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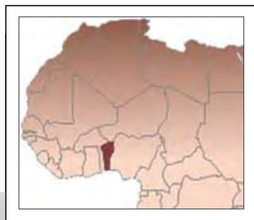

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Update: Malaria, U.S. Armed Forces, 2009

Malaria is a serious, often life-threatening, mosquito-transmitted parasitic disease. Four *Plasmodium* species are responsible for the overwhelming majority of human malaria infections: *Plasmodium falciparum* (the most deadly), *Plasmodium vivax* (the most common), *Plasmodium ovale*, and *Plasmodium malariae*.

Malaria is endemic in more than 100 countries throughout tropics and in some temperate regions. In 2006, malaria accounted for nearly 250 million acute illnesses and nearly one million deaths worldwide; most deaths were due to *P. falciparum* infections of young children. Malaria's health and economic impacts are relatively most severe in the poorest and least developed countries – particularly in Africa.

For centuries, malaria has been recognized as a disease of military operational significance.[1,2] U.S. service members are at risk of malaria when they are permanently assigned to endemic areas (such as near the Demilitarized Zone [DMZ] in Korea[3,4]); when they participate in operations in endemic areas (e.g., Afghanistan[5], Africa, Central/South America); and when they visit malarious areas during personal travels. The U.S. military has effective countermeasures against malaria, including chemoprophylactic drugs, permethrin impregnated uniforms and bednets, and DEET-containing insect repellents. When cases and outbreaks of malaria do occur, they are generally due to non-compliance with indicated chemoprophylactic or personal protective measures.

In the 1990s, there was a general increase in malaria incidence among U.S. service members, primarily due to *P. vivax* infections acquired near the DMZ in Korea.[3,4, 6-8] Since 2001, U.S. service members have been exposed to malaria risk (particularly due to *P. vivax*) while serving in Southwest and Central Asia (particularly in Afghanistan).[5] This report summarizes the malaria experiences of U.S. service members during calendar year 2009 and compares it to recent experience.

Methods:

The surveillance period was January 2002 through December 2009. The Defense Medical Surveillance System was searched to identify inpatient medical encounters and reportable medical events that included primary (first-listed) diagnoses of malaria (ICD-9-CM: 084.0-084.9, except 084.7) among active and Reserve component members of the U.S. Armed Forces during the surveillance period. For this summary, only one episode of malaria per service member was included. When multiple records documented a single case, the date of the earliest encounter was considered the date of clinical onset, and the most specific diagnosis (typically from an inpatient record) was used to classify the *Plasmodium* species.

Presumed locations of malaria acquisition were estimated using a hierarchical classification algorithm: (1) cases hospitalized in a malarious country were considered acquired in that country; (2) case reports (submitted as reportable medical events) that listed exposures to malaria endemic locations were considered acquired in those locations; (3) cases diagnosed among service members during or within 90 days of deployment to a malarious country were considered acquired in that country; (4) cases diagnosed among service members who had been deployed to Afghanistan or Korea within two years prior to diagnosis were considered acquired in those countries; (5) all remaining cases were considered acquired in unknown locations.

Results:

In 2009, 60 U.S. military members were diagnosed and/or reported with malaria. The number of cases in 2009 was lower than in any other calendar year since 2002 **(Figure 1)**. In 2009, as in prior years, most U.S. military members diagnosed with malaria were males (92%), younger than 30 years old (60%), in the Army (53%), and in the active component (85%) **(Table 1).**

Table 1. Malaria cases by plasmodium species and selected demographic characteristics, U.S. Armed Forces, 2009

	P. vivax	*P. falciparum*	Unspecified or other	Total	Percent of total
Total	11	25	24	60	100
Component					
Active	10	20	21	51	85.0
Reserve/Guard	1	5	3	9	15.0
Service					
Army	10	8	14	32	53.3
Navy	0	10	6	16	26.7
Air Force	1	3	1	5	8.3
Marine Corps	0	4	3	7	11.7
Gender					
Male	8	23	24	55	91.7
Female	3	2	0	5	8.3
Age group					
<20 years	1	0	1	2	3.3
20-24	1	6	9	16	26.7
25-29	6	5	7	18	30.0
30-34	2	4	4	10	16.7
35-39	1	8	1	10	16.7
40+	0	2	2	4	6.7
Race/ethnicity					
White non-Hispanic	7	13	14	34	56.7
Black non-Hispanic	1	7	7	15	25.0
Other	3	5	3	11	18.3
Total	**11**	**25**	**24**	**60**	**100.0**

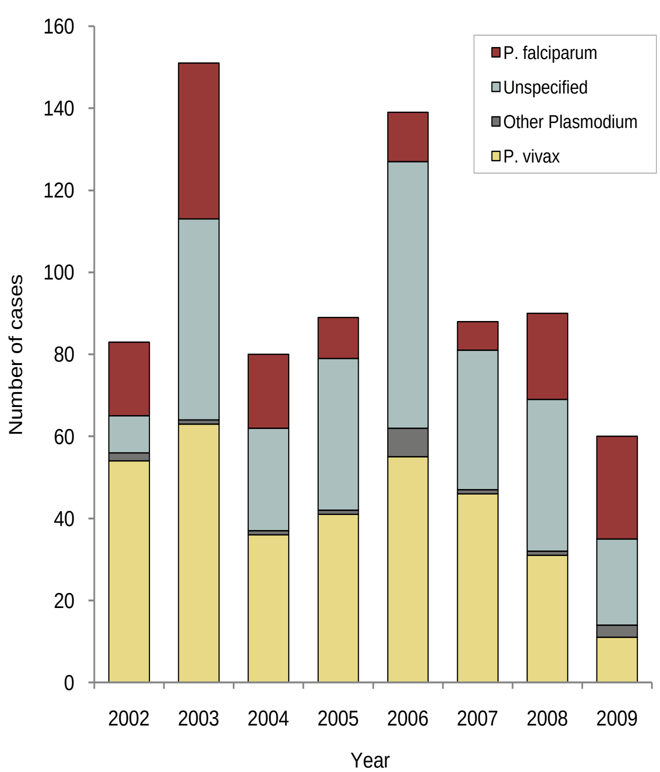
Table 2. Number of malaria cases by geographical locations of diagnosis or report and presumed location of acquisition, U.S. Armed Forces, 2009

Location of diagnosis/report	Presumed location of infection acquisition					Location total	% of total 2009 cases
	Korea	Afghanistan	Africa	Central/ South America	Unknown location		
Fort Benning, GA	1	2	1	0	1	5	8.3
Fort Campbell, KY	0	4	0	0	0	4	6.7
Wuerzburg, Germany	0	1	3	0	0	4	6.7
Landstuhl, Germany	0	1	2	0	0	3	5.0
Bagram Airfield, Afghanistan	0	3	0	0	0	3	5.0
Fort Carson, CO	0	3	0	0	0	3	5.0
Portsmouth, VA	0	0	3	0	0	3	5.0
Eastern Louisiana[a]	0	0	0	0	3	3	5.0
Fort Knox, KY	0	0	2	0	0	2	3.3
Maxwell Air Force Base, AL	0	0	2	0	0	2	3.3
Keelser Air Force Base, MS	0	0	1	0	1	2	3.3
Tennessee[a]	0	0	0	0	2	2	3.3
Other locations (with 1 case each)	1	7	11	0	5	24	40.0
Total	2	21	25	0	12	60	100.0
% of total	3.3	35.0	41.7	0.0	20.0	100.0	

[a]Non-military facilities

Of all 2009 cases, more than two-fifths were caused by *P. falciparum* (n=25, 42%) and fewer than one-fifth by *P. vivax* (n=11, 18%) **(Table 1).** In 2009, there were more cases attributed to *P. falciparum* and fewer cases attributed to *P. vivax* than in any other year of the reporting period. The responsible agent was "unspecified" for more than one-third (n=21) of 2009 cases **(Table 1, Figure 1).**

Figure 1. Malaria cases among U.S. service members, by plasmodium species, by calendar year of diagnosis/report, 2002-2009



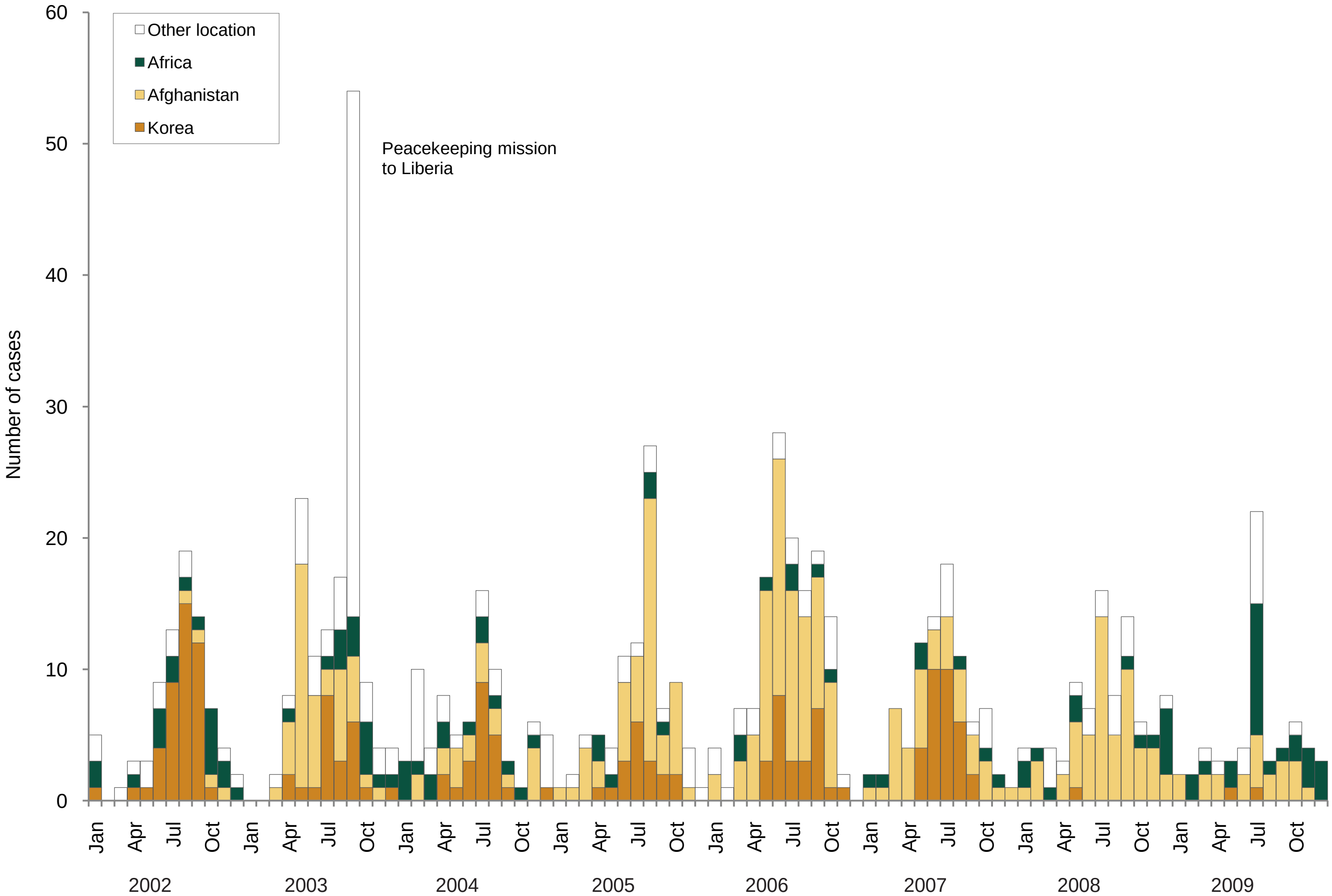
Of the 60 cases reported in 2009, most were considered acquired in Africa (n=25, 42%) or Afghanistan (n=21, 35%); only two cases (3%) were presumably acquired in Korea. One-fifth (n=12, 20%) of all malaria cases had unknown areas of infection acquisition **(Table 2).**

Of the 25 infections considered acquired in Africa, 12 were likely acquired in West Africa (Ghana: 3; Liberia: 3; Benin, Nigeria, Togo: 2 each); four were considered acquired in Uganda; and three each were considered acquired in countries in Central Africa, the Horn of Africa, and Southern Africa.

In 2009, malaria cases were diagnosed/reported from more than 30 different medical facilities in the United States, western Europe, and the Pacific Islands; also, three cases were diagnosed and reported from a U.S. military medical facility in Afghanistan. During the year, only three facilities treated/reported at least four cases each: Martin Army Community Hospital, Fort Benning, GA (n=5); Blanchfield Army Community Hospital, Fort Campbell, KY (n=4) and Bavaria Medical Department Activity, Germany (n=4); 24 facilities diagnosed/reported only a single case each **(Table 2).**

In 2009 as in most prior years, malaria cases were diagnosed among U.S. military members during each month of the year; however, in 2009, there was less distinct seasonality than in past years. In 2009, there were at least two cases in every month and only two months with more than four cases **(Figure 2).** The finding likely reflects the relatively higher number and proportion of cases acquired in tropical

Figure 2. Malaria cases among U.S. service members, by estimated location of infection acquisition, U.S. Armed Forces, 2002-2009



regions of Africa compared to temperate regions of Korea and Afghanistan.

Data summaries by Stephen B. Taubman, PhD, Data Analysis Group, AFHSC.

Editorial comment:

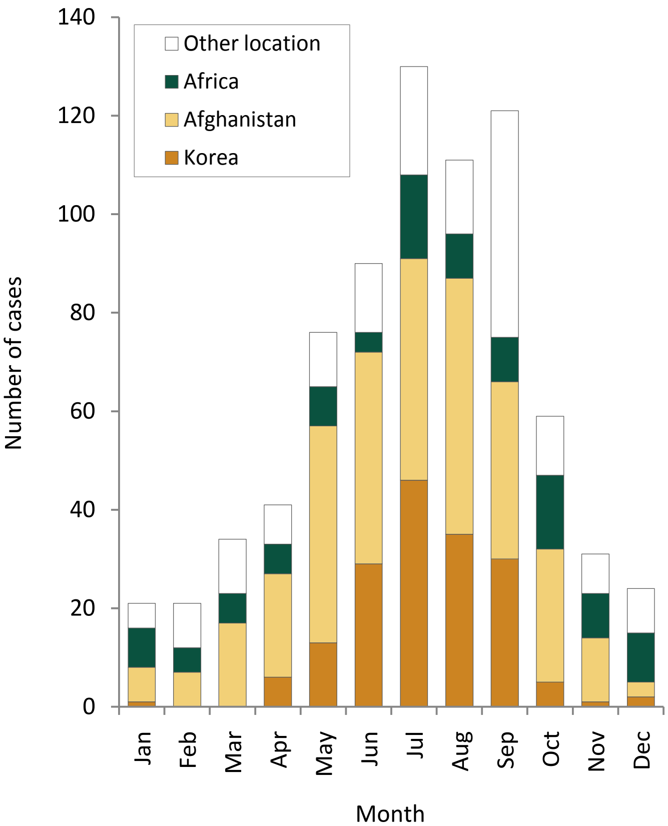
In 2009, there were fewer cases of malaria diagnosed/reported among U.S. military members than in any other year since 2002. The finding reflects negligible malaria acquisition in Korea since 2008 when it sharply declined from a trend of much higher annual incidence. Also in 2009, there were fewer Afghanistan-acquired cases than in any other year since 2004.

There are significant limitations to the report that should be considered when interpreting the findings. For example, the ascertainment of malaria cases is likely incomplete (e.g., cases treated in deployed or non-U.S. military medical facilities may not be specifically reported or otherwise ascertained). Also, the locations of infection acquisition were estimated from reported relevant information. Still, some cases had reported exposures in multiple malarious areas, while nearly 20% of the cases had no relevant exposure information.

Although there were relatively few cases overall in 2009, the number of cases likely acquired in Africa, and the number and percent reported as *P. falciparum*, were all higher in 2009 than in any other year included in this report. In October 2007, the U.S. Africa Command (AFRICOM) was formally established to provide "sustained security engagement" with African partners. AFRICOM's activities include the conduct of civil-military and crisis response operations; such activities may increase exposures of U.S. service members to falciparum malaria risk.

Prior to 2009, most malaria cases among U.S. military members were caused by *P. vivax* infections acquired in Korea or Afghanistan; such infections are generally acquired and clinically manifested during warm months in the northern hemisphere (i.e., April through October) **(Figure 3)**. In tropical areas, malaria is transmitted and clinically expressed during all seasons. If in the future higher proportions of malaria cases among U.S. military members are caused by *P. falciparum* acquired in Africa, there may be more severe

Figure 3. Clinical presentation/diagnosis of malaria, by cumulative month and location of acquisition of infection, U.S. Armed Forces, January 2002-December 2009



clinical manifestations and less distinct seasonality of malaria among U.S. military members — even if overall incidence remains stable or continues to decline.

As in prior years, in 2009, most malaria cases among U.S. military members were treated at medical facilities remote from malaria endemic areas; and 24 medical facilities treated only one malaria case each. Providers of acute medical care to service members (in both garrison and deployed settings) should be knowledgeable of and vigilant for the early clinical manifestations of malaria — particularly among service members who are currently or were recently in malaria-endemic areas (e.g., Afghanistan, Africa, Korea). Care providers should be capable of diagnosing malaria (or have access to a clinical laboratory that is proficient in malaria diagnosis) and initiating treatment (particularly when falciparum malaria is clinically suspected).

Most important, all military members at risk of malaria should be informed in detail of the nature and severity of the risk; they should be trained, equipped, and supplied to conduct all indicated countermeasures; and they should closely monitored to ensure compliance. Personal protective measures against malaria include the proper wear of permethrin impregnated uniforms; the use of bed nets and military-issued DEET-containing insect repellent; and compliance with prescribed chemoprophylactic drugs before, during, and after times of exposure in malarious areas.

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Case Report: Fatal Outcome of Falciparum Malaria Acquired in Liberia, U.S. Navy Member, 2009

A male in his early twenties was deployed as a member of a Navy detachment to Liberia, near the capital city of Monrovia on the west coast of Africa. Approximately four months into the deployment, the sailor presented to his battalion aid station (BAS) with fatigue, malaise, and temperature of 101ºF. He was treated for heat illness and responded well to intravenous (IV) fluids with complete resolution of symptoms. He reportedly ate dinner that night and continued to feel well the following morning; later in the day, however, he was found "walking through camp like he was drunk." He was brought to the BAS with a temperature of 104ºF. His fever continued despite direct cooling and IV fluids **(Table 1)**.

The detachment corpsman contacted the unit's medical officer and initiated medical evacuation procedures. The sailor was transferred to a local hospital outside Monrovia. At the local hospital, the sailor responded to voice "most of the time;" his urinalysis showed granular casts. By that evening, an American missionary physician had initiated antimalarial treatment with an IV quinine preparation.

The following day, while awaiting medical evacuation from Liberia, the patient developed jaundice; his mental status waxed and waned; and intermittent fevers continued. By the time he was evacuated to Dakar, Senegal, his mental status had declined, e.g., he responded only to pain. On arrival in Senegal, he received dialysis; he was then evacuated to the U.S. military's Landstuhl Regional Medical Center in Germany.

En route to Landstuhl, the patient required endotracheal intubation due to his worsening mental status. Upon arrival, he was unstable and severely acidotic. On admission, he had anemia (Hct 19%), leukocytosis (WBC 31.5 x 10^3/mcL) and thrombocytopenia (platelets 25 x 10^3/mcL); blood smears and a rapid diagnostic test were positive for *Plasmodium falciparum*. The parasite burden was 1.8%, and a single blood culture ultimately grew out Gram positive cocci (speciation was not available; the isolate was deemed to likely be skin contaminant). He was started on IV quinidine and oral malarone in addition to broad spectrum antibiotics. Soon after admission, he developed disseminated intravascular coagulation and hepatic failure and was treated with pressors.

Within his first 36 hours at Landstuhl, his condition improved substantially. He was weaned off pressors and his mental status improved to the point where sedation was required for continued ventilator support. The following evening, his mental status declined despite a parasite burden approaching zero. Physical exam indicated fixed and dilated pupils with loss of brain stem reflexes. A CT scan demonstrated cerebral edema. Imaging studies indicated no cerebral blood flow. The sailor succumbed to his illness eight days after initial presentation in theater. (Results of autopsy were not available at the time of this report.)

The sailor's compliance with antimalarial chemoprophylaxis is unknown. He was prescribed doxycycline prior to deployment; when he initially presented at the BAS, he reportedly affirmed that he had been taking it. Directly observed therapy (DOT) was not in practice at the time (since then, it has been instituted for the unit). Prior to deployment, all personnel in the unit, including the leaders, were briefed at least twice by the medical officer. All were issued two permethrin treated uniforms, and DEET insect repellent was supplied. Bed nets were not issued prior to deployment; the unit had been informed they would receive them from their predecessors upon turnover. When no bed nets were turned over, they were procured locally within a few weeks of arrival. The permethrin status of these locally obtained bed nets is unknown.

The unit's living conditions in Liberia were described as "austere at best." Berthing spaces are in an uninsulated steel-framed, plastic-covered building with individually partitioned rooms; there was no air conditioning at the time

Table 1. Summary of clinical course, by day

Day 0:	Initial presentation with fatigue/malaise, T = 101ºF Treated for heat illness Symptoms resolved entirely with IV fluids
Day 1:	Second presentation to BAS, now febrile to 104ºF, and with mental status changes Transfer to local hospital Signs of acute renal failure Mental status changes persist IV quinine
Day 2:	Developed jaundice
Day 3:	Transfer to hospital in Senegal Dialysis Medevac to LRMC Endotracheal intubation en route to LRMC
Day 4:	Arrival to LRMC Unstable, acidotic Smear and rapid test positive for *P. falciparum* Antimalarials and broad spectrum antibiotics
Day 5:	Initial improvement in mental status
Day 6:	Decline in mental status (PM) CT shows cerebral edema Pupils fixed/dilated, loss of brain stem reflexes Parasite burden near 0%
Day 7:	Imaging indicates no cerebral blood flow
Day 8:	Brain death declared

the case developed. Living quarters are within one quarter mile of a saltwater lagoon; there was no obvious standing water in the camp (the case occurred during the dry season). An Environmental Health Officer reportedly visited the camp recently to set mosquito traps and test water; results are pending.

Report by: Roxanne Danielson, LT, MC, USN; Jennifer Espiritu, LCDR, MC, USN; Natalie Wells, LCDR, MC, USN.

Editorial comment:

This report highlights the severity of the *P. falciparum* threat to U.S. military members who conduct operations in falciparum malaria endemic areas. The case is a tragic reminder that preventing, diagnosing, and treating falciparum malaria are life-saving activities for deploying service members in all military occupations and grades.

The nature and intensity of the threat, and the potential medical and military operational consequences, of falciparum malaria in Liberia are well known to the U.S. military. In 2003, there was a large outbreak of falciparum malaria among members of a U.S. peacekeeping force in Liberia. Of 290 individuals who spent any time ashore in Liberia, 80 (clinical attack rate: 28%) were treated for malaria (positive smears and/or clinical indications); 43 were evacuated to U.S. military medical centers; several required intensive medical care; and at least two were diagnosed with cerebral malaria. There were no deaths.[1,2]

The avoidance of severe medical and military operational consequences when operating in high falciparum malaria risk areas requires comprehensive planning, thorough preparations, and uncompromising execution of prevention, diagnosis, and treatment regimens. For example, before deployment, all individuals (i.e., commanders, supervisors, and service members at all levels) must be informed in detail regarding the nature of the threat, personal and unit protection policies and practices, and the potential consequences of prevention failures. Before deploying, all individuals must initiate prescribed malaria chemoprophylaxis. All deployers must be provided the equipment (e.g., permethrin impregnated uniforms and bed nets) and supplies (e.g., DEET insect repellent) necessary to prevent the potentially lethal bites of malarious mosquitoes; and they must be trained to properly and consistently use all indicated personal protective measures. Before deploying, medical care providers should receive formal/refresher training to clinically detect, diagnose, and begin treatment of falciparum malaria in its earliest stages. During deployment, supervisors must ensure 100% compliance with all indicated chemopropophylactic and personal protective measures.

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Outbreak Report: Malaria in a U.S. Marine Reserve Unit Deployed to Benin

Military operations and personal travel in malaria endemic countries expose U.S. service members to the risk of malaria infection. During World War II, there were more casualties from malaria than from battle injuries.[1] More recently, large malaria outbreaks affected U.S. soldiers deployed to Somalia (n=112) in 1993[2] and members of a U.S. peacekeeping force (n=80) in Liberia in 2003.[3] Since 2002, more than 300 U.S. service members have been diagnosed or reported with malaria that was likely acquired in Afghanistan (see page 2).

This report summarizes preliminary findings from an investigation of a malaria outbreak among a U.S. Marine Reserve unit that conducted a humanitarian exercise in Benin in June and July of 2009. The majority of the 370 service members were Reservists from four companies located in Tennessee, Alabama, Louisiana, and Oregon. Most members of the unit deployed to Benin during the first three weeks of June and remained for an average of 20 (± 7) days.

Within a few days after returning to the U.S, three cases of malaria were suspected and later confirmed among unit members. Soon afterwards, 12 additional malaria cases were reported among deployers. A questionnaire was administered to unit members to assess compliance with chemoprophylaxis and personal protective measures (PPM), the presence of clinical symptoms of malaria, and uses of medical care during and after deployment. At the time of this report, analyses of questionnaire responses were not completed; however, this report summarizes preliminary results regarding compliance with antimalarial chemoprophylaxis and PPMs.

Methods:

Malaria cases were initially identified and reported through the U.S. Navy's medical event reporting system. A confirmed case was defined by observation of malaria parasites in the blood of a suspected case. A probable case was defined by clinical signs and symptoms consistent with malaria in an individual with recent travel in a malarious country.

An anonymous, self-reported questionnaire administered to members of the unit assessed use of chemoprophylaxis and PPMs. Responses were categorized as either "compliant" or "non-compliant" with prescribed antimalarial medications and indicated uses of protective clothing, permethrin-treated uniforms, mosquito nets and DEET insect repellent. For example, while deployed in Benin, applications of DEET insect repellent are indicated three or more times per day; thus, for this analysis, respondents were considered compliant if they reported applications of DEET three or more times per day "most or all of the time".

Results:

From 27 June (the date of diagnosis of the index case) through 12 August, 15 malaria cases were reported among members of all four companies of the recently deployed unit **(Figure 1)**. Of the 15 cases, 12 were confirmed by blood smear; 11 of the confirmed cases were caused by *Plasmodium falciparum* and one by *Plasmodian ovale*. The three probable cases were treated presumptively.

Of the 370 service members who deployed to Benin, 260 (70%) returned questionnaires. The questionnaire respondents were predominately male (98%), in the Marine Corps (92%), 21 to 25 years old (55%), and white race; 7% of the respondents were in the Navy.

All questionnaire respondents affirmed having received antimalarial medications. Self-reported compliance with doxycycline (daily) and primaquine (terminal) prophylaxis overall were 17% and 83%, respectively. However, compliance with chemoprophylaxis sharply varied across the four companies (chemoprophylaxis, by company: doxycycline, 0-44%; primaquine, 71-88%). Among malaria cases that completed questionnaires, none (of two) reported compliance

Figure 1. Dates of report/diagnosis of malaria among members of a Marine Reserve unit deployed to Benin during June and July 2009

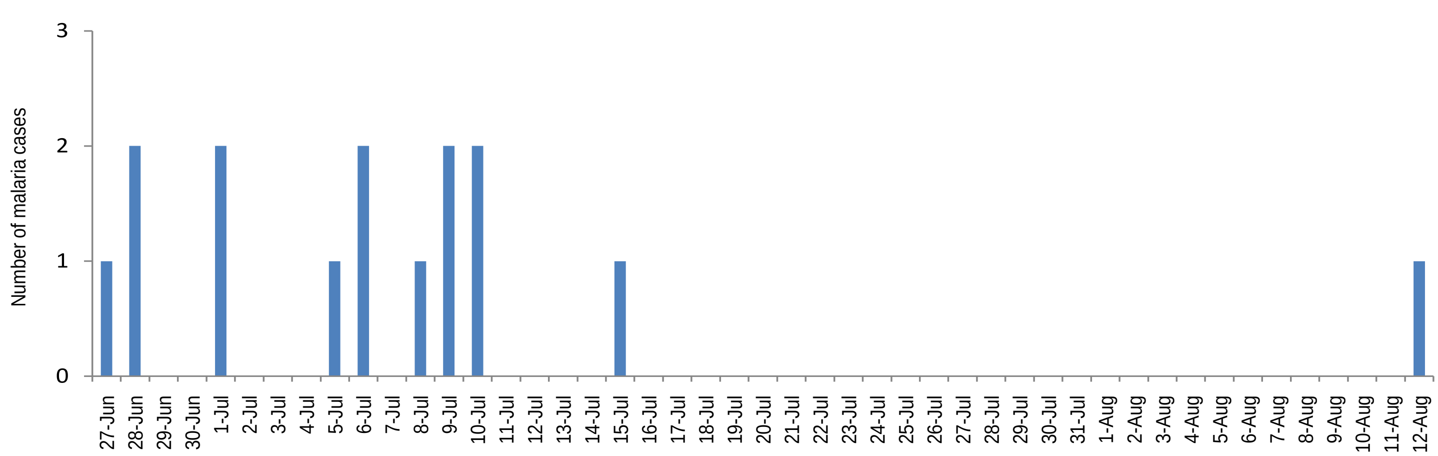

Table 1. Compliance with chemoprophylaxis and personal protective measures among members of a U.S. Marine Reserve unit deployed to Benin, April-July 2009

	Malaria cases (n=15)	All respondents (n=260)
	% compliant	% compliant
Chemoprophylaxis		
Doxycycline (daily)	0 (0/2)	17 (16/97)
Primaquine (terminal prophylaxis)	100 (4/4)	83 (48/58)
Personal protective measures		
Applied appropriate amount of DEET	63 (5/8)	38 (92/241)
Used a mosquito net	63 (5/8)	57 (138/243)
Wore treated uniforms exclusively	75 (6/8)	86 (210/244)
Pant legs down at all times	88 (7/8)	85 (204/240)
Sleeves down at all times	100 (8/8)	97 (236/243)

with daily doxycycline while deployed and four (of four) reported compliance with post-exposure primaquine **(Table 1)**.

Regarding uses of personal protective measures, 86% of questionnaire respondents reported wearing pretreated uniforms exclusively; most respondents reported wearing their uniforms with the sleeves (97%) and pant legs (85%) pulled down at all times. Most (86%) respondents reported access to DEET-containing repellent; however, just 38% applied the repellent as often as indicated. Similarly, most (80%) respondents reported possession of a mosquito net; however, fewer than three-fifths (57%) reported use of the mosquito net as indicated. Most (81%) respondents reported that their mosquito nets were not treated with permethrin or other insect repellant. Of respondents who had but did not use mosquito nets, one-third (34%) reported the main reason for noncompliance as "it was too hot".

Of note, of eight malaria cases that completed questionnaires, most reported compliance with indicated PPMs: sleeves down at all times; 100%; pant legs down at all times; 88%; pretreated uniforms exclusively: 75%; use of mosquito net: 63%; use of DEET as indicated: 63% **(Table 1)**.

Editorial comment:

The U.S. military employs many measures to protect its members from malaria. When used together and as indicated, the measures are very effective. This report documents again that outbreaks of malaria occur when military members in high-risk settings are less than fully compliant with all indicated malaria countermeasures.

In the unit that is the subject of this report, fewer than one-fifth of members reported taking doxycycline every day while deployed to prevent malaria. Mosquito nets and DEET insect repellent were widely available to unit members; however, fewer than two-thirds used them consistently. Some protective measures were used by most members and as indicated; however, the use of most indicated countermeasures by most deployed service members is not sufficient to prevent cases and outbreaks of potentially life- and mission-threatening illnesses when operating in high malaria risk areas.

This report has several limitations that should be considered when interpreting the findings. For example, all deployed members did not complete questionnaires; and all respondents did not answer all of the questions. It is possible, perhaps likely, that the responses of self-selected questionnaire respondents do not reliably reflect the experiences of all unit members. Also, among completed questionnaires, descriptive information such as race, duty status, and rank were often missing; although the questionnaires were anonymous, some respondents further masked their identities – perhaps, fearing repercussions from reported nonadherence with prescribed preventive measures. After malaria was diagnosed in some unit members (and before questionnaires were distributed), terminal prophylaxis was emphasized by the unit's leaders and medical staffs. The high compliance with self-reported use of primaquine is likely related to increased awareness of the risk and heightened command emphasis. Finally, investigators were not able to interview the malaria cases or match questionnaires to each case.

Service members at risk of malaria should be monitored to ensure compliance with protective measures. It is advisable for medical personnel who are responsible for service members deploying to infectious disease risk areas to consult their local Navy Environmental Health and Preventive Medicine Unit (NEPMU) for the latest recommendations. Such information is often obtained by the Senior Medical Officer (SMO) or by local Reserve units. If the SMO at the U.S. Marine Corps Headquarters contacts the local NEPMU for the most current recommendations, Reservists may receive prophylaxis and PPM instructions directly from their SMO (rather than from their local Reserve unit). This practice enables the SMO to implement strict prophylaxis monitoring (directly observed therapy) beginning with the first indicated dose.

Reported by Linda C. Dunn, LCDR, MC, USN; Jason D. Maguire, CDR, MC, USN; Paul Rockswold, CAPT, MC, USN.

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Update: Deployment Health Assessments, U.S. Armed Forces, December 2009

Since January 2003, peaks and troughs in the numbers of pre- and post-deployment health assessment forms transmitted to the Armed Forces Health Surveillance Center generally corresponded to times of departure and return of large numbers of deployers. Since April 2006, numbers of post-deployment health reassessments (PDHRA) transmitted per month have ranged from 17,000 to 43,000 **(Table 1, Figure 1)**.

During the past 12 months, the proportions of returned deployers who rated their health as "fair" or "poor" were 8-11% on post-deployment health assessment questionnaires and 10-14% on PDHRA questionnaires **(Figure 2)**.

In general, on post-deployment assessments and reassessments, deployers in the Army and in reserve components were more likely than their respective counterparts to report health and exposure-related concerns **(Table 2, Figure 2)**. Both active and reserve component members were more likely to report exposure concerns three to six months after compared to the time of return from deployment **(Figure 3)**.

At the time of return from deployment, soldiers serving in the active component were the most likely of all deployers to receive mental health referrals; however, three to six months after returning, active component soldiers were less likely than Army and Marine Corps Reservists to receive mental health referrals **(Table 2)**.

Finally, during the past three years, reserve component members have been more likely than active to report "exposure concerns" on post-deployment assessments and reassessments **(Figure 3)**.

Table 1. Deployment-related health assessment forms, by month, U.S. Armed Forces, January-December 2009

	Pre-deployment assessment DD2795		Post-deployment assessment DD2796		Post-deployment reassessment DD2900	
	No.	%	No.	%	No.	%
Total	**450,805**	**100**	**361,738**	**100**	**311,509**	**100**
2009						
January	43,225	9.6	31,799	8.8	26,089	8.4
February	36,894	8.2	28,379	7.8	28,488	9.1
March	40,622	9.0	23,856	6.6	32,116	10.3
April	43,463	9.6	18,837	5.2	31,307	10.1
May	36,249	8.0	28,140	7.8	24,976	8.0
June	44,370	9.8	28,325	7.8	26,885	8.6
July	39,833	8.8	25,843	7.1	22,590	7.3
August	38,959	8.6	43,742	12.1	21,604	6.9
September	30,372	6.7	37,667	10.4	26,068	8.4
October	36,252	8.0	30,920	8.5	23,786	7.6
November	31,629	7.0	31,572	8.7	20,002	6.4
December	28,937	6.4	32,658	9.0	27,598	8.9

Figure 2. Proportion of deployment health assessment forms with self-assessed health status as "fair" or "poor", U.S. Armed Forces, January-December 2009

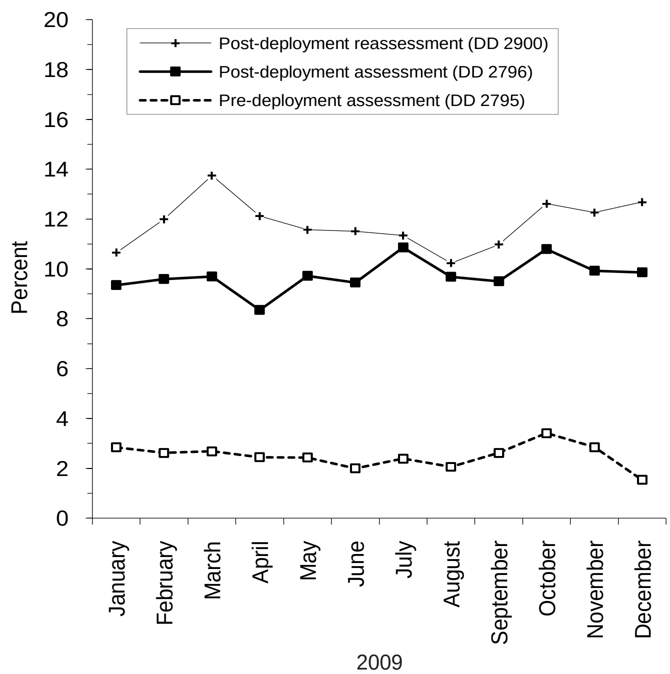


Figure 1. Total deployment health assessment and reassessment forms, by month, U.S. Armed Forces, January 2003-December 2009

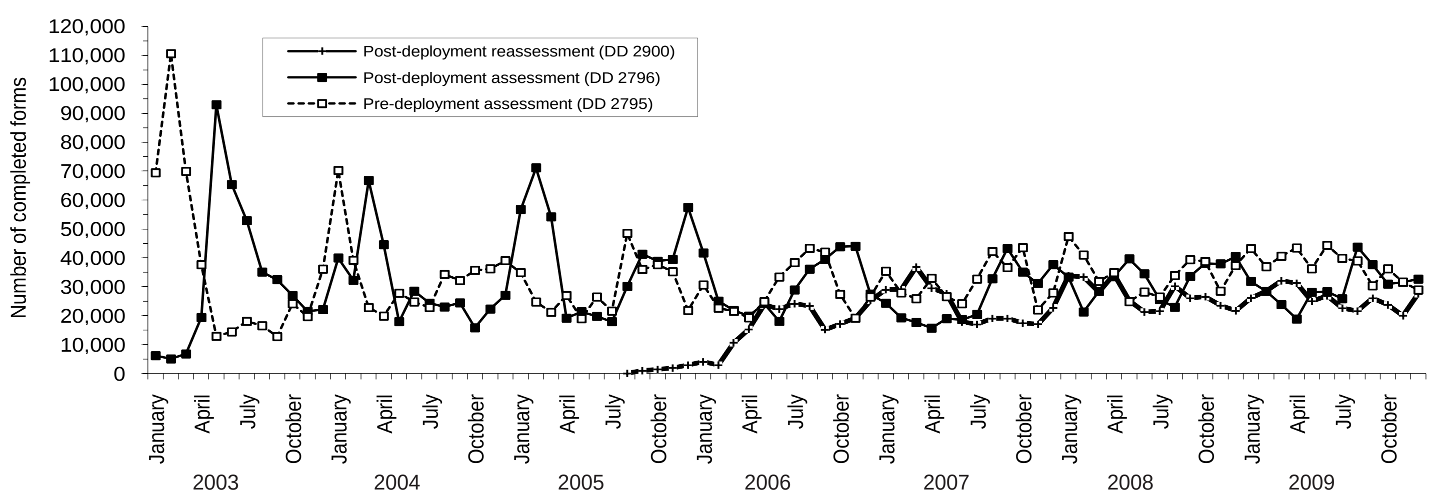


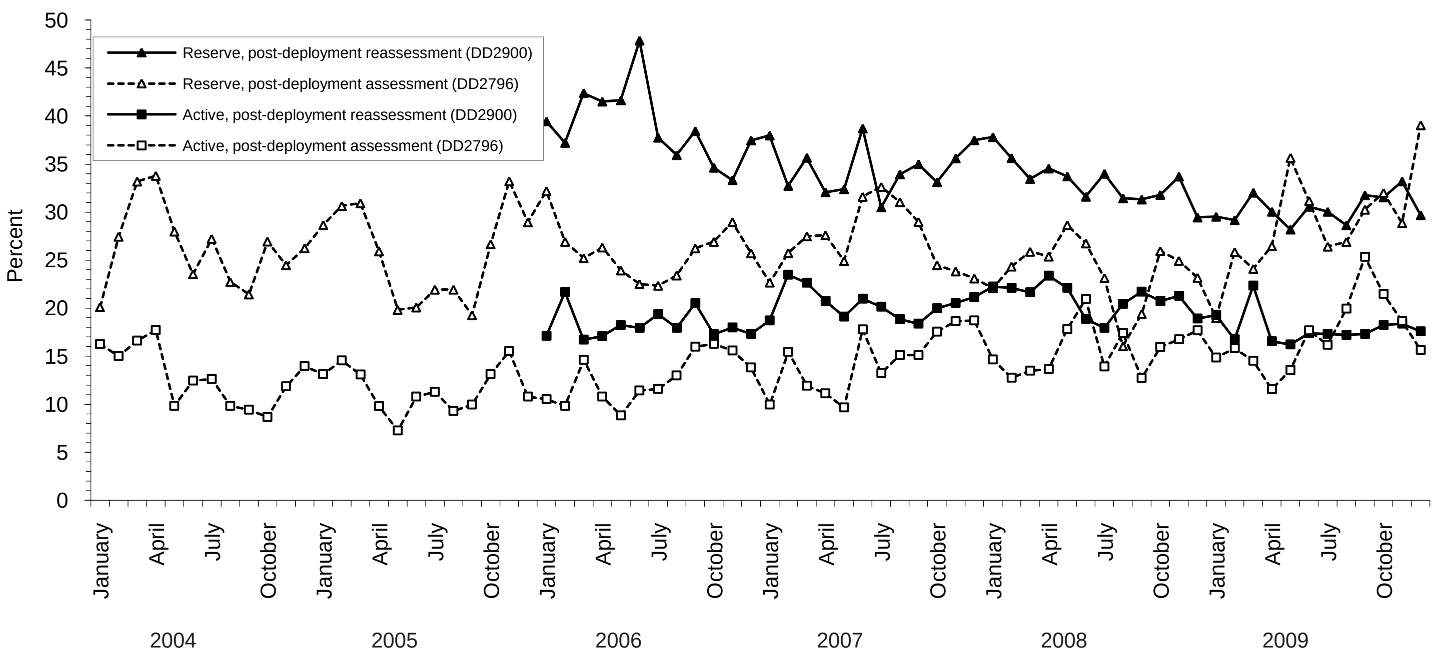
Table 2. Percentage of service members who endorsed selected questions/received referrals on health assessment forms, U.S. Armed Forces, January-December 2009

	Army			Navy			Air Force			Marine Corps			All service members		
	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900
Active component	n= 150,937	n= 139,532	n= 118,826	n= 19,183	n= 8,760	n= 15,103	n= 59,170	n= 51,610	n= 52,578	n= 35,629	n= 15,048	n= 36,805	n= 264,919	n= 214,950	n= 223,312
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	4.1	10.7	14.6	1.3	4.3	6.0	0.5	3.6	4.1	1.8	6.9	9.4	2.7	8.5	10.7
Health concerns, not wound or injury	21.2	25.9	24.0	3.7	12.8	13.7	1.4	5.7	10.5	3.3	12.1	17.4	13.1	19.5	19.1
Health worse now than before deployed	na	23.3	26.1	na	12.1	13.4	na	8.6	8.5	na	14.9	18.2	na	18.7	19.8
Exposure concerns	na	18.2	18.6	na	18.0	18.3	na	11.5	14.7	na	18.3	20.4	na	16.6	17.9
PTSD symptoms (2 or more)	na	9.5	12.4	na	4.3	6.5	na	2.2	2.4	na	5.5	8.3	na	7.2	9.0
Depression symptoms (any)	na	31.9	32.3	na	19.7	23.0	na	13.1	13.7	na	25.6	29.6	na	26.4	26.9
Referral indicated by provider (any)	4.9	34.3	20.8	5.4	22.1	15.8	1.7	10.5	6.6	3.5	20.6	24.9	4.0	27.1	17.8
Mental health referral indicated*	0.9	7.3	6.6	0.7	3.2	5.9	0.5	1.2	1.8	0.3	2.2	4.7	0.7	5.3	5.1
Medical visit following referral†	96.7	99.6	98.0	92.5	86.1	91.5	81.8	96.4	98.5	64.0	74.9	90.0	91.8	97.2	95.8

	Army			Navy			Air Force			Marine Corps			All service members		
	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900
Reserve component	n= 79,556	n= 62,443	n= 54,791	n= 5,790	n= 2,023	n= 5,669	n= 15,595	n= 14,791	n= 17,333	n= 4,739	n= 1,368	n= 6,618	n= 105,680	n= 80,625	n= 84,411
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	1.6	12.0	17.7	0.5	9.7	8.3	0.3	5.3	4.8	1.1	8.8	10.2	1.3	10.6	13.8
Health concerns, not wound or injury	16.4	34.5	44.1	1.8	36.2	30.1	0.6	8.5	15.1	3.3	24.0	35.1	12.7	29.6	36.5
Health worse now than before deployed	na	26.7	33.4	na	22.4	20.9	na	13.4	11.2	na	19.6	26.5	na	24.0	27.5
Exposure concerns	na	30.1	32.5	na	34.2	31.4	na	21.2	22.9	na	25.3	30.5	na	28.5	30.3
PTSD symptoms (2 or more)	na	8.8	20.1	na	5.9	10.7	na	2.2	3.0	na	4.5	13.9	na	7.4	15.5
Depression symptoms (any)	na	31.4	35.9	na	25.3	24.4	na	14.0	13.8	na	29.7	28.1	na	28.0	30.0
Referral indicated by provider (any)	3.6	36.6	34.1	3.4	30.4	17.9	0.4	13.2	5.6	3.5	30.2	27.4	3.1	32.1	26.6
Mental health referral indicated*	0.4	4.7	12.8	0.3	3.4	4.9	0.0	0.9	0.8	0.3	2.9	8.7	0.3	3.9	9.5
Medical visit following referral†	95.8	97.9	36.7	90.8	96.6	40.7	60.5	64.3	42.2	39.4	67.7	28.5	93.6	94.1	36.5

[a]Includes behavioral health, combat stress and substance abuse referrals.
[b]Record of inpatient or outpatient visit within 6 months after referral.

Figure 3. Proportion of service members who endorsed exposure concerns on post-deployment health assessments, U.S. Armed Forces, January 2004-December 2009



Sentinel reportable events among service members and beneficiaries at U.S. Army medical facilities, cumulative numbers[a] for calendar years through 31 December 2008 and 31 December 2009

Army

Reporting locations	Number of reports all events[b]		Food-borne						Vaccine preventable					
			Campylo-bacter		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella[c]	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
NORTHERN														
Aberdeen Proving Ground, MD	33	45	.	.	.	.	.	.	.	1	.	.	.	.
Fort Belvoir, VA	231	247	8	9	14	4	4	.	.	.	.	.	.	.
Fort Bragg, NC	1,480	1,702	.	6	20	20	4	.	.	.	.	3	.	.
Fort Dix, NJ	0	0	.	.	.	.	.	.	.	.	.	.	.	.
Fort Drum, NY	239	54	.	.	.	.	.	.	.	.	.	.	.	.
Fort Eustis, VA	261	264	1	.	2	4	.	.	.	.	.	.	1	.
Fort George G Meade, MD	78	38	.	1	.	1	1	.	.	.	.	.	.	.
Fort Knox, TN	282	245	3	.	1	.	.	.	.	.	.	.	.	.
Fort Lee, VA	292	595	.	.	.	.	.	.	.	.	4	.	2	.
Fort Monmouth, NJ	25	49	.	.	1	.	.	.	.	.	.	2	1	.
Walter Reed AMC, DC	204	162	2	1	1	.	1	.	1	.	3	1	5	1
West Point Military Reservation, NY	67	116	.	1	.	.	.	.	.	.	1	1	.	.
SOUTHERN														
Fort Benning, GA	348	410	2	1	5	.	1	1	.	1	.	.	.	.
Fort Campbell, KY	185	526	1	.	.	1	2	.	.	.	.	.	.	1
Fort Gordon, GA	666	680	2	3	14	20	19	3	.	.	1	4	2	1
Fort Hood, TX	2,156	2,079	6	9	38	22	6	19	.	.	.	3	2	.
Fort Jackson, SC	383	593	.	.	.	.	.	.	.	.	1	2	.	.
Fort Polk, LA	172	621	1	.	1	2	1	3	.	1	.	.	1	.
Fort Rucker, AL	90	80	2	8	5	5	.	.	.	.	1	1	.	.
Fort Sam Houston, TX	550	591	.	1	14	9	12	2	.	.	.	1	.	1
Fort Sill, OK	126	647	.	.	3	.	.	4	.	.	1	.	.	.
Fort Stewart, GA	955	1,173	6	.	27	35	3	15	1	.	8	1	.	.
WESTERN														
Fort Bliss, TX	567	299	.	.	14	1	1	1	.	1	.	5	.	.
Fort Carson, CO	654	761	4	9	5	3	.	.	1	1	1	.	.	.
Fort Huachuca, AZ	110	82	.	1	2	.	2	.	.	.	1	.	.	.
Fort Leavenworth, KS	54	68	.	.	.	1	.	.	.	.	.	.	.	.
Fort Leonard Wood, MO	276	364	2	2	1	.	1	.	2	1	1	.	1	1
Fort Lewis, WA	1,193	1,068	12	6	4	8	4	1	.	.	.	.	.	.
Fort Riley, KS	445	421	3	1	3	3	.	.	.	.	2	.	.	.
Fort Wainwright, AK	297	213	6	.	2	.	.	.	2	.	.	.	.	.
NTC and Fort Irwin, CA	73	130	.	.	2	1	1	1	.	.	.	.	.	.
PACIFIC														
Hawaii	797	830	39	33	16	17	3	6	1	.	5	4	.	.
Japan	29	3	1	.	.	.	.	.	.	.	.	.	.	.
Korea	475	539	.	.	1	.	.	.	.	.	.	.	1	.
EUROPEAN														
Heidelberg	263	194	9	13	9	6	1	.	.	1	2	.	1	.
Landstuhl	385	904	1	4	6	3	4	2	.	1	.	1	1	1
Bavaria	446	497	.	6	9	9	.	.	1	.	1	.	.	.
OTHER LOCATIONS														
OTHER	0	0	.	.	.	.	.	.	.	.	.	.	.	.
Total	**14,887**	**17,290**	**111**	**115**	**220**	**175**	**71**	**58**	**9**	**8**	**33**	**29**	**18**	**6**

[a]Events reported by Jan 8, 2009 and 2010
[b]Sixty-seven medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, June 2009.
[c]Service member cases only.
Note: Completeness and timeliness of reporting vary by facility.

Sentinel reportable events among service members and beneficiaries at U.S. Army medical facilities, cumulative numbers[a] for calendar years through 31 December 2008 and 31 December 2009

Army

Reporting location	Arthropod-borne				Sexually transmitted						Environmental				Travel associated			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis		Cold[c]		Heat[c]		Q Fever		Tuberculosis	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
NORTHERN																		
Aberdeen Proving Ground, MD	3	.	.	.	25	37	5	5	.	2	.	.	.	.	.	.	.	.
Fort Belvoir, VA	.	.	.	.	188	216	14	18	3	.	.	.	.	.	.	.	.	.
Fort Bragg, NC	1	.	10	.	1,088	1,309	211	255	2	4	.	1	142	104	.	.	2	.
Fort Dix, NJ	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fort Drum, NY	4	.	.	.	212	51	23	3	.	.	.	.	.	.	.	.	.	.
Fort Eustis, VA	.	.	.	.	216	221	36	39	4	.	.	.	1	.	.	.	.	.
Fort George G Meade, MD	1	1	.	.	70	35	6	.	.	.	.	.	.	.	.	.	.	.
Fort Knox, TN	2	1	.	2	220	210	49	31	3	.	1	.	2	.	1	1	.	.
Fort Lee, VA	2	1	1	.	210	540	67	52	1	2	.	.	5	.	.	.	.	.
Fort Monmouth, NJ	.	15	.	.	6	29	3	2	.	1	.	.	14	.	.	.	.	.
Walter Reed AMC, DC	17	10	1	.	136	120	24	17	9	11	.	.	.	.	3	.	1	1
West Point Military Reservation, NY	36	35	.	.	28	74	2	5	.	.	.	.	.	.	.	.	.	.
SOUTHERN																		
Fort Benning, GA	.	.	.	6	236	289	83	68	1	2	.	1	20	40	.	.	.	1
Fort Campbell, KY	1	5	.	1	162	373	14	98	1	1	.	.	4	46	.	.	.	.
Fort Gordon, GA	.	.	.	.	515	549	111	91	.	.	.	.	1	9	.	.	1	.
Fort Hood, TX	1	.	1	.	1,701	1,628	399	367	1	11	.	.	.	19	1	.	.	1
Fort Jackson, SC	.	.	.	.	321	330	41	52	1	2	.	.	19	207	.	.	.	.
Fort Polk, LA	.	.	.	.	111	410	36	68	2	1	.	.	19	136	.	.	.	.
Fort Rucker, AL	3	.	.	.	64	62	10	4	2	.	.	.	2	.	.	.	1	.
Fort Sam Houston, TX	.	.	2	.	402	459	96	89	19	11	1	.	4	17	.	.	.	1
Fort Sill, OK	.	.	.	.	92	576	21	45	.	1	.	.	9	21	.	.	.	.
Fort Stewart, GA	3	1	3	1	731	888	136	136	6	7	.	.	30	82	1	6	.	1
WESTERN																		
Fort Bliss, TX	.	.	.	.	455	248	89	37	7	5	.	.	.	.	.	.	1	1
Fort Carson, CO	.	.	.	2	582	677	59	69	.	.	1	.	.	.	1	.	.	.
Fort Huachuca, AZ	1	.	.	.	87	75	14	4	.	1	1	.	2	1	.	.	.	.
Fort Leavenworth, KS	1	4	.	.	48	55	5	5	.	2	.	.	.	1	.	.	.	.
Fort Leonard Wood, MO	.	.	.	.	223	318	32	32	1	.	3	1	7	8	.	.	2	1
Fort Lewis, WA	.	.	6	.	1,067	967	98	81	1	2	.	.	.	1	.	.	1	2
Fort Riley, KS	6	1	1	1	369	362	51	49	1	1	1	1	8	2	.	.	.	.
Fort Wainwright, AK	1	.	.	.	239	189	30	18	1	.	14	2	1	1	.	1	1	2
NTC and Fort Irwin, CA	.	.	.	.	49	115	9	6	1	2	.	.	11	5	.	.	.	.
PACIFIC																		
Hawaii	.	.	1	1	653	680	69	71	.	7	.	.	2	3	.	1	8	7
Japan	.	.	.	.	24	3	4	.	.	.	.	.	.	.	.	.	.	.
Korea	.	.	.	.	420	509	48	22	3	2	.	1	2	5	.	.	.	.
EUROPEAN																		
Heidelberg	17	11	.	.	184	143	39	19	1	.	.	.	.	.	.	.	.	1
Landstuhl	9	25	15	4	250	726	39	92	5	9	8	.	18	30	25	2	4	4
Bavaria	17	16	5	6	343	410	69	46	1	2	.	1	.	1	.	.	.	.
OTHER LOCATIONS																		
Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Total	**126**	**126**	**46**	**24**	**11,727**	**13,883**	**2,042**	**1,996**	**77**	**89**	**30**	**8**	**323**	**739**	**32**	**11**	**22**	**23**

Sentinel reportable events among service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers[a] for calendar years through 31 December 2008 and 31 December 2009

Navy

Reporting locations	Number of reports all events[b]		Food-borne						Vaccine preventable					
			Campylobacter		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella[c]	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
NATIONAL CAPITOL AREA														
NNMC Bethesda, MD	264	171	4	5	16	2	2	.	.	3	6	7	.	.
NHC Annapolis, MD	34	10	1	.	1	1	.	.	.	.	.	.	.	.
NHC Patuxent River, MD	51	28	.	.	.	.	.	.	.	.	.	.	.	.
NHC Quantico, VA	222	110	.	1	.	1	.	3	.	.	3	.	.	.
NAVY MEDICINE EAST														
NH Beaufort, SC	183	400	.	.	1	.	1	.	.	1	.	5	.	.
NH Camp Lejeune, NC	1,085	605	3	1	33	15	.	1	.	.	.	.	.	.
NH Charleston, SC	40	3	.	.	1	.	1	.	.	.	.	.	.	.
NH Cherry Point, NC	178	3	.	.	8	.	.	.	.	.	.	.	.	.
NH Corpus Christi, TX	19	6	.	.	.	.	2	.	1	.	.	.	2	.
NHC Great Lakes, IL	752	481	.	.	.	1	.	.	.	1	7	12	2	.
NH Guantanamo Bay, Cuba	10	0	.	.	.	.	.	.	.	.	.	.	.	.
NH Jacksonville, FL	597	252	.	.	93	18	7	1	.	.	5	.	2	.
NH Naples, Italy	62	1	2	.	.	.	.	.	2	.	2	.	.	.
NHC New England, RI	40	0	1	.	1	.	.	.	.	.	.	.	1	.
NH Pensacola, FL	375	248	2	1	12	8	3	2	.	.	.	.	.	.
NMC Portsmouth, VA	655	206	.	.	2	.	2	.	.	.	6	2	.	.
NH Rota, Spain	29	0	6	.	3	.	.	.	.	.	.	.	.	.
NH Sigonella, Italy	54	1	.	.	1	.	.	.	.	.	.	.	1	1
NAVY MEDICINE WEST														
NH Bremerton, WA	77	6	1	.	1	.	.	.	.	.	.	.	.	.
NH Camp Pendleton, CA	250	6	3	.	5	.	1	.	.	.	.	.	.	.
NH Guam-Agana, Guam	159	31	.	.	.	3	.	.	.	.	.	.	6	.
NHC Hawaii, HI	170	22	.	.	2	.	.	.	.	.	1	.	.	.
NH Lemoore, CA	73	48	.	.	.	.	.	.	.	.	.	.	.	.
NH Oak Harbor, WA	176	108	.	3	4	2	2	1	.	1	6	4	.	1
NH Okinawa, Japan	47	39	.	.	.	.	.	.	.	.	.	.	.	.
NMC San Diego, CA	1,418	885	1	9	6	12	2	1	1	.	67	65	2	1
NH Twentynine Palms, CA	10	1	.	.	.	.	.	.	.	.	.	.	.	.
NH Yokosuka, Japan	255	38	.	.	.	.	.	.	.	.	11	3	.	.
NAVAL SHIPS														
COMNAVAIRLANT/CINCLANTFLEET	81	22	.	.	.	.	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	146	79	.	.	4	.	.	.	.	.	.	.	.	.
OTHER LOCATIONS														
OTHER	3,987	3,570	17	18	35	25	7	5	.	1	18	12	8	3
Total	**11,499**	**7,380**	**41**	**38**	**229**	**88**	**30**	**14**	**4**	**7**	**132**	**110**	**24**	**6**

[a]Events reported by Jan 8, 2010
[b]Sixty-seven medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, June 2009.
[c]Service member cases only.
Note: Completeness and timeliness of reporting vary by facility.

Sentinel reportable events among service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers[a] for calendar years through 31 December 2008 and 31 December 2009

Navy

Reporting location	Arthropod-borne				Sexually transmitted						Environmental				Travel associated			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis		Cold[c]		Heat[c]		Q Fever		Tuberculosis	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
NATIONAL CAPITOL AREA																		
NNMC Bethesda, MD	22	12	7	.	187	132	15	9	3	1	.	.	.	.	.	.	2	.
NHC Annapolis, MD	6	.	.	.	23	8	1	.	1	1	.	.	1	.	.	.	.	.
NHC Patuxent River, MD	6	6	.	.	43	18	2	3	.	1	.	.	.	.	.	.	.	.
NHC Quantico, VA	4	1	2	.	148	84	21	10	.	.	.	.	44	10	.	.	.	.
NAVY MEDICINE EAST																		
NH Beaufort, SC	1	.	.	.	68	375	5	18	2	1	1	.	104	.	.	.	.	.
NH Camp Lejeune, NC	8	4	.	2	753	424	151	91	2	.	.	1	133	63	2	2	.	1
NH Charleston, SC	1	.	.	.	31	2	3	1	2	.	.	.	1	.	.	.	.	.
NH Cherry Point, NC	1	.	.	.	143	3	23	.	.	.	.	.	3	.	.	.	.	.
NH Corpus Christi, TX	1	.	.	.	6	5	7	1	.	.	.	.	.	.	.	.	.	.
NHC Great Lakes, IL	.	1	.	.	693	429	47	33	3	.	.	.	.	3	.	.	.	1
NH Guantanamo Bay, Cuba	.	.	.	.	9	.	1	.	.	.	.	.	.	.	.	.	.	.
NH Jacksonville, FL	.	1	.	1	442	210	40	21	8	.	.	.	.	.	.	.	.	.
NH Naples, Italy	.	.	.	.	52	1	4	.	.	.	.	.	.	.	.	.	.	.
NHC New England, RI	8	.	.	.	26	.	3	.	.	.	.	.	.	.	.	.	.	.
NH Pensacola, FL	3	.	.	.	272	194	31	24	9	2	.	.	42	14	.	2	1	1
NMC Portsmouth, VA	2	.	1	4	526	158	110	34	4	6	.	.	.	.	1	.	1	2
NH Rota, Spain	.	.	.	.	19	.	1	.	.	.	.	.	.	.	.	.	.	.
NH Sigonella, Italy	.	.	1	.	41	.	5	.	1	.	.	.	4	.	.	.	.	.
NAVY MEDICINE WEST																		
NH Bremerton, WA	.	.	1	.	70	6	4	.	.	.	.	.	.	.	.	.	.	.
NH Camp Pendleton, CA	2	.	2	.	209	6	25	.	1	.	.	.	.	.	1	.	1	.
NH Guam-Agana, Guam	.	.	6	.	118	24	29	3	.	.	.	.	.	.	.	.	.	1
NHC Hawaii, HI	.	.	.	.	158	20	8	2	1	.	.	.	.	.	.	.	.	.
NH Lemoore, CA	4	1	.	.	68	42	1	5	.	.	.	.	.	.	.	.	.	.
NH Oak Harbor, WA	.	1	.	.	151	93	10	2	3	.	.	.	.	.	.	.	.	.
NH Okinawa, Japan	.	.	1	.	33	39	8	.	.	.	.	.	5	.	.	.	.	.
NMC San Diego, CA	12	3	2	3	1,164	650	136	95	17	19	.	.	5	21	2	2	1	4
NH Twentynine Palms, CA	.	.	.	.	7	.	.	.	.	1	.	.	3	.	.	.	.	.
NH Yokosuka, Japan	.	1	.	.	211	34	30	.	1	.	.	.	.	.	.	.	2	.
NAVAL SHIPS																		
COMNAVAIRLANT/CINCLANTFLEET	.	.	.	1	70	21	10	.	1	.	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	.	.	.	.	113	68	29	10	.	1	.	.	.	.	.	.	.	.
OTHER LOCATIONS																		
Other	89	34	11	8	3,281	2,912	356	369	24	13	1	9	138	155	1	.	1	6
Total	**170**	**65**	**34**	**19**	**9,135**	**5,958**	**1,116**	**731**	**83**	**46**	**2**	**10**	**483**	**266**	**7**	**6**	**9**	**16**

Sentinel reportable events among service members and beneficiaries at U.S. Air Force medical facilities, cumulative numbers[a] for calendar years through 31 December 2008 and 31 December 2009

Air Force

Reporting locations	Number of reports all events[b]		Food-borne						Vaccine preventable					
			Campylo-bacter		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella[c]	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
Air Combat Cmd	1,511	1,333	5	5	24	16	7	2	7	2	34	4	2	2
Air Education & Training Cmd	949	1,465	3	5	20	22	7	7	3	3	5	13	.	.
Air Force Dist. of Washington	204	174	.	.	2	1	.	.	1	.	3	3	.	.
Air Force Materiel Cmd	625	533	4	2	8	15	12	.	2	1	1	7	.	.
Air Force Special Ops Cmd	198	171	.	1	4	13	.	.	.	.	3	.	.	.
Air Force Space Cmd	287	330	1	2	7	8	1	.	.	1	3	2	.	.
Air Mobility Cmd	814	705	1	4	13	9	2	5	.	1	9	5	1	1
Pacific Air Forces	701	517	9	3	7	6	.	.	3	.	10	5	1	2
U.S. Air Forces in Europe	547	548	2	4	12	7	.	.	.	.	4	4	3	1
U.S. Air Force Academy	53	66	2	1	.	3	.	.	.	.	.	.	.	.
Other	584	86	4	1	16	4	8	.	1	.	2	.	.	.
Total	**6,473**	**5,928**	**31**	**28**	**113**	**104**	**37**	**14**	**17**	**8**	**74**	**43**	**7**	**6**

Reporting location	Arthropod-borne				Sexually transmitted						Environmental				Travel associated			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis		Cold[c]		Heat[c]		Q Fever		Tuberculosis	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
Air Combat Cmd	4	11	1	.	1,303	1,176	114	98	3	6	5	5	1	5	.	.	1	1
Air Education & Training Cmd	5	7	.	4	818	1,256	76	133	7	7	1	.	4	8	.	.	.	.
Air Force Dist. of Washington	3	5	.	.	169	155	24	10	2	.	.	.	.	.	.	.	.	.
Air Force Materiel Cmd	13	9	1	.	512	457	66	40	3	2	.	.	.	.	1	.	2	.
Air Force Special Ops Cmd	.	1	1	.	176	144	13	10	.	1	.	1	.	.	1	.	.	.
Air Force Space Cmd	1	.	.	.	256	300	17	14	.	1	.	.	1	1	.	.	.	1
Air Mobility Cmd	20	18	1	1	679	602	71	49	4	1	6	6	5	1	1	1	1	1
Pacific Air Forces	.	1	.	1	634	434	32	46	1	4	3	9	.	6	.	.	1	.
U.S. Air Forces in Europe	21	19	3	2	465	465	36	41	1	2	.	1	.	.	.	.	.	2
U.S. Air Force Academy	1	1	.	1	48	57	1	3	.	.	1	.	.	.	.	.	.	.
Other	6	.	2	5	505	43	29	7	2	.	.	1	5	23	4	1	.	1
Total	**74**	**72**	**9**	**14**	**5,565**	**5,089**	**479**	**451**	**23**	**24**	**16**	**23**	**16**	**44**	**7**	**2**	**5**	**6**

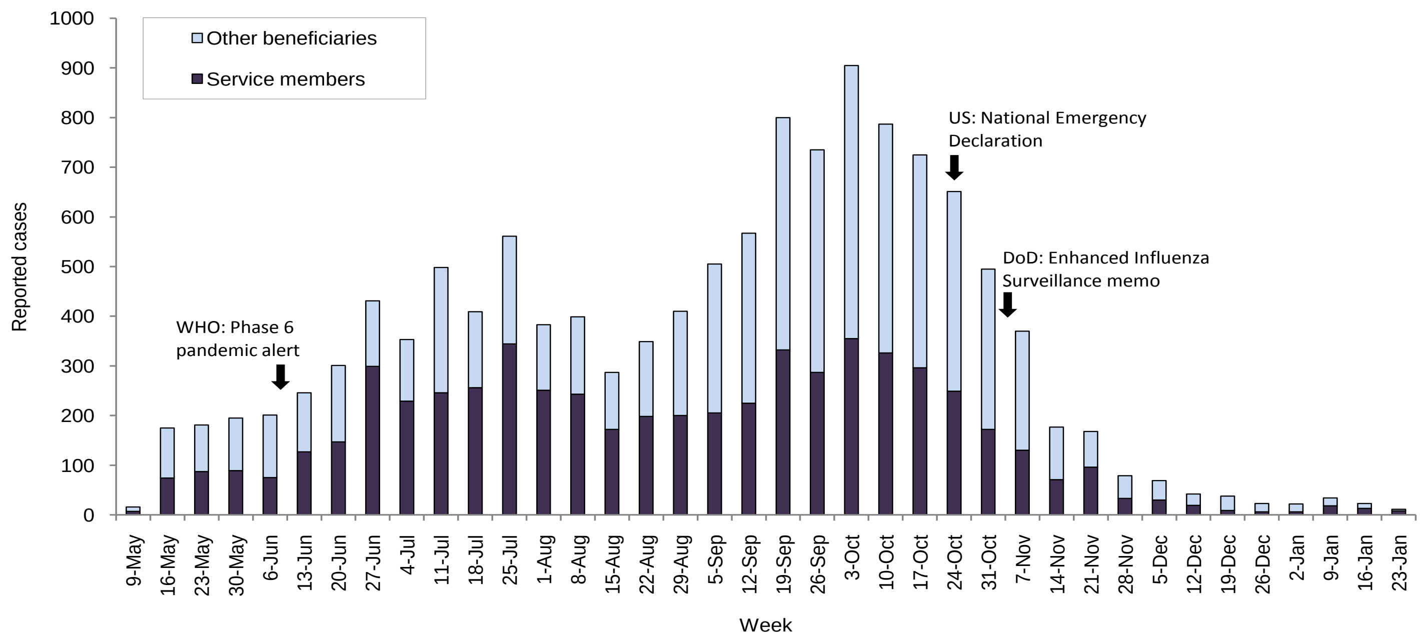
[a]Events reported by Jan 8, 2010
[b]Sixty-seven medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, June 2009.
[c]Service member cases only.
Note: Completeness and timeliness of reporting vary by facility.

Acute respiratory disease (ARD) and streptococcal pharyngitis rates (SASI)

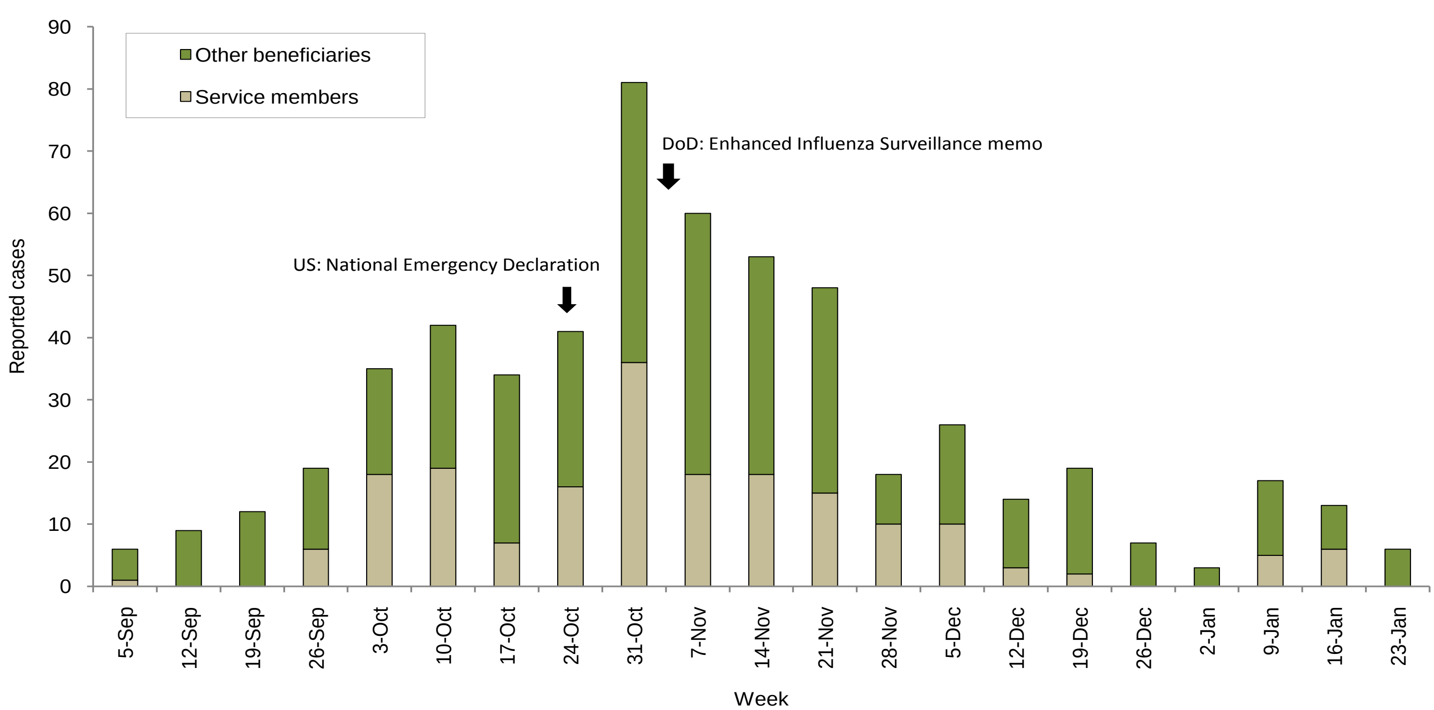
The ARD report was omitted due to space constraints and will return to the MSMR next month.

SURVEILLANCE SNAPSHOT:
Influenza reportable events, service members and other beneficiaries, 2009-2010

Reported non-hospitalized cases of influenza, service members and other beneficiaries of the military health system, U.S. Armed Forces, 9 May 2009 - 23 January 2010



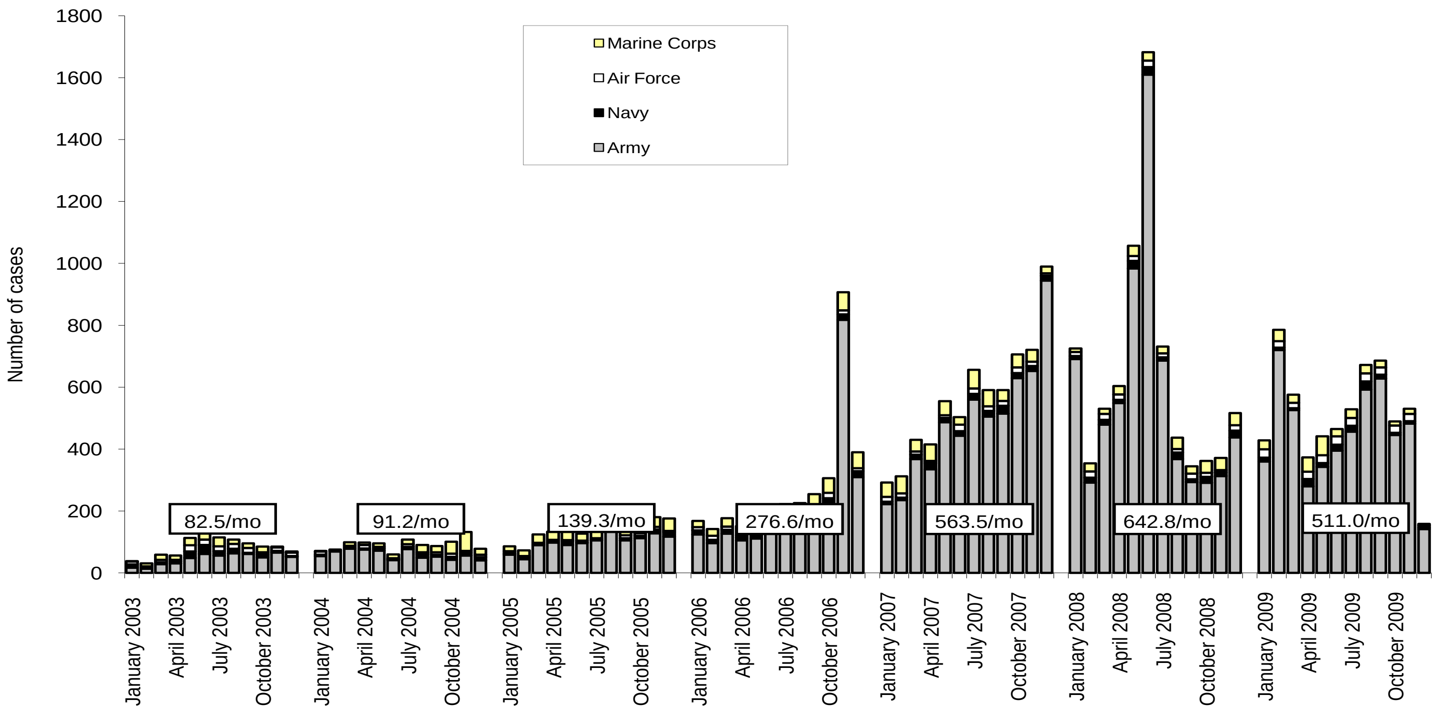
Reported hospitalized cases of influenza, service members and other beneficiaries of the military health system, U.S. Armed Forces, 5 September 2009 - 23 January 2010 (no hospitalized cases were reported between May and August 2009)



According to the Tri-Service Reportable Events Guidelines and Case Definitions adopted in June 2009, "a reportable event may represent an inherent, significant threat to public health and military operation." With increased attention to the burden and severity of influenza due to the novel strain detected in April, the Military Health System enhanced surveillance of influenza-associated hospitalizations using electronic public health reporting tools to provide timely data on inpatients at military treatment facilities and hospitalized active duty members.

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - December 2009 (data as of 28 January 2010)

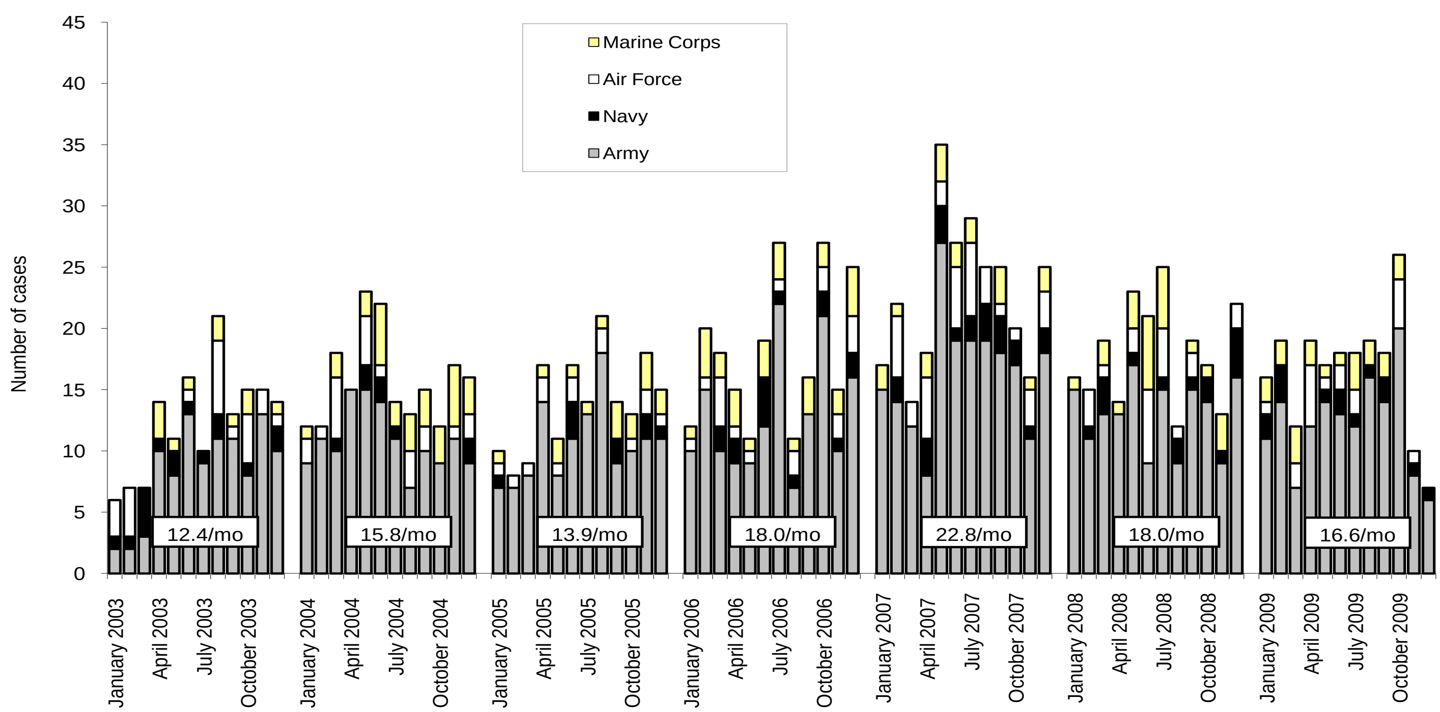
Traumatic brain injury (ICD-9: 310.2, 800-801, 803-804, 850-854, 907.0, 950.1-950.3, 959.01, V15.5_1-9, V15.5_A-F, V15.59_1-9, V15.59_A-F)[a]



Reference: Armed Forces Health Surveillance Center. Deriving case counts from medical encounter data: considerations when interpreting health surveillance reports. *MSMR*. Dec 2009; 16(12):2-8.

[a]Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit while deployed to/within 30 days of returning from OEF/OIF (includes in-theater medical encounters from the Theater Medical Data Store [TMDS]);1,901 individuals had a previous TBI-related medical encounter.

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

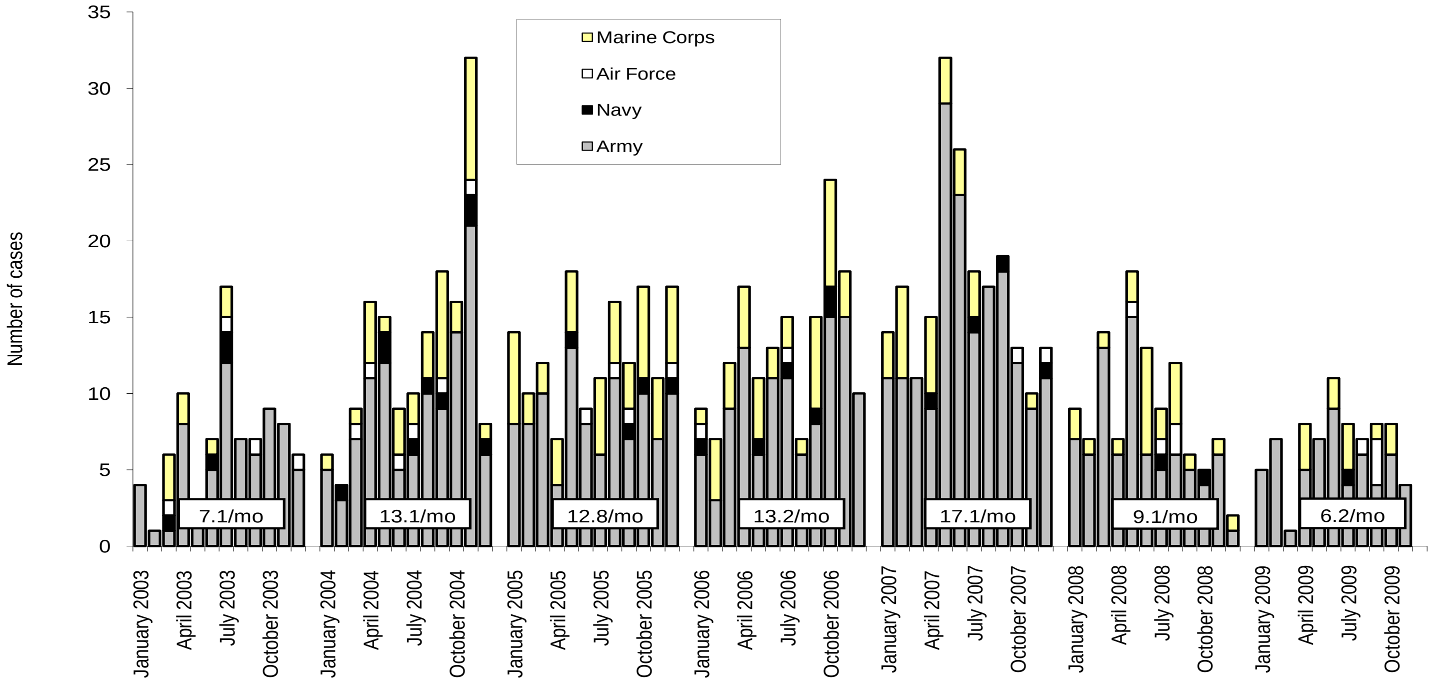


Reference: Isenbarger DW, Atwood JE, Scott PT, et al. Venous thromboembolism among United States soldiers deployed to Southwest Asia. *Thromb Res*. 2006;117(4):379-83.

[b]One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 90 days of returning from OEF/OIF.

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - December 2009 (data as of 28 January 2010)

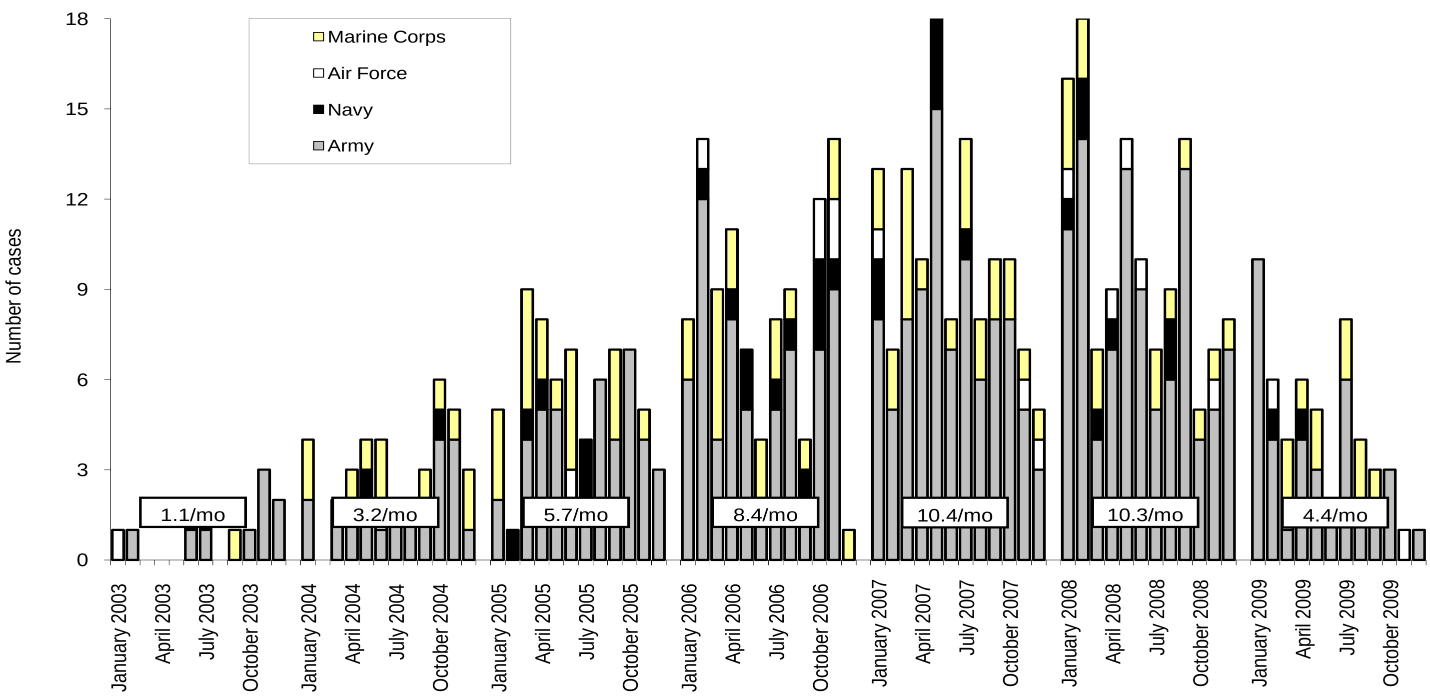
Amputations (ICD-9: 887, 896, 897, V49.6 except V49.61-V49.62, V49.7 except V49.71-V49.72, PR 84.0-PR 84.1, except PR 84.01-PR 84.02 and PR 84.11)[a]



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

[a]Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 365 days of returning from OEF/OIF.

Heterotopic ossification (ICD-9: 728.12, 728.13, 728.19)[b]



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

[b]One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 365 days of returning from OEF/OIF.

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