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Annual Summary Issue

Absolute and Relative Morbidity Burdens Attributable to Various Illnesses and Injuries, Active Component, U.S. Armed Forces, 2017

Perceptions of the relative "importance" of various health conditions in military populations often determine the natures, extents, and priorities for resources applied to primary, secondary, and tertiary prevention activities. However, these perceptions are inherently subjective and may not reflect objective measures of the relationship between the conditions and their impact on health, fitness, military operational effectiveness, healthcare costs, and so on.

Several classification systems and morbidity measures have been developed to quantify the "public health burdens" that are attributable to various illnesses and injuries in defined populations and settings.[1] Not surprisingly, different classification systems and morbidity measures lead to different rankings of illness- and injury-specific public health burdens.[2]

For example, in a given population and setting, the illnesses and injuries that account for the most hospitalizations are likely different from those that account for the most outpatient medical encounters, and the illnesses and injuries that account for the most medical encounters overall may differ from those that affect the most individuals, have the most debilitating or long-lasting effects, and so on.[2] Thus, in a given population and setting, the classification system or measure used to quantify condition-specific morbidity burdens shapes to a large extent the conclusions that may be drawn regarding the relative "importance" of various conditions—and, in turn, the resources that may be indicated to prevent or minimize their impacts.

This annual summary uses a standard disease classification system (modified for use among U.S. military members) and several healthcare burden measures to quantify the impacts of various illnesses and injuries among members of the active component of the U.S. Armed Forces in 2017.

METHODS

The surveillance period was 1 January through 31 December 2017. The surveillance population included all individuals who served in the active component of the U.S. Army, Navy, Air Force, or Marine Corps at any time during the surveillance period. All data used in this analysis were derived from records routinely maintained in the Defense Medical Surveillance System (DMSS). These records document both ambulatory encounters and hospitalizations of active component members of the U.S. Armed Forces in fixed military and civilian (if reimbursed through the Military Health System [MHS]) treatment facilities worldwide.

For this analysis, DMSS data for all inpatient and outpatient medical encounters of all active component members during 2017 were summarized according to the primary (first-listed) diagnosis (if reported with an International Classification of Diseases, Tenth Revision, Clinical Modification [ICD-10] code between A00 and T88, codes beginning with Z37, or Department of Defense [DoD] unique personal history codes DOD0101–DOD0105). For summary purposes, all illness- and injury-specific diagnoses (as defined by the ICD-10) were grouped into 142 burden of disease-related conditions and 25 categories based on a modified version of the classification system developed for the Global Burden of Disease (GBD) Study.[1] In general, the GBD system groups diagnoses with common pathophysiologic or etiologic bases and/or significant international health policymaking importance. In this analysis, some diagnoses that are grouped into single categories in the GBD system (e.g., mental health disorders) were disaggregated to increase the military relevance of the results. Also, injuries were categorized by affected anatomic site rather than by cause because external causes of injuries are incompletely reported in military outpatient records.

The "morbidity burdens" attributable to various "conditions" were estimated based on the total number of medical encounters attributable to each condition (i.e., total hospitalizations and ambulatory visits for the condition with a limit of one encounter per individual per condition per day), numbers of service members affected by each condition (i.e., individuals with at least one medical encounter for the condition during the year), and total bed days during hospitalizations for each condition.

MHS GENESIS, the new electronic health record for the MHS, was implemented at several military treatment facilities during 2017. Medical data from sites that are using MHS GENESIS are not available in DMSS. These sites include Naval Hospital Oak Harbor, Naval Hospital Bremerton, Air Force Medical Services Fairchild, and Madigan Army Medical Center. Therefore, medical encounter data for individuals seeking care at one of these facilities during 2017 were not included in this analysis.

RESULTS

Morbidity burden, by category

In 2017, more service members (n=538,945) received medical care for injury/poisoning than any other morbidity-related category **(Figures 1a, 1b)**. In addition, injury/poisoning accounted for more medical encounters (n=2,775,393) than any other morbidity category and approximately one-quarter (24.9%) of all medical encounters overall.

Mental health disorders accounted for more hospital bed days (n=152,566) than any other morbidity category and 45.5%

FIGURE 1a. Numbers of medical encounters,[a] individuals affected,[b] and hospital bed days, by burden of disease major category,[c] active component, U.S. Armed Forces, 2017

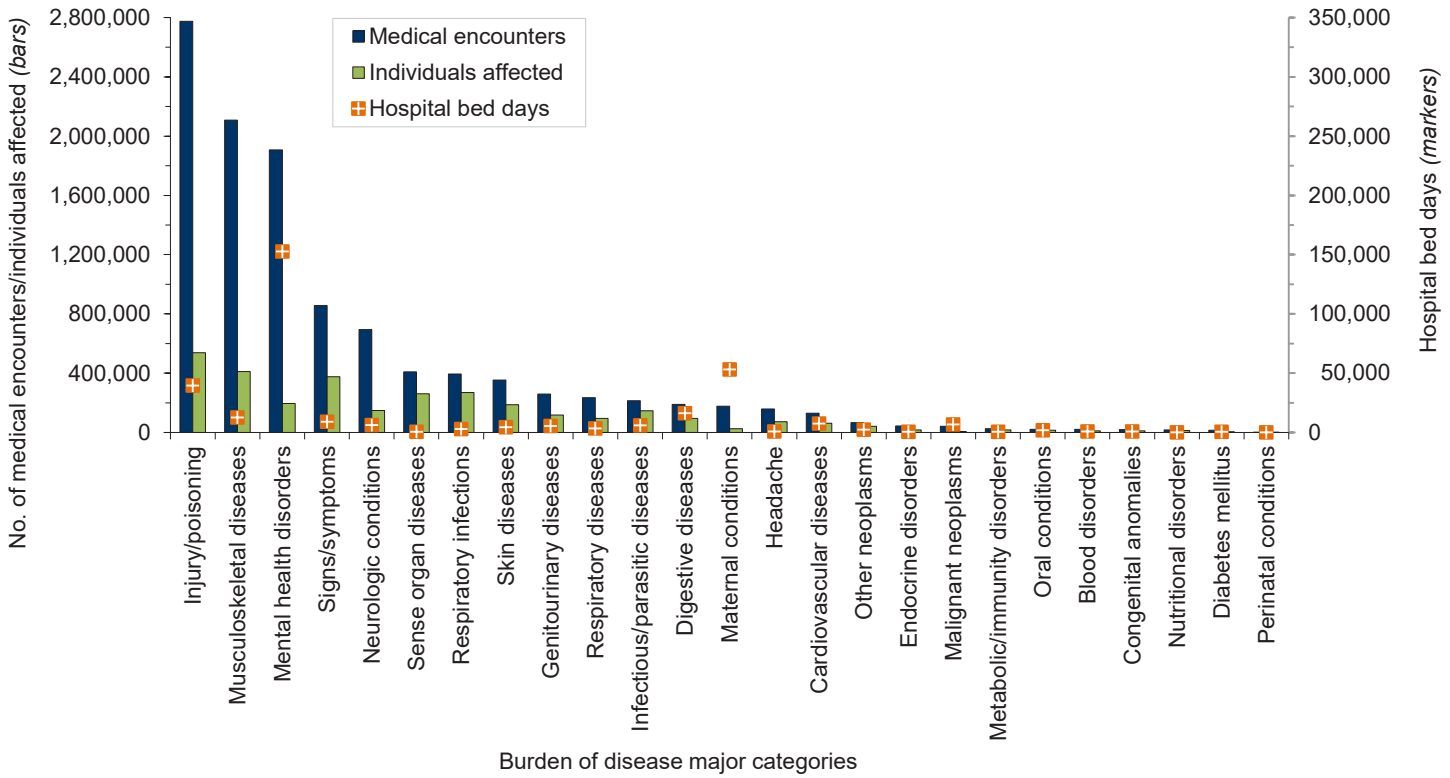
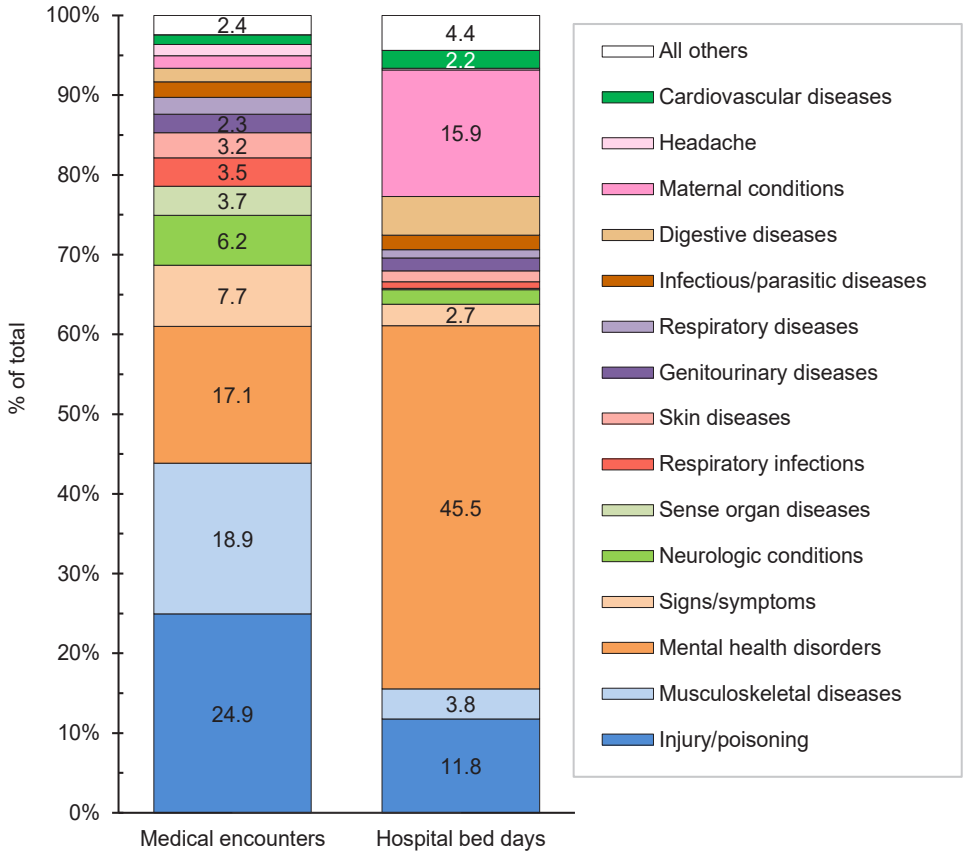


FIGURE 1b. Percentages of medical encounters,[a] and hospital bed days, attributable to burden of disease major categories,[c] active component, U.S. Armed Forces, 2017



[a]Medical encounters: total hospitalizations and ambulatory visits for the condition (with no more than one encounter per individual per day per condition)

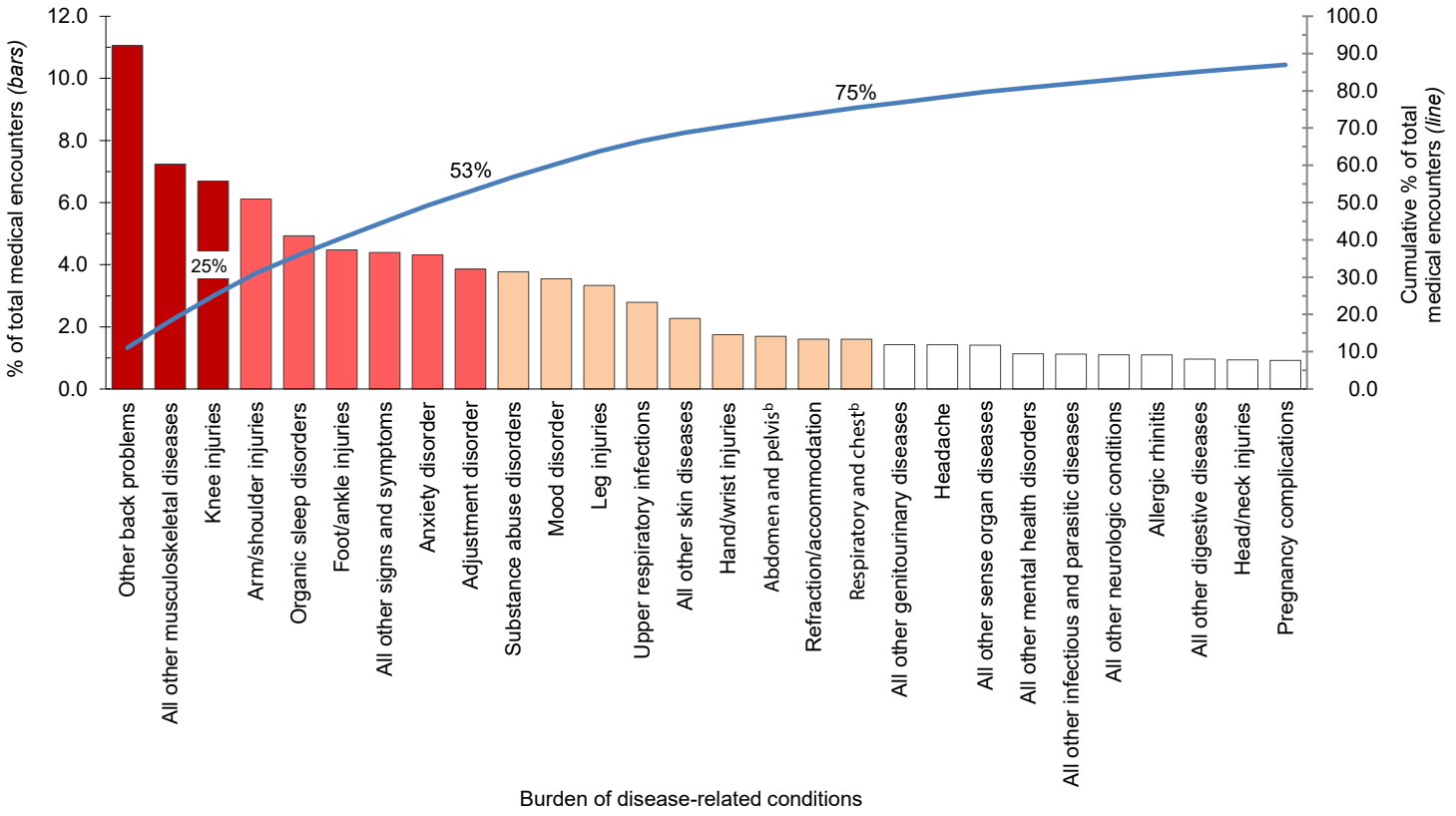
[b]Individuals with at least one hospitalization or ambulatory visit for the condition

[c]Burden of disease major categories based on a modified version of those defined in the Global Burden of Disease Study[1]

of all hospital bed days overall **(Figures 1a, 1b)**. Together, injury/poisoning and mental health disorders accounted for more than half (57.3%) of all hospital bed days and more than two-fifths (42.1%) of all medical encounters.

Of note, maternal conditions (including pregnancy complications and delivery) accounted for a relatively large proportion of all hospital bed days (n=53,165; 15.9%) but a much smaller proportion of medical

FIGURE 2. Percentage and cumulative percentage distribution, burden of disease-related conditions[a] that accounted for the most medical encounters, active component, U.S. Armed Forces, 2017



[a]Burden of disease-related conditions based on a modified version of those defined in the Global Burden of Disease Study[1]
[b]Under the major category signs and symptoms

encounters overall (n=177,496; 1.6%) **(Figures 1a, 1b)**. Routine prenatal visits are not included in this summary.

Medical encounters, by condition

In 2017, the three burden of disease-related conditions that accounted for the most medical encounters (i.e., other back problems, all other musculoskeletal diseases, and knee injuries) accounted for one-fourth (25.0%) of all illness- and injury-related medical encounters overall **(Figure 2)**. Moreover, the nine conditions that accounted for the most medical encounters accounted for slightly more than half (53.1%) of all illness- and injury-related medical encounters overall. In general, the conditions that accounted for the most medical encounters were predominantly musculoskeletal disorders (e.g., back problems), injuries (e.g., knee, arm/shoulder, foot/ankle), and mental health disorders (e.g., anxiety, adjustment disorders) **(Table, Figure 2)**.

Individuals affected, by condition

In 2017, more service members received medical care for all other musculoskeletal diseases than for any other specific condition **(Table)**. Of the 10 conditions that affected the most service members, three were injuries (knee, foot/ankle, and arm/shoulder), two were musculoskeletal diseases (all other musculoskeletal diseases and other back problems), two were signs and symptoms (all other signs and symptoms and abdomen and pelvis), one was respiratory infections (upper respiratory infections), one was a sense organ disease (refraction/accommodation), and one was skin diseases (all other skin diseases).

Hospital bed days, by condition

In 2017, mood and substance abuse disorders accounted for over one-quarter (26.3%) of all hospital bed days. Together, four mental health disorders (mood, substance abuse, adjustment, and anxiety) and two maternal conditions (pregnancy complications and delivery) accounted for more than half (55.9%) of all hospital bed days **(Table, Figure 3)**. Close to one-eighth (11.8%) of all hospital bed days were attributable to injuries and poisonings.

Relationships between healthcare burden indicators

There was a strong positive correlation between the number of medical encounters attributable to various conditions and the number of individuals affected by the

TABLE. Healthcare burdens attributable to various diseases and injuries, active component, U.S. Armed Forces, 2017

Major categories and conditions[a]	Medical encounters[b]		Individuals affected[c]		Bed days	
	No.	Rank[d]	No.	Rank[d]	No.	Rank[d]
Injury and poisoning						
Knee	744,593	(3)	156,062	(5)	1,498	(35)
Arm and shoulder	680,685	(4)	133,947	(9)	2,583	(26)
Foot and ankle	498,506	(6)	144,970	(7)	2,646	(24)
Leg	370,974	(12)	100,156	(13)	5,513	(12)
Hand and wrist	194,607	(15)	75,566	(18)	1,398	(36)
Head and neck	104,282	(27)	52,445	(22)	9,861	(7)
Back and abdomen	50,459	(34)	31,535	(33)	4,055	(20)
Other injury from external causes	37,260	(41)	16,557	(45)	414	(64)
Other complications NOS	33,631	(42)	18,540	(44)	7,126	(9)
Environmental	25,616	(47)	19,466	(43)	909	(45)
Unspecified injury	20,429	(53)	13,867	(50)	453	(62)
Poisoning, nondrug	5,206	(90)	3,645	(77)	298	(72)
All other injury	3,637	(98)	3,025	(83)	146	(84)
Poisoning, drugs	3,370	(101)	1,910	(93)	2,529	(27)
Other burns	1,316	(111)	610	(107)	83	(96)
Other superficial injury	798	(119)	642	(105)	0	(128)
Underdosing	24	(142)	23	(139)	0	(128)
Musculoskeletal diseases						
Other back problems	1,229,870	(1)	236,454	(2)	6,204	(11)
All other musculoskeletal diseases	805,857	(2)	246,989	(1)	4,587	(17)
Osteoarthritis	42,795	(38)	19,737	(42)	1,352	(38)
Other knee disorders	13,665	(63)	5,966	(68)	390	(66)
Other shoulder disorders	11,155	(69)	4,848	(71)	39	(106)
Rheumatoid arthritis	3,441	(100)	1,135	(98)	22	(112)
Mental health disorders						
Anxiety	480,722	(8)	67,287	(20)	17,956	(6)
Adjustment	429,365	(9)	85,080	(17)	34,453	(3)
Substance abuse disorders	419,977	(10)	30,587	(35)	42,407	(2)
Mood	394,826	(11)	48,528	(23)	45,775	(1)
All other mental health disorders	126,097	(22)	44,790	(25)	3,658	(22)
Personality	19,274	(56)	3,224	(81)	2,585	(25)
Psychotic	18,379	(57)	1,962	(90)	5,119	(13)
Tobacco dependence	10,320	(72)	6,440	(65)	0	(128)
Somatoform	8,132	(78)	2,114	(88)	613	(54)
Signs/symptoms						
All other signs and symptoms	488,964	(7)	235,343	(3)	6,773	(10)
Abdomen and pelvis	188,683	(16)	118,660	(10)	1,120	(40)
Respiratory and chest	178,263	(18)	108,051	(12)	1,208	(39)
Neurologic conditions						
Organic sleep disorders	548,916	(5)	115,781	(11)	367	(67)
All other neurologic conditions	122,419	(24)	39,758	(27)	4,669	(15)
Other mononeuritis - upper and lower limbs	13,550	(64)	6,953	(64)	51	(104)
Epilepsy	5,413	(88)	1,717	(94)	903	(47)
Multiple sclerosis	2,784	(103)	532	(110)	177	(81)
Parkinson disease	214	(130)	54	(130)	2	(126)
Sense organ diseases						
Refraction/accommodation	178,479	(17)	146,780	(6)	5	(123)
All other sense organ diseases	157,000	(21)	99,070	(14)	475	(60)
Hearing disorders	58,758	(31)	37,560	(29)	37	(107)
Glaucoma	12,651	(65)	8,037	(61)	8	(122)
Cataracts	1,187	(115)	680	(103)	4	(124)
Respiratory infections						
Upper respiratory infections	310,551	(13)	231,124	(4)	609	(55)
Lower respiratory infections	58,608	(32)	38,390	(28)	2,162	(29)
Otitis media	25,335	(48)	20,097	(39)	27	(109)
Skin diseases						
All other skin diseases	252,737	(14)	139,817	(8)	4,504	(18)

TABLE. (cont.) Healthcare burdens attributable to various diseases and injuries, active component, U.S. Armed Forces, 2017

Major categories and conditions[a]	Medical encounters[b]		Individuals affected[c]		Bed days	
	No.	Rank[d]	No.	Rank[d]	No.	Rank[d]
Sebaceous gland diseases	57,661	(33)	32,920	(32)	22	(112)
Contact dermatitis	43,251	(37)	31,502	(34)	53	(103)
Genitourinary diseases						
All other genitourinary diseases	158,719	(19)	85,168	(16)	2,105	(30)
Female genital pain	28,664	(46)	14,283	(49)	193	(79)
Menstrual disorders	22,920	(50)	14,864	(48)	573	(58)
Other breast disorders	19,863	(55)	10,808	(55)	324	(68)
Kidney stones	15,319	(60)	6,376	(66)	730	(51)
Nephritis and nephrosis	9,986	(73)	3,979	(75)	1,363	(37)
Benign prostatic hypertrophy	3,229	(102)	2,033	(89)	64	(99)
Respiratory diseases						
Allergic rhinitis	122,250	(25)	45,901	(24)	12	(119)
All other respiratory diseases	64,000	(30)	36,849	(30)	3,104	(23)
Asthma	30,554	(45)	13,228	(52)	228	(77)
Chronic sinusitis	12,420	(66)	7,176	(63)	59	(102)
Chronic obstructive pulmonary disease	6,147	(84)	5,303	(69)	68	(97)
Infectious and parasitic diseases						
All other infectious and parasitic diseases	124,817	(23)	85,531	(15)	4,634	(16)
Diarrheal diseases	47,805	(35)	40,445	(26)	982	(43)
Unspecified viral infection	14,314	(62)	13,247	(51)	119	(87)
STDs	11,892	(67)	8,441	(60)	103	(88)
Chlamydia	9,029	(75)	7,986	(62)	11	(120)
Tuberculosis	3,784	(97)	1,679	(95)	61	(100)
Hepatitis B and C	1,311	(112)	658	(104)	17	(115)
Intestinal nematode infection	256	(129)	223	(123)	4	(124)
Bacterial meningitis	173	(134)	45	(134)	124	(86)
Malaria	138	(138)	53	(132)	47	(105)
Tropical cluster	112	(140)	52	(133)	16	(116)
Digestive diseases						
All other digestive diseases	107,000	(26)	60,535	(21)	8,608	(8)
Esophagus disease	31,997	(43)	19,955	(40)	668	(52)
Other gastroenteritis and colitis	31,693	(44)	19,951	(41)	2,239	(28)
Inguinal hernia	10,916	(71)	4,847	(72)	307	(69)
Appendicitis	5,666	(86)	2,725	(84)	4,070	(19)
Peptic ulcer disease	1,318	(110)	839	(101)	393	(65)
Cirrhosis of the liver	164	(135)	65	(128)	14	(117)
Maternal conditions						
Pregnancy complications	102,371	(28)	21,679	(38)	27,282	(4)
All other maternal disorders	41,077	(39)	9,715	(56)	4,802	(14)
Delivery	20,130	(54)	11,048	(54)	19,582	(5)
Ectopic/miscarriage/abortion	8,147	(77)	3,550	(79)	417	(63)
Puerperium complications	5,771	(85)	3,332	(80)	1,082	(41)
Headache						
Headache	158,458	(20)	72,464	(19)	745	(50)
Cardiovascular diseases						
All other cardiovascular diseases	66,515	(29)	34,092	(31)	4,043	(21)
Essential hypertension	47,563	(36)	27,061	(36)	190	(80)
Cerebrovascular disease	7,226	(79)	1,565	(96)	1,918	(32)
Ischemic heart disease	7,035	(80)	2,405	(87)	967	(44)
Inflammatory	2,199	(106)	1,184	(97)	307	(69)
Rheumatic heart disease	358	(127)	307	(118)	17	(115)
Other neoplasms						
All other neoplasms	38,253	(40)	25,870	(37)	1,504	(34)
Benign skin neoplasm	15,395	(59)	12,721	(53)	5	(123)
Lipoma	8,160	(76)	5,293	(70)	60	(101)
Uterine leiomyoma	3,902	(95)	1,918	(92)	908	(46)
Endocrine disorders						
All other endocrine disorders	23,526	(49)	9,123	(58)	237	(76)

TABLE. (cont.) Healthcare burdens attributable to various diseases and injuries, active component, U.S. Armed Forces, 2017

Major categories and conditions[a]	Medical encounters[b]		Individuals affected[c]		Bed days	
	No.	Rank[d]	No.	Rank[d]	No.	Rank[d]
Hypothyroidism	11,046	(70)	6,215	(67)	18	(114)
Other thyroid disorders	9,042	(74)	4,028	(74)	291	(73)
Malignant neoplasms						
All other malignant neoplasms	6,862	(81)	962	(99)	1,699	(33)
Lymphoma and multiple myeloma	6,507	(83)	641	(106)	872	(49)
Breast cancer	4,148	(93)	422	(114)	248	(75)
Leukemia	3,926	(94)	275	(120)	1,020	(42)
Melanoma and other skin cancers	3,890	(96)	1,952	(91)	86	(94)
Testicular cancer	3,450	(99)	580	(108)	262	(74)
Colon and rectum cancers	2,600	(104)	224	(122)	581	(57)
Brain	2,431	(105)	189	(125)	902	(48)
Thyroid	1,819	(109)	476	(111)	300	(71)
Prostate cancer	1,221	(114)	208	(124)	84	(95)
Mouth and oropharynx cancers	1,088	(117)	134	(126)	87	(93)
Cervix uteri cancer	961	(118)	398	(116)	100	(91)
Trachea, bronchus, and lung cancers	604	(122)	77	(127)	174	(83)
Pancreas cancer	516	(124)	33	(138)	101	(90)
Stomach cancer	317	(128)	37	(135)	66	(98)
Bladder cancer	213	(131)	58	(129)	35	(108)
Ovary cancer	206	(132)	54	(130)	17	(115)
Esophagus cancer	183	(133)	16	(142)	9	(121)
Liver cancer	146	(136)	21	(140)	26	(111)
Corpus uteri cancer	143	(137)	18	(141)	11	(120)
Metabolic and immunity disorders						
Other metabolic disorders	22,815	(51)	15,173	(46)	468	(61)
Immunity disorders	2,125	(107)	762	(102)	99	(92)
Lipoid metabolism disorders	637	(120)	452	(112)	4	(124)
Oral conditions						
All other oral conditions	20,691	(52)	15,066	(47)	1,936	(31)
Dental caries	631	(121)	535	(109)	2	(126)
Periodontal disease	465	(125)	423	(113)	14	(117)
Blood disorders						
All other blood disorders	6,758	(82)	3,182	(82)	520	(59)
Iron-deficiency anemia	5,337	(89)	2,606	(85)	103	(88)
Other non-deficiency anemias	4,432	(91)	2,543	(86)	198	(78)
Hereditary anemias	4,200	(92)	3,632	(78)	20	(113)
Other deficiency anemias	557	(123)	307	(118)	12	(119)
Congenital anomalies						
All other congenital anomalies	16,067	(58)	9,467	(57)	655	(53)
Congenital heart disease	1,899	(108)	905	(100)	144	(85)
Other circulatory anomalies	1,108	(116)	411	(115)	177	(81)
Nutritional disorders						
Overweight, obesity	11,234	(68)	8,745	(59)	33	(109)
All other nutritional disorders	5,497	(87)	4,164	(73)	3	(125)
Protein-energy malnutrition	125	(139)	37	(135)	4	(124)
Diabetes mellitus						
Diabetes mellitus	15,148	(61)	3,825	(76)	594	(56)
Conditions arising during perinatal period[e]						
Low birth weight	1,310	(113)	310	(117)	1	(127)
All other perinatal anomalies	382	(126)	225	(121)	13	(118)
Birth asphyxia and birth trauma	52	(141)	35	(137)	1	(127)

[a]Burden of disease major categories and burden of disease-related conditions based on a modified version of those defined in the Global Burden of Disease Study[1]

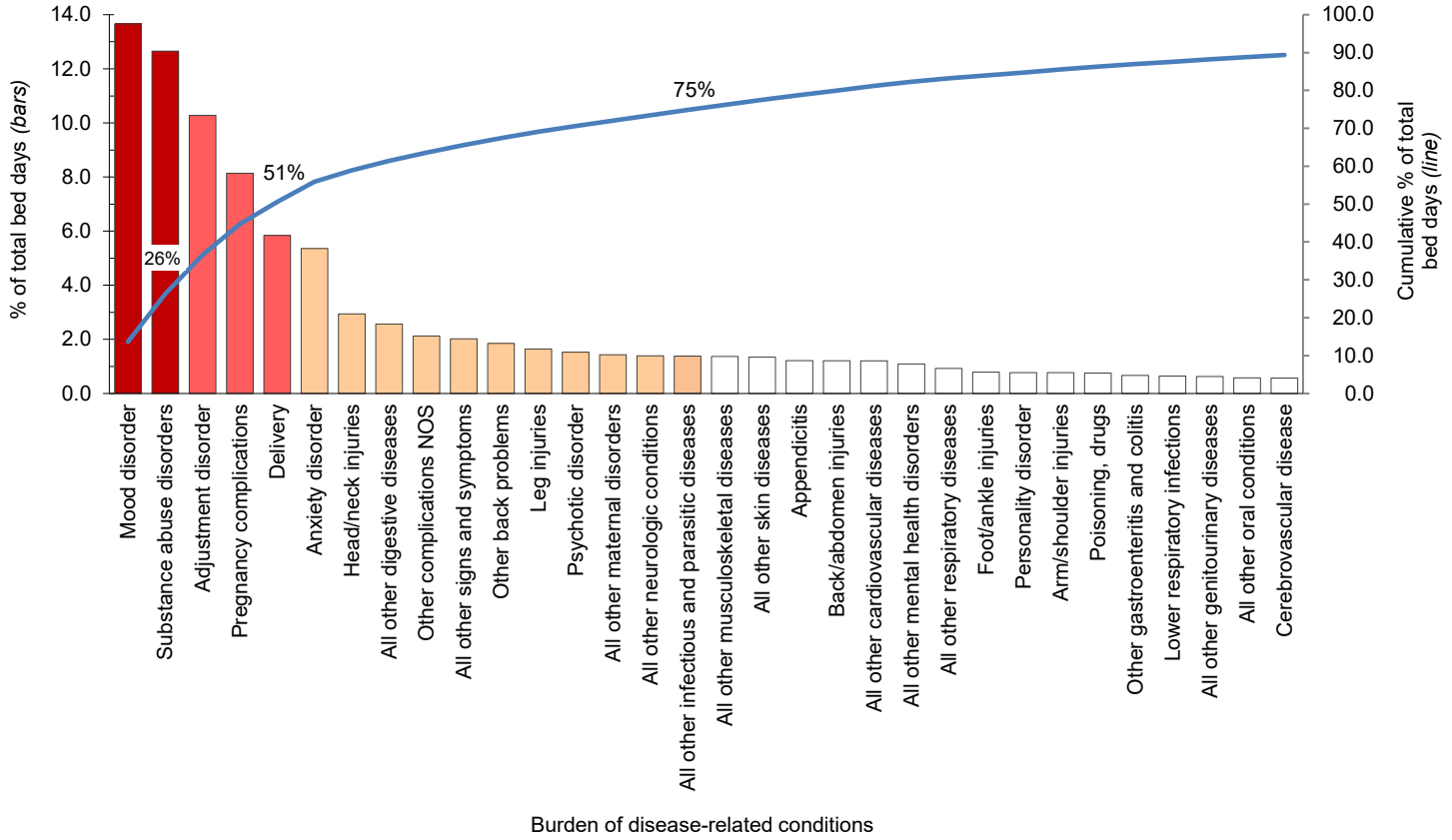
[b]Medical encounters: total hospitalizations and ambulatory visits for the condition (with no more than one encounter per individual per day per condition)

[c]Individuals with at least one hospitalization or ambulatory visit for the condition

[d]Rank based on 142 burden of disease-related disease conditions; for hospital bed days, tied values were given the same ranking, which resulted in a highest rank of 128

[e]Conditions affecting newborns erroneously coded on service member medical records

FIGURE 3. Percentage and cumulative percentage distribution, burden of disease-related conditions[a] that accounted for the most hospital bed days, active component, U.S. Armed Forces, 2017



NOS, not otherwise specified

[a]Burden of disease-related conditions based on a modified version of those defined in the Global Burden of Disease Study[1]

conditions (r=0.86) **(data not shown)**. For example, the three leading causes of medical encounters were among the five conditions that affected the most individuals **(Table)**. In contrast, there were weak to moderate positive relationships between the hospital bed days attributable to conditions and either the numbers of individuals affected by (r=0.20) or medical encounters attributable to (r=0.39) the same conditions. For example, labor and delivery and substance abuse disorders were among the top-ranking conditions in terms of proportion of total hospital bed days; however, these conditions affected relatively few service members.

EDITORIAL COMMENT

This report reiterates the major findings of prior annual reports on morbidity and healthcare burdens among U.S. military members. In particular, this report documents that a majority of the morbidity and healthcare burdens that affect active component U.S. military members are attributable to just 6.3% of the 142 burden of disease-defining conditions considered in the analysis.

In 2017, as in prior years, musculoskeletal disorders (particularly of the back), injuries (particularly of the knee and arm/shoulder), mental health disorders (particularly adjustment, anxiety, substance abuse and mood disorders), and pregnancy- and delivery-related conditions accounted for relatively large proportions of the morbidity and healthcare burdens that affected active component service members. Nine burden of disease-related conditions accounted for slightly more than half of all illness- and injury-related medical encounters of active component members and included two mental health disorders (anxiety and adjustment disorders), three anatomic site-defined injuries (knee, arm/shoulder, and foot/ankle), two musculoskeletal conditions (other back problems and all other musculoskeletal diseases), organic sleep disorders, and all other signs and symptoms.

It should be noted that this annual summary for 2017 was based on the use of ICD-10 codes exclusively. This is the second *MSMR* burden report that did not use ICD-9 codes. Because of some of the differences between the two generations of coding (e.g., ICD-10 has more than four times as many codes, often allows for much greater specificity of diagnoses, and has added and deleted some specific diagnoses or terminology compared to ICD-9), direct comparisons of the counts for 2017 with those from years prior to 2016 should be interpreted with caution. Dramatic changes in counts and rankings for specific categories or conditions may reflect changes in incidence or prevalence, the effects of a different coding system, the adjustment of healthcare providers to

the new coding system, or combinations of all three. Several years of experience with ICD-10 and analyses of the resulting DMSS data will be needed to clarify the impact of the changeover from ICD-9 to ICD-10.

Mental health disorders (including substance abuse disorders), injuries, and musculoskeletal disorders of the back have been leading causes of morbidity and disability among service members throughout military history.[3-8] It is well recognized that the prevention, treatment, and rehabilitation of back problems and joint injuries, and the detection, characterization, and management of mental health disorders—including substance abuse and deployment stress-related disorders (e.g., post-traumatic stress disorder)—should be the highest priorities for military medical research, public health, and force health protection programs.

In summary, this analysis, like those of prior years, documents that a relatively few illnesses and injuries account for most of the morbidity and healthcare burdens that affect U.S. military members. Illnesses and injuries that disproportionately contribute to morbidity and healthcare burdens should be high-priority targets for prevention research and resources.

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Hospitalizations, Active Component, U.S. Armed Forces, 2017

This report documents the frequencies, rates, trends, and distributions of hospitalizations of active component members of the U.S. Army, Navy, Air Force, and Marine Corps during calendar year 2017. Summaries are based on standardized records of hospitalizations at U.S. military and non-military (reimbursed care) medical facilities worldwide. For this report, primary (first-listed) discharge diagnoses are considered indicative of the primary reasons for hospitalizations; summaries are based on the first three digits of the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10) used to report primary discharge diagnoses. Hospitalizations not routinely documented with standardized, automated records (e.g., field training exercises, shipboard) are not centrally available for health surveillance purposes and thus are not included in this report.

Frequencies, rates, and trends

In 2017, there were 67,845 records of hospitalizations of active component members of the U.S. Army, Navy, Air Force, and Marine Corps; 31.4% of the hospitalizations were in non-military facilities **(Table 1, data not shown)**. The annual hospitalization rate (all causes) for 2017 was 52.9 per 1,000 service member person-years (p-yrs) and was the lowest rate reported during 2008–2017, the years covered in this report **(Figure 1)**.

Hospitalizations, by illness and injury categories

As in prior years, in 2017, three diagnostic categories accounted for more than half (58.7%) of all hospitalizations of active component members: mental health disorders (26.6%), pregnancy- and delivery-related conditions (22.5%), and injury/poisoning (9.5%) **(Table 1)**. Similar to 2013 and 2015, in 2017 there were more hospitalizations for mental health disorders than for any other major diagnostic category (per ICD-10); 2008 was the last year in which the number of hospitalizations for pregnancy- and delivery-related conditions exceeded the number for mental health disorders **(data not shown)**.

Comparing 2017 to 2013, numbers of hospitalizations decreased in all major categories of illnesses and injuries except for mental health disorders, which remained relatively stable **(Table 1)**. The largest drop in the number of hospitalizations during 2013–2017 was seen in the category of injury/poisoning (hospitalization difference, 2013–2017: -2,132; 24.8% decrease).

Hospitalizations, by sex

In 2017, the hospitalization rate (all causes) among females was more than three times that among males (hospitalization

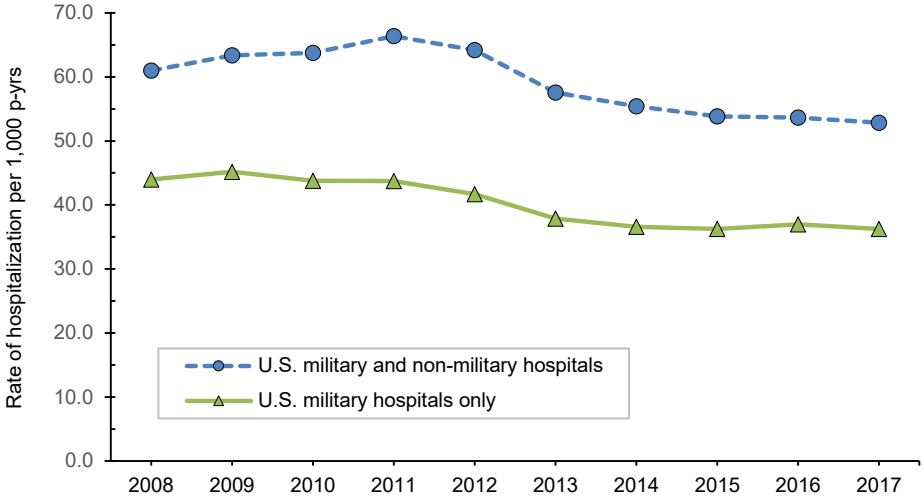
TABLE 1. Hospitalizations, by ICD-10 diagnostic categories, U.S. Armed Forces, 2013, 2015, and 2017

	2013			2015			2017		
Major diagnostic category (ICD-10 codes)	No.	Rate[a]	Rank	No.	Rate[a]	Rank	No.	Rate[a]	Rank
Mental health disorders (F01–F99)	18,025	13.2	(1)	15,572	12.0	(1)	18,078	14.1	(1)
Pregnancy and delivery (O00–O99, relevant Z-codes)[b]	16,096	79.2	(2)	15,377	76.8	(2)	15,264	73.7	(2)
Injury/poisoning (S00–T98, DOD0101–DOD0105)	8,599	6.3	(3)	7,034	5.4	(3)	6,467	5.0	(3)
Digestive system (K00–K95)	7,253	5.3	(4)	6,321	4.9	(5)	5,394	4.2	(4)
Musculoskeletal system (M00–M99)	6,560	4.8	(5)	6,373	4.9	(4)	5,217	4.1	(5)
Signs/symptoms and ill-defined conditions (R00–R99)	3,765	2.7	(6)	3,007	2.3	(7)	3,164	2.5	(6)
Other (Z00–Z99, except pregnancy-related)	3,231	2.4	(7)	3,226	2.5	(6)	2,060	1.6	(7)
Genitourinary system (N00–N99)	2,382	1.7	(9)	2,164	1.7	(8)	2,015	1.6	(8)
Respiratory system (J00–J99)	2,192	1.6	(10)	1,906	1.5	(10)	1,855	1.4	(9)
Circulatory system (I00–I99)	2,459	1.8	(8)	2,040	1.6	(9)	1,815	1.4	(10)
Nervous system and sense organs (G00–H95)	1,963	1.4	(11)	1,549	1.2	(12)	1,665	1.3	(11)
Neoplasms (C00–D49)	1,918	1.4	(12)	1,653	1.3	(11)	1,533	1.2	(12)
Skin and subcutaneous tissue (L00–L99)	1,683	1.2	(13)	1,379	1.1	(13)	1,147	0.9	(13)
Infectious and parasitic diseases (A00–B99)	1,289	0.9	(14)	1,199	0.9	(14)	1,092	0.9	(14)
Endocrine, nutrition, immunity (E00–E89)	742	0.5	(15)	644	0.5	(15)	552	0.4	(15)
Hematologic disorders (D50–D89)	330	0.2	(17)	287	0.2	(17)	283	0.2	(16)
Congenital anomalies (Q00–Q99)	414	0.3	(16)	366	0.3	(16)	244	0.2	(17)
Total	78,901	57.6		70,097	53.9		67,845	52.9	

[a]Rate per 1,000 person-years

[b]Rate of pregnancy and delivery-related hospitalizations among females only

FIGURE 1. Rates of hospitalization, by year, active component, U.S. Armed Forces, 2008–2017



rate, overall: females: 129.2 per 1,000 p-yrs; males: 38.2 per 1,000 p-yrs). Excluding pregnancy and delivery, the rate of hospitalizations among females (55.5 per 1,000 p-yrs) was 45.5% higher than the rate among males **(data not shown)**.

Overall hospitalization rates were higher (i.e., the rate difference [RD] was greater than 1.0 per 1,000 p-yrs) among females than males for mental health disorders (female:male [f:m], RD: 8.3 per 1,000 p-yrs); genitourinary disorders (RD: 3.9 per 1,000 p-yrs); neoplasms (RD: 2.2 per 1,000 p-yrs); and, signs, symptoms, and ill-defined conditions (RD: 1.3 per 1,000 p-yrs) **(data not shown)**. Hospitalization rates were higher among males than females for injury/poisoning (m:f RD: 1.0 per 1,000 p-yrs). Hospitalization rates were similar among males and females for the remaining 11 major disease-specific categories **(data not shown)**.

Relationships between age and hospitalization rates varied significantly across illness- and injury-specific categories. For example, among both males and females, hospitalization rates increased with age for neoplasms, circulatory, genitourinary, and musculoskeletal system/connective tissue disorders; rates decreased with age for mental health disorders; and rates were relatively stable across age groups for injury/poisoning, skin and subcutaneous tissue, and infectious/parasitic diseases. Rate differences between females and males changed for one category with advancing age; for service members aged 30 years or older, the rates for neoplasms among females were notably higher than among males when compared to the differences in the younger age groups **(Figure 2)**.

Most frequent diagnoses

In 2017, adjustment disorder was the most frequent discharge diagnosis among males (n=4,318) **(Table 2)**. Alcohol dependence (n=1,964), major depressive disorder [single episode, unspecified] (n=1,369), acute appendicitis (n=1,098), major depressive disorder [recurrent, severe without psychotic features] (n=773), and posttraumatic stress disorder (PTSD) (n=695) were the next five most frequent diagnoses in males **(Table 2)**.

In 2017, pregnancy- and delivery-related conditions represented four of the five leading causes of hospitalizations among females and this category alone accounted for 57.0% of all hospitalizations of females **(Table 3)**. The four top-ranking discharge diagnoses in this condition category included post-term (late) pregnancy (n=1,280), abnormality in fetal heart rate and rhythm (n=1,154), and first- and second-degree perineal laceration during delivery (n=1,019 and n=958, respectively). Other than pregnancy- and delivery-related diagnoses, leading causes of hospitalizations among females were adjustment disorder (n=1,326), major depressive disorder [single episode, unspecified] (n=477), PTSD (n=377), recurrent major depressive disorder without psychotic features (n=353), and alcohol dependence (n=247). Combined, mental health disorder diagnoses accounted for one-sixth (16.3%) of all hospitalizations of females.

Injury/poisoning

As in the past, in 2017, injury/poisoning was the third-leading cause of hospitalizations of U.S. military members **(Table 1)**. Of all injury/poisoning-related hospitalizations in U.S. military medical facilities (n=3,802), three-fifths (60.0%) had a missing or invalid NATO Standardization Agreement (STANAG) code **(Table 4)**. More than one-quarter (28.8%) of all "unintentional" injury/poisoning-related hospitalizations in U.S. military facilities (n=1,353), were considered caused by falls and miscellaneous (n=389), while complications of medical or surgical care (n=133) accounted for 9.8% of "unintentional" injury/poisoning-related hospitalizations **(Table 4)**.

Among males, injury/poisoning-related hospitalizations were most often related to infection following a procedure, other fractures of the lower leg, or concussion **(Table 2)**. Among females, injury/poisoning-related hospitalizations were most often related to infection following a procedure, poisoning by/adverse effect of acetaminophen derivatives, other fractures of the lower leg, or poisoning by/adverse effect of other and unspecified antidepressants **(Table 3)**.

Durations of hospitalizations

During 2008–2017, the median duration of hospital stays (all causes) remained stable (3 days) **(Figure 3)**. As in previous years, medians and ranges of durations of hospitalizations varied considerably across major diagnostic categories. For example, median lengths of hospitalizations varied from 2 days (e.g., musculoskeletal system disorders; genitourinary system disorders; signs, symptoms, and ill-defined conditions) to 6 days (mental health disorders). For most diagnostic categories, less than 5% of hospitalizations exceeded 12 days, but for five categories, 5% of hospitalizations had longer durations: nervous system/sense organs (19 days); injury/poisoning (20 days); neoplasms (21 days); "other" or

FIGURE 2. Rates of hospitalization, by major diagnostic category, age group, and sex, active component, U.S. Armed Forces, 2017

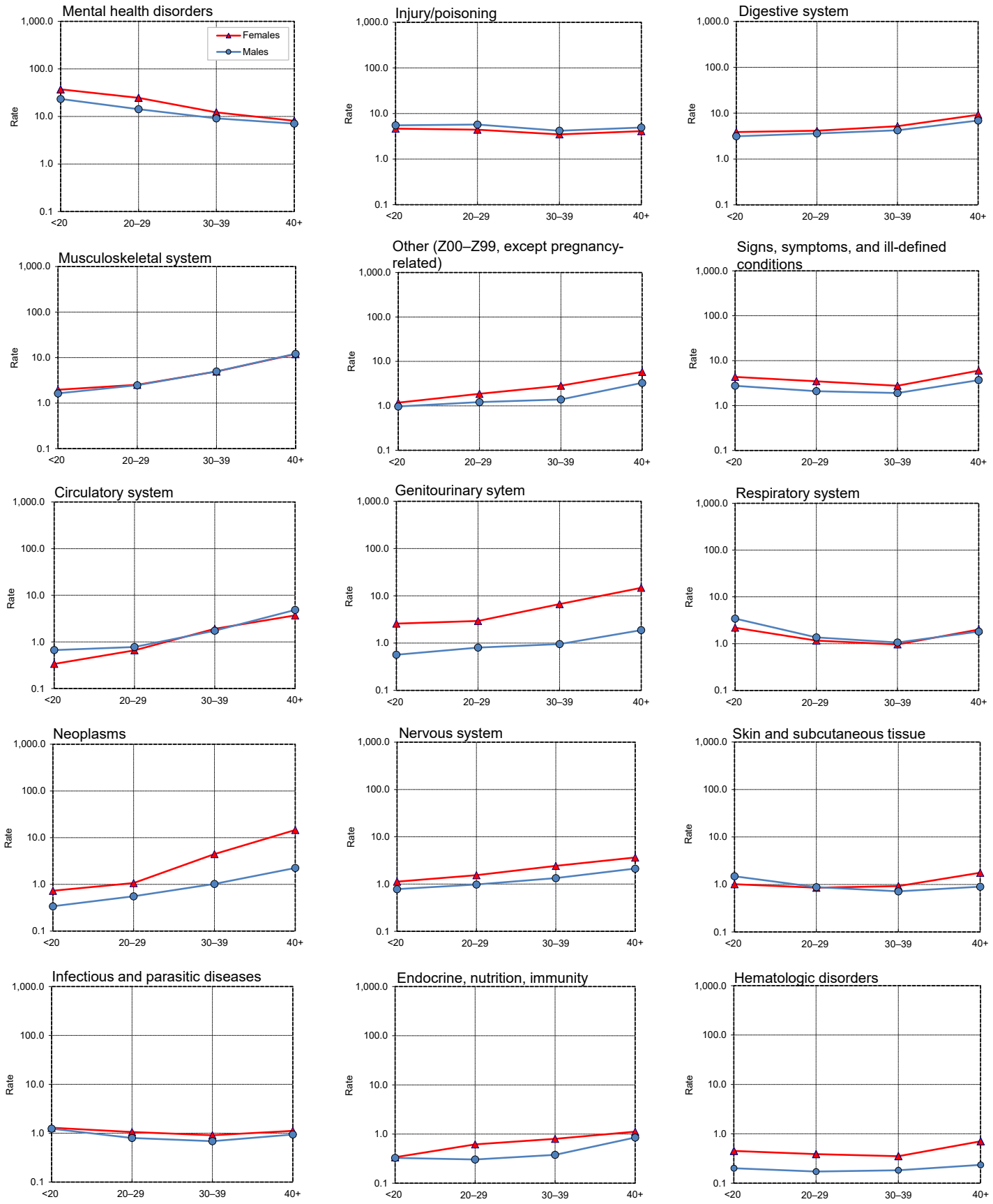


TABLE 2. Most frequent diagnoses during hospitalization with ICD-10 codes, by major diagnostic category, males, U.S. Armed Forces, 2017

Diagnostic category (ICD-10 codes) ♂	No.	%[a]
Mental health disorders (F01–F99)	**13,717**	
Adjustment disorders	4,318	31.5
Alcohol dependence	1,964	14.3
Major depressive disorder, single episode, unspecified	1,369	10.0
Major depressive disorder, recurrent, severe without psychotic features	773	5.6
Post-traumatic stress disorder (PTSD)	695	5.1
Injury/poisoning (S00–T98, DOD0101–DOD0105)	**5,603**	
Infection following a procedure	202	3.6
Other fractures of lower leg	170	3.0
Concussion	166	3.0
Heatstroke and sunstroke	130	2.3
Fracture of mandible	127	2.3
Digestive system (K00–K95)	**4,398**	
Other and unspecified acute appendicitis	1,098	25.0
Noninfective gastroenteritis and colitis, unspecified	176	4.0
Acute pancreatitis, unspecified	162	3.7
Acute appendicitis with localized peritonitis	156	3.5
Other and unspecified intestinal obstruction	143	3.3
Musculoskeletal system (M00–M99)	**4,414**	
Other specified disorders of muscle	494	11.2
Thoracic, thoracolumbar and lumbosacral intervertebral disc disorders with radiculopathy	421	9.5
Major anomalies of jaw size	271	6.1
Other spondylosis with radiculopathy	235	5.3
Cervical disc disorder with radiculopathy	224	5.1
Other (V00–V98, except pregnancy-related)	**1,567**	
Encounter for other orthopedic aftercare	292	18.6
Encounter for antineoplastic chemotherapy and immunotherapy	290	18.5
Encounter for examination and observation for unspecified reason	241	15.4
Encounter for other specified postprocedural aftercare	201	12.8
Aftercare following joint replacement surgery	135	8.6
Signs, symptoms, and ill-defined conditions (R00–R99)	**2,425**	
Other symptoms and signs involving emotional state	671	27.7
Other chest pain	261	10.8
Syncope and collapse	247	10.2
Chest pain, unspecified	147	6.1
Unspecified convulsions	98	4.0
Circulatory system (I00–I99)	**1,565**	
Pulmonary embolism without acute cor pulmonale	198	12.7
Non-ST elevation (NSTEMI) myocardial infarction	79	5.0
Paroxysmal atrial fibrillation	75	4.8
Unspecified atrial fibrillation and atrial flutter	66	4.2
Atherosclerotic heart disease of native coronary artery	65	4.2
Genitourinary system (N00–N99)	**1,010**	
Acute kidney failure, unspecified	216	21.4
Hydronephrosis with renal and ureteral calculous obstruction	100	9.9
Calculus of ureter	74	7.3
Calculus of kidney	57	5.6
Hypertrophy of breast	44	4.4

Diagnostic category (ICD-10 codes) ♂	No.	%[a]
Respiratory system (J00–J99)	**1,592**	
Pneumonia, unspecified organism	310	19.5
Peritonsillar abscess	119	7.5
Deviated nasal septum	98	6.2
Other intraoperative and postprocedural complications and disorders of respiratory system, not elsewhere classified	68	4.3
Acute tonsillitis, unspecified	57	3.6
Neoplasms (C00–D49)	**906**	
Malignant neoplasm of thyroid gland	42	4.6
Malignant neoplasm of brain, unspecified	33	3.6
Malignant neoplasm of prostate	31	3.4
Malignant neoplasm of testis, unspecified whether descended or undescended	28	3.1
Acute lymphoblastic leukemia [ALL]	24	2.6
Nervous system and sense organs (G00–G99, H00–H95)	**1,270**	
Sleep apnea	135	10.6
Acute pain, not elsewhere classified	79	6.2
Nonpyogenic meningitis	55	4.3
Epilepsy, unspecified	54	4.3
Brachial plexus disorders	42	3.3
Skin and subcutaneous tissue (L00–L99)	948	
Cellulitis and acute lymphangitis of other parts of limb	438	46.2
Cutaneous abscess, furuncle and carbuncle of limb	51	5.4
Cutaneous abscess, furuncle and carbuncle of trunk	44	4.6
Cellulitis and acute lymphangitis of finger and toe	42	4.4
Pilonidal cyst and sinus with abscess	41	4.3
Infectious and parasitic diseases (A00–B99)	876	
Sepsis, unspecified organism	247	28.2
Infectious gastroenteritis and colitis, unspecified	72	8.2
Viral intestinal infection, unspecified	55	6.3
Viral meningitis, unspecified	40	4.6
Viral infection, unspecified	36	4.1
Endocrine, nutrition, immunity (E00–E89)	411	
Dehydration	58	14.1
Type 1 diabetes mellitus with ketoacidosis	39	9.5
Type 2 diabetes mellitus with other specified complications	33	8.0
Hypo-osmolality and hyponatremia	30	7.3
Other specified diabetes mellitus with ketoacidosis	24	5.8
Congenital anomalies (Q00–Q99)	181	
Atrial septal defect	17	9.4
Meckel's diverticulum (displaced) (hypertrophic)	15	8.3
Pectus excavatum	14	7.7
Arteriovenous malformation of cerebral vessels	13	7.2
Other congenital deformities of hip	13	7.2
Hematologic and immune disorders (D50–D89)	198	
Neutropenia, unspecified	39	19.7
Other specified aplastic anemias and other bone marrow failure syndromes	16	8.1
Immune thrombocytopenic purpura	14	7.1
Anemia, unspecified	12	6.1
Iron deficiency anemia secondary to blood loss (chronic)	11	5.6

[a]Percentage of the total number of hospitalizations within the diagnostic category

TABLE 3. Most frequent diagnoses during hospitalization with ICD-10 codes, by major diagnostic category, females, U.S. Armed Forces, 2017

Diagnostic category (ICD-10 codes) ♀	No.	%[a]
Mental health disorders (F01–F99)	**4,361**	
Adjustment disorders	1,326	30.4
Major depressive disorder, single episode, unspecified	477	10.9
Post-traumatic stress disorder (PTSD)	377	8.6
Major depressive disorder, recurrent severe without psychotic features	353	8.1
Alcohol dependence	247	5.7
Pregnancy and delivery (O00–O99, relevant Z-codes)	**15,264**	
Post-term pregnancy	1,280	8.4
Abnormality in fetal heart rate and rhythm complicating labor and delivery	1,154	7.6
First-degree perineal laceration during delivery	1,019	6.7
Second-degree perineal laceration during delivery	958	6.3
Maternal care due to uterine scar from previous surgery	814	5.3
Injury and poisoning (S00–T98, DOD0101–DOD0105)	**864**	
Infection following a procedure	58	6.7
Poisoning by, adverse effect of and underdosing of 4-Aminophenol derivatives	40	4.6
Other fractures of lower leg	32	3.7
Poisoning by, adverse effect of, and underdosing of other and unspecified antidepressants	32	3.7
Unspecified injury	29	3.4
Digestive system (K00–K95)	**996**	
Other and unspecified acute appendicitis	180	18.1
Noninfective gastroenteritis and colitis, unspecified	56	5.6
Calculus of gallbladder with acute cholecystitis	43	4.3
Acute cholecystitis	40	4.0
Acute pancreatitis, unspecified	36	3.6
Musculoskeletal system (M00–M99)	**803**	
Other specified disorders of muscle	75	9.3
Major anomalies of jaw size	59	7.3
Thoracic, thoracolumbar and lumbosacral intervertebral disc disorders with radiculopathy	54	6.7
Anomalies of dental arch relationship	41	5.1
Unilateral primary osteoarthritis of knee	33	4.1
Other (V00–V98, except pregnancy-related)	**493**	
Encounter for other specified postprocedural aftercare	95	19.3
Encounter for examination and observation for unspecified reason	84	17.0
Encounter for other orthopedic aftercare	48	9.7
Encounter for antineoplastic chemotherapy and immunotherapy	43	8.7
Aftercare following joint replacement surgery	35	7.1
Signs, symptoms, and ill-defined conditions (R00–R99)	**739**	
Other symptoms and signs involving emotional state	167	22.6
Syncope and collapse	70	9.5
Pain localized to other parts of lower abdomen	64	8.7
Other chest pain	45	6.1
Unspecified abdominal pain	37	5.0
Circulatory system (I00–I99)	**250**	
Pulmonary embolism without acute cor pulmonale	52	20.8
Supraventricular tachycardia	18	7.2
Cerebral infarction, unspecified	10	4.0
Non-ST elevation (NSTEMI) myocardial infarction	8	3.2
Cerebral aneurysm, nonruptured	8	3.2

Diagnostic category (ICD-10 codes) ♀	No.	%[a]
Genitourinary system (N00–N99)	**1,005**	
Abnormal uterine and vaginal bleeding, unspecified	116	11.5
Other and unspecified ovarian cysts	77	7.7
Hypertrophy of breast	63	6.3
Excessive and frequent menstruation with regular cycle	63	6.3
Acute tubulo-interstitial nephritis	57	5.7
Respiratory system (J00–J99)	**263**	
Pneumonia, unspecified organism	32	12.2
Peritonsillar abscess	17	6.5
Other intraoperative and postprocedural complications and disorders of respiratory system, not elsewhere classified	14	5.3
Acute tonsillitis, unspecified	13	4.9
Chronic tonsillitis and adenoiditis	12	4.6
Neoplasms (C00–D49)	**627**	
Leiomyoma of uterus, unspecified	208	33.2
Intramural leiomyoma of uterus	77	12.3
Subserosal leiomyoma of uterus	40	6.4
Malignant neoplasm of breast of unspecified site	28	4.5
Malignant neoplasm of thyroid gland	21	3.3
Nervous system and sense organs (G00–G99, H00–H95)	**395**	
Acute pain, not elsewhere classified	37	9.4
Migraine, unspecified	31	7.8
Multiple sclerosis	22	5.6
Epilepsy, unspecified	17	4.3
Brachial plexus disorders	15	3.8
Skin and subcutaneous tissue (L00–L99)	**199**	
Cellulitis and acute lymphangitis of other parts of limb	39	19.6
Cutaneous abscess, furuncle and carbuncle of limb	13	6.5
Pilonidal cyst and sinus with abscess	12	6.0
Postprocedural hematoma and seroma of skin and subcutaneous tissue following a procedure	12	6.0
Excessive and redundant skin and subcutaneous tissue	11	5.5
Infectious and parasitic diseases (A00–B99)	**216**	
Sepsis, unspecified organism	76	35.2
Infectious gastroenteritis and colitis, unspecified	18	8.3
Viral intestinal infection, unspecified	15	6.9
Enterocolitis due to *Clostridium difficile*	12	5.6
Sepsis due to other Gram-negative organisms	12	5.6
Endocrine, nutrition, immunity (E00–E89)	**141**	
Thyrotoxicosis with diffuse goiter	17	12.1
Nontoxic single thyroid nodule	10	7.1
Nontoxic multinodular goiter	8	5.7
Hypokalemia	8	5.7
Type 1 diabetes mellitus with ketoacidosis	7	5.0
Hematologic and immune disorders (D50–D89)	**85**	
Iron deficiency anemia, unspecified	13	15.3
Immune thrombocytopenic purpura	12	14.1
Thrombocytopenia, unspecified	11	12.9
Anemia, unspecified	9	10.6
Iron deficiency anemia secondary to blood loss (chronic)	8	9.4

[a]Percentage of the total number of hospitalizations within the diagnostic category

TABLE 4. Injury hospitalizations,[a] by causal agent,[b] U.S. Armed Forces, 2017

Cause	No.	%
Unintentional	1,353	35.6
Fall and miscellaneous	389	10.2
Land transport	300	7.9
Complications of medical/surgical	133	3.5
Athletics	121	3.2
Poisons and fire	112	2.9
Environmental	86	2.3
Guns, explosives (includes accidents during war)	83	2.2
Machinery, tools	78	2.1
Air transport	44	1.2
Water transport	7	0.2
Intentional	168	4.4
Self-inflicted	96	2.5
Battle casualty	41	1.1
Non-battle, inflicted by other (e.g., assault)	31	0.8
Missing/invalid code	2,281	60.0
Total	3,802	

[a]Hospitalizations in U.S. military medical facilities only
[b]Causal agents were determined by codes per STANAG 2050

V-coded hospitalizations (primarily orthopedic aftercare and rehabilitation following a previous illness or injury) (29 days); and mental health disorders (30 days) **(Figure 4)**.

Hospitalizations, by service

Among active component members of the Navy and Air Force, pregnancy- and delivery-related conditions accounted for more hospitalizations than any other category of illnesses or injuries; however, among active component members of the Army and Marine Corps, mental health disorders were the leading cause of hospitalizations **(Table 5)**. The crude hospitalization rate for mental health disorders among active component Army members (18.4 per 1,000 p-yrs) was higher than among members of all other services.

Injury/poisoning was the third-leading cause of hospitalizations in the Army, fourth in the Navy, fifth in the Air Force, and third in the Marine Corps **(Table 5)**. The hospitalization rate for injury/poisoning was 17.1% higher among soldiers (7.0 per 1,000 p-yrs) than Marines (6.0 per 1,000 p-yrs).

FIGURE 3. Length of hospital stay, by year, active component, U.S. Armed Forces, 2008–2017

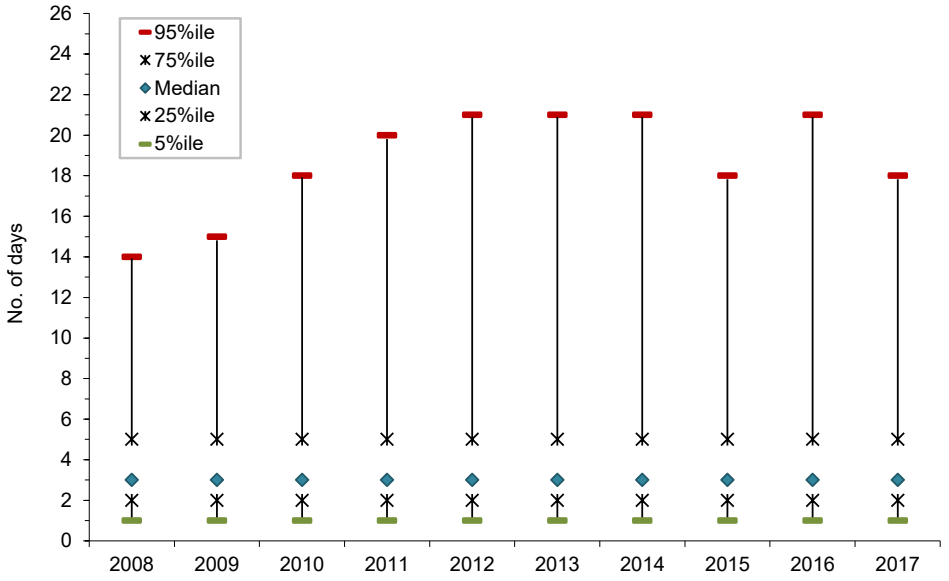
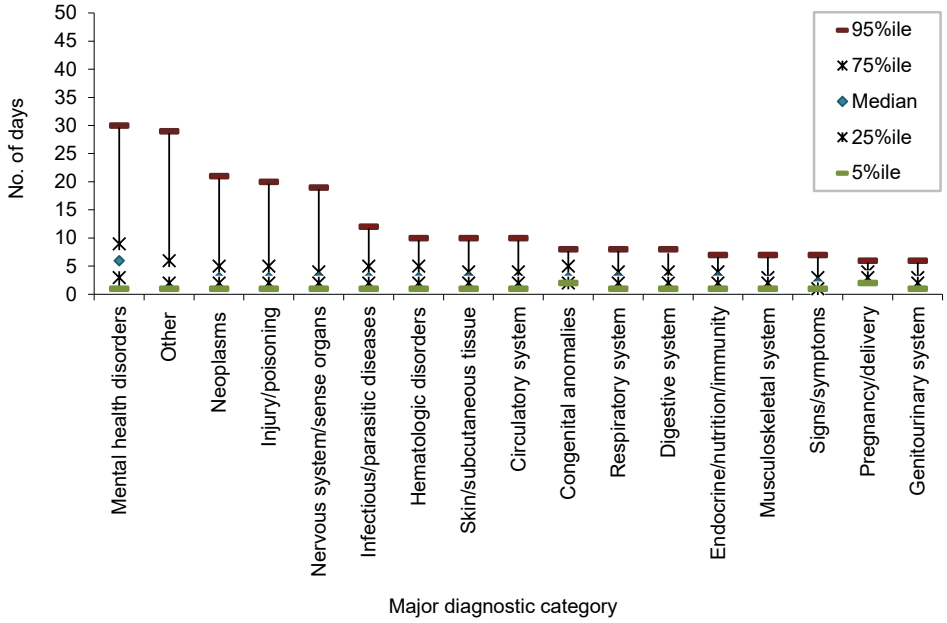


FIGURE 4. Length of hospital stay, by major diagnostic category, active component, U.S. Armed Forces, 2017



EDITORIAL COMMENT

In 2017, the hospitalization rate for all causes among active component members was the lowest rate in the past 10 years. As in past years, in 2017, mental health disorders, pregnancy- and delivery-related conditions, and injury/poisoning accounted for more than half of all hospitalizations of active component members. Adjustment and mood disorders were among the leading causes of hospitalizations among both male and female service members. In recent years, attention at the highest levels of the U.S. military

TABLE 5. Hospitalizations, by service and ICD-10 diagnostic category, U.S. Armed Forces, 2017

	Army		Navy		Air Force		Marine Corps	
Major diagnostic category (ICD-10 codes)	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]
Mental health disorders (F01–F99)	8,571	18.4	3,439	10.8	3,842	12.1	2,226	12.1
Pregnancy and delivery (O00–O99, relevant Z-codes)[b]	5,262	76.5	4,433	73.0	4,327	69.5	1,242	81.2
Injury/poisoning (S00–T98, DOD0101–DOD0105)	3,269	7.0	1,145	3.6	950	3.0	1,103	6.0
Musculoskeletal system (M00–M99)	2,566	5.5	901	2.8	1,070	3.4	680	3.7
Digestive system (K00–K95)	2,449	5.3	1,282	4.0	1,028	3.2	635	3.5
Signs, symptoms, and ill-defined conditions (R00–R99)	1,925	4.1	486	1.5	521	1.6	232	1.3
Genitourinary system (N00–N99)	900	1.9	428	1.3	499	1.6	188	1.0
Respiratory system (J00–J99)	881	1.9	298	0.9	313	1.0	363	2.0
Other (Z00–Z99, except pregnancy-related)	820	1.8	552	1.7	438	1.4	250	1.4
Circulatory system (I00–I99)	785	1.7	426	1.3	417	1.3	187	1.0
Nervous system and sense organs (G00–G99, H00–H95)	751	1.6	395	1.2	355	1.1	164	0.9
Neoplasms (C00–D49)	639	1.4	392	1.2	379	1.2	123	0.7
Skin and subcutaneous tissue (L00–L99)	547	1.2	213	0.7	179	0.6	208	1.1
Infectious and parasitic diseases (A00–B99)	444	1.0	213	0.7	289	0.9	146	0.8
Endocrine, nutrition, immunity (E00–E89)	250	0.5	119	0.4	113	0.4	70	0.4
Hematologic and immune disorders (D50–D89)	122	0.3	64	0.2	58	0.2	39	0.2
Congenital anomalies (Q00–Q99)	98	0.2	47	0.1	61	0.2	38	0.2
Total	30,279	65.1	14,833	46.6	14,839	46.9	7,894	43.0

[a]Rate per 1,000 person-years
[b]Rates for pregnancy and delivery-related hospitalizations among females only

and significant resources have focused on detecting, diagnosing, and treating mental health disorders—especially those related to long and repeated deployments and combat stress. Annual numbers and crude rates of hospitalizations for mental health disorders decreased between 2013 and 2015, but then increased slightly in 2016. The number of mental health disorder-related hospitalizations in 2017 was more than a thousand greater than in 2016 and the crude rate was 9.6% higher.

The reasons for the recent downturn in the trends for annual numbers of hospitalizations overall and for the slight increase in mental health disorder-related hospitalizations in particular are not clear. It is conceivable that there has been a decline in the impact of combat and peacekeeping operations on overall morbidity among service members since the withdrawal of U.S. forces from Iraq and the official end to combat operations in Afghanistan. Continued monitoring of hospitalizations and all other healthcare encounters over time may permit elucidation of the possible reasons for the recent trends in hospitalization.

This summary has certain limitations that should be considered when interpreting the results. For example, the scope of this report is limited to members of the active components of the U.S. Armed Forces. Many reserve component members were hospitalized for illnesses and injuries while serving on active duty in 2017; these hospitalizations are not accounted for in this report. Also, many injury/poisoning-related hospitalizations occur in non-military hospitals; in most cases, the "external causes" of such injuries and poisonings are not reported on standardized records. If there are significant differences between the causes of injuries and poisonings that resulted in hospitalizations in U.S. military and non-military hospitals, the summary of external causes of injuries requiring hospital treatment reported here **(Table 4)** could be misleading. Also, this summary is based on primary (first-listed) discharge diagnoses only; in many hospitalized cases, there are multiple underlying conditions. For example, military members who are wounded in combat or injured in motor vehicle accidents may have multiple injuries and complex medical and psychological complications. In such cases, only the first-listed discharge diagnosis would be accounted for in this report. Even with these and other limitations, this report provides useful and informative insights regarding the natures, rates, and distributions of the most serious illnesses and injuries that affect active component military members. Finally, MHS GENESIS, the new electronic health record for the Military Health System, was implemented at several military treatment facilities during 2017. Medical data from sites using MHS GENESIS are not available in DMSS. These sites include Naval Hospital Oak Harbor, Naval Hospital Bremerton, Air Force Medical Services Fairchild, and Madigan Army Medical Center. Therefore, medical encounter data for individuals who were hospitalized at one of these facilities during 2017 were not included in this analysis.

Ambulatory Visits, Active Component, U.S. Armed Forces, 2017

This report documents the frequencies, rates, trends, and characteristics of ambulatory healthcare visits of active component members of the U.S. Army, Navy, Air Force, and Marine Corps during 2017. Ambulatory visits of U.S. service members in fixed military and nonmilitary (reimbursed through the Military Health System [MHS]) medical treatment facilities are documented with standardized, automated records. These records are routinely archived for health surveillance purposes in the Defense Medical Surveillance System (DMSS), which is the source of data for this report. Ambulatory visits that are not routinely and completely documented with standardized electronic records (e.g., during deployments, field training exercises, at sea) are not included in this analysis. As in previous *MSMR* reports, all records of ambulatory visits of active component service members were categorized according to the first four characters of the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10) codes entered in the primary (first-listed) diagnostic position of the visit records.[1]

Frequencies, rates, and trends

During 2017, there were 17,079,552 reported ambulatory visits of active component service members. The crude annual rate (all causes) was 13,305 visits per 1,000 person-years (p-yrs) or 13.3 visits per p-yr; thus, on average, each service member had approximately 13 ambulatory encounters during the year **(Table 1)**. The rate of documented ambulatory visits in 2017 was 5.0% lower than the rate in 2015 and 7.9% lower than the peak in 2012 (14,438.9 visits per 1,000 p-yrs) but 17.0% higher than in 2008 **(Figure 1)**. In 2017, 32.1% of ambulatory visits were classified into the "other" category (i.e., other contact with health services) **(Table 1)**. This category (indicated by Z-codes of ICD-10, except pregnancy-related) covers health care not related to a current illness or injury. Such care includes counseling, immunizations, deployment-related health assessments, routine and special medical examinations (e.g., periodic, occupational, retirement), and therapeutic and rehabilitative treatments for previously diagnosed illnesses or injuries (e.g., physical therapy).

In 2017, there were 11,596,220 documented ambulatory visits for illnesses and injuries (ICD-10: A00–T88, including relevant pregnancy Z-codes) **(Table 1)**. The illness and injury category does not include diagnoses classified as "other." The crude annual rate of illness- and injury-related visits was approximately 9.0 visits per person-year (p-yr). The rate of ambulatory visits for illnesses and injuries in 2017 was

TABLE 1. Ambulatory visits, ICD-10 diagnostic categories, U.S. Armed Forces, 2013, 2015, and 2017

	2013			2015			2017		
Major diagnostic category (ICD-10 codes)	No.	Rate[a]	Rank	No.	Rate[a]	Rank	No.	Rate[a]	Rank
Other (Z00–Z99, except pregnancy-related)	9,242,490	6,744.5	(1)	7,817,424	6,005.71	(1)	5,483,332	4,271.58	(1)
Musculoskeletal system (M00–M99)	3,002,975	2,191.4	(2)	3,210,531	2,466.48	(2)	4,233,423	3,297.88	(2)
Mental health disorders (F01–F99)	1,990,173	1,452.3	(3)	1,889,440	1,451.56	(3)	1,950,077	1,519.13	(3)
Nervous system and sense organs (G00–H95)	1,026,377	749.0	(5)	1,057,019	812.05	(4)	1,286,040	1,001.84	(4)
Signs, symptoms, and ill-defined conditions (R00–R99)	1,067,824	779.2	(4)	1,007,320	773.87	(5)	1,034,849	806.16	(5)
Injury/poisoning (S00–T98)	858,887	626.8	(6)	801,233	615.54	(6)	776,290	604.74	(6)
Respiratory system (J00–J99)	603,025	440.0	(7)	568,222	436.53	(7)	602,391	469.27	(7)
Skin and subcutaneous tissue (L00–L99)	391,152	285.4	(8)	364,098	279.72	(8)	370,035	288.26	(8)
Pregnancy and delivery (O00–O99, relevant Z-codes)[b]	347,981	1,713.2	(9)	331,392	1,655.61	(9)	313,893	1,515.55	(9)
Genitourinary system (N00–N99)	272,033	198.5	(10)	257,014	197.45	(10)	240,525	187.37	(10)
Digestive system (K00–K95)	270,624	197.5	(11)	239,217	183.78	(11)	218,628	170.31	(11)
Infectious and parasitic diseases (A00–B99)	213,933	156.1	(12)	212,044	162.90	(12)	200,294	156.03	(12)
Circulatory system (I00–I99)	169,706	123.8	(13)	142,551	109.51	(13)	116,154	90.49	(13)
Neoplasms (C00–D49)	126,955	92.6	(15)	118,865	91.32	(14)	110,959	86.44	(14)
Endocrine, nutrition, immunity (E00–E89)	137,042	100.0	(14)	116,232	89.29	(15)	99,297	77.35	(15)
Hematologic disorders (D50–D89)	27,602	20.1	(17)	23,109	17.75	(17)	24,169	18.83	(16)
Congenital anomalies (Q00–Q99)	28,055	20.5	(16)	25,250	19.40	(16)	19,196	14.95	(17)
Total	19,776,834	14,431.8		18,180,961	13,967.45		17,079,552	13,305.16	

[a]Rate per 1,000 person-years

[b]Rates for ambulatory visits among females only

higher than the rates in 2015 (8.0 visits per p-yr) and 2013 (7.7 visits per p-yr).

Ambulatory visits, by diagnostic categories

In 2017, four major diagnostic categories accounted for 73.3% of all illness- and injury-related ambulatory visits among active component service members: musculoskeletal system/connective tissue disorders (36.5%); mental health disorders (16.8%); disorders of the nervous system and sense organs (11.1%); and signs, symptoms, and ill-defined conditions (8.9%) **(Table 1)**.

In a comparison of the years 2013 and 2017, there were increases in numbers of visits in two major diagnostic categories of illness and injury and decreases in 14 categories **(Table 1)**. The largest percentage increases in ambulatory visits during 2013–2017 were for musculoskeletal system/connective tissue disorders (change: +1,230,448 visits; +41.0%) and disorders of the nervous system and sense organs (change: +259,663; +25.3%). The largest percentage decreases in ambulatory visits during 2013–2017 were for disorders of the circulatory system (change: -53,552; -31.6%), for endocrine, nutrition, and immunity disorders (change: -37,745; -27.5%), congenital anomalies (change: -8,859; -31.6%), and for disorders of the digestive system (change: -51,996; -19.2%). The largest decrease in numbers of visits was for injury/poisoning (change: -82,597; -9.6%).

Over the past 5 years, the relative distributions of ambulatory visits by diagnostic categories of the ICD-10 remained stable with a few exceptions **(Table 1)**. In a comparison of the numbers and rates of visits attributable to each of the 17 major diagnostic categories (including "other") in the years 2013 and 2017, the rank orders of two categories were exchanged: hematologic and immune disorders (17th to 16th) and congenital anomalies (16th to 17th).

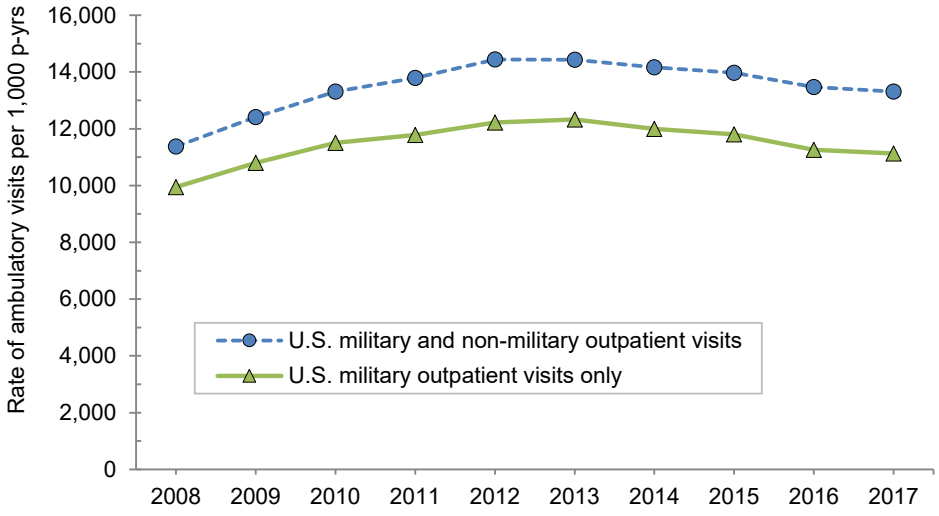
Ambulatory visits, by sex

In 2017, males accounted for almost three-fourths (74.2%) of all illness- and injury-related visits; however, the annual crude rate among females (14.4 visits per p-yr) was 80.4% higher than that among males (8.0 visits per p-yr) **(data not shown)**. Excluding pregnancy and delivery-related visits (which accounted for 10.5% of all non-Z-coded ambulatory visits among females), the illness and injury ambulatory visit rate among females was 12.9 visits per p-yr. As in the past, rates were higher among females than males for every illness- and injury-related category **(Figure 2)**.

Among all illness- and injury-specific diagnoses, three of the five diagnoses with the largest numbers of ambulatory visits were the same for males and females. For all of the three most common diagnoses that males and females shared, the crude rate was at least 38% higher among females than males: pain in joint (rates [per 1,000 p-yrs], female: 1,762.0; male: 1,168.3; female:male ratio [RR]: 1.51); low back pain (rates, female: 790.9; male: 573.1; RR: 1.38); and adjustment disorders (rates, female: 609.3; male: 256.9; RR: 2.37) **(data not shown)**. Six other diagnoses were among the 10 most common diagnoses for both males and females: alcohol dependence; pain in limb, hand, foot, fingers, and toes; post-traumatic stress disorder (PTSD); cervicalgia; acute respiratory infection, unspecified; and anxiety disorder, unspecified. Of note, "sleep apnea" was the third most frequent illness- or injury-specific primary diagnosis during ambulatory visits of males, but it ranked as the 12th most common diagnosis among females. Among females, the 10th most common diagnosis was myopia, which was the 11th most common diagnosis among males **(Tables 2, 3)**.

Across diagnostic categories, relationships between age and ambulatory visit rates were broadly similar among males and females **(Figure 2)**. For example, among both males and females, ambulatory visit rates for neoplasms and circulatory disorders among those aged 40 years or older were 15 or more times the rates among those younger than 20 years old; in contrast, clinic visit rates for infectious and parasitic diseases were lower among the oldest compared to the youngest service members. As in the past, ambulatory visit rates for disorders of the endocrine system, nutrition, and immunity; nervous system; circulatory system; and musculoskeletal system rose more steeply with advancing age than most other categories of illness or injury, for which rates were relatively stable or only modestly increased **(Figure 2)**.

FIGURE 1. Rates of ambulatory visits, by year, active component, U.S. Armed Forces, 2008–2017



Dispositions after ambulatory visits

Because disposition codes are assigned to ambulatory medical encounters that occur only at military treatment facilities (MTFs), the following metrics do not include outsourced care. Approximately 64.4% of all illness-and injury-related visits resulted in "no limitation" (i.e., duty without limitations) dispositions **(Figure 3)**. Approximately one in 48 (2.1%) illness- and injury-related visits resulted in "convalesce in quarters" dispositions **(data not shown)**. The illness-and injury-related diagnostic categories with the highest proportions of "limited duty" dispositions were injuries and

TABLE 2. Most frequent diagnoses during ambulatory visits with ICD-10 codes, by major diagnostic category, males, U.S. Armed Forces, 2017

Diagnostic category (ICD-10 codes) ♂	No.	%[a]
Infectious and parasitic diseases (A00–B99)	**150,726**	
Viral intestinal infection, unspecified	18,330	12.2
Infectious gastroenteritis and colitis, unspecified	11,744	7.8
Viral infection, unspecified	10,467	6.9
Other viral warts	8,430	5.6
Plantar wart	7,698	5.1
Neoplasms (C00–D49)	**81,732**	
Neoplasm of uncertain behavior of skin	11,617	14.2
Melanocytic nevi of trunk	3,030	3.7
Neoplasm of unspecified behavior of bone, soft tissue, and skin	3,029	3.7
Other benign neoplasm of skin, unspecified	2,826	3.5
Benign lipomatous neoplasm of skin and subcutaneous tissue of trunk	2,580	3.2
Endocrine, nutrition, immunity (E00–E89)	**73,472**	
Testicular hypofunction	15,133	20.6
Hyperlipidemia, unspecified	6,674	9.1
Type 2 diabetes mellitus without complications	5,014	6.8
Hypothyroidism, unspecified	4,270	5.8
Dehydration	3,463	4.7
Hematologic and immune disorders (D50–D89)	**15,241**	
Anemia, unspecified	1,929	12.7
Anemia due to glucose-6-phosphate dehydrogenase [g6pd] deficiency	1,557	10.2
Other specified disorders of white blood cells	1,401	9.2
Iron deficiency anemia, unspecified	1,250	8.2
Sickle-cell trait	1,084	7.1
Mental health disorders (F01–F99)	**1,436,526**	
Adjustment disorders	276,532	19.3
Alcohol dependence	236,900	16.5
Post-traumatic stress disorder (PTSD)	206,497	14.4
Anxiety disorder, unspecified	88,043	6.1
Alcohol abuse	75,344	5.2
Nervous system and sense organs (G00–G99, H00–H95)	**1,058,980**	
Sleep apnea	415,246	39.2
Myopia	86,544	8.2
Chronic pain, not elsewhere classified	51,622	4.9
Insomnia	49,903	4.7
Astigmatism	21,925	2.1
Circulatory system (I00–I99)	**98,367**	
Essential (primary) hypertension	41,542	42.2
Scrotal varices	4,576	4.7
Atherosclerotic heart disease of native coronary artery	2,915	3.0
Acute embolism and thrombosis of deep veins of lower extremity	2,209	2.2
Paroxysmal atrial fibrillation	2,134	2.2
Respiratory system (J00–J99)	**448,965**	
Acute upper respiratory infection, unspecified	89,124	19.9
Acute pharyngitis, unspecified	44,599	9.9
Acute nasopharyngitis [common cold]	42,609	9.5
Allergic rhinitis due to pollen	38,060	8.5
Allergic rhinitis, unspecified	25,179	5.6
Digestive system (K00–K95)	**170,280**	
Gastro-esophageal reflux disease without esophagitis	16,224	9.5
Noninfective gastroenteritis and colitis, unspecified	13,292	7.8
Unilateral inguinal hernia, without obstruction or gangrene	8,803	5.2
Constipation	7,723	4.5
Hemorrhage of anus and rectum	7,418	4.4
Genitourinary system (N00–N99)	**106,284**	
Other specified disorders of male genital organs	17,914	16.9
Calculus of kidney	7,379	6.9
Hypertrophy of breast	6,694	6.3
Epididymitis	4,835	4.5
Male erectile dysfunction, unspecified	4,164	3.9
Skin and subcutaneous tissue (L00–L99)	**282,890**	
Pseudofolliculitis barbae	42,117	14.9
Ingrowing nail	15,676	5.5
Acne vulgaris	15,441	5.5
Cellulitis and acute lymphangitis of other parts of limb	15,330	5.4
Dermatitis, unspecified	11,394	4.0
Musculoskeletal system (M00–M99)	**3,277,180**	
Pain in joint	1,257,782	38.4
Low back pain	616,943	18.8
Pain in limb, hand, foot, fingers and toes	225,276	6.9
Cervicalgia	132,937	4.1
Radiculopathy	61,732	1.9
Congenital anomalies (Q00–Q99)	**14,316**	
Congenital pes planus	2,394	16.7
Congenital pes cavus	1,206	8.4
Other congenital deformities of feet	791	5.5
Atrial septal defect	642	4.5
Pectus excavatum	475	3.3
Signs, symptoms, and ill-defined conditions (R00–R99)	**752,503**	
Headache	49,539	6.6
Chest pain, unspecified	38,459	5.1
Other abnormalities of breathing	29,271	3.9
Other symptoms and signs involving cognitive functions and awareness	28,296	3.8
Cough	27,264	3.6
Injury/poisoning (S00–T98, DOD0101–DOD0105)	**641,463**	
Sprain of ankle	45,439	7.1
Sprain of shoulder joint	27,293	4.3
Sprain of cruciate ligament of knee	25,672	4.0
Fracture of other and unspecified metacarpal bone	15,199	2.4
Concussion	15,097	2.4
Other (Z00–Z99, except pregnancy-related)	**4,203,719**	
Encounter for immunization	657,713	15.6
Encounter for other administrative examinations	633,706	15.1
Encounter for examination of ears and hearing	398,917	9.5
Other specified counseling	192,992	4.6
Encounter for issue of medical certificate	154,406	3.7

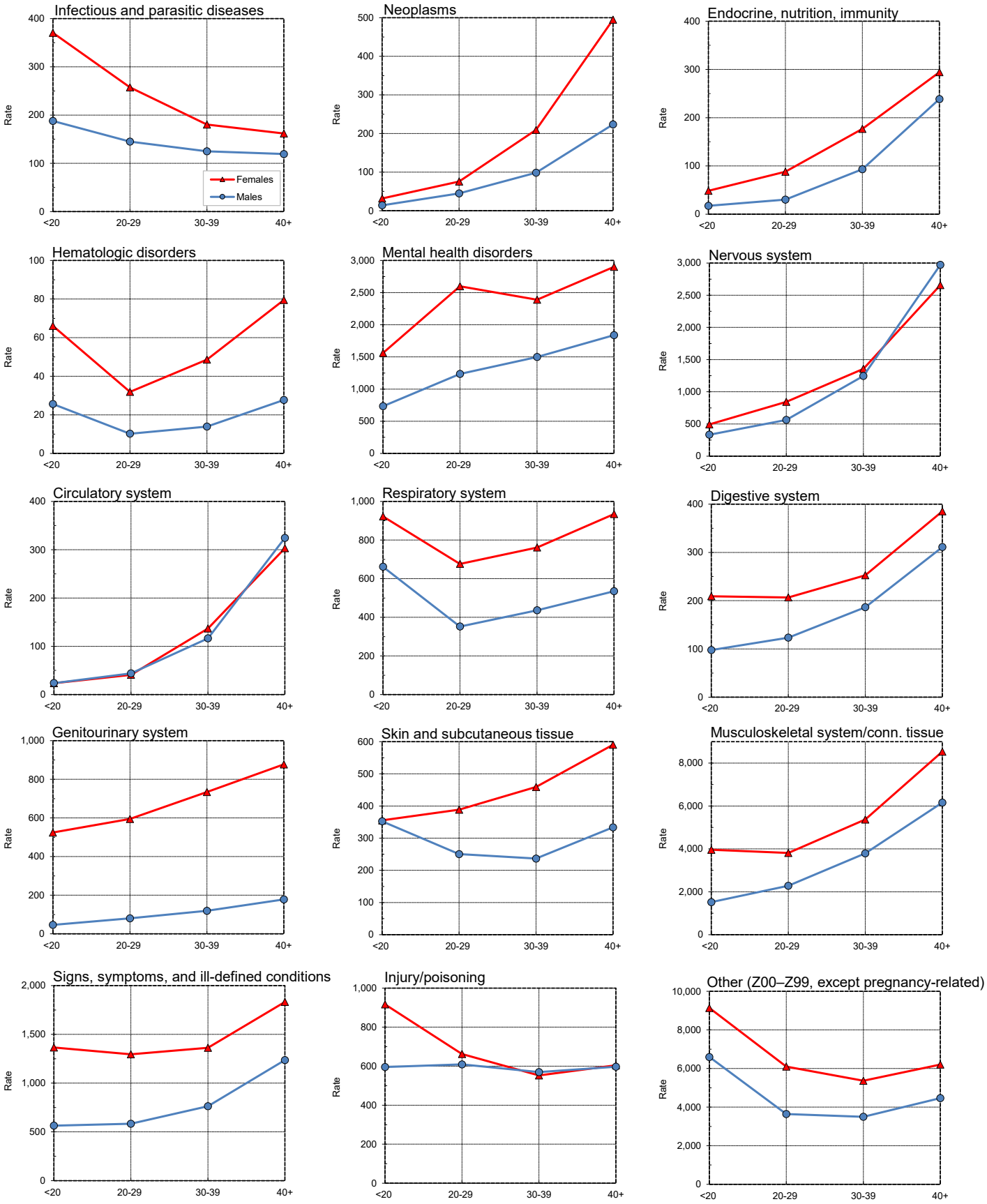
[a]Percentage of the total number of ambulatory visits within the diagnostic category

TABLE 3. Most frequent diagnoses during ambulatory visits with ICD-10 codes, by major diagnostic category, females, U.S. Armed Forces, 2017

Diagnostic category (ICD-10 codes) ♀	No.	%[a]
Infectious and parasitic diseases (A00–B99)	**49,568**	
Viral intestinal infection, unspecified	6,546	13.2
Candidiasis of vulva and vagina	5,803	11.7
Infectious gastroenteritis and colitis, unspecified	3,838	7.7
Viral infection, unspecified	3,815	7.7
Chlamydial infection of genitourinary tract, unspecified	1,921	3.9
Neoplasms (C00–D49)	**29,227**	
Neoplasm of uncertain behavior of skin	3,076	10.5
Leiomyoma of uterus, unspecified	2,860	9.8
Malignant neoplasm of breast of unspecified site	1,912	6.5
Malignant neoplasm of upper-outer quadrant of breast	1,155	4.0
Other benign neoplasm of skin, unspecified	955	3.3
Endocrine, nutrition, immunity (E00–E89)	**25,825**	
Hypothyroidism, unspecified	3,730	14.4
Polycystic ovarian syndrome	2,045	7.9
Obesity, unspecified	1,607	6.2
Dehydration	1,330	5.2
Overweight	1,324	5.1
Hematologic and immune disorders (D50–D89)	**8,928**	
Iron deficiency anemia, unspecified	2,643	29.6
Anemia, unspecified	1,449	16.2
Iron deficiency anemia secondary to blood loss (chronic)	679	7.6
Sickle-cell trait	613	6.9
Other specified disorders of white blood cells	426	4.8
Mental health disorders (F01–F99)	**513,551**	
Adjustment disorders	126,204	24.6
Post-traumatic stress disorder (PTSD)	72,891	14.2
Anxiety disorder, unspecified	38,080	7.4
Alcohol dependence	32,889	6.4
Major depressive disorder, recurrent, moderate	26,198	5.1
Nervous system and sense organs (G00–G99, H00–H95)	**227,060**	
Myopia	28,343	12.5
Sleep apnea	24,651	10.9
Chronic pain, not elsewhere classified	17,494	7.7
Insomnia	13,247	5.8
Migraine without aura	9,917	4.4
Circulatory system (I00–I99)	**17,787**	
Essential (primary) hypertension	5,781	32.5
Varicose veins of lower extremities with other complications	1,082	6.1
Nevus, non-neoplastic	605	3.4
Venous insufficiency (chronic) (peripheral)	566	3.2
Supraventricular tachycardia	533	3.0
Respiratory system (J00–J99)	**153,426**	
Acute upper respiratory infection, unspecified	30,740	20.0
Acute pharyngitis, unspecified	17,282	11.3
Acute nasopharyngitis [common cold]	16,717	10.9
Allergic rhinitis due to pollen	13,983	9.1
Allergic rhinitis, unspecified	9,782	6.4
Digestive system (K00–K95)	**48,348**	
Constipation	7,575	15.7
Noninfective gastroenteritis and colitis, unspecified	4,573	9.5
Gastro-esophageal reflux disease without esophagitis	3,925	8.1
Hemorrhage of anus and rectum	1,512	3.1
Other hemorrhoids	1,344	2.8
Genitourinary system (N00–N99)	**134,241**	
Acute vaginitis	13,494	10.1
Urinary tract infection, site not specified	12,685	9.4
Other specified noninflammatory disorders of vagina	6,636	4.9
Female infertility, unspecified	6,525	4.9
Abnormal uterine and vaginal bleeding, unspecified	5,929	4.4
Pregnancy and delivery (O00–O99, relevant Z-codes)	**313,893**	
Encounter for supervision of normal first pregnancy	34,358	10.9
Encounter for supervision of other normal pregnancy	28,274	9.0
Encounter for care and examination of lactating mother	21,039	6.7
Other specified diseases and conditions complicating pregnancy, childbirth and the puerperium	14,897	4.7
Encounter for routine postpartum follow-up	14,205	4.5
Skin and subcutaneous tissue (L00–L99)	**87,145**	
Acne vulgaris	12,767	14.7
Dermatitis, unspecified	3,701	4.2
Acne, unspecified	3,139	3.6
Ingrowing nail	2,707	3.1
Cellulitis and acute lymphangitis of other parts of limb	2,494	2.9
Musculoskeletal system (M00–M99)	**956,243**	
Pain in joint	364,938	38.2
Low back pain	163,812	17.1
Pain in limb, hand, foot, fingers and toes	69,249	7.2
Cervicalgia	51,320	5.4
Dorsalgia, unspecified	20,115	2.1
Signs, symptoms, and ill-defined conditions (R00–R99)	**282,346**	
Headache	23,009	8.1
Pelvic and perineal pain	17,820	6.3
Unspecified abdominal pain	16,033	5.7
Nausea with vomiting, unspecified	12,930	4.6
Pain localized to other parts of lower abdomen	11,540	4.1
Injury/poisoning (S00–T98, DOD0101–DOD0105)	**134,827**	
Sprain of ankle	11,234	8.3
Sprain of cruciate ligament of knee	4,603	3.4
Sprain of hip	3,178	2.4
Concussion	3,038	2.3
Injury of other muscles and tendons at lower leg level	2,887	2.1
Other (Z00–Z99, except pregnancy-related)	**1,279,613**	
Encounter for other administrative examinations	161,864	12.6
Encounter for immunization	140,621	11.0
Other specified counseling	77,058	6.0
Encounter for examination of ears and hearing	68,614	5.4
Encounter for administrative examinations, unspecified	44,136	3.4

[a]Percentage of the total number of ambulatory visits within the diagnostic category

FIGURE 2. Rates of ambulatory visits, by major diagnostic category, age group, and sex, active component, U.S. Armed Forces, 2017



poisonings (17.5%) and musculoskeletal system disorders (13.0%) **(Figure 3)**. The illness- and injury-related diagnostic categories with the highest proportions of "convalesce in quarters" were infectious and parasitic diseases (16.0%) and diseases of the respiratory system (13.5%). Musculoskeletal system/connective tissue disorders (54.1%) accounted for more than half of all "limited duty" dispositions, and mental health disorders (14.4%) and injury/poisoning (13.4%) together accounted for more than one-quarter **(Figure 4)**. Diseases of the respiratory system accounted for approximately one-third (33.2%) of all "convalesce in quarters" dispositions—more than twice as many (n=81,082) as any other disease category, except signs and symptoms (20.7%).

EDITORIAL COMMENT

In the past 5 years, the distribution of illness- and injury-related ambulatory visits in relation to their reported primary causes has remained fairly stable. In 2017, musculoskeletal system and mental health disorders accounted for more than one-half (53.3%) of all illness- and injury-related diagnoses documented on standardized records of ambulatory encounters. The number of visits for musculoskeletal disorders in 2017 (n=4,233,423) was the highest annual count in the past 5 years. In 2017, the annual count of 1,950,077 visits for mental health disorders was higher than the annual counts of the previous 2 years but represented a decrease of 2.0% since 2013. Only two major illness- and injury-related categories (musculoskeletal system/connective tissue disorders and disorders of the nervous system and sense organs) showed increased numbers of visits in 2017 compared to 2013. Four additional categories (mental health disorders, signs/symptoms, respiratory system disorders, and skin and subcutaneous tissue disorders) showed slight rate increases, but not increases in visits, since 2013. Except as described, the annual numbers of visits and the rates for most (10 of 17) of the major diagnostic categories have recently declined. This downward trend is likely due, in part, to the ongoing drawdown of military forces; for example, at the end of September 2017, there were approximately 75,000 fewer active duty military personnel than at the same time in 2013.[2]

During 2013–2017, the relative ranking of injuries and poisonings (rank: 6) as primary causes of ambulatory visits has been stable. However, the numbers and rates of visits for injuries and poisonings have declined by 9.6% and 3.5%, respectively, since 2013. Nevertheless, the potential military operational impacts of various conditions cannot be assessed by numbers of attributable ambulatory visits alone. For example, in 2017, injuries and poisonings accounted for approximately one of every 22 ambulatory visits overall, but, of ambulatory visits occurring at MTFs, 17.5% (approximately one in six) had limited duty dispositions. Of particular note in relation to injuries and musculoskeletal conditions, in 2017 as in the past, joint and back injuries and other disorders accounted for large numbers of ambulatory visits and lost duty time; resources should continue to be focused on preventing, treating, and rehabilitating back pain and injuries among active component members.

It should be noted that the summary data presented here using the major diagnostic categories of the ICD-10 system deserve more detailed examination, as presented in Tables 2 and 3. For example, the general category identified as "nervous system" encompasses diseases of the nervous system and the sense organs (eyes and ears). Tables 2 and 3 indicate that the more common diagnoses in this category refer to sleep disorders, disorders of refraction and accommodation, and pain disorders. Closer scrutiny reveals that the overall increase (259,663) in annual visits for this category from 2013 to 2017 (described above) can be attributed mostly to a rise in diagnoses of organic sleep disorders from 310,681 in 2013 to 503,047 in 2017.[3]

Several limitations should be considered when interpreting the findings of this report. For example, ambulatory care that is delivered by unit medics and at deployed medical treatment facilities (such as in Afghanistan, Iraq, or at sea) may not be

FIGURE 3. Numbers of ambulatory visits in relation to reported dispositions, by illness- and injury-related diagnostic category, active component, U.S. Armed Forces, 2017

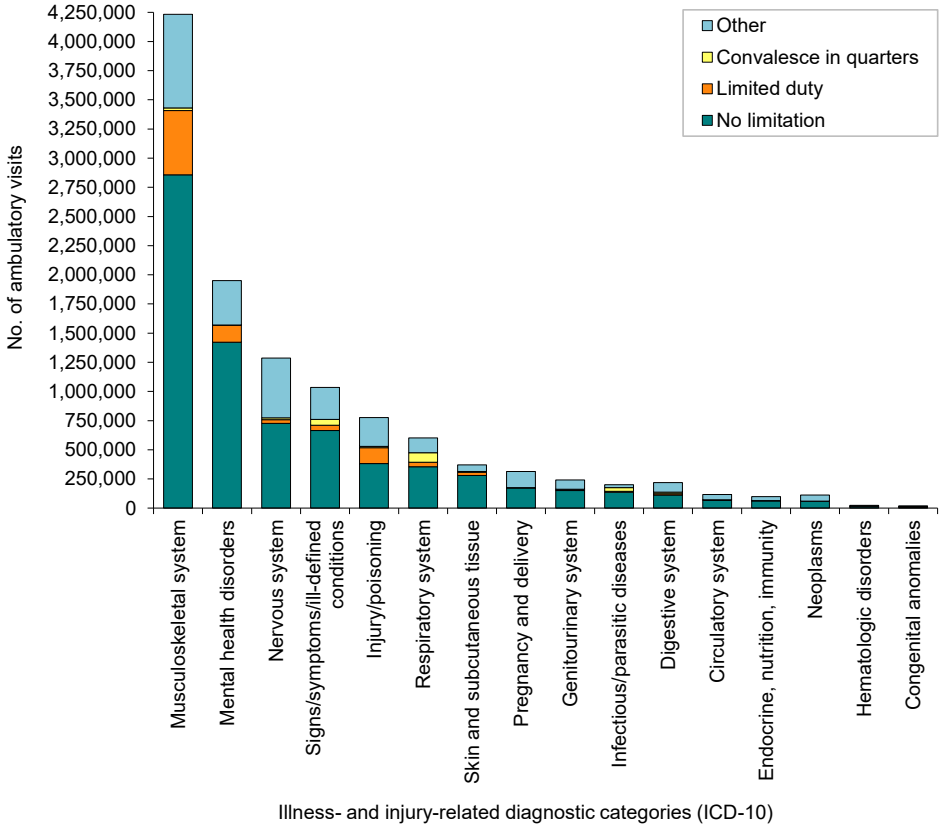
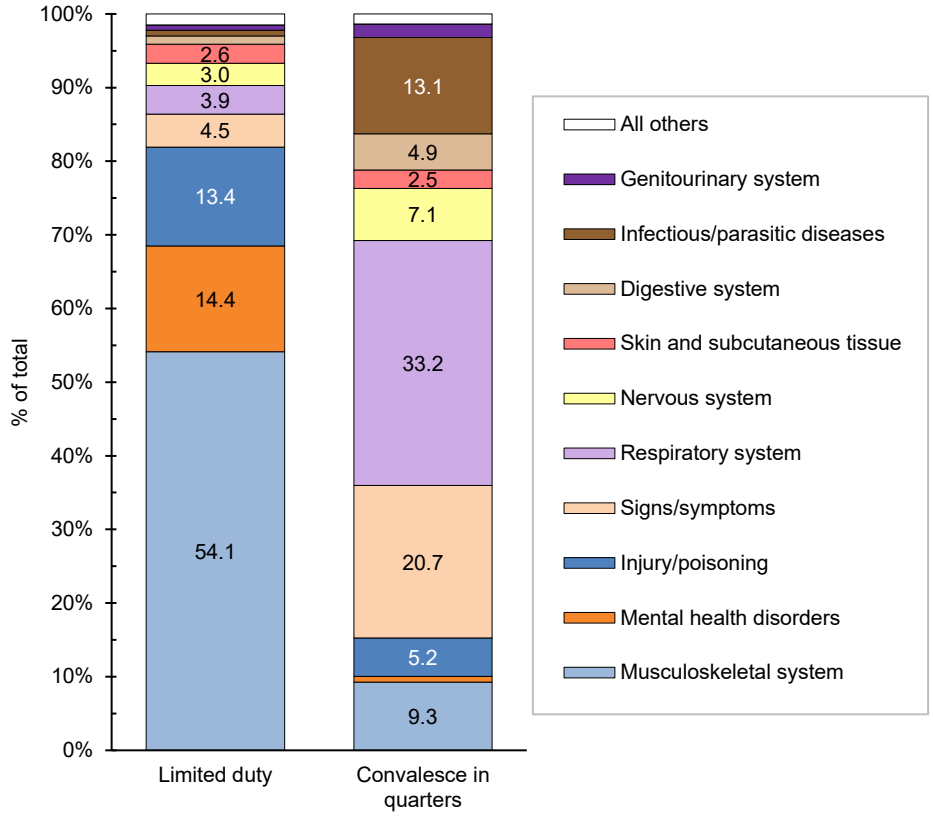


FIGURE 4. Percentages of ambulatory visit-related limited duty and convalesce in quarters dispositions, attributable to illness- and injury-related diagnostic categories, active component, U.S. Armed Forces, 2017



documented on standardized, automated records and thus not archived in the DMSS. In turn, this summary does not reflect the experience of active component military members overall to the extent that the natures and rates of illnesses and injuries may vary between those who are deployed and those who are not deployed.

In addition, this summary is based on primary (first-listed) diagnosis codes reported on ambulatory visit records. As a result, the summary discounts morbidity related to comorbid and complicating conditions that may have been documented in secondary diagnostic positions of the healthcare records. Furthermore, the accuracy of reported diagnoses likely varies across conditions, care providers, treatment facilities, and clinical settings. Although some specific diagnoses made during individual encounters may not be definitive, final, or even correct, summaries of the frequencies, natures, and trends of ambulatory encounters among active component members are informative and potentially useful. For example, the relatively large numbers of ambulatory visits for mental health disorders in general, and the large numbers of visits for organic sleep disorders among males, reflect patterns of responses by the MHS to the effects of combat- and deployment-related stresses on active component service members.

Also, this report documents all ambulatory healthcare visits but does not provide estimates of the incidence rates of all diagnoses described. Illnesses and injuries that necessitate multiple ambulatory visits for evaluation, treatment, and rehabilitation are over-represented in this summary of the ambulatory burden of health care, in contrast to common, self-limited, and minor illnesses and injuries that require very little, if any, follow-up or continuing care. Finally, MHS GENESIS, the new electronic health record for the MHS, was implemented at several MTFs during 2017. Medical data from sites using MHS GENESIS are not available in DMSS. These sites include Naval Hospital Oak Harbor, Naval Hospital Bremerton, Air Force Medical Services Fairchild, and Madigan Army Medical Center. Therefore, medical encounter data for individuals who received outpatient care at one of these facilities during 2017 were not included in this analysis.

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Surveillance Snapshot: Illness and Injury Burdens, Reserve Component, U.S. Armed Forces, 2017

FIGURE 1. Numbers of medical encounters,[a] individuals affected,[b] and hospital bed days, by burden of disease major category,[c] reserve component,[d] U.S. Armed Forces, 2017

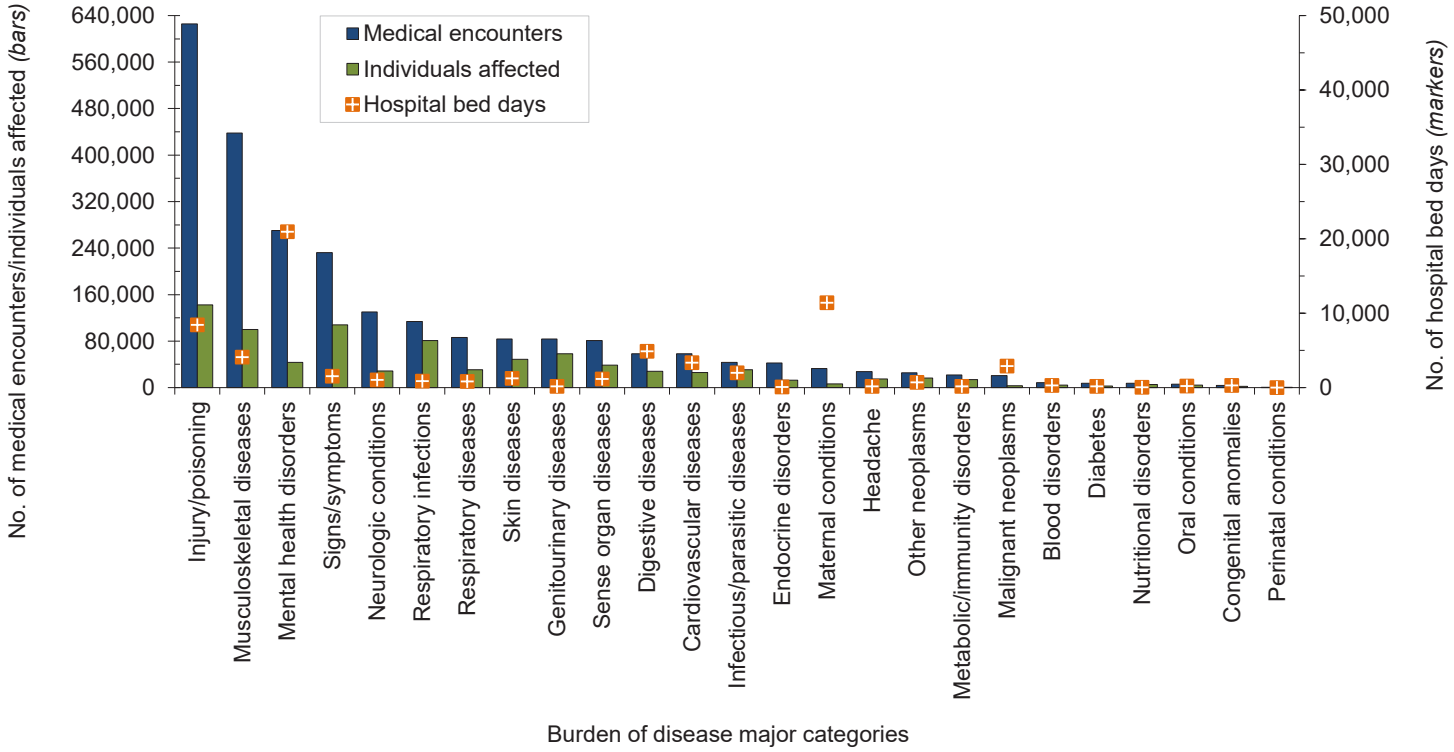
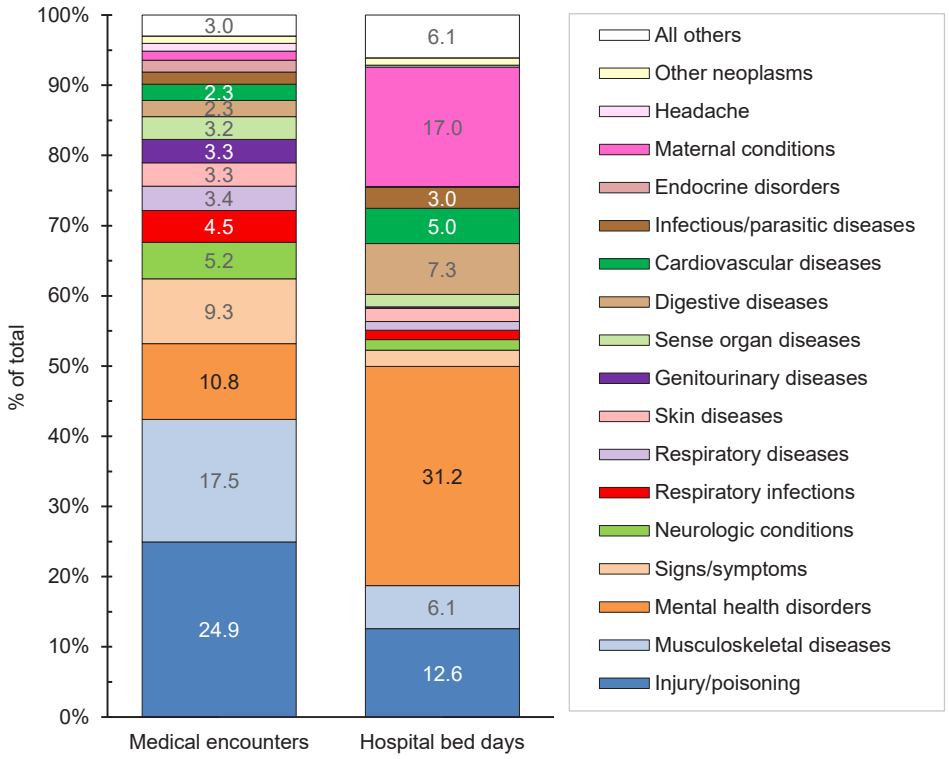


FIGURE 2. Percentages of medical encounters[a] and hospital bed days, by burden of disease major category,[c] reserve component,[d] U.S. Armed Forces, 2017



[a]Medical encounters: total hospitalizations and ambulatory visits for the condition (with no more than one encounter per individual per day per condition)

[b]Individuals with at least one hospitalization or ambulatory visit for the condition

[c]Burden of disease categories are the same as those used for analyses of morbidity burdens in the active component overall (see pp. 2–9).

[d]The reserve component comprises reserve and guard members of each service.

Surveillance Snapshot: Illness and Injury Burdens, Recruit Trainees, Active Component, U.S. Armed Forces, 2017

FIGURE 1. Numbers of medical encounters,[a] individuals affected,[b] and hospital bed days, by burden of disease major category,[c] among recruit trainees,[d] active component, U.S. Armed Forces, 2017

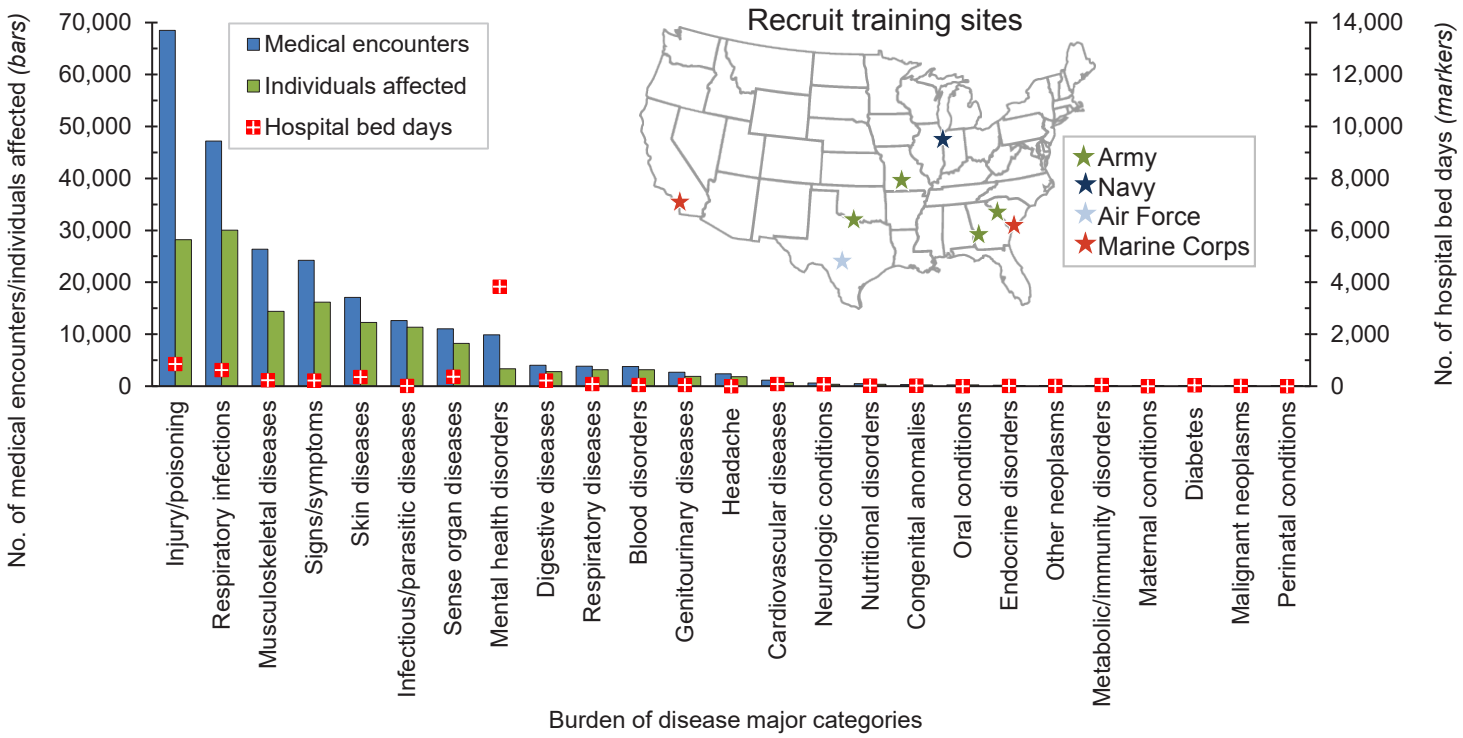
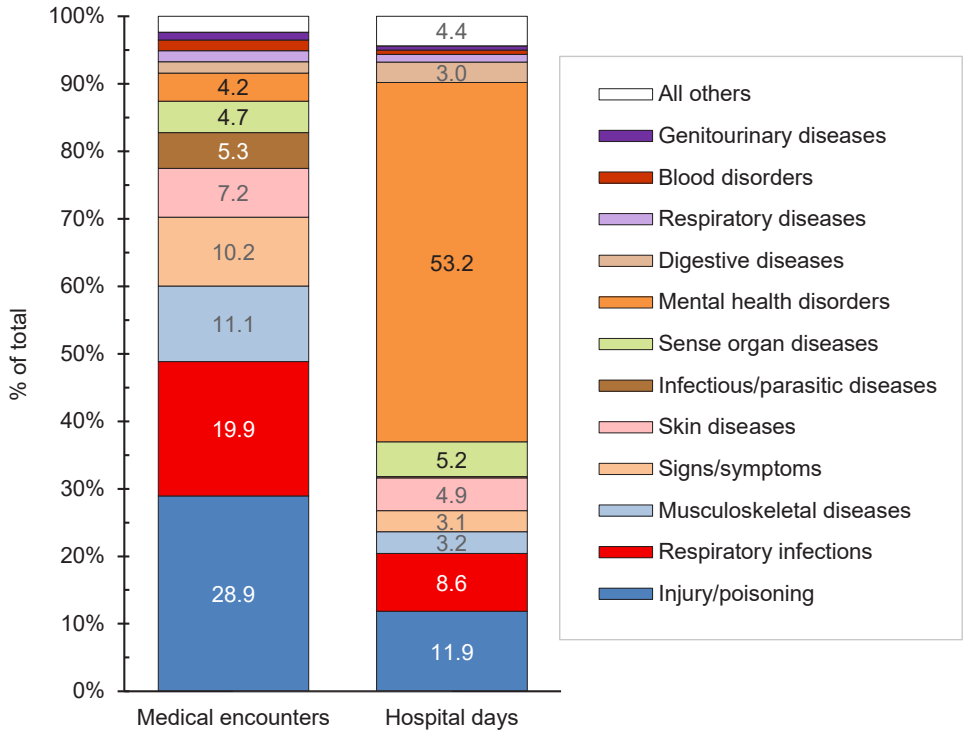


FIGURE 2. Percentages of medical encounters[a] and hospital bed days, by burden of disease major category,[c] among recruit trainees,[d] active component, U.S. Armed Forces, 2017



[a]Medical encounters: total hospitalizations and ambulatory visits for the condition (with no more than one encounter per individual per day per condition)

[b]Individuals with at least one hospitalization or ambulatory visit for the condition

[c]Burden of disease categories are the same as those used for analyses of mobidity burdens in the active component overall (see pp. 2–9).

[d]Recruit trainees are defined as active component members of the Army, Navy, Air Force, or Marine Corps with a rank of E1–E4 who served at one of the eight basic training locations **(Figure 1, map inset)** during a service-specific training period following a first-ever personnel record. The data shown here are a subset of the active component data found on pp. 2–9.

Morbidity Burdens Attributable to Various Illnesses and Injuries, Deployed Active and Reserve Component Service Members, U.S. Armed Forces, 2017

Every year, the *MSMR* estimates illness and injury-related morbidity and healthcare "burdens" on the U.S. Armed Forces and the Military Health System (MHS) using electronic records of medical encounters from the Defense Medical Surveillance System (DMSS). These records document health care delivered in the fixed medical facilities of the MHS and in civilian medical facilities when care is paid for by the MHS. Healthcare encounters of deployed service members are documented in records that are maintained in the Theater Medical Data Store (TMDS), which is incorporated into DMSS. An article in the November 2011 *MSMR* compared the burdens of health care documented in both DMSS and TMDS for 2010.[1] In August 2015, another *MSMR* article used TMDS data to report on the morbidity burdens attributable to various illnesses and injuries among deployed service members for the period between 2008 and 2014.[2]

This report examines the distributions of illnesses and injuries that accounted for medical encounters ("morbidity burdens") of active component members in deployed settings in the U.S. Central Command and the U.S. Africa Command areas of operations during the 2017 calendar year. For the first time, these TMDS morbidity burden analyses are included in the annual MSMR burden issue.

METHODS

The surveillance population included all individuals who served in the active or reserve components of the U.S. Army, Navy, Air Force, or Marine Corps and who had records of healthcare encounters captured in the TMDS during the surveillance period. The analysis was restricted to encounters where the theater of care specified was U.S. Central Command, U.S. Africa Command, or where the theater of operation was missing or null; by default, this excluded encounters in the U.S. Northern Command, U.S. European Command, U.S. Pacific Command, or U.S. Southern Command theater of operations. In addition, TMDS-recorded medical encounters where the data source was identified as Shipboard Automated Medical System (e.g., SAMS, SAMS8, SAMS9) or the military treatment facility descriptor indicated care was provided aboard a ship (e.g., *USS George H.W. Bush*, *USS Dwight D. Eisenhower*) were excluded from this analysis. Inpatient and outpatient medical encounters were summarized according to the primary (first-listed) diagnoses (if reported with an ICD-9 code between 001 and 999 or beginning with V27, or with an ICD-10 code between A00 and T88 or beginning with Z37). Primary diagnoses that did not correspond to an ICD-9 or ICD-10 code (e.g., 1XXXX, 4XXXX) were not reported in this burden analysis.

In tandem with the methodology described on page 2 of this issue of the *MSMR*, all illness and injury-specific diagnoses were grouped into 142 burden of disease-related conditions and 25 major categories based on a modified version of the classification system developed for the Global Burden of Disease (GBD) Study.[3] The "morbidity burdens" attributable to various "conditions" were estimated on the basis of the total number of medical encounters attributable to each condition (i.e., total hospitalizations and ambulatory visits for the condition with a limit of one encounter per individual per condition per day) and the numbers of service members affected by the conditions. In general, the GBD system groups diagnoses with common pathophysiologic or etiologic bases and/or significant international health policymaking importance. For this analysis, some diagnoses that are grouped into single categories in the GBD system (e.g., mental health disorders) were disaggregated. Also, injuries were categorized by the affected anatomic sites rather than by causes because external causes of injuries are not completely reported in TMDS records. It is important to note that, because TMDS has not fully transitioned to ICD-10, ICD-9 codes appear in this analysis. In addition to the examination of the distribution of diagnoses by the 142 "conditions" and the 25 major categories of disease burden, a third analysis depicts the distribution of diagnoses according to the 17 traditional categories of the ICD classification system.

RESULTS

In 2017, a total of 180,864 medical encounters occurred among 67,904 individuals while deployed to Southwest Asia/Middle East and Africa. Of the total medical encounters, only 90 (0.05%) were hospitalizations. A majority of the medical encounters (79.2%), individuals affected (82.8%), and hospitalizations (78.9%) occurred among males **(Figure 1a)**.

Medical encounters/individuals affected by burden of disease categories

During 2017, the percentages of total medical encounters by burden of disease categories in both deployed men and women were generally similar; in both sexes, more encounters were attributable to injury/poisoning, musculoskeletal diseases, signs/symptoms (including ill-defined conditions), and mental health disorders than any other categories **(Figures 1a, 1b, 2a, 2b)**. Of note, females had a greater proportion of medical encounters for genitourinary diseases (5.7%) compared to males (1.3%).

Among both males and females, four burden conditions (other back problems, all other musculoskeletal diseases, knee injuries, and upper respiratory infections) were among the five burden conditions that accounted for the most medical encounters **(Figures 3a, 3b)**. Among males, arm and shoulder injury was the remaining burden condition among the five conditions, and among females it was signs/symptoms of the abdomen and pelvis.

The four-digit ICD-9/ICD-10 code with the most medical encounters in the

FIGURE 1a. Numbers of medical encounters[a] and individuals affected,[b] by burden of disease major category,[c] among deployed male service members, U.S. Armed Forces, 2017

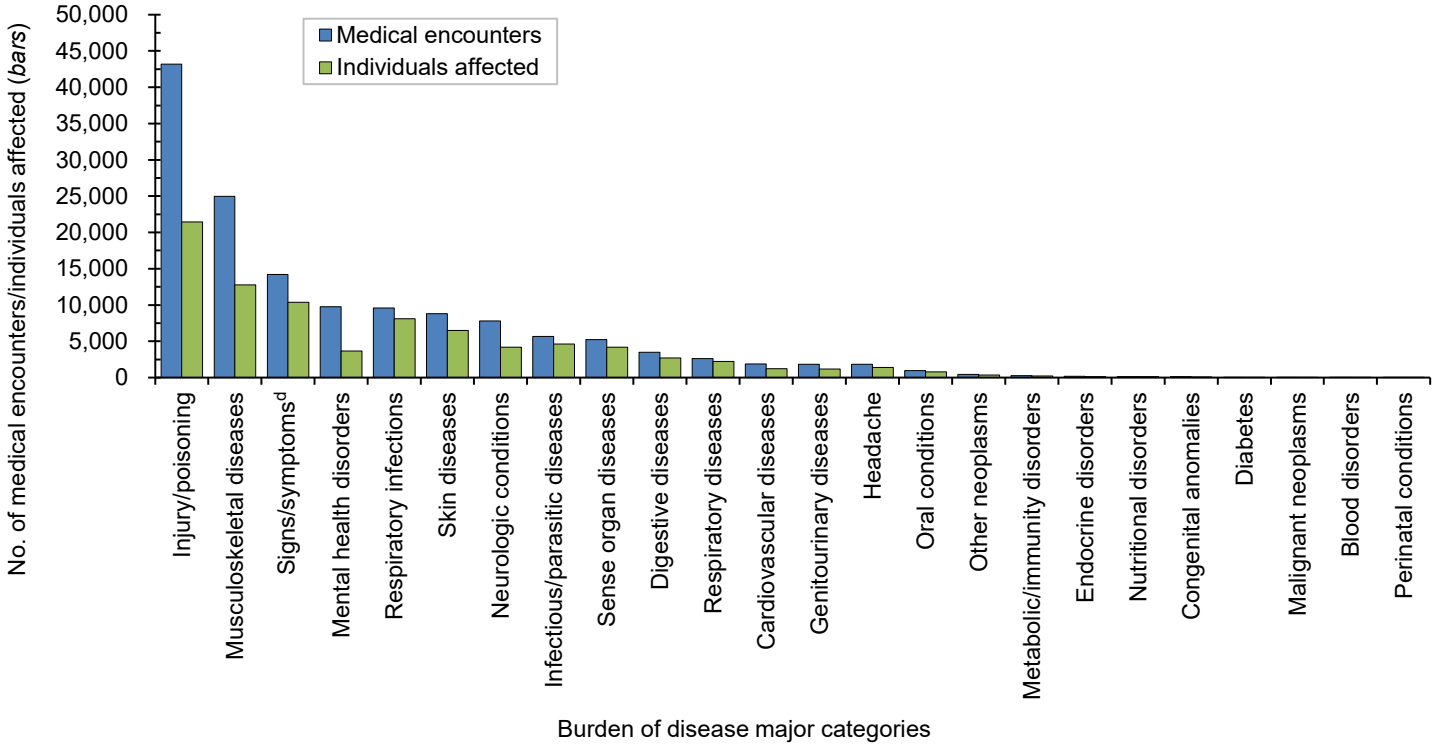
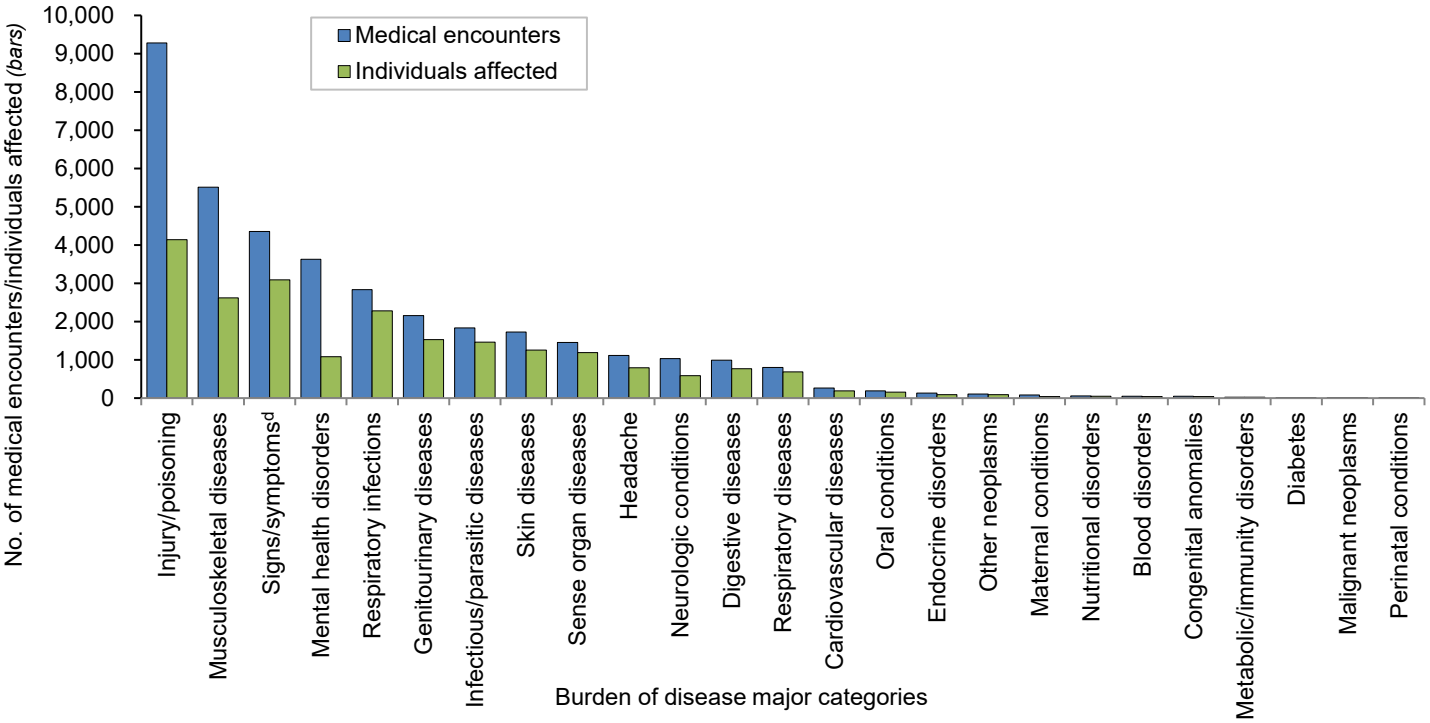


FIGURE 1b. Numbers of medical encounters[a] and individuals affected,[b] by burden of disease major category,[c] among deployed female service members, U.S. Armed Forces, 2017



[a]Medical encounters: total hospitalizations and ambulatory visits for the condition (with no more than one encounter per individual per day per condition)
[b]Individuals with at least one hospitalization or ambulatory visit for the condition
[c]Burden of disease major categories based on a modified version of those defined in the Global Burden of Disease Study[3]
[d]Includes ill-defined conditions

FIGURE 2a. Percentage of medical encounters,[a] by burden of disease major category,[b] among deployed male service members, U.S. Armed Forces, 2017

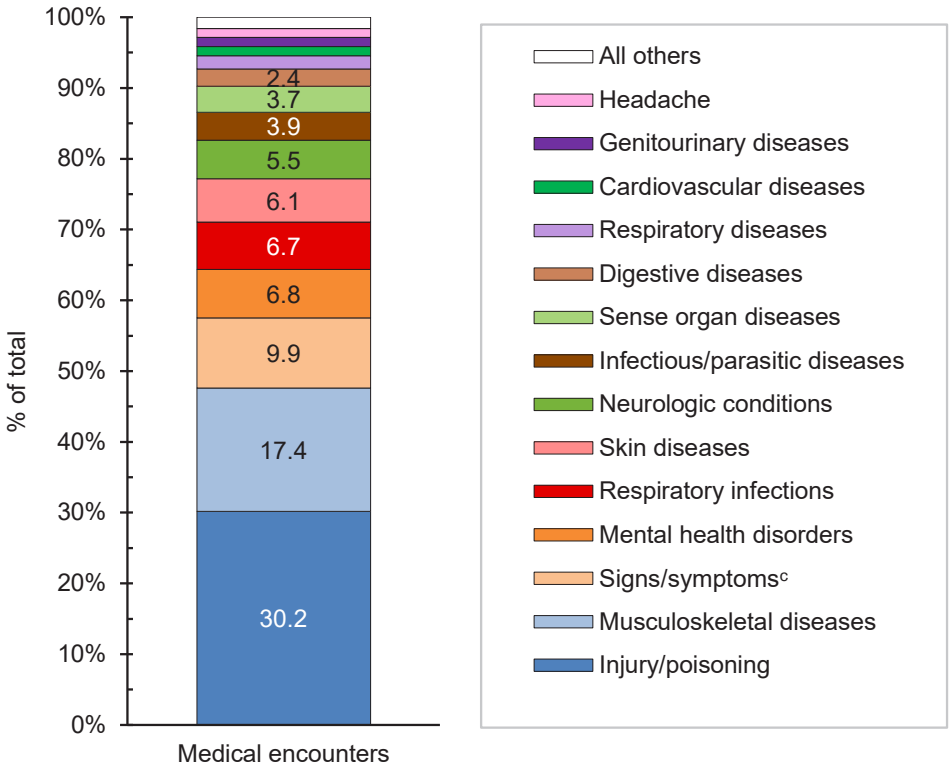
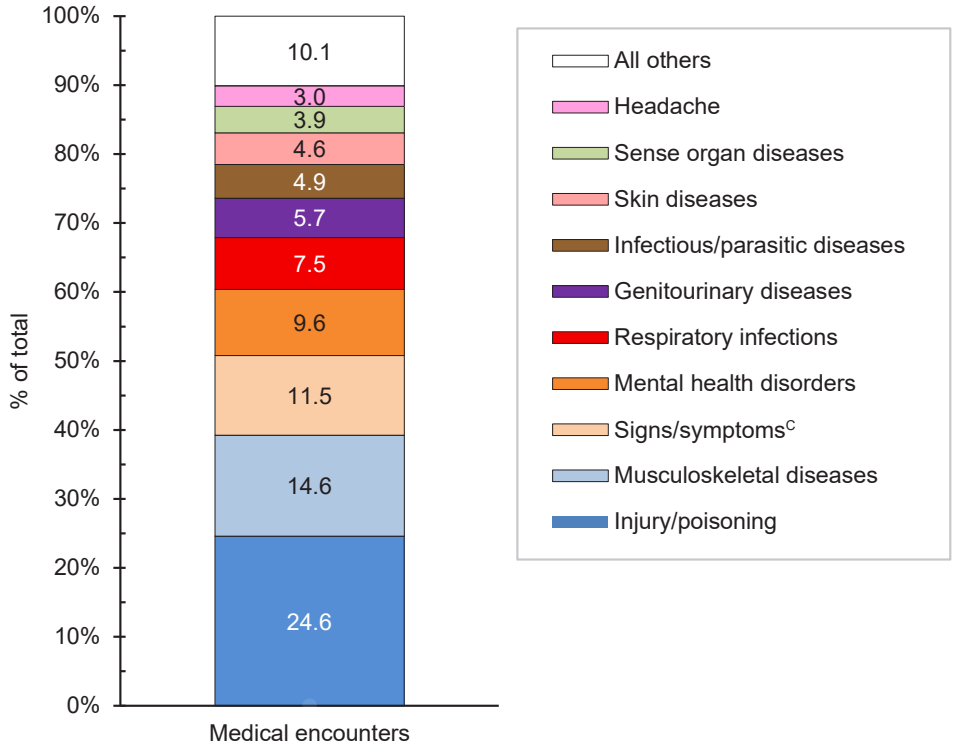


FIGURE 2b. Percentage of medical encounters,[a] by burden of disease major category,[b] among deployed female service members, U.S. Armed Forces, 2017



[a]Medical encounters: total hospitalizations and ambulatory visits for the condition (with no more than one encounter per individual per day per condition)
[b]Burden of disease major categories based on a modified version of those defined in the Global Burden of Disease Study[3]
[c]Includes ill-defined conditions

other back problems category was lumbago/low back pain **(data not shown)**. Among both men and women, for all other musculoskeletal diseases, the most common ICD codes were for pain in limb and cervicalgia. In the signs/symptoms of the abdomen and pelvis category among women, abdominal pain, diarrhea, and nausea/vomiting were the four-digit ICD codes with the most medical encounters. In addition, the four-digit ICD code with the most medical encounters in the other signs/symptoms major category was sleep disturbances among both males and females. Non-specific rashes and skin eruptions, syncope/collapse, dizziness/giddiness, disturbance of skin sensation, and local superficial swelling were among the other top-ranking conditions in the "other signs/symptoms" major category in both sexes.

Of note, among males, fewer than 0.3% of all medical encounters during deployment were associated with any of the following major morbidity categories: metabolic/immunity disorders, endocrine disorders, nutritional disorders, congenital anomalies, diabetes, malignant neoplasms, and blood disorders **(Figure 1a)**. Among females, fewer than 0.3% of all medical encounters during deployment were associated with maternal/perinatal conditions, nutritional disorders, blood disorders, congenital anomalies, metabolic/immunity disorders, diabetes, and malignant neoplasms **(Figure 1b)**.

Among both sexes, injury/poisoning as well as signs/symptoms were among the three categories that affected the most individuals **(Figures 1a, 1b)**. Musculoskeletal diseases ranked second among males and third among females.

Medical encounters by major ICD-9/ICD-10 diagnostic category

In 2017, among the 17 major ICD-9/ICD-10 diagnostic categories, the largest percentages of medical encounters were attributable to musculoskeletal system and "other" (includes factors influencing health status and contact with health services, as well as external causes of morbidity) **(Figure 4)**. The percentage of medical encounters attributable to musculoskeletal system conditions increased from 2013 through 2017 and the percentage attributable to "other" decreased during the same time period. In 2013, 2015, and 2017, the

FIGURE 3a. Percentage and cumulative percentage distribution, burden of disease-related conditions[a] that accounted for the most medical encounters among deployed male service members, U.S. Armed Forces, 2017

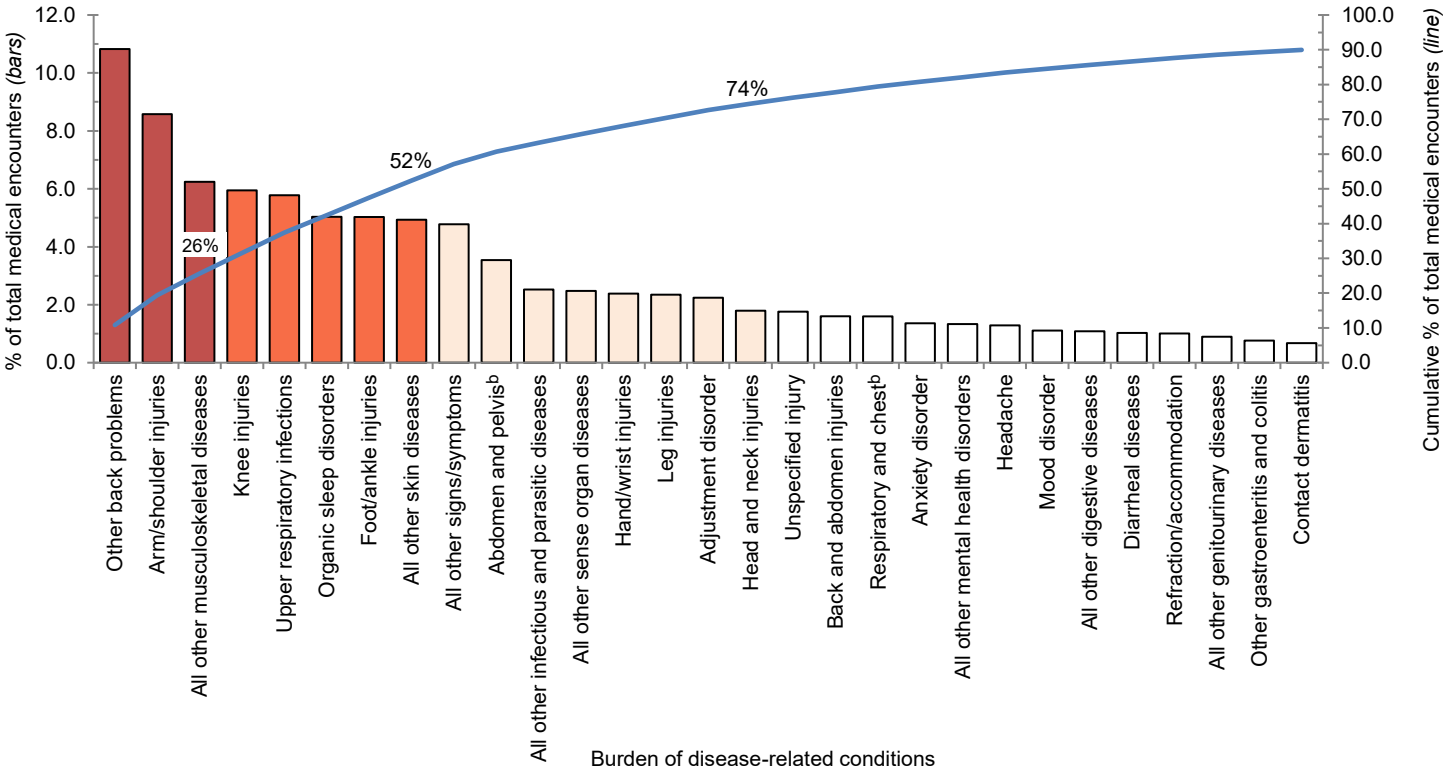
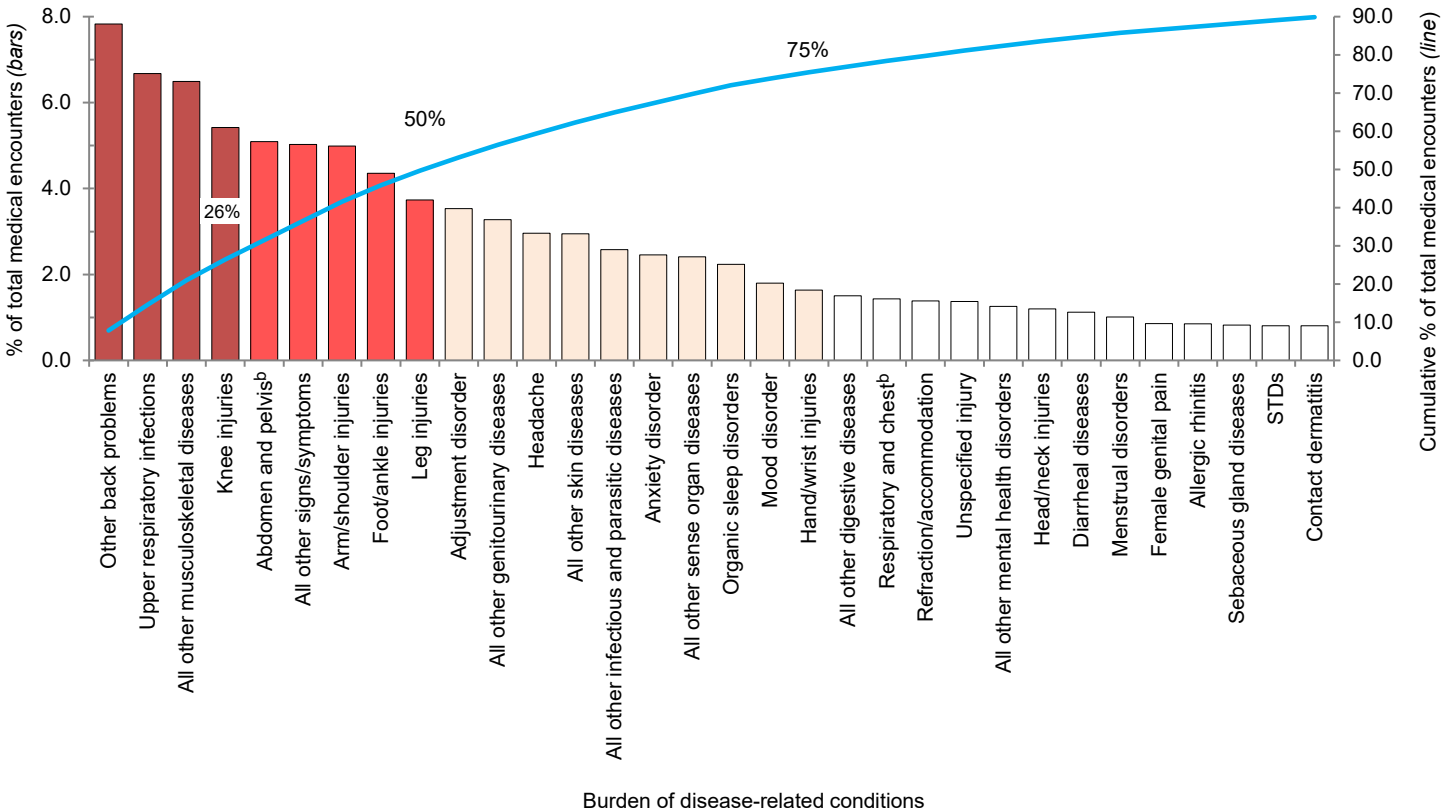
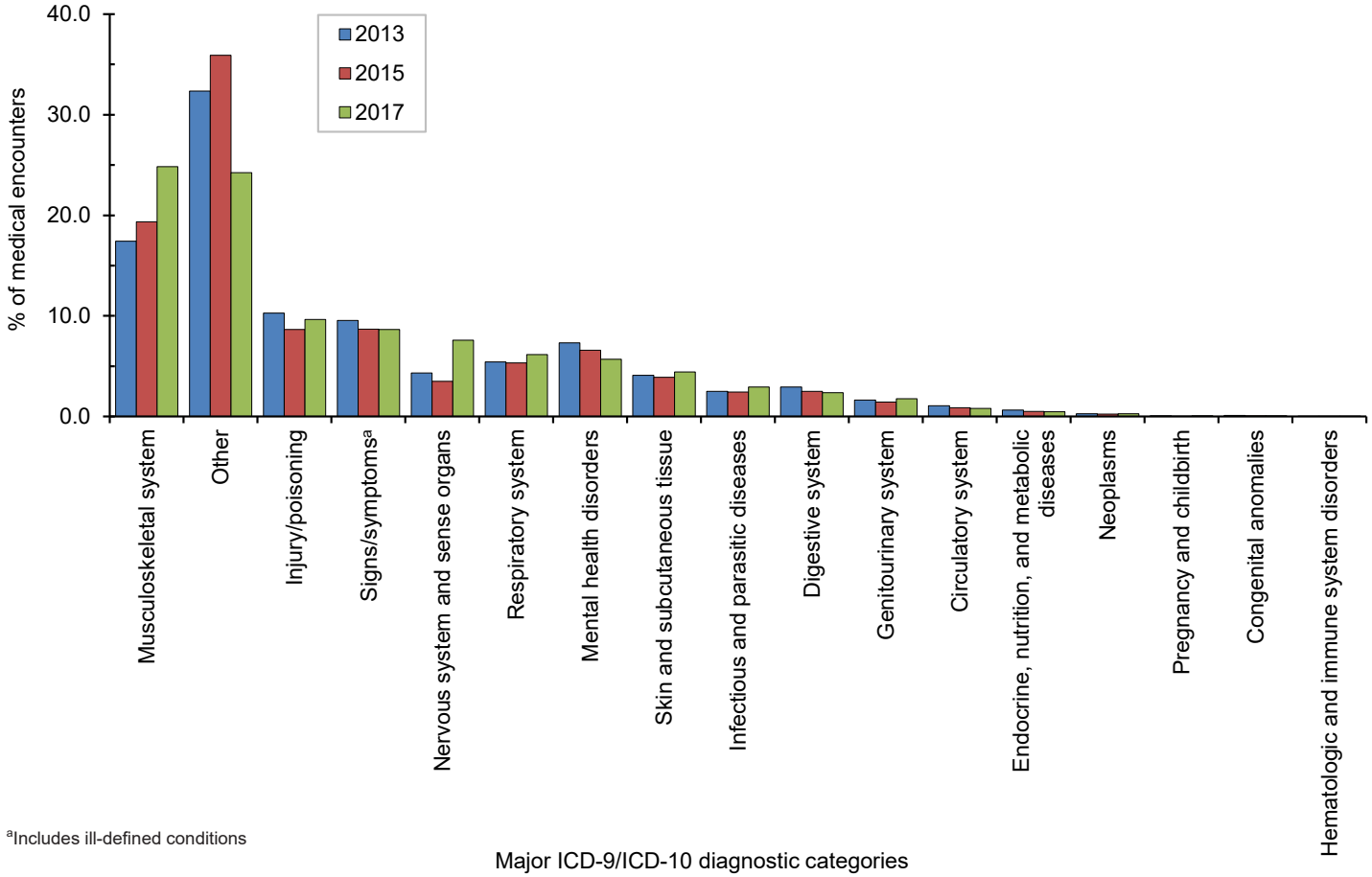


FIGURE 3b. Percentage and cumulative percentage distribution, burden of disease-related conditions[a] that accounted for the most medical encounters among deployed female service members, U.S. Armed Forces, 2017



[a]Burden of disease-related conditions based on a modified version of those defined in the Global Burden of Disease Study[3]
[b]Under the major category signs and symptoms (including ill-defined conditions)

FIGURE 4. Percentage distribution of in-theater medical encounters, by ICD-9/ICD-10 diagnostic categories, active component, U.S. Armed Forces, 2013, 2015, and 2017



percentage of medical encounters attributable to other major ICD-9/ICD-10 diagnostic categories were relatively similar. Of note, however, the percentage of medical encounters attributable to the nervous system and sense organs increased from 3.5% in 2015 to 7.6% in 2017. In addition, the percentage attributable to mental health disorders decreased from 6.6% in 2015 to 5.7% in 2017.

EDITORIAL COMMENT

This report documents the morbidity and healthcare burden that affected U.S. military members while deployed to Southwest Asia/Middle East and Africa during 2017. Similar to results from 2008–2014,[2] there were three burden categories that together comprised 50% or more of the total healthcare burden among both male and female deployers: injury/poisoning, musculoskeletal diseases, and signs/symptoms. However, the 2017 percentages of encounters due to mental health disorders among males and females (6.8% and 9.6%, respectively) were much smaller that the corresponding percentages during 2008–2014 (13.1% and 13.8%, respectively).[2]

Compared to the distribution of major burden of disease categories documented in garrison, this report demonstrates a relatively greater proportion of in-theater medical encounters due to respiratory infections, skin diseases, infectious/parasitic diseases, and digestive diseases.[4] The lack of certain amenities and greater exposure to austere environmental conditions may have compromised hygienic practices and contributed to this finding. However, the four top-ranking major burden of disease categories in-theater were the same as those reported in non-deployed settings: injury/poisoning, musculoskeletal diseases, signs/symptoms, and mental health disorders. In non-deployed settings, mental health disorders ranked third and signs/symptoms ranked fourth. The similarity in these top conditions is likely attributed to the fact that the underlying population in both deployed and non-deployed settings is generally the same. In particular, both populations comprise young and healthy individuals undergoing strenuous physical and mental tasks. Some of the similarity in top conditions could also be attributed to service members receiving follow-up care once out of theater. For example, a service member medically evacuated out of theater for an injury could have encounters for injury recorded in both deployed and non-deployed (hospital or ambulatory care) settings.

Encounters for certain conditions are not expected to occur often in deployment settings. For example, the presence of some conditions (e.g., diabetes, pregnancy,

congenital anomalies) makes the affected service members ineligible for deployment. As a result of this selection process, deployed service members are generally healthier than their non-deployed counterparts and, specifically, less likely to require medical care for conditions that preclude deployment. The overall result of such predeployment medical screening is diminished healthcare burdens (as documented in TMDS) related to certain disease categories.

Interpretation of the data in this report should be done with consideration of some limitations. Not all medical encounters in theaters of operation are captured in TMDS. Some care is rendered by medical personnel at small, remote, or austere forward locations where electronic documentation of diagnoses and treatment is not feasible. As a result, the data described in this report likely underestimate the total burden of health care actually provided in the areas of operation examined. In particular, some emergency medical care provided to stabilize combat-injured service members before evacuation may not be routinely captured in TMDS. Another limitation derives from the potential for misclassification of diagnoses due to errors in the coding of diagnoses entered into the electronic health record. Although the aggregated distributions of illness and injury found in this study are compatible with expectations derived from other examinations of morbidity in military populations (both deployed and non-deployed), instances of incorrect diagnostic codes (e.g., coding a spinal cord injury using an ICD-9 code that denotes the injury was suffered as "birth trauma" rather than using a code indicating injury in an adult) warrant care in the interpretation of some findings. Although such coding errors are not common, their presence serves as a reminder of the extent to which this study depends on the capture of accurate information in the sometimes austere deployment environment in which healthcare encounters occur.

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Absolute and Relative Morbidity Burdens Attributable to Various Illnesses and Injuries, Non-service Member Beneficiaries of the Military Health System, 2017

Individuals who are eligible for care through the Military Health System (MHS) ("beneficiaries") include active component service members and their eligible family members, activated National Guard and Reserve service members and their eligible family members, and retirees and eligible family members of retirees. In 2017, there were approximately 9.42 million beneficiaries eligible for health care in the MHS: 1.54 million active duty and activated reserve component service members; 1.71 million active component family members; 750,000 Guard/Reserve family members; and 5.42 million retirees and their family members.[1] Some beneficiaries of MHS care do not enroll in the healthcare plans provided by the MHS (e.g., if they use insurance through their own employment); also, some of those who are enrolled do not seek care through the MHS.

MHS beneficiaries may receive care from resources provided directly by the Uniformed Services (i.e., military medical treatment facilities [MTFs]) or from civilian healthcare resources (i.e., outsourced [purchased] care) that supplement direct military medical care.[1] In 2017, approximately 6.7 million non-service member beneficiaries utilized inpatient or outpatient services provided by the MHS (data source: the Defense Medical Surveillance System). In the population of non-service member MHS care recipients in 2017, there were more females (57.6%) than males (42.4%); more infants, children, and adolescents (younger than 20 years old: n=1.7 million; 25.5%); and more seniors (aged 65 years or older: n=2.0 million; 30.4%) than younger (aged 20–44 years: n=1.35 million; 20.2%) or older (aged 45–64 years: n=1.6 million; 24.0%) adults.

Since 1998, the *MSMR* has published annual summaries of the numbers and rates of hospitalizations and outpatient medical encounters to assess the healthcare "burdens" of 16 categories of illnesses and injuries among active component military members. Beginning in 2001, the *MSMR* complemented those summaries with annual reports on the combined healthcare burden of both inpatient and outpatient care for 25 categories of health care. Since then, the *MSMR's* annual "burden" issue has contained three reports on hospital care, ambulatory care, and the overall burden of care for active component service members. In 2014, for the first time and using similar methodology, the *MSMR* published a report that quantified the health care for illnesses and injuries among non-service members in 2013.[2] The current report represents an update and provides a summary of care provided to non-service members in the MHS during calendar year 2017. Healthcare burden estimates are stratified by direct versus outsourced care and across four age groups of healthcare recipients.

METHODS

The surveillance period was 1 January through 31 December 2017. The surveillance population included all non-service member beneficiaries of the MHS who had at least one hospitalization or outpatient medical encounter during 2017 either through a military medical facility/provider or a civilian facility/provider (if paid for by the MHS). For this analysis, all inpatient and outpatient medical encounters were summarized according to the primary (first-listed) diagnoses documented on administrative records of the encounters if the diagnoses were reported with International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10) codes that indicate the natures of illnesses or injuries (i.e., ICD-10 codes A00–T88). Nearly all records of encounters with first-listed diagnoses that were codes for "Z-codes" (care other than for a current illness or injury, e.g., general medical examinations, after care, vaccinations) or "V/X/Y-codes" (indicators of the external causes but not the natures of injuries) were excluded from the analysis; however, encounters with primary diagnoses of Z37 "outcome of delivery, single liveborn" were retained.

For summary purposes, all illness- and injury-specific diagnoses (as defined by the ICD-10) were grouped into 142 burden of disease-related conditions and 25 major categories based on a modified version of the classification system developed for the Global Burden of Disease Study.[3] The methodology for summarizing absolute and relative morbidity burdens is described on page 2 of this issue of the *MSMR*.

MHS GENESIS, the new electronic health record for the MHS, was implemented at several military treatment facilities during 2017. Medical data from sites that are using MHS GENESIS are not available in DMSS. These sites include Naval Hospital Oak Harbor, Naval Hospital Bremerton, Air Force Medical Services Fairchild, and Madigan Army Medical Center. Therefore, medical encounter data for individuals seeking care at one of these facilities during 2017 were not included in this analysis.

RESULTS

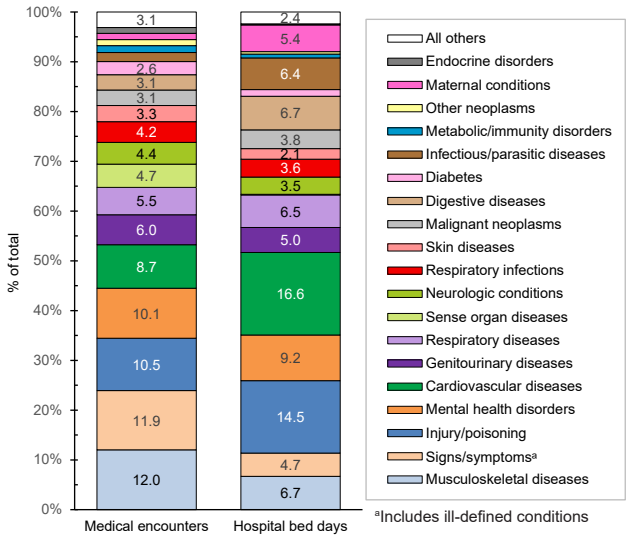
In 2017, a total of 6,704,613 non-service member beneficiaries of the MHS had 82,704,427 medical encounters **(Table)**. Thus, on average, each individual who accessed care from the MHS had 12.3 medical encounters over the course of the year. Three morbidity-related categories, which accounted for a little more than one-third (34.4%) of all medical encounters, were musculoskeletal diseases (12.0%), signs/symptoms and ill-defined conditions (11.9%), and injury/poisoning (10.5%) **(Figures 1a, 1b)**. The illness/injury categories that affected the most beneficiaries who received any care were signs/symptoms and ill-defined conditions (44.2%); injury/poisoning (33.6%); and sense organ diseases (29.1%).

TABLE. Medical encounters, individuals affected, and hospital bed days, by source and age group, non-service member beneficiaries, 2017

	Medical encounters		Individuals affected		Hospital bed days		Medical encounters per individual affected
	No.	% total	No.	% total	No.	% total	
All non-service member beneficiaries	82,704,427	---	6,704,613	---	6,402,450	---	12.3
Source							
Direct care only	9,249,531	11.2	823,945	12.3	501,169	7.8	n/a
Outsourced care only	73,454,896	88.8	4,720,296	70.4	5,901,281	92.2	n/a
Direct and outsourced	n/a	n/a	1,160,372	17.3	n/a	n/a	n/a
Age group[a]							
0–17 years	12,051,862	14.6	1,544,246	23.0	450,985	7.0	7.8
18–44 years	12,059,184	14.6	1,517,218	22.6	750,291	11.7	7.9
45–64 years	18,868,277	22.8	1,607,136	24.0	984,222	15.4	11.7
65 years or older	39,725,103	48.0	2,036,012	30.4	4,216,948	65.9	19.5

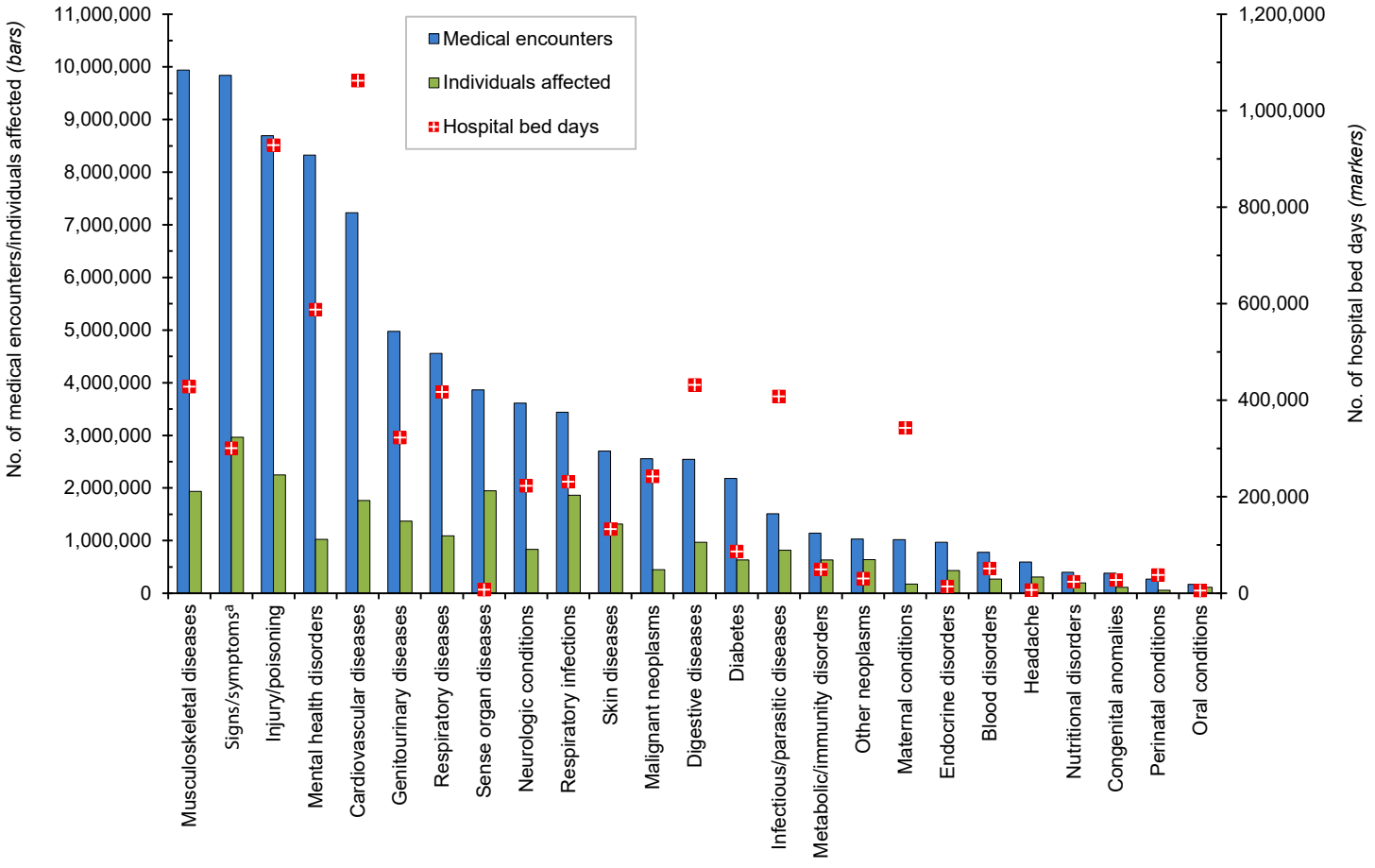
[a]Information on age was missing for one individual

FIGURE 1b. Percentages of medical encounters and hospital bed days, by burden of disease major category, non-service member beneficiaries, 2017



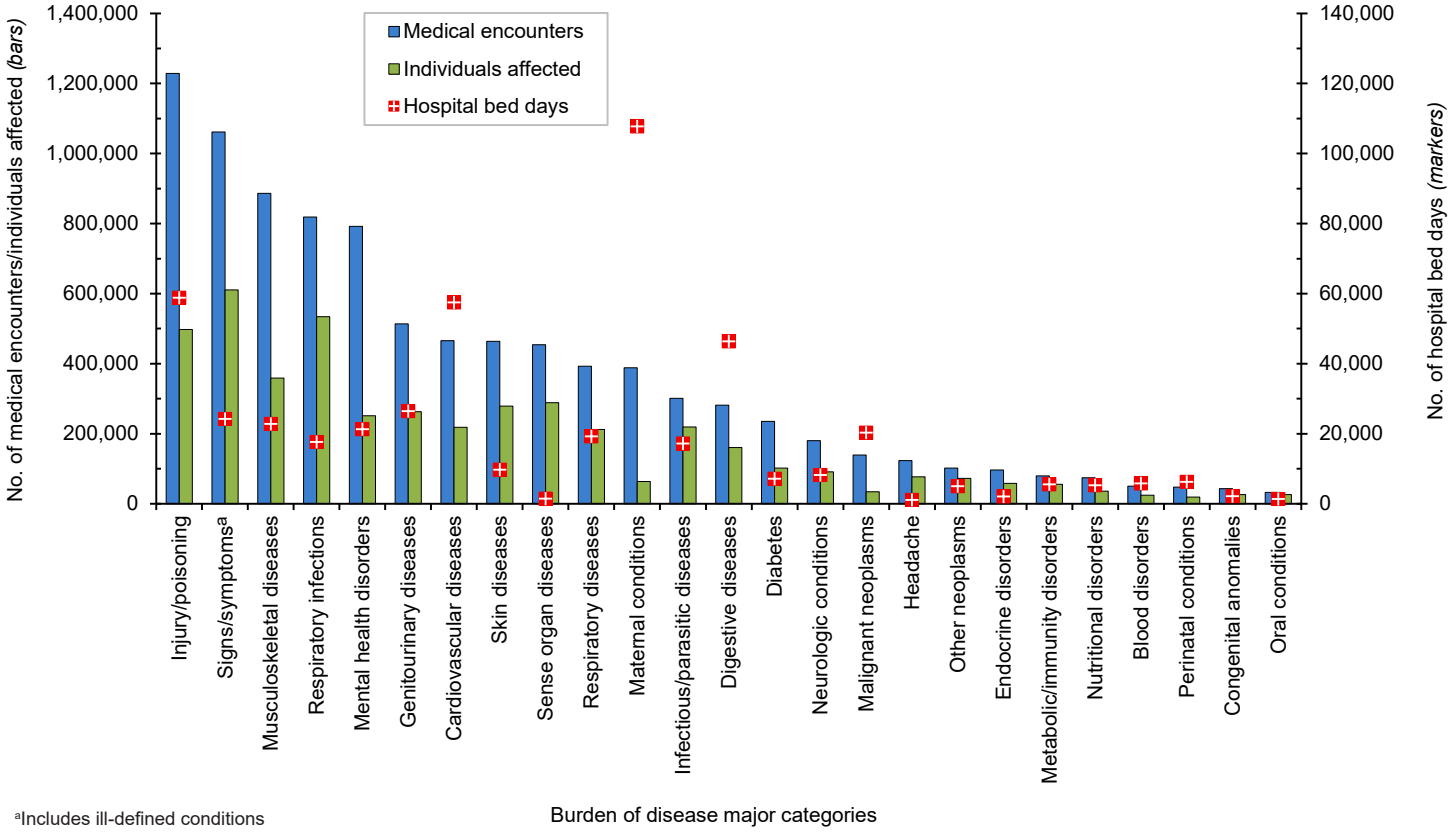
[a]Includes ill-defined conditions

FIGURE 1a. Numbers of medical encounters, individuals affected, and hospital bed days, by burden of disease major category, among non-service member beneficiaries, 2017



[a]Includes ill-defined conditions

FIGURE 2a. Numbers of medical encounters, individuals affected, and hospital bed days, by burden of disease major category, among non-service member beneficiaries, direct care only, 2017



[a]Includes ill-defined conditions

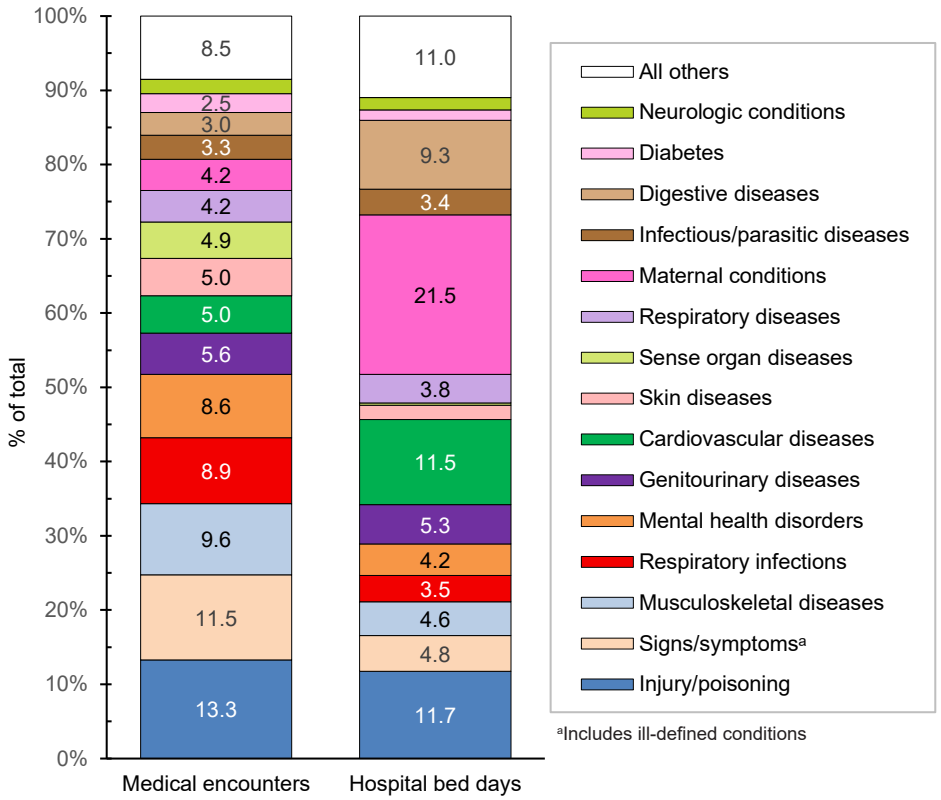
Cardiovascular diseases accounted for more hospital bed days (n=1,062,585) than any other illness/injury category and 16.6% of all hospital bed days overall **(Figures 1a, 1b)**. An additional 37.1% of all bed days were attributable to injury/poisoning (14.5%), mental health disorders (9.2%), musculoskeletal diseases (6.7%), and digestive diseases (6.7%).

Of note, maternal conditions (including pregnancy complications and delivery) accounted for relatively more hospital bed days (n=343,086; 5.4%) than individuals affected (n=172,025; 2.6% of all beneficiaries) **(Figure 1a)**.

Direct care vs. outsourced care

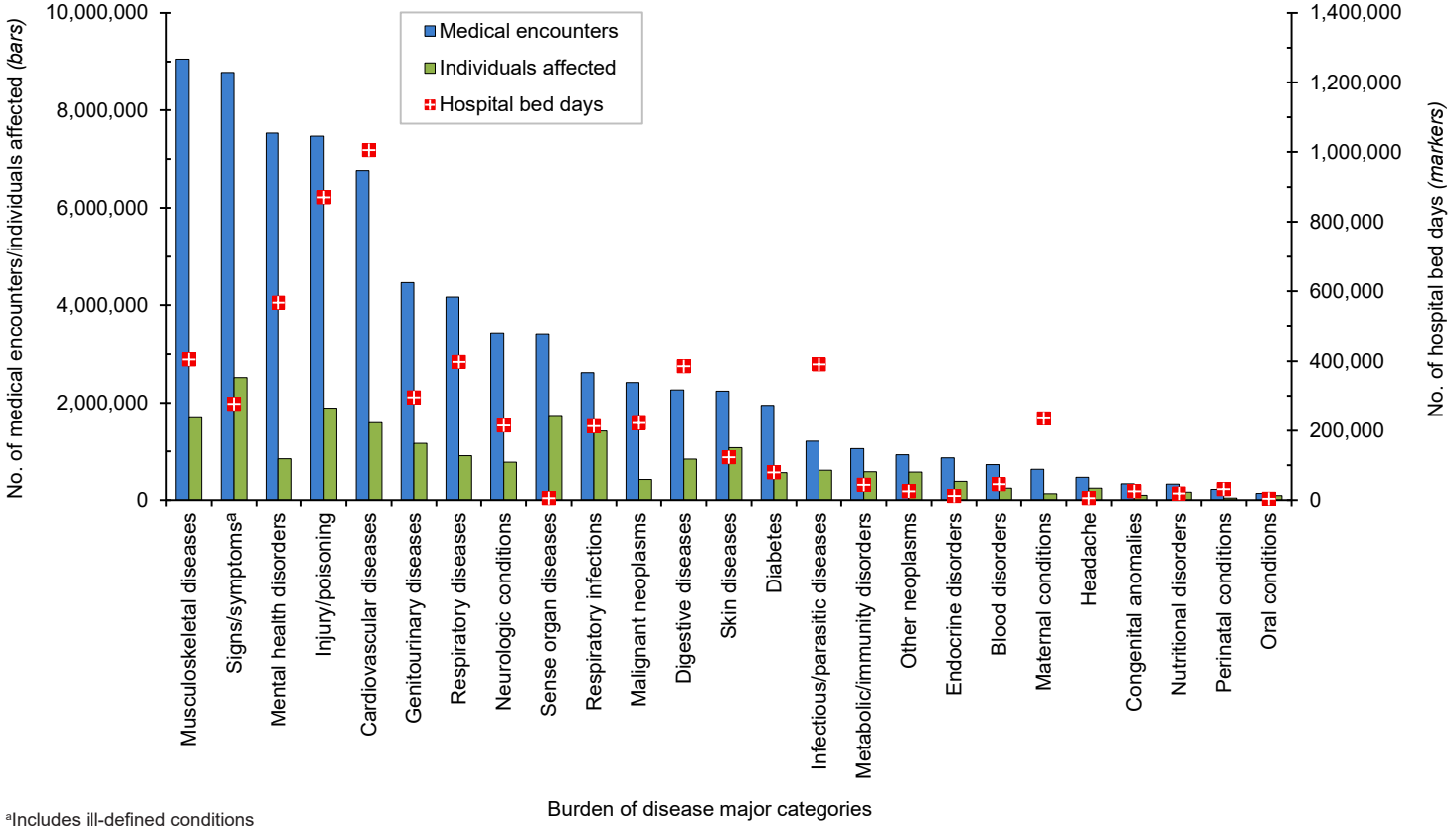
In 2017, among non-service member beneficiaries, most medical encounters (88.8%) were in non-military medical facilities ("outsourced care") **(Table)**. Of all beneficiaries with any illness- or injury-related encounters during the year, many more received exclusively outsourced care (n=4,720,296; 70.4%) than either military medical (direct) care only (n=823,945; 12.3%) or both outsourced and direct care

FIGURE 2b. Percentages of medical encounters and hospital bed days, by burden of disease major category, non-service member beneficiaries, direct care only, 2017



[a]Includes ill-defined conditions

FIGURE 3a. Numbers of medical encounters, individuals affected, and hospital bed days, by burden of disease major category, among non-service member beneficiaries, outsourced care only, 2017



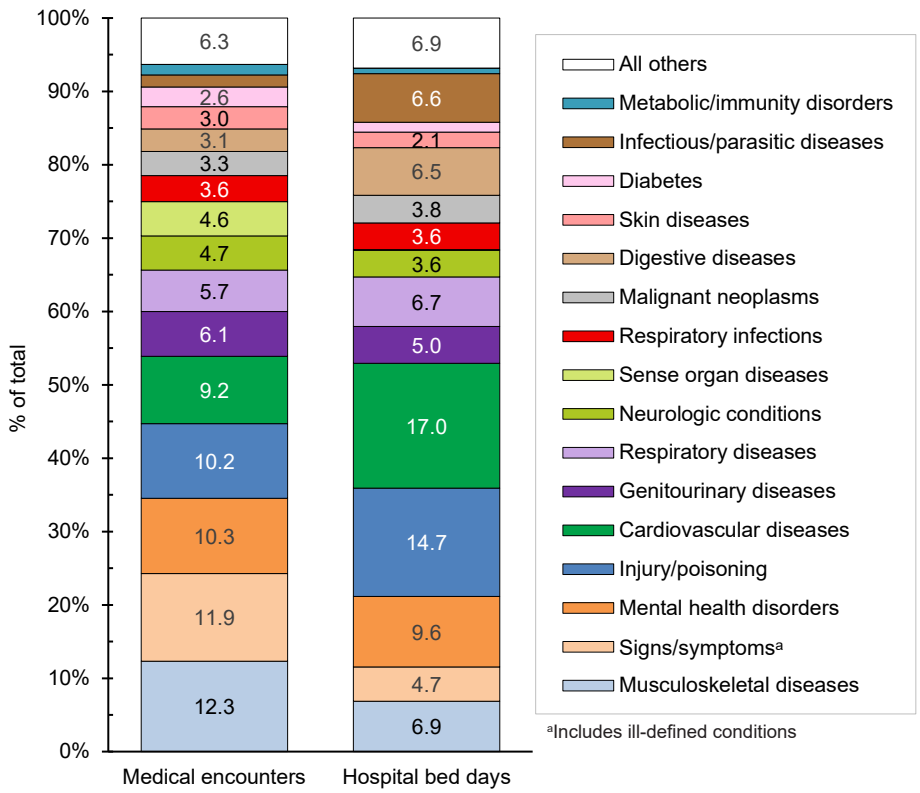
[a]Includes ill-defined conditions

(n=1,160,372; 17.3%). By far, most inpatient care (92.2% of all bed days) was received in non-military facilities (outsourced).

The proportions of medical encounters by morbidity-related categories were broadly similar for direct and outsourced care **(Figures 2a, 2b, 3a, 3b)**. However, encounters for respiratory infections and injury/poisoning were relatively more common during direct (8.9% and 13.3%, respectively) than outsourced (3.6% and 10.2%, respectively) care encounters. Musculoskeletal diseases, cardiovascular diseases, neurologic disorders, and malignant neoplasms were relatively more common during outsourced (12.3%, 9.2%, 4.7%, and 3.3%, respectively) than direct (9.6%, 5.0%, 1.9%, and 1.5%, respectively) care encounters.

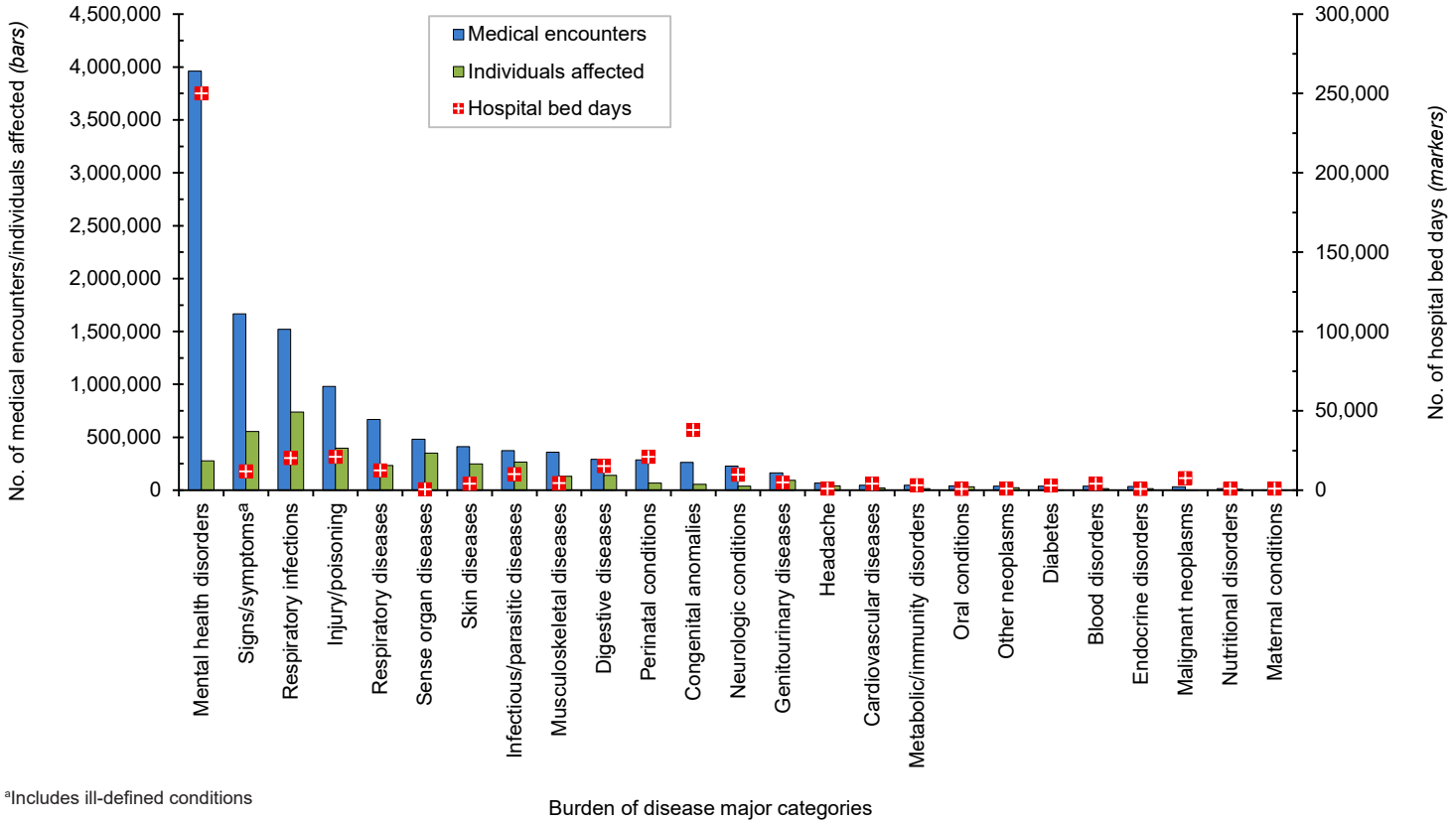
Maternal conditions accounted for 21.5% of all direct care bed days but only 4.0% of all outsourced care bed days **(Figures 2a, 2b, 3a, 3b)**. However, cardiovascular diseases, mental health disorders, and musculoskeletal diseases accounted for relatively more of all outsourced than direct care bed days (% of outsourced vs. % of

FIGURE 3b. Percentages of medical encounters and hospital bed days, by burden of disease major category, non-service member beneficiaries, outsourced care only, 2017



[a]Includes ill-defined conditions

FIGURE 4a. Numbers of medical encounters, individuals affected, and hospital bed days, by burden of disease major category among non-service member beneficiaries, pediatric non-service member beneficiaries, aged 0–17 years, 2017



[a]Includes ill-defined conditions

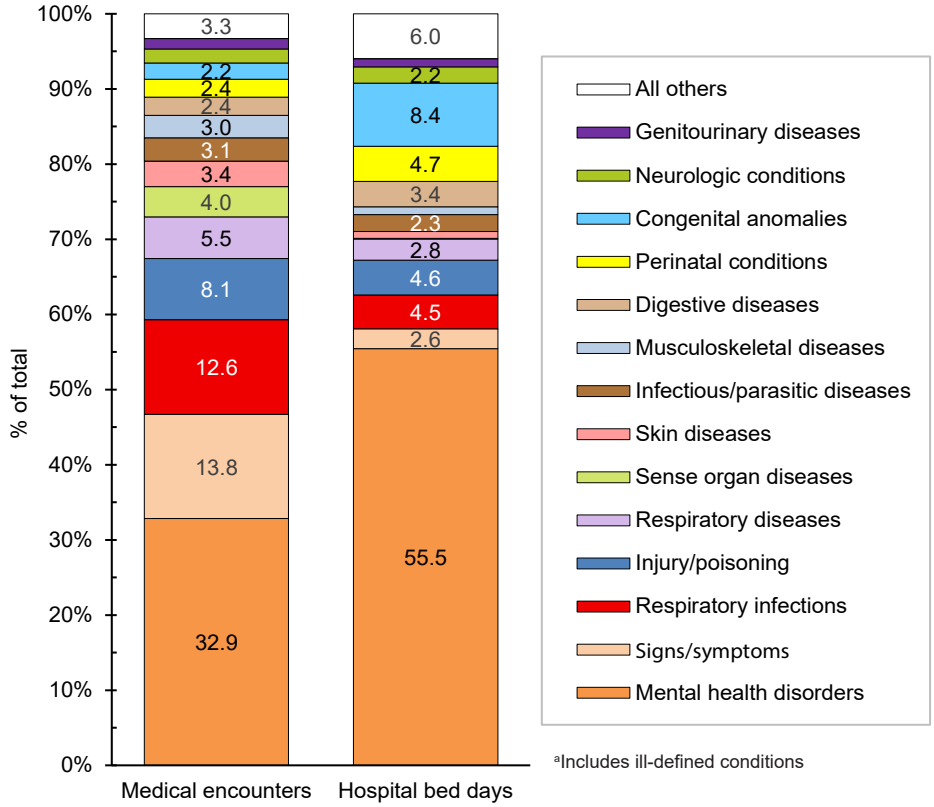
direct care bed days: cardiovascular, 17.0% vs. 11.5%; mental health, 9.6% vs. 4.2%; musculoskeletal, 6.9% vs. 4.6%).

Pediatric beneficiaries (aged 0–17 years)

In 2017, pediatric beneficiaries accounted for 14.6% of all medical encounters, 23.0% of all individuals affected, and 7.0% of all hospital bed days **(Table)**. On average, each affected individual had 7.8 medical encounters during the year.

Mental health disorders accounted for nearly one-third (32.9%; n=3,781,278) of all medical encounters and 55.5% of all hospital bed days (n=276,846) among pediatric beneficiaries **(Figures 4a, 4b)**. On average, each pediatric beneficiary who was affected by a mental health disorder had 14.3 mental health disorder-related encounters during the year. More than two-thirds (67.8%) of all medical encounters for mental health disorders among pediatric beneficiaries were for autistic disorders (33.5%), developmental speech/language disorders (22.3%), or attention deficit disorders (11.9%) **(Figures 4c,**

FIGURE 4b. Percentages of medical encounters and hospital bed days, by burden of disease category, pediatric non-service member beneficiaries, aged 0–17 years, 2017



[a]Includes ill-defined conditions

FIGURE 4c. Numbers of medical encounters, individuals affected, and hospital bed days, by the mental health disorders accounting for the most morbidity burden, pediatric non-service member beneficiaries, aged 0–17 years, 2017

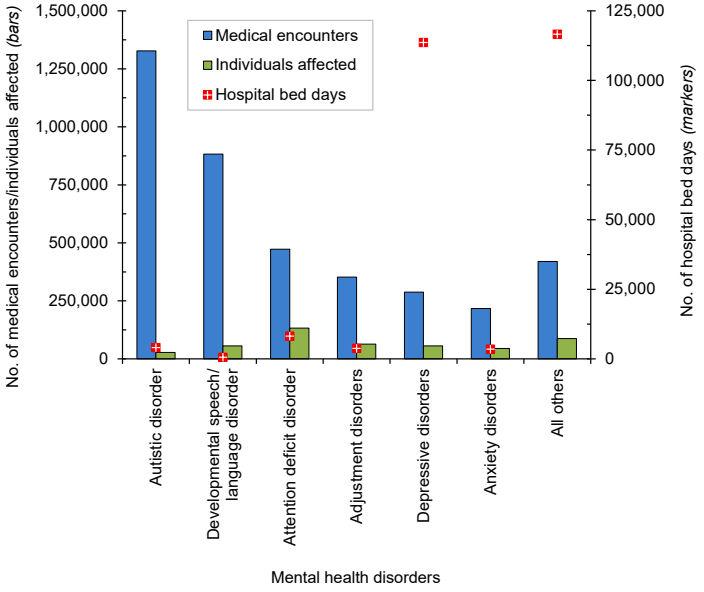
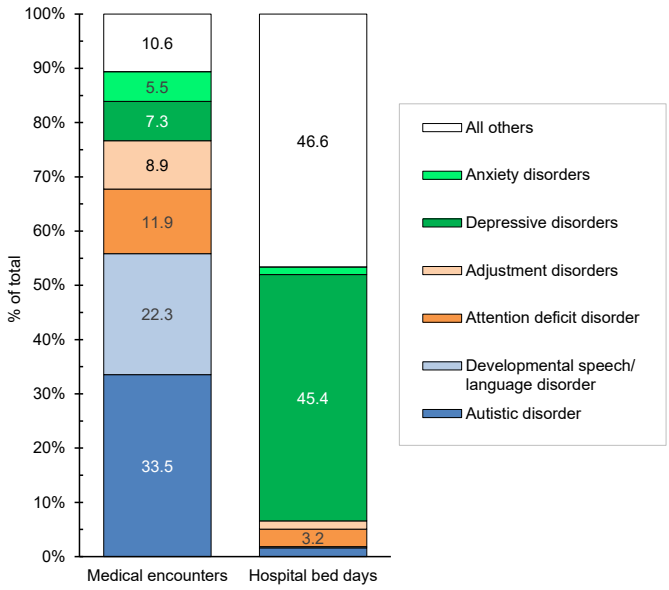


FIGURE 4d. Percentages of medical encounters and hospital bed days for mental health disorders, by the conditions accounting for the most morbidity burden, pediatric non-service member beneficiaries, aged 0–17 years, 2017



4d). On average, there were 47.3 autism-related encounters per individual affected with an autistic disorder and 15.9 encounters for developmental speech/language disorder per individual affected with those specific disorders **(data not shown)**. Despite the high numbers of encounters overall associated with these three categories of mental health disorders, 45.4% of mental health disorder-related bed days were attributable to depressive disorders, and more than one-third (35.6%) of all depression-related bed days were attributable to "major depressive disorder, recurrent severe without psychotic features" **(data not shown)**.

Among pediatric beneficiaries overall, "conditions arising during the perinatal period" (i.e., perinatal category) accounted for the third most hospital bed days (n=21,105, 4.7%) **(Figures 4a, 4b)**. Of note, among pediatric beneficiaries with at least one illness- or injury-related diagnosis, those with malignant neoplasms had the second highest number of related encounters per affected individual (12.8). The highest numbers of malignant neoplasm-related encounters and bed days were attributable to leukemias, "all other malignant neoplasms," and brain neoplasms **(data not shown)**.

Finally, respiratory infections (including upper and lower respiratory infections and otitis media) accounted for relatively more medical encounters and bed days among pediatric beneficiaries (12.6% and 4.5%, respectively), compared to any older age group of beneficiaries (with the exception of beneficiaries aged 65 years or older in whom respiratory infections also accounted for 4.5% of total bed days) **(data not shown)**.

Beneficiaries (aged 18–44 years)

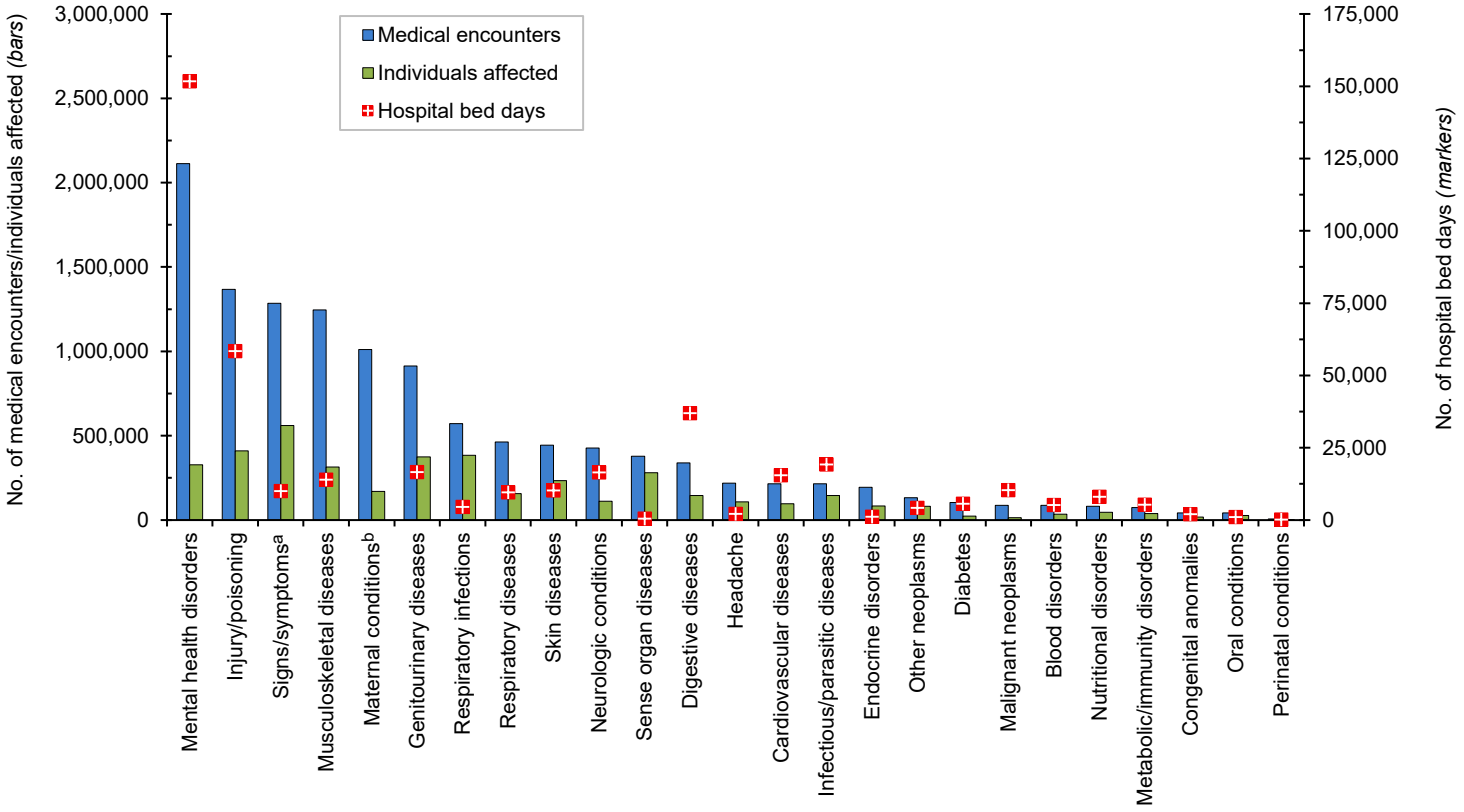
In 2017, non-service member beneficiaries aged 18–44 years accounted for 14.6% of all medical encounters, 22.6% of all individuals affected, and 11.7% of hospital bed days **(Table)**. On average, each individual affected with an illness or injury (any cause) had 7.9 medical encounters during the year.

Among beneficiaries aged 18–44 years, the morbidity-related category that accounted for the most medical encounters was mental health disorders (n=2,112,663; 17.5% of all encounters) **(Figures 5a, 5b)**. Among these adult beneficiaries, mental health disorders accounted for 20.2% of all bed days, and on average, each adult affected by a mental health disorder had 6.4 mental health disorder-related encounters during the year. Mood disorders (34.2%), anxiety disorders (28.0%), and adjustment disorders (16.9%) accounted for close to four-fifths (79.1%) of all mental health disorder-related medical encounters among beneficiaries aged 18–44 years **(data not shown)**.

Among adults aged 18–44 years, maternal conditions accounted for close to half (45.5%) of all bed days and, on average, 5.9 medical encounters per affected individual **(Figures 5a, 5b)**. Normal deliveries accounted for 11.4% of maternal condition-related medical encounters **(data not shown)**. Adults aged 18–44 years accounted for nearly all (99.4%) maternal condition-related bed days among beneficiaries not in military service. If morbidity burdens associated with maternal conditions were excluded from the overall analysis, adults aged 18–44 years would account for lower percentages of total medical encounters (13.5%) and total hospital bed days (6.8%) than any other age group **(data not shown)**.

Among beneficiaries aged 18–44 years with at least one illness- or injury-related diagnosis, those with malignant neoplasms had the most category-specific encounters per affected individual (5.9). Of all malignant

FIGURE 5a. Numbers of medical encounters, individuals affected, and hospital bed days, by burden of disease major category among non-service member beneficiaries, aged 18–44 years, 2017



[a]Includes ill-defined conditions

[b]Maternal conditions accounted for 341,040 hospital bed days in 2017 (not shown in figure).

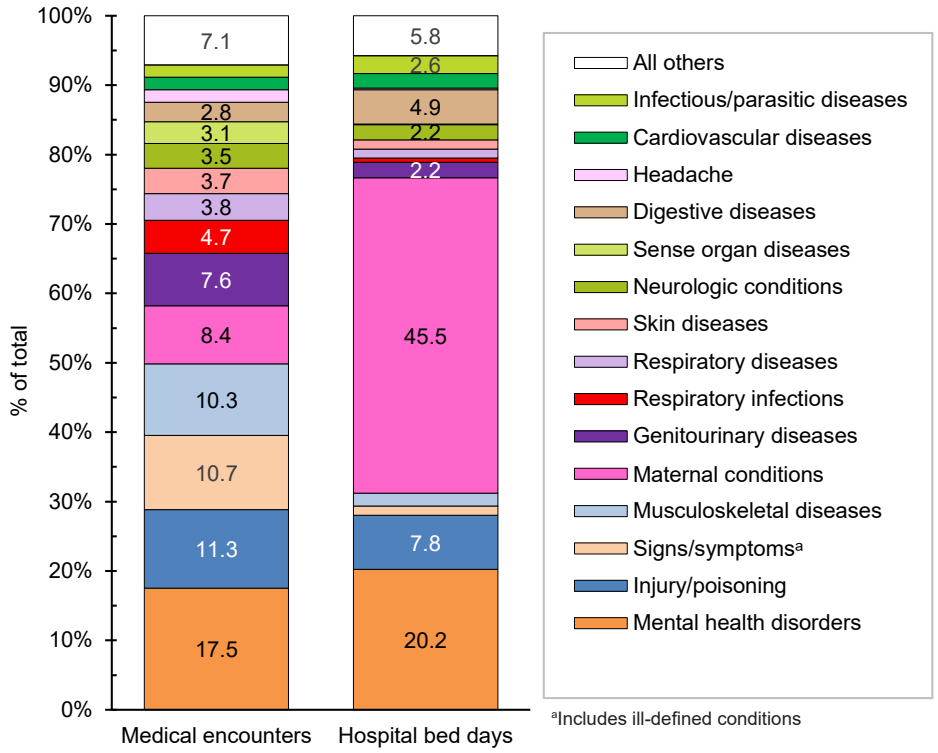
neoplasms, breast cancer accounted for the most malignant neoplasm-related encounters (27.0% of the total) **(data not shown)**.

Beneficiaries (aged 45–64 years)

In 2017, non-service member beneficiaries aged 45–64 years accounted for 22.8% of all medical encounters, 24.0% of all individuals affected, and 15.4% of hospital bed days **(Table)**. On average, each affected individual had 11.7 medical encounters during the year.

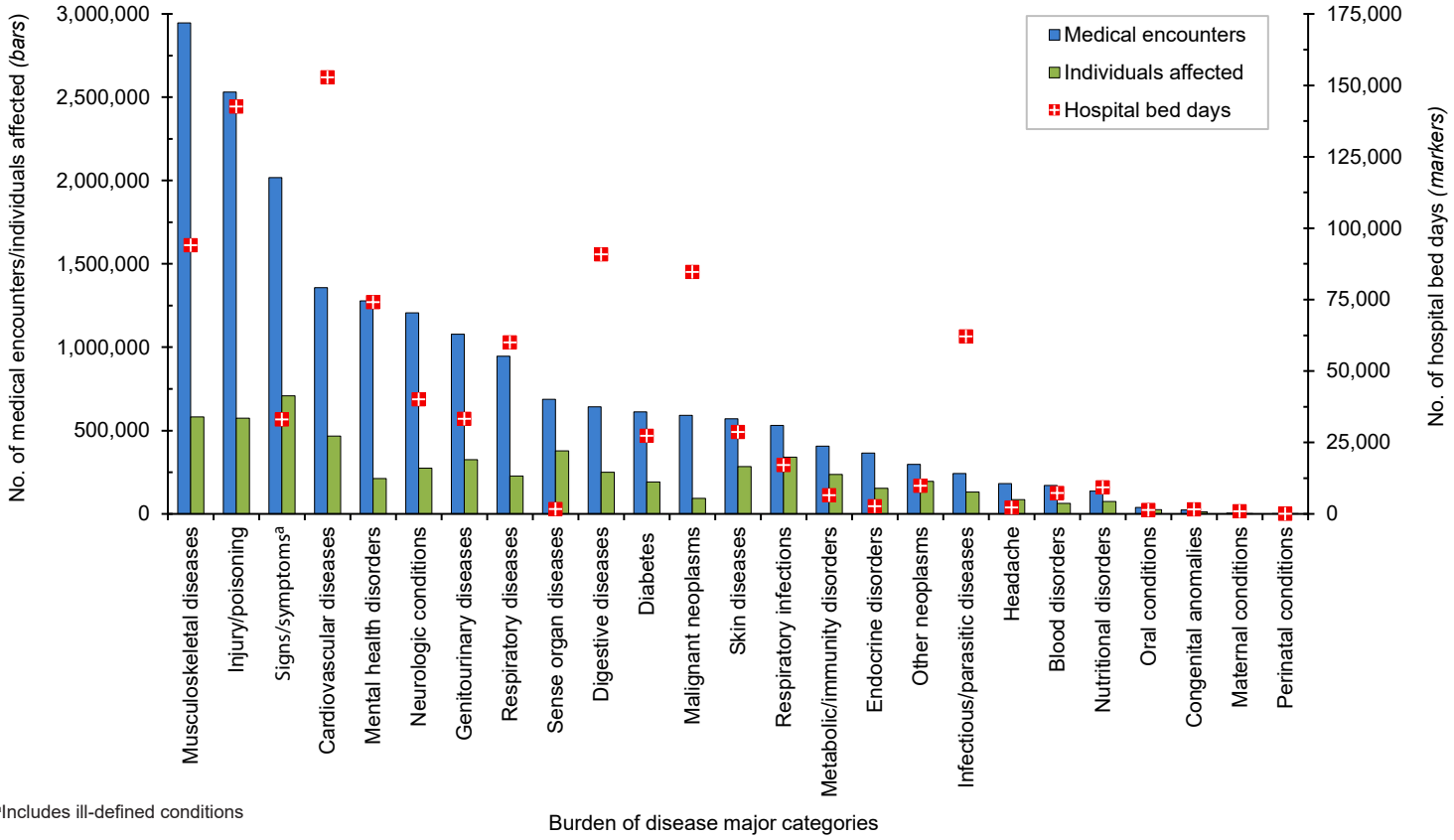
Of all morbidity-related categories, musculoskeletal diseases accounted for the most medical encounters (n=2,946,859; 15.6%) among older adult beneficiaries **(Figures 6a, 6b)**. In addition, in this age group, back problems accounted for 45.3% of all musculoskeletal disease-related encounters **(data not shown)**. Cardiovascular diseases accounted for more hospital bed days (15.5% of the total) than any other category of illnesses or injuries; and cerebrovascular disease and ischemic heart disease accounted for 32.0% and 18.0%, respectively, of all

FIGURE 5b. Percentages of medical encounters and hospital bed days, by burden of disease major category, non-service member beneficiaries, aged 18–44 years, 2017



[a]Includes ill-defined conditions

FIGURE 6a. Numbers of medical encounters, individuals affected, and hospital bed days, by burden of disease major category among non-service member beneficiaries, aged 45–64 years, 2017



[a]Includes ill-defined conditions

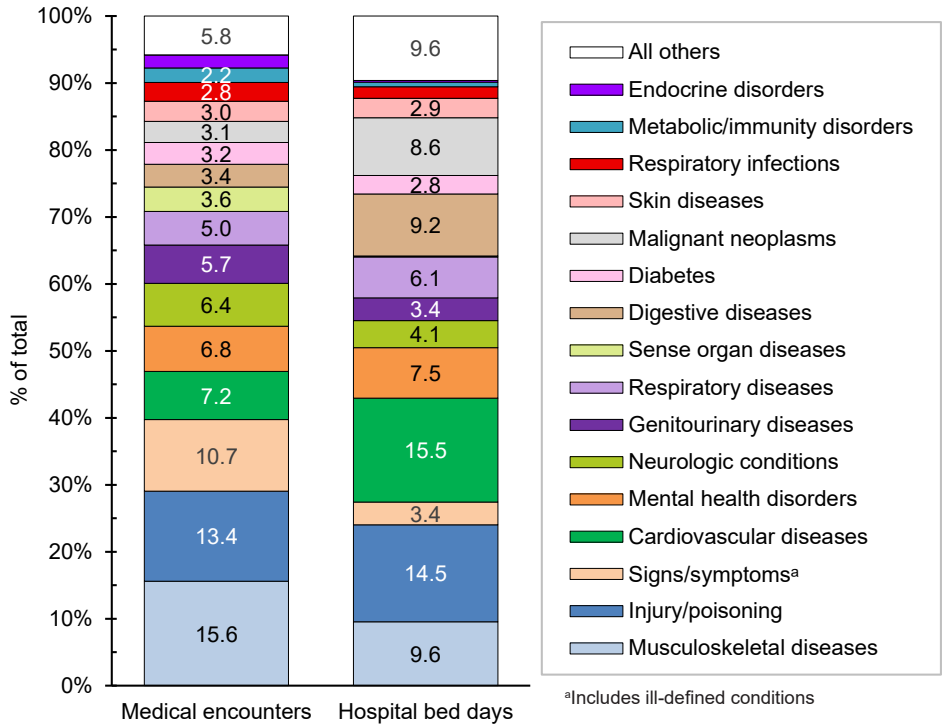
cardiovascular disease-related bed days **(data not shown)**. Digestive diseases accounted for a larger percentage (9.2%) of total hospital bed days among this age group compared to the other age groups of beneficiaries.

The most medical encounters per affected individual were associated with malignant neoplasms (6.3), mental health disorders (6.0), musculoskeletal diseases (5.1), maternal conditions (5.0), injury/poisoning (4.4), neurologic conditions (4.4), and respiratory diseases (4.1) **(data not shown)**. Malignant neoplasms (8.6%) accounted for a larger proportion of total bed days among beneficiaries aged 45–64 years than the other age groups of beneficiaries. Breast cancer accounted for nearly one-fourth (24.1%) of all malignant neoplasm-related encounters among older adult beneficiaries **(data not shown)**.

Beneficiaries (aged 65 years or older)

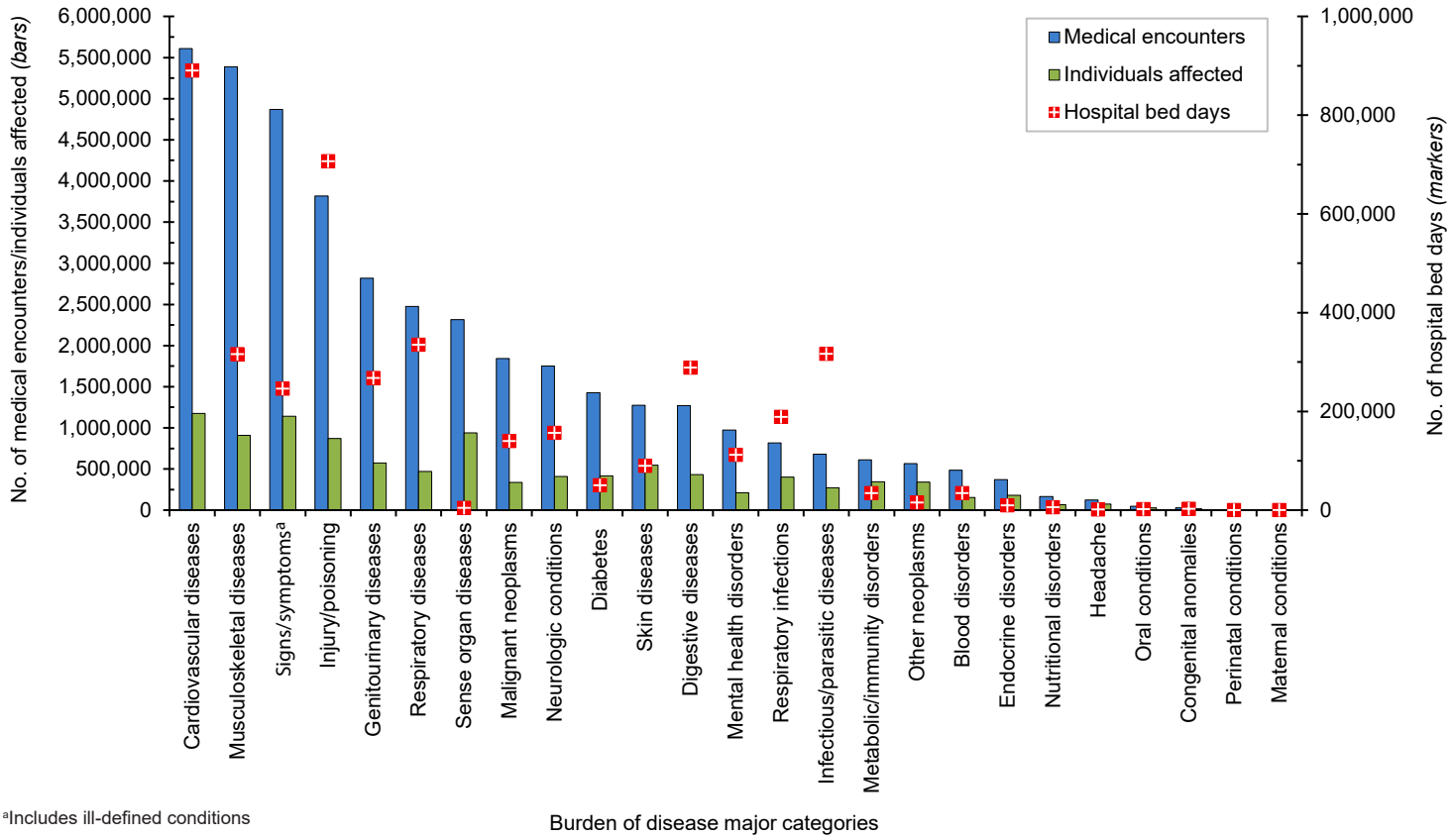
In 2017, non-service member beneficiaries aged 65 years or older accounted for close to half (48.0%) of all medical

FIGURE 6b. Percentages of medical encounters and hospital bed days, by burden of disease major category, non-service member beneficiaries, aged 45–64 years, 2017



[a]Includes ill-defined conditions

FIGURE 7a. Numbers of medical encounters, individuals affected, and hospital bed days, by burden of disease major category among non-service member beneficiaries, aged 65 years or older, 2017

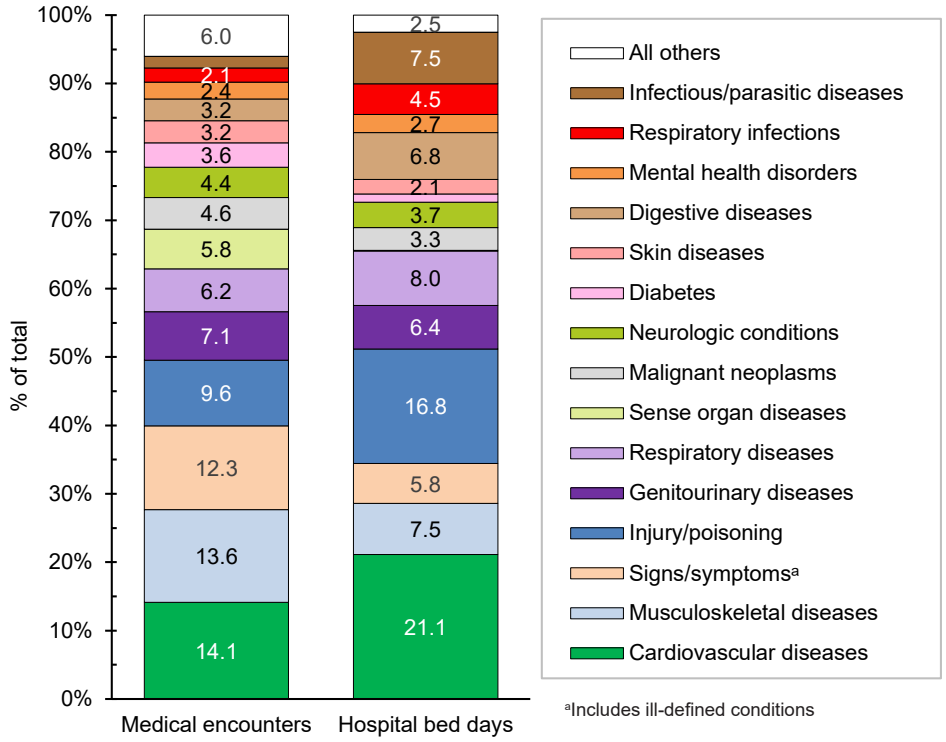


encounters, 30.4% of all individuals affected, and 65.9% of hospital bed days **(Table)**. On average, each affected individual had 19.5 medical encounters during the year.

Of all morbidity-related categories, cardiovascular diseases accounted for the most medical encounters (n=5,609,275; 14.1%) and bed days (n=890,170; 21.1%) **(Figures 7a, 7b)**. Essential hypertension (26.4%), ischemic heart disease (15.0%), and cerebrovascular disease (9.8%) accounted for a little more than half (51.1%) of all cardiovascular disease-related medical encounters; and cerebrovascular disease accounted for more than one-quarter (28.3%) of all cardiovascular disease-related bed days **(data not shown)**.

Among the oldest age group of beneficiaries, the most medical encounters per affected individual were associated with musculoskeletal diseases (5.9), malignant neoplasms (5.4), respiratory diseases (5.3), diseases of the genitourinary system (4.9), cardiovascular diseases (4.8), and mental health disorders (4.6). In this

FIGURE 7b. Percentages of medical encounters and hospital bed days, by burden of disease major category, non-service member beneficiaries, aged 65 years or older, 2017



age group, back problems accounted for more than one-third (36.3%) of all musculoskeletal disease-related encounters. Together, melanomas and other skin cancers (19.7%); prostate cancer (14.3%); breast cancer (12.4%); and trachea, bronchus, and lung cancers (11.0%) accounted for more than half (57.4%) of all malignant neoplasm-related encounters **(data not shown)**. Chronic obstructive pulmonary disease accounted for more than two-fifths of all medical encounters (43.5%) and bed days (43.1%) attributable to respiratory diseases **(data not shown)**.

Infectious and parasitic diseases (7.5%) accounted for a larger proportion of total bed days among the oldest compared to the other age groups of beneficiaries **(Figures 7a, 7b)**. In contrast, mental health disorders accounted for smaller percentages of medical encounters (2.4%) and bed days (2.7%) among the oldest compared to the younger age groups.

EDITORIAL COMMENT

This report describes the fifth estimate of overall morbidity burdens among non-service member beneficiaries of the MHS. The report notes that a large majority of the healthcare services for current illness and injury (excluding encounters with diagnoses identified by Z-codes) that are provided through the MHS to non-service member beneficiaries are delivered in non-military medical facilities (i.e., outsourced [purchased] care). The report also documents that there are pronounced differences in the types of morbidity and the natures of the care provided for evaluation and treatment across age groups of beneficiaries. Of particular note, individuals aged 65 years or older account for nearly half of all medical encounters (48.0%) and a majority (65.9%) of all hospital bed days delivered to beneficiaries not currently in military service.

In 2017, mental health disorders accounted for the largest proportions of the morbidity and healthcare burdens that affected the pediatric (aged 0–17 years) and young adult (aged 18–44 years) beneficiary age groups. Among pediatric beneficiaries, 67.8% of medical encounters for mental health disorders were attributable to autistic disorders, attention deficit disorders, and developmental speech/language disorders. Of particular note, children affected by autistic disorders had, on average, 47.3 autism-related encounters each during the 1-year surveillance period.

As among pediatric beneficiaries, among young adults (18–44 years), mental health disorders accounted for more medical encounters than any other major category of illnesses or injuries. However, the proportion of all encounters attributable to mental health disorders was markedly less among adults (18–44 years) (17.5%), compared to pediatric (32.9%) beneficiaries. Also, as expected, the mental health disorders that accounted for the largest healthcare burdens among adults (18–44 years)—mood, anxiety, and adjustment disorders—differed from those that most affected the pediatric age group.

It is not surprising that the highest numbers and proportion of hospital bed days among adults aged 18–44 years were for maternal conditions because this age group encompasses nearly all women of childbearing age. Among older adults (aged 45–64 years), musculoskeletal diseases were the greatest contributors to morbidity and healthcare burdens; and among adults aged 65 years or older, cardiovascular diseases accounted for the most morbidity and healthcare burdens.

Of musculoskeletal diseases, back problems were a major source of healthcare burden; and of cardiovascular diseases, cerebrovascular disease, ischemic heart disease, and essential hypertension accounted for the largest healthcare burdens. These findings are not surprising and reflect the inevitable effects of aging on the health and healthcare needs of the older segment of the MHS beneficiary population. However, many of the health conditions associated with the largest morbidity and healthcare burdens among beneficiaries in older age groups are also associated with unhealthy lifestyles (e.g., unhealthy diet, inadequate exercise, tobacco use). As such, to varying extents, the most costly health conditions may be preventable and their disabling or life-threatening long-term consequences may be avoidable. Illnesses and injuries that disproportionately contribute to morbidity and healthcare burdens in various age groups of MHS beneficiaries should be targeted for early detection and treatment and by comprehensive prevention and research programs.

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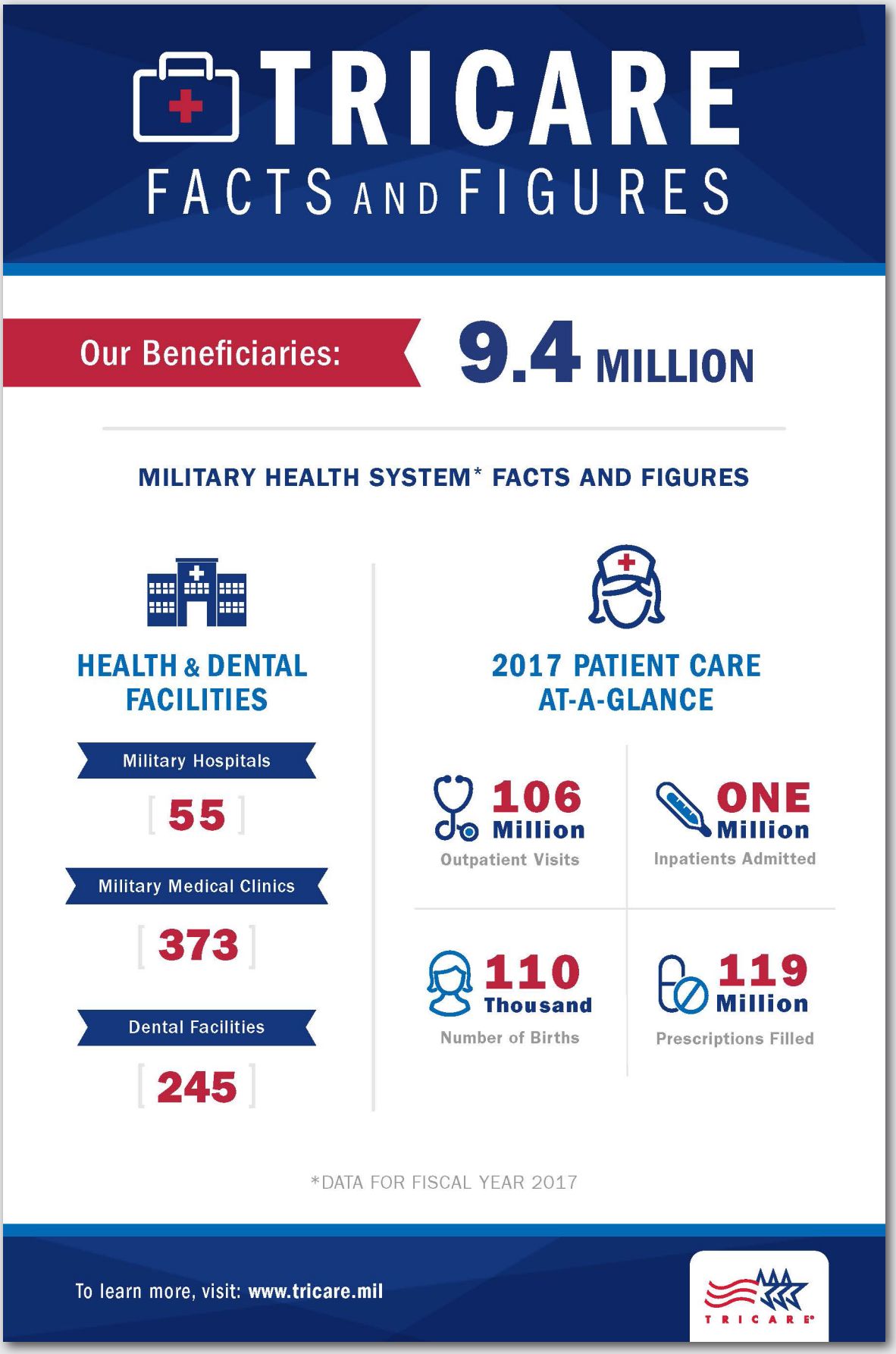
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