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Women's Health Issue

PAGE 2 Complications and care related to pregnancy, labor and delivery, active component, U.S. Armed Forces, 2001-2010

PAGE 6 Urinary stones, active component, U.S. Armed Forces, 2001-2010

PAGE 10 Uterine fibroids, active component females, U.S. Armed Forces, 2001-2010

PAGE 14 Historical snapshot: Dr. Anna Baetjer, industrial hygiene pioneer, military occupational health advocate

BRIEF REPORTS

PAGE 16 Births, active component, 2001-2010

PAGE 18 Numbers and characteristics of women in the active component, U.S. Armed Forces, 2011

SUMMARY TABLES AND FIGURES

PAGE 20 Deployment-related conditions of special surveillance interest

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Complications and Care Related to Pregnancy, Labor and Delivery, Active Component, U.S. Armed Forces, 2001-2010

Diagnoses of "complications of pregnancy, childbirth, and the puerperium" (ICD-9-CM: 630-679) include both morbid complications and indications for routine care of pregnant women. During 2001-2010, U.S. service members with live births (n=156,314) had 1.16 million medical encounters with primary diagnoses of "pregnancy complications". The most frequent diagnoses were "other current conditions", "other threatened labor" (e.g., false labor), "previous cesarean delivery" and "normal delivery". The number of complication-related medical encounters per pregnancy more than doubled during 2001-2010. Diagnoses of gestational diabetes, previous cesarean delivery and advanced maternal age contributed to the largest increases in pregnancy-related medical encounters during the period. The complications that accounted for the largest increases in the percents of pregnancies affected by them were urinary tract infections, fetal heart rate/rhythm abnormalities and back pain in pregnancy.

During the past 10 years, there have been more service members hospitalized for labor and delivery than for any other specific condition.[1] Previous surveillance analyses have shown recent increases in the numbers of health care encounters for "pregnancy complications" as indicated by diagnoses of "complications of pregnancy, childbirth, and the puerperium" (International Classification of Diseases, 9th revision [ICD-9] codes 630-679) on administrative records of the medical encounters of U.S. military members. Because diagnostic codes in this range include both morbid complications and indications for routine care of pregnant women (e.g. ICD-9 code 650 "normal delivery"), recent increases in diagnoses suggestive of pregnancy "complications" may reflect actual increases in pregnancy-related morbidity and/or changes in diagnostic coding and reporting practices. For example, a pregnant woman who experiences back pain (ICD-9 code 648.7 "bone and joint disorders of back affecting pregnancy") and delivers three days past her due date (ICD-9 code 645 "late pregnancy") at the age of 35 (ICD-9 code 659.5 "elderly primagravida") may have these "complications" coded and reported in the record of the hospitalization, even if the pregnancy and delivery were clinically unremarkable. Also, in 2006, a new series of codes was added to the "pregnancy complications" category of the ICD-9-CM to indicate "other conditions or status of the mother" (ICD-9-CM: 649.00-649.64); the additional pregnancy complication-related codes enabled reporting of tobacco use and obesity as specific pregnancy-related conditions. Prior to 2006, such conditions were coded using non-specific ICD-9 codes such as "other complications of pregnancy".

This report characterizes the numbers and trends of the most frequent diagnoses of "complications" and indications for care related to pregnancy and childbirth among active component service members from 2001 through 2010.

METHODS

The surveillance population consisted of all active component female service members 17 to 49 years of age with delivery hospitalizations resulting in live births during 2001-2010. Delivery hospitalizations were defined by an inpatient record with one of the following in any diagnostic position: ICD-9 code V27.0-V27.9 "outcome of delivery", ICD-9 code 650 "normal delivery" or fifth-digit classifications of "delivered" or "postpartum condition" with ICD-9 codes in the range 640-679 "complications of pregnancy". For summary purposes, individuals were allowed one delivery hospitalization every 280 days.

Endpoints of analysis were complications and indications for care related to pregnancy, labor and delivery as defined by four-digit level ICD-9 diagnosis codes from 640.0-679.1 ("indicator diagnoses") that were reported during hospitalizations and ambulatory visits in U.S. military and civilian (reimbursed care) medical treatment facilities within 280 days before to 7 days after each delivery hospitalization during the surveillance period. The primary summary measures used for analyses were numbers of "medical encounters" for and "pregnancies affected" by each four-digit level coded diagnosis of complications or care. Numbers of medical encounters of interest were the numbers of inpatient or outpatient visits with indicator diagnoses in the primary (first-listed) diagnostic position. Pregnancies affected were the number of pregnancies or deliveries during which an indicator diagnosis was recorded in any diagnostic position.

RESULTS

From 1 January 2001 to 31 December 2010, there were 156,314 deliveries ending in live births among active component service members (summarized on pages 16-17 of this report). These pregnancies were associated with 1.16 million outpatient visits (84% of all encounters) or inpatient stays (16%) during which complications and indications for care (ICD-9 codes 640.0-679.1, hereafter "complications") were diagnosed. Of the 262 different four-digit level coded diagnoses that documented complications of these pregnancies, the majority (52%) of the diagnoses affected fewer than 0.5 percent each of all pregnancies during the period **(data not shown)**.

TABLE 1. Numbers of medical encounters[a] for and pregnancies affected[b] by "pregnancy complications" (ICD-9-CM: 640.0-679.1) among active component women who delivered during the surveillance period, 2001-2010

ICD-9 code	Description	No. encounters[a]	Rank	% of all encounters	No. pregnancies affected[b]	Rank	% pregnancies affected
648.9	Other current conditions complicating pregnancy	65,697	1	5.6	59,858	1	38.3
646.8	Other specified complications of pregnancy	60,153	2	5.2	38,507	2	24.6
644.1	Other threatened labor	55,082	3	4.7	37,612	3	24.1
654.2	Previous cesarean delivery	51,867	4	4.5	14,089	16	9.0
644.0	Threatened premature labor	50,761	5	4.4	26,211	9	16.8
650	Normal delivery	46,516	6	4.0	36,537	4	23.4
648.8	Abnormal glucose tolerance	45,645	7	3.9	11,468	22	7.3
640.0	Threatened abortion	33,513	8	2.9	22,659	12	14.5
659.5-659.6	Elderly primagravida and multigravida	32,913	9	2.8	12,182	19	7.8
664.0	First-degree perineal laceration during labor	31,102	10	2.7	30,440	6	19.5
664.1	Second-degree perineal laceration during labor	30,339	11	2.6	29,376	7	18.8
646.9	Unspecified complications of pregnancy	29,680	12	2.5	18,169	14	11.6
651.0	Twin pregnancy	26,934	13	2.3	2,806	65	1.8
645.1	Postterm pregnancy	26,304	14	2.3	27,937	8	17.9
659.7	Abnormality in fetal heart rate or rhythm	24,446	15	2.1	31,536	5	20.2
648.2	Anemia complicating pregnancy	24,148	16	2.1	24,266	11	15.5
646.6	Infections of genitourinary tract in pregnancy	21,530	17	1.8	20,156	13	12.9
655.7	Decreased fetal movements	19,513	18	1.7	16,548	15	10.6
656.5	Poor fetal growth	18,598	19	1.6	11,492	21	7.4
642.4	Mild or unspecified pre-eclampsia	17,281	20	1.5	9,503	27	6.1

[a]Inpatient or outpatient encounters with a primary (first-listed) diagnosis
[b]Inpatient or outpatient encounters with a diagnosis in any diagnostic position (one diagnosis per pregnancy)

Complications associated with the most medical encounters

The four most frequent complications (at the 4-digit level of the ICD-9-CM) accounted for one-fifth (20.0%), and the 14 most frequent accounted for the majority (50.4%), of all complication-related medical encounters during the period **(Table 1).** The most frequent condition complicating pregnancy was "other current conditions in the mother classifiable elsewhere" (ICD-9-CM code 648.9). Among outpatient encounters with this as a primary (first-listed) diagnosis, most secondary diagnoses were among the most common causes of medical visits among female service members in general (e.g., abdominal symptoms, back pain, headache and acute upper respiratory infections) or were indications of a positive Group B streptococcus urine culture without symptoms of infection (code V02.51 "carrier or suspected carrier of Group B streptococcus") **(data not shown).**

The second through fourth most frequent pregnancy complications were "other specified complications of pregnancy" (code 646.8, which includes "fatigue during pregnancy" and "herpes gestationis", according to its ICD-9 description), "other threatened labor" (e.g., false labor, Braxton Hicks contractions) (code 644.1) and previous cesarean delivery (code 654.2) **(Table 1).**

Complications that affected the most pregnancies

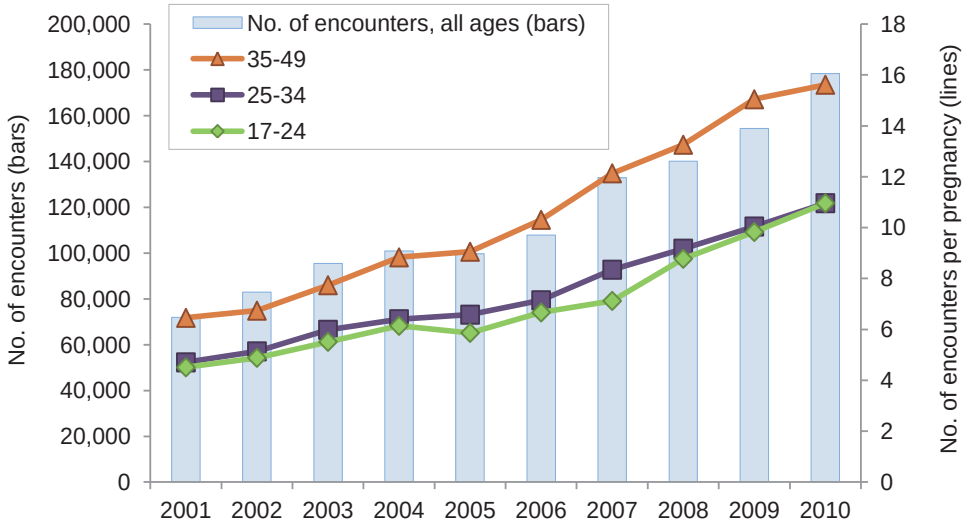
Virtually every pregnancy was affected by one or more conditions that were documented with complication-related diagnosis codes. The three diagnoses that affected the most pregnancies (24-38% of pregnancies during the period) were the same as the three leading causes of medical encounters **(Table 1).** Three additional conditions each affected approximately one-fifth of all pregnancies: "normal delivery" (code 650), "abnormality in fetal heart rate or rhythm" (code 659.7) and "first-degree perineal laceration" during labor (code 664.0) **(Table 1).**

Trends in complication-related medical encounters

Numbers of medical encounters with a primary (first-listed) diagnosis of any pregnancy complication increased in each year from 2001 (n=71,885) to 2010 (n=178,336) **(Figure 1).** In each age group, the numbers of pregnancy complication-related encounters per delivery more than doubled during the period, with the sharpest increases among 35-49-year-olds between 2005 and 2010. Women 35 and older who delivered in 2010 had an average of 4.7 more complication-related medical visits per pregnancy than their younger counterparts. The trend of increasing numbers of encounters per pregnancy among women overall was observed for care provided in both military and non-military facilities **(data not shown).**

One-quarter (25.3%) of the increase in the numbers of medical encounters between the first five years (2001-2005) and the last five years (2006-2010) was attributable to the first, second and fourth leading causes of medical encounters described above ("other current conditions", "other specified complications" and "previous cesarean delivery"). The third most frequent cause of medical encounters, "other threatened labor", caused 2.4 percent fewer

FIGURE 1. Medical encounters with a primary (first-listed) diagnosis of a "pregnancy complication" (ICD-9-CM: 640-679) for all ages, and number of encounters per pregnancy by age group, 2001-2010



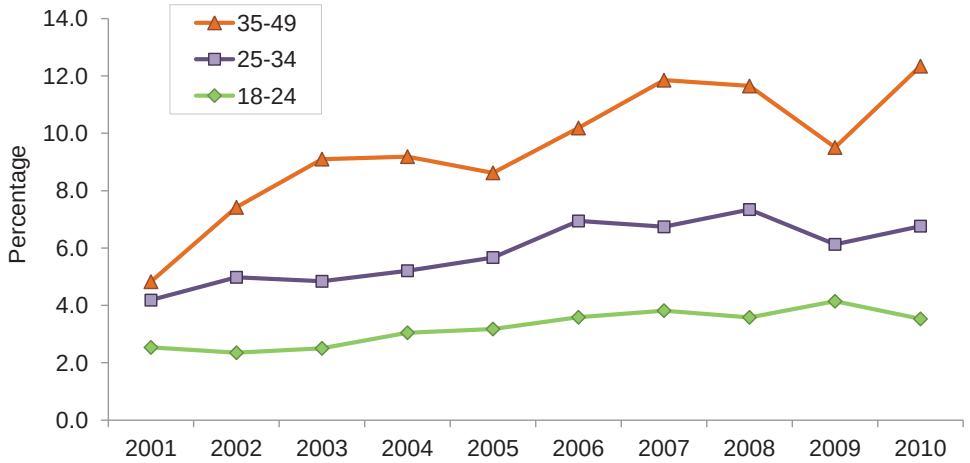
visits in 2006-2010 as compared to 2001-2005 **(data not shown)**.

Of note, "abnormal glucose tolerance" (i.e., gestational diabetes, code 648.8) and "unspecified hypertension complicating pregnancy" (code 642.9) accounted for 6.2 percent and 3.1 percent of the increases of medical encounters for complications between the first and last five years of the period. Indications of advanced maternal age (i.e., 35 or older) (codes 659.5, 659.6) and new codes introduced into the ICD-9 in 2006 (code 649) each accounted for approximately five percent of the increase in the number of complication-related encounters between the periods **(data not shown)**.

Trends in pregnancies affected by complications

Of the complications that affected at least one percent of all pregnancies during the period, the diagnoses that caused the largest increases in the percents of pregnancies affected between 2001-2005 and 2006-2010 were the "other" complications discussed above as well as "unspecified" complications or indications for care **(Table 2)**. Of the 20 conditions with the largest increases between the periods in the percents of pregnancies affected by them, four had codes that were introduced into the ICD-9 in 2006. Specified complications responsible for three to six percent increases between the five-year periods in the percent of pregnancies by them affected included (a) common diagnoses among female service members in general (e.g., genitourinary tract infections, back pain), (b) common conditions or indications for care during pregnancy or labor (e.g., edema, anemia, post-term pregnancy, first-degree perineal laceration) and (c) conditions frequently detected during routine fetal monitoring (abnormality in fetal heart rate/rhythm). Of note, between the periods, there were 3-4 percent increases in the percentages of pregnancies affected by hypertension (codes 642.3, 642.9) and abnormal glucose tolerance (code 648.8) **(Table 2)**; for each of these, the sharpest increases were among women 35 and older **(Figure 2)**.

FIGURE 2. Percentage of pregnancies affected by "abnormal glucose tolerance" (ICD-9-CM: 648.8), by age group and year, active component, U.S. Armed Forces, 2001-2010



EDITORIAL COMMENT

During the past 10 years, the vast majority of "pregnancy complications", and those responsible for the greatest increases in numbers of medical visits, were either health conditions common in all female service members or indications for routine care during pregnancy, labor and delivery, or the postpartum period. The most frequently reported "complication," affecting 38 percent of all pregnancies, was reported with the diagnosis of "other current conditions"; this diagnosis code refers to conditions classified under non-pregnancy-specific categories of the ICD-9. The diagnoses recorded during the same outpatient encounters as "other current conditions" generally reflected the most common diagnoses among female service members overall (e.g., abdominal symptoms, back pain, headache, and upper respiratory infections), plus positive Group B streptococcus urine cultures without symptoms of infection. The pregnancy-specific complications that accounted for the largest increases during the period in the percents of pregnancies affected by

TABLE 2. Conditions complicating pregnancy with the greatest change in the percentage of pregnancies affected between 2001-2005 and 2006-2010, active component, U.S. Armed Forces

		2001-2005 (n=79,405)		2006-2010 (n=76,909)		Difference between the periods
ICD-9 code	Description	No. affected	% affected	No. affected	% affected	Increase in % affected
648.9	Other current conditions complicating pregnancy classified elsewhere	23,023	29.0	36,835	47.9	18.9
646.8	Other specified complications of pregnancy	12,559	15.8	25,948	33.7	17.9
646.9	Unspecified complication of pregnancy	5,260	6.6	12,909	16.8	10.2
659.9	Unspecified indication for care or intervention, labor/delivery	1,517	1.9	7,100	9.2	7.3
646.6	Infections of genitourinary tract in pregnancy	7,920	10.0	12,236	15.9	5.9
659.7	Abnormality in fetal heart rate or rhythm	13,748	17.3	17,788	23.1	5.8
648.7	Bone/joint disorders of back/pelvis in pregnancy	2,382	3.0	6,417	8.3	5.3
649.6	Uterine size date discrepancy[a]	0	0.0	3,843	5.0	5.0
645.1	Post term pregnancy	12,401	15.6	15,536	20.2	4.6
646.1	Edema or excessive weight gain w/o hypertension	5,284	6.7	8,215	10.7	4.0
642.9	Unspecified hypertension complicating pregnancy	1,652	2.1	4,678	6.1	4.0
648.2	Anemia complicating pregnancy childbirth or the puerperium	10,782	13.6	13,484	17.5	4.0
649.0	Tobacco use disorder complicating pregnancy[a]	0	0.0	3,011	3.9	3.9
664.0	First-degree perineal laceration during delivery	14,122	17.8	16,318	21.2	3.4
649.5	Spotting complicating pregnancy[a]	0	0.0	2,485	3.2	3.2
648.8	Abnormal glucose tolerance of mother	4,564	5.7	6,904	9.0	3.2
655.8	Other known or suspected fetal abnormality	2,746	3.5	5,106	6.6	3.2
649.1	Obesity complicating pregnancy[a]	0	0.0	2,255	2.9	2.9
642.3	Transient hypertension of pregnancy	4,091	5.2	6,110	7.9	2.8

[a]Introduced into the International Classification of Diseases (ICD-9) in October 2006

them were "infections of the genitourinary tract", "abnormalities in fetal heart rate or rhythm" and back pain in pregnancy. Urinary tract infections due to *E. coli* are common during pregnancy.[2] Irregular fetal heartbeats are frequently detected during routine prenatal care and labor and delivery; in 2008, fetal heart rate/rhythm abnormalities were diagnosed during 14.8 percent of 4.2 million delivery hospital stays in the United States.[3]

Increasing maternal ages during the period (see page 16) contributed to the overall increase in numbers of complication-related medical encounters during 2001-2010. This report demonstrates that in 2010, service members 35 and older had an average of 16 complication-related visits per pregnancy compared to 11 visits among those younger than 35. In addition, the three specific diagnoses that contributed to the largest increases in pregnancy-related medical encounters between the first and last 5 years of the period were history of cesarean delivery, gestational diabetes and advanced maternal age. Gestational diabetes and previous cesarean delivery affected women 35 and older at considerably higher rates than their younger counterparts; the finding is likely both a cause and a consequence of closer medical supervision of these pregnancies.

Increasing maternal age does not explain the notable increase in the number of complication-related visits per pregnancy that affected service members of all age groups. As this increase was observed in both military and non-military facilities, it was not likely driven by financial incentives for reimbursement (determined by ICD-9 codes in non-military facilities) or concerns of obstetric malpractice (military physicians are protected from malpractice lawsuits). The increase may reflect changes in standards of clinical care or in ICD-9 coding practices.

This report characterized complications of pregnancy by summarizing the most frequently reported complicating conditions and the sources of the greatest increases in "morbidity burdens". This report did not seek to measure or interpret increases in rates of relatively rare pregnancy complications. Future analyses should explore rates and trends of standard indicators of maternal morbidity such as hemorrhage and severe preeclampsia.

Finally, this report documents that, during 2006-2010 compared to 2001-2005, 3-4 percent more pregnancies were complicated by gestational diabetes and unspecified hypertension. Studies that do not rely on surveillance data may be necessary to determine if this trend reflects a true increase in the rates of these complications or is the result of improved awareness of, and better documentation of care provided for, these conditions during pregnancy.

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Urinary Stones, Active Component, U.S. Armed Forces, 2001-2010

Urinary stones can cause debilitating morbidity that impairs the operational effectiveness of affected members of the U.S. Armed Forces. This report describes a "gender shift," i.e., the narrowing of prevalence differences between men and women, similar to trends described in the U.S. civilian population. Rates of incident diagnoses of urinary stones increased in the active component during the past decade – particularly among females. On average, 60 service members were medically evacuated from combat zones each year during the period. Service members with a history of urinary stones should be counseled on reducing risk, particularly in the deployment setting.

Urinary stones, or renal calculi, are crystalline deposits of dietary minerals and acid salts that accumulate in the kidneys. The stones vary in size, shape, and composition; however, the majority contain calcium, particularly calcium oxalate.[1] Most stones pass out of the urinary tract without surgical intervention; however, depending on their size and location, urinary stones can trigger severe, undulating pain ("renal colic"). Evaluation, treatment, and lost work days are costly in terms of medical resource expenditures and military operational decrements.[2]

Risk factors for stone formation include advancing age, male gender, family history, dehydration, diet, chronic urinary tract infections, and history of previous stones.[3-6] Recent increases in the prevalence of urinary stones in the U.S. population have been correlated with increasing prevalences of obesity and type II diabetes.[7,8] Historically, urinary stones have affected men more than women; however, recent studies have described a "gender shift" with narrowing of prevalence differences between women and men.[9,10]

This analysis estimates incidence rates and trends of urinary stones among active component members of the U.S. military and compares the experiences of females and males from 2001 through 2010. The report also enumerates and characterizes urinary stone-related medical evacuations from the combat theaters in Iraq and Afghanistan.

METHODS

The surveillance period was 1 January 2001 to 31 December 2010. The surveillance population included all individuals who served in the active component of any branch of the U.S. Armed Forces at any time during the surveillance period. Health care encounters (hospitalizations and outpatient clinic visits) that were documented with records maintained in the Defense Medical Surveillance System were reviewed to identify those associated with diagnoses of urinary stones.

For this analysis, a case was defined by a diagnosis of ICD-9-CM: 592.x "calculus of kidney and ureter", 594.x "calculus of lower urinary tract", 788.0 "renal colic", or 274.11 "uric acid nephrolithiasis [UAN]" in the primary (first-listed) diagnostic position on a record of a hospitalization or ambulatory visit. Each affected service member could be counted as an "incident case" only once per 365 days; service members were considered "recurrent" cases if they were incident cases more than once during the surveillance period. If service members had more than one case-defining encounter during a calendar year, hospitalizations were prioritized over outpatient encounters as the case-defining events.

Medical evacuations (MEDEVACs) for urinary stones were ascertained from records of service members who were medically evacuated from the U.S. Central Command (CENTCOM) area of responsibility (AOR) to a medical treatment facility outside of the CENTCOM AOR. Evacuations were included in analyses if affected service members had at least one inpatient or outpatient urinary stone-related medical encounter in a fixed U.S. military medical facility within 10 days of their evacuation dates.

RESULTS

Incident diagnoses

During the 10 year surveillance period, 61,587 active component members received 84,055 incident diagnoses of urinary stones; most of the cases (n=79,138, 94% total) were treated during outpatient encounters **(Table 1)**. The crude overall incidence rate during the period was 58.9 per 10,000 person-years (p-yrs); the annual incidence rate was 15.2 percent higher in 2010 than 2001 (64.6 and 56.1 per 10,000 p-yrs, respectively) **(Table 1)**.

Most cases overall (86%) were reported as stones in the kidney or ureter ("upper calculus"). From the first to the last year of the period, incident cases of "upper calculi" increased by 38 percent, while those documented with other diagnoses (i.e., lower calculus, renal colic, uric acid nephrolithiasis) decreased **(data not shown)**.

Among racial/ethnic subgroups, crude overall incidence rates were highest among white, non-Hispanic (69.3 per 10,000 p-yrs) and lowest among black, non-Hispanic (33.2 per 10,000 p-yrs) service members. During the period, annual incidence rates increased by a larger percentage among white, non-Hispanic (18.2%) than any other racial/ethnic subgroup members **(Table 1)**.

Among the service branches, the highest overall incidence rate (79.0 per 10,000 p-yrs) and the largest relative increase in annual rates (34%) affected Coast Guard members; the lowest incidence rate affected Marine Corps members (42.4 per 10,000 p-yrs) **(Table 1)**.

For the entire period, crude overall incidence rates were very similar among females (58.6 per 10,000 p-yrs) and males (59.0 per 10,000 p-yrs). However, among service members younger than 30 years, overall incidence rates were higher among females than males, while among those older than 30 years, rates were higher among males than females **(Table 1)**.

Among males, annual rates declined from 2002 to 2005 and then slowly increased through the end of the period; in contrast, among females, annual rates increased consistently throughout the period. As a result, there was a change in the relationship between male and female incidence rates ("gender shift") in 2005; i.e., prior to 2005, annual rates were higher among males than females, while after 2005, rates were consistently higher among females than males **(Figure 1)**.

FIGURE 1. Incidence rates of urinary stones by gender, active component, U.S. Armed Forces, 2001-2010

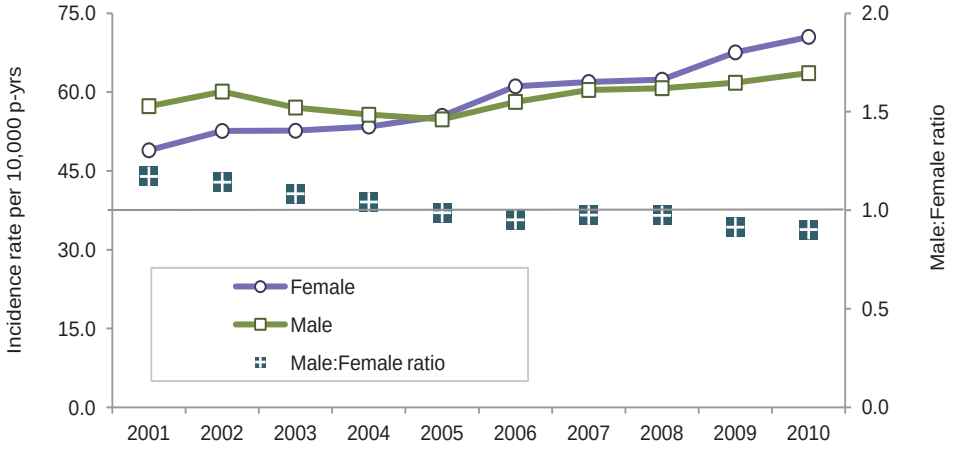


TABLE 1. Numbers and rates of urinary stones, active component, U.S. Armed Forces, 2001-2010

	No.	Rate[a]	IRR[b]	2001-2010 % change
Total	84,055	58.9	.	15.2
Inpatient encounters	4,917	3.4	.	-2.5
Outpatient encounters	79,138	55.5	.	16.4
Gender				
Female	12,135	58.6	0.99	44.1
Male	71,920	59.0	Ref	11.0
Age group				
17-19	2,336	17.1	Ref	9.4
20-29	38,984	47.1	2.76	9.3
30-39	27,545	82.6	4.84	20.2
40+	15,190	117.2	6.87	16.2
Female age group				
17-19	721	31.5	Ref	46.4
20-29	7,443	58.5	1.86	34.6
30-39	2,768	67.4	2.14	50.4
40+	1,203	75.1	2.38	43.5
Male age group				
17-19	1,615	14.2	Ref	-0.3
20-29	31,541	45.1	3.18	4.5
30-39	24,777	84.8	5.98	17.4
40+	13,987	123.2	8.70	14.4
Race-ethnicity				
White, non-Hispanic	62,529	69.3	2.08	18.2
Black, non-Hispanic	8,267	33.2	Ref	5.9
Hispanic	7,036	48.9	1.47	7.8
Asian/Pacific Islander	2,387	36.6	1.10	1.1
American Indian/Alaskan Native	1,451	60.9	1.83	9.7
Other	2,385	56.0	1.68	-21.3
Service				
Army	29,489	58.2	1.37	32.6
Navy	20,798	59.3	1.40	2.1
Air Force	22,867	66.0	1.56	10.1
Marine Corps	7,791	42.4	Ref	4.3
Coast Guard	3,110	79.0	1.86	34.1

[a]Rate per 10,000 person-years (p-yrs)
[b]Incidence Rate Ratio

Among both males and females, rates of urinary stone diagnoses increased with increasing age **(Table 1)**. However, during the surveillance period, annual rates increased by large percentages in every age group of females, but by relatively small percentages (or not at all) in various age groups of males (% difference in annual rates, 2001 to 2010, by age groups, range: females, 34.6 to 50.4%; males, -0.3 to 17.4%) **(Table 1)**.

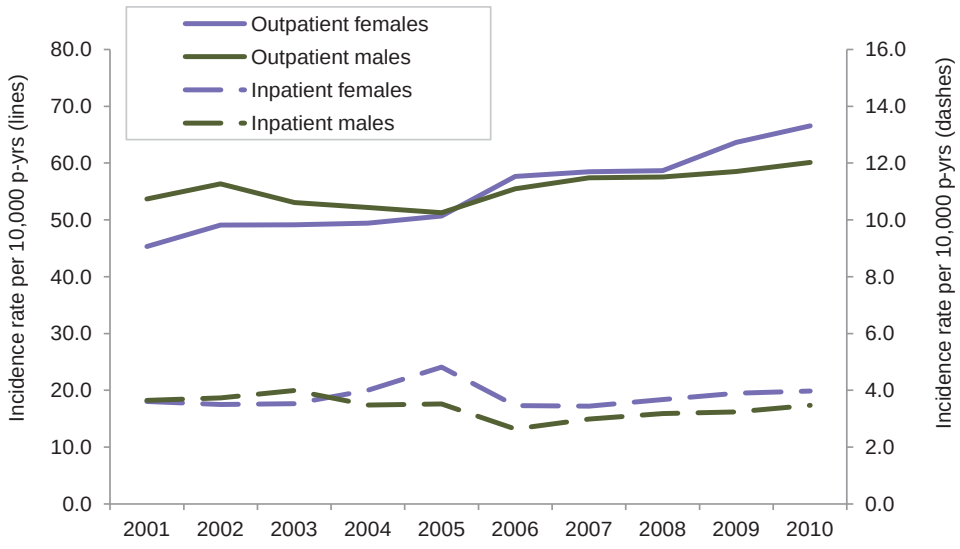
Among both males and females, annual rates of hospitalized cases were fairly stable throughout the period; of note, annual rates of hospitalized cases were consistently higher among females than males from 2004 through 2010 **(Figure 2)**.

Among males, annual rates of outpatient diagnoses of urinary stones were stable from 2001 through 2005 and then slowly increased through 2010. Among females, rates slightly increased from 2001 through 2005 and then sharply increased (by approximately 30 percent) from 2005 through 2010. As result, rates of outpatient diagnoses were higher among females than males each year from 2006 through 2010 **(Figure 2)**.

Recurrent diagnoses

During the period, 14,290 service members received more than one incident

FIGURE 2. Incidence rates of outpatient and inpatient encounters for urinary stones by gender, active component, U.S. Armed Forces, 2001-2010



diagnosis of urinary stones ("recurrent cases"); nearly one-fourth (23.2%) of all incident cases during the period were recurrent cases (i.e., incident diagnoses in two or more years). Among recurrent cases, approximately two-thirds (n=9,456; 66.2%) received two, and one-fifth received three (n=2,950; 20.6%), incident diagnoses during the period; 2.6 percent (n=373) of recurrent cases were diagnosed with urinary stones in six or more years. Of all service members diagnosed with urinary stones during the period, relatively more males (23.9%) than females (19.3%) were recurrent cases **(data not shown)**.

Medical evacuations

During the surveillance period, 625 medical evacuations (i.e., from Iraq, Afghanistan) were temporally associated with urinary stone-related medical encounters in fixed medical facilities outside of combat operational theaters **(data not shown)**. No service members were medically evacuated more than once for urinary stones. However, more than one-third (n=240, 38.1%) of all medical evacuees with urinary stones had a case-defining medical encounter for urinary stones earlier during the surveillance period; of these individuals, more than one-half (n=128, 53%) had urinary stone-related encounters within one year prior to their medical evacuation dates **(data not shown)**.

EDITORIAL COMMENT

This report documents that, during the past decade, rates of incident diagnoses of urinary stones have increased in the active component of the U.S. military overall – particularly among females. The trend reflects the experience of the general U.S. population.

During the 1990s, increasing uses of minimally invasive treatments for urinary stones enabled the outpatient management of most cases.[11] This report documents fairly stable rates of inpatient diagnosed cases, but increasing rates of outpatient diagnosed cases, among active component members since 2000. Also, from 2001 to 2010, more than 94 percent of all incident cases among active component service members were treated in outpatient settings. Of note in this regard, rates of outpatient diagnosed cases increased much more sharply among female than male service members, particularly since 2005.

The changing relationship in prevalences of urinary stones among males and females ("gender shift") in the general U.S. population is reflected in the recent experience of U.S. military members. Prior to 2005, annual incidence rates were higher among male than female service members; however, since 2005, rates have been consistently higher among females than males. The gender shift in female-to-male incidence rates among military members is due primarily to the sharply increasing outpatient incidence rates among females since 2005.

In the general population, the "gender shift" in urinary stone prevalence has been attributed at least in part to increases in obesity – particularly morbid obesity among women – and dietary changes.[7,9,12] In the past ten years among U.S. military members, incidence rates of urinary stone diagnoses have increased by large percentages in every age group of women (but not of men). Over the same period, prevalences of clinical overweight have increased among female service members in every age group.[13] The gender shift in incident diagnoses of urinary stones in the military may be due at least in part to a greater increase in the prevalence of overweight/obesity among female than male members of the active component.

The relatively sharp increase in diagnoses of urinary stones among active component women may also reflect increasing utilization of highly sensitive diagnostic imaging procedures (e.g., ultrasound, computed tomography [CT]) in a broader range of health care settings.[12] Urinary stones may be incidentally detected during medical evaluations that are unrelated to renal disease; incidental findings of asymptomatic urinary stones may be documented on records of related health care encounters. To reduce the effect of incidental detections of asymptomatic stones for this analysis, incident cases were restricted to urinary stone diagnoses that were reported as primary (first-listed) diagnoses on hospitalization and ambulatory visit records. Still, some diagnoses that were considered case-defining for this analysis may reflect the documentation of asymptomatic and incidentally diagnosed urinary stones.

Urinary stones are a significant military medical concern because they are associated with decreased military operational effectiveness (e.g., lost duty days, medical evacuation) and may be precipitated by environmental stressors common to military training and operational settings.

Particularly during physically rigorous operations in hot, dry environments (such as Iraq and Afghanistan), U.S. military members may be at high risk of dehydration, decreased urine output, concentration of the urine, and urinary stone formation.[14] In recent years, on average per year, more than 60 service members have been medically evacuated from combat operational theaters in Iraq and Afghanistan; undoubtedly, other urinary stone-related cases have been treated in theater hospitals and other field medical facilities. Nearly thirty percent of medical evacuees for urinary stones reported urinary stone-related medical encounters within the previous two years. Because of the high recurrence rate and the debilitating morbidity that can result from urinary stones, service members with histories of urinary stones should be counseled and closely supervised to avoid dehydration and to adhere to diets that reduce the risk of stone formation.

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Uterine Fibroids, Active Component Females, U.S. Armed Forces, 2001-2010

Uterine fibroids are benign tumors of the uterus that can cause significant morbidity in symptomatic women. From 2001 to 2010 there were 11,931 incident cases (incidence rate: 57.6 per 10,000 person-years) of uterine fibroids among active component females. The incidence rates were highest among black, non-Hispanic females and increased with advancing age. The observed decline in the number and percentage of inpatient hysterectomies for fibroids may reflect changes in overall treatment patterns during the period. Uterine fibroids commonly affect the health and military operational effectiveness of women on active duty; research to identify causes and preventive interventions is warranted.

Uterine fibroids, or leiomyomas, are benign, often asymptomatic tumors of the uterus that occur frequently in premenopausal women. Risk factors for fibroids include African American heritage, early age of menarche, and increasing age before menopause.[4] Parity, i.e., the number of pregnancies, is inversely related to the risk of developing fibroids.[4] Because many fibroids remain undetected, the true prevalence is undoubtedly underestimated.

Symptomatic fibroids can cause appreciable morbidity and disability in affected women; common symptoms include heavy, painful menstrual bleeding, pelvic pain, urinary frequency, and reproductive difficulties.

Courses of treatment of symptomatic fibroids vary according to the size, location, and number of fibroids, the severity of symptoms, and the patient's desire to retain reproductive ability. Therapeutic options range from watchful waiting and drug therapy to surgical procedures such as hysterectomy (removal of the uterus) and myomectomy (removal of the fibroid). In the United States, fibroids are the most frequent indication for hysterectomy.[1-3] Newer, minimally invasive treatments such as uterine artery embolization and guided focused ultrasound have also become available as treatment options.

In the U.S. Armed Forces in 2010, "uterine leiomyoma" (ICD-9-CM: 218) was the 5th most frequent diagnosis during hospitalizations for active component females (after hospitalizations for pregnancy, childbirth, episodic mood disorder, and adjustment reaction), and the 2nd most frequent diagnosis during ambulatory visits for neoplasms.[5,6] Fibroid symptoms may result in loss of duty days and the management and treatment of fibroids are an important burden on the resources of the Military Health System.

This report describes numbers, rates, trends, and demographic characteristics of incident diagnosed cases of uterine fibroids; health care burdens associated with the clinical management of uterine fibroids; and fibroid cases that were first diagnosed during pregnancies of active component females of the U.S. Armed Forces from 2001 to 2010.

METHODS

The surveillance period was 1 January 2001 to 31 December 2010. The surveillance population included all females who served in the active component of any branch of the U.S. Armed Forces at any time during the surveillance period. Records of health care encounters (hospitalizations and outpatient clinic visits) in the Defense Medical Surveillance System were searched to identify encounters associated with uterine fibroids **(Table 1)**. In order to limit case-finding to symptomatic fibroids, a case of uterine fibroids was defined as an individual with an inpatient or outpatient encounter with a case-defining code (ICD-9-CM: 218.xx) in the primary (first-listed) diagnostic position; or an inpatient or outpatient encounter with a case-defining code in the second diagnostic position and an associated symptom code in the primary (first-listed) diagnostic position **(Table 1)**. An individual could be an incident case once during the surveillance period; if an individual had a case-defining encounter for fibroids before the surveillance period, they were excluded from the analysis.

To estimate the health care burden associated with uterine fibroids, all inpatient and outpatient medical encounters with a case-defining code (ICD-9-CM: 218.xx) reported as primary (first-listed) were identified. Health care burdens were quantified by the total number of medical encounters attributable to uterine fibroid diagnoses, number of individuals affected, and the total number of bed days during hospitalizations. Numbers and percentages of inpatient treatment procedures for

TABLE 1. ICD-9-CM case-defining codes for uterine fibroids and associated symptom and procedure codes

Case-defining codes	
Uterine leiomyoma	218.xx
Associated symptom codes	
Anemia due to blood loss	280.0, 285.1
Vaginal bleeding, menstrual bleeding disorders	623.8, 626.5, 626.6,626.8, 626.9
Pain associated with female genital organs	625.0, 625.3, 625.5, 625.9
Inpatient procedure codes	
Hysterectomy	683, 6831, 6839, 684, 6841, 6849, 6851, 6859, 686, 6879, 689
Myomectomy	6829

TABLE 2. Numbers and rates of uterine fibroids (ICD-9-CM: 218.xx), active component, U.S. Armed Forces, 2001-2010

	No	Rate	IRR
Total	11,931	57.6	.
Inpatient encounters	975	4.7	.
Outpatient encounters	10,956	52.9	.
Age Group			
<20	57	2.5	Ref
20-24	608	8.0	3.2
25-29	1,382	30.6	12.3
30-34	2,245	84.1	33.7
35-39	3,427	167.0	67.0
40+	4,212	262.8	105.5
Race-ethnicity			
White, non-Hispanic	2,950	28.4	Ref
Black, non-Hispanic	7,419	125.9	4.4
Hispanic	711	32.1	1.1
Asian/Pacific Islander	334	30.9	1.1
American Indian/Alaskan Native	103	25.7	0.9
Other	414	55.1	1.9
Service			
Army	5,380	74.3	3.2
Navy	2,429	47.3	2.0
Air Force	3,599	53.3	2.3
Marine Corps	262	23.2	Ref
Coast Guard	261	56.9	2.5

[a]Rate per 10,000 person-years (p-yrs)
[b]Incidence Rate Ratio

fibroids (e.g., hysterectomy, myomectomy) were calculated from procedures that were documented on records of hospitalizations for uterine fibroids **(Table 1)**.

RESULTS

During the period there were 11,931 incident diagnoses of fibroids among active component females (incidence rate: 57.6 per 10,000 person-years [p-yrs]). Hospitalized cases (n=975; rate=4.7 per 10,000 p-yrs) accounted for 8 percent of all incident encounters **(Table 2)**. Outpatient cases (n=10,956; rate=52.9 per 10,000 p-yrs) accounted for 91 percent of all incident encounters **(Table 2)**. The overall incidence rate increased 9.2 percent from 2001 to 2010 (52.9 and 57.7 per 10,000 p-yrs, respectively).

Overall rates of incident diagnoses of uterine fibroids increased with advancing age. The highest rate occurred in service women aged 40 years and older (262.8 per 10,000 p-yrs). The overall rate among black, non-Hispanic women (125.9 per 10,000 p-yrs) was over four times that among white, non-Hispanic women (28.4 per 10,000 p-yrs) **(Table 2)**. Compared to those of all other race-ethnicities, black, non-Hispanic women had higher rates of uterine fibroid in every age group, and rate differences increased with increasing ages **(Figure 1)**.

During the period, there were 3,052 hospitalizations of women for treatment of fibroids (i.e., the hospitalization record included a fibroid-specific code as the primary (first-listed) diagnosis and a fibroid-related procedure code). Of these hospitalizations, nearly 90 percent had primary (first-listed) procedure codes for hysterectomy (n=1,826; 59.8%) or myomectomy (n=819; 26.8%) **(Figure 2)**. Of note in this regard, from 2001 to 2010, the percentage of all inpatient fibroid-related procedures that were hysterectomies sharply declined (2001: 76.5%; 2010: 48.9%), while those that were myomectomies increased (2001: 18.1%; 2010: 29.9%) **(Figure 2)**.

From 2001 to 2006, the number of medical encounters for, individuals affected by, and hospital bed days associated with fibroids increased rapidly; however, from 2007 to 2010, these indicators of fibroid-related health care burdens increased only slightly **(Figure 3)**. In 2001, there were 745 medical encounters for treatment of fibroids among 377 affected women (i.e., 2.2 encounters per case). Compared to 2001, in 2010 there were many more fibroid-related medical encounters (n=2,952) and affected

FIGURE 1. Incidence rates of uterine fibroids by age group and race/ethnicity, active component, U.S. Armed Forces, 2001-2010

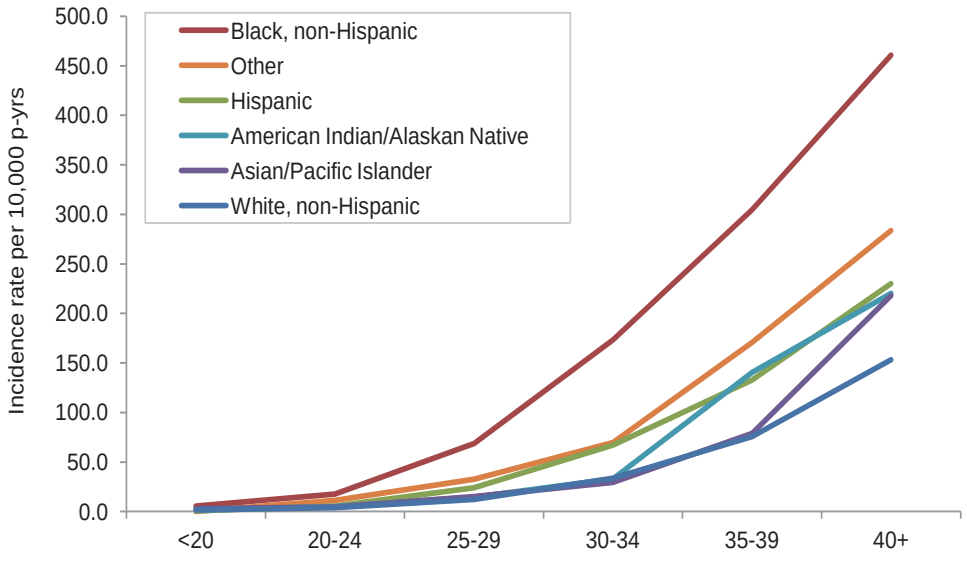
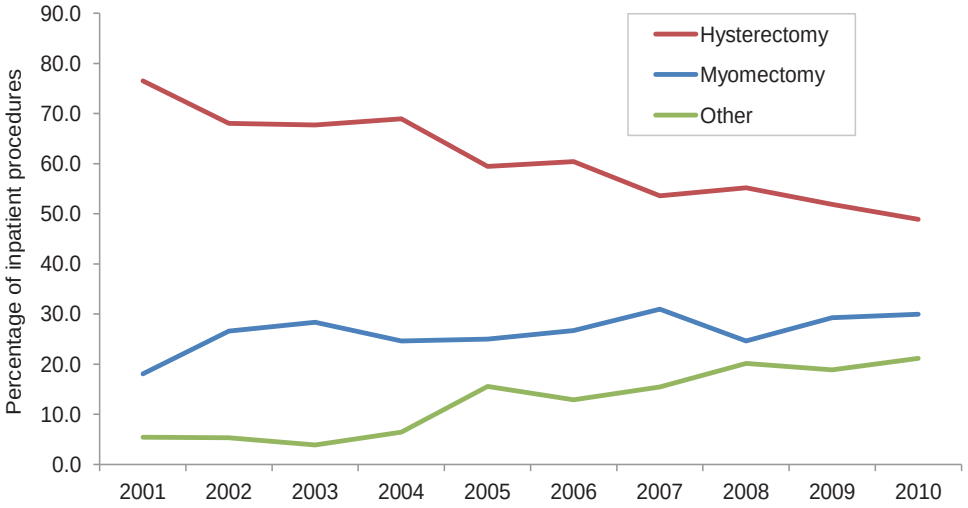


FIGURE 2. Percentages of selected medical/surgical procedures (first-listed on standardized records) during uterine fibroid-related hospitalizations, active component females, U.S. Armed Forces, 2001-2010



women (n=1,344), but a similar number of medical encounters per case (2.2 encounters per case). Of note, there were more than twice as many hospital bed days attributable to treatment of fibroids in 2010 than 2001 (hospital bed days, by year, 2001: 603; 2010: 1,336) **(Figure 3)**.

EDITORIAL COMMENT

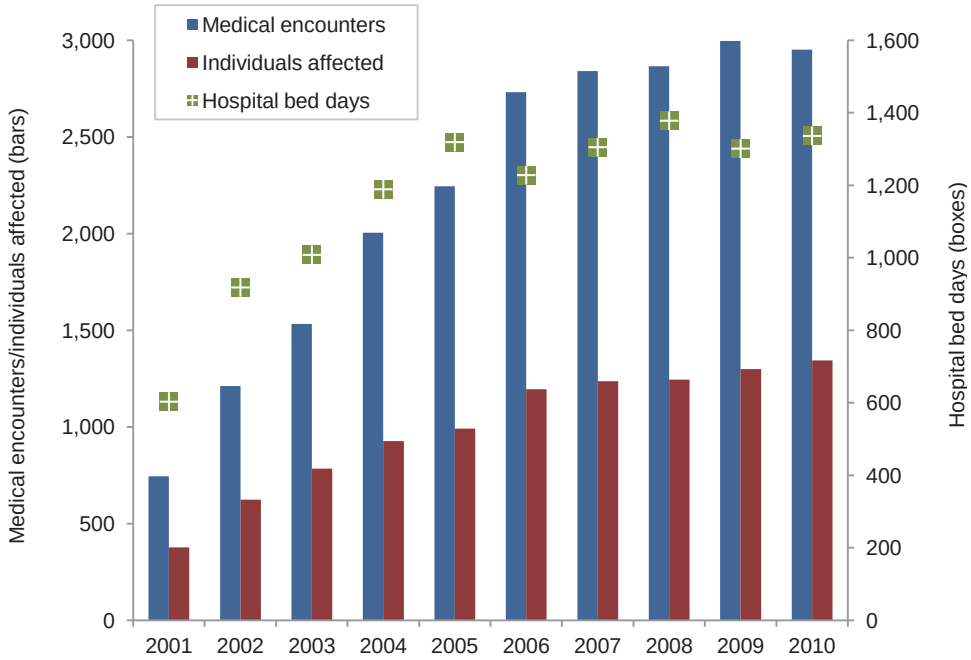
This report summarizes numbers, rates, and trends of incident diagnoses of uterine fibroids, and health care burdens associated with their treatment, among active component women from 2001 through 2010. As in the general U.S. population, incident diagnosis rates were relatively highest among older premenopausal and black, non-Hispanic active military women.

Of note in this regard, U.S. military women have "free" (i.e., no personal expense) access to health care, including periodic "well woman" examinations. Thus, in contrast to the general U.S. experience, among women in active military service, fibroid case ascertainment is likely similar among those of all racial and ethnic backgrounds. Still, among military women, black, non-Hispanic females accounted for 62 percent of all incident cases, and disparities in incidence rates between black, non-Hispanics and all other racial-ethnic group members increased with advancing age.

Overall, the incidence rates of newly diagnosed uterine fibroids increased during the surveillance period. This trend may reflect an increase in incidental detections of asymptomatic fibroids during routine physical examinations or imaging studies. To reduce the impact of incidental detection of asymptomatic fibroids on case counts in this analysis, incident cases were restricted to those diagnoses recorded in the primary (first-listed) diagnostic position or the secondary position when a fibroid-associated symptom was reported in the primary position. Despite this methodological approach, an undetermined proportion of fibroid diagnoses that were case-defining for this analysis may have resulted from incidental detections.

During the surveillance period, there was a decrease in the number and percentage of primary procedure codes indicative of hysterectomies among women hospitalized for fibroids. Concurrently, there was an increase in myomectomies and other fibroid-related procedures. Decreasing trends in numbers of inpatient hysterectomies may reflect changes in overall treatment patterns for uterine fibroids, e.g., increase in minimally invasive (laparoscopic) hysterectomies in outpatient settings, or alternative treatments for fibroids. Further analyses are required to discern the impacts of changing treatment patterns for uterine fibroids on the experience of affected women in military service.

FIGURE 3. Total medical encounters, individuals affected, and hospital bed days for uterine fibroids, active component females, U.S. Armed Forces, 2001-2010



This analysis was limited because cases were not characterized by fibroid size, number, anatomic locations, or the natures or severities of associated symptoms. Such factors influence clinical management strategies (i.e., whether treatment is indicated and, if so, the type, such as surgery); in addition, they determine the extent of morbidity and disability of affected female service members. In spite of its limitations, this analysis provides an overview of the impact of fibroids on the military healthcare system. For example, during the 10-year surveillance period, over 22,124 medical encounters and 11,585 hospital bed days were attributable to the clinical management of uterine fibroids. Although the severity of disease in female service members was not measured in this report, uterine fibroids undoubtedly cause symptomatic women appreciable morbidity and military operational disability.

Uterine fibroids commonly affect the health and military operational effectiveness of women in active military service. Among women in service, those who are black, non-Hispanic are disproportionately affected by fibroids. Research to identify causes of and effective preventive interventions and treatments for uterine fibroids is indicated.

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Historical Snapshot:
Dr. Anna Baetjer, Industrial Hygiene Pioneer, Military Occupational Health Advocate

In the United States prior to the 1930s, the physical and psychological hazards associated with most industrial jobs and settings, and measures to ensure the health and safety of industrial workers, generated relatively little scientific or medical interest. In the late 1930s, however, the American Industrial Hygiene Association was established, and the U.S. Public Health Service initiated industrial hygiene activities throughout the country.

In the early 1940s, mobilization for and conduct of the Second World War required massive increases in the production of military equipment, supplies, and ammunition for the U.S. Armed Forces. Yet, as the industrial base of the U.S. Armed Forces was expanding, many workers in manufacturing, transportation, and other industrial trades were leaving for military service. In response, women in huge numbers stepped forward to work in what had been male dominated occupations. By 1942, the U.S. War Department owned or operated more than 160 industrial plants, and as many as 70 percent of the workers at some of the plants were women.

In 1942, the Army Surgeon General's Office established an Industrial Medical Program and shortly thereafter, a central Industrial Hygiene Laboratory; the Industrial Hygiene Laboratory was established at the Johns Hopkins School of Hygiene in Baltimore. The laboratory received invaluable support from faculty and technical staff members of the university; together, they visited military industrial sites, documented hazards associated with various occupations and work areas, sampled air and chemicals to which workers were exposed, and recommended policies and practices to mitigate health threats. (In the nearly 70 years since its founding, the Industrial Hygiene Laboratory has increased in size and changed its name – from Army Environmental Hygiene Agency [USAEHA], to Army Center for Health Promotion and Preventive Medicine [USACHPPM], to the current Army Public Health Command [USAPHC] – to reflect its continuously expanding missions).[1]

In the early 1940s, Doctor Anna Baetjer was a highly regarded researcher, teacher, and consultant in occupational

An 18-year-old woman operates a lathe without eye protection during World War II. The U.S. Army Ordinance Department proudly released this photo in 1942 with a caption stating that the "chips are flying". Source: Anderson RS, ed. Special fields. In: Preventive Medicine in World War II. Vol 9. Washington, DC: DA Office of The Surgeon General; 1969. Photograph: US Army Signal Corps, 1942.[2]

health on the faculty of the Johns Hopkins School of Hygiene. In addition, she was a strong advocate for the establishment of the Army's Industrial Hygiene Laboratory at the university. For more than 40 years, beginning with her support of the Army Laboratory during World War II, she advocated on behalf of military occupational health and industrial hygiene efforts, taught and mentored generations of military occupational and environmental health professionals, led consultations and investigations of military industrial sites, and advised in the development of military occupational health and safety guidelines, policies, and practices. Of particular note, at the request of the Office of the Secretary of War, Doctor Baetjer studied the health effects of military industrial work on women and recommended policies aimed at protecting the health of female workers. Based on her pioneering research, in 1944, the U.S. War Department issued a groundbreaking policy regarding pregnancy among civilian workers that limited work periods relative to weeks of pregnancy and during postpartum periods; required that job assignments not endanger the health of pregnant employees; and protected job security and seniority of pregnant employees. Such a policy was unprecedented in American industrial employee relations. In 1946, Dr. Baetjer summarized her research findings in the seminal treatise *Women in Industry. Their Health and Efficiency.* After the war, Dr. Baetjer expanded her teaching and research activities at Johns Hopkins, served as president of the American Industrial Hygiene Association, and advised the National Research Council and the Environmental Protection Agency. In addition, she remained a trusted adviser and consultant to the Army Environmental Hygiene Agency and Office of the Surgeon General.[1]

Since 2001, there has been another massive shift in the roles of women in support of U.S. war operations. In theaters of combat operations in Afghanistan and Iraq, women have served in larger numbers, greater proportions, and more diverse military occupations – and have been exposed to more direct combat activities – than in any other U.S. wartime period. Following the lead of Dr. Baetjer and her colleagues during World War II, this (and several past) issues of the MSMR document the health of women during times of unprecedented military occupational activities in mentally and physically challenging settings.

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Brief Report

Births, Active Component, U.S. Armed Forces, 2001-2010

In the general U.S. population, birth rates have been fairly stable during the past 10 years. As a result of delayed childbearing, birth rates among women in their 30s and 40s have been increasing while birth rates in younger women have been decreasing.[1] Among U.S. service members, the fertility rate (the average number of births per woman) differs by service branch due to the different age compositions of the services and perhaps different deployment experiences. This report summarizes trends in births by age and service among active component females during the past 10 years.

METHODS

The surveillance population consisted of all active component female service members 17 to 49 years of age with delivery hospitalizations during 2001-2010. A delivery hospitalization was defined as an inpatient record with one of the following in any diagnostic position: ICD-9 code V27.0-V27.9 "outcome of delivery", ICD-9 code 650 "normal delivery" or fifth-digit classifications of "delivered" or "postpartum condition" with an ICD-9 code in the range 640-679 "complications of pregnancy". Individuals were allowed one delivery hospitalization every 280 days.

Summary measures were numbers of live births among members of the surveillance population, age-specific birth rates (calculated as live births per 1,000 person-years of active military service) and total fertility rate, an estimate of the number of children a cohort of 1,000 women would bear during their childbearing years, if all years were spent in active military service. Birth rates were summarized in relation to person-years of, rather than numbers of women in, military service because the U.S. military is a dynamic cohort – every day, many women enter and many others leave service – and total person-years was considered a more consistent measure of pregnancy and delivery experiences across calendar years.

RESULTS

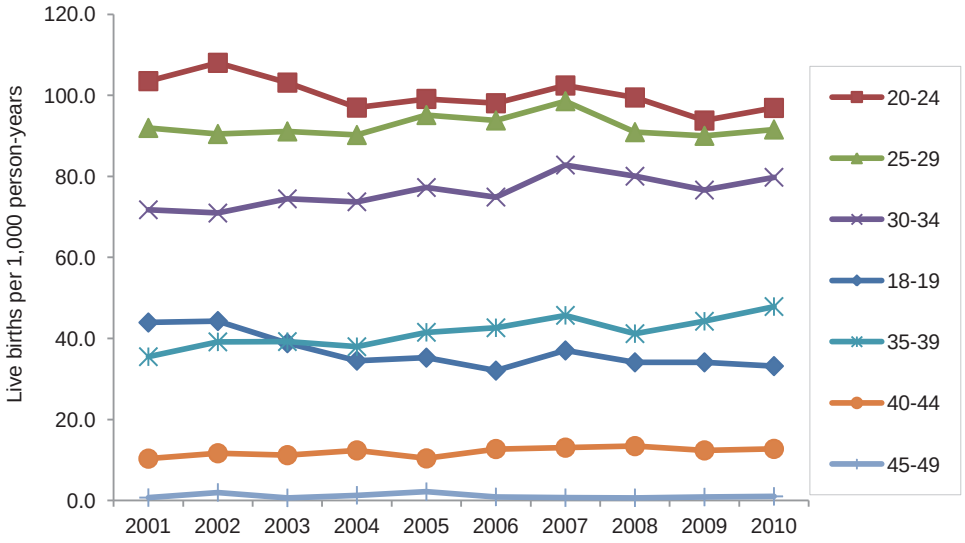
Among women who served in the active component from 1 January 2001 to 31 December 2010, there were 156,314 deliveries ending in live births **(Table 1)** and 9 stillbirths (removed from analysis to facilitate birth rate calculation). The annual number of births was stable, ranging from 14,933 (in 2009) to 16,383 (in 2003) **(data not shown)**.

The majority of births (51.8%) were to women 18-24 years old (there were none among 17-year-olds) and one in 15 (6.6%) births were to those older than 34 **(Table 1)**. The mean age at delivery increased monotonically from 24.9 years (in 2001 and 2002) to 26.0 years (in 2010) **(data not**

TABLE 1. Live births among active component women, by selected demographic and military characteristics, active component, U.S. Armed Forces, 2001-2010

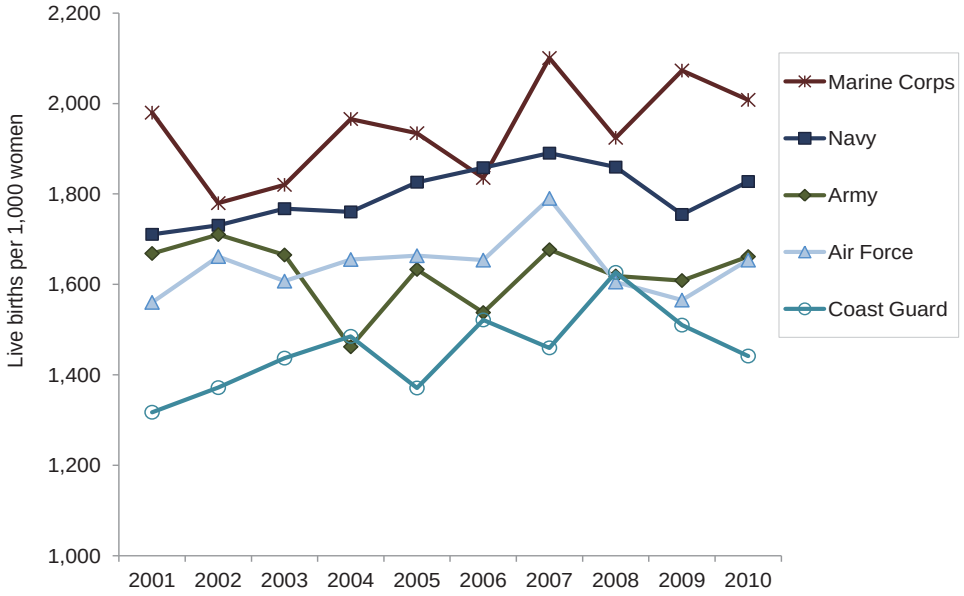
	No.	%
Total	156,314	100.0
Age group		
<20	6,570	4.2
20-24	74,426	47.6
25-29	43,966	28.1
30-34	21,115	13.5
35-39	8,748	5.6
40+	1,489	1.0
Race/ethnicity		
White, non-Hispanic	74,349	47.6
Black, non-Hispanic	45,484	29.1
Other	36,481	23.3
Service branch		
Army	52,840	33.8
Navy	41,676	26.7
Air Force	47,816	30.6
Marine Corps	11,144	7.1
Coast Guard	2,838	1.8
Military status		
Enlisted (E)	137,220	87.8
Officer (O)	19,094	12.2

FIGURE 1. Age-specific birth rates[a], active component, U.S. Armed Forces.



[a]Number of live births divided by person-years of military service

FIGURE 2. Total fertility rates[a], by year and service branch, active component, U.S. Armed Forces, 2001-2010.



[a]An estimate of the number of children a cohort of 1,000 women would deliver if they experienced the observed age-specific birth rates throughout their reproductive lives.

shown). Age-specific birth rates for the 10-year period were highest among women 20-24 (100.3 per 1,000 person-years [p-yrs]), 25-29 (92.4 per 1,000 p-yrs) and 30-34 (76.3 person 1,000 p-yrs) and lowest among women in their 40s **(Figure 1).** The 10-year birth rate among 18-19-year-old service members (37.4 per 1,000 p-yrs) was just slightly lower than that of women aged 35-39 (41.4 per 1,000 p-yrs). During the period, birth rates among 18-24-year-olds generally decreased, while rates among those aged 30-45 generally increased.

There were more births during the period among members of the Army (33.8% of all births) and the Air Force (30.6%) **(Table 1)**; however, the highest total fertility rates were among women in the Marine Corps and Navy **(Figure 2)**. In 2010, a hypothetical cohort of 1,000 female Marine Corps members would bear 2,008 children (i.e., average of 2 children per woman) during their lifetimes if they experienced the age-specific birth rates observed among Marine Corps women throughout their childbearing years. Similar cohorts of female sailors, soldiers and airmen would bear 1,828, 1,661 and 1,654 children, respectively. The Coast Guard had the lowest total fertility rate among the services in 2010 and during most years of the period.

EDITORIAL COMMENT

During 2001-2010, an average of 15,600 children were born to active component females each year. The highest birth rates were among those in their 20s, but the birth rates among women in their 30s and 40s increased. Women in the Marine Corps and Navy had higher total fertility rates than those in the other services. Of note, 20-24-year-old Marines had much higher age-specific birth rates than their same-aged counterparts in the other services.

An important limitation of this report is that it summarizes only births to women in active military service. Children who are born to women before and after they serve in the military are not accounted for in this report. The wars in Iraq and Afghanistan were ongoing during most of the surveillance period. This report did not explore the potiental impact of factors such as frequency and length of overseas deployment and policies regarding postpartum deferment from deployment.

During the past 10 years, there were no deliveries among 17-year-old service members. For purposes of birth rate calculations in this report, 17-year-olds were not considered at risk for birth. Although females may enter into military service at age 17, they are not allowed to be pregnant at the time of entry and those who become pregnant during their first 180 days of service are usually separated.

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Brief Report

Numbers and Characteristics of Women in the Active Component, U.S. Armed Forces, 2011

As of 30 September 2011, women composed 14.5 percent (n=204,706) of the active components of the U.S. Army, Navy, Marine Corps, and Air Force and 13.8 percent of the active duty members of the U.S. Coast Guard **(Table 1)**.

Among the service branches, the Air Force (19.0%) and Marine Corps (6.8%) had the largest and smallest proportions of women among their active component members, respectively **(Table 1)**. Women accounted for approximately one-fifth (19.3%; n=2,596) of all U.S. military service academy cadets and midshipmen and nearly one-third (31%) of all cadets at the U.S. Coast Guard Academy **(Table 2)**. Among the service academies, the U.S. Air Force Academy had relatively more women (22.0%) in 2011, and the largest absolute and relative increases (n=395, +70.7%) in women since 1994 **(Table 2)**.

From 1994 to 2011, the absolute and relative numbers of women in the active component of the U.S. Armed Forces slightly increased **(Table 2)**. Of note however, in 2011 compared to 1994, there were more than six times as many women among the highest ranking officers (Generals/Admirals), more than 80 percent more women in the highest enlisted grade (E9), and more than 60 percent more women in military service academies **(Table 2)**.

TABLE 1. Profile of women serving in the U.S. Armed Forces as of 30 September 2011

	Total	Army	Navy	Air Force	Marine Corps	Coast Guard
All active component	1,453,429	561,435	320,139	328,821	201,025	42,009
Women	210,502	76,013	52,414	62,592	13,687	5,796
% of active component	14.5%	13.5%	16.4%	19.0%	6.8%	13.8%
Men	1,242,927	485,422	267,725	266,229	187,338	36,213
% of active component	85.5%	86.5%	83.6%	81.0%	93.2%	86.2%
Women only						
Military status						
Enlisted	171,261	60,253	43,894	50,302	12,360	4,452
% of all enlisted	14.2%	13.0%	16.4%	19.1%	6.9%	13.3%
Officers, commissioned/warrant	39,241	15,760	8,520	12,290	1,327	1,344
% of all officers	15.9%	16.2%	16.0%	18.8%	6.1%	16.0%
OEF/OIF/OND deployments (since 2001)						
Any deployment	50.6%	59.0%	49.1%	48.9%	36.5%	4.2%
1	29.3%	33.6%	29.7%	27.5%	23.4%	3.7%
2	13.8%	16.8%	13.3%	12.8%	9.3%	0.4%
3 or more	7.4%	8.5%	6.1%	8.6%	3.7%	0.1%
Enlisted occupations						
% of women among all persons in occupational positions						
Health care specialists	30.5%	27.4%	19.6%	49.3%	N/A	34.4%
Functional support and administration	30.1%	32.6%	24.2%	36.0%	18.7%	31.0%
Service and supply handlers	16.4%	17.7%	19.6%	17.1%	8.9%	1.1%
Communications and intelligence specialists	14.3%	9.2%	21.7%	22.1%	8.3%	19.2%
Other occupations enlisted	13.0%	13.5%	15.8%	14.5%	7.4%	13.8%
Electronic equipment repairers	10.1%	11.4%	11.9%	9.3%	4.9%	4.9%
Electrical/mechanical equipment repairers	8.5%	7.4%	13.0%	5.9%	4.7%	7.8%
Infantry, gun crews, and seamanship specialists	2.8%	0.9%	14.6%	7.2%	0.5%	5.8%
Officer occupations						
% of women among all persons in occupational positions						
Health care	39.2%	37.2%	37.5%	43.9%	N/A	13.0%
Administrators	26.6%	28.1%	21.2%	31.3%	17.7%	19.1%
Supply, procurement and allied	19.1%	22.6%	13.8%	20.6%	9.9%	11.6%
Other occupations	15.2%	13.9%	16.0%	17.7%	7.7%	17.6%
Engineering and maintenance	10.9%	13.4%	5.4%	12.9%	4.6%	0.7%
Tactical operations	5.2%	2.8%	7.9%	7.2%	2.4%	3.6%

TABLE 2. Proportions of women in certain categories of military service, 1994 vs 2011 (U.S. Coast Guard excluded)

	September 1994		September 2011		1994-2011	
	No.	% of all persons	No.	% of all persons	No. increase	Percent increase (%)
Active component	198,087	12.4	204,712	14.5	6,625	3.3
Officers, total	31,815	13.0	37,807	15.9	5,992	18.8
- General/Admiral (O7-O10)	11	1.2	71	7.3	60	545.5
- Colonel/Captain (O6)	590	4.8	1,372	11.3	782	132.5
Enlisted members, total	166,272	12.3	166,905	14.2	633	0.4
- Highest grade (E9)	405	3.3	755	7.3	350	86.4
- Next highest grade (E8)	1,775	5.9	2,541	9.3	766	43.2
Cadets/Midshipmen, total	1,601	13.0	2,596	19.3	995	62.1
- U.S. Military Academy	477	11.9	743	16.1	266	55.8
- U.S. Naval Academy	565	13.2	899	19.9	334	59.1
- U.S. Air Force Academy	559	14.0	954	22.0	395	70.7

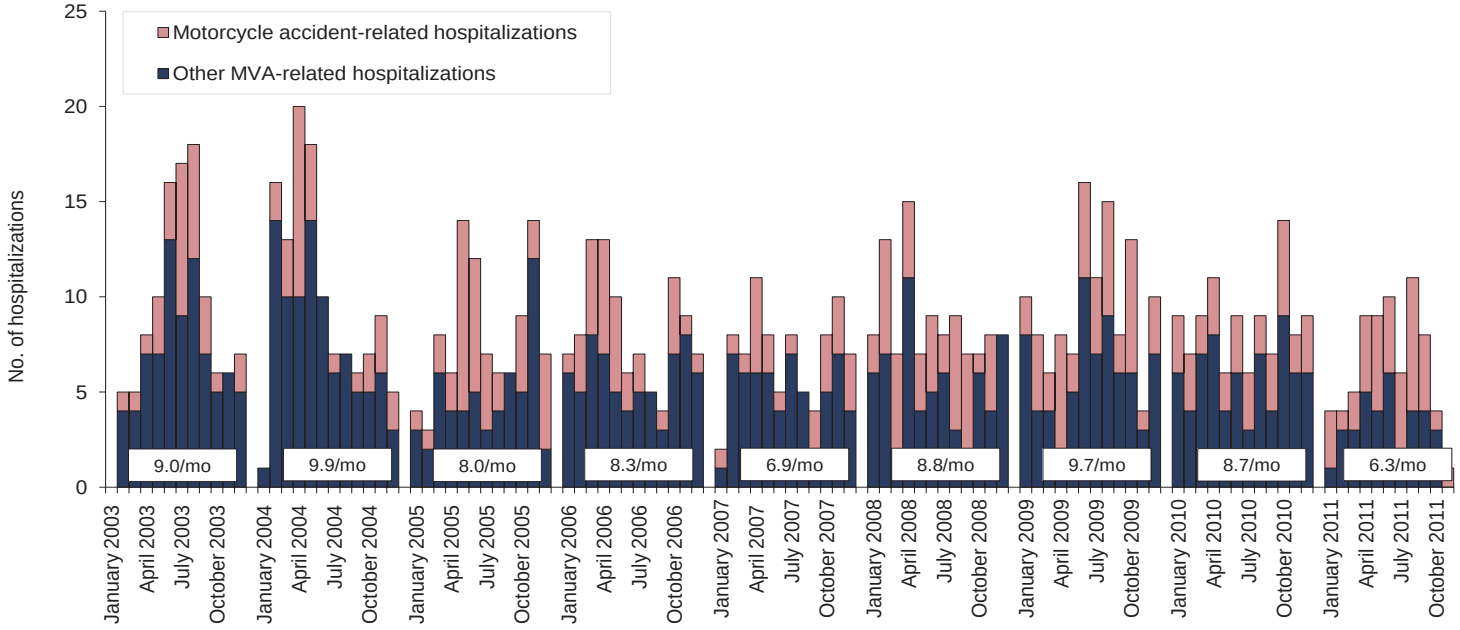
In regard to military occupations, women account for nearly one-third of all enlisted health care and "administrative and functional support" specialists and approximately 40 percent of all health care officers. Of particular note, in the Air Force, women constitute 49 percent and 44 percent of all enlisted members and officers in health care-related occupations, respectively **(Table 1).**

Of all female members of the active component in September 2011, approximately one-half (50.6%) had deployed at least once in support of Operations Enduring Freedom, Iraqi Freedom, or New Dawn **(Table 1).**

Finally, over the last 10 years (2002 –2011), the median age of female active component members overall has increased from 24 years to 26 years; women in the Marine Corps are younger (median age: 23 years) than their counterparts in the other services **(data not shown)**.

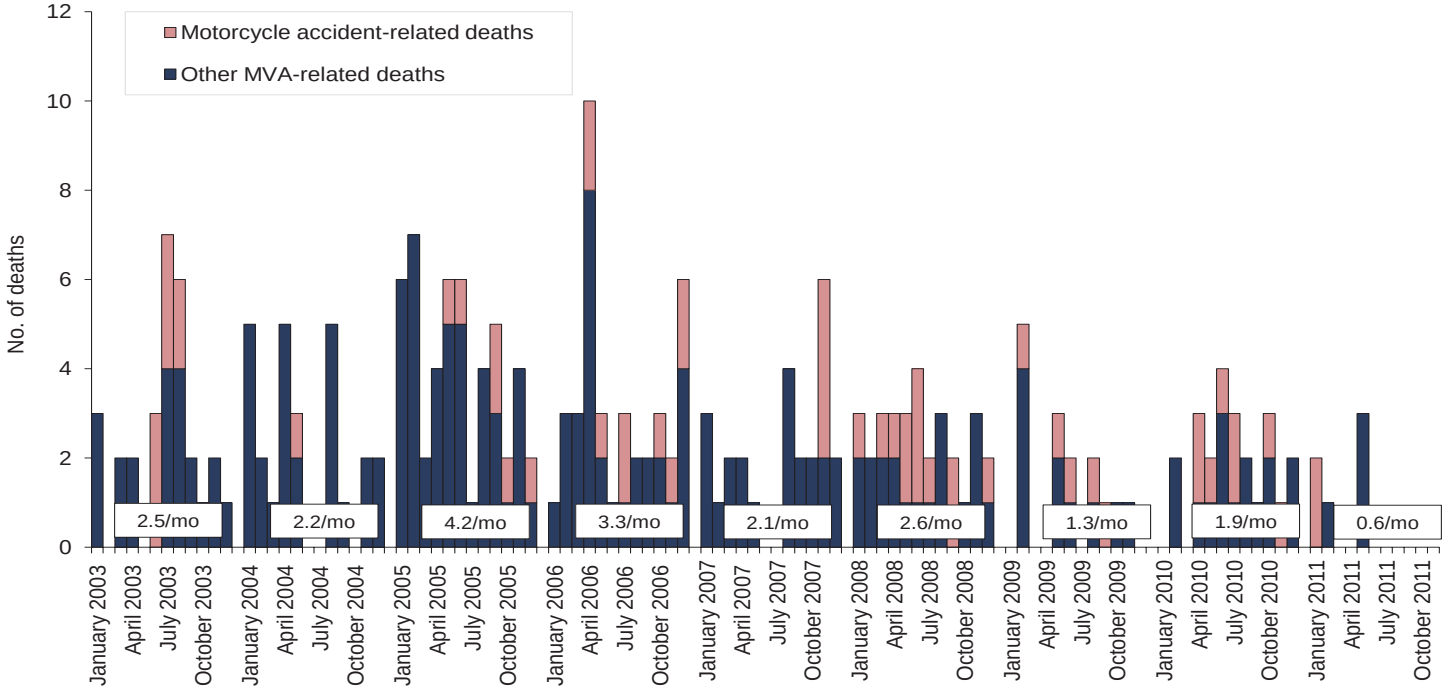
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - November 2011 (data as of 26 December 2011)

Hospitalizations for motor vehicle accidents occurring in non-military vehicles and outside of the operational theater (ICD-9-CM: E810-E825; NATO Standard Agreement 2050 (STANAG): 100-106, 107-109, 120-126, 127-129)



Note: Hospitalization (one per individual) while deployed to/within 90 days of returning from OEF/OIF/OND. Excludes accidents involving military-owned/special use motor vehicles. Excludes individuals medically evacuated from CENTCOM and/or hospitalized in Landstuhl, Germany within 10 days of another motor vehicle accident-related hospitalization.

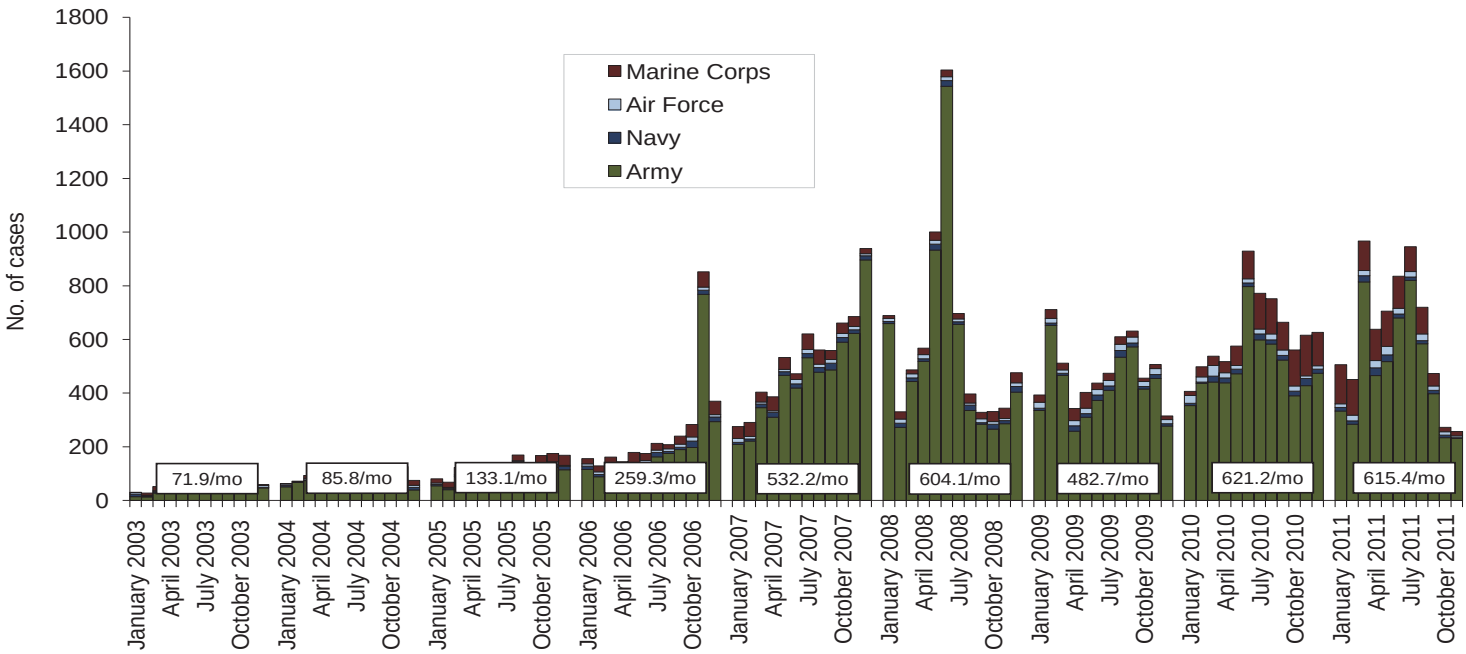
Deaths following motor vehicle accidents occurring in non-military vehicles and outside of the operational theater (per the DoD Medical Mortality Registry)



Reference: Armed Forces Health Surveillance Center. Motor vehicle-related deaths, U.S. Armed Forces, 2010. *Medical Surveillance Monthly Report (MSMR)*. Mar 11;17(3):2-6.
Note: Death while deployed to/within 90 days of returning from OEF/OIF/OND. Excludes accidents involving military-owned/special use motor vehicles. Excludes individuals medically evacuated from CENTCOM and/or hospitalized in Landstuhl, Germany within 10 days prior to death.

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 -November 2011 (data as of 22 December 2011)

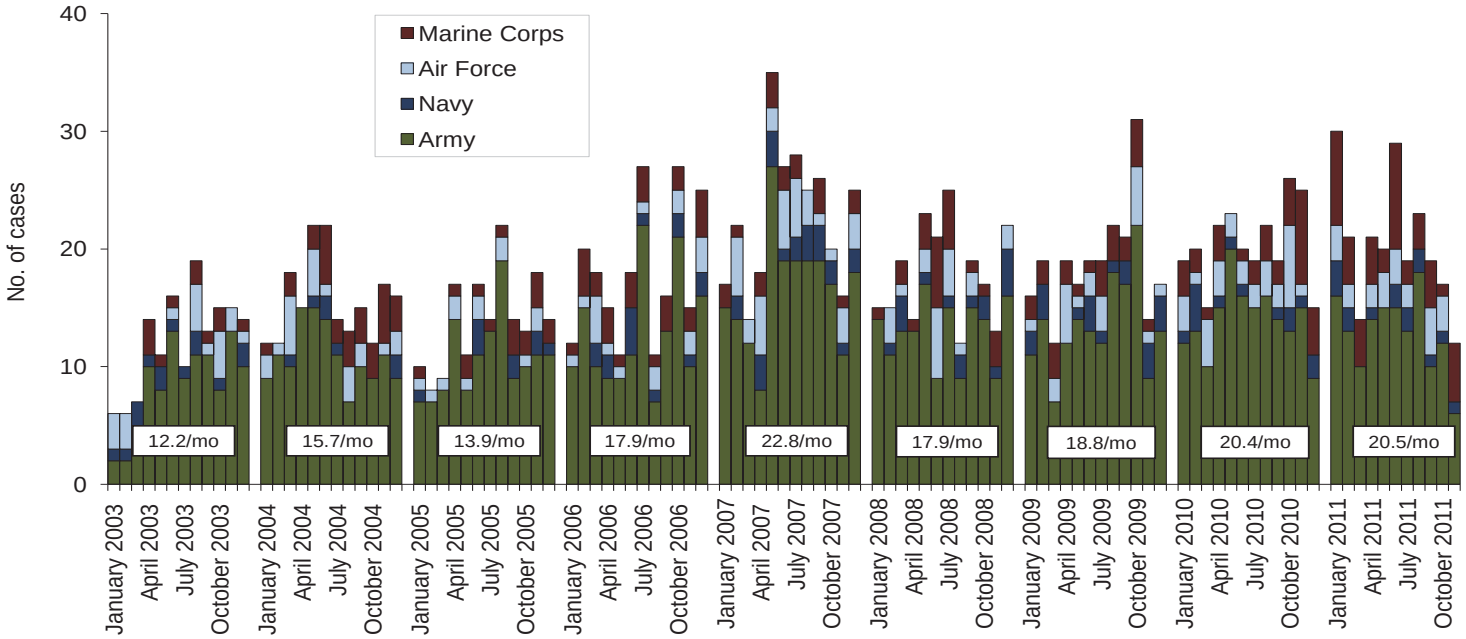
Traumatic brain injury (ICD-9: 310.2, 800-801, 803-804, 850-854, 907.0, 950.1-950.3, 959.01, V15.5_1-9, V15.5_A-F, V15.52_0-9, V15.52_A-F, V15.59_1-9, V15.59_A-F)[a]



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/OND. (Includes in-theater medical encounters from the Theater Medical Data Store [TMDS] and excludes 3,528 deployers who had at least one TBI-related medical encounter any time prior to OEF/OIF/OND).

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]

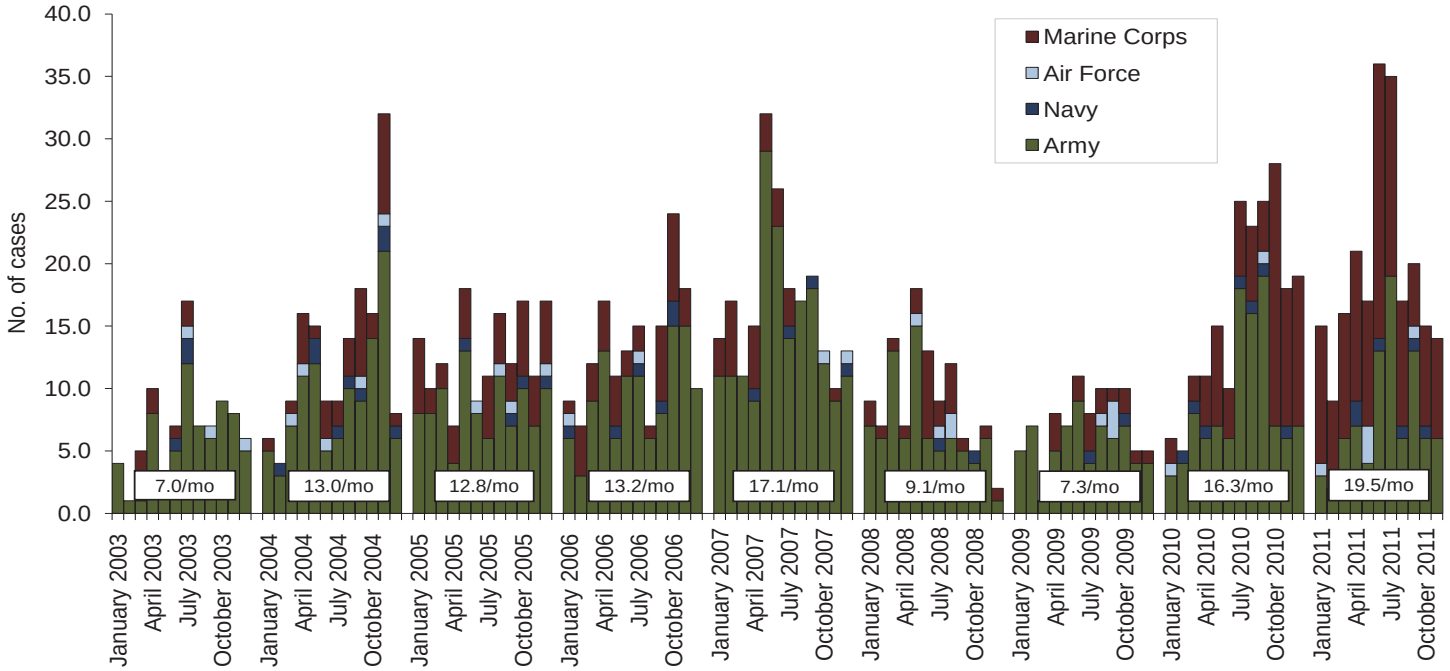


Reference: Isenbarger DW, Atwood JE, Scott PT, et al. Venous thromboembolism among United States soldiers deployed to Southwest Asia. *Thromb Res*. 2006;117(4):379-83.

[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/OND.

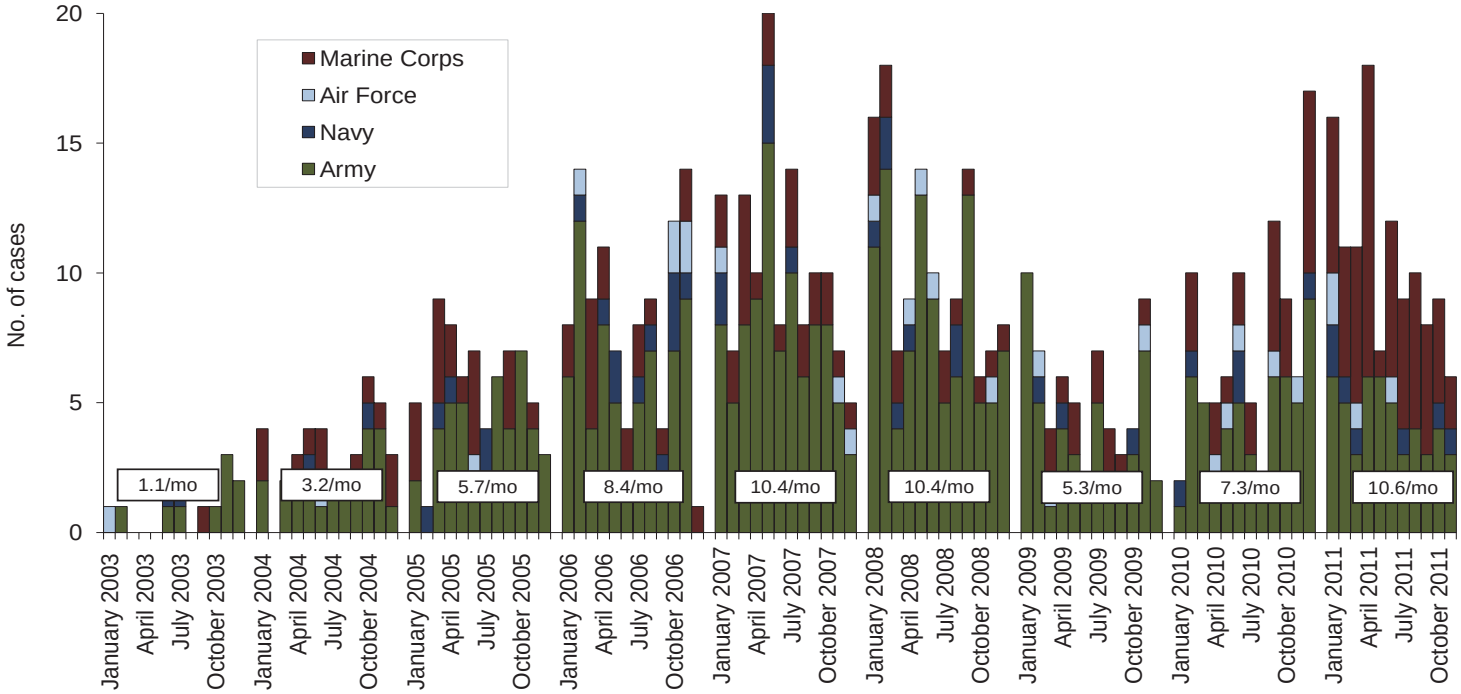
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - November 2011 (data as of 22 December 2011)

Amputations (ICD-9-CM: 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/OND.

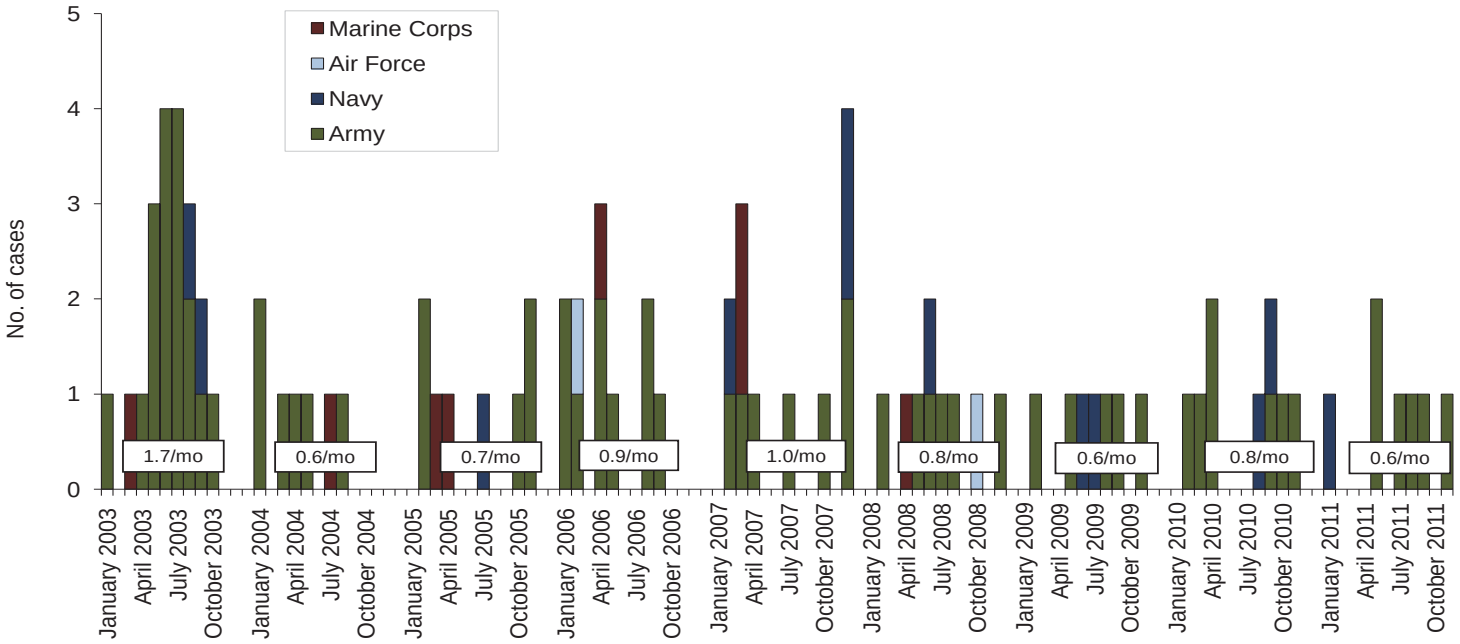
Heterotopic ossification (ICD-9: 728.12, 728.13, 728.19)[b]



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/OND.

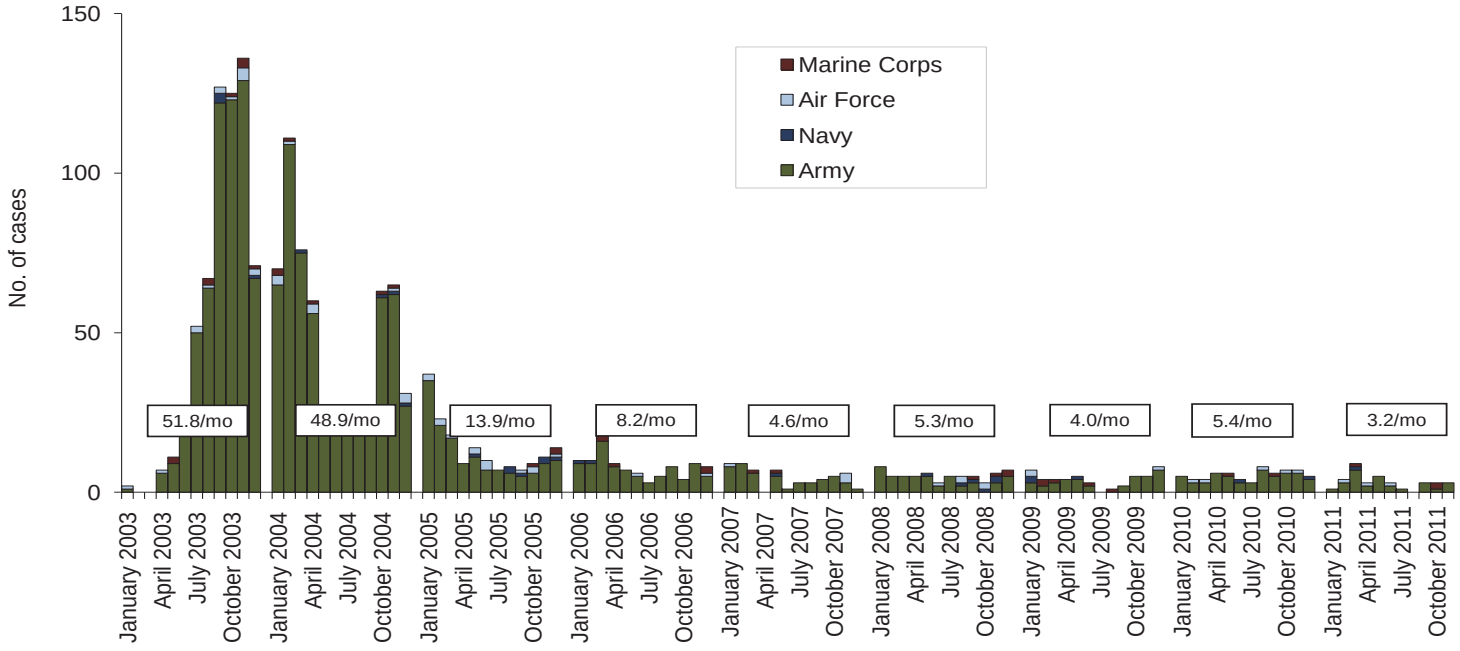
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - November 2011 (data as of 22 December 2011)

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/OND.

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/OND.

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