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Low Back Pain, Active Component, U.S. Armed Forces, 2000-2009

In the United States, low back pain is diagnosed during approximately one of every 35 (2.8%) physician visits by adults.[1] The vast majority of low back pain episodes resolve within two to four weeks of onset. However, 25% of patients have recurrent episodes within one year, and the prevalence of chronic back pain (7-10%) may be increasing.[2,3,4]

In the U.S. Armed Forces, low back pain is among the most frequent causes of medical visits and lost-duty time. In 2009, "intervertebral disc disorders" and "other disorders of the back" (including lumbago and unspecified backache) were the primary (first-listed) diagnoses during 606,332 outpatient medical encounters (6.4% of all outpatient visits for any illness or injury among active component members).[5] Back problems are also leading causes of medical evacuations from Iraq and Afghanistan. Since the beginning of military operations in those countries, more than 3,100 U.S. service members have been medically evacuated from theater for "disc disorders" and "other disorders of the back".

In 1992, Cherkin and colleagues described an algorithm for using diagnostic and procedure codes from medical administrative databases to identify patients with "mechanical low back problems" which were defined as local or radicular pain associated with conditions of the sacrum or lumbar spine unrelated to major trauma, neoplasms, pregnancy, or infectious or inflammatory causes.[6] This report applies the Cherkin algorithm to estimate the natures and incidence of "low back pain" (LBP) diagnosed during medical encounters of U.S. military members while in active service.

Methods:

The surveillance period was 1 January 2000 to 31 December 2009. A medical visit for mechanical low back pain (LBP) was defined as an inpatient or outpatient encounter that was documented with a diagnosis (in any diagnostic position) of ICD-9-CM codes indicative of low back problems.[6] Encounters that were associated with major trauma (e.g. traffic accidents, vertebral fractures or dislocations), pregnancy, neoplasms, infections, or other inflammatory causes of back pain were excluded.

The incident episode of mechanical LBP was defined as each individual's first low back pain-related medical encounter. Incidence rates of LBP overall were calculated by dividing the total of first (incident) episodes of LBP during the period by the total years (person-time) of active military service during the same period. Also, incidence rates of each of seven clinical categories of mechanical LBP were calculated separately. For these analyses, individuals could be counted as incident cases once in each category during the 10-year period; medical encounters with multiple LBP indicator diagnoses were classified using the LBP diagnosis that was reported in the highest position. Finally, the age distribution at each affected service member's first encounter and the number of individuals with more than one LBP episode were assessed.

Table 1. Numbers of medical encounters for mechanical low back pain, by clinical category, active component, U.S. Armed Forces, 2000-2009

Clinical category	Ambulatory visits	Hospitalizations
Nonspecific back pain	4,552,042	9,026
Miscellaneous back problems	1,395,704	2,475
Degenerative changes	464,081	6,271
Herniated disc	433,265	11,075
Possible instability	101,777	1,573
Spinal stenosis	41,171	1,098
Sequelae of previous back surgery	20,517	157
Total	7,008,557	31,675

Results:

Numbers and natures of medical encounters:

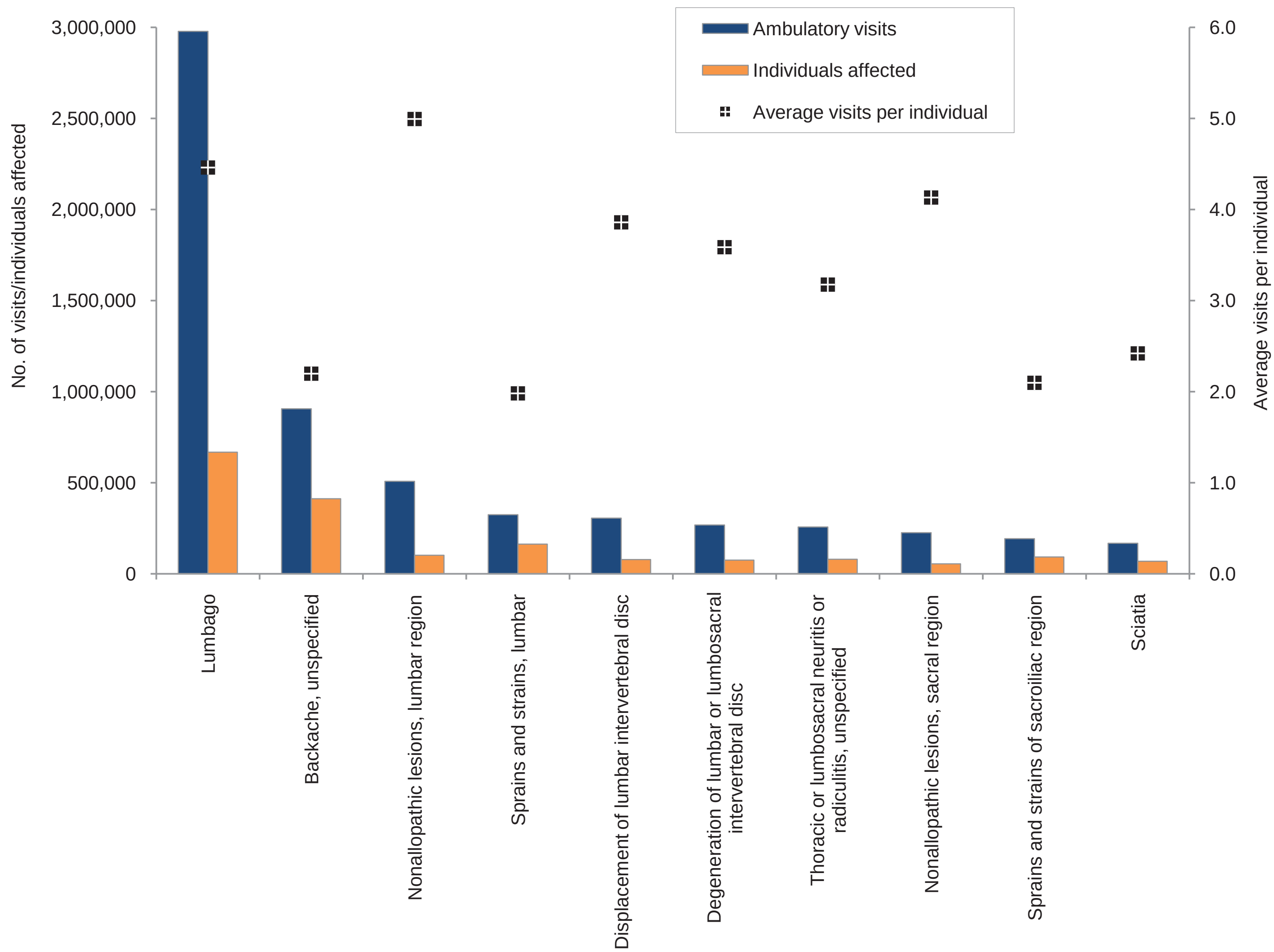
During the 10-year surveillance period, active component members had more than seven million mechanical low back problem-related medical encounters. Approximately 7.2% and 2.0% of all LBP-associated hospitalizations and outpatient encounters, respectively, were associated with major trauma, pregnancy, neoplasm, infection, or other inflammatory cause of back pain. These episodes were excluded from further analyses.

After excluding medical encounters for conditions that may cause back pain, there were 7,008,557 ambulatory visits (among 1,020,701 individuals) and 31,675 hospitalizations (among 26,575 individuals) with mechanical low back pain-related diagnoses **(Table 1)**.

"Nonspecific back pain" was the clinical category of nearly two-thirds of all ambulatory visits for low back problems (n=4,552,042, 64.9%); one-fifth of all LBP-related ambulatory visits were reported as "miscellaneous back problems" (n=1,395,704, 19.9%). "Degenerative changes" and "herniated disc" each represented approximately six percent of all outpatient diagnoses; the remaining clinical categories combined accounted for only two percent of all visits. The majority (63%) of all hospitalizations for mechanical low back problems were documented with "herniated disc" (n=11,075, 35.0%) or "nonspecific back pain" (n=9,026, 28.5%) diagnoses **(Table 1)**.

"Lumbago" was by far the most frequent diagnosis during ambulatory visits for LBP. During the 10-year

Figure 1. Most frequent mechanical low back pain diagnoses during ambulatory visits, active component, U.S. Armed Forces, 2000-2009



period, 667,378 service members had approximately three million ambulatory visits for lumbago (average per person: 4.5) **(Figure 1)**. The nonspecific diagnoses of "backache, unspecified" (905,447 visits; 411,767 individuals; average per person: 2.0) and "sprains and strains, lumbar" (324,548 visits; 163,825 individuals; average per person 2.2) were the second and fourth most frequent diagnoses reported during LBP-related visits. "Nonallopathic lesions, lumbar region" (often indicative of chiropractic care)[7] was the third most frequent diagnosis during LBP-related ambulatory visits (507,686 visits; 101,673 individuals); the average number of visits per individual who received the diagnosis was 5.0 **(Figure 1)**.

During hospitalizations, the most frequent diagnoses were "displacement of lumbar intervertebral disc", "lumbago", "degeneration of lumbar or lumbosacral intervertebral disc" and "backache, unspecified" **(Figure 2)**. These four conditions accounted for 71% of all LBP-related hospitalizations. Surgery was performed during more than 70% of hospitalizations for lumbar disc problems, radiculitis, stenosis and spondylolisthesis. LBP-related hospitalizations documented with nonspecific back pain diagnoses rarely involved surgery: "lumbago" and "backache, unspecified" were treated with surgery in just 8% and 3% of cases, respectively **(Figure 2)**.

Incidence rates and trends

During the 10-year period, 860,524 service members had their first (incident) LBP-related medical encounter. The overall incidence rate was 74.1 visits per 1,000 person-years (p-yrs) **(Table 2)**. The number of service members with at least one LBP-related visit during each calendar year sharply declined from 2000 (n=104,645) to 2003 (n=82,187), then remained relatively stable through 2009 (range of number affected per year, 2004-9: 77,749 [2006] to 87,305 [2004]) **(Figure 3)**.

Incidence rates in each of the Services were also relatively stable during the period **(Figure 3)**. Unadjusted incidence rates were highest in the Army (2009: 102.6 per 1,000 p-yrs), intermediate in the Air Force (2009: 74.4 per 1,000 p-yrs),

Figure 2. Most frequent mechanical low back pain diagnoses during hospitalizations, active component, U.S. Armed Forces, 2000-2009

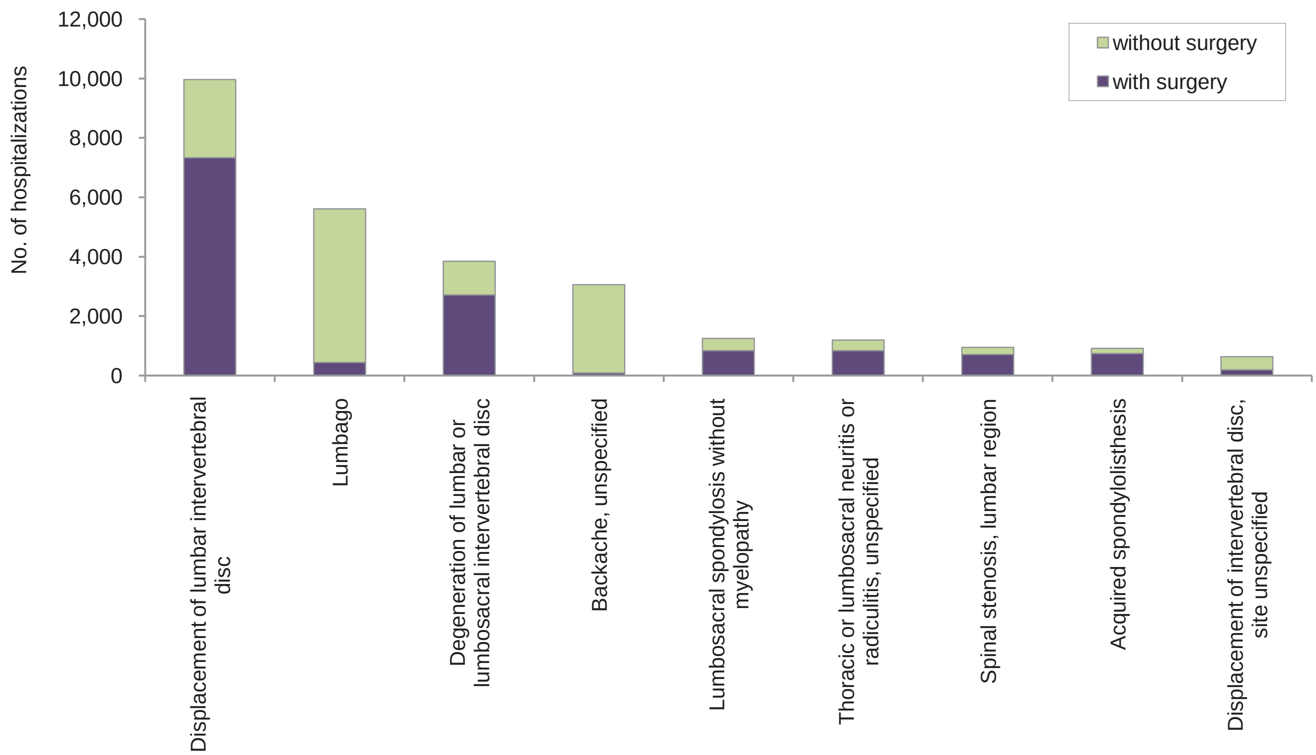


Table 2. Incidence rates (per 1,000 person-years) of mechanical low back pain, by diagnostic category, active component, U.S. Armed Forces, 2000-2009

	Total (all categories)		Nonspecific back pain		Misc back problems		Degenerative changes		Herniated disc		Possible instability		Spinal stenosis		Sequelae of back surgery	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Total individuals	860,524	74.1	804,320	68.2	296,363	22.1	112,237	8.0	93,215	6.7	27,813	2.0	18,960	1.3	5,182	0.4
Age (years)																
<20	110,734	107.1	103,268	99.5	16,836	15.4	1,567	1.4	1,506	1.4	1,116	1.0	301	0.3	26	0.0
20-24	309,316	76.3	289,056	70.5	79,126	17.2	16,461	3.5	15,726	3.3	6,154	1.3	2,577	0.6	527	0.1
25-29	166,530	69.7	155,639	64.0	60,123	21.2	18,853	6.3	17,806	6.0	5,312	1.8	2,979	1.0	820	0.3
30-34	102,195	63.4	95,470	58.1	45,719	24.0	18,453	9.2	16,655	8.3	4,388	2.2	3,022	1.5	965	0.5
35-39	93,737	66.6	88,000	61.3	49,528	29.9	26,349	15.0	21,010	11.9	5,341	3.0	4,417	2.4	1,441	0.8
>=40	78,012	70.1	72,887	64.0	45,031	34.4	30,554	21.9	20,512	14.5	5,502	3.8	5,664	3.9	1,403	1.0
Gender																
Female	171,266	109.2	159,790	99.6	66,103	35.0	17,199	8.5	13,474	6.6	6,576	3.2	2,637	1.3	664	0.3
Male	689,258	68.6	644,530	63.3	230,260	20.0	95,038	8.0	79,741	6.7	21,237	1.8	16,323	1.4	4,518	0.4
Service																
Army	381,059	97.8	362,399	91.7	118,746	25.4	55,024	11.3	42,406	8.7	11,244	2.3	7,552	1.5	1,985	0.4
Navy	164,711	54.4	150,303	48.9	57,683	17.0	19,286	5.5	16,510	4.7	4,963	1.4	3,147	0.9	1,127	0.3
Air Force	200,841	71.7	186,841	65.5	83,855	26.0	26,169	7.7	23,245	6.8	8,363	2.4	6,110	1.8	1,453	0.4
Marine Corps	93,599	59.8	85,918	54.2	29,853	17.2	8,800	4.9	7,722	4.3	2,593	1.4	1,534	0.9	418	0.2
Coast Guard	20,314	63.8	18,859	58.3	6,226	16.9	2,958	7.8	3,332	8.8	650	1.7	617	1.6	199	0.5
Race/ethnicity																
Black, non-Hispanic	162,701	81.5	154,575	76.3	54,328	22.9	19,102	7.7	15,036	6.0	3,972	1.6	3,352	1.3	656	0.3
White, non-Hispanic	542,011	73.3	503,646	67.0	191,072	22.6	75,314	8.5	63,382	7.2	19,510	2.2	12,837	1.4	3,841	0.4
Other	155,812	70.3	146,099	65.0	50,963	20.0	17,821	6.7	14,797	5.6	4,331	1.6	2,771	1.0	685	0.3
Military occupation																
Combat	157,116	64.1	145,373	58.5	51,036	18.4	22,390	7.9	18,349	6.4	4,800	1.7	3,492	1.2	899	0.3
Health Care	76,122	83.9	70,247	75.6	32,972	31.0	11,600	10.2	9,270	8.2	3,298	2.9	1,946	1.7	494	0.4
Admin/supply	217,231	84.0	205,718	78.2	79,516	25.9	30,518	9.4	24,544	7.6	7,405	2.3	5,278	1.6	1,360	0.4
Other	410,055	72.4	382,982	66.7	132,839	20.5	47,729	7.1	41,052	6.1	12,310	1.8	8,244	1.2	2,429	0.4

Figure 3. Numbers and incidence rates of any mechanical low back pain diagnosis, by Service, active component, U.S. Armed Forces, 2000-2009

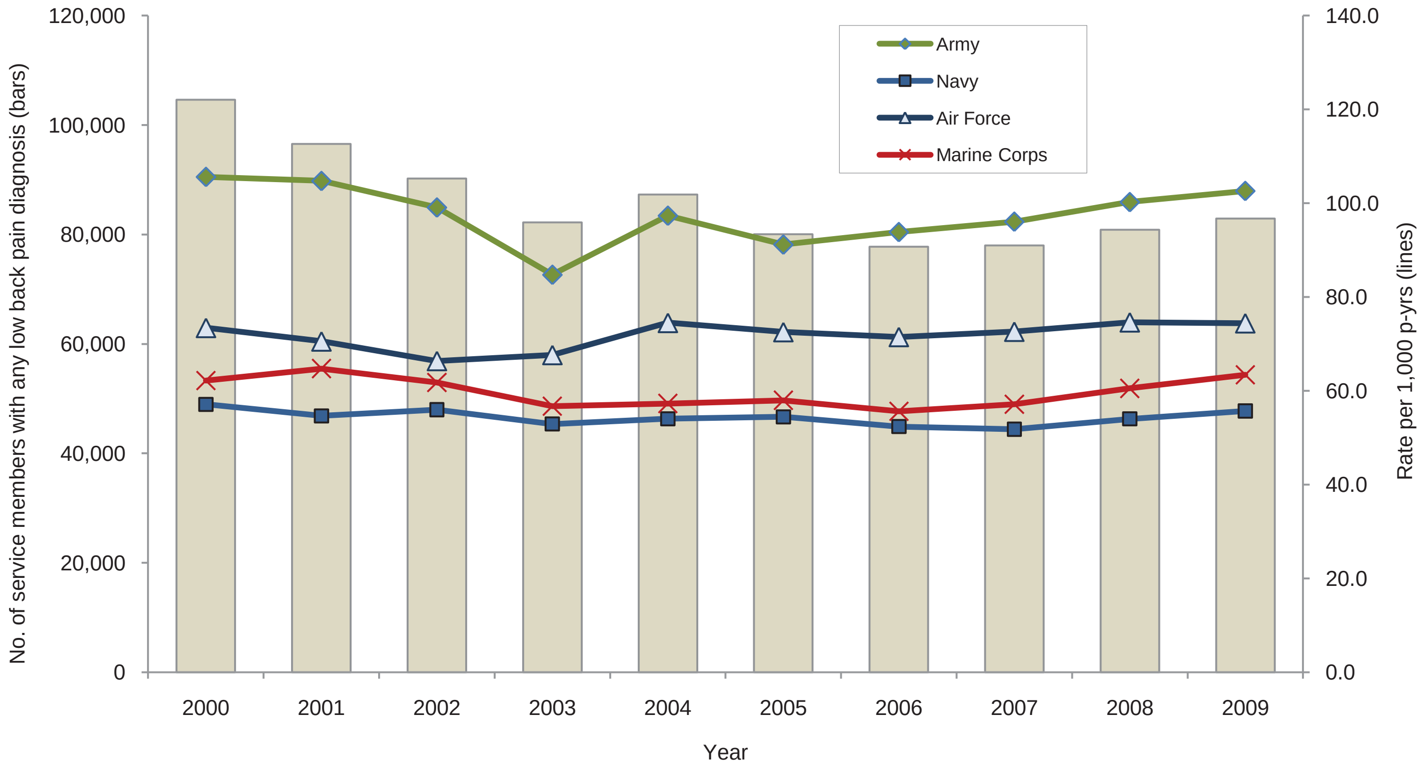


Figure 4. Incidence rates of mechanical low back pain, by clinical category and age, active component, U.S. Armed Forces, 2000-2009

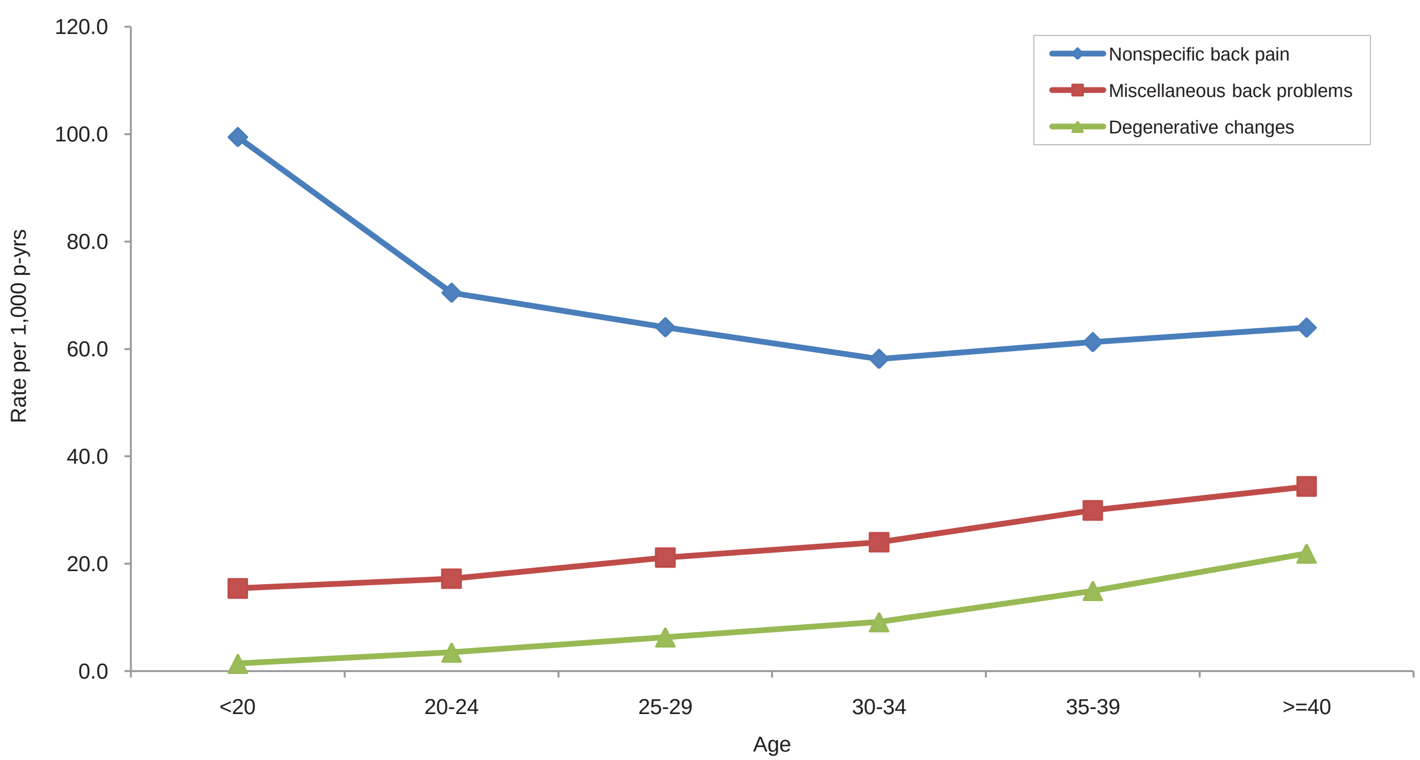


Figure 5. Age at first mechanical low back pain (LBP) diagnosis (during military service), active component, U.S. Armed Forces, 2000-2009

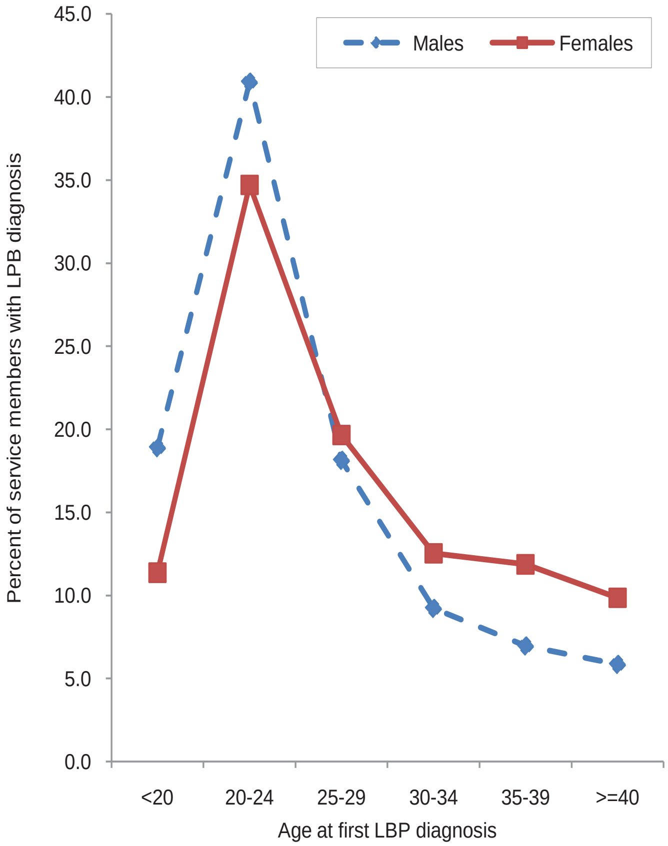
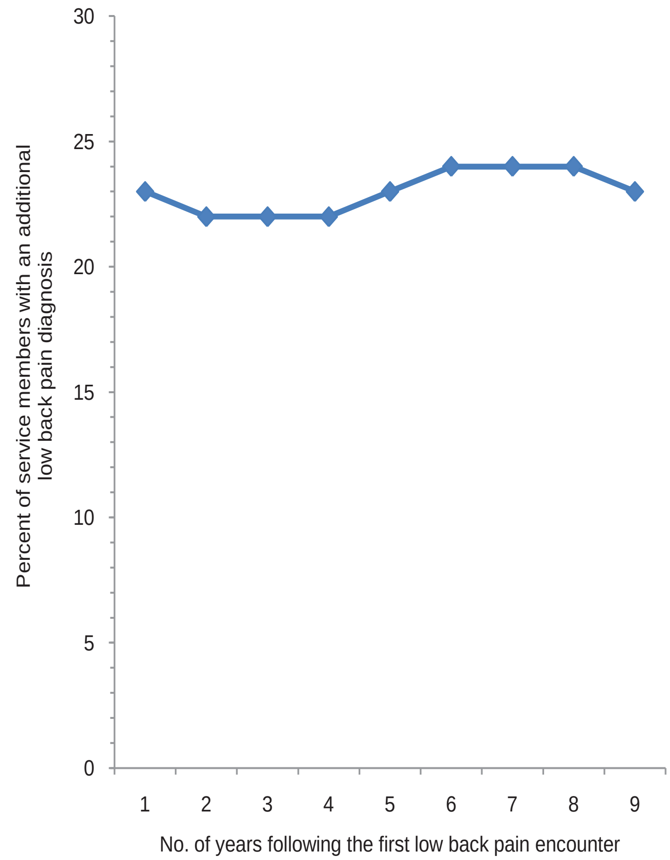


Figure 6. Among service members with an incident low back pain, proportion who have at least one encounter during each year of followup, active component, U.S. Armed Forces, 2000-2009



and lowest in the Navy and Marine Corps (2009: 55.7 and 63.4 per 1,000 p-yrs, respectively) **(Figure 3)**.

Among the various clinical categories of mechanical low back pain, the highest rates by far were for "nonspecific back pain" **(Table 2)**. Of service members with any LBP diagnoses during the period, 93% were diagnosed at least once with "nonspecific back pain" (rate: 68.2 per 1,000 p-yrs), approximately one-third were diagnosed with "miscellaneous back problems" (rate: 22.1 per 1,000 p-yrs), one-eighth with "degenerative changes" (rate: 8.0 per 1,000 p-yrs), and one-tenth with "herniated disc" (rate: 6.7 per 1,000 p-yrs) **(Table 2)**.

For all clinical categories except "nonspecific back pain", incidence rates were lowest among the youngest service members and increased monotonically with age **(Table 2)**. In contrast, incidence rates of "nonspecific back pain" were highest among the youngest service members (<20 years: 99.5 per 1,000 p-yrs) and declined with age until the mid-30s (30-34 years: 58.1 per 1,000 p-yrs) **(Figure 4)**.

The clinical categories of LBP affected demographically-defined subgroups differently. For example, the incidence rate of LBP overall was higher among females than males (female to male, incidence rate ratio [f:m, IRR: 1.59]). Incidence rates of "possible instability" (f:m, IRR: 1.83), "miscellaneous back problems" (f:m, RR: 1.75), and "non-specific back pain" (f:m, RR: 1.57) were higher among female than male service members, but rates of "sequelae of back surgery" (f:m, RR: 0.86) and "spinal stenosis" (f:m, IRR: 0.95) were higher among males than females **(Table 2)**. Also, there were no striking differences or consistent relationships of rates of LBP with racial/ethnic identity. For example, rates of any LBP and "nonspecific back pain" were higher among black non-Hispanic, and rates of "degenerative changes", "herniated disc", and "possible instability" were higher among white non-Hispanic, service members than their respective counterparts **(Table 2)**. In general, females experienced their first medical visits for low back pain at older ages than males **(Figure 5)**.

Recurrence

One-half (50.1%) of all service members with at least one LBP diagnosis during the period had at least one recurrence (LBP diagnosis ≥30 days after the initial episode) (data not shown). Of 860,524 service members who received their first (incident) diagnoses of LBP (while in military service) during the surveillance period, approximately one-fourth (23%) had at least one medical encounter for LBP within one year after the incident episode. During each of the first nine years following the incident episode, 22-24% of those still in military service had at least one additional LBP-related medical encounter **(Figure 6)**.

Editorial comment:

This report documents that, during the past 10 years, 7.4% of all active component members had at least one diagnosis of mechanical low back pain; one-half of all service members with any LBP-related medical encounter had more than one documented episode of LBP (while in military service). From the time of their initial medical encounters for LBP, approximately one-fourth of those still in military service had at least one LBP-related encounter during each of the next nine years.

During the past 10 years, the vast majority of all medical encounters for mechanical low back pain were documented with nonspecific back pain diagnoses, particularly "lumbago", "backache, unspecified," and "sprains and strains". Incidence rates of nonspecific back pain were highest among the youngest service members (18-24 years old), while rates of all other clinical categories of low back pain were lowest among the youngest and increased with age.

Specific LBP-related diagnoses (e.g., intervertebral disc disorders, spinal stenosis) were reported infrequently during ambulatory visits; when such diagnoses were made, they may have indicated provisional or "rule out" diagnoses. Studies in civilian populations have found that very few patients presenting with low back pain have detectable spinal pathology;[8] also, findings from radiographic and magnetic resonance imaging studies do not strongly correlate with the presence or severity of low back pain symptoms or reliably indicate the causes of low back pain.[9,10,11] In a prospective study of asymptomatic veterans, self-indicated depression was a stronger predictor of low back pain than any imaging abnormalities (e.g. disc bulges, protrusions, degeneration).[11]

This summary included medical encounters reported from fixed medical facilities outside of combat theaters. However, lumbosacral strain is the second most prevalent disability among veterans of the first Gulf War;[12] and lengthy deployments (or recurrent deployments) to Iraq/Afghanistan may increase low back pain risk. Among both male and female deployers to OIF/OEF, low back pain is much more prevalent after than before they deployed.[13] In modern times, U.S. military members in combat settings carry heavier loads than those who served in such settings in the past.[14] A recent survey of U.S. soldiers in Iraq revealed a substantial increase in self-reported back and neck pain during deployment; many respondents attributed the symptoms to lengthy periods of wearing body armor.[15] The LBP surveillance report above does not document increased numbers or rates of LBP-related diagnoses in the active component overall since the beginning of large scale deployments to Afghanistan and Iraq. However, even a significant increase in risk in relationship to deployment would be difficult to detect against the background of LBP that affects military members in general. The natures and strengths of relationships between service in combat settings and risk of LBP are relevant force health protection concerns; as such, they warrant further study.

The medical health care and military operational costs of LBP are enormous. Interventions that could reduce the prevalence and recurrence of LBP could be extremely cost-effective and should be a high priority for military research. A three-year clinical trial to determine the effectiveness of core stabilization exercise programs and other interventions in preventing and reducing the severity of LBP in service members is nearly complete, with final results expected in 2011.[16]

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Thoracolumbar Spine Fractures, Active and Reserve Components, 2000-2009

The spine consists of serially connected bones (vertebrae) in a column; it provides stability and flexibility to the body and protects the spinal cord. While the thoracolumbar spine (mid-to-lower back) is relatively well protected and strongly reinforced, high-energy trauma can seriously injure the thoracolumbar spine and spinal cord.[1] In the general U.S. population, most thoracolumbar spine fractures result from motor-vehicle collisions (MVCs), falls, violence, and accidents during recreational activities.[2]

To a great extent, the acute and long-term clinical effects of spine fractures depend on the nature and severity of complicating injuries. For example, in general, spine fractures produce significant pain and disability; in turn, most affected individuals require hospitalization for acute care and post-hospital rehabilitative care.[3] However, epidemiologic studies have estimated that 10-35% of thoracolumbar spine fractures are complicated by spinal cord injuries; the short and long-term consequences of such injuries are enormous (e.g., paralysis, lengthy hospitalizations and rehabilitation, high acute and lifetime health care costs).[1,2,4]

Military members encounter risks of severe traumatic injuries (including spine fractures) during combat, training, and transportation-related activities. Common military activities that can be hazardous include flying (planes/helicopters), parachute jumping, climbing (e.g., ropes, rocky terrain), and combat training.[5,6] During combat operations in Iraq and Afghanistan, spine fractures have resulted from explosions (e.g., improvised explosive devices [IEDs]), gunshots, and MVCs.[7,8]

This report documents the numbers, rates, trends, and demographic and military characteristics of U.S. military members who were hospitalized for thoracolumbar spine fractures from 2000-2009.

Methods:

The surveillance period was 1 January 2000 to 31 December 2009. The surveillance population included all individuals in the active or reserve components (including National Guard) of the U.S. Army, Navy, Air Force, Marine Corps, or Coast Guard who served on active duty any time during the surveillance period. Data were derived from records routinely maintained in the Defense Medical Surveillance System (DMSS).

An incident case of a thoracolumbar spine fracture was defined as the first hospitalization of each individual that included a discharge diagnosis of thoracolumbar spine fracture. For this analysis, the thoracolumbar spine was defined as the thoracic (T1-T12) and lumbar (L1-L5) vertebrae. Case-defining diagnoses were ascertained from records of hospitalizations that included ICD-9-CM diagnosis codes indicative of thoracolumbar spine fracture in any diagnostic position. Case-defining diagnosis codes were also used to document the presence or absence of concurrent spinal cord injuries **(Table 1)**.

For this analysis, summary measures were numbers of thoracolumbar spine fractures in the surveillance population overall (i.e., active and reserve component members on active duty) and fracture rates (calculated as fractures per 10,000 person-years of active military service) among members of the active component only. Reserve component members were not included in rate calculations because the start and end dates of their active duty service periods were not available. Deaths of active duty service members were ascertained from records produced by service-specific casualty offices and maintained by the Armed Forces Medical Examiner in the DoD Medical Mortality Registry; the mortality registry classifies deaths by manner and underlying cause. Causes of thoracolumbar spine fractures among active component members were assessed based on STANAG codes (per NATO Standard Agreement No. 2050) reported on the record of each case-defining hospitalization in a U.S. military medical facility.

Records of medical evacuations (medevacs) conducted by the U.S. Transportation Command (TRANSCOM) are routinely provided for health surveillance purposes to the Armed Forces Health Surveillance Center (AFHSC) via the Office of the Assistant Secretary of Defense for Health Affairs. For this report, causes of injuries that resulted in medevacs were assessed based on descriptions (recorded in text) on medevac records.

Results:

In the ten-year surveillance period, there were 4,655 incident thoracolumbar spine fracture-related hospitalizations among active and reserve component U.S. military members. More than four-fifths of all thoracolumbar

Table 1. Case-defining diagnosis codes (per ICD-9-CM): thoracolumbar spine fracture

Fracture of vertebral column without mention of spinal cord injury	Fracture of vertebral column with spinal cord injury
805.2 Dorsal [thoracic], closed	806.2(x) Dorsal [thoracic], closed
805.3 Dorsal [thoracic], open	806.3(x) Dorsal [thoracic], open
805.4 Lumbar, closed	806.4 Lumbar, closed
805.5 Lumbar, open	806.5 Lumbar, open
805.8 Unspecified, closed	806.8 Unspecified, closed
805.9 Unspecified, open	806.9 Unspecified, open

Table 2. Hospitalizations related to thoracolumbar spine fractures, active and reserve components, U.S. Armed Forces, 2000-2009

	Active component		Reserve component	Overall
	No.	Rate[a]	No.	No.
Total	3,853	2.7	802	4,655
Service				
Army	1,757	3.5	587	2,344
Navy	781	2.2	50	831
Air Force	568	1.6	92	660
Marine Corps	669	3.7	68	737
Coast Guard	78	2.0	5	83
Sex				
Male	3,529	2.9	714	4,243
Female	324	1.6	88	412
Race ethnicity				
White, non-hispanic	2,803	3.1	633	3,436
Black, non-hispanic	357	1.4	73	430
Other	693	2.6	96	789
Age				
<20	347	3.2	54	401
20-24	1,701	3.6	203	1,904
25-29	774	2.6	125	899
30-34	423	2.1	97	520
35-39	350	1.9	113	463
40+	258	1.7	210	468
Military occupation				
Health	185	1.6	37	222
Combat	1,341	4.6	265	1,606
Other	2,327	2.3	500	2,827

[a]Rate per 10,000 person-years of service

spine fracture-related hospitalizations (n=3,853; 83%) affected active component members; the incidence rate in the active component was 2.7 per 10,000 person-years (p-yrs) **(Table 2)**.

During the 10-year period, in the active component, incidence rates were relatively high among members of the Marine Corps (3.7 per 10,000 p-yrs) and Army (3.5 per 10,000 p-yrs), 20-24 year olds (3.6 per 10,000 p-yrs), white non-Hispanic members (3.1 per 10,000 p-yrs), and males (2.9 per 10,000 p-yrs) **(Table 2)**. Incidence rates were more than twice as high among service members with combat specific military occupations (4.6 per 10,000 p-yrs) compared to non-combat **(Table 2)**.

In the active components, annual incidence rates increased in the Army each year from 2003 through 2007, plateaued at a relatively high rate in the Marine Corps between 2004 and 2006, and were relatively low and stable in the other Services throughout the period **(Figure 1)**. Incidence rates and trends markedly varied across military occupational categories. For example, beginning in 2003, incidence rates sharply increased among service members with combat-specific occupations; in contrast, among those in health care and "other" non-combat specific occupations, rates remained relatively low and stable after 2003 **(Figure 2)**.

In both the active and reserve components, most thoracolumbar spine fractures were not complicated by spinal cord injuries **(Figure 3)**. In the active component, the highest number (n=66) and percentage (19.1%) of thoracolumbar spine fractures that were complicated by spinal cord injuries occurred in 2006. In the reserve component, the highest number (n=15) and percentage (15.2%) of thoracolumbar spine fractures complicated by spinal cord injuries occurred in 2005.

During the 10-year period, there were more than twice as many thoracolumbar spine fracture-related hospitalizations of U.S. military members at Landstuhl Regional Medical Center, Germany (n=606) than at any other U.S. military medical facility. In the United States, U.S. military medical facilities at 18 locations had 50 or more thoracolumbar spinal fracture-related hospitalizations each during the period (data not shown).

Seventy-three U.S. military members died while on active duty (per records in the DoD Mortality Registry) during or after hospitalizations with thoracolumbar spine fractures. Accidents involving motorcycles (n=28) or other motor vehicles (n=30) were considered the underlying causes of the deaths of approximately two-thirds (68%) of these individuals **(Table 4)**.

Of 2,617 U.S. military members who were treated for thoracolumbar spine fractures in U.S. military medical facilities, "land transport" (n=946, 36%), "falls and miscellaneous" (n=600, 23%), and "air transport" (n=365, 14%) were consistently the leading causes of their injuries (per STANAG No. 2050 cause of injury codes). "Guns and explosives (including accidents during war)" and "battle casualties" accounted for relatively large numbers of thoracolumbar spine fracture-related hospitalizations beginning in 2003 (n=26) and peaking in 2007 (n=120) **(Figure 4)**.

During the surveillance period, there were 703 medical evacuations of military members with thoracolumbar spine fractures to the Landstuhl Regional Medical Center from the U.S. Central Command area of operations. Explosions (including improvised explosive devices [IEDs]) (n=381), motor vehicle collisions (n=91), gunshot wounds (n=66), falls (n=59), and helicopter accidents (n=50) accounted for more than 90% of all spine fracture-related medevacs during the period **(Figure 5)**.

Editorial comment:

This report documents that, during the past ten years, an average of approximately 465 U.S. military members per year were hospitalized with thoracolumbar spine fractures.

Figure 1. Annual incidence rates of hospitalizations related to thoracolumbar spine fracture by service, active component, U.S. Armed Forces, 2000-2009

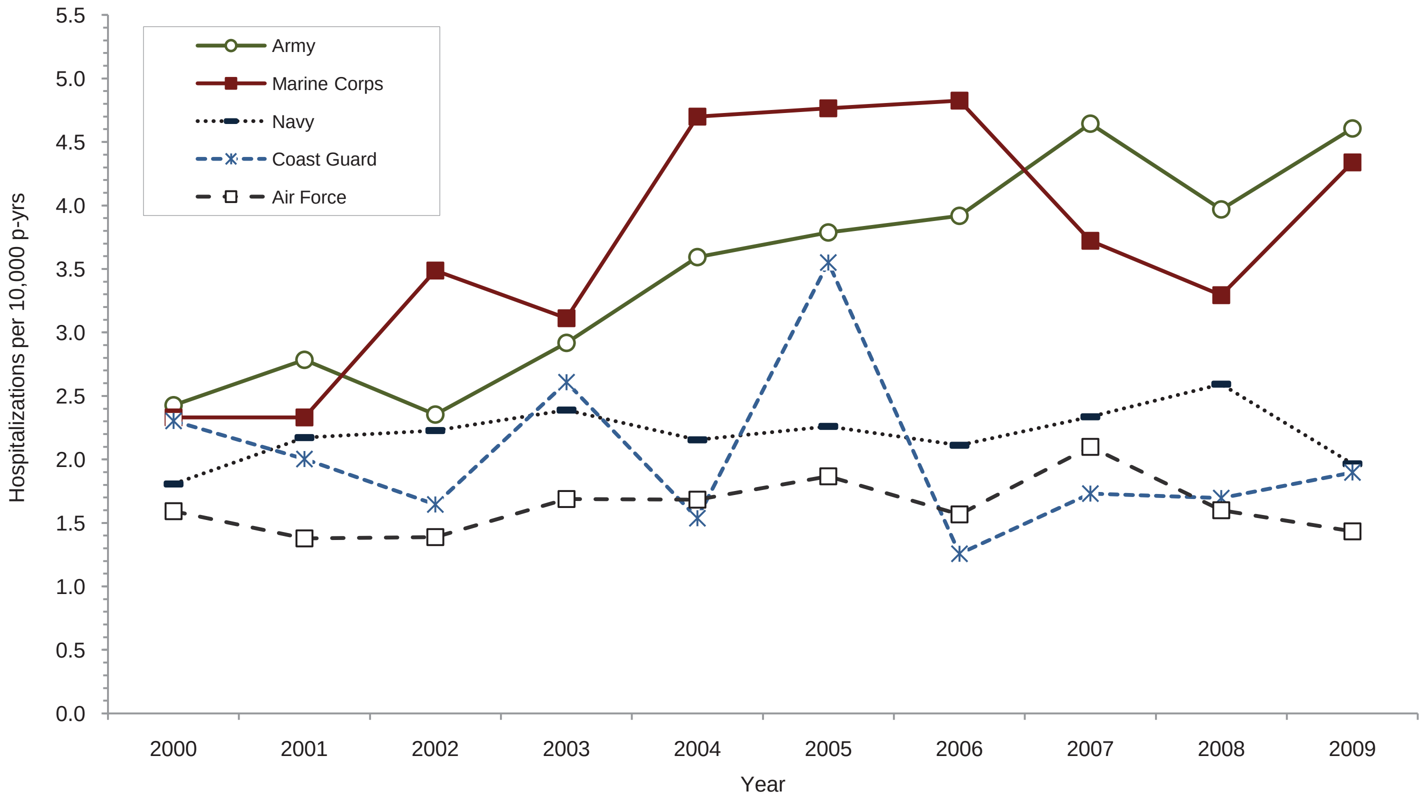


Figure 2. Annual incidence rates of hospitalizations related to thoracolumbar spine fracture by occupational category, active component, U.S. Armed Forces, 2000-2009

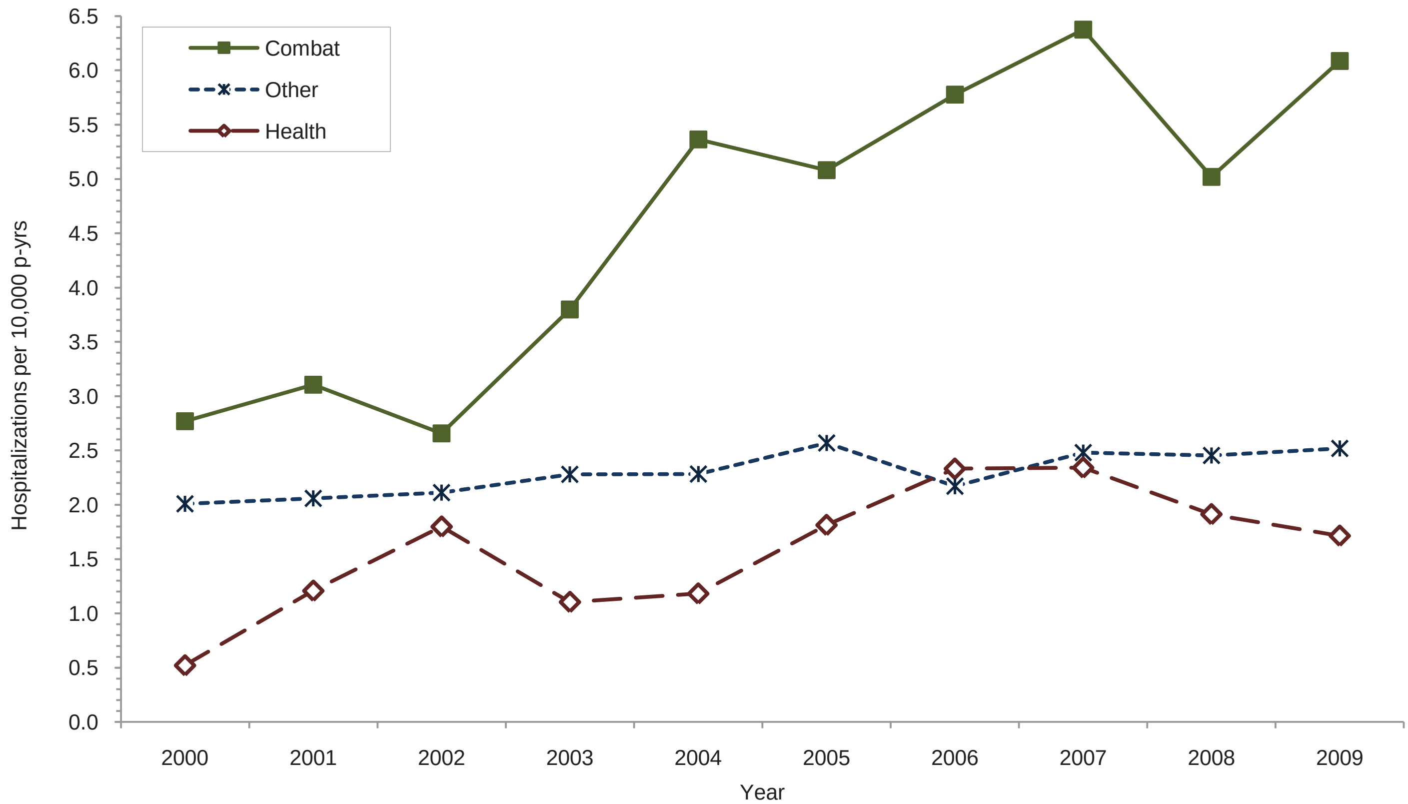


Figure 3. Hospitalizations related to thoracolumbar spinal fractures, by type, number per year by component, and annual rates in active component, U.S. Armed Forces, 2000-2009

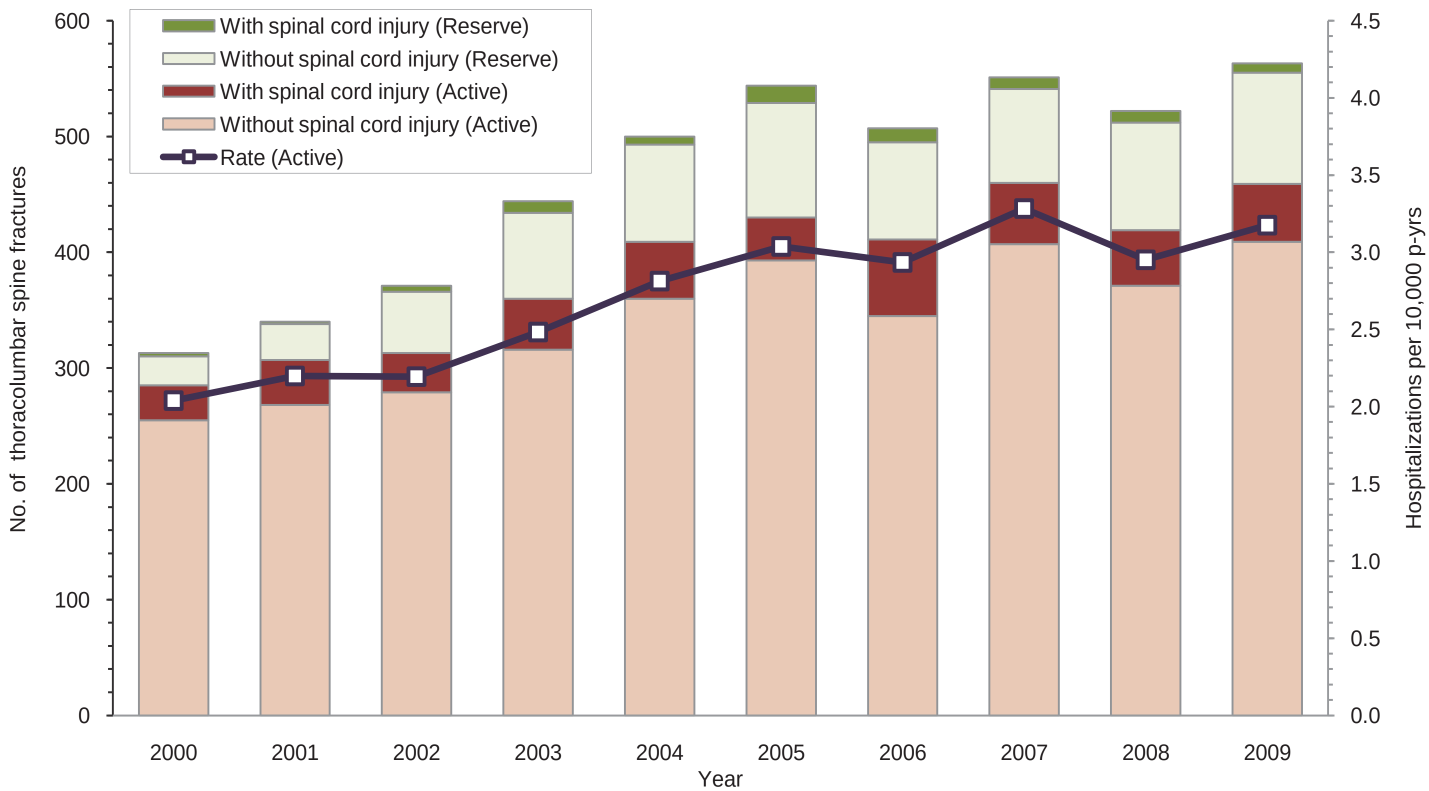
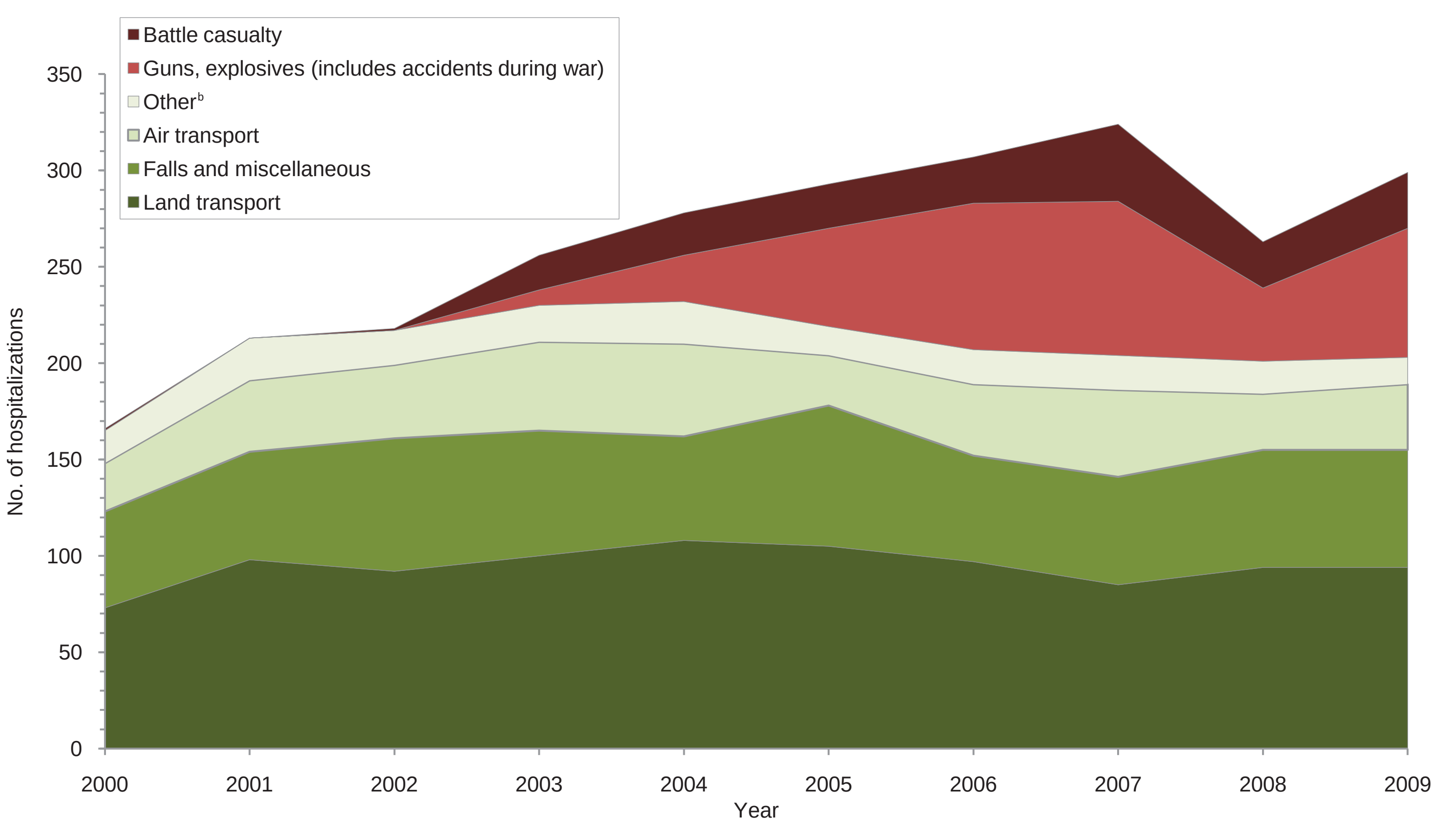


Figure 4. Hospitalizations related to thoracolumbar spinal fractures in U.S. military medical facilities by external causes of injuries[a] (n=2,539), active component, U.S. Armed Forces, 2000-2009



[a]Causes determined by codes specified in NATO Standarization Agreement (STANAG) No. 2050.
[b]Other includes: Athletics, complications of medical surgery, machinery, tools, water transport, environmental poisons and fire, self-inflicted, non-battle (assault), missing/invalid code.

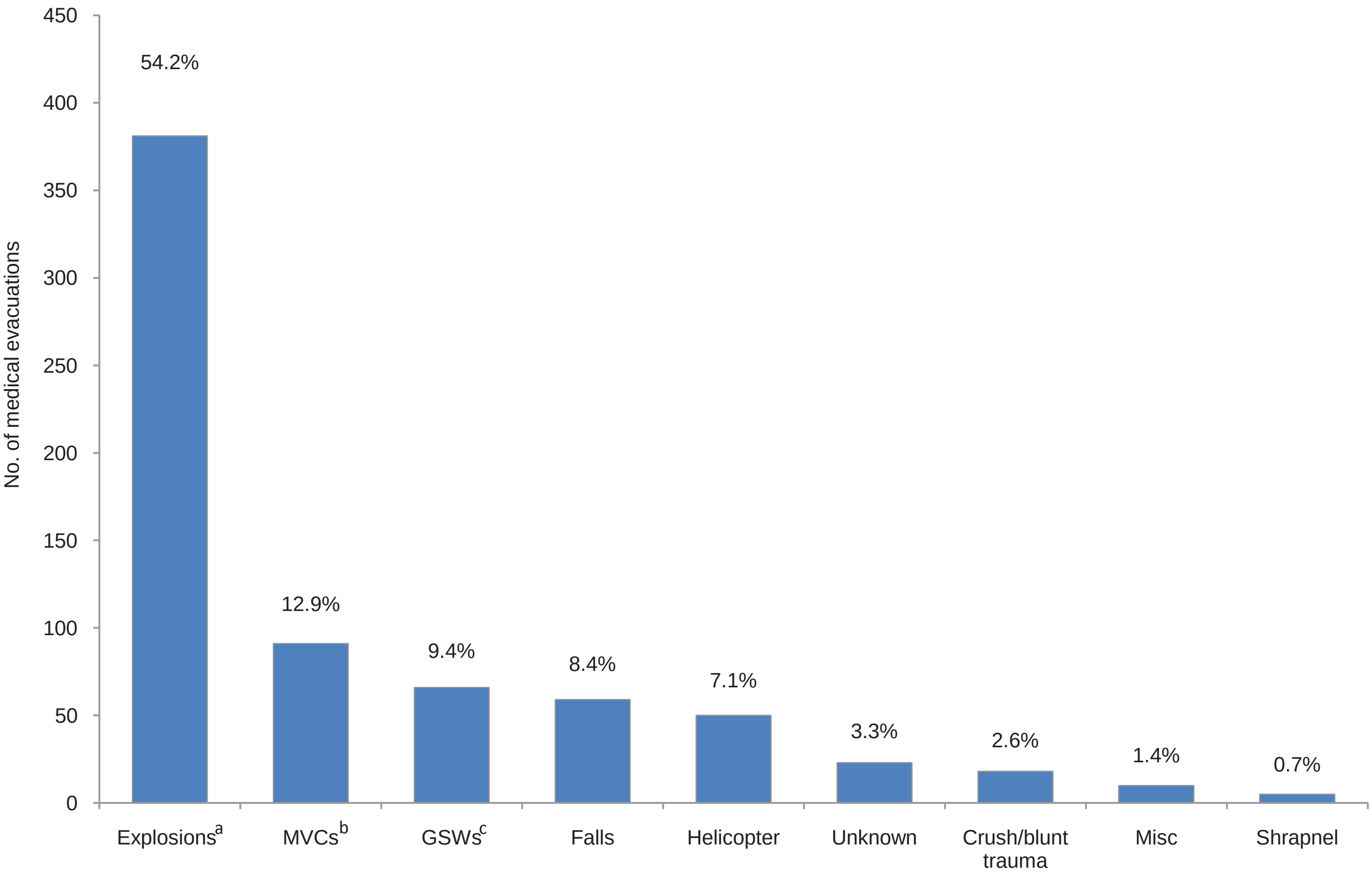
Table 3. Underlying causes of death of U.S. service members during/after hospitalizations related to thoracolumbar spine fractures, active and Reserve components, 2001-2009

Description	Underlying cause of death code	Number	%
Motorcycle accidents	2980	28	32.9
All other motor vehicle accidents	3010, 3020, 3040, 3050, 3060	26	30.6
Operations of war and their sequelae	3550	8	9.4
Air and space transport accidents	3100	6	7.1
Fall from one level to another	3130	3	3.5
Intentional self-harm (suicide)	3340, 3360	3	3.5
Pedestrian vs. motor vehicle	2960	3	3.5
Railway accidents	2950	3	3.5
Assault (homicide)	3400, 3410	2	2.4
Other and unspecified transport accidents and their sequelae	3110	2	2.4
Pedal cyclist involved in collision with motor vehicle	2970	1	1.2
Total		85	100%

Throughout the 10-year period (including several years of intensive combat operations in Iraq and Afghanistan), most thoracolumbar spine fractures of U.S. military members were caused by land and air transportation accidents or "falls and miscellaneous". The findings reiterate the importance of motorcycle, automobile, military vehicle, and military aviation safety programs.

There are limitations to the report that should be considered when interpreting the results. For example, the analysis only considered thoracolumbar spine fracture cases that were hospitalized; thus, individuals who sustained severe injuries to vital organs in addition to thoracolumbar spine fractures may have died before they could be hospitalized. To the extent that this occurred, the numbers and rates of traumatic events that caused thoracolumbar spine fractures among U.S. military members were underestimated, and the causes and consequences of thoracolumbar spine fractures were only partially assessed. Also, the analysis did not account for the natures or severities of injuries and medical conditions that were concurrent with or complicated the clinical courses

Figure 5. Number and percent by cause, aeromedical evacuations related to thoracolumbar spinal fractures (n=703) from the U.S. Central Command area of operations, active and Reserve components, U.S. Armed Forces, 2000-2009



[a]IEDs, mortars, rocket-propelled grenades [b]MVCs=Motor vehicle collisions [c]GSWs=Gunshot wounds

of thoracolumbar spine fractures. Undoubtedly, such factors are important determinants of epidemiologic and clinical characteristics of thoracolumbar spine fractures. In spite of such limitations, the findings of this report are informative and potentially useful.

Thoracolumbar spine fracture-related hospitalizations of U.S. military members sharply increased beginning in 2003, the first year of Operation Iraqi Freedom; fractures caused by "battle injuries" and "explosions" steadily increased from 2003 through 2007 and slightly declined thereafter. Still, during each year of the surveillance period, land and air transportation accidents and "falls and miscellaneous" were the most frequent causes by far of thoracolumbar spine fractures among U.S. military members; numbers of hospitalized cases related to these causes remained fairly stable throughout the period.

During the surveillance period, approximately one-eighth of all U.S. military members who were hospitalized with thoracolumbar spine fractures had concurrent spinal cord injuries. The proportion is similar to that reported in epidemiologic studies in non-military populations.[1,4] The finding suggests that most non-lethal high impact traumas that cause thoracolumbar spine fractures are not complicated by spinal cord injuries. Of note, however, high impact traumas that fracture the thoracolumbar spine and significantly damage the spinal cord are often life threatening; many individuals affected with such catastrophic injuries may not survive to be hospitalized (and would not be included as cases for this report).

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Tendon Ruptures, Active Component, U.S. Armed Forces, 2000-2009

Injuries and musculoskeletal disorders account for significant morbidity, lost duty time, and health care burdens in the U.S. Armed Forces. In 2009, more service members received medical care for injuries than any other category of medical conditions.[1]

Tendon ruptures are tears in the fibrous tissue that attaches muscle to bone; ruptures of tendons without significant trauma ("spontaneous ruptures") occasionally occur in physically active, young adults such as U.S. military members. Tendon ruptures can be chronically painful and/or disabling depending on the nature and location of the affected tendon.[2] Most ruptured tendons can be repaired surgically or with immobilization; however, regardless of the therapeutic approach, there are often long periods of rehabilitation, inability to perform physically demanding duties, and unavailability for overseas deployments. In military populations, primary prevention of spontaneous tendon ruptures is particularly desirable because of their disproportionately large impacts on military operational effectiveness and the military health system.[3,4,5]

Sudden, strenuous activities are the usual proximate causes of spontaneous tendon ruptures (e.g., running, sudden stops and starts, and jumping are often associated with Achilles tendon tears); however, there are other risk factors. For example, increasing age, male gender, use of certain medications (e.g., fluroquinolone antibiotics, anabolic steroids), and degenerative changes in tendon tissue have been associated with increased risk;[6,7,8] in addition, there may be genetic predispositions (e.g., tendon width and vasculature, ABO blood group).[9,10,11]

This report summarizes the numbers, incidence rates, trends, and demographic and military characteristics of U.S. military members affected by spontaneous tendon ruptures from 2000 to 2009.

Methods:

The surveillance period was 1 January 2000 to 31 December 2009. The surveillance population included all individuals who served in the active component of the U.S. Armed Forces any time during the surveillance period. Cases were defined by inpatient or outpatient medical encounters with primary (first-listed) diagnoses of a tendon rupture (ICD-9 codes: 727.60-727.69). The date of the first case-defining medical encounter for each affected tendon of each affected individual was considered the incident date. Incidence rates were calculated as incident tendon rupture cases, overall and by specific tendon or anatomic location **(Table 1)** per 10,000 person-years (p-yrs) at risk. Each individual could be included as an incident case once for analysis of "any tendon rupture" and once per analysis by specific tendon type/location.

Table 1. ICD-9-Codes for tendon ruptures by body location

Body location	ICD-9 -CM code
Shoulder/arm	727.61, 727.62
Hand	727.63, 727.64
Leg	727.65, 727.66
Foot/ankle	727.67, 727.68
Unspecified/other tendon rupture	727.60, 727.69
Achilles tendon rupture	727.67
Rotator cuff rupture	727.61
Anterior cruciate ligament tear	844.2
Ankle sprain	845
Biceps tendon rupture	727.62

As secondary analyses, incident episodes of Achilles tendon (ICD-9: 727.67) and rotator cuff (ICD-9: 727.61) ruptures during calendar year 2009 were assessed in more detail. Achilles tendon ruptures were examined because of their relatively high incidence (second only to rotator cuff ruptures), associated morbidity, and prolonged incapacitation. Rotator cuff tears were examined because they are the most frequent type of tendon rupture and the incidence has been increasing.

Results:

During the 10-year surveillance period, there were 30,955 incident tendon ruptures among active component members **(Table 2)**. During the period, annual incidence rates of any tendon rupture increased by more than 40% (2000: 17.3 per 10,000 p-yrs; 2009: 24.7 per 10,000 p-yrs).

Incidence rates of any tendon rupture monotonically increased with age. More than one-half of all incident tendon ruptures affected service members older than 30 years; the highest tendon rupture incidence rate by far (61.5 per 10,000 p-yrs) affected service members older than 40 **(Table 2)**. Over the entire period, the incidence rate of any tendon rupture was nearly twice as high among males than females and more than two-thirds higher among black non-Hispanic than white non-Hispanic or other racial/ethnic group members **(Table 2)**.

Incidence rates of ruptures of shoulder and arm tendons steadily increased and approximately doubled over the 10-year surveillance period **(Figure 1)**; during each year and overall, the rotator cuff was the specific tendon type/group most frequently ruptured (data not shown). Incidence rates of ruptures of tendons in other anatomic locations slightly increased (e.g., foot/ankle) or were stable during the period **(Figure 1)**.

Table 2. Numbers and rates of incident tendon ruptures, active component, U.S. Armed Forces, 2000-2009

	Total 2001-2008		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009	
	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]
Total	30,955	21.8	2,419	17.3	2,680	19.2	2,788	19.6	2,799	19.3	3,093	21.3	3,376	23.9	3,294	23.5	3,386	24.2	3,552	25.0	3,568	24.7
Service																						
Army	11,473	23.0	932	19.7	972	20.5	984	20.5	922	18.8	1,021	20.7	1,187	24.4	1,164	23.6	1,337	26.2	1,500	28.2	1,454	26.6
Coast Guard	934	24.2	24	6.9	55	15.7	66	18.1	94	24.5	86	22.0	102	25.9	102	25.7	135	33.4	129	31.2	141	33.4
Air Force	7,817	22.4	649	18.5	716	20.6	711	19.8	761	20.7	822	22.0	778	22.0	811	23.5	848	25.4	887	27.3	834	25.4
Marine Corps	3,482	19.3	288	16.8	299	17.4	348	20.2	355	20.1	360	20.4	392	22.0	379	21.3	313	17.1	357	18.4	391	19.3
Navy	7,249	20.4	526	14.4	638	17.3	679	18.0	667	17.7	804	21.7	917	25.6	838	24.2	753	22.6	679	20.7	748	23.0
Sex																						
Female	2,596	12.6	211	10.5	259	12.6	219	10.4	249	11.6	280	13.0	280	13.6	253	12.5	262	13.1	285	14.2	298	14.5
Male	28,359	23.4	2,208	18.5	2,421	20.3	2,569	21.2	2,550	20.7	2,813	22.7	3,096	25.6	3,041	25.4	3,124	26.0	3,267	26.8	3,270	26.4
Race/ethnicity																						
Black non-Hispanic	8,417	33.3	687	25.1	788	28.7	757	27.7	723	26.8	857	32.9	996	40.6	897	38.1	903	39.3	914	39.7	895	38.5
White non-Hispanic	17,730	19.7	1,408	15.9	1,555	17.7	1,636	18.2	1,653	18.1	1,791	19.5	1,855	20.8	1,876	21.2	1,879	21.1	2,056	22.8	2,021	22.0
Other	4,808	17.8	324	13.5	337	14.0	395	15.5	423	15.9	445	16.1	525	19.0	521	18.7	604	21.5	582	20.4	652	22.3
Age																						
<20	852	6.1	90	6.0	113	7.0	103	6.4	102	6.6	88	6.0	92	7.1	73	5.8	55	4.4	78	6.2	58	4.8
20-24	5,465	11.4	514	11.7	555	12.3	562	11.9	582	11.7	592	11.7	592	12.0	507	10.4	521	10.8	505	10.4	535	10.9
25-29	5,076	17.5	452	16.4	443	16.7	474	17.7	468	16.8	543	18.9	535	18.4	502	17.1	524	17.4	573	18.3	562	17.0
30-34	5,111	25.1	431	20.3	461	22.5	451	21.9	467	22.6	452	21.9	604	29.9	547	27.6	533	27.1	563	28.4	602	29.5
35-39	6,582	37.0	500	25.2	626	32.4	569	29.9	566	30.6	641	36.1	716	42.4	747	45.0	717	43.1	745	44.7	755	45.3
40+	7,869	61.5	432	35.8	482	39.8	629	50.1	614	48.1	777	59.0	837	63.6	918	71.1	1,036	81.1	1,088	84.0	1,056	78.7

[a]Rate per 10,000 person-years of service

Figure 1. Annual incidence rates of tendon ruptures, by anatomic location, active component, U.S. Armed Forces, 2000-2009

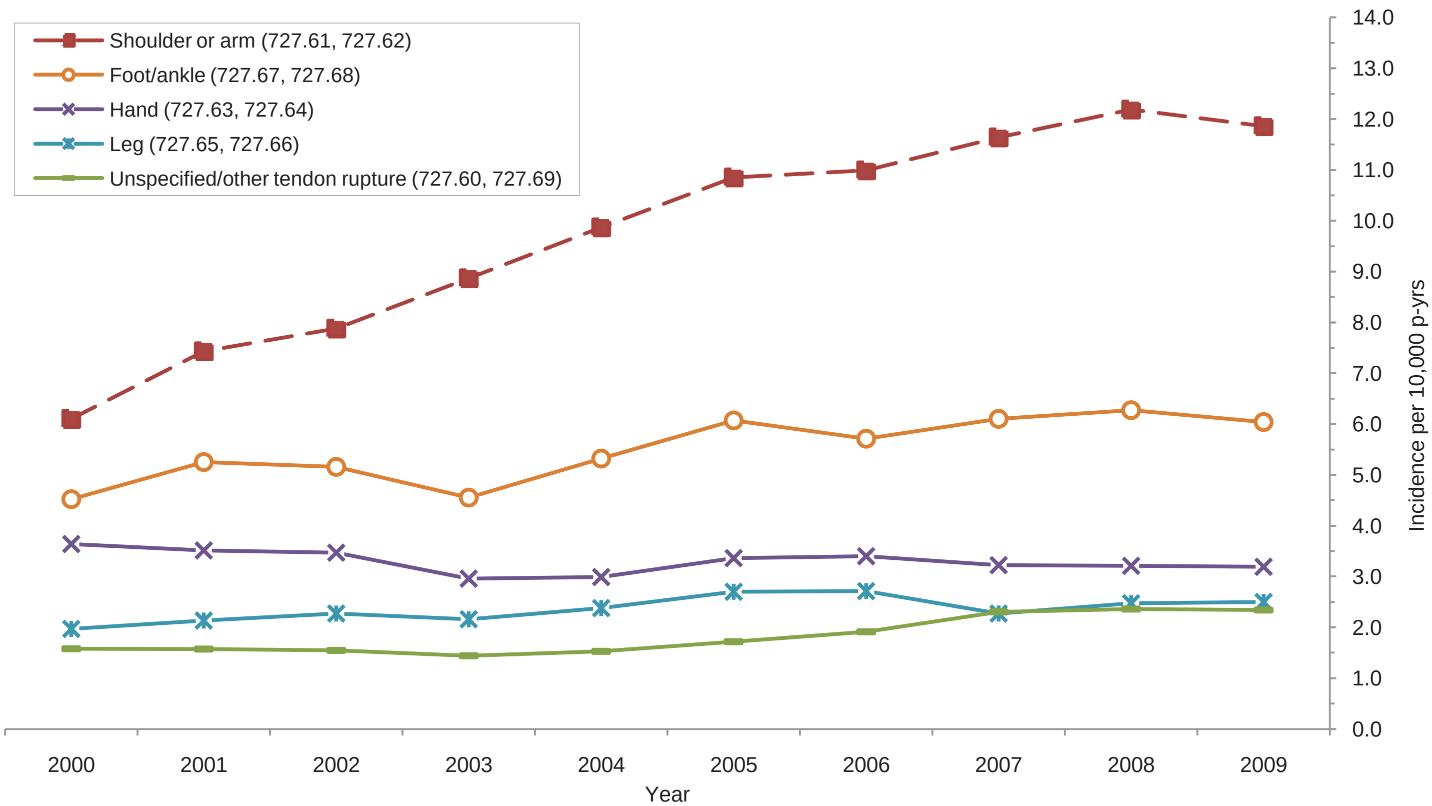
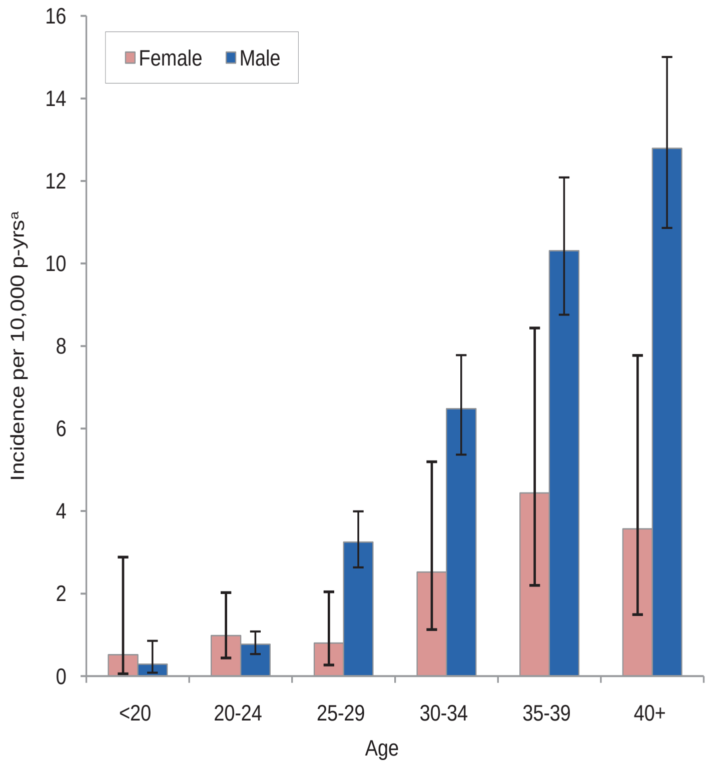


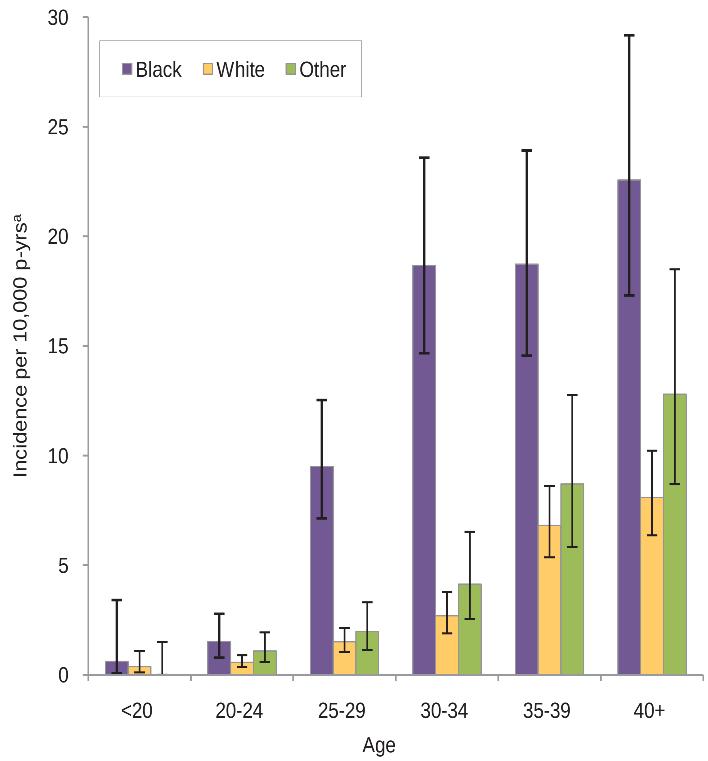
Figure 2. Incidence rates of ruptures of achilles tendon and rotator cuff, by demographic characteristics, active component, U.S. Armed Forces, 2009

a. Achilles tendon, by sex and age group



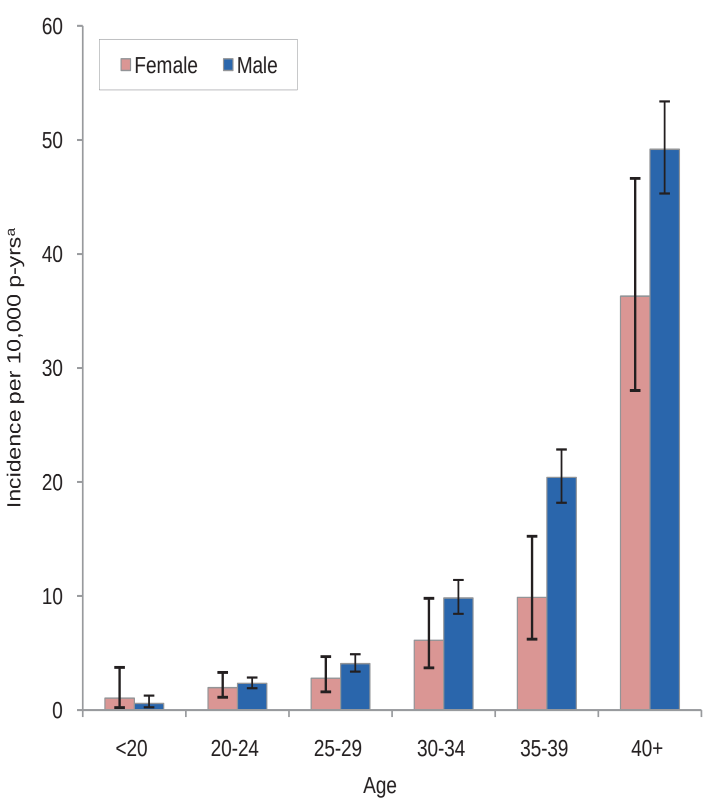
[a]Error bars indicate 95% confidence intervals for rates.

b. Achilles tendon, by race and age group



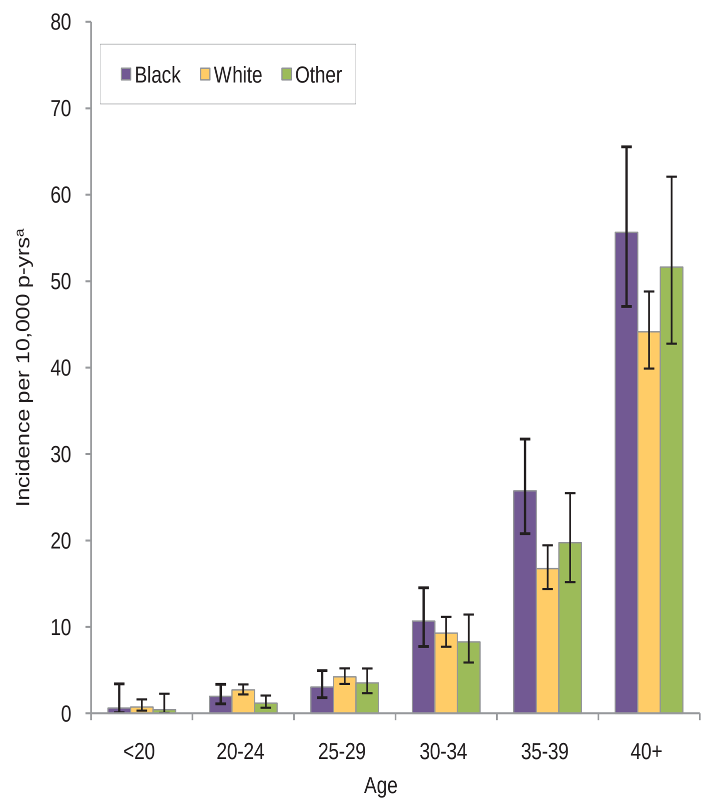
[a]Error bars indicate 95% confidence intervals for rates.

c. Rotator cuff, by sex and age group



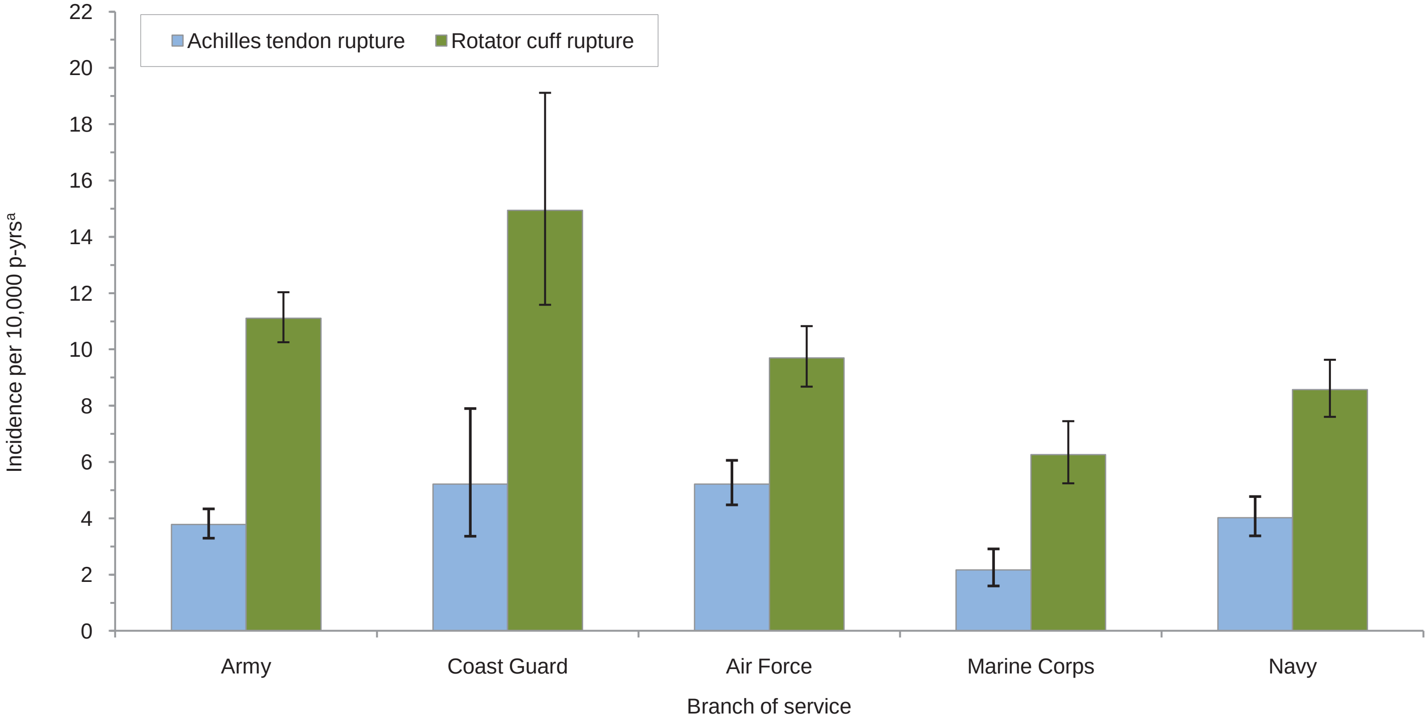
[a]Error bars indicate 95% confidence intervals for rates.

d. Rotator cuff, by race and age group



[a]Error bars indicate 95% confidence intervals for rates.

Figure 3. Crude overall incidence rates of achilles tendon and rotator cuff rupture, by service, active component, U.S. Armed Forces, 2009



[a]Error bars indicate 95% confidence intervals for rates.

Figure 2 (panels a-d) summarizes incidence rates of Achilles tendon and rotator cuff ruptures in 2009 in various demographic subgroups. Rates of both Achilles tendon and rotator cuff ruptures sharply increased with age; and in all age groups, rates of Achilles tendon ruptures were much higher among male and black non-Hispanic service members than their respective counterparts. Also, in most age groups, male and black non-Hispanic members had higher rates of rotator cuff tears than their respective counterparts; however, the differences in rates related to these factors were much smaller for rotator cuff than Achilles tendon ruptures **(Figure 2, a-d).** Black non-Hispanic service members also experienced relatively high rates of patellar tendon ruptures but not biceps tendon ruptures, anterior cruciate ligament (ACL) tears, or ankle sprains (data not shown).

In 2009, the Coast Guard and Marine Corps had relatively high and low overall rates, respectively, of both rotator cuff and Achilles tendon ruptures **(Figure 3)**; the differences in rates across the Services were minimal when age effects were controlled **(Figure 4, a,b).**

Editorial comment:

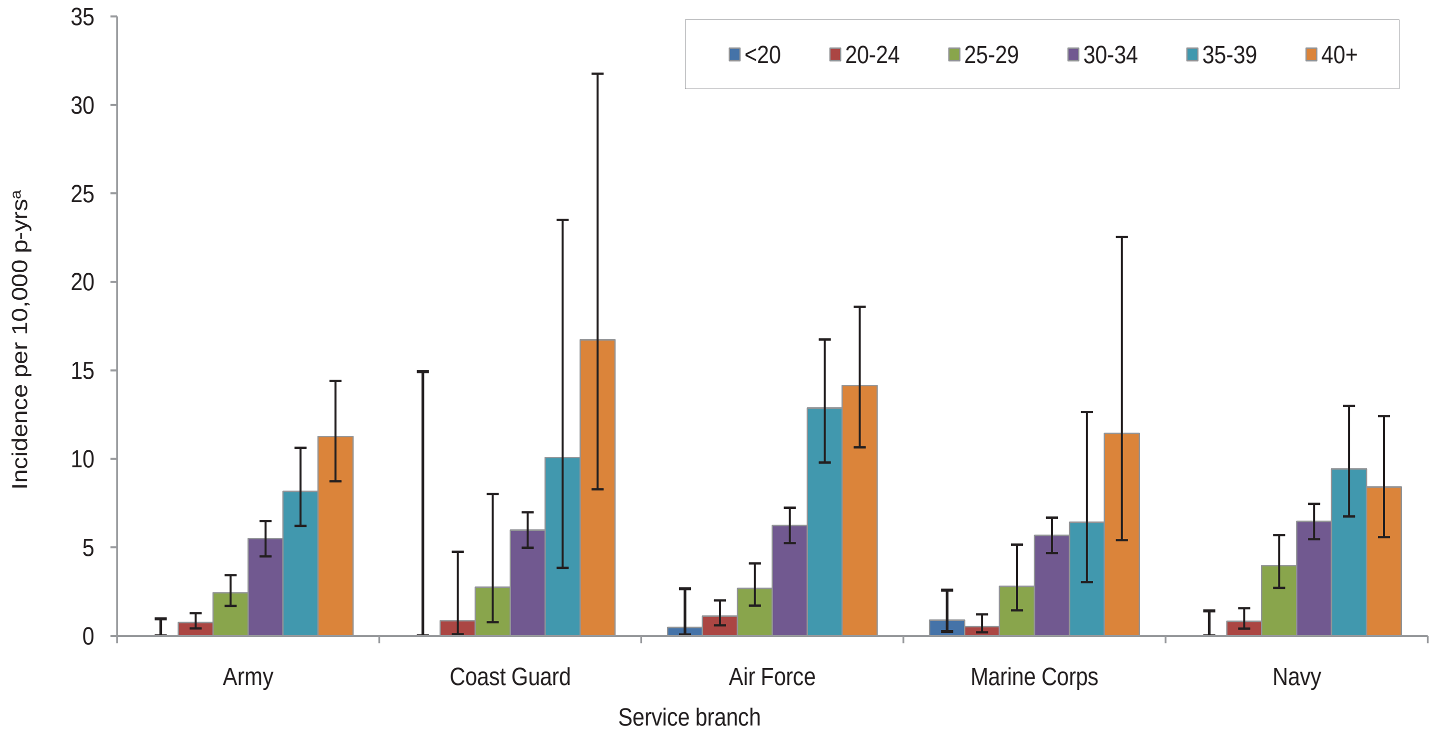
Over the last ten years, diagnoses of rotator cuff ruptures have markedly increased among members of the active component of the U.S. military; the increase in rotator cuff ruptures accounts for much of the overall increase in tendon rupture diagnoses. The finding must be interpreted cautiously because, unlike ruptures of other major tendons (e.g., Achilles, patellar), rotator cuff ruptures are not necessarily acute injuries that are immediately disabling. It is possible that the recent increase in rates of diagnoses of rotator cuff ruptures reflects, at least in part, more complete ascertainment of previously undetected cases.

In the U.S. military, as in other populations, age is strongly correlated with tendon rupture risk. In the U.S. military, increasing age is also correlated with higher rank and greater responsibilities. As such, tendon ruptures that entail prolonged periods of disability and nondeployability have disproportionately large military operational impacts. New insights regarding modifiable risk factors and primary prevention practices would be very valuable additions to military force health protection practices.

Even after age adjustment, the rate of Achilles tendon rupture — but not rotator cuff rupture — was much higher among black non-Hispanic than other service members. Based on their review of experience at Fort Bragg, NC, White and colleagues estimated that the rate of major tendon ruptures was more than 13-times higher among black than white soldiers.[5] In this report, black non-Hispanic service members also had relatively high rates of patellar tendon ruptures but not ACL tears or ankle sprains; the finding suggests that differences in activities — such as recreational activities that involve sudden acceleration, deceleration, twisting, or jumping — were not key determinants of the race-ethnicity-related differences in rates of ruptures of lower extremity

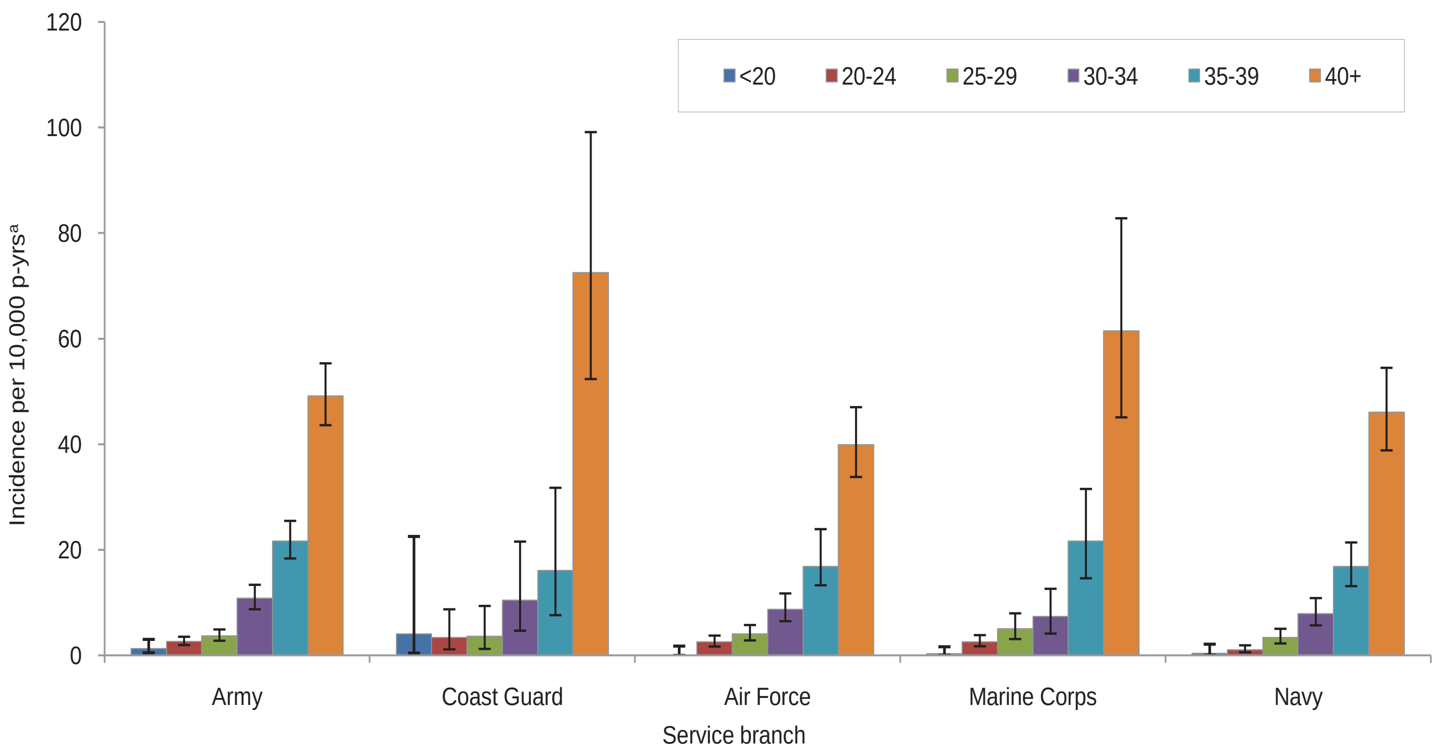
Figure 4. Incidence rates of achilles tendon and rotator cuff ruptures, by service and age group, active component, U.S. Armed Forces, 2009

a. Achilles tendon



[a]Error bars indicate 95% confidence intervals for rates.

b. Rotator cuff



[a]Error bars indicate 95% confidence intervals for rates.

tendons. The apparently strong association between risk of lower extremity tendon rupture and race-ethnicity deserves further investigation.

Finally, mechanisms of injury were not assessed in this analysis; however, other studies have consistently documented that large proportions of major tendon ruptures are sustained during athletic and other recreational activities. A recently published study of injuries of U.S. Air Force members during a ten-year period revealed that basketball was one of the leading causes of lost workdays overall; injuries to the Achilles tendon (including rupture) caused more lost work days, on average, than any other basketball-related injury.[12] The development and implementation of policies, practices, and perhaps equipment that can reduce sports-related injuries among young and middle-aged (i.e., military-aged) adults are indicated.

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Surveillance Snapshot: Plantar Fasciitis

Plantar fasciitis is inflammation of the thick band of tissue that connects the heel to the toes. The hallmark symptoms are heel pain that is worst with the first steps of the day and pain that worsens with weight-bearing. In the civilian population, plantar fasciitis accounts for approximately one million patient visits per year; it is estimated that approximately 10% of all individuals will have plantar fasciitis in their lifetimes.[1] There are several treatment options; however, in approximately 80% of patients, the condition is self-limiting, and symptoms resolve within twelve months.[2]

Factors associated with the development of plantar fasciitis include increasing age, female gender, running or other activities that place stress on the heel and attached tissue, obesity, inappropriate footwear, and various mechanical causes (e.g., excessive pronation, limited ankle dorsiflexion).[3] In the U.S. military, service in the Army and Marine Corps has been associated with increased risk.[4]

Among active component military members, the overall incidence rate of plantar fasciitis increased slightly during the past 10 years. Throughout the period, the highest rates among male service members were among the oldest (> 40 years); among them, the rates steadily increased from 2003 through 2009. In contrast, from 2000 to 2007, the highest rates among female service members were among the youngest (< 20 years); however, among them, rates sharply declined beginning in 2008. Since 2008, the highest rates among females have been among the oldest (>40 years).

1. Riddle DL, Schapper SM. Volume of ambulatory visits and patterns of care for patients diagnosed with plantar fasciitis: a national study of medical doctors. *Foot Ankle Int.* 2004 May;25(5):303-310.
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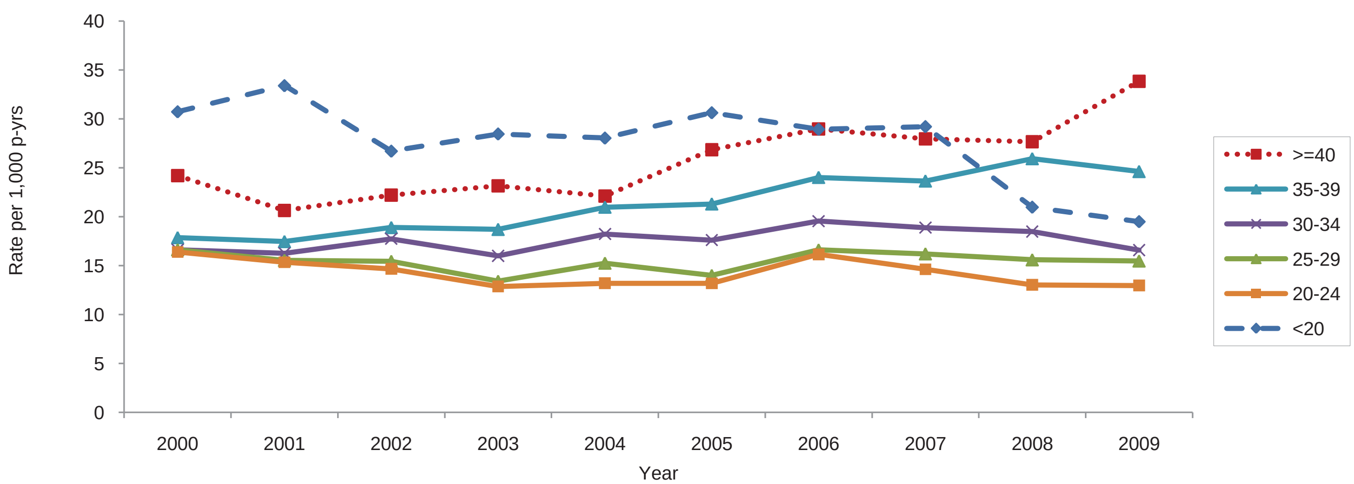
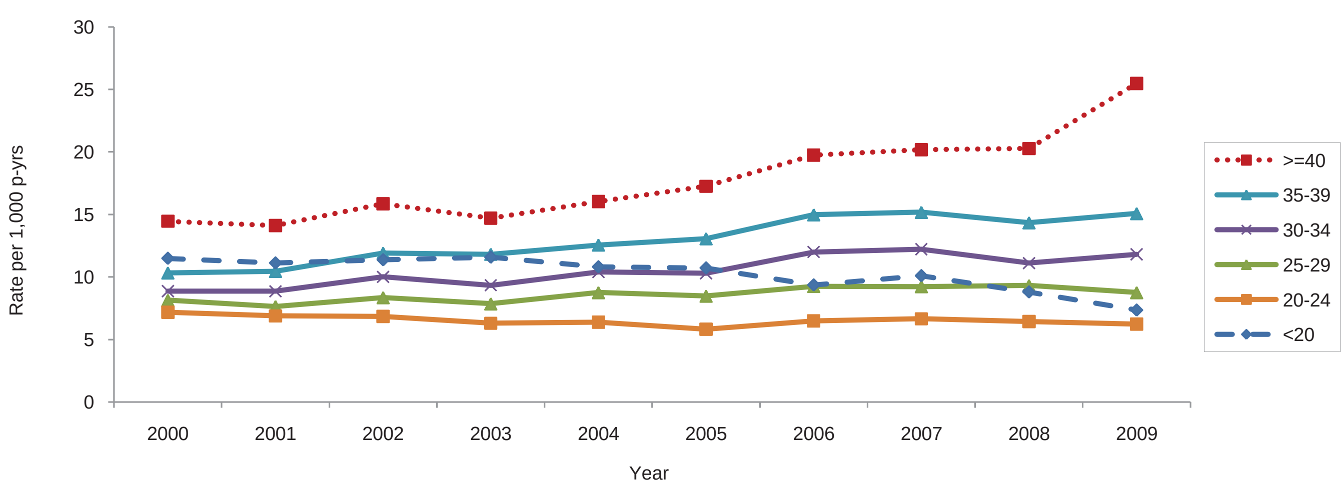
Incident diagnoses of plantar fasciitis among females, by age group and year, active component, U.S. Armed Forces, 2000-2009



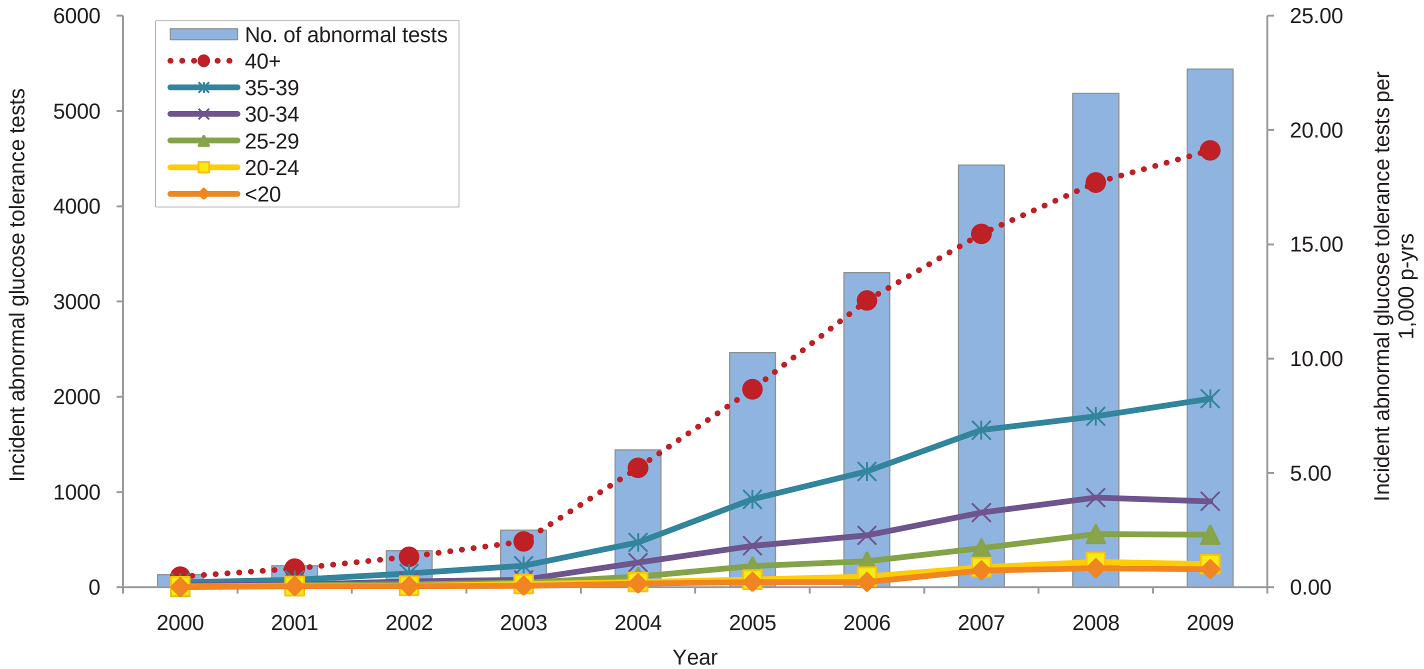
Incident diagnoses of plantar fasciitis among males, by age group and year, active component, U.S. Armed Forces, 2000-2009



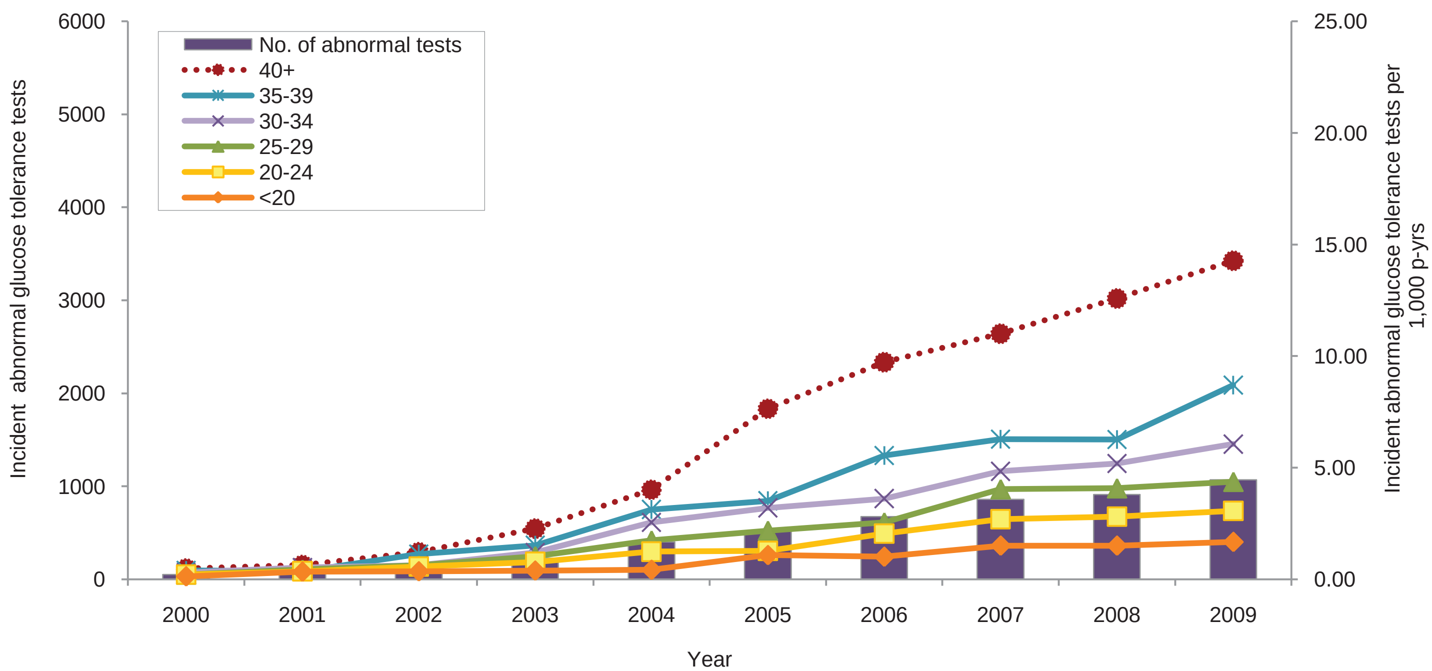
Surveillance Snapshot: Abnormal Glucose Tolerance Test

An "abnormal glucose tolerance test" was defined as an individual's first outpatient record with ICD-9-CM: 790.2 in any diagnostic position. Acknowledgement: MAJ Paul Ciminera, MD, MPH (USA)

Incident outpatient diagnoses, counts and rates of "abnormal glucose tolerance test" in males, by age group, active component, U.S. Armed Forces, 2000-2009



Incident outpatient diagnoses, counts and rates of "abnormal glucose tolerance test" in females, by age group, active component, U.S. Armed Forces, 2000-2009



Update: Deployment Health Assessments, U.S. Armed Forces, July 2010

In July 2010, there were lower numbers of pre-deployment health assessment forms transmitted to the Armed Forcces Health Surveillance Center than at any time in the past 12 months **(Table 1, Figure 1)**. Since January 2003, peaks and troughs in the numbers of pre- and post-deployment health assessment forms transmitted generally corresponded to times of departure and return of large numbers of deployers. The numbers of post-deployment health reassessments (PDHRA) transmitted in July 2010 were the lowest since November 2009. Between April 2006 and March 2010, the number of forms per month 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 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, August 2009-July 2010

	Pre-deployment assessment DD2795		Post-deployment assessment DD2796		Post-deployment reassessment DD2900	
	No.	%	No.	%	No.	%
Total	**417,861**	**100**	**451,655**	**100**	**302,509**	**100**
2009						
August	39,296	9.4	46,791	10.4	21,797	7.2
September	30,627	7.3	39,629	8.8	26,282	8.7
October	36,463	8.7	32,458	7.2	24,087	8.0
November	32,304	7.7	32,908	7.3	20,683	6.8
December	31,006	7.4	36,539	8.1	29,068	9.6
2010						
January	55,525	13.3	34,200	7.6	25,730	8.5
February	31,395	7.5	27,710	6.1	26,960	8.9
March	32,484	7.8	44,602	9.9	35,610	11.8
April	32,000	7.7	33,436	7.4	24,702	8.2
May	37,989	9.1	35,350	7.8	22,549	7.5
June	29,888	7.2	44,847	9.9	24,066	8.0
July	28,884	6.9	43,185	9.6	20,975	6.9

Figure 2. Proportion of deployment health assessment forms with self-assessed health status as "fair" or "poor", U.S. Armed Forces, August 2009-July 2010

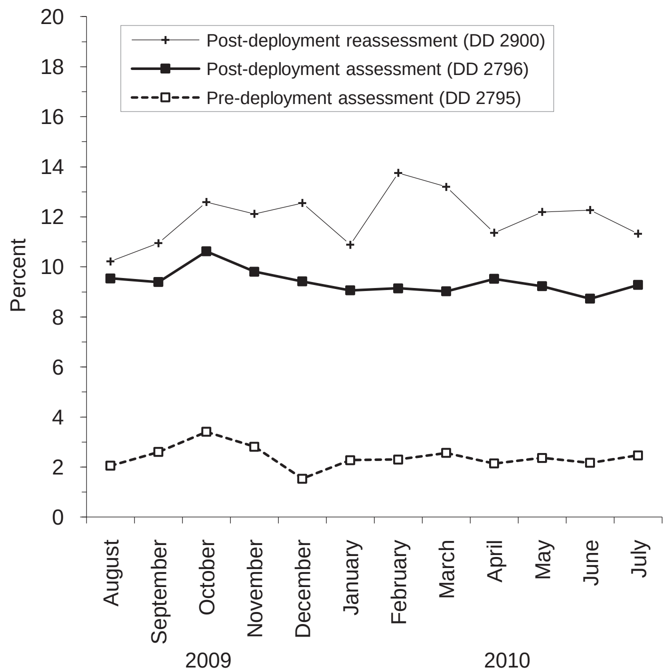


Figure 1. Total deployment health assessment and reassessment forms, by month, U.S. Armed Forces, January 2003-July 2010

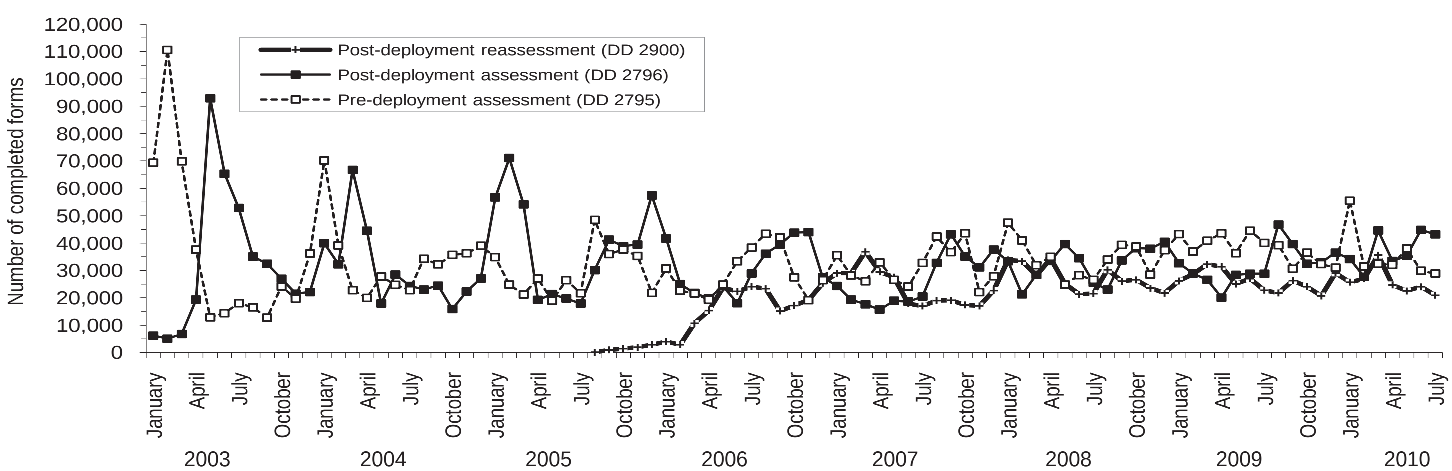


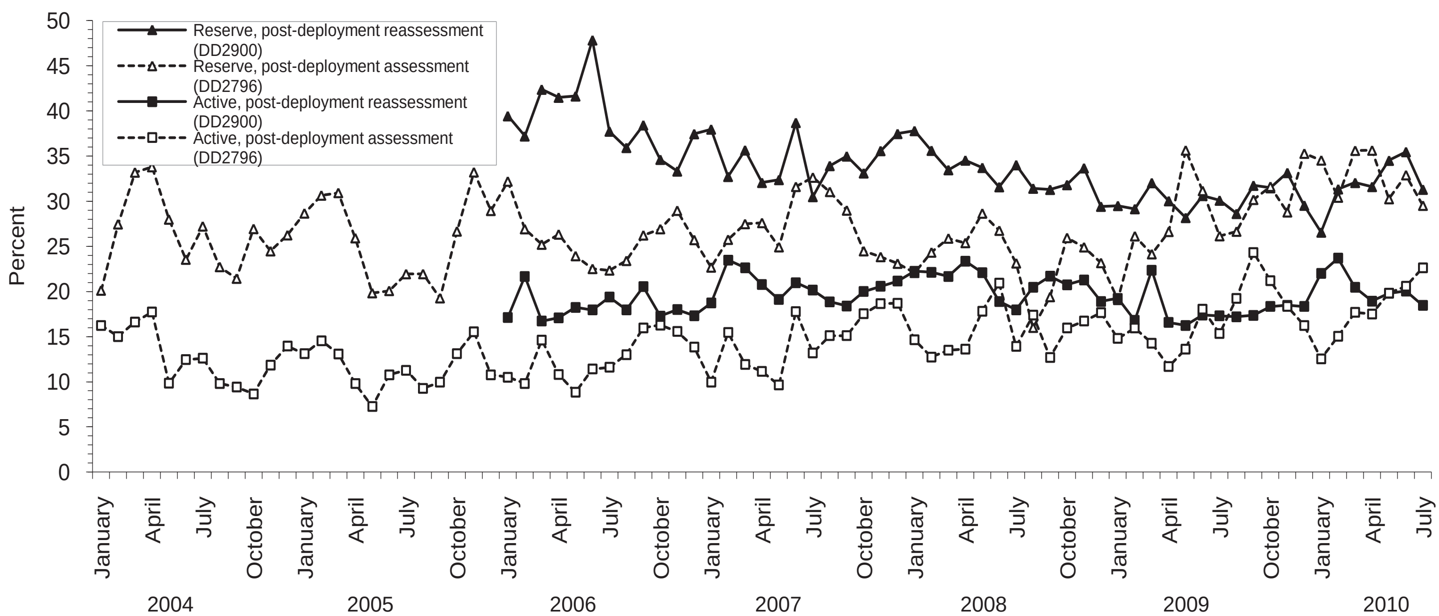
Table 2. Percentage of service members who endorsed selected questions/received referrals on health assessment forms, U.S. Armed Forces, August 2009-July 2010

	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= 154,221	n= 154,274	n= 113,182	n= 19,250	n= 14,968	n= 12,660	n= 59,274	n= 54,321	n= 50,822	n= 32,860	n= 28,711	n= 32,188	n= 265,605	n= 252,274	n= 208,852
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	3.9	10.0	14.9	1.2	4.6	5.8	0.4	3.3	4.2	1.5	7.3	9.7	2.6	7.9	11.0
Health concerns, not wound or injury	17.6	25.5	25.7	3.3	11.7	14.7	1.3	5.6	10.7	2.7	11.6	17.2	11.1	18.8	20.1
Health worse now than before deployed	na	21.8	25.9	na	11.8	13.4	na	8.2	8.4	na	15.7	18.6	na	17.6	19.8
Exposure concerns	na	21.5	21.2	na	18.3	21.0	na	11.5	14.5	na	13.7	20.9	na	18.3	19.5
PTSD symptoms (2 or more)	na	8.4	12.1	na	5.5	7.5	na	2.5	2.6	na	6.2	8.7	na	6.7	9.0
Depression symptoms (any)	na	30.6	33.1	na	21.9	24.1	na	13.1	13.6	na	25.9	30.0	na	25.8	27.4
Referral indicated by provider (any)	4.9	35.5	26.5	4.3	22.3	17.7	2.0	11.7	7.2	3.8	18.8	29.2	4.1	27.7	21.7
Mental health referral indicated[a]	1.2	7.2	12.8	0.5	3.0	5.3	0.5	1.5	2.0	0.2	1.6	5.1	0.9	5.1	8.5
Medical visit following referral[b]	95.0	99.8	98.0	84.7	90.3	95.8	86.1	96.0	97.8	45.1	82.7	93.9	84.5	97.5	96.9
	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= 63,126	n= 86,911	n= 60,708	n= 5,176	n= 4,027	n= 5,474	n= 16,140	n= 15,196	n= 16,337	n= 3,346	n= 4,299	n= 7,385	n= 87,788	n= 110,433	n= 89,904
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	1.3	11.6	16.6	0.5	10.2	9.4	0.3	5.0	4.9	1.0	7.7	11.0	1.0	10.5	13.5
Health concerns, not wound or injury	21.1	34.5	42.6	1.3	32.1	31.2	0.5	8.7	14.8	2.7	23.6	36.4	15.4	30.4	36.3
Health worse now than before deployed	na	26.0	31.7	na	21.0	20.2	na	12.9	10.8	na	21.4	26.8	na	23.8	26.8
Exposure concerns	na	33.5	33.6	na	42.2	34.7	na	18.6	22.3	na	15.2	31.6	na	31.1	31.4
PTSD symptoms (2 or more)	na	8.6	17.9	na	6.3	11.8	na	2.6	2.7	na	4.2	13.2	na	7.5	14.4
Depression symptoms (any)	na	30.7	33.9	na	26.5	24.1	na	14.7	13.2	na	31.0	27.9	na	28.4	29.0
Referral indicated by provider (any)	3.9	36.6	35.4	3.7	28.6	21.5	0.5	14.1	7.3	3.1	27.6	32.1	3.2	32.9	29.2
Mental health referral indicated[a]	0.4	4.8	12.6	0.2	2.6	6.2	0.0	0.8	1.1	0.1	2.1	10.5	0.3	4.0	9.9
Medical visit following referral[b]	90.6	99.2	38.4	97.7	97.0	42.9	60.0	70.4	43.5	38.2	83.6	33.0	86.9	96.5	38.4

[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-July 2010



Sentinel reportable events among service members and beneficiaries at U.S. Army medical facilities, cumulative numbers[a] for calendar years through 30 June 2009 and 30 June 2010

Army

Reporting locations	Number of reports all events[b]		Food-borne						Vaccine preventable					
			Campylo-bacter		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella[c]	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
NORTHERN														
Aberdeen Proving Ground, MD	3	24	.	.	.	.	.	.	.	.	.	.	.	.
Fort Belvoir, VA	107	131	4	8	2	1	.	2	.	.	.	.	.	.
Fort Bragg, NC	905	796	3	5	7	3	.	.	.	.	2	.	.	.
Fort Dix, NJ	0	0	.	.	.	.	.	.	.	.	.	.	.	.
Fort Drum, NY	26	39	.	.	.	.	.	.	.	.	.	.	.	.
Fort Eustis, VA	123	118	.	.	1	.	.	.	.	.	.	.	.	.
Fort George G Meade, MD	25	11	.	.	.	.	.	.	.	.	.	.	.	.
Fort Knox, KY	101	187	.	.	.	2	.	2	.	.	.	.	.	1
Fort Lee, VA	256	264	.	.	.	.	.	.	.	.	.	.	.	.
Fort Monmouth, NJ	27	23	.	.	.	.	.	.	.	.	.	1	.	.
Walter Reed AMC, DC	96	86	1	.	.	3	.	.	.	.	1	.	1	.
West Point Military Reservation, NY	43	36	1	.	.	.	.	.	.	.	1	.	.	.
SOUTHERN														
Fort Benning, GA	98	7	.	.	.	.	1	1	1	.	.	.	.	.
Fort Campbell, KY	246	350	.	.	.	.	.	.	.	.	.	.	.	.
Fort Gordon, GA	380	379	1	2	3	8	1	1	.	.	1	.	1	.
Fort Hood, TX	976	1,105	7	3	11	5	5	36	.	.	.	1	.	.
Fort Jackson, SC	262	229	.	.	.	.	.	.	.	.	2	.	.	.
Fort Polk, LA	277	234	.	.	.	1	1	3	.	.	.	.	.	.
Fort Rucker, AL	38	55	7	1	1	1	.	.	.	.	.	1	.	.
Fort Sam Houston, TX	324	263	1	.	2	2	.	1	.	.	1	1	.	.
Fort Sill, OK	119	233	.	.	.	.	2	1	.	.	.	.	.	.
Fort Stewart, GA	558	317	.	1	6	6	10	4	.	.	.	1	.	1
WESTERN														
Fort Bliss, TX	230	320	.	3	1	2	1	1	1	.	5	3	.	.
Fort Carson, CO	374	402	1	5	1	2	.	.	.	.	.	.	.	.
Fort Huachuca, AZ	44	52	.	.	.	2	.	.	.	.	.	.	.	.
Fort Leavenworth, KS	35	21	.	.	.	.	.	.	.	.	.	.	.	.
Fort Leonard Wood, MO	213	196	1	.	.	2	.	.	1	.	.	.	1	.
Fort Lewis, WA	593	436	2	4	4	1	.	.	.	.	.	.	.	.
Fort Riley, KS	256	228	.	.	2	1	.	1	.	.	.	.	.	.
Fort Wainwright, AK	101	173	.	.	.	.	.	.	.	.	.	.	.	.
NTC and Fort Irwin, CA	63	61	.	.	1	.	1	.	.	.	.	.	.	.
PACIFIC														
Hawaii	380	427	16	18	8	10	1	4	.	1	1	.	.	.
Japan	3	1	.	.	.	.	.	.	.	.	.	.	.	.
Korea	264	248	.	.	.	.	.	.	.	.	.	.	.	.
EUROPEAN														
Heidelberg	45	83	3	11	1	4	.	1	.	.	.	.	.	.
Landstuhl	365	213	3	2	2	1	.	2	.	.	1	2	1	.
Bavaria	219	333	4	1	2	4	.	.	.	.	.	.	.	.
CENTCOM LOCATIONS														
CENTCOM	103	86	.	.	.	2	1	.	.	.	.	.	.	.
Total	**8,278**	**8,167**	**55**	**64**	**55**	**63**	**24**	**60**	**3**	**1**	**15**	**10**	**4**	**2**

[a]Events reported by July 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 30 June 2009 and 30 June 2010

Army

Reporting location	Arthropod-borne				Sexually transmitted						Environmental				Travel associated			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis		Cold[c]		Heat[c]		Q Fever		Tuberculosis	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
NORTHERN																		
Aberdeen Proving Ground, MD	.	.	.	.	2	20	1	4	.	.	.	.	.	.	.	.	.	.
Fort Belvoir, VA	.	.	.	.	90	109	11	11	.	.	.	.	.	.	.	.	.	.
Fort Bragg, NC	.	.	.	4	740	615	126	118	3	1	.	8	24	42	.	.	.	.
Fort Dix, NJ	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fort Drum, NY	.	.	.	.	23	36	3	3	.	.	.	.	.	.	.	.	.	.
Fort Eustis, VA	.	.	.	.	106	104	16	12	.	2	.	.	.	.	.	.	.	.
Fort George G Meade, MD	.	.	.	.	25	7	.	4	.	.	.	.	.	.	.	.	.	.
Fort Knox, KY	1	.	.	1	87	168	13	11	.	.	.	.	.	1	.	.	.	1
Fort Lee, VA	1	.	.	.	229	239	24	25	2	.	.	.	.	.	.	.	.	.
Fort Monmouth, NJ	5	11	.	.	20	10	1	.	1	1	.	.	.	.	.	.	.	.
Walter Reed AMC, DC	5	3	.	.	67	65	9	13	11	1	.	.	.	.	.	.	1	1
West Point Military Reservation, NY	6	8	.	.	33	24	2	4	.	.	.	.	.	.	.	.	.	.
SOUTHERN																		
Fort Benning, GA	.	.	5	.	70	1	19	.	1	.	.	.	.	5	.	.	1	.
Fort Campbell, KY	4	.	.	.	167	317	44	25	1	.	.	.	30	8	.	.	.	.
Fort Gordon, GA	.	.	.	.	317	312	55	56	.	.	.	.	1	.	.	.	.	.
Fort Hood, TX	.	.	.	1	769	876	179	179	4	3	.	.	.	.	.	.	1	1
Fort Jackson, SC	.	.	.	.	173	118	26	18	.	.	.	8	61	85	.	.	.	.
Fort Polk, LA	.	.	.	.	204	170	22	24	1	.	.	.	49	36	.	.	.	.
Fort Rucker, AL	.	.	.	.	28	51	2	1	.	.	.	.	.	.	.	.	.	.
Fort Sam Houston, TX	.	.	.	1	254	224	47	26	10	8	.	.	9	.	.	.	.	.
Fort Sill, OK	.	.	.	.	98	195	14	27	.	1	.	.	5	9	.	.	.	.
Fort Stewart, GA	.	2	.	.	420	258	77	38	4	.	.	.	35	6	6	.	.	.
WESTERN																		
Fort Bliss, TX	.	.	.	3	185	272	31	31	5	4	.	.	.	.	.	.	1	1
Fort Carson, CO	.	.	.	.	336	367	36	28	.	.	.	.	.	.	.	.	.	.
Fort Huachuca, AZ	.	1	.	.	42	45	2	2	.	.	.	.	.	2	.	.	.	.
Fort Leavenworth, KS	2	1	.	.	28	19	3	.	1	1	.	.	1	.	.	.	.	.
Fort Leonard Wood, MO	.	.	.	.	187	163	19	26	.	.	1	.	2	4	.	.	1	1
Fort Lewis, WA	.	.	.	.	535	399	51	30	1	1	.	.	.	.	.	.	.	1
Fort Riley, KS	.	.	.	.	214	210	36	14	1	.	1	.	2	2	.	.	.	.
Fort Wainwright, AK	.	.	.	4	94	153	6	7	.	.	1	9	.	.	.	.	.	.
NTC and Fort Irwin, CA	.	.	.	.	60	55	1	4	.	.	.	.	.	2	.	.	.	.
PACIFIC																		
Hawaii	.	.	.	.	310	352	36	37	2	2	.	.	.	2	1	.	5	1
Japan	.	.	.	.	3	1	.	.	.	.	.	.	.	.	.	.	.	.
Korea	.	.	.	3	251	217	9	18	2	.	1	8	1	2	.	.	.	.
EUROPEAN																		
Heidelberg	3	2	.	.	34	56	4	8	.	1	.	.	.	.	.	.	.	.
Landstuhl	15	5	.	4	284	157	40	32	8	.	.	.	9	7	.	.	2	1
Bavaria	5	5	3	.	186	275	18	47	.	1	1	.	.	.	.	.	.	.
CENTCOM LOCATIONS																		
CENTCOM	.	.	.	.	94	77	7	7	1	.	.	.	.	.	.	.	.	.
Total	**47**	**38**	**8**	**21**	**6,765**	**6,737**	**990**	**890**	**59**	**27**	**5**	**33**	**229**	**213**	**7**	**0**	**12**	**8**

Sentinel reportable events among service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers[a] for calendar years through 30 June 2009 and 30 June 2010

Navy

Reporting locations	Number of reports all events[b]		Food-borne						Vaccine preventable					
			Campylo-bacter		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella[c]	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
NATIONAL CAPITOL AREA														
NNMC Bethesda, MD	90	89	3	3	1	1	.	2	2	.	1	6	.	.
NHC Annapolis, MD	2	13	.	.	.	.	.	.	.	.	.	.	.	.
NHC Patuxent River, MD	21	3	.	.	.	.	.	.	.	.	.	.	.	.
NHC Quantico, VA	71	33	1	.	1	.	2	.	.	.	.	1	.	.
NAVY MEDICINE EAST														
NH Beaufort, SC	271	65	.	.	.	.	.	.	1	.	2	.	.	.
NH Camp Lejeune, NC	290	266	.	.	4	3	1	1	.	.	.	1	.	.
NH Charleston, SC	3	0	.	.	.	.	.	.	.	.	.	.	.	.
NH Cherry Point, NC	3	0	.	.	.	.	.	.	.	.	.	.	.	.
NH Corpus Christi, TX	1	7	.	.	.	.	.	.	.	.	.	.	.	.
NHC Great Lakes, IL	95	305	.	.	.	.	.	.	.	.	.	3	.	1
NH Guantanamo Bay, Cuba	0	0	.	.	.	.	.	.	.	.	.	.	.	.
NH Jacksonville, FL	162	114	.	2	7	7	1	.	.	.	.	6	.	.
NH Naples, Italy	1	0	.	.	.	.	.	.	.	.	.	.	.	.
NHC New England, RI	0	0	.	.	.	.	.	.	.	.	.	.	.	.
NH Pensacola, FL	96	76	1	1	3	2	2	.	.	.	.	.	.	.
NMC Portsmouth, VA	108	121	.	.	.	1	.	.	.	.	1	2	.	.
NH Rota, Spain	0	0	.	.	.	.	.	.	.	.	.	.	.	.
NH Sigonella, Italy	1	0	.	.	.	.	.	.	.	.	.	.	1	.
NAVY MEDICINE WEST														
NH Bremerton, WA	2	3	.	.	.	.	.	.	.	.	.	1	.	.
NH Camp Pendleton, CA	6	1	.	.	.	.	.	.	.	.	.	.	.	.
NH Guam-Agana, Guam	26	43	.	.	2	.	.	.	.	.	.	.	.	.
NHC Hawaii, HI	15	311	.	5	.	3	.	.	.	.	.	.	.	.
NH Lemoore, CA	40	2	.	.	.	.	.	.	.	.	.	.	.	.
NH Oak Harbor, WA	66	63	3	1	2	.	.	.	.	.	1	1	1	.
NH Okinawa, Japan	38	92	.	.	.	.	.	.	.	.	.	.	.	.
NMC San Diego, CA	454	531	.	7	5	7	.	2	.	.	33	15	1	.
NH Twentynine Palms, CA	1	2	.	.	.	.	.	.	.	.	.	.	.	.
NH Yokosuka, Japan	29	30	.	.	.	.	.	.	.	.	3	1	.	.
NAVAL SHIPS														
COMNAVAIRLANT/CINCLANTFLEET	19	16	.	.	.	.	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	37	22	.	.	.	.	.	.	.	.	.	.	.	.
OTHER LOCATIONS														
Other	2,180	1,724	6	7	10	2	2	.	1	.	7	17	1	2
Total	**4,128**	**3,932**	**14**	**26**	**35**	**26**	**8**	**5**	**4**	**0**	**48**	**54**	**4**	**3**

[a]Events reported by July 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 30 June 2009 and 30 June 2010

Navy

Reporting location	Arthropod-borne				Sexually transmitted						Environmental				Travel associated			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis		Cold[c]		Heat[c]		Q Fever		Tuberculosis	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
NATIONAL CAPITOL AREA																		
NNMC Bethesda, MD	4	12	.	1	72	42	6	5	1	16	.	.	.	.	.	1	.	.
NHC Annapolis, MD	.	1	.	.	2	12	.	.	.	.	.	.	.	.	.	.	.	.
NHC Patuxent River, MD	3	1	.	.	15	1	2	1	1	.	.	.	.	.	.	.	.	.
NHC Quantico, VA	.	1	.	.	53	20	6	3	.	.	.	6	8	2	.	.	.	.
NAVY MEDICINE EAST																		
NH Beaufort, SC	.	.	.	.	256	59	11	6	1	.	.	.	.	.	.	.	.	.
NH Camp Lejeune, NC	2	4	1	2	218	218	44	30	.	.	1	2	19	5	.	.	.	.
NH Charleston, SC	.	.	.	.	2	.	1	.	.	.	.	.	.	.	.	.	.	.
NH Cherry Point, NC	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.
NH Corpus Christi, TX	.	.	.	.	1	6	.	1	.	.	.	.	.	.	.	.	.	.
NHC Great Lakes, IL	.	.	.	.	90	271	5	29	.	.	.	.	.	1	.	.	.	.
NH Guantanamo Bay, Cuba	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NH Jacksonville, FL	.	.	.	.	139	88	15	6	.	1	.	.	.	3	.	.	.	1
NH Naples, Italy	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
NHC New England, RI	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NH Pensacola, FL	.	.	.	.	69	64	6	7	1	2	.	.	12	.	2	.	.	.
NMC Portsmouth, VA	.	1	.	2	86	91	18	14	1	8	.	.	.	.	.	.	2	2
NH Rota, Spain	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NH Sigonella, Italy	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE WEST																		
NH Bremerton, WA	.	.	.	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.
NH Camp Pendleton, CA	.	.	.	.	6	1	.	.	.	.	.	.	.	.	.	.	.	.
NH Guam-Agana, Guam	.	.	.	.	22	40	2	3	.	.	.	.	.	.	.	.	.	.
NHC Hawaii, HI	.	.	.	.	14	270	1	32	.	1	.	.	.	.	.	.	.	.
NH Lemoore, CA	.	.	.	.	39	.	1	2	.	.	.	.	.	.	.	.	.	.
NH Oak Harbor, WA	1	.	.	1	58	55	.	3	.	1	.	1	.	.	.	.	.	.
NH Okinawa, Japan	.	.	.	1	38	75	.	11	.	.	.	.	.	4	.	.	.	1
NMC San Diego, CA	.	2	3	1	332	438	59	44	13	10	.	.	4	5	2	.	2	.
NH Twentynine Palms, CA	.	.	.	.	.	1	.	1	1	.	.	.	.	.	.	.	.	.
NH Yokosuka, Japan	1	.	.	.	25	27	.	1	.	1	.	.	.	.	.	.	.	.
NAVAL SHIPS																		
COMNAVAIRLANT/CINCLANTFLEET	.	.	.	.	19	14	.	2	.	.	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	.	.	.	.	35	20	2	2	.	.	.	.	.	.	.	.	.	.
OTHER LOCATIONS																		
Other	12	22	4	14	1,857	1,459	220	149	7	12	9	8	42	29	.	.	2	3
Total	**23**	**44**	**8**	**22**	**3,454**	**3,274**	**399**	**352**	**26**	**52**	**10**	**17**	**85**	**49**	**4**	**1**	**6**	**7**

Sentinel reportable events among service members and beneficiaries at U.S. Air Force medical facilities, cumulative numbers[a] for calendar years through 30 June 2009 and 30 June 2010

Air Force

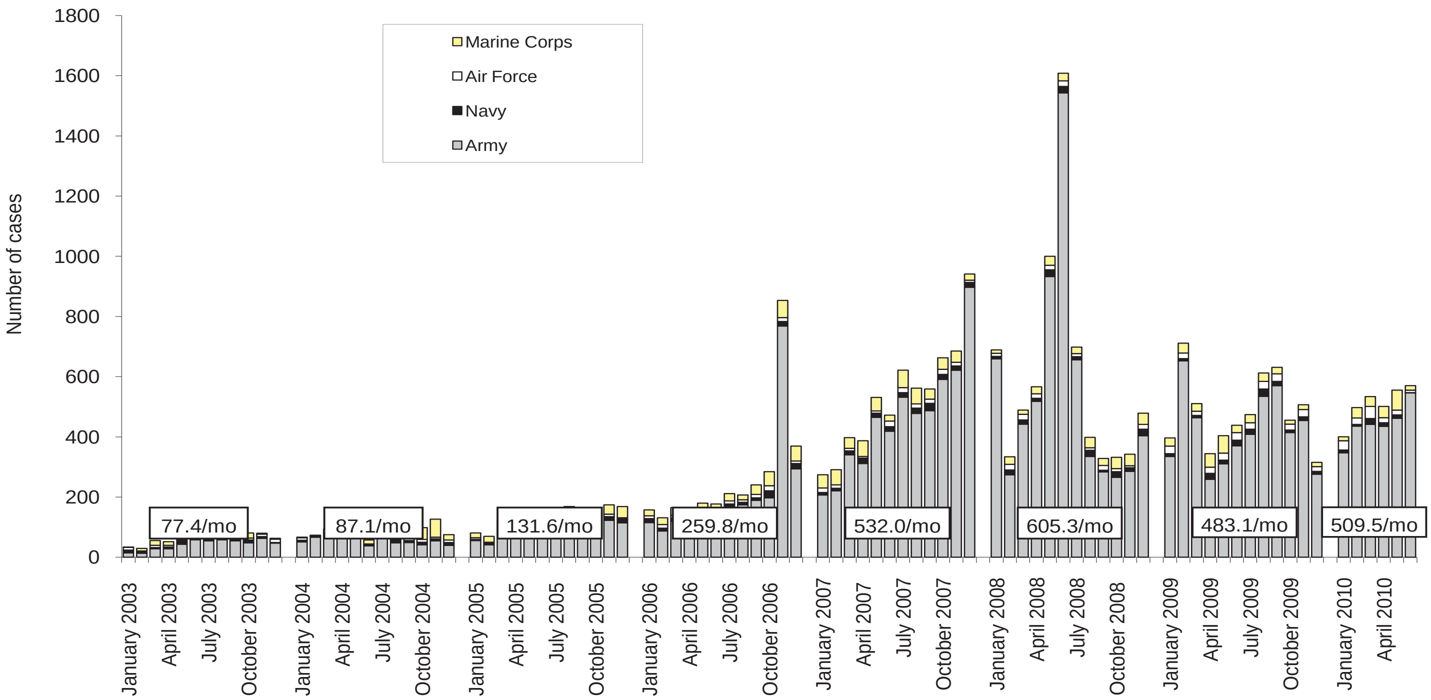
Reporting locations	Number of reports all events[b]		Food-borne						Vaccine preventable					
			Campylo-bacter		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella[c]	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
Air Combat Cmd	752	812	2	2	6	5	1	3	.	1	2	12	2	2
Air Education & Training Cmd	803	744	4	7	12	3	4	1	3	2	5	10	.	2
Air Force Dist. of Washington	116	102	.	2	1	.	.	1	.	.	2	2	.	.
Air Force Materiel Cmd	311	265	1	2	5	8	.	.	.	.	4	.	.	.
Air Force Special Ops Cmd	92	97	1	.	1	7	.	1	.	.	.	1	.	.
Air Force Space Cmd	166	168	1	.	4	3	.	.	1	1	.	1	.	.
Air Mobility Cmd	440	314	4	2	4	1	2	.	.	2	4	2	1	.
Pacific Air Forces	268	464	2	1	3	6	.	2	.	.	4	2	2	1
U.S. Air Forces in Europe	317	276	3	1	3	7	.	.	.	.	3	.	1	3
U.S. Air Force Academy	34	32	.	.	1	1	.	.	.	.	.	2	.	.
Other	42	45	1	.	1	5	.	2	.	.	.	.	.	.
Total	**3,341**	**3,319**	**19**	**17**	**41**	**46**	**7**	**10**	**4**	**6**	**24**	**32**	**6**	**8**

Reporting location	Arthropod-borne				Sexually transmitted						Environmental				Travel associated			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis		Cold[c]		Heat[c]		Q Fever		Tuberculosis	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
Air Combat Cmd	7	6	.	.	660	693	59	73	3	5	5	4	5	5	.	.	.	1
Air Education & Training Cmd	3	.	.	2	692	642	71	70	3	4	3	.	3	.	.	.	.	1
Air Force Dist. of Washington	7	5	.	.	98	75	8	15	.	.	.	.	.	2	.	.	.	.
Air Force Materiel Cmd	7	1	.	.	265	223	26	26	3	1	.	.	.	4	.	.	.	.
Air Force Special Ops Cmd	1	.	.	.	84	82	3	4	1	1	1	1	.	.	.	.	.	.
Air Force Space Cmd	1	1	.	1	151	149	7	10	.	.	.	1	1	1	.	.	.	.
Air Mobility Cmd	12	12	.	1	359	266	38	24	2	1	14	2	.	1	.	.	.	.
Pacific Air Forces	.	.	1	1	222	420	22	29	2	1	9	.	1	.	.	.	.	1
U.S. Air Forces in Europe	5	8	1	2	274	231	23	23	2	.	1	.	.	.	.	.	1	1
U.S. Air Force Academy	.	.	1	.	31	29	1	.	.	.	.	.	.	.	.	.	.	.
Other	.	.	1	1	27	33	5	1	.	1	.	1	5	1	1	.	1	.
Total	**43**	**33**	**4**	**8**	**2,863**	**2,843**	**263**	**275**	**16**	**14**	**33**	**9**	**15**	**14**	**1**	**0**	**2**	**4**

[a]Events reported by July 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.

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - June 2010 (data as of 27 July 2010)

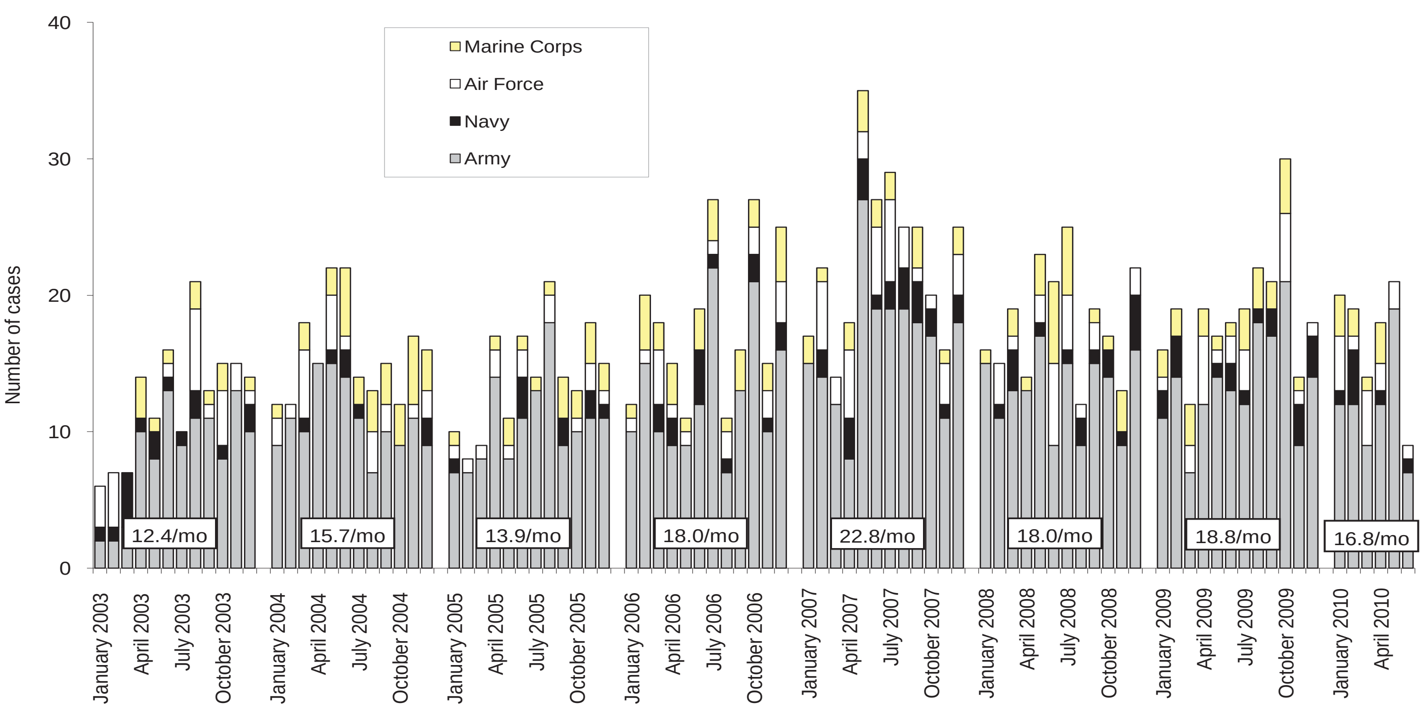
Traumatic brain injury (ICD-9: 310.2, 800-801, 803-804, 850-854, 907.0, 950.1-950.3, 959.01, V15.5_1-9, V15.5_A-F, V15.59_1-9, V15.59_A-F)[a]



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] and excludes 2,278 deployers who had at least one TBI-related medical encounter any time prior to OEF/OIF).

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]

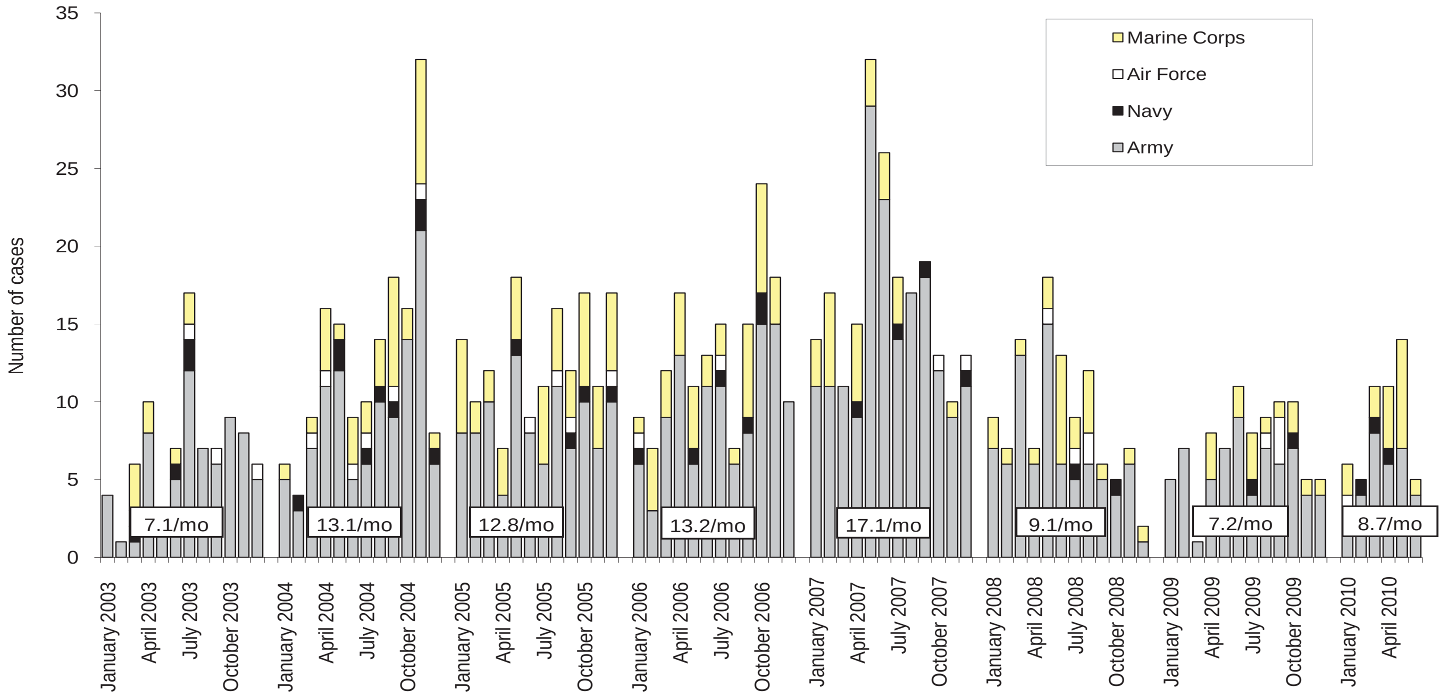


Reference: Isenbarger DW, Atwood JE, Scott PT, et al. Venous thromboembolism among United States soldiers deployed to Southwest Asia. *Thromb Res*. 2006;117(4):379-83.

[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 - June 2010 (data as of 27 July 2010)

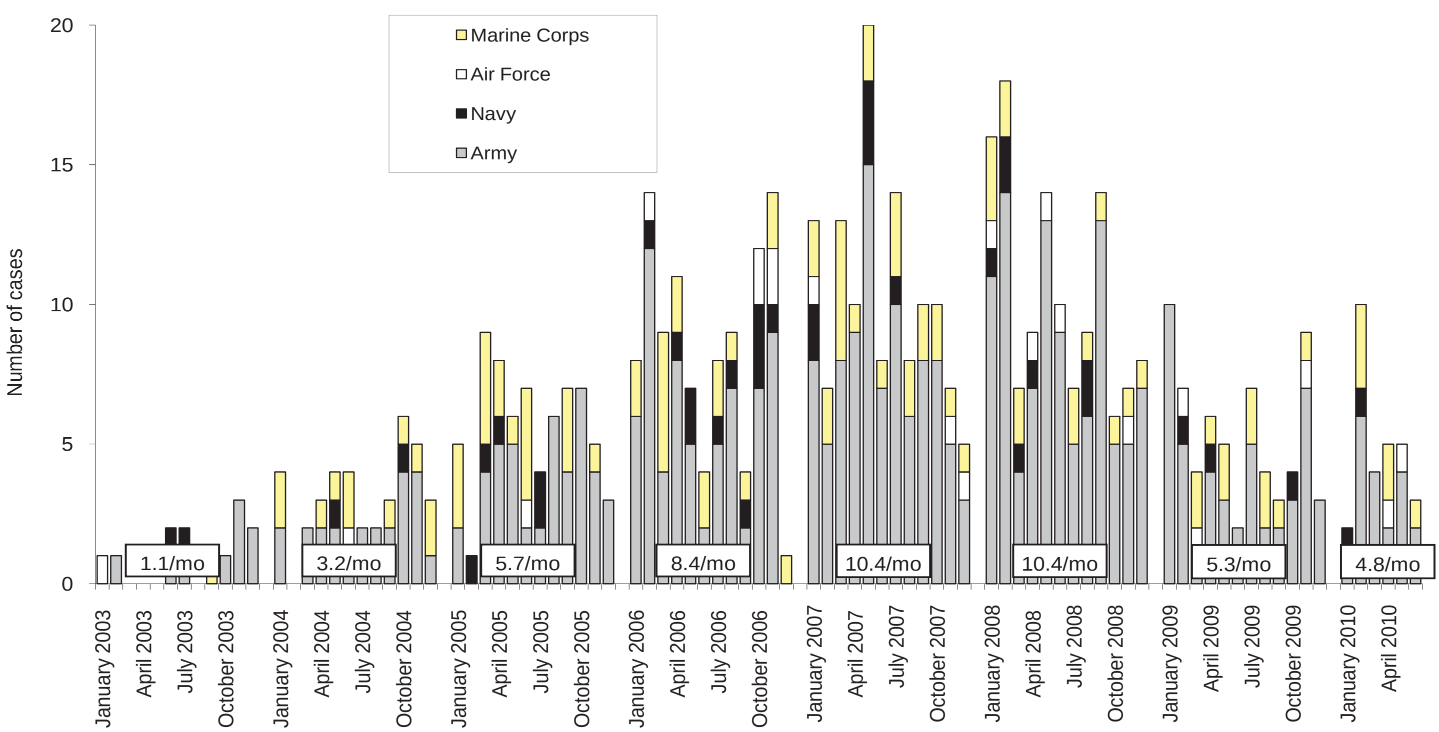
Amputations (ICD-9: 887, 896, 897, V49.6 except V49.61-V49.62, V49.7 except V49.71-V49.72, PR 84.0-PR 84.1, except PR 84.01-PR 84.02 and PR 84.11)[a]



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]

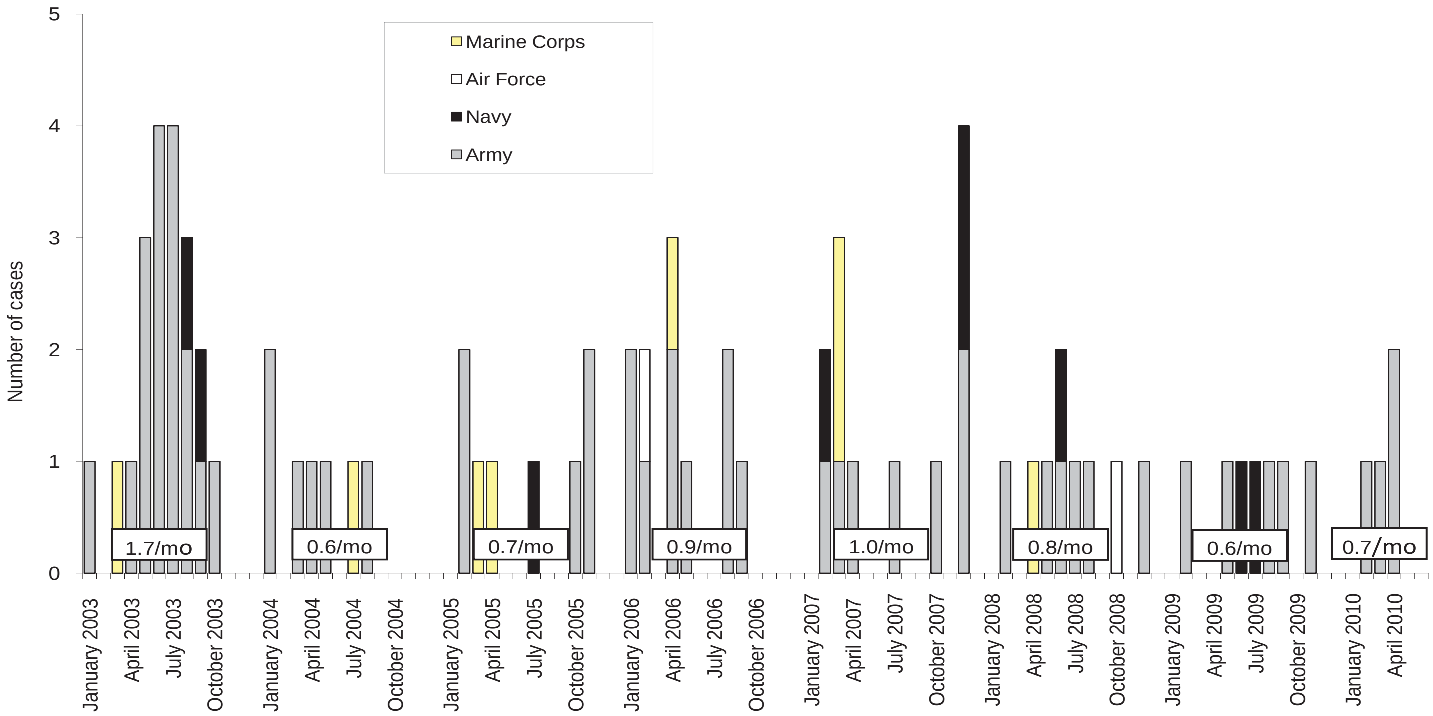


Reference: Army Medical Surveillance Activity. Heterotopic ossification, active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):7-9.

[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.

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - June 2010 (data as of 27 July 2010)

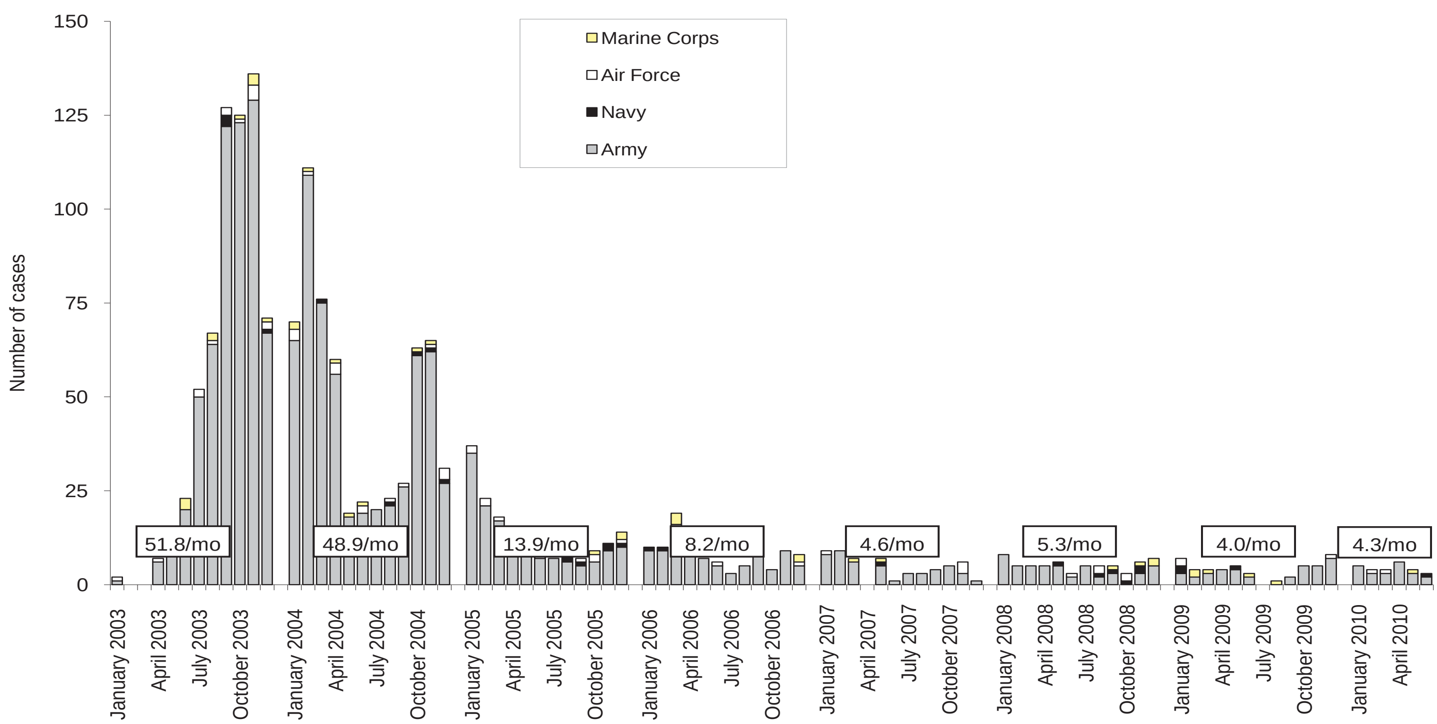
Severe acute pneumonia (ICD-9: 518.81, 518.82, 480-487, 786.09)[a]



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: severe acute pneumonia. Hospitalizations for acute respiratory failure (ARF)/acute respiratory distress syndrome (ARDS) among participants in Operation Enduring Freedom/Operation Iraqi Freedom, active components, U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):6-7.

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

Leishmaniasis (ICD-9: 085.0 to 085.9)[b]



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: leishmaniasis. Leishmaniasis among U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):2-4.

[b]Indicator diagnosis (one per individual) during a hospitalization, ambulatory visit, and/or from a notifiable medical event during/after service in OEF/OIF.

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