MSMR

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100TH ISSUE

Contents

Medical Surveillance Monthly Report (*MSMR*): The First 100 Issues and the Future

"If you have knowledge, let others light their candles with it." - Winston Churchill

To some degree, we are all hostages of limited experience. While we want to believe that things we have seen and done – and successes we have achieved– are generalizable to all other times, locations, and circumstances, events continuously remind us otherwise.

This is the 100th issue of the *Medical Surveillance Monthly Report* (*MSMR*). Since the first issue was published in April 1995, there has been a steady stream of unimaginable events with profound military medical significance, including the initiation and conduct of U.S. military operations in the Balkans; terrorist attacks on the United States (including the Pentagon) on 11 September 2001; the initiation and conduct of the global war on terrorism; widespread uses of vaccines for military-specific indications, including smallpox, anthrax, and tick-borne encephalitis; outbreaks of "mysterious" illnesses with unknown causes among deploying/deployed U.S. troops; life-threatening hyponatremia from excessive water consumption in heat stressful conditions; the reemergence of vivax malaria along the demilitarized zone in Korea; the loss of vaccines against adenovirus types 4 and 7 – and the reemergence of adenoviruses as significant causes of acute respiratory disease among military recruits; interrupted supplies of benzathine penicillin for preventing severe group A beta hemolytic streptococcal diseases among recruits; uses of the DoD Serum Repository for health surveillance, policymaking, and medical research purposes; outbreaks of community-acquired methicillin-resistant *S. aureus* (MRSA), particularly among recruits; routine health assessments before and after overseas deployments; numerous combat casualties, illnesses, and non-battle injuries during service in Afghanistan and Iraq, including wounds from conventional and improvised munitions, accidents, and endemic and nosocomial infections (e.g., leishmaniasis, malaria, multiple drug resistant *Acinetobacter baumanii*); greater appreciation of the scopes and consequences of post-traumatic stress reactions and emerging infections; and many others.

But how do military medical professionals learn of persistent and new health threats to military recruits; to deployed forces conducting combat, humanitarian, or peacekeeping operations overseas; to individuals recently returned from combat operations in Afghanistan or Iraq; to individuals stationed in Alaska, Korea, Japan, or aboard ships? How do they learn of military-specific preventive measures – and their desired (and potential adverse) effects?

For the past 12 years, the *MSMR* has attempted to inform its readers of the natures, distributions, and consequences of ongoing and new military-specific health threats – and the effects of countermeasures to them. To this end, the *MSMR* has routinely reported indicators and trends of the health of U.S. military members, including numbers of cases, rates, trends, and correlates of risk of various illnesses and injuries emphasizing their military public health and operational importance. Most reports in the *MSMR* have summarized records routinely collected and maintained in the Defense Medical Surveillance System. Many other reports – of unusual cases, disease clusters, and outbreaks, for example – have been submitted by military medical professionals throughout the world. In the first 100 issues of the *MSMR*, there have been approximately 240 reports of surveillance findings and/or results of preventive interventions, 50 reports of outbreaks (approximately 80% of infectious diseases), and 40 case/case series reports (approximately 85% of infectious diseases).

The 100th issue of the *MSMR* closes a chapter; the next issue of the *MSMR* starts a new one. In support of the vision to consolidate and improve health surveillance capabilities in the U.S. military, beginning in April, the *MSMR* will have a new appearance, a broader focus, a larger distribution, and improved accessibility. The "new" *MSMR* will no longer identify with a specific Service; instead, it will be a true Armed Forces health surveillance publication in support of a new organization, the Armed Forces Health Surveillance Center. Also, to the extent possible, reports will emphasize military relevance and be "action" oriented. For example, editorial comments will be responsive to the question, "Given these findings, what can/should be done to better prevent disease, promote health, and enhance military operational effectiveness?" For those who read the *MSMR* online or want to search past issues, there will be a new, user friendly website that will be frequently updated, easily accessed, and linked to other sources of useful military medical information.

The old *MSMR* has set the stage for a more informative and more useful new *MSMR*. We are proud of the past and enthusiastic about the future. Stay tuned – and thank you for your encouragement and support.

Relationships between the Timing and Causes of Hospitalizations Before and After Deploying to Iraq or Afghanistan, Active Components, U.S. Armed Forces, 2002-2005

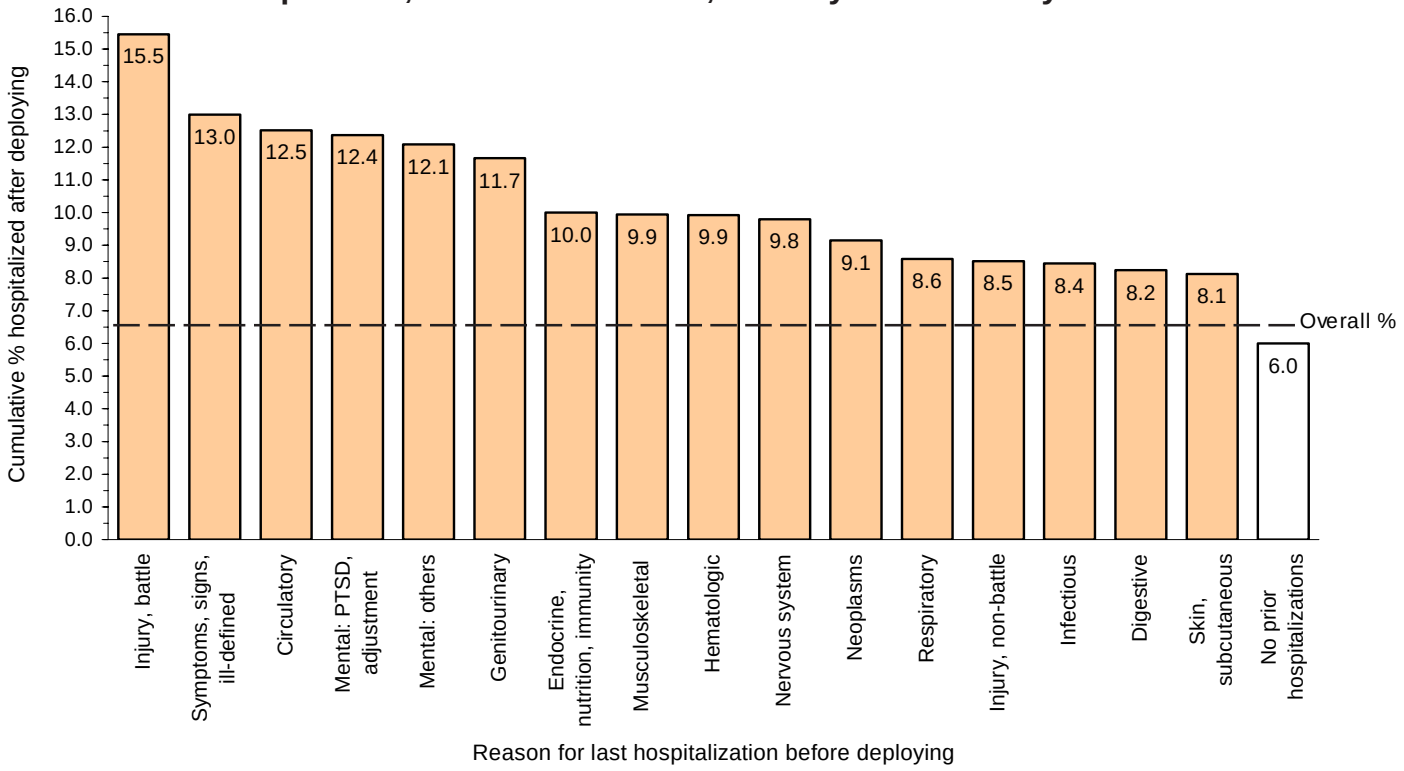
"Deployment health" seeks to enhance the health, fitness, and operational capabilities of participants in military operations overseas. As such, it is a focus of military public health practice.

Not surprisingly, during past military operations overseas, the medical experiences of participants prior to deploying have been determinants of their medical experiences during and after their deployments. For example, during the first Gulf War, the hospitalizations and care-seeking patterns of Gulf War participants before they deployed were strong predictors of their likelihood to seek care (through clinical registries) and to be hospitalized after they returned.[1-4] Also, among participants in peacekeeping operations in Bosnia-Herzegovina, the recency and causes of hospitalizations before deploying were significant determinants of rates and causes of hospitalizations during and after deployment.[5]

In regard to recent combat operations in Afghanistan and Iraq, self-reported indicators of health before deploying are used to assess risks of illnesses and injuries during and after deployment.[6,7] However, there have not been assessments of relationships between the predeployment hospitalization experiences of deployers and the frequencies, natures, and timing of their hospitalizations after deploying. For this report, we assessed relationships between the timing and causes of the most recent hospitalizations before deploying to Afghanistan or Iraq and rates of and reasons for first hospitalizations after deploying. We also estimated cumulative percentages of hospitalization at various times after deploying in relation to demographic and military characteristics of deployers and their prior hospitalization experiences. We anticipated that the findings would inform deployment health-related policies and practices.

***Methods*:** The surveillance population included all individuals in an active component of the U.S. Armed Forces who completed a deployment to Afghanistan or Iraq during the period 1 January 2002 to 31 December 2005. For each relevant deployment of an active military member, the last hospitalization before deploying and the first hospitalization after deploying (through January 2007) were identified. For each last hospitalization before deploying, the primary (first-listed) diagnosis and the number of days

Figure 1. Cumulative percent hospitalized after deploying to Afghanistan/Iraq, in relation to reason for last hospitalization before deploying, active components, U.S. Armed Forces, January 2002-January 2007



from hospital discharge to the date of deployment were ascertained. For each first hospitalization after deploying, the primary diagnosis and the number of days from the date of deployment to hospital admission were ascertained.

The cumulative percent hospitalized was used to summarize the hospitalization experiences of deployers at various times after deploying. It was calculated as the percent of deployers who were hospitalized at least once in a fixed medical facility at specified times (in days) after deploying. Of note, hospitalizations for illnesses and injuries that occurred in deployed medical facilities were not included if they did not result in medical evacuations to fixed medical facilities outside of Afghanistan or Iraq.

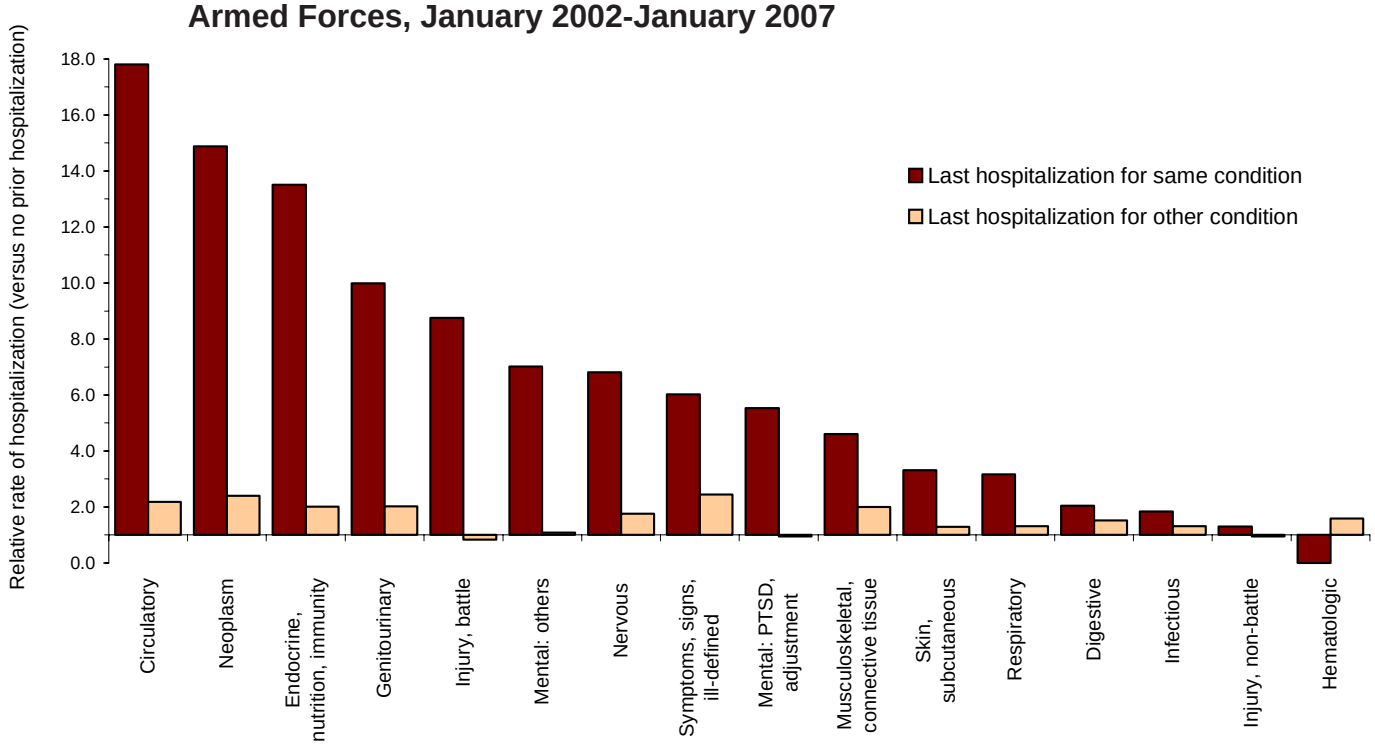
The reasons for hospitalizations were based on primary (first listed) diagnoses recorded on standardized hospitalization records. For summary purposes, primary diagnoses were grouped based on major diagnostic categories of the ICD-9-CM. Hospitalizations with "V" or "E codes" as primary diagnoses were excluded because they did not document current illnesses or injuries. Hospitalizations for "complications of pregnancy, childbirth, and the puerperium" (ICD-9-CM: 630-676) were also excluded. All data were derived from records in the Defense Medical Surveillance System.

***Results*:** During the surveillance period, there were 515,060 completed deployments to Afghanistan or Iraq by active military members. Approximately one-sixth (n=81,025; 15.7%) of all deployers were hospitalized at least once prior to deploying. Approximately one of 15 deployers (n=33,741; 6.6%) were hospitalized at least once during the surveillance period after deploying (Table 1).

Compared to their never-hospitalized counterparts, deployers who had been hospitalized before deploying were approximately 58% more likely to be hospitalized after deploying (cumulative percent hospitalized after deploying, by hospitalization experience before deploying: ever hospitalized: 9.5%; never hospitalized: 6.0%). Deployers whose most recent hospitalizations before deploying were for battle injuries; symptoms, signs, and ill-defined conditions; circulatory disorders; and mental disorders were more than twice as likely to be hospitalized after deploying than those with no prior hospitalizations (Figure 1).

In general, those most likely to be hospitalized for a given condition after deploying were those whose last hospitalizations before deploying were for the same condition; the next most likely were those whose last hospitalizations before deploying were for other conditions;

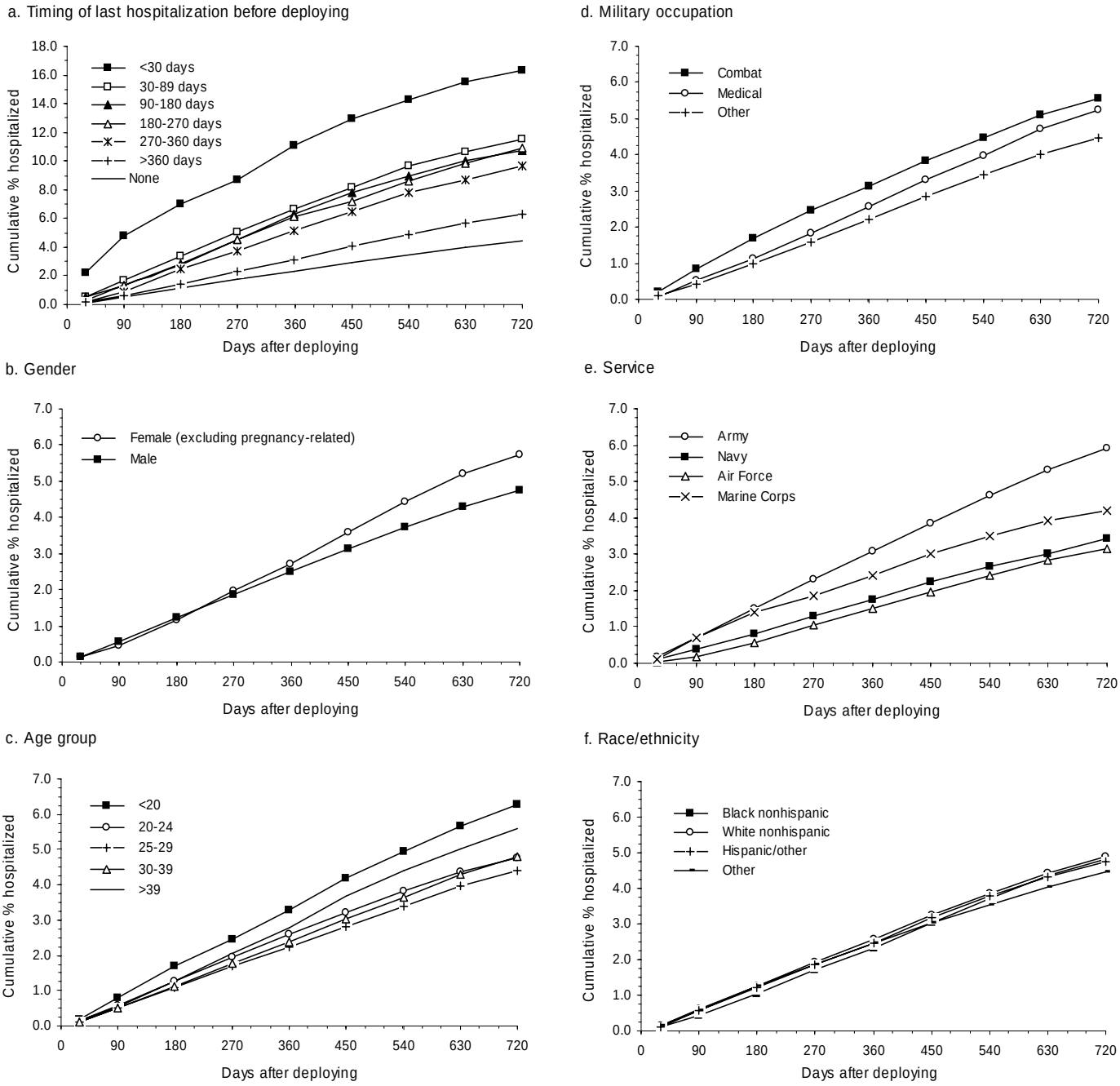
Figure 2. Relative rate of hospitalization for specific conditions among deployers to Afghanistan/Iraq (versus those with no prior hospitalizations), in relation to reason for last hospitalization before deploying, active components, U.S. Armed Forces, January 2002-January 2007



and the least likely were those who had never been hospitalized before deploying (Figure 2). In this regard, compared to those with no prior hospitalizations, deployers whose most recent predeployment hospitalizations were for "diseases of the circulatory system" were nearly 18-times more likely to be hospitalized for a circulatory disorder after deploying; and those whose most recent predeployment hospitalizations were for "neoplasms" were nearly 15-times more likely to be hospitalized for a "neoplasm" after deploying (Figure 2). Of note, those whose last hospitalizations before deploying were for "non-battle injuries" were only 29% more likely than their never hospitalized counterparts to be hospitalized for a non-battle injury after deploying (Figure 2).

There was a strong relationship between the recency of hospitalization before deploying and the risk of

Figure 3. Cumulative percent hospitalized, by time after deploying, by characteristics of deployers to Afghanistan/Iraq, active component, U.S. Armed Forces, January 2002-January 2007



hospitalization (for any cause) after deploying (cumulative percent hospitalized after deploying, by recency of last hospitalization before deploying: 1-30 days: 17.9%; 31-90 days: 14.1%; >90 days: 9.3%; no prior hospitalization: 6.0%). The increased risk of hospitalization among deployers who had most recently been hospitalized was apparent soon after deployment (Figure 3a). For example, the cumulative percent hospitalized was sharply higher – beginning within 30 days after deploying – among those who had been hospitalized within 30 days of deploying compared to all others (Figure 3a). In contrast, within 180 days after deploying, cumulative percents hospitalized were clearly lower among those who had not been hospitalized within a year or ever prior to deploying (Figure 3a).

Compared to their respective counterparts, cumulative percents hospitalized during the first two years after deploying were higher among soldiers and Marines (which were similar to each other through the first 180 days after deploying); those in combat-specific occupations; and those younger than 20 years old (Figure 3c-e). Of note, through the first 270 days after deploying, cumulative percents hospitalized were similar among females and males; those in medical occupations compared to those "other" non-combat-specific occupations; and those older than 39 years compared to those 20-24 years old (Figure 3b-d). However, after approximately one year of deployment, cumulative percents hospitalized were clearly higher among females than males, those in medical versus other non-combat occupations, and those older than 39 compared to those in their twenties and thirties (Figure 3b-d). Finally, throughout the first two years after deploying, there were minimal differences in cumulative percents hospitalized in relation to race/ethnicity (Figure 3f).

Data analysis by Stephen Taubman, PhD., Army Medical Surveillance Activity.

Editorial comment: This report documents that during operations in Iraq and Afghanistan, as during other large overseas operations, the nature and timing of last hospitalizations prior to deploying strongly predict the nature and timing of first hospitalizations after deploying. In particular, deployers who were discharged from hospitalizations within 30 days of deploying were at much higher risk than others of being hospitalized after deploying (beginning within the first month after deploying). On the other hand, deployers who had not been hospitalized for one year prior to deploying had nearly the same low risk of hospitalization after deploying as those who had never been hospitalized previously. Finally, as expected, risks of being hospitalized after deploying for various conditions were highest by far among deployers who were hospitalized for the same conditions prior to deploying.

Together, the findings suggest that some deployers who are recently discharged from hospitalizations before deploying may not be fully recuperated from – and thus may be at higher risk of relapses or recurrences of – the illnesses or injuries that resulted in their prior hospitalizations. In turn, during predeployment medical assessments, deployers should be asked about the timing and causes of their most recent hospitalizations. If they had been hospitalized within the past year, they should have detailed assessments of their post-hospitalization courses (including frequencies and severities of clinical relapses), ongoing rehabilitation and treatment regimens, the natures and severities of current physical and psychological disabilities, and military occupational limitations. Decisions regarding deployability should be made after such assessments.

This analysis only accounted for each deployer's last hospitalization before deploying and first hospitalization in a fixed medical facility after deploying. It is likely that more complete consideration of the medical histories of deployers (e.g., natures and frequencies of all medical encounters within the year or two prior to deploying) would be even more informative regarding risks of serious illnesses or injuries during deployments. We restricted this analysis to each deployer's most recent hospitalization before deploying because such information could be relatively easily ascertained (e.g., without accessing medical records) during predeployment medical assessments.

Because we only used hospitalizations in fixed medical facilities as end points, we did not account for illnesses or injuries that resulted in hospitalizations in Afghanistan or Iraq after which affected individuals returned to duty. Thus, most hospitalizations of deployed service members that we included as endpoints reflected medical evacuations from operational theaters –hence, the illnesses and injuries with the most significant operational impacts.

Finally, readers should be careful in interpreting the results of this analysis because first hospitalizations after deploying did not necessarily occur while service members were still deployed. Different relationships between subgroups in cumulative percents hospitalized over time may reflect differences in risk during deployment versus after returning from deployment.

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Table 1. Number and timing of first hospitalizations after deploying in relation to characteristics of deployers to Afghanistan/Iraq, active component, U.S. Armed Forces, 2002-2005

	Timing (in days) of first hospitalization after deploying										Total deployers	Deployers hospitalized any time after deploying	Percent hospitalized any time after deploying
	<30	30-89	90-180	180-360	360-450	450-540	540-630	630-720	>720	None			
Gender													
Male	624	2,011	3,027	5,917	2,960	2,784	2,618	2,083	7,833	434,150	464,007	29,857	6.4
Female	64	170	365	792	449	424	396	276	948	47,169	51,053	3,884	7.6
Age group													
<20	62	199	310	527	302	258	246	197	625	30,825	33,551	2,726	8.1
20-24	276	939	1,396	2,720	1,284	1,249	1,112	826	2,887	192,496	205,185	12,689	6.2
25-29	141	424	672	1,313	676	646	638	501	1,790	107,244	114,045	6,801	6.0
30-39	156	485	764	1,607	839	803	796	633	2,842	118,290	127,215	8,925	7.0
>39	53	134	250	542	308	252	222	202	637	32,464	35,064	2,600	7.4
Race ethnicity													
Black non-Hisp	109	303	594	1,255	683	669	610	466	1,951	90,545	97,185	6,640	6.8
White non-Hisp	482	1,493	2,267	4,417	2,180	2,075	1,956	1,541	5,574	312,833	334,818	21,985	6.6
Hispanic/other	57	249	333	660	374	318	294	228	848	49,410	52,771	3,361	6.4
Other	40	136	198	377	172	146	154	124	408	28,531	30,286	1,755	5.8
Service													
Army	517	1,483	2,260	4,493	2,242	2,176	2,050	1,638	6,448	262,052	285,359	23,307	8.2
Navy	31	86	121	280	141	125	99	118	293	28,018	29,312	1,294	4.4
Air Force	53	183	482	1,177	589	531	546	391	1,453	120,226	125,631	5,405	4.3
Marine Corps	87	429	529	759	437	376	319	212	587	71,023	74,758	3,735	5.0
Occupation													
Combat	311	1,022	1,382	2,322	1,090	1,049	982	730	2,791	148,403	160,082	11,679	7.3
Medical	23	121	174	406	213	182	211	153	592	26,126	28,201	2,075	7.4
Other	354	1,038	1,836	3,981	2,106	1,977	1,821	1,476	5,398	306,790	326,777	19,987	6.1
Status													
Officer	75	218	335	660	389	331	345	253	1,049	73,728	77,383	3,655	4.7
Enlisted	613	1,963	3,057	6,049	3,020	2,877	2,669	2,106	7,732	407,591	437,677	30,086	6.9
Last pre-deployment hospitalization													
<30 days	14	17	14	26	12	9	8	5	11	527	643	116	18.0
30-89 days	10	19	29	58	26	26	17	16	56	1,481	1,738	257	14.8
90-180 days	16	27	47	107	47	36	34	22	83	2,716	3,135	419	13.4
180-270 days	8	33	44	104	32	45	38	31	82	2,663	3,080	417	13.5
270-360 days	5	22	45	79	39	41	26	27	79	2,588	2,951	363	12.3
>360 days	115	315	556	1,147	671	582	572	436	1,710	63,374	69,478	6,104	8.8
None	520	1,748	2,657	5,188	2,582	2,469	2,319	1,822	6,760	407,970	434,035	26,065	6.0
Total	688	2,181	3,392	6,709	3,409	3,208	3,014	2,359	8,781	481,319	515,060	33,741	6.6

Stressors Prior to and Methods of Suicide, U.S. Air Force, 2000-2005

In 1994, 30% of non-hostile deaths among active members of the U.S. Air Force were caused by suicide.[1] The Air Force Suicide Prevention Program (AFSPP) was initiated in 1996 to provide early identification and intervention through a community network designed to channel airmen at risk of suicide to professional help.[2] A key component of the program is the Suicide Event Surveillance System (SESS). The SESS is a secure, central database that is used to track fatal and non-fatal self injuries and assess potential risk factors for suicide.[2] The SESS integrates data on suicide events with demographic and military information as well as personal, professional and military problems. This report summarizes frequencies and correlates of risk of suicide among active Air Force members during the past six years.

***Methods*:** The surveillance period was defined as 1 January 2000 to 31 December 2005. The surveillance population included all members of the U.S. Air Force who served in the active component during the surveillance period. Problems experienced by individuals prior to their self-inflicted deaths were ascertained during investigations of completed suicides by the Air Force Office of Special Investigations. All data were derived from the SESS.

***Results*:** From 2000 to 2005, the total number of completed suicides among active Air Force members was 216; the crude rate was 10 suicides per 100,000 person-years. The majority of suicide victims were male (n=200, 93%), younger than 30 years old (n=136, 63%) white, non-Hispanic (n=161, 75%), and enlisted (n=93, 91%). Suicide rates were higher among Airmen who were "divorced/separated" than others (data not shown).

Significant stressors prior to suicide events varied by gender. Among male suicide victims, the most frequently identified stressors were marital problems (n=108, 54%), work problems (n=85, 43%), military legal problems (n=70, 35%), financial difficulties (n=61, 31%) and criminal activities (n=54, 27%) (Figure 1). Among women, marital (n=8, 50%), work (n=7, 44%) and financial problems (n=6, 38%) were most frequently identified; however, mood disorders (n=7, 44%) and "other significant problems" (n=5, 31%) were also relatively frequent (Figure 1).

Prior suicide attempts were reported by approximately one-sixth (n=34, 15.7%) of all airmen who eventually committed suicide (data not shown). Histories of serious psychiatric illnesses were infrequent among suicide victims. In summary, among Air Force members overall, the most prevalent retrospectively identified stressor prior to suicide was marital problems (n=115, 53%) (Figure 1).

Finally, there were sharp differences in the methods of suicide between males and females (Figure 2). Firearms/explosives and poisoning/overdose were the most commonly used methods by male and female suicide victims, respectively (Figure 2).

Editorial comment: Between 1980 and 2003, rates of self-inflicted deaths among active U.S. military members have varied between 9.0 per 100,000 (in 2001) and 15.0 per 100,000 (in 1995).[3] For the past several decades, suicides have been the second or third leading cause of deaths (excluding those from hostile or terrorist acts) of U.S. service members.[3] Not surprisingly, the prevention of suicides among U.S. military members is a high priority.

Identification of risk factors for suicide can be used to design successful prevention efforts. For example, AFSPP leaders recognized in 1996 that legal military problems were a risk factor for suicide and implemented a policy to provide psychosocial support to airmen under investigation.[2] Rates of suicide declined in the Air Force (but not the other Services) in the immediate wake of implementing the AFSPP.[4] However, by 2000, suicide rates across the services were relatively similar. Several reports have documented the difficulties in attributing short-term variations in suicide rates in military populations to specific factors, including prevention programs.[5,6]

An important finding of this report is that more than half of all airmen who completed suicides during the 6-year surveillance period were found to have had marital problems prior to their suicides. Also, a relatively high proportion of Air Force suicide victims during the period were divorced or separated. The findings are consistent with those in other military populations and settings.[7,8] The military services should focus suicide prevention and other mental health intervention efforts on those (particularly young men) who are separated from their spouses, recently divorced, or having marital problems.

Report by Tiffany D'Mello, Ernest Williams IV and Capt Melinda Eaton, Air Force Institute of Operational Health, Brooks City-Base, Texas; and Lt Col Steven E. Pflanz , Air Force Medical Operations Agency, Washington, DC.

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Figure 1. Problems experienced by individuals prior to their suicides, by gender, U.S. Air Force, 2000-2005

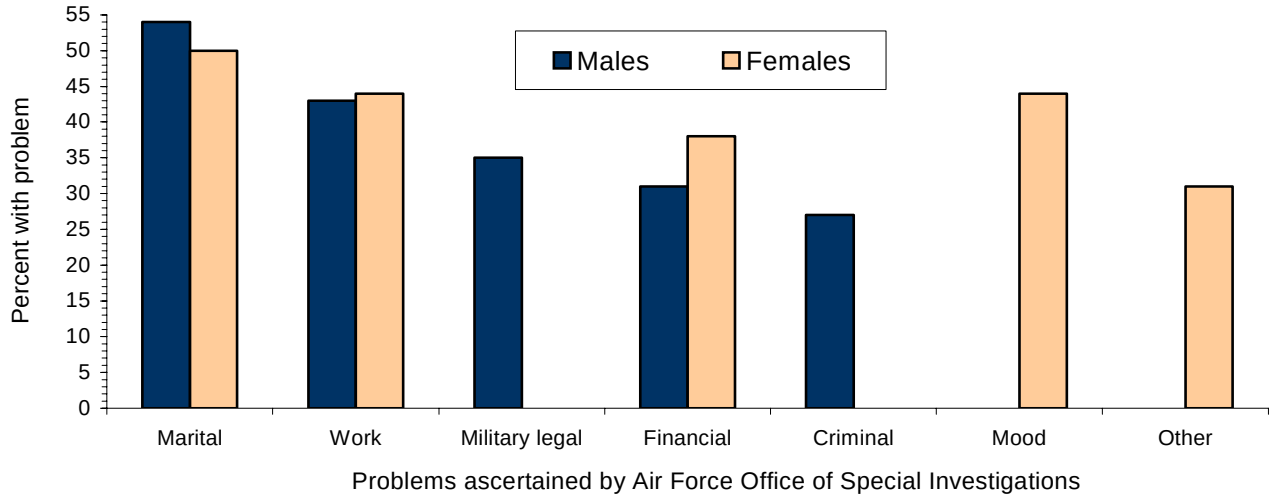
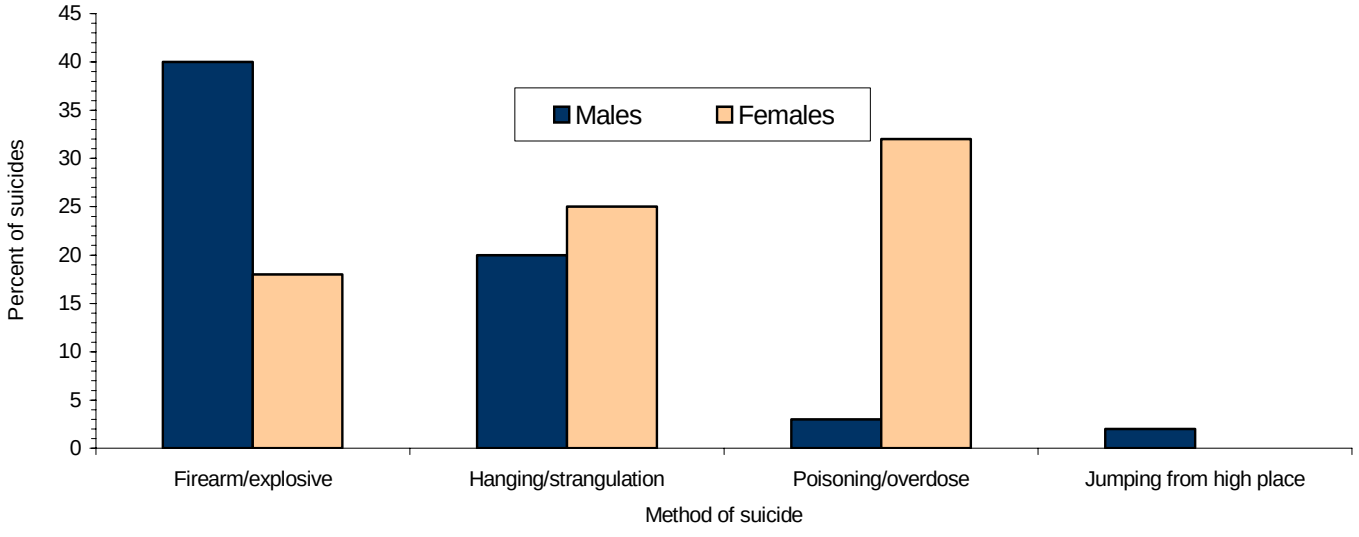


Figure 2. Method of self-inflicted death among members of U.S. Air Force, by gender, 2000-2005



Concordance of Measles and Rubella Immunity with Immunity to Mumps, Enlisted Accessions, U.S. Armed Forces, 2000-2004

In 1989, the U.S. Army, Navy, Air Force and Marine Corps began to immunize all newly enlisted recruits with a measles, mumps and rubella (MMR) combination vaccine. In the 1990s, the Air Force began a new cost-saving policy of administering the MMR vaccine only to those recruits who lack immunity to measles or rubella, determined by serological screening using EIA qualitative IgG assays. Recent outbreaks of mumps among civilian populations have evoked concerns that the results of serological screening for only measles and rubella immunity may not correlate with mumps immunity[1,2,3]. In response, the Air Force began screening for immunity to mumps in addition to measles and rubella.

In late 2005, the Army also shifted its policy from universal MMR immunization to serological testing for immunity to measles and rubella prior to immunization.[4,5] However, the Army does not screen for immunity to mumps. To respond to concerns regarding mumps outbreaks and assess the costs and potential benefits of screening for mumps immunity, the Military Vaccine Agency (MILVAX) asked the Army Medical Surveillance Activity (AMSA) to assess the concordance of measles and rubella immunity with mumps immunity among enlisted recruits who entered active duty from 2000-2004.

Methods: The Defense Medical Surveillance System (DMSS) was used to define a five-year retrospective cohort of enlisted recruits, aged 17-29 years, who entered the active components of the Air Force, Army, Navy, or Marine Corps between 1 January 2000 and 31 December 2004. From this cohort, 3,000 recruits with a Military Entrance Processing Station (MEPS) serum specimen available were randomly selected for analysis. The sampling method required equal numbers of recruits (n=750) into each of the following groups: Air Force foreign origin (AFF), Air Force U.S. origin (AFUS), Army/Navy/Marine Corps foreign origin (ANMF), and Army/Navy/Marine Corps U.S. origin (ANMUS). Foreign origin was defined as being foreign born or having a foreign location of home of record upon entry to military service. This selection strategy was used to account for differences in immunization policies between the services and in immunization requirements inside and outside of the United States.

Serum was tested by commercially available ELISA test kits for measles, mumps, and rubella IgG at the Epidemiological Surveillance Division at the Air Force Institute of Operational Health, Brooks City Base, Texas. Qualitative results of immunity to each virus were merged with demographic data in DMSS. Initially indeterminate or negative results were re-tested and considered negative if the second test was indeterminate or negative.

***Results*:** The percentage of recruits with measles and rubella (MR) concordant immunity and measles, rubella, and mumps (MMR) concordant immunity by calendar year and group are presented in Figure 1. On average, the percentage of recruits with serological evidence of MR concordant immunity was 85, 82, 85, and 80% for AFF, AFUS, ANMF, ANMUS, respectively. The average MMR concordant immunity among recruits was 81, 77, 82, and 74% for AFF, AFUS, ANMF, ANMUS, respectively. For all groups except ANMUS, the percentage of recruits with MR concordance was not statistically significantly different than MMR concordance (data not shown). The percentage of foreign origin recruits with MR and MMR concordant immunity was statistically similar to the percentage of U.S. origin recruits (data not shown).

Measles and rubella immunity was highly predictive of mumps immunity among all 4 groups. The positive predictive values were 95.0, 93.5, 96.1, and 92.2% for AFF, AFUS, ANMF, ANMUS, respectively (Table 1).

Editorial comment: This serosurveillance found evidence of mumps immunity in over 90% of recruits with measles and rubella immunity. These findings support the policy of MMR vaccination based solely on screening for measles and rubella. The addition of mumps screening would result in immunization of an additional 4-8% of recruits (which may or may not prevent additional cases of mumps). Given the high rates of immunization (i.e., herd immunity) and the very low numbers of reported mumps cases among service members, the addition of mumps screening would likely have minimal benefit.

For this investigation, testing was limited (due to funding constraints) to a subset of all recruits who entered service during the surveillance period. Although random sampling was used, it is possible that the subset was not representative of the entire recruit cohort.

Finally, this investigation demonstrates the unique and

Figure 1. Percentage of recruits with immunity to measles and rubella (MR) and measles, mumps, and rubella (MMR) by service, origin, and calendar year, 2000-2004

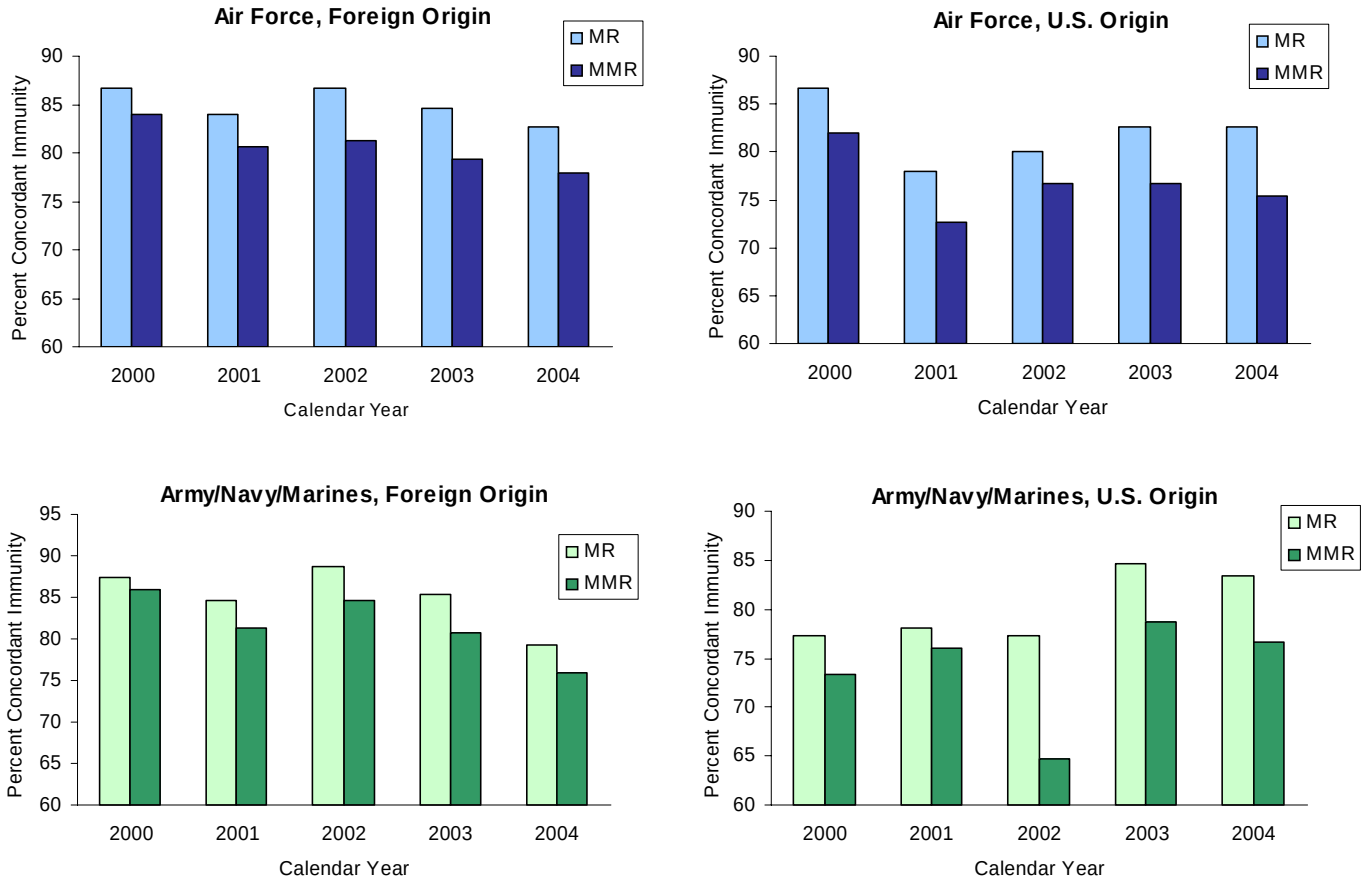


Table 1. Positive predictive value of measles and rubella immunity for mumps immunity by service and origin, enlisted recruits, U.S. Armed Forces, 2000-2004

	Number of measles and rubella IgG positives (M+R+)	Among M+R+, number of mumps IgG positives (M+R+Mu+)	Positive predictive value (%)
Air Force			
- Foreign origin	637	605	95.0
- U.S. origin	615	575	93.5
Army, Navy, Marine Corps			
- Foreign origin	638	613	96.1
- U.S. origin	601	554	92.2

powerful serosurveillance capabilities that are available by combining data in the DMSS and serum in the DoD Serum Repository. Findings of serum surveillance investigations such as this are invaluable to military health planners, policymakers, and practitioners.

Study design and analysis by Dr. Angie Eick and CPT Remington Nevin. Acknowledgements: Ms. Sylvia Trevino and the Air Force Institute of Operational Health for providing the laboratory testing for this investigation; and COL(Ret) Grabenstein, COL Anderson, LTC Ford, and Ms. Hayley Hughes of the MILVAX Agency for their assistance.

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Vaccine-preventable Diseases, Active Service Members and other Beneficiaries, of the U.S. Military Health System, 2005-2006

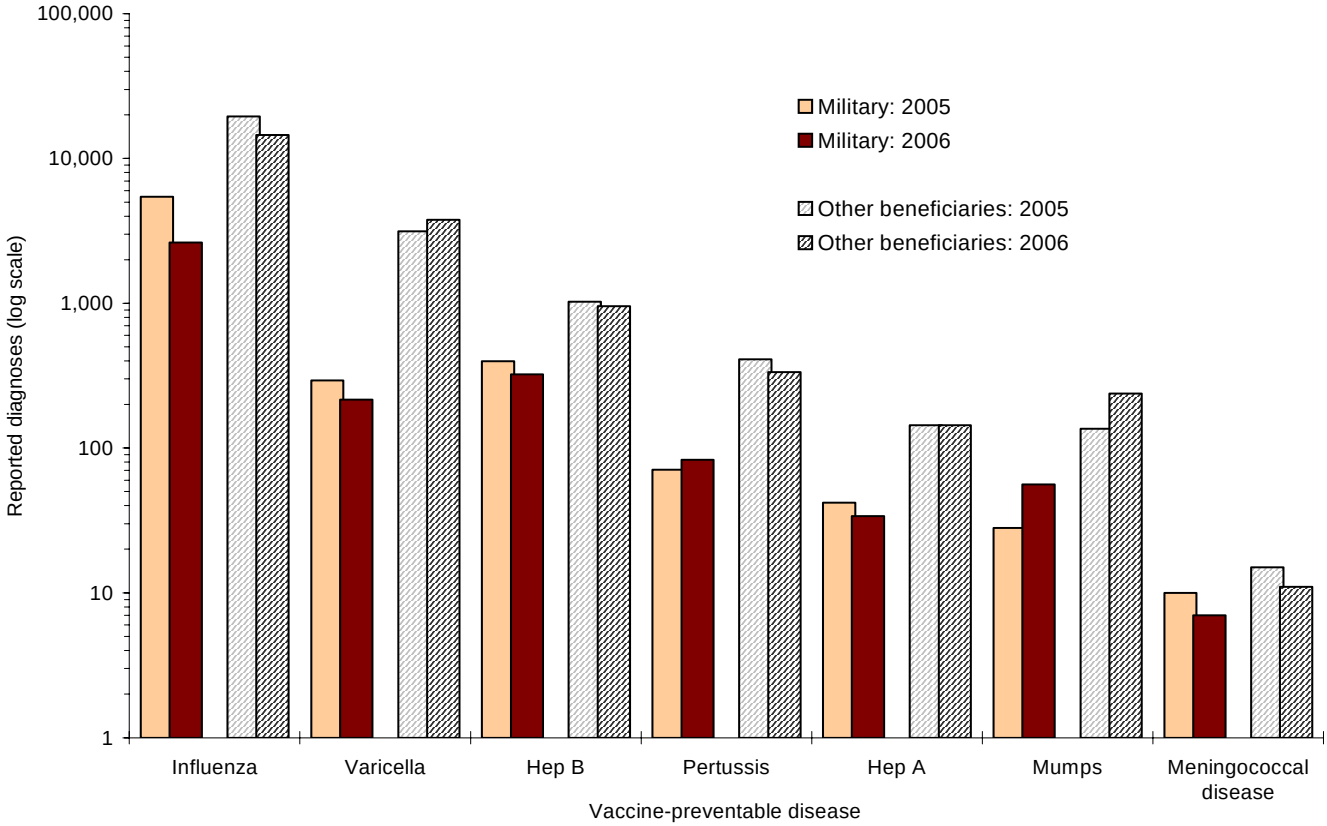
All enlisted accessions to the U.S. military are immunized against influenza, measles, rubella, and meningococci (serogroups A, C, Y, and W135).[1] Since 1999 and 2002, respectively, vaccinations against varicella and hepatitis B have been required of all recruits who lack evidence of immunity.[2,3] During service, all military members receive annual immunizations against influenza and periodic boosters to maintain immunity against tetanus.[1] In April 1995, the Department of Defense began a phased program to achieve immunity of all service members against hepatitis A.[4,5] In addition, children in the U.S. under 6-years old, including the family members of military service members, are vaccinated against vaccine-preventable diseases as part of national and local government disease-elimination programs.

This report updates estimates of frequencies and incidence rates of seven vaccine-preventable diseases among active U.S. military personnel in 2005 and 2006. These estimates are compared with those for 1998-2004, previously published in the *MSMR*.[6] This report also summarizes frequencies of diagnoses of vaccine-preventable diseases among all other beneficiaries of the U.S. Military Health System (e.g., family members, retirees) and demographic characteristics of both service members and beneficiaries who were diagnosed with selected vaccine preventable diseases in 2005 and 2006.

Methods: The Defense Medical Surveillance System (DMSS) was searched to identify the earliest report of a clinical diagnosis of each selected vaccine preventable disease per U.S. service member and other beneficiary between 1 January 2005 and 31 December 2006. Frequencies were summarized for both service members and other beneficiaries; however, incidence rates were calculated for service members only.

Cases of varicella (ICD-9-CM: 052), pertussis (ICD-9: 033), mumps (ICD-9: 072), influenza (ICD-9: 487), hepatitis B (ICD-9: 070.2, 070.3), and hepatitis A (ICD-9: 070.0, 070.1) were defined by primary (first-listed) diagnoses during hospitalizations or ambulatory visits or by notifiable medical event reports. When multiple records were

Figure 1. Reported diagnoses of selected vaccine preventable diseases among military members and other beneficiaries of the U.S. Military Health System, 2005-2006



available for a single case, an inpatient or reportable event record was used as the definitive source of case information. Cases of meningococcal disease (ICD-9: 036.0 through 036.3) were defined from hospitalization or reportable event records only. The demographic and/or military characteristics of cases at times of diagnoses were estimated from personnel records maintained in the DMSS.

***Results*:** In 2005 and 2006, the most frequently diagnosed vaccine preventable diseases among service members and other beneficiaries of the U.S. Military Health System were influenza, varicella, and hepatitis B (Tables 1,2; Figure 1). For each of these diseases, rates declined or were relatively stable among service members between 2004 and 2006.

In contrast, in 2006 compared to 2005, the incidence rate of mumps among service members approximately doubled, and the rate of pertussis increased by approximately 18% (continuing a generally increasing trend) (Table 1, Figure 1).

Findings related to each of the vaccine-preventable diseases of interest for this report follow:

Influenza: Among service members, there were 2,628 reports of influenza in 2006 –approximately half as many as in 2005 and fewer than in any of the previous 8 years.[6] The highest subgroup-specific rates of influenza in 2006 were among females, black non-Hispanics, and members of the Marine Corps (Table 1). Among other beneficiaries, the number of influenza diagnoses decreased from 2005 to 2006 by approximately 26% overall, 32% among females, and 41% among adults older than 18 (Table 2). Of interest, the number of influenza diagnoses among infants (<12 months old) increased by more than 15% from 2005 to 2006 (Table 2).

Varicella: Among service members, there were 216 reports of varicella in 2006 – approximately 25% less than in 2005 (Table 1). The decline in the rate of varicella

Table 1. Frequencies and rates of selected vaccine preventable diseases, by demographic characteristics, active components, U.S. Armed Forces, 2006

	Influenza					Varicella					Hepatitis B w/o coma				
	2005		2006		Rate	2005		2006		Rate	2005		2006		Rate
	Cases	Rate[1]	Cases	Rate[1]	ratio[2]	Cases	Rate	Cases	Rate[1]	ratio[2]	Cases	Rate	Cases	Rate[1]	ratio[2]
Total	5,441	395.4	2,628	193.1	0.49	293	21.3	216	15.9	0.75	398	28.9	324	23.8	0.82
Gender															
Female	1,199	596.2	571	289.0	0.48	62	30.8	47	23.8	0.77	66	32.8	69	34.9	1.06
Male	4,242	361.0	2,057	176.8	0.49	231	19.7	169	14.5	0.74	332	28.3	255	21.9	0.78
Age group															
<20	328	255.7	185	151.6	0.59	30	23.4	18	14.8	0.63	13	10.1	13	10.7	1.05
20-24	1,571	326.9	839	176.5	0.54	79	16.4	56	11.8	0.72	96	20.0	86	18.1	0.91
25-29	1,319	469.0	605	212.0	0.45	59	21.0	46	16.1	0.77	97	34.5	65	22.8	0.66
30-34	938	477.8	416	216.4	0.45	56	28.5	48	25.0	0.88	60	30.6	60	31.2	1.02
35-39	702	427.9	327	202.6	0.47	36	21.9	29	18.0	0.82	61	37.2	44	27.3	0.73
40+	583	463.7	256	205.2	0.44	33	26.2	19	15.2	0.58	71	56.5	56	44.9	0.79
Race/ethnicity															
Asian/Pacific Isl	228	350.6	125	188.4	0.54	29	44.6	10	15.1	0.34	147	226.1	104	156.7	0.69
Black	1,074	438.8	571	240.5	0.55	61	24.9	59	24.9	1.00	132	53.9	110	46.3	0.86
Hispanic	507	377.0	240	172.8	0.46	33	24.5	20	14.4	0.59	24	17.8	24	17.3	0.97
Am Indn/Alaskn	68	285.6	32	131.5	0.46	2	8.4	1	4.1	0.49	1	4.2	5	20.5	4.89
Other	28	480.0	14	220.3	0.46	2	34.3	1	15.7	0.46	3	51.4	3	47.2	0.92
White	3,433	393.7	1,584	183.9	0.47	159	18.2	115	13.3	0.73	83	9.5	68	7.9	0.83
Unknown	103	339.3	62	236.1	0.70	7	23.1	10	38.1	1.65	8	26.3	10	38.1	1.45
Service															
Army	2,088	429.7	1,081	219.5	0.51	117	24.1	89	18.1	0.75	168	34.6	120	24.4	0.70
Air Force	1,161	323.9	532	153.8	0.47	55	15.3	47	13.6	0.89	129	36.0	92	26.6	0.74
Marine Corps	1,813	513.0	816	236.8	0.46	78	22.1	61	17.7	0.80	72	20.4	85	24.7	1.21
Navy	379	212.5	199	111.7	0.53	43	24.1	19	10.7	0.44	29	16.3	27	15.2	0.93

[1] Rates are expressed as cases per 100,000 person-years

[2] Rate ratios are rates in 2006 divided by corresponding rates in 2005

diagnoses in 2006 continued a 10-year declining trend. In 2006, the highest subgroup specific rates of varicella among service members were among females, black non-Hispanics, and 30-34-year olds (Table 1). Rates were higher in the Army and Marine Corps than the Air Force and Navy (Table 1). Among beneficiaries, there were approximately 20% more diagnoses of varicella in 2006 than 2005. The highest relative increases (approximately 30%) in varicella diagnoses from 2005 to 2006 were among children younger than 7 years (Table 2).

Hepatitis B: Among service members, there were 324 reports of hepatitis B in 2006 – approximately 18% less than in 2005 (Table 1). In 2006, the crude rate of diagnoses of hepatitis B among service members (23.8 per 100,000 person-years [p-yrs]) was lower than the relatively stable rate during the previous 9 years (30-40 cases per 100,000 p-yrs). In 2006, the highest subgroup specific rate of hepatitis B among service members was among Asians/Pacific Islanders (156.7 per 100,000 p-yrs) (Table 1). Among beneficiaries, in 2006 compared to 2005, reported diagnoses of hepatitis B declined by approximately 7% overall but 24% among 7-18 year olds.

Mumps: Among service members, there were 56 reports of mumps in 2006 – twice as many as in 2005 and more than in any of the previous 8 years (Table 1). In 2006, rates of mumps diagnoses were similar among male and female service members; however, the overall increase in mumps diagnoses from 2005 to 2006 was entirely attributable to a 2.55-fold increase among males (Table 1). The highest subgroup-specific rates of mumps in 2006 were among Native American/Alaskan and Asian/Pacific Islander service members (based on 4 and 3 cases, respectively) (Table 1). Crude rates of mumps diagnoses were somewhat higher in the Army and Marine Corps than the Air Force and Navy (Table 1). Among other beneficiaries, from 2005 to 2006, mumps diagnoses

Table 1 continued. Frequencies and rates of selected vaccine preventable diseases, by demographic characteristics, active components, U.S. Armed Forces, 2006

	Pertussis					Hepatitis A w/o coma					Mumps					Meningococcal disease				
	2005		2006		Rate	2005		2006		Rate	2005		2006		Rate	2005		2006		Rate
	Cases	Rate	Cases	Rate[1]	ratio[2]	Cases	Rate	Cases	Rate[1]	ratio[2]	Cases	Rate	Cases	Rate[1]	ratio[2]	Cases	Rate	Cases	Rate[1]	ratio[2]
	71	5.2	83	6.1	1.18	42	3.1	34	2.5	0.82	28	2.0	56	4.1	2.02	10	0.7	7	0.5	0.71
	17	8.5	20	10.1	1.20	9	4.5	8	4.0	0.90	9	4.5	8	4.0	0.90	0	0.0	0	0.0	~
	54	4.6	63	5.4	1.18	33	2.8	26	2.2	0.80	19	1.6	48	4.1	2.55	10	0.9	7	0.6	0.71
	3	2.3	10	8.2	3.50	2	1.6	4	3.3	2.10	0	0.0	4	3.3	~	1	0.8	4	3.3	4.21
	19	4.0	25	5.3	1.33	7	1.5	7	1.5	1.01	10	2.1	19	4.0	1.92	6	1.2	2	0.4	0.34
	16	5.7	7	2.5	0.43	10	3.6	6	2.1	0.59	7	2.5	15	5.3	2.11	0	0.0	1	0.4	~
	12	6.1	9	4.7	0.77	11	5.6	6	3.1	0.56	4	2.0	8	4.2	2.04	1	0.5	0	0.0	0.00
	5	3.0	15	9.3	3.05	8	4.9	6	3.7	0.76	4	2.4	6	3.7	1.52	1	0.6	0	0.0	0.00
	16	12.7	17	13.6	1.07	4	3.2	5	4.0	1.26	3	2.4	4	3.2	1.34	1	0.8	0	0.0	0.00
	3	4.6	1	1.5	0.33	4	6.2	2	3.0	0.49	2	3.1	4	6.0	1.96	0	0.0	0	0.0	~
	15	6.1	10	4.2	0.69	13	5.3	9	3.8	0.71	3	1.2	8	3.4	2.75	1	0.4	1	0.4	1.03
	5	3.7	8	5.8	1.55	6	4.5	3	2.2	0.48	1	0.7	5	3.6	4.84	2	1.5	0	0.0	0.00
	1	4.2	2	8.2	1.96	0	0.0	2	8.2	~	1	4.2	3	12.3	2.93	0	0.0	0	0.0	~
	0	0.0	0	0.0	~	0	0.0	0	0.0	~	0	0.0	0	0.0	~	0	0.0	0	0.0	~
	47	5.4	60	7.0	1.29	16	1.8	18	2.1	1.14	21	2.4	34	3.9	1.64	7	0.8	6	0.7	0.87
	0	0.0	2	7.6	~	3	9.9	0	0.0	0.00	0	0.0	2	7.6	~	0	0.0	0	0.0	~
	27	5.6	27	5.5	0.99	25	5.1	12	2.4	0.47	9	1.9	22	4.5	2.41	4	0.8	5	1.0	1.23
	23	6.4	21	6.1	0.95	6	1.7	8	2.3	1.38	4	1.1	13	3.8	3.37	2	0.6	0	0.0	0.00
	19	5.4	30	8.7	1.62	6	1.7	10	2.9	1.71	10	2.8	16	4.6	1.64	3	0.8	0	0.0	0.00
	2	1.1	5	2.8	2.50	5	2.8	4	2.2	0.80	5	2.8	5	2.8	1.00	1	0.6	2	1.1	2.00

Table 2. Frequencies of selected vaccine preventable diseases among non-military beneficiaries of the U.S. Military Health System, by gender and age, 2005 and 2006

	Influenza			Varicella			Hep B w/o coma			Pertussis			Hep A w/o coma			Mumps			Meningococcal disease		
	2005	2006	Ratio[1]	2005	2006	Ratio[1]	2005	2006	Ratio[1]	2005	2006	Ratio[1]	2005	2006	Ratio[1]	2005	2006	Ratio[1]	2005	2006	Ratio[1]
Gender																					
Female	14,762	10,057	0.68	1,698	2,009	1.18	929	864	0.93	270	228	0.84	125	123	0.98	99	159	1.61	8	8	1.00
Male	4,794	4,487	0.94	1,433	1,762	1.23	94	90	0.96	141	107	0.76	19	21	1.11	37	80	2.16	7	3	0.43
Age group																					
<12 mos	736	851	1.16	479	625	1.30	5	6	1.20	68	62	0.91	1	7	7.00	3	4	1.33	3	0	0.00
1-6 yrs	1,949	2,007	1.03	897	1,158	1.29	7	10	1.43	47	30	0.64	2	13	6.50	25	55	2.20	3	2	0.67
7-18 yrs	5,416	4,938	0.91	1,348	1,571	1.17	63	48	0.76	153	102	0.67	12	13	1.08	32	75	2.34	5	2	0.40
> 18 yrs	11,455	6,748	0.59	407	417	1.02	948	890	0.94	143	141	0.99	129	111	0.86	76	105	1.38	4	7	1.75
Total	19,556	14,544	0.74	3,131	3,771	1.20	1,023	954	0.93	411	335	0.82	144	144	1.00	136	239	1.76	15	11	0.73

[1] Ratios are cases in 2006 divided by cases in 2005.

increased by approximately 76% overall but more than doubled among children from 1-18 years old (Table 2).

Pertussis: Among service members, there were 83 reports of pertussis in 2006 – 18% more than in 2005, continuing a generally increasing trend during the past decade (Table 1). Subgroup-specific rates of pertussis in 2006 were highest among females and service members older than 39 years (Table 1). Among other beneficiaries, from 2005 to 2006, pertussis diagnoses declined overall as well as in each demographic subgroup (Table 2).

Hepatitis A: Among service members, there were 34 reports of hepatitis A in 2006 – 18% less than in 2005, continuing a 9-year declining trend (Table 1). Rates of hepatitis A diagnoses were higher among females than males and increased with age over 20 (Table 1). Among other beneficiaries, there were the same number of reports of hepatitis A diagnoses in 2006 as in 2005 (Table 2). Of note, however, in 2006 compared to 2005, there were 6.7-times more hepatitis A diagnoses among children younger than 6 years – but 14% fewer among adults older than 18 years (Table 2).

Meningococcal disease: Among service members, there were 7 reports of meningococcal disease in 2006. From 1998 to 2006, there were between four (in 2004) and 15 (in 2000) cases per year of meningococcal disease among service members. In 2006, all cases of meningococcal disease among service members were males – most were white non-Hispanic and younger than 25 years (Table 1). Among other beneficiaries, there were 11 hospitalizations (or notifiable cases) of meningococcal disease in 2006 (compared to 15 in 2005) (Table 2). Of interest, most other beneficiaries with meningococcal disease in 2006 were females (73%) and older than 18 years (64%) (Table 2).

Editorial comment: For this report, cases of vaccine preventable diseases were ascertained from first-listed diagnoses during hospitalizations, reports of notifiable medical events, and in some cases, ambulatory visits. There are important limitations to this report that should be considered while interpreting the findings.

Vaccine-preventable illnesses that were reported with diagnostic codes specific to their clinical manifestations (e.g., pneumonia, bronchitis) rather than their etiologies (e.g., influenza, pertussis) were not included in this summary. The effect would be underestimation of the "true" number of vaccine-preventable cases.

On the other hand, some reports of vaccine-preventable illnesses (particularly those documented on ambulatory visit records only) reflect clinical diagnoses (e.g., influenza-like illness) without laboratory confirmation. Also, in the past, care providers have reported medical encounters during which immunizations were given using diagnostic codes for the targeted diseases themselves. In summary, some cases included in this report are likely "false positives."

Finally, in recent years, the military health system has increased its capabilities to identify the etiologies of influenza-like and other acute febrile illnesses.[7] In turn, trends in the numbers and rates of influenza, pertussis, and other vaccine-preventable illnesses may reflect, at least in part, improvements in the characterization and reporting of such cases. Assessments of temporal trends of specific

conditions should account for potential changes in case ascertainment and reporting.

With these caveats in mind, several general findings from this summary are noteworthy.

First, rates of many common vaccine-preventable diseases (varicella, hepatitis A, hepatitis B) have generally declined among service members during the past nine years. The results undoubtedly reflect the effects of relatively recent changes in vaccination policies and practices.

Second, there were sharp increases in mumps between 2005 and 2006 among active military and other beneficiaries of the Military Health System. These increases were temporally related to outbreaks of mumps in non-military populations of the U.S. (particularly college-aged residents of six midwestern states) during 2006.

Third, in 2006 as in recent prior years, diagnoses of pertussis increased among U.S. service members. The finding is consistent with the increasing trend (since the early 1990s) of reported cases of pertussis in the U.S. overall.[8,9] Because immunity to pertussis wanes over time, most service members – regardless of their vaccination histories – are immunologically susceptible to pertussis when they enter military service. The 2005 recommendations from the Centers for Disease Control and Prevention for vaccination of adolescents may improve prevention of pertussis among service members – and prevent transmissions of *B. pertussis* from service members to their infant children.[8,9] In 2006, the U.S. military medical departments began transitioning from TD (tetanus-diphtheria) to TDAP (tetanus-diphtheria-acellular pertussis) vaccinations for all incoming recruits and routine 10-year boosters. Of note in this regard, between 2005 and 2006, diagnoses of pertussis decreased in each demographic subgroup of non-military beneficiaries of the Military Health System.

Fourth, meningococcal disease cases continue to be infrequent and sporadic among active military and other beneficiaries of the Military Health System. Because all recruits are immunized against serogroups A, C, Y, and W135 of *N. meningitidis*, it is likely that most cases of meningococcal disease that do occur among service members are caused by serogroup B strains (and thus are not "vaccine-preventable").[10]

Finally, even with more widespread and more intense surveillance, there were relatively few cases of influenza among active military and other beneficiaries in 2006. The finding should not encourage complacency regarding either the threat of influenza or the importance of surveillance because new strains (with different transmissibility and virulence characteristics) circulate and new vaccines (with different components) are deployed each year.

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Update: Pre- and Post-Deployment Health Assessments, U.S. Armed Forces, January 2003-January 2007

The June 2003 issue of the *MSMR* summarized the background, rationale, policies, and guidelines related to pre-deployment and post-deployment health assessments of service members.[1-10] Briefly, prior to deploying, the health of each service member is assessed to ensure his/her medical fitness and readiness for deployment. At the time of redeployment, the health of each service member 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 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 service members (e.g., hospitalizations, ambulatory visits, immunizations).[11] The continuously expanding DMSS database can be used to monitor the health of service members who participated in major overseas deployments.[11-14]

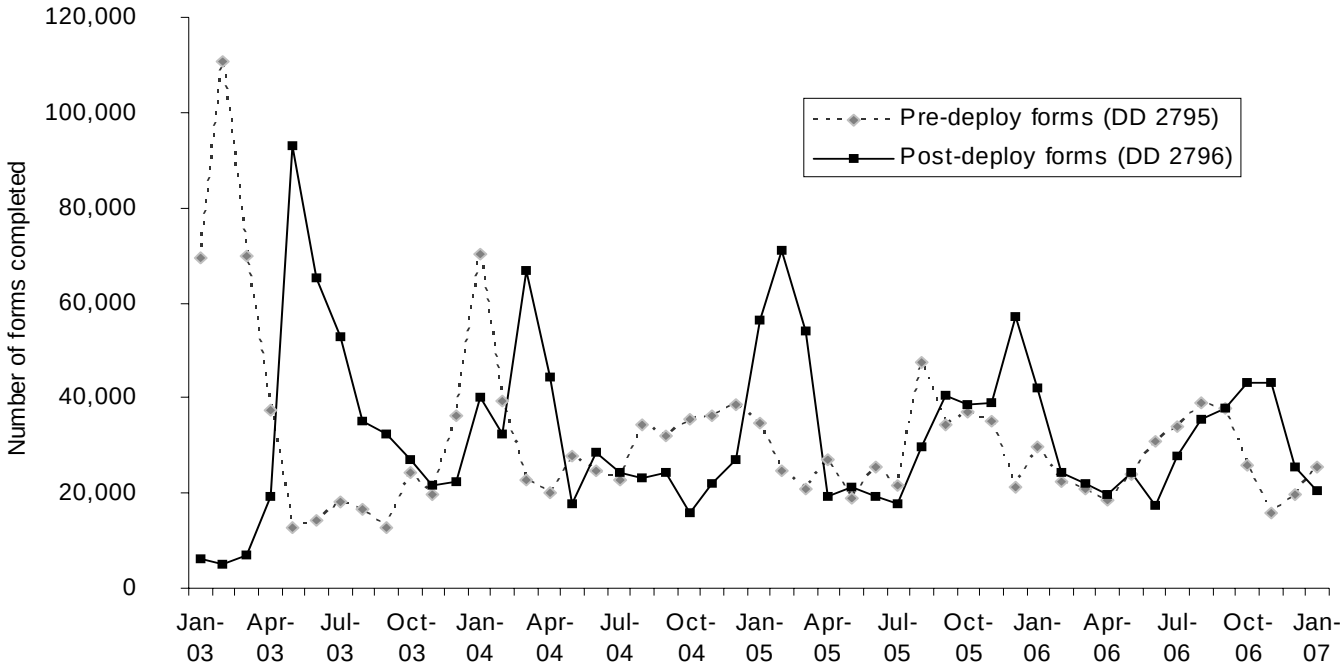
The overall success of deployment force health protection efforts depends at least in part on the completeness and quality of pre- and post-deployment health assessments. This report summarizes characteristics of service members who completed pre-and post-deployment forms since 1 January 2003, responses 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 January 2007, 1,539,519 pre-deployment health assessments and 1,600,635 post-deployment health assessments were completed at field sites, shipped to AMSA, and integrated in the DMSS database (Figure 1).

In general, the distributions of self-assessments of "overall health" were similar among pre- and post-deployment form respondents (Figure 2). For example, both prior to and after deployment, the most frequent descriptor of "overall health" was "very good." Of note, however, relatively more pre- (34%) than post- (24%)

Figure 1. Total pre- and post-deployment health assessments, by month, U.S. Armed Forces, January 2003-January 2007



deployment respondents assessed their overall health as "excellent"; while more post- (40%) than pre- (25%) deployment respondents assessed their overall health as "good," "fair," or "poor" (Figure 2).

Among service members (n=800,245) who completed both a pre- and a post-deployment health assessment, fewer than half (44%) chose the same descriptor of their overall health before and after deploying (Figures 3, 4). Of those (n=445,534) who changed their assessments from pre- to post-deployment, three-fourths (75%) changed by a single category (on a five category scale) (Figure 4); and of those who changed by more than one category, nearly 5-times as many indicated a decrement in overall health (n=92,199; 11.5% of all respondents) as an improvement (n=19,149; 2.4% of all respondents) (Figure 4).

On post-deployment forms, 22% of active and 41% of Reserve component respondents reported "medical/dental problems" during deployment (Table 1). 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 Air Force reported "medical/dental problems" much less often than members of the other Services (Table 2).

Approximately 5% and 6% of active and Reserve component respondents, respectively, reported "mental health concerns." "Mental health concerns" were reported relatively more frequently among soldiers (active: 7%; Reserve: 8%) than members of the other Services (Table 1). Post-deployment forms from approximately one-fifth (18%) of active component and one-fourth (24%) of Reserve component members documented that "referrals" were indicated (Table 1); and 91% and 87% of all active and Reserve component respondents, respectively, had hospitalizations and/or medical encounters within 6 months after documented post-deployment referrals (Table 1).

During interviews by health care providers, approximately 16% of respondents expressed concerns about possible exposures or events during the deployment that they felt may affect their health ("exposure concerns") (Table 2). The proportion of respondents who reported exposure concerns significantly varied from month to month.

Figure 2. Percent distributions of self-assessed health status, pre- and post-deployment, U.S. Armed Forces, January 2003- January 2007

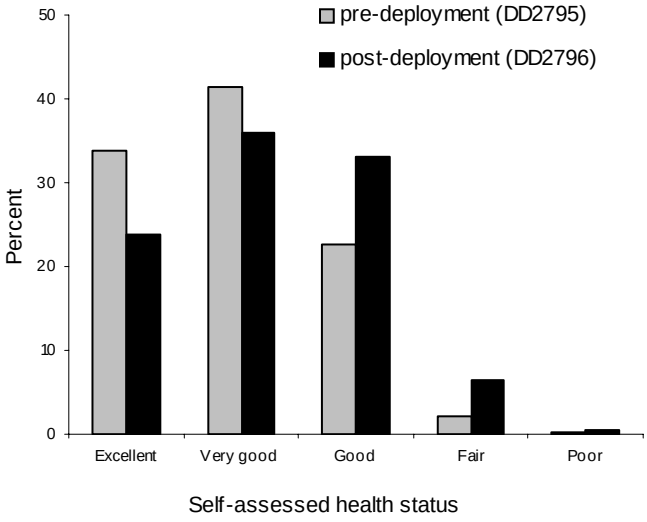


Figure 3. Self-assessed health status on post-deployment form, in relation to self-assessed health status on pre-deployment form, U.S. Armed Forces, January 2003-January 2007

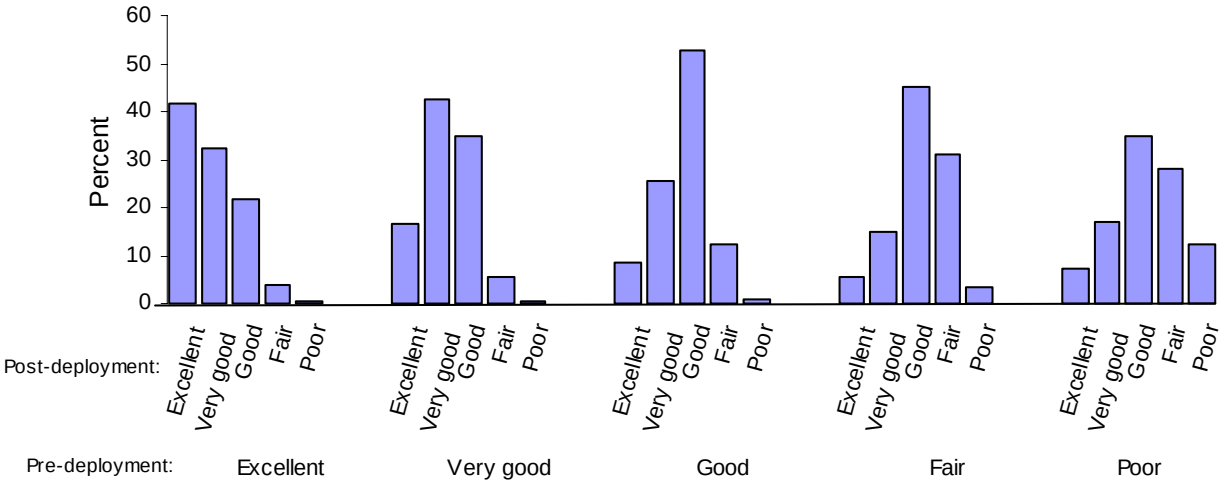
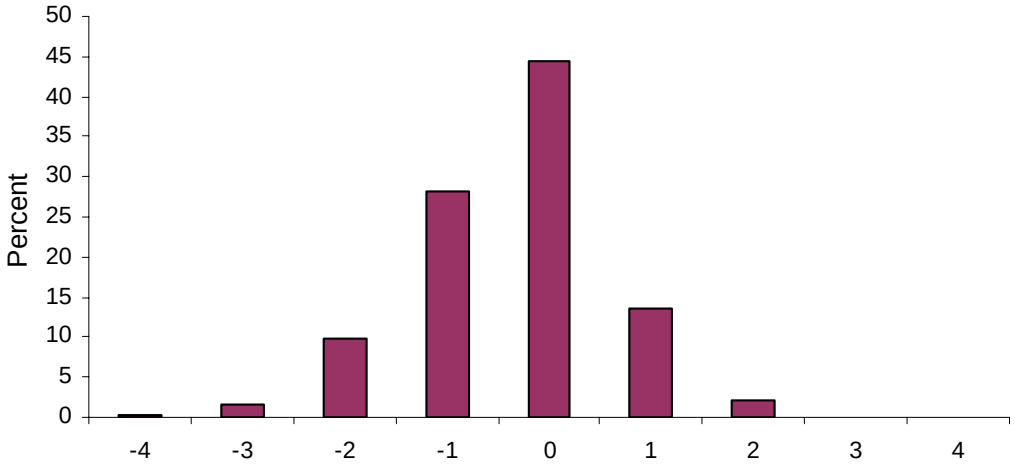


Figure 2. Distribution of changes in self-assessed health status as reported on pre- and post-deployment forms, U.S. Armed Forces, January 2003-January 2007



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".

Table 1. Responses to selected questions from post-deployment forms by service and component, U.S. Armed Forces, January 2003-January 2007

	Army	Navy	Air Force	Marine Corps	Total
Active component					
SMs with DD 2796 in DMSS	**339,368**	**110,281**	**138,404**	**106,078**	**694,131**
Electronic version	84%	13%	78%	32%	63%
General health ("fair" or "poor")	9%	5%	2%	5%	6%
Medical/dental problems during deploy	31%	12%	12%	20%	22%
Currently on profile	11%	2%	2%	2%	6%
Mental health concerns	7%	3%	1%	3%	5%
Exposure concerns	17%	5%	5%	10%	11%
Health concerns	13%	6%	6%	9%	10%
Referral indicated	26%	7%	11%	14%	18%
Med. visit following referral[1]	97%	71%	89%	64%	91%
Post deployment serum[2]	94%	81%	89%	85%	89%
Reserve component					
SMs with DD 2796 in DMSS	**291,640**	**18,183**	**47,108**	**21,664**	**378,595**
Electronic version	75%	18%	68%	27%	69%
General health ("fair" or "poor")	11%	6%	2%	8%	9%
Medical/dental problems during deploy	46%	36%	15%	35%	41%
Currently on profile	15%	4%	2%	3%	12%
Mental health concerns	8%	4%	1%	3%	6%
Exposure concerns	25%	20%	8%	25%	23%
Health concerns	22%	21%	12%	22%	21%
Referral indicated	27%	19%	11%	24%	24%
Med. visit following referral[1]	91%	80%	59%	55%	87%
Post deployment serum[2]	94%	91%	70%	89%	91%

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

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

In general, in the active components, rates of exposure concerns increased through calendar year 2003 and have been relatively stable (5-15%) since the spring of 2004 (Figure 5). In the Reserve components, rates of exposure concerns increased through the spring of 2004 and have been relatively high (15-30%) since then. Reports of exposure concerns have been generally higher in the Army and Marine Corps than the other services and in the Reserve compared to the active component. Finally, prevalences of exposure concerns increase with age (Table 2).

Editorial comment: Since January 2003, approximately 75% of U.S. service members have assessed their overall health as "very good" or "excellent" when they are mobilized and/or prior to deploying overseas; and approximately 60% have assessed their overall health as "very good" or "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). Still, however, approximately one of nine 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 attributable at least in part to the extreme physical and psychological stresses associated with mobilization, overseas deployment, and harsh and dangerous living and working conditions.[15-17]

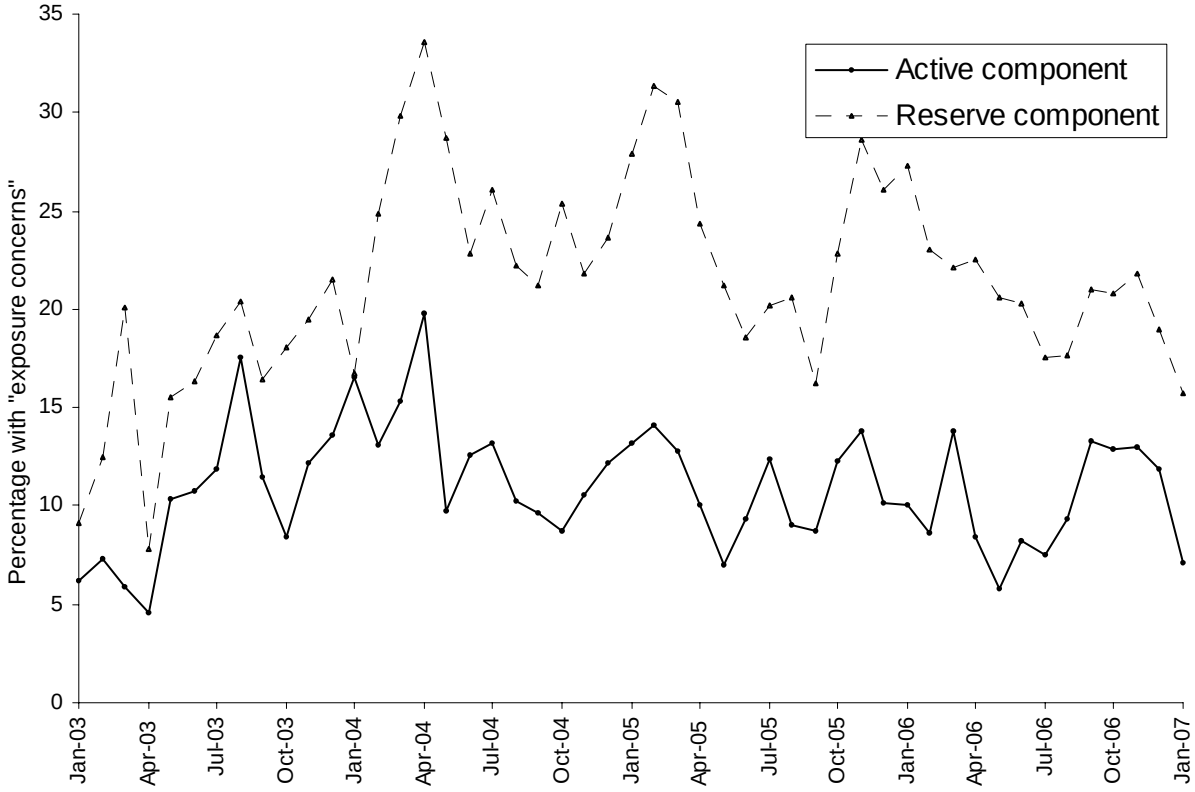
The deployment health assessment process is specifically designed to identify, assess, and follow-up as necessary all service members with concerns regarding their health and/or deployment-related exposures. Overall, for example, approximately one-fifth of all returning soldiers had "referral indications" 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 significantly vary from month to month. Since the beginning of 2004, exposure concerns have been much more common among Reserve compared to active component members. Among both active and Reserve component members, exposure concerns significantly increase with age, and in both components, service members older than 40 are approximately twice as likely as those younger than 20 to report exposure concerns.

References:

1. Medical readiness division, J-4, JCS. Capstone document: force health protection. Washington, DC. Available at: < http://www.dtic.mil/jcs/j4/organization/hssd/fhpcapstone.pdf >.

Figure 5. Proportion of post-deployment forms that include reports of exposure concerns, by month, US Armed Forces, January 2003-January 2007



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15. Hyams KC, Wignall FS, Roswell R. War syndromes and their evaluation: from the U.S. Civil War to the Persian Gulf War. *Ann Intern Med*. 1996 Sep 1;125(5):398-405.

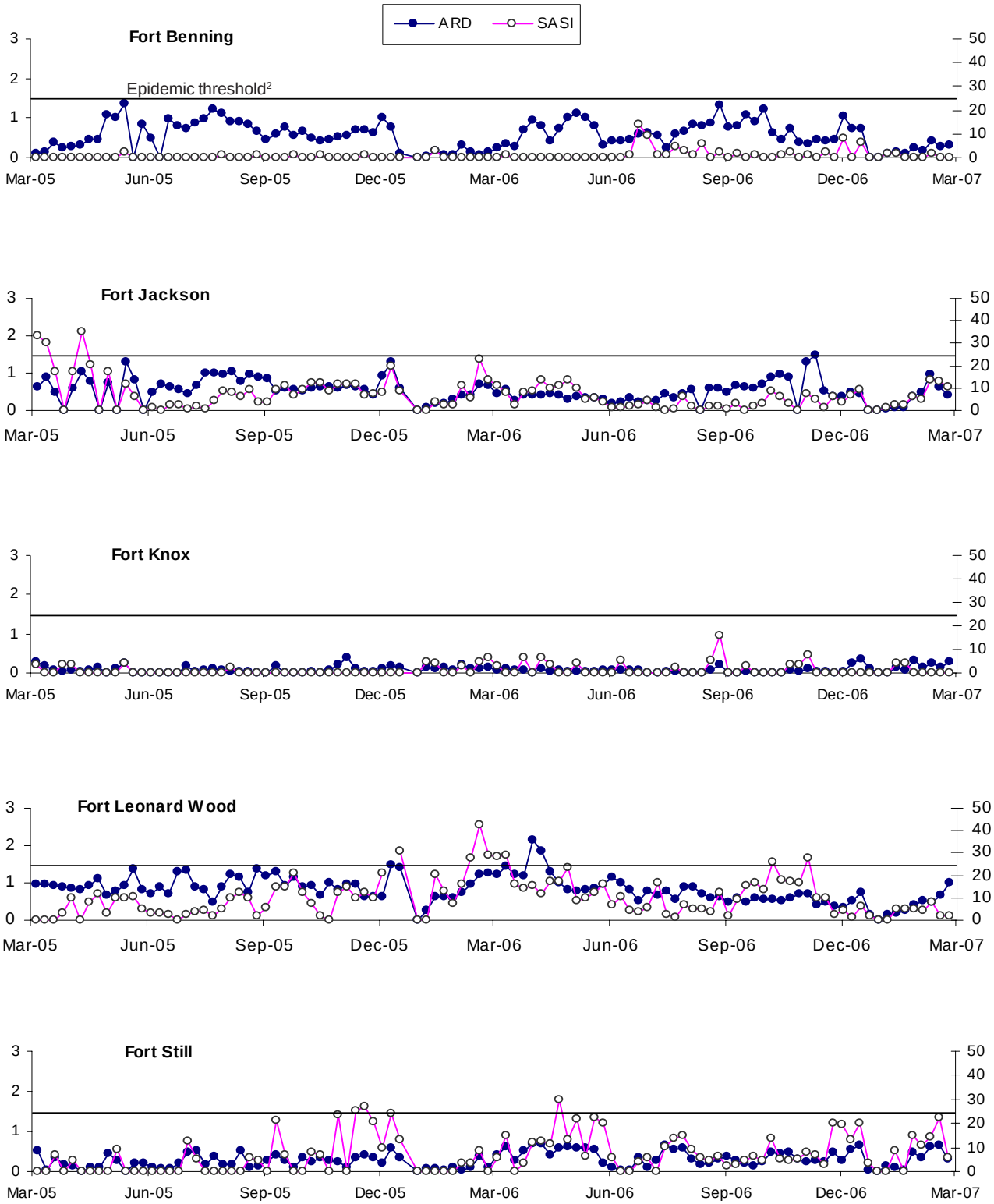
16. Hoge CW, Castro CA, Messer SC, McGurk D, Cotting DI, Koffman RL. Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *N Engl J Med.* 2004 Jul 1;351(1):13-22.

17. Hoge CW, Auchterlonie JL, Milliken CS. Mental health problems, use of mental health services, and attrition from military service after returning from deployment to Iraq or Afghanistan. *JAMA.* 2006 Mar 1;295(9):1023-32.

Table 2. Proportion of post-deployment forms that include reports of exposure concerns, by age group and component, U.S. Armed Forces, January 2003-January 2007

Age group	Active	Reserve
<20	6.1	14.1
20-29	10.2	20.2
30-39	13.0	23.8
>39	15.9	26.0

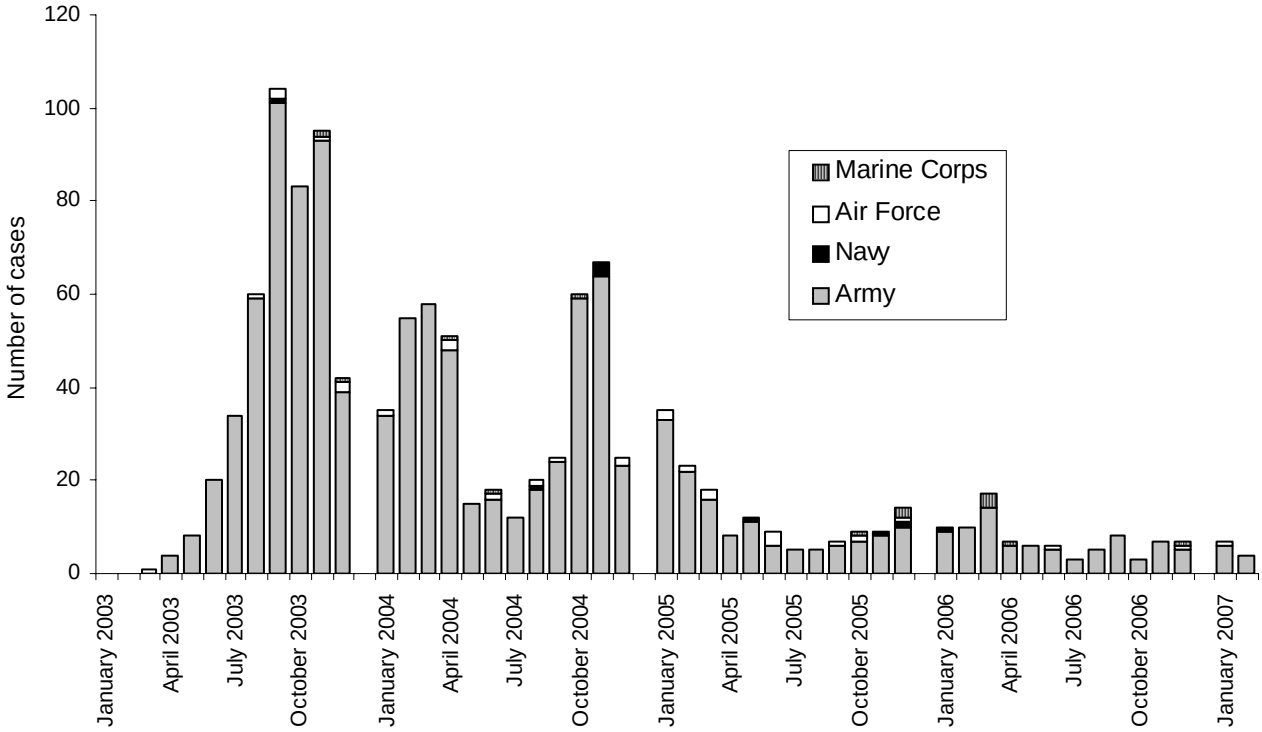
Acute respiratory disease (ARD) and streptococcal pharyngitis (SASI), Army basic training centers, by week through January 31, 2007



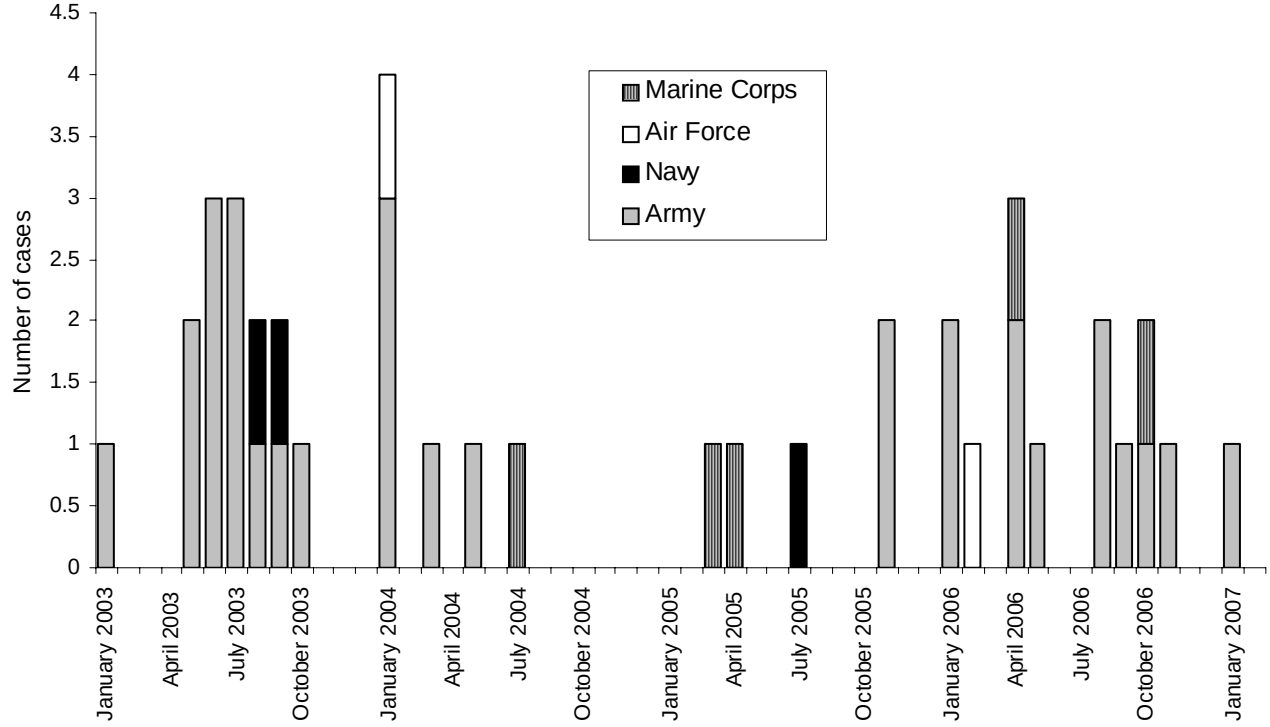
[1] ARD rate = cases per 100 trainees per week
[2] SASI (Strep ARD surveillance index) = (ARD rate)x(rate of Group A beta-hemolytic strep)
[3] ARD rate >=1.5 or SASI>=25.0 for 2 consectutive weeks indicates an "epidemic"

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

Leishmaniasis (ICD-9-CM: 085.0-85.5)[1]



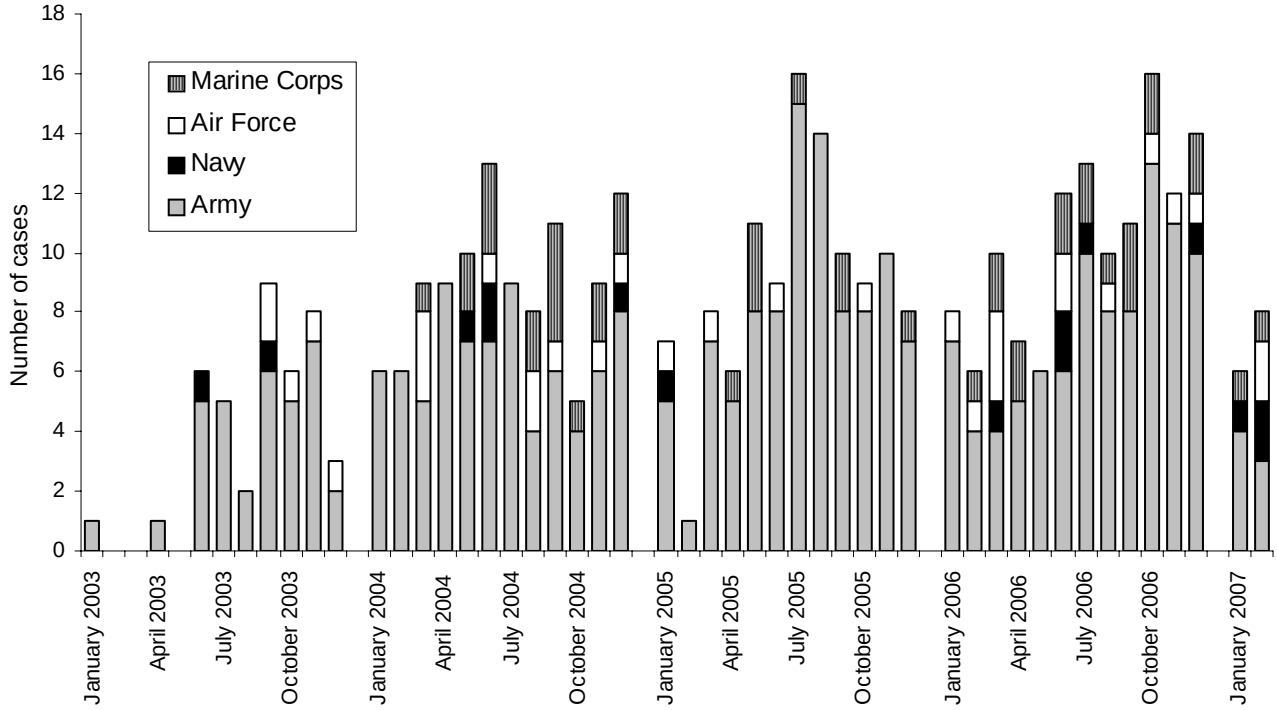
Acute respiratory failure/ARDS (ICD-9-CM:518.81, 518.82)[2]



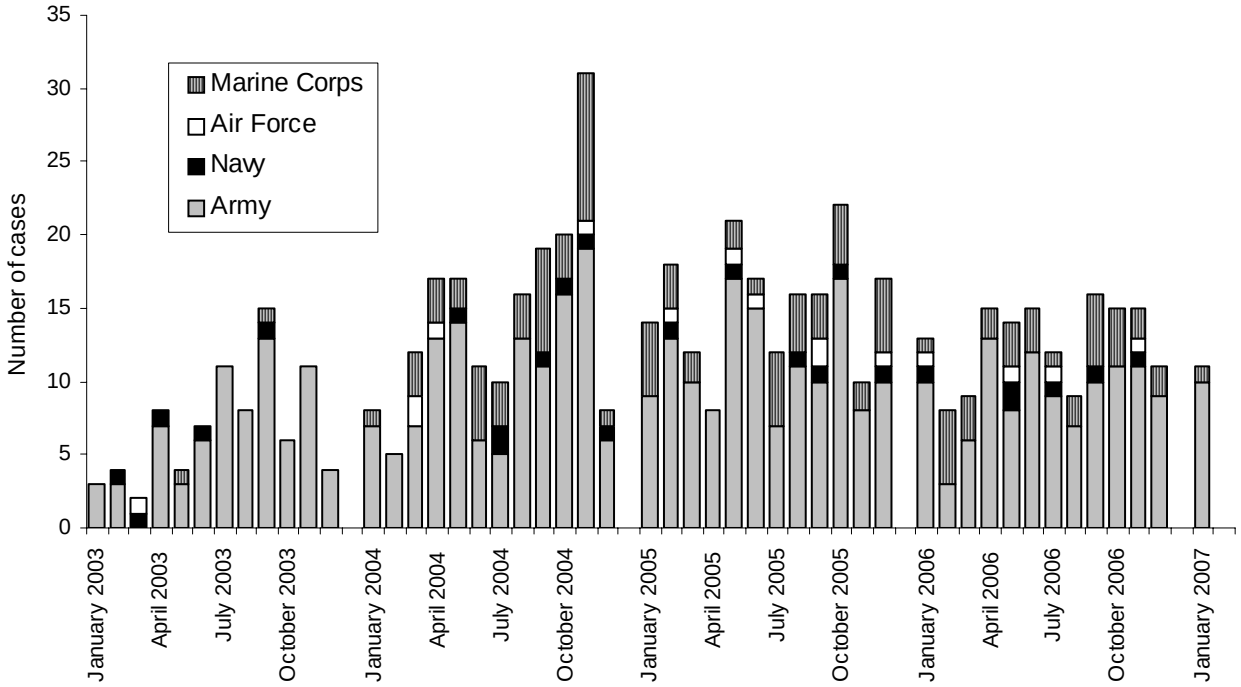
Footnotes:
[1] Indicator diagnosis (one per individual) during a hospitalization, ambulatory vist, and/or from a notifiable medical event during/after service in OEF/OIF.
[2] indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 days of returning from OEF/OIF.

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

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, 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 U.S. Army medical facilities, cumulative numbers[2] for calendar years through February 2006 and 2007

Reporting location	Number of reports all events[3]		Food-borne								Vaccine Preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NORTH ATLANTIC																
Washington, DC Area	50	38	.	.	.	.	1	.	.	.	.	.	.	.	.	1
Aberdeen, MD	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Belvoir, VA	93	45	1	2	.	.	.	.	1	.	.	.	.	.	.	.
FT Bragg, NC	263	221	5	1	.	.	2	2	.	.	.	.	.	.	.	.
FT Drum, NY	11	53	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Eustis, VA	43	31	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Knox, KY	30	50	.	.	.	.	.	1	.	.	.	.	.	1	.	.
FT Lee, VA	88	96	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Meade, MD	22	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.
West Point, NY	9	8	.	.	.	.	.	.	.	.	.	.	.	3	.	.
GREAT PLAINS																
FT Sam Houston, TX	79	55	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Bliss, TX	165	136	.	.	1	.	1	.	.	.	.	.	.	.	.	.
FT Carson, CO	145	152	.	.	.	1	.	.	.	.	.	.	.	.	.	.
FT Hood, TX	277	207	.	2	.	1	1	.	.	2	.	.	.	.	.	.
FT Huachuca, AZ	9	23	.	.	.	.	.	5	.	.	.	.	.	.	.	.
FT Leavenworth, KS	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Leonard Wood, MO	50	80	.	.	.	.	.	.	.	.	.	.	.	.	1	2
FT Polk, LA	23	30	1	.	.	2	.	.	.	.	2	.	.	.	.	.
FT Riley, KS	59	75	1	.	.	.	.	1	.	.	.	.	.	.	.	.
FT Sill, OK	53	29	.	.	.	.	1	.	.	.	.	.	.	.	1	1
SOUTHEAST																
FT Gordon, GA	42	140	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Benning, GA	55	91	2	.	.	1	.	.	.	.	.	.	.	1	.	1
FT Campbell, KY	57	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Jackson, SC	49	25	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Rucker, AL	8	5	1	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Stewart, GA	68	174	.	1	.	.	.	1	.	3	.	.	.	1	1	1
WESTERN																
FT Lewis, WA	63	86	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Irwin, CA	11	13	.	1	.	.	.	1	.	.	.	.	.	.	.	.
FT Wainwright, AK	36	62	.	1	.	.	.	.	.	1	.	.	.	.	.	.
OTHER LOCATIONS																
Hawaii	168	117	4	2	.	.	4	3	.	.	.	.	.	.	.	.
Europe	123	87	5	3	.	1	1	1	.	.	.	.	.	.	.	1
Korea	88	78	.	.	.	.	.	.	.	.	.	.	1	.	1	.
Total	**2,240**	**2,226**	**20**	**13**	**1**	**6**	**11**	**15**	**1**	**6**	**2**	**0**	**1**	**6**	**4**	**7**

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

[2] Events reported by March 7, 2006 and 2007

[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.

Sentinel reportable events for all beneficiaries[1] at U.S. Army medical facilities, cumulative numbers[2] for calendar years through February 2006 and 2007

Reporting location	Arthropod-borne				Sexually Transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis[4]		Urethritis[5]		Cold		Heat	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NORTH ATLANTIC																
Washington, DC Area	.	.	.	.	28	22	6	1	.	1	.	.	.	.	.	.
Aberdeen, MD	.	.	.	.	.	6	.	1	.	.	.	.	.	.	.	.
FT Belvoir, VA	.	.	.	.	25	22	8	5	.	2	.	.	.	.	.	.
FT Bragg, NC	.	.	.	.	188	164	25	25	1	.	33	21	1	1	5	3
FT Drum, NY	.	.	.	.	8	34	3	7	.	.	.	.	.	.	.	.
FT Eustis, VA	.	.	.	.	29	23	9	1	.	.	.	.	.	.	.	.
FT Knox, KY	.	.	.	.	22	44	7	4	.	.	.	.	1	.	.	.
FT Lee, VA	.	.	.	.	68	80	17	12	.	.	.	.	.	1	.	.
FT Meade, MD	.	.	.	.	21	10	1	1	.	.	.	.	.	.	.	.
West Point, NY	.	2	.	.	6	3	.	.	.	.	.	.	.	.	.	.
GREAT PLAINS																
FT Sam Houston, TX	.	.	.	.	54	42	22	10	1	1	.	.	.	.	.	.
FT Bliss, TX	.	.	1	.	60	57	10	6	1	1	.	.	.	.	.	.
FT Carson, CO	.	.	.	.	85	81	20	18	.	1	5	3	.	.	.	.
FT Hood, TX	.	.	.	.	113	128	28	20	.	1	2	8	.	.	1	.
FT Huachuca, AZ	.	.	.	.	8	18	1	.	.	.	.	.	.	.	.	.
FT Leavenworth, KS	.	.	.	.	3	.	.	1	.	.	.	.	.	.	.	.
FT Leonard Wood, MO	.	.	.	.	35	50	2	10	.	.	.	.	.	2	.	.
FT Polk, LA	.	.	.	1	16	22	4	3	.	1	.	.	.	.	.	.
FT Riley, KS	.	.	.	.	49	49	7	2	.	.	.	.	.	.	.	.
FT Sill, OK	.	.	.	.	4	18	6	5	1	.	.	.	.	1	.	.
SOUTHEAST																
FT Gordon, GA	.	.	.	.	29	93	4	12	.	1	.	.	.	.	.	.
FT Benning, GA	.	.	.	1	42	49	10	23	.	.	.	.	.	.	1	.
FT Campbell, KY	.	.	.	.	49	.	6	.	.	.	.	.	.	.	.	.
FT Jackson, SC	.	.	.	.	42	22	7	3	.	.	.	.	.	.	.	.
FT Rucker, AL	.	.	.	.	7	5	.	.	.	.	.	.	.	.	.	.
FT Stewart, GA	.	.	.	.	46	127	19	25	.	.	2	.	.	.	.	.
WESTERN																
FT Lewis, WA	.	.	1	.	38	74	14	11	.	.	7	1	.	.	.	.
FT Irwin, CA	.	.	.	.	9	10	2	1	.	.	.	.	.	.	.	.
FT Wainwright, AK	.	.	.	.	18	32	2	2	.	.	.	.	14	12	.	.
OTHER LOCATIONS																
Hawaii	.	.	.	.	123	95	19	7	.	.	.	.	.	.	1	1
Europe	1	1	.	1	81	54	32	20	.	.	.	.	.	.	.	.
Korea	.	.	.	.	69	67	13	8	1	.	.	1	2	2	.	.
Total	**1**	**3**	**2**	**3**	**1,375**	**1,501**	**304**	**244**	**5**	**9**	**49**	**34**	**18**	**19**	**8**	**4**

[4] Primary and secondary.

[5] Urethritis, non-gonococcal (NGU).

Note: Completeness and timeliness of reporting vary by facility.

Source: Army Reportable Medical Events System.

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

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