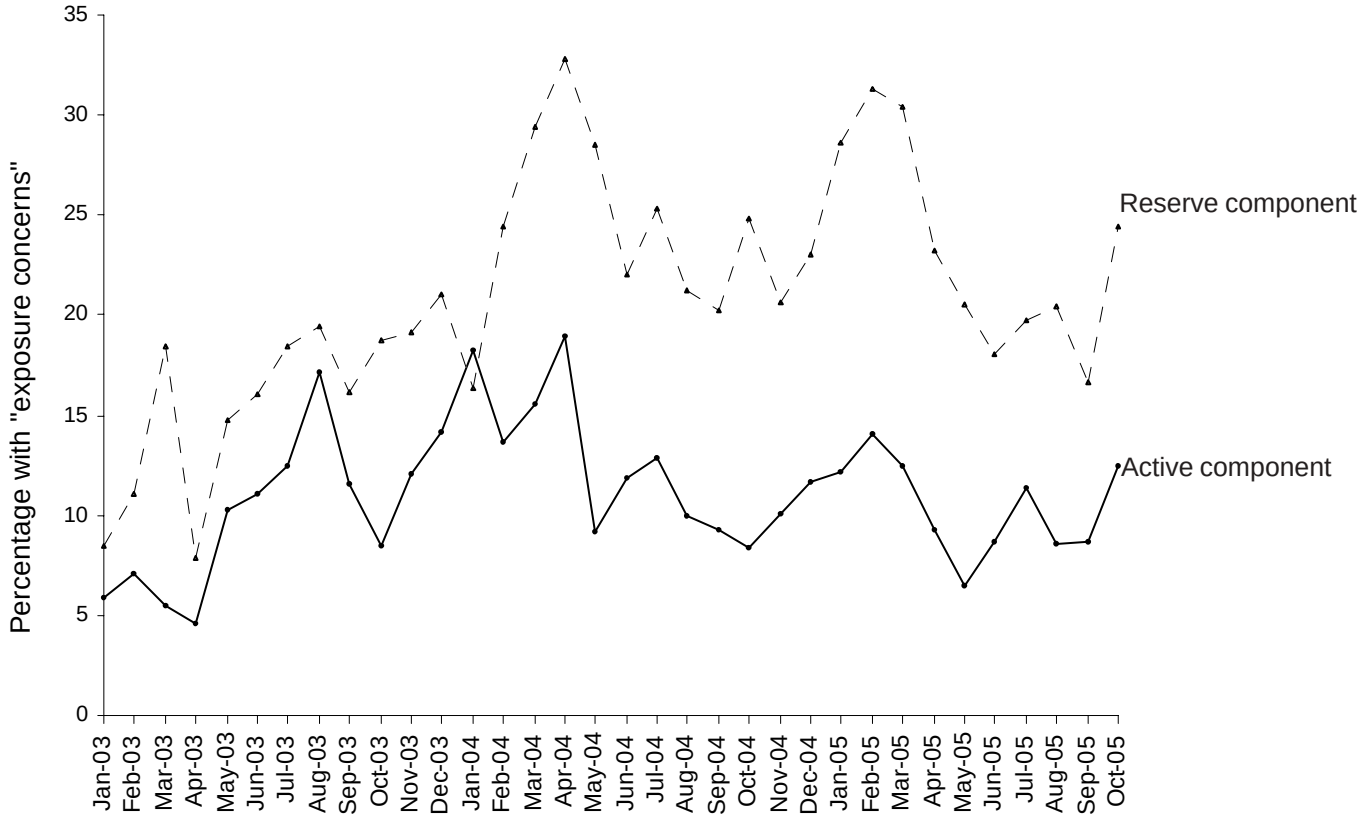
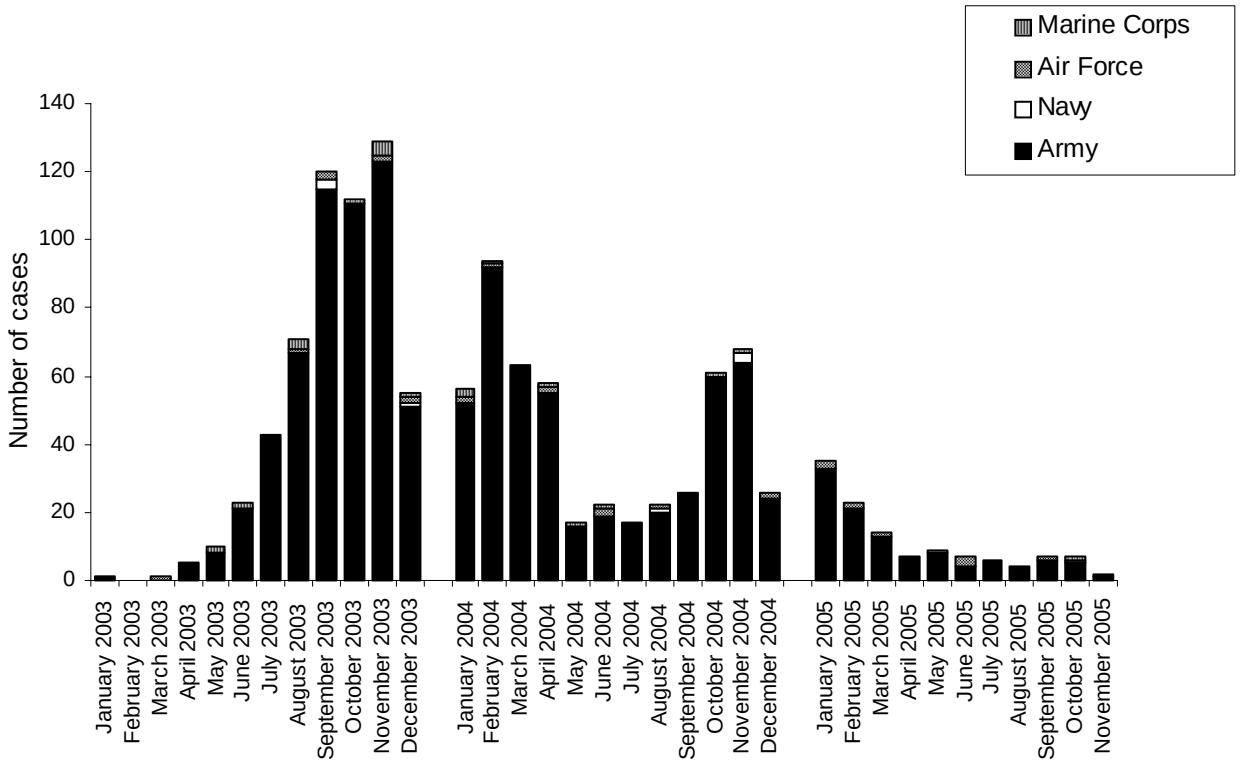


Table 4. Proportion of post-deployment forms that included reports of exposure concerns, by age group and component, US Armed Forces, January 2003-October 2005

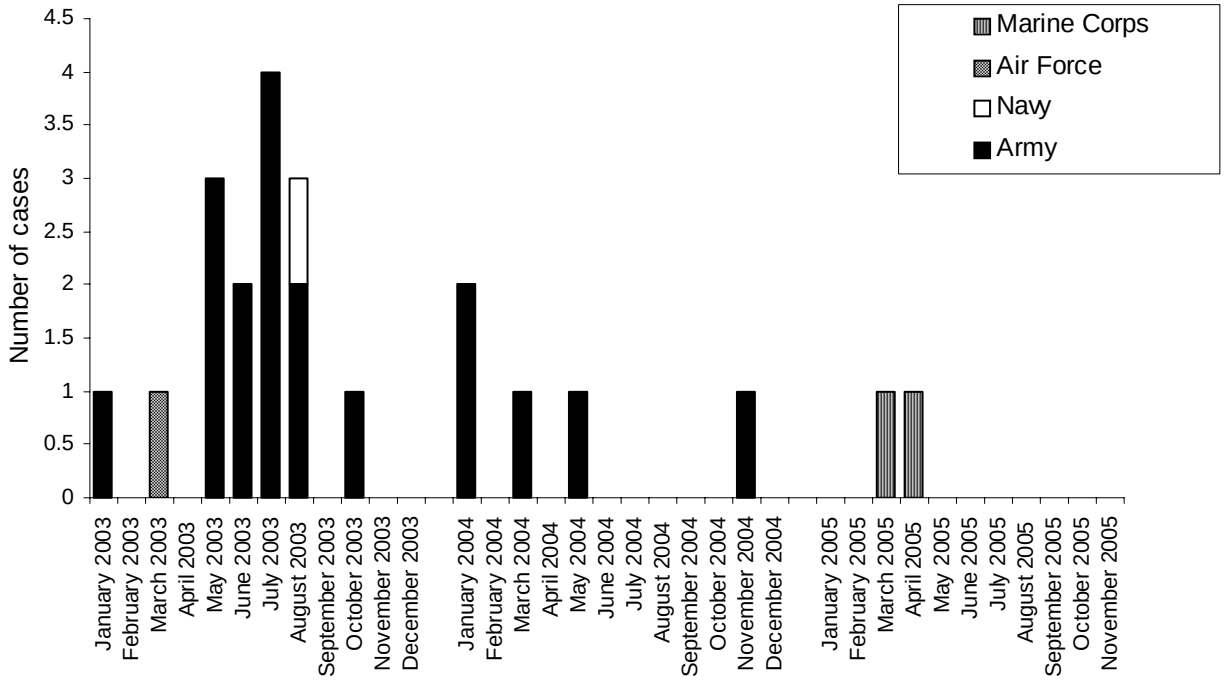
Age group	Active	Reserve
<20	6.8	13.1
20-29	10.8	20.1
30-39	13.6	23.3
>39	16.1	25.4

Deployment related conditions of special surveillance interest, US Armed Forces, by month and service, January 2003-October 2005

Leishmaniasis (ICD-9-CM: 085.0-0.85.5)[1]



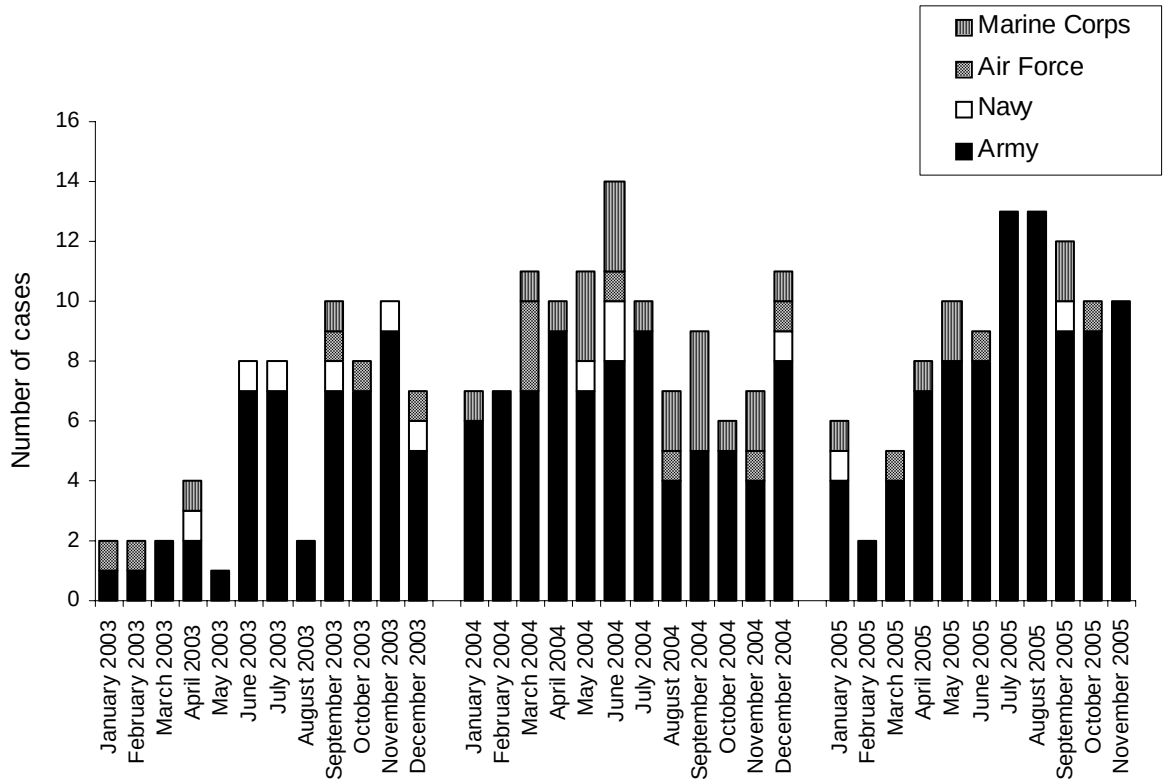
Acute respiratory failure/ARDS (ICD-9-CM: 518.81, 518.82)[2]



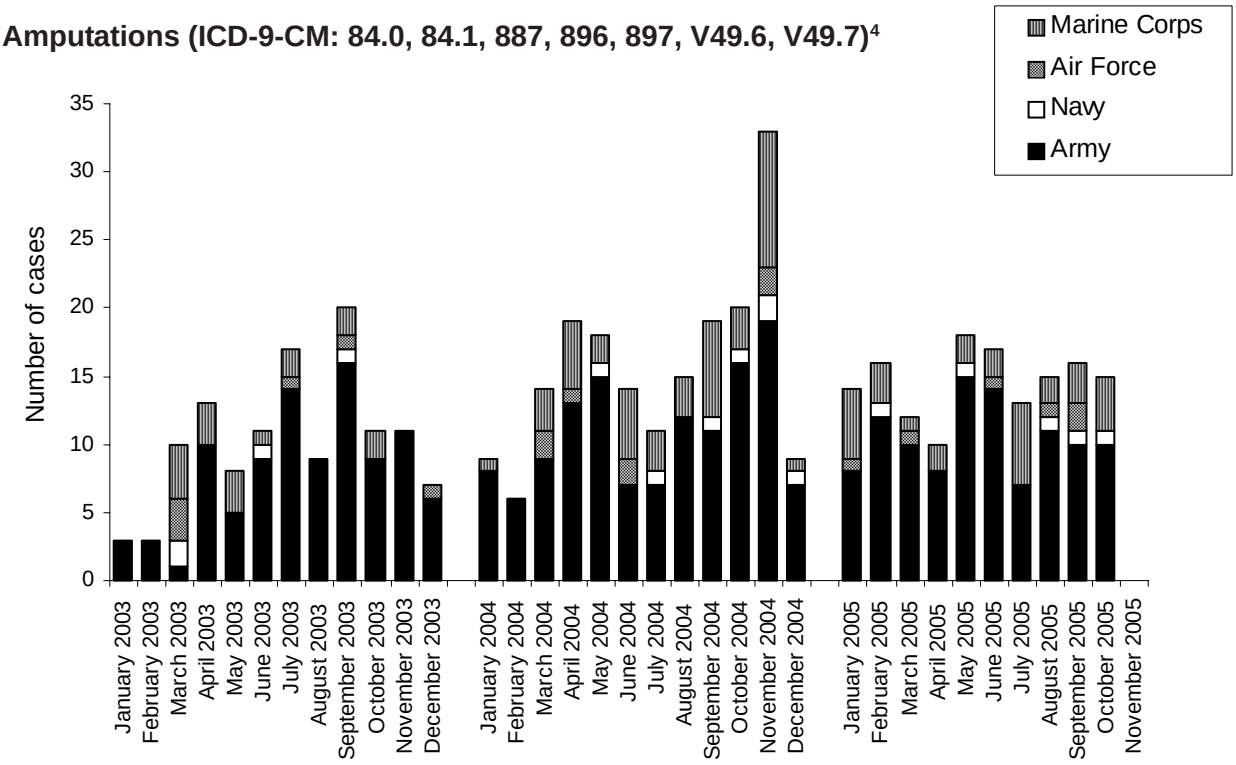
Footnotes:
[1] Indicator diagnosis (one per individual) during a hospitalization, ambulatory vist, and/or from a notifiable medical event during/after service in OEF/OIF.
[2] indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 days of returning from OEF/OIF.

(Cont.) Deployment related conditions of special surveillance interest, US Armed Forces, by month and service, January 2003-October 2005

Deep vein phlebitis/thromboembophlebitis and/or pulmonary embolism/infarction (ICD-9-CM: 541.1, 451.81, 415.1)[3]



Amputations (ICD-9-CM: 84.0, 84.1, 887, 896, 897, V49.6, V49.7)[4]



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

Sentinel reportable events for all beneficiaries[1] at US Army medical facilities, cumulative numbers[2] for calendar years through December 31, 2004 and 2005

Reporting location	Number of reports all events[3]		Food-borne								Vaccine Preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
NORTH ATLANTIC																
Washington, DC Area	253	244	3	4	1	8	1	5	4	6	.	.	3	3	1	2
Aberdeen, MD	60	24	.	.	.	.	1	.	.	1	.	.	.	.	.	.
FT Belvoir, VA	244	274	8	7	1	1	6	7	2	1	1	.	.	1	.	.
FT Bragg, NC	1,730	1,314	11	7	.	.	48	26	1	3	.	.	.	.	.	.
FT Drum, NY	179	120	.	.	.	.	1	.	.	.	.	.	.	.	.	.
FT Eustis, VA	187	226	1	.	.	.	3	1	.	.	.	.	.	.	.	.
FT Knox, KY	190	242	5	4	1	.	.	3	.	.	.	.	1	.	.	.
FT Lee, VA	158	181	.	.	1	.	.	1	.	.	.	.	.	.	.	.
FT Meade, MD	153	102	1	.	.	.	.	1	.	.	.	.	.	.	.	.
West Point, NY	67	32	.	.	.	.	1	.	.	.	.	.	1	.	.	.
GREAT PLAINS																
FT Sam Houston, TX	316	420	.	.	2	.	3	5	1	2	.	6	.	9	2	.
FT Bliss, TX	329	295	.	.	7	6	10	4	12	5	1	.	3	.	.	.
FT Carson, CO	613	634	2	4	2	3	4	5	1	.	.	1	1	.	.	.
FT Hood, TX	1,488	2,002	6	6	.	1	15	13	54	3	.	.	1	.	.	.
FT Huachuca, AZ	85	61	.	1	.	.	.	.	.	.	.	.	.	.	.	.
FT Leavenworth, KS	37	55	2	.	2	.	1	.	.	1	.	.	.	.	.	.
FT Leonard Wood, MO	213	256	1	1	2	1	3	1	.	.	.	.	1	.	1	3
FT Polk, LA	185	214	2	1	1	1	10	5	.	.	.	.	2	1	.	.
FT Riley, KS	237	260	1	.	2	1	1	2	.	.	1	.	.	.	.	.
FT Sill, OK	179	131	.	.	1	1	3	.	5	1	.	.	.	.	.	.
SOUTHEAST																
FT Gordon, GA	231	330	.	.	.	.	5	.	.	.	.	.	3	8	.	2
FT Benning, GA	394	306	.	2	3	1	15	9	3	.	.	.	.	.	1	.
FT Campbell, KY	791	608	7	3	3	1	3	8	7	2	.	.	.	.	4	1
FT Jackson, SC	268	193	.	.	.	.	.	.	.	.	.	1	.	.	3	.
FT Rucker, AL	63	24	.	.	.	.	3	.	.	.	1	.	.	.	1	.
FT Stewart, GA	602	443	1	.	3	2	12	16	5	27	4	5	8	.	.	1
WESTERN																
FT Lewis, WA	618	407	7	3	2	.	5	1	3	.	.	.	1	.	.	.
FT Irwin, CA	58	66	.	.	.	.	.	1	.	.	.	.	.	1	.	.
FT Wainwright, AK	171	128	1	4	.	.	1	2	.	.	.	.	1	.	.	1
OTHER LOCATIONS																
Hawaii	669	744	19	35	6	6	26	13	.	4	.	1	2	1	2	1
Europe	1,209	1,127	19	13	2	1	27	24	1	1	7	1	1	5	2	2
Korea	470	462	.	1	.	.	1	.	.	.	.	1	2	1	3	.
Total	**12,447**	**11,925**	**97**	**96**	**42**	**34**	**209**	**153**	**99**	**57**	**15**	**16**	**31**	**30**	**20**	**13**

1. Includes active duty servicemembers, dependents, and retirees.

2. Events reported after December 7, 2004 and 2005.

3. Seventy events specified by Tri-Service Reportable Events, Version 1.0, July 2000.

Note: Completeness and timeliness of reporting vary by facility.

Source: Army Reportable Medical Events System.

(Cont'd) Sentinel reportable events for all beneficiaries[1] at US Army medical facilities, cumulative numbers[2] for calendar years through December 31, 2004 and 2005

Reporting location	Arthropod-borne				Sexually Transmitted								Environmental			
	Lyme Disease		Malaria		Chlamydia		Gonorrhea		Syphilis[4]		Urethritis[5]		Cold		Heat	
	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
NORTH ATLANTIC																
Washington, DC Area	4	1	.	3	111	136	17	18	6	6	.	.	.	.	11	2
Aberdeen, MD	.	3	.	.	55	14	4	2	.	2	.	.	.	.	.	.
FT Belvoir, VA	1	1	2	.	192	192	23	38	1	.	.	.	.	.	2	.
FT Bragg, NC	.	.	8	.	1,167	910	243	172	20	1	115	82	1	.	112	110
FT Drum, NY	.	.	.	.	107	112	6	6	.	.	.	.	.	1	.	1
FT Eustis, VA	2	.	.	.	153	144	19	30	1	.	.	.	.	.	3	38
FT Knox, KY	.	1	1	1	148	155	15	32	.	.	.	.	.	6	14	20
FT Lee, VA	1	1	.	.	129	145	24	29	.	.	.	.	.	.	1	5
FT Meade, MD	3	.	.	.	132	90	16	11	.	.	.	.	.	.	.	.
West Point, NY	24	4	.	.	33	20	1	2	.	.	.	.	.	.	4	3
GREAT PLAINS																
FT Sam Houston, TX	1	.	2	.	202	263	48	72	1	5	.	.	.	.	22	11
FT Bliss, TX	3	.	.	1	210	146	54	42	1	7	.	.	.	.	3	14
FT Carson, CO	.	.	1	4	470	508	61	70	.	.	59	18	.	.	.	.
FT Hood, TX	1	.	3	1	816	1,283	258	392	3	1	257	123	.	.	49	139
FT Huachuca, AZ	.	.	.	.	81	44	4	14	.	.	.	.	.	.	.	2
FT Leavenworth, KS	.	.	.	.	23	44	7	7	.	1	.	.	1	.	.	2
FT Leonard Wood, MO	.	.	1	1	153	186	40	38	.	2	.	.	.	.	8	18
FT Polk, LA	.	.	1	1	138	120	28	31	1	.	.	.	.	.	2	48
FT Riley, KS	1	.	1	.	157	179	40	60	.	.	.	.	.	4	22	11
FT Sill, OK	.	.	.	.	114	49	21	28	1	4	.	.	.	.	32	31
SOUTHEAST																
FT Gordon, GA	.	.	1	2	191	216	24	22	2	1	.	.	.	.	3	53
FT Benning, GA	.	.	2	2	207	163	88	42	.	1	.	.	.	.	74	85
FT Campbell, KY	.	2	2	1	561	437	106	58	1	.	.	.	.	1	88	68
FT Jackson, SC	.	.	1	.	133	152	30	24	1	.	.	1	1	.	61	6
FT Rucker, AL	.	.	.	.	42	19	11	5	.	.	.	.	.	.	4	.
FT Stewart, GA	.	3	.	.	311	194	138	78	3	4	39	10	.	1	46	39
WESTERN																
FT Lewis, WA	.	1	1	4	356	280	51	42	.	.	60	67	.	.	2	2
FT Irwin, CA	.	.	.	.	47	47	9	12	.	.	.	.	.	.	2	4
FT Wainwright, AK	.	.	2	.	115	99	9	8	.	1	.	.	16	5	.	.
OTHER LOCATIONS																
Hawaii	.	.	2	14	474	529	86	75	.	.	.	.	.	.	14	14
Europe	16	40	5	3	881	779	184	195	3	3	.	.	1	.	7	4
Korea	.	.	11	9	364	364	49	59	2	2	1	.	2	.	18	12
Total	**57**	**57**	**47**	**47**	**8,273**	**8,019**	**1,714**	**1,714**	**47**	**41**	**531**	**301**	**22**	**18**	**604**	**742**

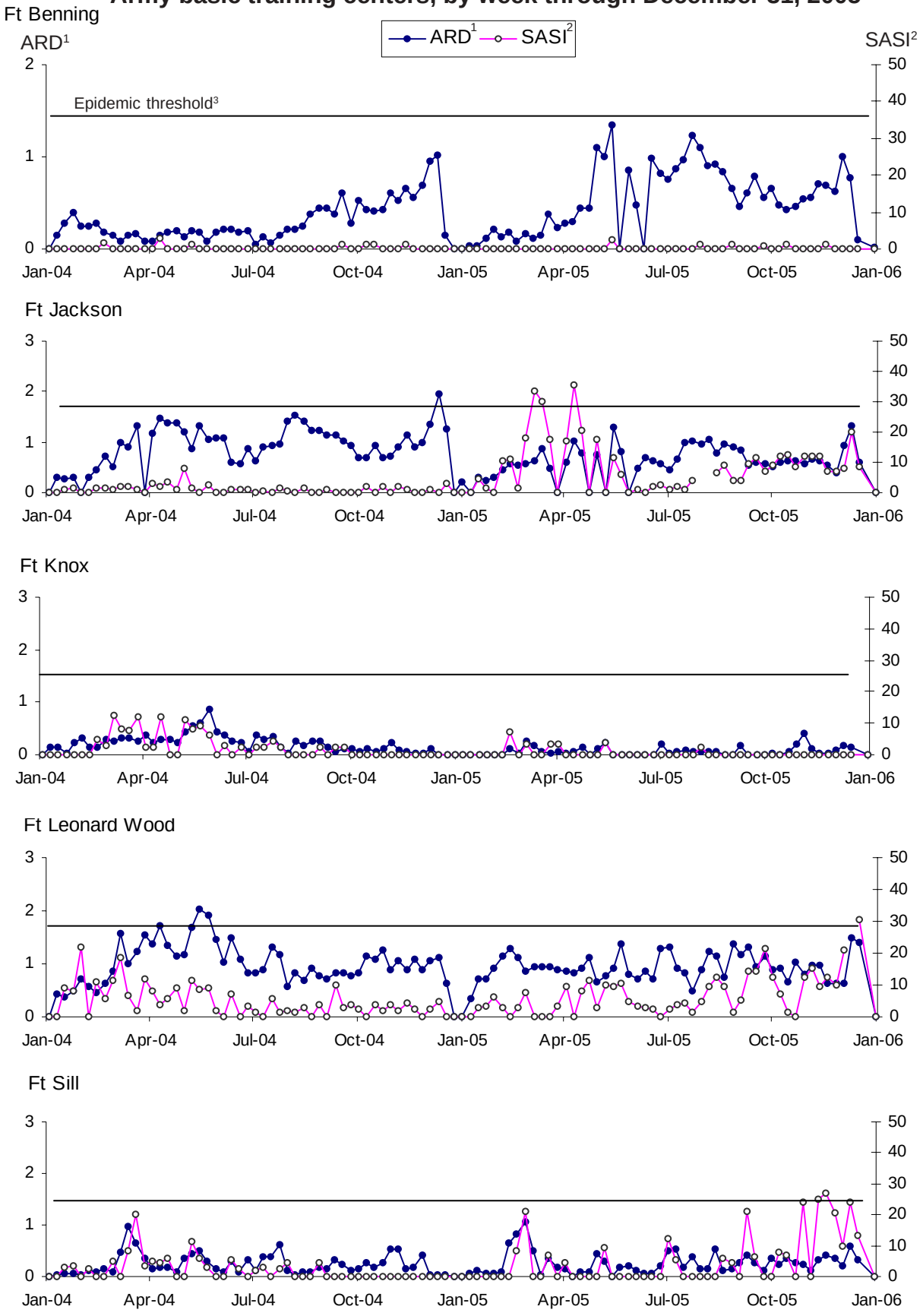
3. Primary and secondary.

4. Urethritis, non-gonococcal (NGU).

Note: Completeness and timeliness of reporting vary by facility.

Source: Army Reportable Medical Events System.

Acute respiratory disease (ARD) and streptococcal pharyngitis (SASI), Army basic training centers, by week through December 31, 2005



[1] ARD rate = cases per 100 trainees per week
[2] SASI (Strep ARD surveillance index) = (ARD rate)x(rate of Group A beta-hemolytic strep)
[3] ARD rate >=1.5 or SASI>=25.0 for 2 consectutive weeks indicates an "epidemic"

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