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Update: Human Immunodeficiency Virus, Type 1 (HIV-1), Antibody Screening among Active and Reserve Component Soldiers and Civilian Applicants for Military Service, January 1990-June 2005

Since October 1985, all civilian applicants for U.S. military service have been screened for antibodies to human immunodeficiency virus, type 1 (HIV-1) during pre-induction medical examinations at Military Entrance Processing Stations (MEPS). Since 1986, all members of active and reserve components of the U.S. Armed Forces have been periodically screened for antibodies to HIV-1.[1] This report summarizes prevalences and trends of new diagnoses of HIV-1 infection among civilian applicants for military service and among soldiers in active and reserve components of the U.S. Army who have been screened since 1990.

Methods: For active, Reserve, and National Guard soldiers, new diagnoses of HIV-1 infections were identified based on results of tests of individuals who were listed on contemporaneous personnel files. For this summary, a new diagnosis was defined as two "positive" results from evaluations of two different specimens from the same individual or one "positive" result from evaluation of one specimen if it was the last for the individual. For calendar year-specific summaries in Army components, denominators were the numbers of soldiers in each component who were tested at least once during each calendar year. Annual HIV-1 infection prevalences among civilian applicants for service were calculated by dividing the number of applicants with new diagnoses of HIV-1 infection each calendar year by the number of applicants tested each year.

Army, active component: From January 2004 through June 2005, nearly 695,000 tests for antibodies to HIV-1 were conducted among soldiers in the active component of the U.S. Army; during the 18-month period, 88 soldiers were diagnosed with HIV-1 infections (Table 1). During calendar year 2004, the overall prevalence of new diagnoses of HIV-1 infections was 0.15 per 1,000 soldiers tested. Among both males and females, prevalences of new diagnoses of HIV-1 infections were lower in 2004 than in any other year since 1990 (Table 1, Figure 1). Of 1,243 active component soldiers diagnosed with HIV-1 infections since 1990, 358 (28.8%) remain in active service (Table 1).

Army National Guard: From January 2004 through June 2005, more than 316,000 tests for antibodies to HIV-1 were conducted among soldiers in the U.S. Army National Guard; during the 18-month period, 52 soldiers were diagnosed with HIV-1 infections (Table 2). During calendar year 2004, the overall prevalence of new diagnoses of HIV-1 infections was 0.21 per 1,000 soldiers tested. Among both males and females, prevalences of new diagnoses of HIV-1 infections were lower in 2004 than in any other year since 1990 (Table 2, Figure 2). Of 641 National Guard soldiers diagnosed with HIV-1 infections since 1990, 108 (16.8%) remain in service (Table 2).

Army Reserve: From January 2004 through June 2005, nearly 173,000 tests for antibodies to HIV-1 were conducted among soldiers in the U.S. Army Reserve; during the 18-month period, 37 soldiers were diagnosed with HIV-1 infections (Table 3). In 2004, the overall prevalence of new diagnoses of HIV-1 infections was 0.32 per 1,000 soldiers tested—the third lowest annual rate in the Army Reserve since 1990 (Table 3). In 2004 compared to 2003, there were fewer than half as many new diagnoses of HIV-1 among males; and for the second year in a row, there was only one new diagnosis among females (Table 3, Figure 3). Of 550 Army Reserve soldiers diagnosed with HIV-1 infections since 1990, 112 (20.4%) remain in service (Table 3).

Civilian applicants for US military service: From January 2004 through June 2005, nearly 460,000 tests for antibodies to HIV-1 were conducted among civilian applicants for military service; during the 18-month period, 172 applicants were diagnosed with HIV-1 infections (Table 4). In 2004, the overall prevalence of HIV-1 infection was 0.40 per 1,000 applicants tested—slightly higher than the prevalences in the prior two years (Table 4). Among males and females, the prevalences were slightly higher in 2004 than in the prior two years but still

Continued on page 8

Table 1. New diagnoses of HIV-1 infections, by gender, active component, US Army , January 1990-June 2005

Year	Total HIV tests	Total persons tested[1]	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+) Male	New HIV-1 (+) Female	Overall rate per 1000 tested	Male rate per 1000 tested	Female rate per 1000 tested	HIV-1(+) still in active status by year of diagnosis
1990	520,317	430,770	376,461	54,163	157	148	9	0.36	0.39	0.17	5
1991	465,317	388,400	339,429	48,833	138	128	9	0.36	0.38	0.18	7
1992	527,614	426,636	373,542	52,942	128	121	7	0.30	0.32	0.13	11
1993	456,405	367,918	319,224	48,580	98	94	4	0.27	0.29	0.08	9
1994	420,041	342,268	294,883	47,291	84	79	5	0.25	0.27	0.11	11
1995	464,913	340,225	292,642	47,484	75	70	5	0.22	0.24	0.11	18
1996	406,115	307,740	261,841	45,818	67	62	5	0.22	0.24	0.11	16
1997	401,944	299,463	252,794	46,581	64	56	8	0.21	0.22	0.17	19
1998	380,808	301,087	252,887	48,114	61	54	7	0.20	0.21	0.15	18
1999	358,455	289,447	243,088	46,281	55	52	3	0.19	0.21	0.06	18
2000	371,585	289,108	241,985	47,048	49	42	7	0.17	0.17	0.15	23
2001	400,735	311,663	261,713	49,931	61	58	3	0.20	0.22	0.06	30
2002	419,594	331,316	278,438	52,831	57	55	2	0.17	0.20	0.04	40
2003	496,351	364,794	307,627	57,136	61	57	4	0.17	0.19	0.07	49
2004	478,174	371,589	316,984	54,605	56	55	1	0.15	0.17	0.02	52
2005[2]	216,605	197,446	167,325	30,121	32	32	0	0.16	0.19	0.00	32
Total	**6,784,973**	**5,359,870**	**4,580,863**	**777,759**	**1,243**	**1,163**	**79**				**358**

[1] Includes unknown status of sex

[2] Through 30 June 2005

Figure 1. New diagnoses of HIV-1 infections, per 1,000 tested by gender, active component, US Army, January 1990-June 2005

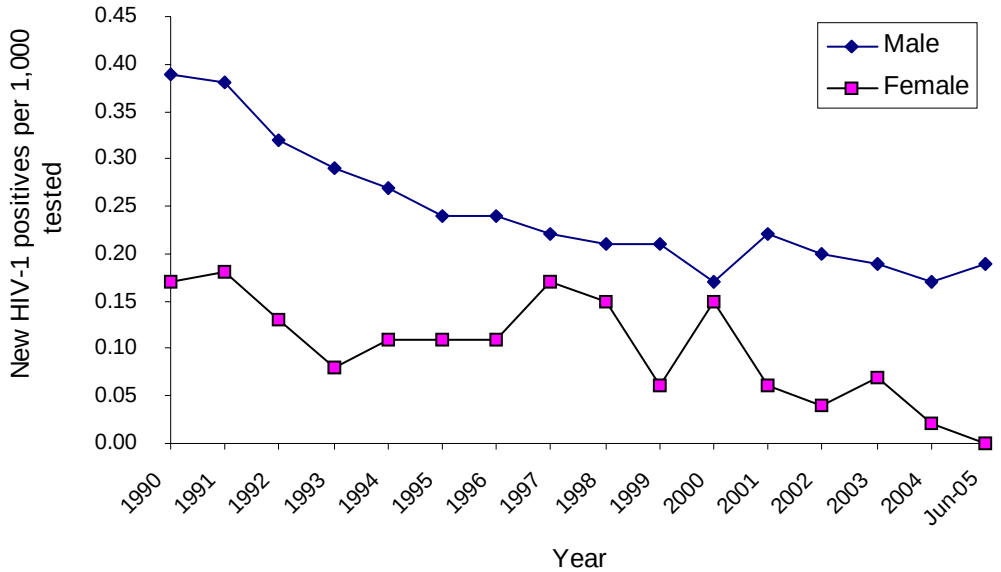


Table 2. New diagnoses of HIV-1 infections, by gender, Army National Guard, January 1990-June 2005

Year	Total HIV tests	Total persons tested [1]	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+) Male	New HIV-1 (+) Female	Overall rate per 1000 tested	Male rate per 1000 tested	Female rate per 1000 tested	HIV-1(+) still in NG, by year of diagnosis
1990	231,692	213,843	198,776	15,062	76	73	3	0.36	0.37	0.20	0
1991	192,209	179,121	167,337	11,781	70	65	5	0.39	0.39	0.42	2
1992	252,971	235,608	218,331	17,274	69	65	4	0.29	0.30	0.23	1
1993	168,435	158,476	146,789	11,685	48	47	1	0.30	0.32	0.09	0
1994	199,882	186,212	171,544	14,668	52	49	3	0.28	0.29	0.20	4
1995	147,584	140,564	130,214	10,349	42	39	3	0.30	0.30	0.29	6
1996	62,659	59,252	54,361	4,891	26	25	1	0.44	0.46	0.20	1
1997	71,718	68,311	61,905	6,406	23	22	1	0.34	0.36	0.16	1
1998	79,224	75,842	68,751	7,091	29	28	1	0.38	0.41	0.14	2
1999	86,621	81,648	73,795	7,853	27	26	1	0.33	0.35	0.13	5
2000	77,258	73,241	65,570	7,671	24	20	4	0.33	0.31	0.52	6
2001	103,887	95,436	85,684	9,752	25	23	2	0.26	0.27	0.21	4
2002	116,298	105,949	95,311	10,638	35	33	2	0.33	0.35	0.19	7
2003	229,047	176,369	158,012	18,357	43	39	4	0.24	0.25	0.22	23
2004	215,693	174,232	156,011	18,221	37	36	1	0.21	0.23	0.05	31
2005 [2]	100,700	92,954	83,718	9,236	15	15	0	0.16	0.18	0.00	15
Total	2,335,878	2,117,058	1,936,109	180,935	641	605	36				108

[1] Includes unknown status of sex

[2] Through 30 June 2005

Figure 2. New diagnoses of HIV-1 infections, per 1,000 tested, by gender, Army National Guard, January 1990-June 2005.

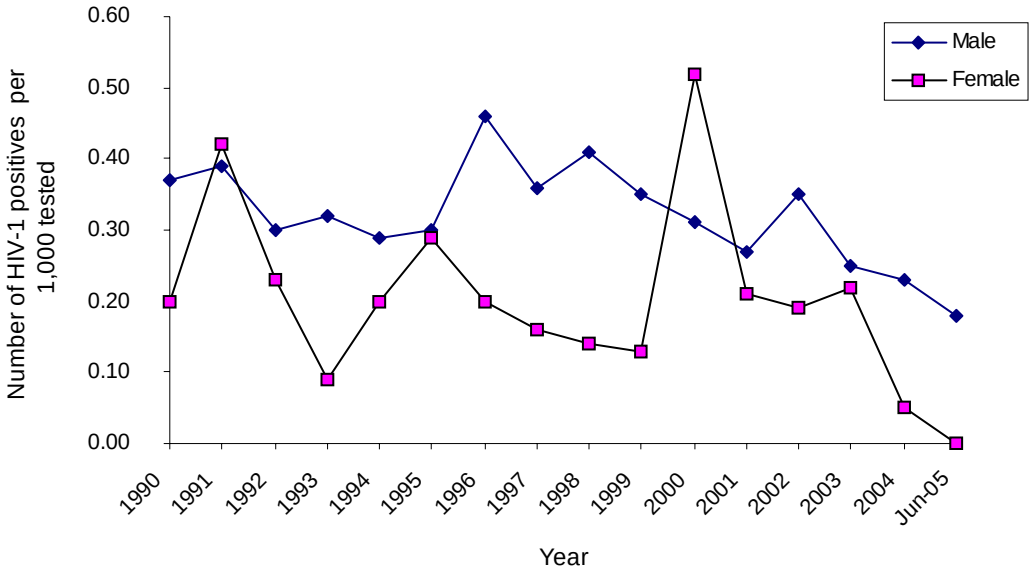


Table 3. New diagnoses of HIV-1 infections, by gender, Army Reserve, January 1990-June 2005

Year	Total HIV tests	Total persons tested [1]	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+) Male	New HIV-1 (+) Female	Overall rate per 1000 tested	Male rate per 1000 tested	Female rate per 1000 tested	HIV-1(+) still in Reserve, by year of diagnosis
1990	176,476	153,609	122,562	31,037	82	79	3	0.53	0.64	0.10	0
1991	123,623	111,980	89,299	22,670	66	64	2	0.59	0.72	0.09	0
1992	184,210	160,612	127,979	32,627	71	61	10	0.44	0.48	0.31	2
1993	147,070	130,268	103,973	26,294	49	45	4	0.38	0.43	0.15	0
1994	137,495	123,128	97,030	26,094	25	21	4	0.20	0.22	0.15	0
1995	105,993	96,016	75,670	20,339	31	26	5	0.32	0.34	0.25	2
1996	52,218	48,223	37,613	10,607	16	16	0	0.33	0.43	0.00	2
1997	45,230	42,057	31,979	10,078	16	14	2	0.38	0.44	0.20	3
1998	37,608	35,935	27,345	8,589	14	13	1	0.39	0.48	0.12	2
1999	41,832	38,754	29,373	9,381	22	17	5	0.57	0.58	0.53	4
2000	39,436	36,237	27,196	9,041	9	6	3	0.25	0.22	0.33	4
2001	54,927	49,896	37,811	12,085	24	20	4	0.48	0.53	0.33	9
2002	62,734	56,385	43,722	12,663	26	19	7	0.46	0.43	0.55	15
2003	156,772	112,569	87,781	24,788	62	61	1	0.55	0.69	0.04	35
2004	118,028	98,276	76,848	21,428	31	30	1	0.32	0.39	0.05	28
2005 [2]	54,792	50,875	40,240	10,635	6	6	0	0.12	0.15	0.00	6
Total	1,538,444	1,344,820	1,056,421	288,356	550	498	52				112

[1] Includes unknown status of sex

[2] Through 30 June 2005

Figure 3. New diagnoses of HIV-1 infections, per 1,000 tested, by gender, Army Reserve, January 1990-June 2005.

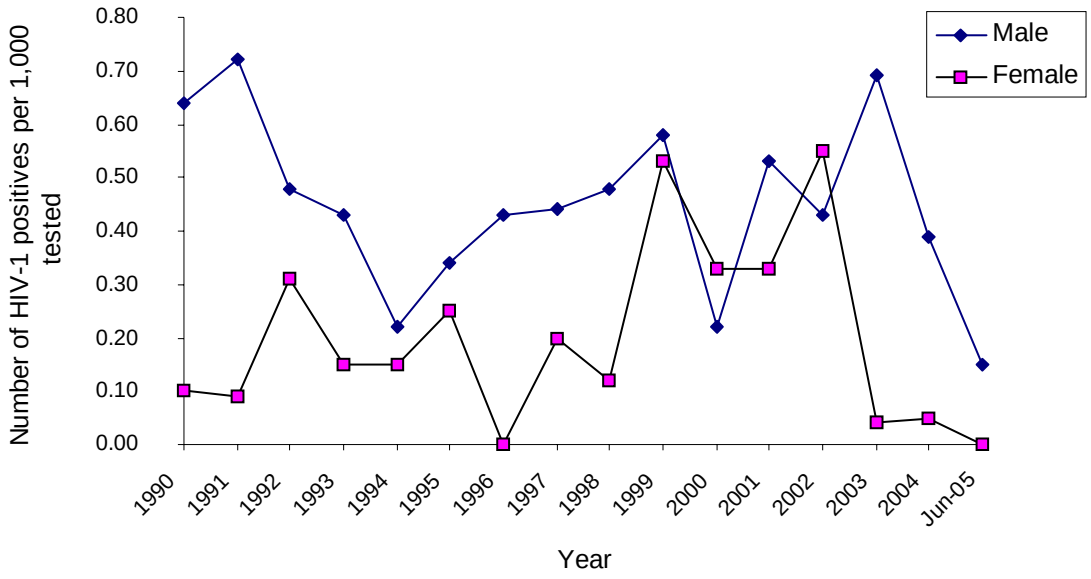


Table 4. Diagnoses of HIV-1 infections, by gender, civilian applicants for US military service, January 1990-June 2005

Year	Total HIV tests	Total persons tested [1]	Male tested	Female tested	Total HIV-1(+)	HIV-1(+) Male	HIV-1(+) Female	Overall rate per 1000 tested	Male rate per 1000 tested	Female rate per 1000 tested
1990	395,449	368,962	312,964	55,998	337	308	29	0.91	0.98	0.52
1991	374,053	344,822	294,933	49,883	306	277	29	0.89	0.94	0.58
1992	335,343	306,350	251,433	54,909	174	145	29	0.57	0.58	0.53
1993	347,655	312,691	255,089	57,602	172	148	24	0.55	0.58	0.42
1994	321,729	283,697	226,003	57,694	125	92	33	0.44	0.41	0.57
1995	281,156	221,741	176,196	45,544	135	112	23	0.61	0.64	0.51
1996	347,538	300,056	235,607	64,441	91	77	14	0.30	0.33	0.22
1997	338,345	296,574	234,982	61,589	120	102	18	0.40	0.43	0.29
1998	331,951	291,523	228,790	62,733	121	103	18	0.42	0.45	0.29
1999	359,749	314,216	246,457	67,758	132	110	22	0.42	0.45	0.32
2000	380,769	334,410	261,154	73,254	131	108	23	0.39	0.41	0.31
2001	406,369	348,963	275,454	73,507	140	120	20	0.40	0.44	0.27
2002	412,162	360,450	283,171	77,277	137	119	18	0.38	0.42	0.23
2003	360,030	315,916	253,290	62,626	109	93	16	0.35	0.37	0.26
2004	306,271	264,668	212,553	52,115	107	93	14	0.40	0.44	0.27
2005 [2]	151,826	127,093	101,811	25,281	65	61	4	0.51	0.60	0.16
Total	**5,450,395**	**4,792,132**	**3,849,887**	**942,211**	**2,402**	**2,068**	**334**			

[1] Includes unknow status of sex

[2] Through 30 June 2005

Figure 4. Diagnoses of HIV-1 infections, per 1,000 tested, by gender, civilian applicants for US military service, January 1990-June 2005.

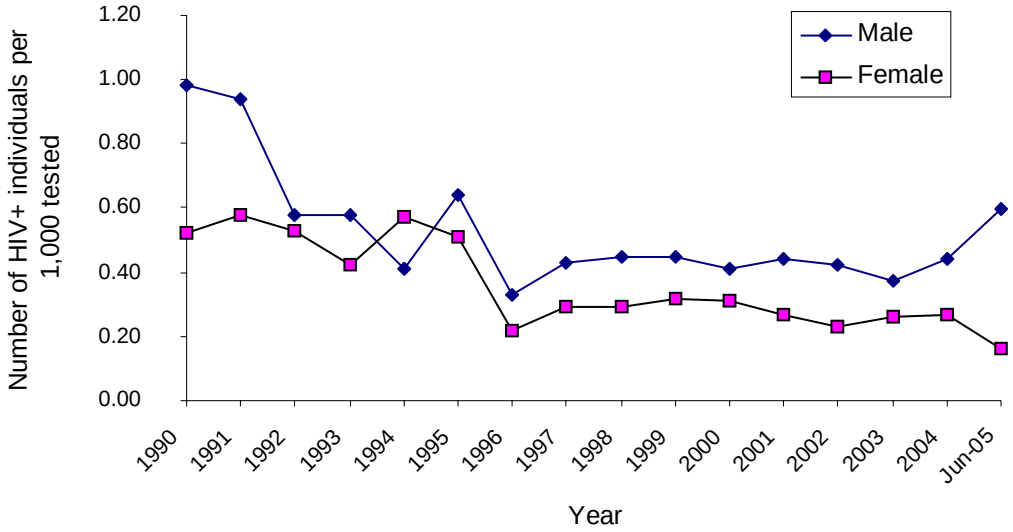
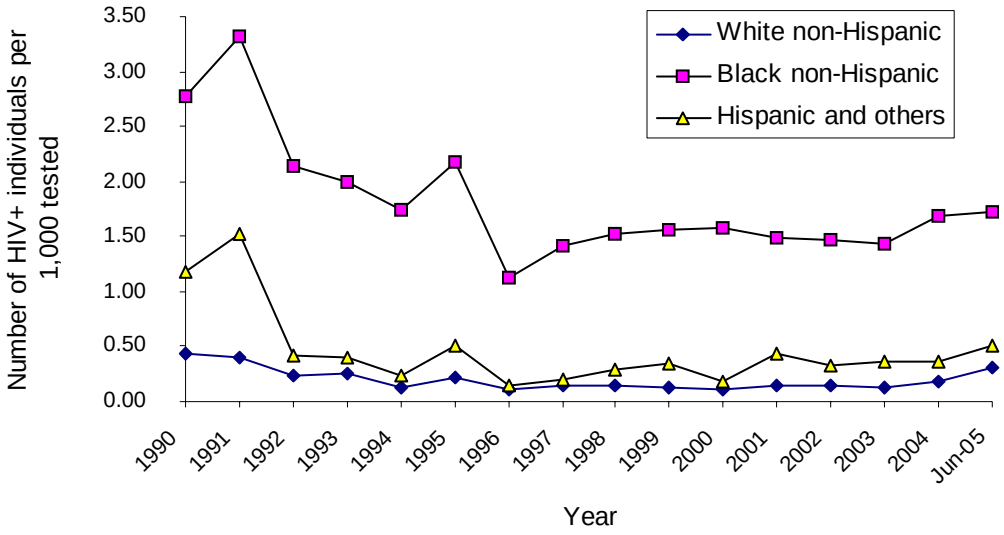


Table 5. Diagnoses of HIV-1 infections, by race/ethnicity, civilian applicants for US military service, 1990 - June 2005

Year	Total HIV tests	Total persons tested	White non-hispanic tested	Black non-hispanic tested	Hispanic and others tested	Total HIV-1(+)	White non-hispanic HIV-1(+)	Black non-hispanic HIV-1(+)	Hispanic and others HIV-1(+)	Overall rate per 1000 tested	White non-hispanic rate per 1000 tested	Black non-hispanic rate per 1000 tested	Hispanic and others rate per 1000 tested
1990	395,449	368,962	276,805	68,464	23,693	337	119	190	28	0.91	0.43	2.78	1.18
1991	374,053	344,822	273,654	50,124	21,044	306	108	166	32	0.89	0.39	3.31	1.52
1992	335,343	306,350	235,601	51,042	19,707	174	57	109	8	0.57	0.24	2.14	0.41
1993	347,655	312,691	239,907	52,457	20,327	172	59	105	8	0.55	0.25	2.00	0.39
1994	321,729	283,697	209,799	52,669	21,229	125	28	92	5	0.44	0.13	1.75	0.24
1995	281,156	221,741	161,325	40,850	19,566	135	36	89	10	0.61	0.22	2.18	0.51
1996	347,538	300,056	213,501	57,588	28,967	91	22	65	4	0.30	0.10	1.13	0.14
1997	338,345	296,574	208,121	57,755	30,698	120	32	82	6	0.40	0.15	1.42	0.20
1998	331,951	291,523	205,238	55,387	30,898	121	28	84	9	0.42	0.14	1.52	0.29
1999	359,749	314,216	221,827	59,753	32,636	132	28	93	11	0.42	0.13	1.56	0.34
2000	380,769	334,410	238,468	64,443	31,499	131	24	101	6	0.39	0.10	1.57	0.19
2001	406,369	348,963	258,390	60,348	30,225	140	37	90	13	0.40	0.14	1.49	0.43
2002	412,162	360,450	272,347	58,190	29,913	137	42	85	10	0.38	0.15	1.46	0.33
2003	360,030	315,916	234,740	47,944	33,232	109	28	69	12	0.35	0.12	1.44	0.36
2004	306,271	264,668	196,811	35,624	32,233	107	35	60	12	0.40	0.18	1.68	0.37
2005 [1]	151,826	127,093	94,706	16,275	16,112	65	29	28	8	0.51	0.31	1.72	0.50
Total	**5,450,395**	**4,792,132**	**3,541,240**	**828,913**	**421,979**	**2,402**	**712**	**1,508**	**182**				

[1] Through 30 June 2005

Figure 5. Diagnoses of HIV-1 infections, per 1,000 tested, by race/ethnicity, civilian applicants for US military service, January 1990-June 2005.



consistent with the generally stable trends since 1997 (Table 4, Figure 4). Among white and black non-Hispanic applicants, the prevalences in 2004 were higher than in any other year since 1995 (Table 5, Figure 5).

Data summaries provided by Anna Soloviov, Analysis Group, Army Medical Surveillance Activity.

Editorial comment: For 20 years, the U.S. military has conducted routine screening for antibodies to HIV-1 among civilian applicants for and serving members of the active and Reserve components of the U.S. military.[1] Since 1995, numbers of tests, individuals tested, and new diagnoses of HIV-1 infections among members of these groups have been summarized in the *MSMR*.[2]

This summary differs from previous summaries of HIV-1 testing in several ways. First, this report summarizes HIV-1 testing since calendar year 1990. During the first rounds of routine screening of service members in the mid-late 1980s, there were relatively high rates of "new diagnoses" because both longstanding ("prevalent") and recently acquired ("incident") infections were being detected. In contrast, screening since 1990 (after most members of the U.S. Army had been tested at least once) has detected infections that were acquired since each individual's last negative test—as a result, rates and trends of new diagnoses since 1990 more reliably reflect magnitudes and trends of contemporaneous HIV-1 infection risks. Second, for previous reports, "new diagnoses" were defined as two positive results from two different specimens from the same individual. (This definition has been used since the beginning of the U.S. military's testing program to confirm the diagnosis of HIV-1 infection in an individual.)[1,3] However, some individuals with positive results from a single specimen do not have a follow-up specimen (sometimes after many years). In the U.S. military, a positive result on a single specimen is rarely a "false positive"[2] (second specimens are required for clinical diagnoses to reduce the likelihood of false positive diagnoses to near zero). However, for public health surveillance purposes, we now include as "new positives" those individuals who have positive results on a single specimen and no record of a follow-up. The effect is to increase the numbers and rates of new positives in overall summaries.

In each component of soldiers, there are long term general trends of slow declines or relative stability. It should be noted, however, that rates of new diagnoses among individuals who are repeatedly tested reflect not only rates of infection acquisition but also testing frequencies. If, for example, infection rates are stable in a group of soldiers who are tested at increasing frequencies over time, then intervals between tests—and prevalences of new diagnoses among those tested—would decrease over time. The effect of decreasing testing intervals (e.g., during times of increased overseas deployments) must be considered in interpreting results of routine HIV-1 screening.

Finally, trends of HIV-1 positivity among civilian applicants for service in general have been remarkably stable for the past eight years. However, in 2004, rates of HIV-1 positivity among black non-Hispanic and white non-Hispanic applicants were slightly higher than in recent years. These findings will be monitored to assess their potential significance.

References

1. Brown AE, Brundage JF, Tomlinson JP, Burke DS. The U.S. Army HIV testing program: the first decade. *Mil Med.* 1996 Feb;161(2):117-22.
2. Army Medical Surveillance Activity. Supplement-HIV-1 in the Army. *MSMR* 1995 June;1(3):12-5.
3. Burke DS, Brundage JF, Redfield RR, et al. Measurement of the false positive rate in a screening program for human immunodeficiency virus infections. *N Engl J Med*. 1988 Oct 13;319(15):961-4.

Table 6. HIV-1 tests, by indication, US Army, 2004

Test indication	Active component	National Guard	Reserve	Total
Clinical (including sexually transmitted diseases)	30,476	2,828	2,305	35,609
Routine screening	257,863	83,091	45,135	386,089
Physical examination	67,598	87,411	43,683	198,692
Other/unknown	122,237	42,363	26,905	191,505
Total	**478,174**	**215,693**	**118,028**	**811,895**

Case reports: Malaria in U.S. Soldiers after Returning from Honduras and Korea, November 2004 and July 2005

Case 1: A 22 year old male U.S. Army soldier of European descent was deployed to Honduras for 6 months. While deployed, he was stationed at Soto Cano Air Force base in west-central Honduras, and visited Tegucigalpa, the Honduran capital, and La Ceiba.

Approximately six weeks after returning to the United States, he presented to the local emergency department with a chief complaint of fever, diarrhea, and vomiting for 3 days. He denied abdominal pain or blood in his stool. His temperature was 100.5°F. He was diagnosed with gastroenteritis and discharged. Two days later, he had a syncopal episode while serving in a color guard at a parade. He was afebrile at the emergency department and discharged to his quarters with a diagnosis of orthostatic syncope. Six days later, he returned to the emergency department with nausea, fever, and headache. He insisted on an evaluation for malaria (based on advice from a friend). Examination of a thin smear of blood revealed malaria parasites. He was referred to a civilian medical specialist who prescribed primaquine in a dosage not available in the military pharmacy.

The Preventive Medicine Officer at Fort Knox was consulted to review the patient's history, clinical status, and medications. The soldier had an unremarkable medical history and no previous travel to the tropics. While in Honduras, he reportedly used DEET insect repellent and permethrin treated uniforms but not a bed net (because there were few mosquitoes inside his air conditioned sleeping quarters). Still, he estimated that he received at least 6 mosquito bites per day. He reported compliance with weekly chloroquine prophylaxis while in Honduras. He continued chloroquine for 4 weeks after he returned to the United States but was not prescribed primaquine.

During his current illness, he had temperature spikes approximately every two days and severe fatigue that made physical work difficult. He ate little and lost weight from 189 to 174 pounds. Approximately two weeks after the onset of his illness, he developed left upper quadrant abdominal pain and a severe headache.

A review of complete blood counts during the course of his current illness revealed WBCs from 3,400 to 6,600/ml; hemoglobin concentrations from 15.2 to 9.8 gm/dl; hematocrits from 43.6 to 28.4%; and platelets from 535,000 to 63,000/ml.

On physical examination, the soldier was in no acute distress with a temperature of 103.9°F., a pulse rate of 122 beats per minute, mild left upper quadrant abdominal tenderness, and no hepatosplenomegaly. A blood smear revealed non-falciparum malaria parasites consistent with *P. vivax*.

While awaiting results of a quantitative assay of G6PD activity, the patient was treated with chloroquine with rapid resolution of symptoms. When G6PD activity was documented as 11.8 U/gm Hgb (normal range: 7.0-20.5 U/gm Hgb), he was prescribed 15 mg. of primaquine base daily for 14 days. He returned to full military duties including physical training soon after completing the course of primaquine.

Case 2: In March 2005, a 20 year old male U.S. Army soldier of European descent returned from a one year assignment in Korea. In July, he presented to the emergency department with chief complaints of fevers, chills, light-headedness, and headache (primarily, in the nuchal region). He was afebrile and with normal vital signs. He was discharged to home with a diagnosis of viral syndrome.

Two days later, he returned to the emergency department with similar symptoms and a fever to 101.4°F. Laboratory tests revealed normal hemoglobin and hematocrit, a white blood cell count of 2,000/ml, and a platelet count of 80,000/ml. A chemistry panel and urinalysis were normal. He was discharged to home with a diagnosis of thromocytopenia and viral syndrome.

Two days later, he returned with similar symptoms plus vomiting and fever to 104.5 °F. Laboratory tests revealed a white blood cell count of 2,200/ml, a platelet count of 31,000/ml, and abnormal concentrations of potassium (3.1 mEq/L), AST (112 U/L), ALT (126 U/L), and alkaline phosphotase (163 U/L). Thick blood smears showed <1% parasitemia and a thin smear was consistent with *P. vivax*.

Because of the metabolic and hematologic abnormalities, he was hospitalized for treatment with chloroquine with rapid resolution of his symptoms. During follow-up at the preventive medicine service at Fort Knox, he was treated with primaquine for 14 days after confirming a normal G6PD level. He reported feeling much better and was returned to full duty after the primaquine treatment.

In Korea, he received multiple mosquito bites during a field training exercise in August. During the exercise, he used DEET insect repellent but not permethrin, mosquito netting, or chemoprophylaxis (which was not prescribed). After the exercise, a non-commissioned officer and a Republic of Korea soldier assigned to his unit became ill with malaria.

Editorial comment: A major threat to travelers in malaria endemic areas is incomplete or sub-optimal malaria chemoprophylaxis.[1] To counter the threat, the U.S. military has institutionalized medical screening of servicemembers prior to deploying; chemoprophylaxis against endemic plasmodium species (as well as personal protective measures against mosquito bites) during deployments; and "terminal prophylaxis" against malaria after returning from deployments.

Primaquine is the only drug currently available for treating liver stage infections with *P. vivax* and *P. ovale*.[2] However, primaquine can cause hemolytic anemia in individuals with glucose-6-phosphate dehydrogenase (G6PD) deficiency.[3] The United States Army began universal G6PD screening in 2004.[4] Case 1 of this report was under the impression that he was G6PD deficient prior to deploying to Honduras; as a result, he was not offered terminal prophylaxis with primaquine after he left Honduras.

The soldier had no clinical manifestations of malaria while in Honduras because chloroquine is effective against blood stage (but not liver stage) infections with *P. vivax*.[1,2,5] The failure of chloroquine to eradicate *P. vivax* in the patient's liver enabled the emergence of plasmodia into his blood and clinical manifestations of relapsing malaria approximately 5 weeks after he returned from Honduras (and approximately one week after he completed terminal prophylaxis with chloroquine). Not surprisingly, when the patient was treated with the standard post-exposure course of primaquine, he quickly responded.[1,2,5]

Malaria should be included in the differential diagnosis when evaluating patients who complain of and/or present with fevers after serving/traveling in malarious areas.[1,2,5,6] The cases in this report were diagnosed after multiple emergency department visits. In each case, gastrointestinal symptoms may have contributed to delays in diagnoses; however, up to 25% of malaria patients have gastrointestinal symptoms, including nausea, vomiting, and diarrhea.[1, 6] The thrombocytopenia and elevated transaminases that were manifested in these patients are frequent clinical expressions of malaria.[1]

In the second case of this report, malaria infection was acquired in Korea but clinical manifestations were not detectable until his next assignment outside of Korea. This is not uncommon. In the past decade, there has been a general increase in malaria incidence among U.S. soldiers, primarily due to *P. vivax* infections acquired in Korea.[7] In 2004, 23 (41%) of 56 malaria cases among U.S. Army soldiers were acquired in Korea[7]; and 13 Korea-acquired cases were diagnosed/reported in facilities outside of Korea[7].

In malaria endemic areas of Korea, the peak transmission season is generally from late summer through early fall. Because chemoprophylaxis is not routinely used in Korea, personal protective measures to prevent mosquito bites in endemic areas are particularly important. They include using military issued DEET repellent on exposed skin; treating uniforms with permethrin; wearing uniforms such that skin exposure is minimized; and using mosquito bed nets while sleeping.[8]

In summary, while malaria is relatively uncommon in the United States, it must be considered when evaluating patients with fevers who have recently traveled in endemic areas, including in the Republic of Korea. Malaria may present long after last exposures to malaria endemic areas and with atypical symptoms, e.g., gastrointestinal symptoms. Finally, G6PD activity should be assayed before using primaquine for terminal prophylaxis.

Report and comment provided by Eric E. Shuping, LTC, MC, USA, Ireland Army Community Hospital, Fort Knox, Kentucky.

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

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

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

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

Methods: For this update, the DMSS was searched to identify all pre- and post-deployment health assessments (DD Form 2795 and DD Form 2796, respectively) that were completed from 1 January 2003 to August 2005.

Results: From 1 January 2003 to 31 August 2005, 1,042,790 pre-deployment health assessments and 1,004,384 post-deployment health assessments were completed at field sites, shipped to AMSA, and integrated in the DMSS database (Table 1).

In general, the distributions of self-assessments of "overall health" were similar among

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

	Pre-deployment		Post-deployment	
	No.	%	No.	%
Total	**1,042,790**	**100.0**	**1,004,384**	**100.0**
2003				
January	69,061	6.6	5,972	0.6
February	109,841	10.5	4,713	0.5
March	69,709	6.7	6,331	0.6
April	37,441	3.6	19,221	1.9
May	12,814	1.2	91,522	9.1
June	14,388	1.4	65,115	6.5
July	17,901	1.7	52,071	5.2
August	16,155	1.5	34,845	3.5
September	12,572	1.2	32,056	3.2
October	23,954	2.3	26,253	2.6
November	19,404	1.9	20,647	2.1
December	35,714	3.4	21,030	2.1
2004				
January	67,359	6.5	39,017	3.9
February	39,048	3.7	32,041	3.2
March	22,719	2.2	65,883	6.6
April	19,671	1.9	43,887	4.4
May	27,708	2.7	17,650	1.8
June	24,401	2.3	28,146	2.8
July	22,576	2.2	24,059	2.4
August	33,914	3.3	22,604	2.3
September	31,540	3.0	24,016	2.4
October	34,843	3.3	15,457	1.5
November	33,848	3.2	21,409	2.1
December	37,467	3.6	26,567	2.6
2005				
January	33,658	3.2	50,210	5.0
February	23,230	2.2	66,235	6.6
March	20,131	1.9	51,472	5.1
April	26,372	2.5	18,176	1.8
May	17,597	1.7	19,916	2.0
June	24,170	2.3	18,244	1.8
July	20,310	1.9	15,184	1.5
August	43,274	4.1	24,435	2.4

pre- and post-deployment form respondents (Figure 1). For example, both prior to and after deployment, the most frequent descriptor of "overall health" was "very good." Of note, however, relatively more pre- (33%) than post- (22%) deployment respondents assessed their overall health as "excellent," while more post- (41%) than pre- (26%) deployment respondents assessed their overall health as "good," "fair," or "poor" (Figure 1).

Among servicemembers (n=357,450) who completed both a pre- and a post-deployment health assessment, nearly half (46%) chose the same descriptor of their overall health before and after deploying (Figures 2, 3). Of those (n=191,550) who changed their assessments from pre- to post-deployment, approximately three-fourths (76%) changed by a single category (on a five category scale) (Figure 3); and of those who changed by more than one category, approximately 5-times as many indicated a decrement in overall health (n=52,233; 11% of all respondents) than an improvement (n=10,445; 2% of all respondents) (Figure 3).

On post-deployment forms, approximately 21% of active and 40% of Reserve component respondents reported "medical/dental problems" during deployment. Among active component respondents, "medical/dental problems" were more frequently reported by soldiers and Marines than by members of the other Services, while among Reservists, members of the Army, Navy, and Marines were at least twice as likely to report "medical/dental problems" as were Air Force members (Table 2).

Approximately 4% and 6% of active and Reserve component respondents, respectively, reported "mental health concerns." "Mental health concerns" were reported relatively more frequently among soldiers (active: 6%; Reserve: 7%) than members of the other Services (Table 2).

From 7% (active component, Navy) to 27% (active component, Army) of post-deployment forms documented that "referrals" were indicated (Table 2); and 84% and 80% of all active and Reserve component respondents, respectively, had hospitalizations and/or medical encounters within 6 months after documented post-deployment referrals (Table 2).

Overall, approximately 16% of all post-deployment forms indicated deployment-related "exposure concerns" (Table 3). The proportions of respondents who reported exposure concerns significantly varied from month to month and generally increased over time throughout the period (range: 4.5% [April 2003]-18.6% [April 2004] active component; 8.0% [April 2003]-32.5% [April 2004] Reserve component) (Figure 4).

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

Editorial comment:. Since January 2003, approximately three-fourths of U.S. servicemembers have assessed their overall health as "very good" or "excellent" when they are mobilized and/or prior to deploying overseas, but approximately 60% have assessed their overall health as "very good" or "excellent" at the end of their deployments. Most changes in assessments of overall health from pre- to post-deployment have been relatively minor (i.e., one

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

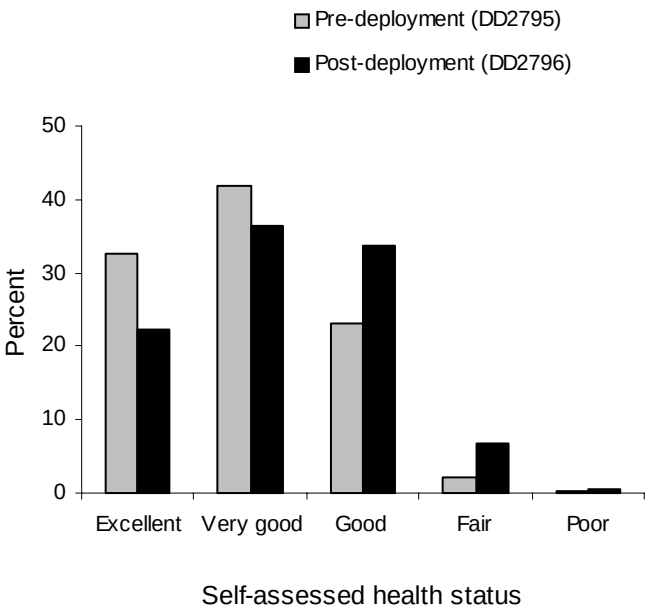

Figure 2. Self-assessed health status on post-deployment form, in relation to self-assessed health status on pre-deployment form, US Armed Forces, January 2003- August 2005.

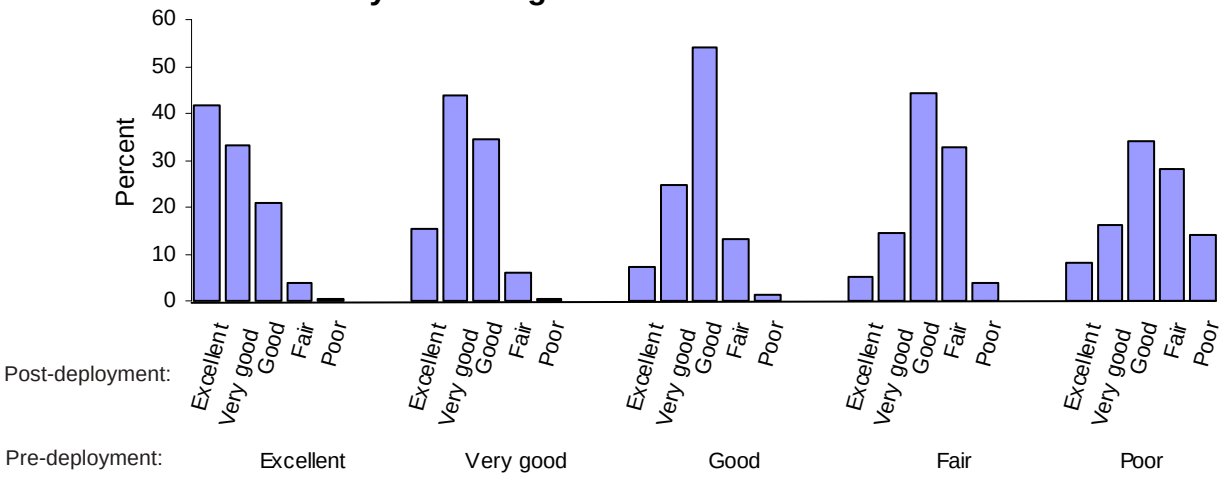

Table 2. Responses to selected questions from post-deployment forms (DD2796) by service and component, US Armed Forces, January 2003-August 2005

	Army	Navy	Air Force	Marines	Total
Active component					
SMs with DD 2796 at AMSA	**234,052**	**89,310**	**91,661**	**73,693**	**488,716**
Electronic version	70%	3%	62%	10%	50%
General health ("fair" or "poor")	9%	5%	2%	6%	6%
Medical/dental problems during deploy	29%	12%	11%	20%	21%
Currently on profile	10%	2%	2%	3%	6%
Mental health concerns	6%	2%	1%	2%	4%
Exposure concerns	18%	5%	5%	11%	12%
Health concerns	13%	6%	5%	8%	10%
Referral indicated	27%	7%	10%	14%	18%
Med. visit following referral[1]	96%	70%	87%	62%	84%
Post deployment serum[2]	93%	78%	85%	82%	88%
Reserve component					
SMs with DD 2796 at AMSA	**209,085**	**13,444**	**32,042**	**15,760**	**270,331**
Electronic version	66%	18%	45%	13%	59%
General health ("fair" or "poor")	11%	6%	2%	9%	10%
Medical/dental problems during deploy	44%	36%	16%	35%	40%
Currently on profile	15%	4%	2%	3%	12%
Mental health concerns	7%	3%	1%	3%	6%
Exposure concerns	25%	19%	9%	26%	23%
Health concerns	22%	22%	9%	22%	20%
Referral indicated	26%	19%	12%	25%	24%
Med. visit following referral[1]	86%	79%	58%	55%	80%
Post deployment serum[2]	92%	87%	66%	80%	89%

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

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

category on a 5-category scale). Still, however, more than 10% of all post-deployers have indicated relatively significant declines (i.e., two or more categories) in their overall health from pre- to post-deployment. The findings are not surprising considering the extreme physical and psychological stresses associated with mobilization, overseas deployment, and harsh and dangerous living and working conditions.[14,15]

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

Of interest, "exposure concerns" among post-deploying respondents have significantly varied from month to month with a general increase in prevalences through the spring of 2004 (Figure 4). Since then, prevalence of exposure concerns have been fairly stable with the exception of a relative peak among Reservists in January through March 2005. Among both active and Reserve component members, prevalences of exposure concerns increased with age. In both components, servicemembers older than 40 were approximately twice as likely as those younger than 20 to report exposure concerns. In all age groups, Reservists were much more likely to report exposure concerns than their active component counterparts.

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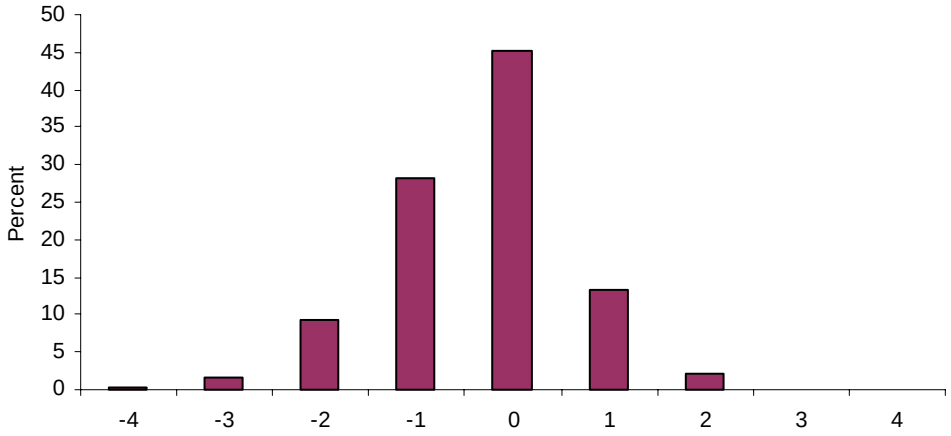
Figure 3. Distribution of changes in self-assessed health statuses as reported on pre- and post-deployment forms, US Armed Forces, January 2003-August 2005.



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

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Table 3. Reports of exposure concerns on post-deployment health assessments, US Armed Forces, January 2003-August 2005

	Total[1]	Exposure concerns	% with exposure concerns
Total	**759,047**	**119,039**	**15.7**
Component			
Active	488,716	58,101	13.5
Reserve	270,331	60,938	29.1
Service			
Army	443,137	92,869	21.0
Navy	102,754	6,699	6.5
Air Force	123,703	7,150	5.8
Marine Corps	89,453	12,321	13.8
Age (years)			
<20	22,574	1,762	7.8
20-29	404,701	53,331	13.2
30-39	209,822	36,858	17.6
>39	121,930	27,087	22.2
Gender			
Men	674,498	104,372	15.5
Women	84,547	14,667	17.3
Race/ethnicity			
Black	134,146	22,719	16.9
Hispanic	75,033	12,605	16.8
Other	1,779	203	11.4
White	495,329	75,631	15.3
Grade			
Enlisted	662,109	102,690	15.5
Officer	96,836	16,349	16.9

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

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

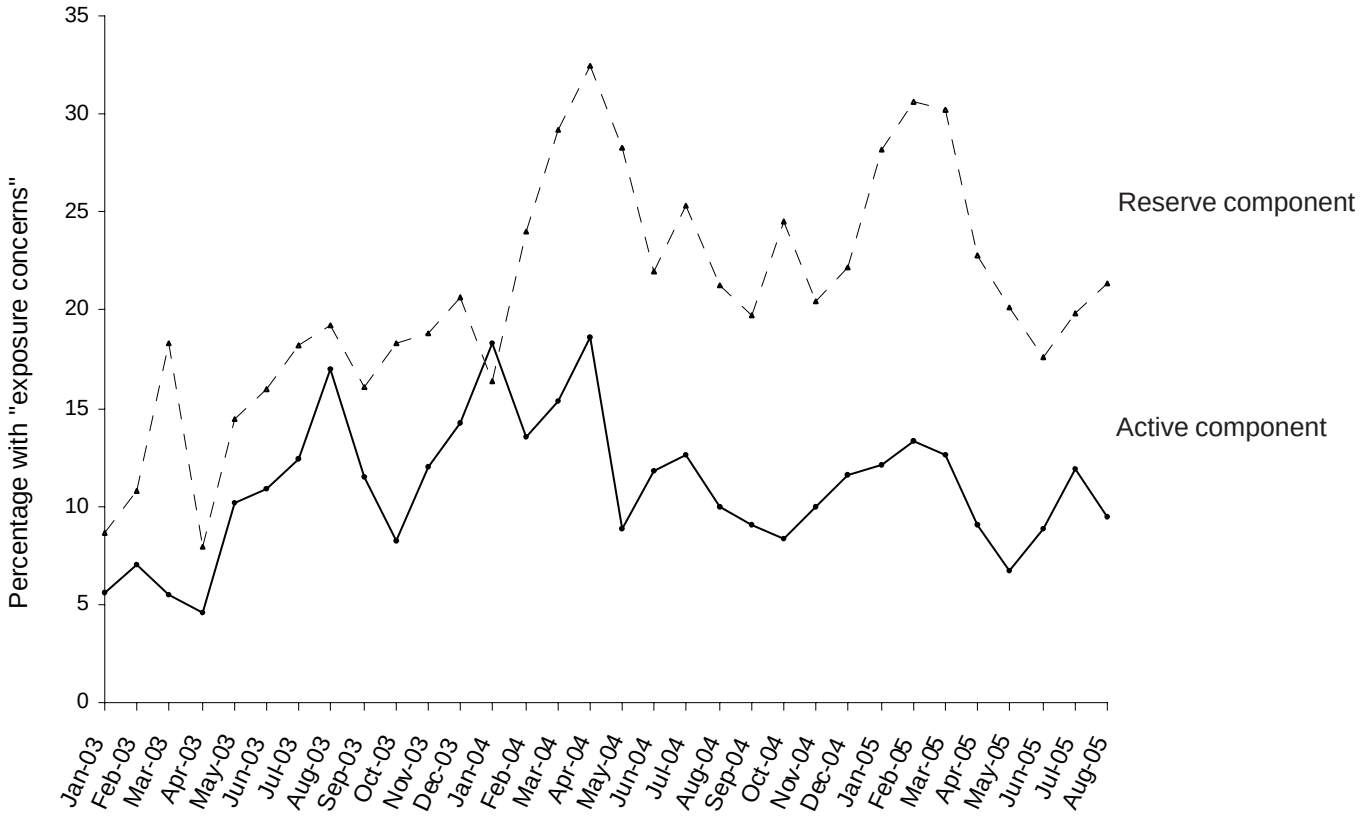
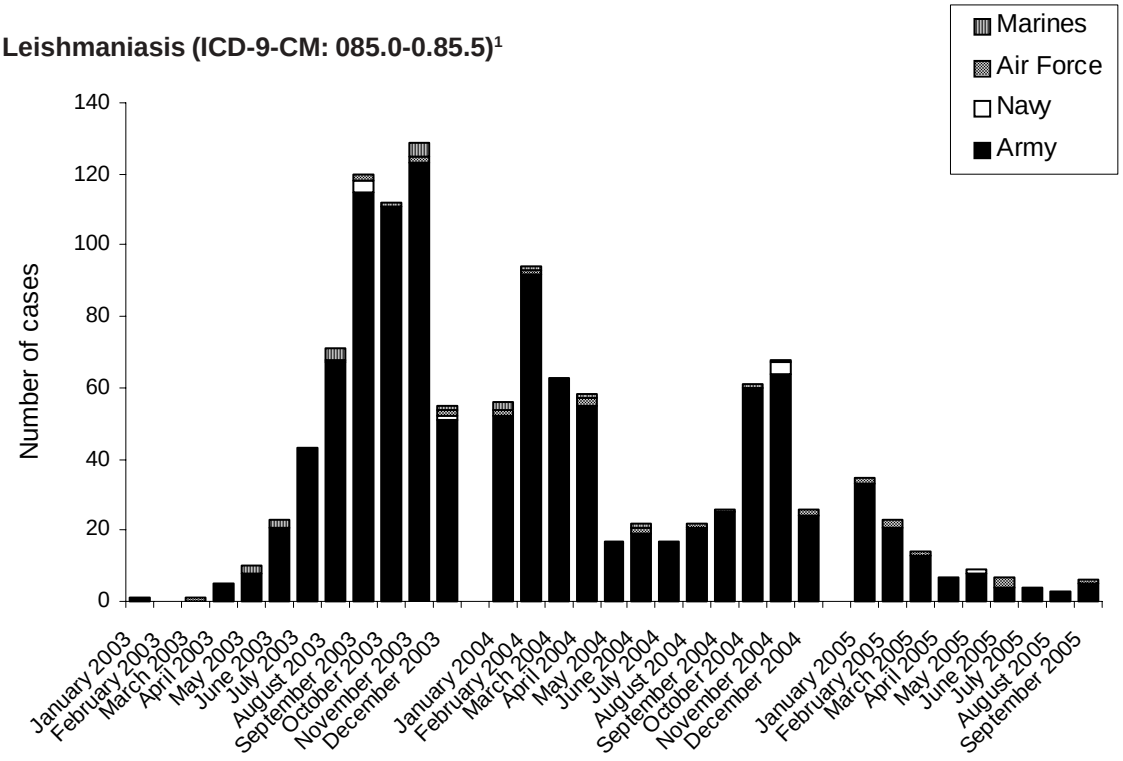


Table 4. Proportion of post-deployment forms that include reports of exposure concerns, by age group and component, US Armed Forces, January 2003-August 2005

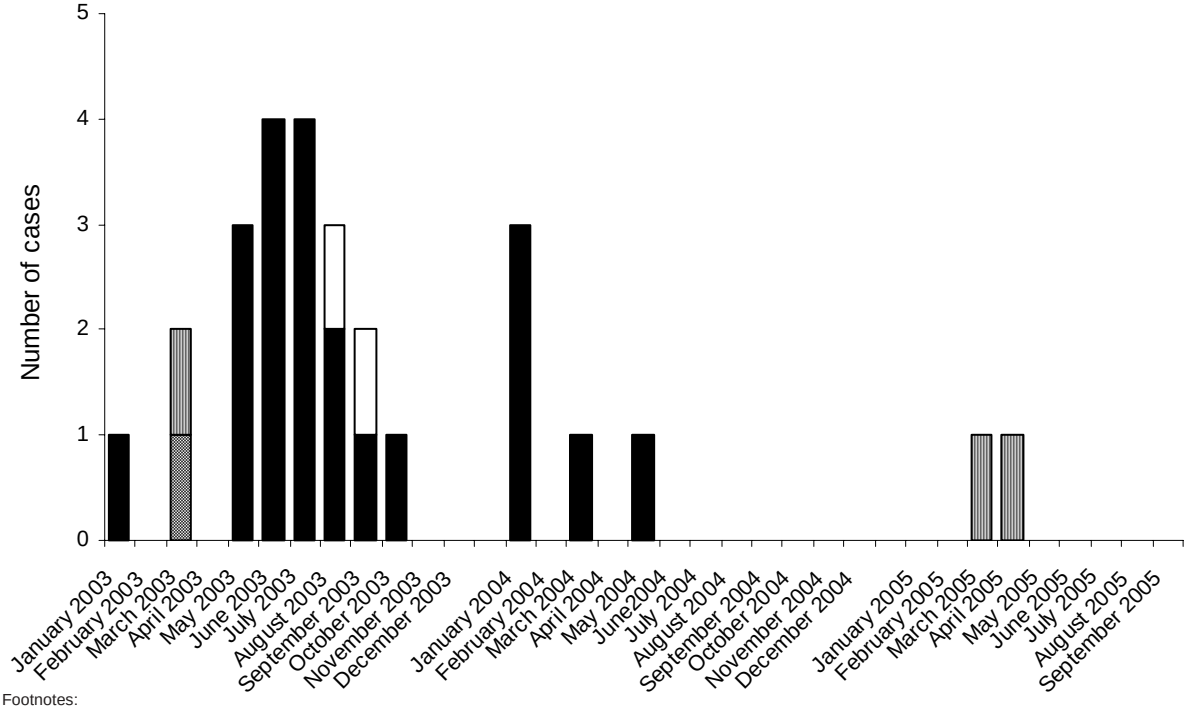
Age group	Active	Reserve
<20	6.6	13.2
20-29	10.9	20.1
30-39	13.8	23.2
>39	16.1	25.3

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

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



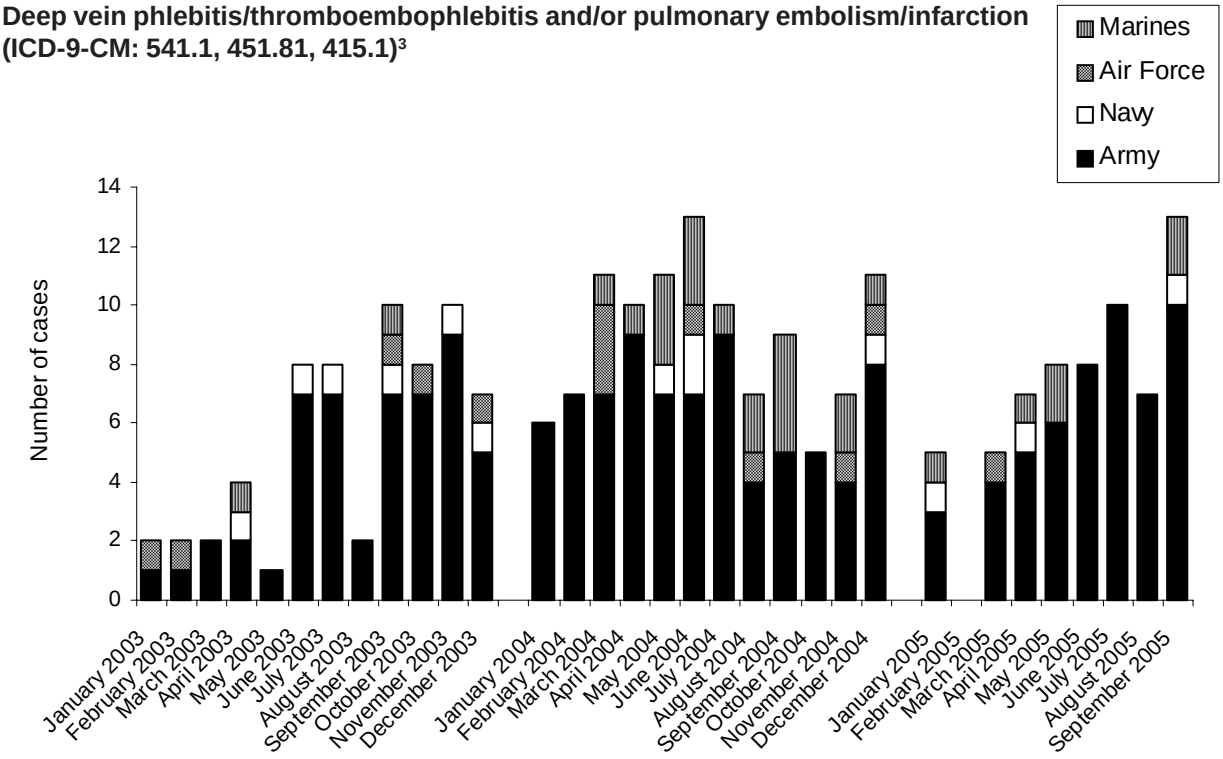
Acute repiratory failure/ARDS (ICD-9-CM: 518.81, 518.82)[2]



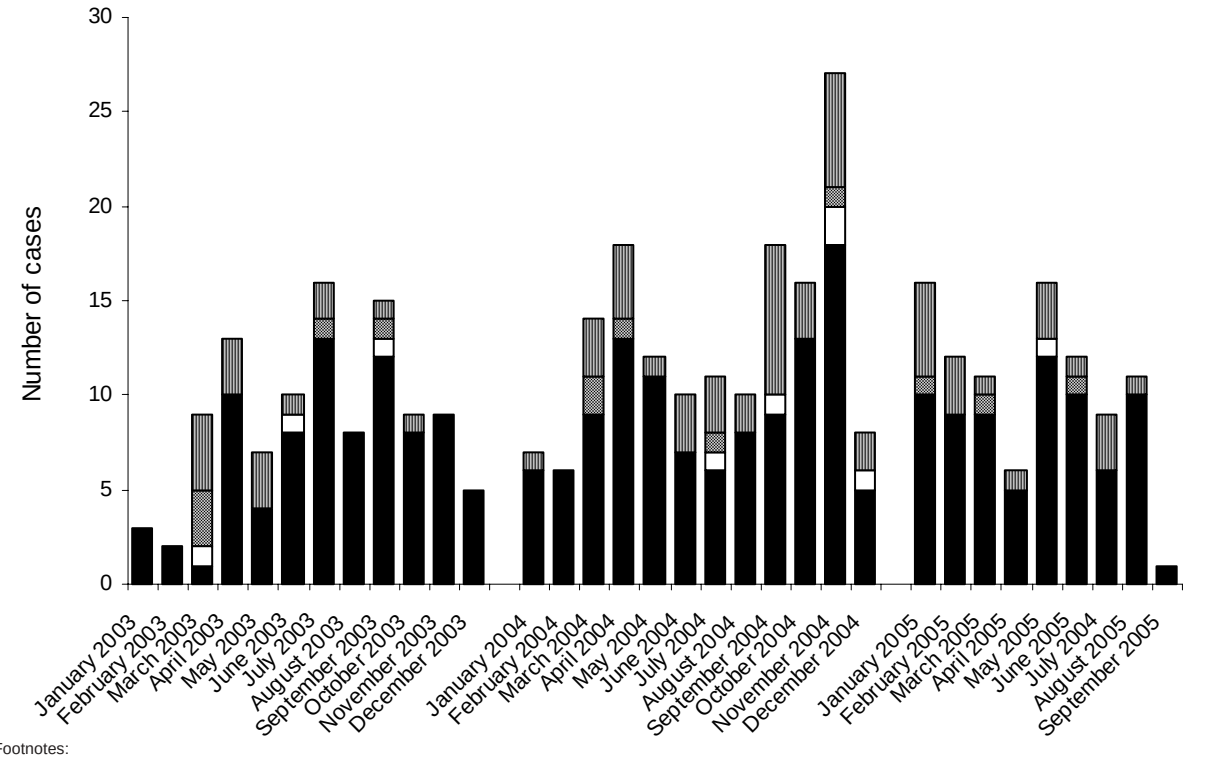
Footnotes:
[1] Indicator diagnosis (one per individual) during a hospitalization, ambulatory visit, and/or from a notifiable medical event during/after service in OEF/OIF.
[2] Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 days of returning from OEF/OIF.

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

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



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



Footnotes:

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

[4] Indicator diagnosis (one per individual) during a hospitalization of a servicemember during/after service in OEF/OIF.

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

Reporting location	Number of reports all events[3]		Food-borne								Vaccine Preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
NORTH ATLANTIC																
Washington, DC Area	219	312	3	2	.	7	2	4	2	3	.	.	2	2	3	1
Aberdeen, MD	43	60	.	.	.	.	1	.	.	1	.	.	.	.	.	.
FT Belvoir, VA	190	269	7	8	2	.	2	6	1	.	2	.	.	.	1	.
FT Bragg, NC	1,402	1,157	8	6	.	.	38	11	1	3	.	.	.	.	.	.
FT Drum, NY	87	139	.	.	.	.	1	.	.	.	.	.	.	.	.	.
FT Eustis, VA	169	221	1	.	.	.	1	1	.	.	.	.	.	.	.	.
FT Knox, KY	167	192	3	4	4	.	1	2	.	.	.	.	1	.	.	.
FT Lee, VA	118	131	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Meade, MD	140	84	1	.	1	.	.	1	.	.	.	.	.	.	.	1
West Point, NY	51	41	1	.	.	.	.	.	.	.	.	.	1	.	.	.
GREAT PLAINS																
FT Sam Houston, TX	239	339	.	.	1	.	3	3	1	2	.	.	.	4	2	.
FT Bliss, TX	273	291	1	1	3	4	3	2	9	6	1	.	2	.	.	.
FT Carson, CO	467	544	2	3	1	2	3	3	1	.	.	.	1	.	.	.
FT Hood, TX	1,096	1,499	8	5	.	1	8	6	43	4	.	.	1	.	.	.
FT Huachuca, AZ	80	49	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Leavenworth, KS	28	31	1	.	2	.	1	1	.	1	.	.	.	.	.	.
FT Leonard Wood, MO	191	264	1	1	2	.	3	1	.	.	.	.	1	.	.	2
FT Polk, LA	144	178	2	.	.	1	7	2	.	.	.	.	1	1	.	.
FT Riley, KS	191	185	1	.	2	2	1	2	.	.	1	.	.	.	.	.
FT Sill, OK	152	125	.	.	1	1	3	.	3	1	.	.	.	.	.	.
SOUTHEAST																
FT Gordon, GA	167	260	1	.	.	.	3	.	.	.	.	.	2	4	.	2
FT Benning, GA	347	240	.	2	5	1	10	6	3	2	.	.	.	.	.	.
FT Campbell, KY	591	609	5	.	3	.	4	7	2	4	.	.	.	.	4	1
FT Jackson, SC	252	128	.	.	.	.	.	.	.	.	.	2	.	.	3	.
FT Rucker, AL	51	26	.	.	1	.	3	.	.	.	.	.	.	.	1	.
FT Stewart, GA	413	373	2	.	3	2	5	8	3	.	2	6	4	.	.	1
WESTERN																
FT Lewis, WA	403	393	4	4	1	.	5	1	2	.	.	.	1	.	.	.
FT Irwin, CA	49	46	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Wainwright, AK	148	113	1	3	.	.	2	1	.	.	1	.	1	.	.	1
OTHER LOCATIONS																
Hawaii	621	549	15	31	8	5	22	9	.	3	.	1	1	.	2	1
Europe	1,056	1,119	13	14	2	.	22	19	1	1	4	3	1	4	3	2
Korea	386	315	1	.	.	.	1	.	.	.	.	1	.	1	3	.
Total	**9,931**	**10,282**	**82**	**84**	**42**	**26**	**155**	**96**	**72**	**31**	**11**	**13**	**20**	**16**	**22**	**12**

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

[2] Events reported by September 7, 2004 and 2005.

[3] Total of all reports of events specified by Tri-Service Reportable Events, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

Source: Army Reportable Medical Events System.

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

Reporting location	Arthropod-borne				Sexually Transmitted								Environmental			
	Lyme Disease		Malaria		Chlamydia		Gonorrhea		Syphilis[4]		Urethritis[5]		Cold		Heat	
	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
NORTH ATLANTIC																
Washington, DC Area	4	1	.	2	86	123	9	19	4	7	.	.	29	1	11	2
Aberdeen, MD	.	3	.	.	41	20	.	3	.	2	.	.	.	.	.	.
FT Belvoir, VA	.	1	1	.	150	140	17	33	3	.	.	.	.	.	2	.
FT Bragg, NC	.	.	9	.	928	803	213	161	3	2	85	79	3	1	107	74
FT Drum, NY	.	.	4	.	73	86	5	4	.	.	.	.	1	2	.	1
FT Eustis, VA	2	.	.	.	134	117	16	26	1	.	.	.	.	2	3	29
FT Knox, KY	.	1	.	1	130	114	12	13	.	.	.	.	.	1	13	20
FT Lee, VA	1	1	.	.	98	108	17	16	.	.	.	.	.	1	1	5
FT Meade, MD	3	.	.	.	113	75	21	7	.	.	.	.	.	.	.	.
West Point, NY	18	6	.	.	25	23	1	2	.	.	.	.	1	1	4	3
GREAT PLAINS																
FT Sam Houston, TX	.	.	2	.	159	209	29	58	1	3	.	.	.	.	22	11
FT Bliss, TX	3	.	.	1	184	117	40	23	1	3	.	.	.	.	2	11
FT Carson, CO	.	.	1	4	377	368	37	45	1	.	39	18	.	1	.	.
FT Hood, TX	1	.	3	1	621	891	182	301	1	.	167	169	.	.	43	46
FT Huachuca, AZ	.	.	.	.	76	32	4	15	.	.	.	.	.	.	.	1
FT Leavenworth, KS	.	.	.	.	17	25	7	3	.	.	.	.	.	1	.	.
FT Leonard Wood, MO	.	.	1	.	139	151	35	34	.	2	.	1	1	4	7	18
FT Polk, LA	.	.	.	1	108	110	23	28	1	1	.	.	.	.	2	29
FT Riley, KS	1	.	.	.	125	97	31	41	.	.	.	.	5	5	22	4
FT Sill, OK	.	.	.	.	98	45	11	24	1	.	.	.	2	.	31	28
SOUTHEAST																
FT Gordon, GA	.	.	.	2	128	165	24	14	1	1	.	.	.	.	3	25
FT Benning, GA	.	.	2	2	169	119	84	36	.	1	.	.	.	1	73	68
FT Campbell, KY	.	2	3	1	392	417	68	82	1	.	.	.	.	1	76	21
FT Jackson, SC	.	.	1	.	166	100	23	16	1	.	.	.	6	.	49	6
FT Rucker, AL	.	.	.	.	36	17	6	9	.	.	.	.	.	.	3	.
FT Stewart, GA	.	3	.	.	209	174	89	75	3	.	26	10	.	1	43	35
WESTERN																
FT Lewis, WA	1	1	.	5	281	271	32	39	.	.	54	50	1	.	2	2
FT Irwin, CA	.	.	.	.	38	31	9	11	.	.	.	.	.	.	2	4
FT Wainwright, AK	.	.	1	1	74	78	11	8	.	1	.	.	54	14	.	.
OTHER LOCATIONS																
Hawaii	.	.	2	10	433	360	89	45	.	.	.	.	.	.	12	6
Europe	14	30	6	2	758	707	170	182	2	2	.	1	1	5	7	3
Korea	.	.	11	5	300	237	41	41	3	2	.	.	6	3	16	13
Total	**48**	**49**	**47**	**38**	**6,666**	**6,330**	**1,356**	**1,414**	**28**	**27**	**371**	**328**	**110**	**45**	**556**	**465**

[4] Primary and secondary.

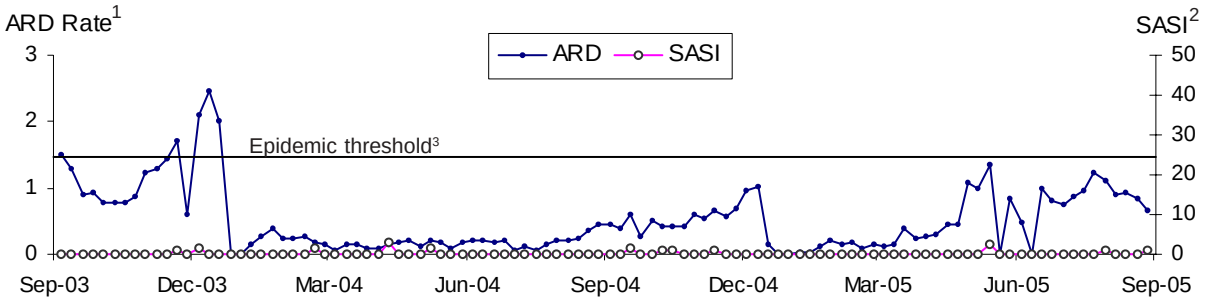
[5] Urethritis, non-gonococcal (NGU).

Note: Completeness and timeliness of reporting vary by facility.

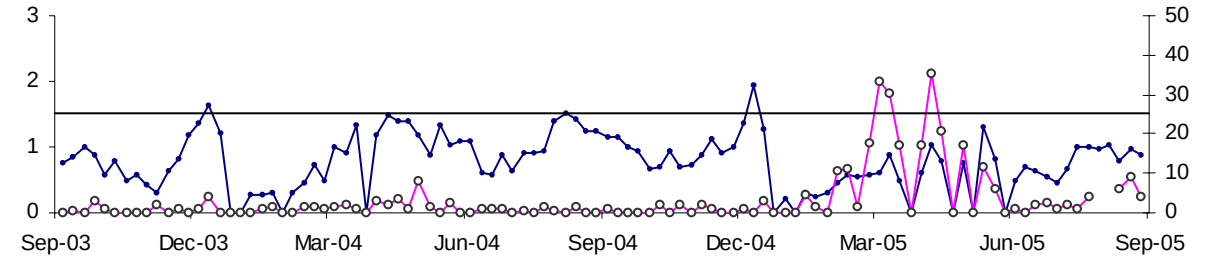
Source: Army Reportable Medical Events System.

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

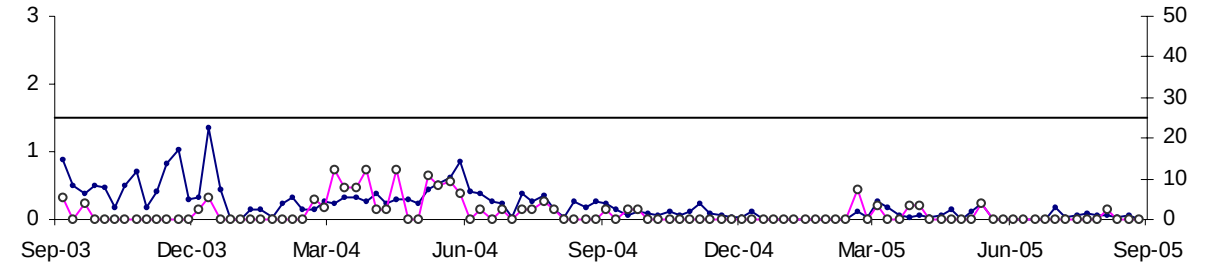
Ft Benning



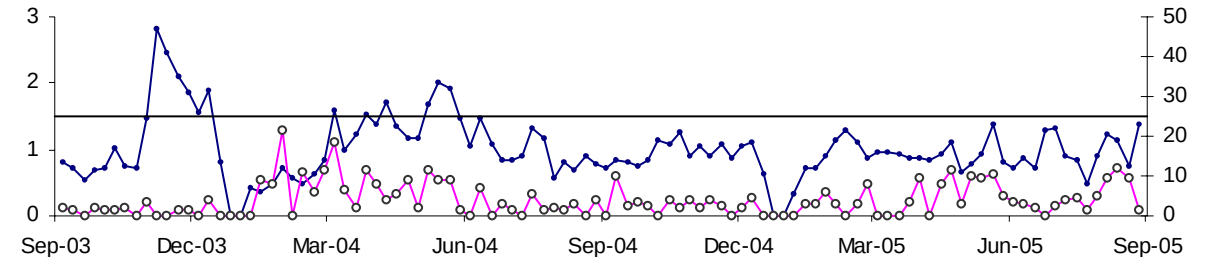
Ft Jackson



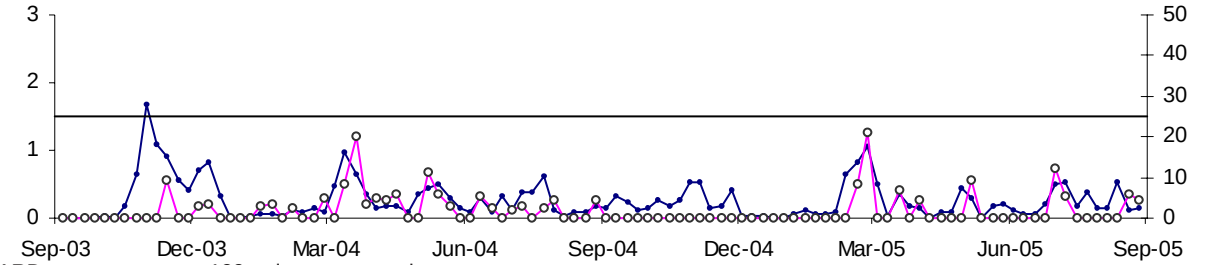
Ft Knox



Ft Leonard Wood



Ft Sill



[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 consecutive weeks indicates an “epidemic”

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