MSMR

Medical Surveillance Monthly Report November 2023 | Vol. 30 | No. 11

In this issue:

A Publication of the Armed Forces Health Surveillance Division

www.health.mil/MSMR

Update

Cold Weather Injuries Among the Active and Reserve Components of the U.S. Armed Forces, July 2018–June 2023

From July 2022 through June 2023, a total of 423 members of the active (n=376) and reserve (n=47) components of the U.S. Armed Forces had at least 1 cold weather injury. The crude overall incidence rate of cold injury among all active component service members (ACSM) during the 2022-2023 cold season was 28.5 per 100,000 person-years (p-yrs), 15.2% lower than the rate observed during the 2021-2022 cold season (33.6 per 100,000 p-yrs). The rates of cold injuries varied among the Armed Forces, with the highest rates per 100,000 p-yrs observed in the Army, at 50.9, followed by the Marine Corps, at 32.2, the Air Force, at 18.9, the Navy, at 8.1, and the Coast Guard at 5.1. Consistent with previous cold seasons, frostbite (54.0%) remained the most common type of cold injury among ACSM during the 2022-2023 cold season, while the proportions of hypothermia and immersion injuries were 16.5% and 30.3%, respectively. Cold injury rates among ACSM during the 2018 to 2023 cold seasons were generally highest for males, non-Hispanic Blacks, those under 20 years of age, and enlisted members. The number of cold injuries identified in service members deployed outside the U.S during the 2022-2023 cold season (n=10) was comparable to the 2 preceding cold seasons (11 in 2020-2021 and 12 in 2021-2022), with frostbite accounting for half (n=5) of the 2022-2023 cases.

What are the new findings?

For all ACSM, the rate of cold weather injuries in 2022-2023 decreased by 15.2% compared to the preceding cold season. The decrease was most pronounced in the Marine Corps, with a 22.0% reduction in the incidence rate of cold injuries. This year's report includes cold injury rates for the Coast Guard.

What is the impact on readiness and force health protection?

Cold injuries are a predictable and preventable threat. Continuous surveillance is essential to prevent cold weather injuries and mitigate their adverse impacts on military operations. Military training and combat operations require continued emphasis on effective cold weather injury prevention strategies and adherence to relevant policies and procedures to protect service members against such injuries.

Cold injuries are of significant military concern because of their adverse impact on operations and the high financial costs of treatment and disability.[1,2] In response, the U.S. Armed Forces have developed and are continually improving their training, doctrine, procedures, and protective equipment and clothing to counter the threat of cold environments.[3-8] Although these measures are highly effective, cold injuries continue to affect hundreds of service members each year due to exposure to both cold and wet environments.[9]

Military training or mission requirements in cold and wet weather conditions can preclude immediate warm or dry shelter, the ability to change wet or damp clothing, or even healthy physical activity.[2-4] Continuous surveillance of cold weather injuries is essential to inform measures for reducing their impacts and remind leaders of this predictable threat. The Department of Defense guidelines for reportable medical events (RMEs) require reporting of cases of hypothermia, freezing peripheral injuries (e.g., frostbite), and non-freezing peripheral injuries (e.g., immersion injuries, chilblains).[10]

Cold injuries can be broadly categorized in 2 major groups: those with a central effect, and those primarily affecting peripheral parts of the body. Hypothermia is a classic example of a central cold injury, which occurs when the body's core temperature falls below 95°F.[7] Freezing atmospheric temperatures are not required to produce hypothermia.[11] Severe hypothermia can lead to pulmonary edema, reduced heart rate, coma, ventricular arrhythmias (including ventricular fibrillation), and asystole.[11-13]

Peripheral cold injuries mainly affect extremities such as hands and feet, and can be further classified as either freezing injuries, such as frostbite, or non-freezing injuries such as immersion foot. Freezing peripheral injury is defined as the damage sustained by tissues exposed to temperatures below freezing.[14] A substantial proportion of patients with peripheral frostbite experience permanent changes in their microcirculation and disruption of local neurological functions (e.g., reduced sensation in the affected area).[15] The areas of the body most frequently affected by frostbite include the ears, nose, cheeks, chin, fingers, and toes.[15,16] Although most frostbite damage is minor, severe injury may lead to impaired functioning and inability to work due to cold hypersensitivity, chronic ulceration, vasospasm, localized osteoarthritis, or chronic pain.[15,17]

Non-freezing peripheral cold injury includes a spectrum of localized injuries to the soft tissues, nerves, and vasculature of distal extremities that result from prolonged exposure (12 to 48 hours) to wet, cold (generally 32 to 59°F) conditions; the injury process is generally slower in warmer water.[14,21] Although non-freezing peripheral cold injuries most often involve feet (e.g., immersion foot), any dependent body part can be affected by the condition, including the hands.[22] Immersion foot generally presents as waterlogging, with the most marked effect in the soles[20,21]: The foot becomes hyperemic (i.e., increased blood flow), painful, and swollen with continuous exposure; progression to blistering, decreased blood flow, ulceration, and gangrene is gradual.[20,21] Long-term complications of non-freezing cold injury such as immersion foot are similar to, and equally debilitating as, those produced by frostbite: hypersensitivity to cold, chronic pain, and severe pain induced by walking.[17,19,20,21]

Environmental factors that increase the risk of cold weather injuries include prolonged outdoor exposure to temperatures 40°F and below, wind speeds exceeding 5 miles per hour, high altitude, hypoxia, geographic location, wet conditions due to rain and snow, or submersion in cold water, in addition to lack of adequate shelter and clothing.[22] Situational factors that increase risk of immersion foot include immobility, wet socks, and constrictive boots.[20,23,24] Individual risk factors vary and include previous cold injury, exhaustion, dehydration, fatigue, sleep deprivation, improper acclimatization, inadequate nutrition, alcohol use, smoking, chronic disease (e.g., peripheral vascular disease, diabetes), older age, and medications that impair compensatory responses (e.g., oral antihyperglycemics, beta-blockers, general anesthetic agents).[13-17,20]

Since 2004, the *MSMR* has published annual updates on the incidence of cold weather injuries affecting U.S. military members for the 5 most recent cold seasons.[25] The timing of these annual updates is intended to call attention to the recurring risks of such injuries as winter approaches in the Northern Hemisphere, where most members of the U.S. Armed Forces are assigned. This 2023 report addresses the occurrence of frostbite, immersion hand and foot, and hypothermia during the cold seasons from July 2018 through June 2023. Cases of chilblains are not included in this report because the condition is common, infrequently diagnosed, usually mild in severity, and thought to have minimal medical, public health, or military impacts.

Methods

This surveillance population included all individuals who served in the active or reserve components of the U.S. Armed Forces at any time during the surveillance period of July 1, 2018 through June 30, 2023. Service members in the Space Force were classified as Air Force for this analysis due to data availability beginning January 2023 for the newly formed service. For analysis purposes, "cold years" or "cold seasons" were defined as July 1 through June 30 intervals so complete cold weather seasons could be represented in annual summaries and comparisons.

Records of cold weather injuries for frostbite, immersion hand and foot, and hypothermia were queried from RMEs submitted to the Disease Reporting System internet (DRSi) and diagnostic codes from inpatient and outpatient medical encounters and records from the Theater Medical Data Store. Data from these sources are routinely incorporated into the Defense Medical Surveillance System (DMSS). A case was defined by the presence of an RME or 1 of any qualifying International Classification of Diseases, 9th or 10th revision (ICD-9 and ICD-10, respectively) code in the first diagnostic position of a record of a health care encounter **(Table 1)**. Due to an update to the DRSi medical event reporting system in July 2017, the type of RME for a cold injury (e.g., frostbite, immersion injury, hypothermia) could not be distinguished using RME records in DMSS data. Instead, information on the types of RMEs for cold injury between July 2018 and June 2023 were extracted from DRSi and then combined with DMSS data.

To estimate the number of unique individuals who suffered a cold injury each cold season, and to avoid counting follow-up health care encounters, only 1 cold injury per individual per cold season was included. To count types of cold injury, namely frostbite, immersion hand and foot, and hypothermia cases, 1 of each type of cold injury per individual per cold season could be included. For example, if an individual was diagnosed or reported with immersion hand and foot at 1 point during a cold season and then with frostbite later in the same cold season, each of those different types of injury would be included in the injury calculation. If a service member had multiple medical encounters for cold injuries on the same day, only 1 encounter was used for analysis (hospitalizations were prioritized over ambulatory visits, which were prioritized over RMEs).

Annual incidence rates of cold injuries among active component service members (ACSM) were calculated as incident cold injury diagnoses per 100,000 person-years (p-yrs) of service. Annual rates of cold injuries among reservists were calculated as cases per 100,000 persons using the total number of reserve component service members for each year of the surveillance period. Counts of persons in the reserves were used as the denominator in these calculations because information on the start and end dates of active duty service periods of reserve component members is not available.

TABLE 1. ICD-9/ICD-10 Diagnostic Codes for Cold Weather Injuries

Case classification	ICD-9	ICD-10[a]
Frostbite	991.0, 991.1, 991.2, 991.3	T33.*, T34.*
Immersion hand and foot	991.4	T69.0*
Hypothermia	991.6	T68.*

Abbreviatoin: ICD, International Classification of Diseases, 9th and 10th revisions.
[a]An asterisk (*) indicates that any subsequent digit/character is included.

Cold injuries are summarized by the locations where service members were treated for those injuries, identified by a Defense Medical Information System Identifier (DMIS ID) of an encounter. Because such injuries can occur during field training, temporary duty, or outside usual duty stations, DMIS ID was used as a proxy for the location where the cold injury occurred.

Results

2022–2023 cold season

From July 2022 through June 2023, a total of 423 members of the active (n=376) and reserve (n=47) components had at least 1 cold weather injury **(Table 2)**. In the active component, Army members had the highest rate of any cold injury (n=231, 50.9 per 100,000 p-yrs) during the 2022-2023 cold season, followed by members of the Marine Corps (n=55, 32.2 per 100,000 p-yrs), Air Force (n=61, 18.9 per 100,000 p-yrs), and Navy (n=27, 8.1 per 100,000 p-yrs). Only 2 active component Coast Guard members were affected by cold weather injuries during the 2022-2023 cold season (5.1 per 100,000 p-yrs). One cold injury, frostbite, was recorded for a member of the Space Force (counted with the Air Force) (data not shown). Among the reserve component, Army personnel accounted for more than two-thirds of cases (n=33, 6.1 per 100,000 p-yrs) during 2022-2023 **(Table 2)**, although the Marine Corps had the highest rate of cold injuries among reservists (n=4, 10.2 per 100,000 persons).

When major types of cold injury case classifications are considered (not numbers of individuals affected), frostbite was the most common type of cold injury (n=202; 54.0% of all cold injuries) among ACSM in all services in 2022-2023 **(Tables 3a–3e)**. Within the Air Force during the 2022-2023 season, 78.7% of all cold injuries were frostbite, but the proportions of frostbite injury in the Army (53.9%), Marine Corps (35.7%) and Navy (29.6%) were much lower. The Coast Guard had 2 cold weather injuries in 2022-2023, 1 each of frostbite and hypothermia.

For all active component service members in 2022-2023, the proportions of hypothermia (n=62) and immersion injuries (n=114) were 16.5% and 30.3%, respectively **(Tables 3a–3e)**. The numbers and rates of hypothermia injuries in the 2022-2023 cold season were the lowest among active component Army and Marine Corps members during the 5-year period, while case counts and rates of frostbite were the lowest among active component Navy members **(Table 3a, Table 3b, Table 3d)**.

TABLE 2. Annual Incidence of Service Members Affected by Any Cold Injury (1 per person per year), by Service and Component, July 2018–June 2023

	Army		Navy		Air Force		Marine Corps		Coast Guard		All services	
	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]
Active component												
All years (2018-2023)	1,323	56.5	135	8.1	275	16.9	404	45.1	11	5.5	2,148	31.9
Jul 2018-Jun 2019	275	59.1	22	6.7	46	14.3	118	63.9	4	9.7	465	34.7
Jul 2019-Jun 2020	234	49.4	28	8.4	48	14.6	59	32.0	1	2.5	370	27.2
Jul 2020-Jun 2021	298	62.4	26	7.6	57	17.3	99	55.0	2	5.0	482	35.3
Jul 2021-Jun 2022	285	60.4	32	9.4	63	19.4	73	41.3	2	5.0	455	33.6
Jul 2022-Jun 2023	231	50.9	27	8.1	61	18.9	55	32.2	2	5.1	376	28.5
Reserve component												
All years (2018-2023)	190	.	12	.	46	.	40	.	3	.	291	.
Jul 2018-Jun 2019	45	7.8	1	1.6	7	3.7	16	35.4	0	0.0	69	7.8
Jul 2019-Jun 2020	36	6.2	2	3.1	10	5.3	4	9.0	0	0.0	52	5.9
Jul 2020-Jun 2021	42	7.3	6	9.5	13	6.9	11	25.6	1	15.1	73	8.3
Jul 2021-Jun 2022	34	6.0	2	3.2	7	3.7	5	11.9	2	30.3	50	5.8
Jul 2022-Jun 2023	33	6.1	1	1.7	9	4.9	4	10.2	0	0.0	47	5.7
Overall, active and reserve												
All years (2018-2023)	1,513	.	147	.	321	.	444	.	14	.	2,439	.
Jul 2018-Jun 2019	320	.	23	.	53	.	134	.	4	.	534	.
Jul 2019-Jun 2020	270	.	30	.	58	.	63	.	1	.	422	.
Jul 2020-Jun 2021	340	.	32	.	70	.	110	.	3	.	555	.
Jul 2021-Jun 2022	319	.	34	.	70	.	78	.	4	.	505	.
Jul 2022-Jun 2023	264	.	28	.	70	.	59	.	2	.	423	.

Abbreviation: No., number.
[a] For active component, rate is per 100,000 person-years; for reserve component, rate is per 100,000 persons.

Five cold seasons: July 2018–June 2023

The crude overall incidence rate of cold injury for all ACSM in 2022-2023 was 28.5 per 100,000 p-yrs, representing a 15.2% decline compared to the rate observed in 2021-2022 (33.6 per 100,000 p-yrs) **(Table 2, Figure 1)**. Throughout the surveillance period, cold injury rates were consistently higher among active component members of the Army and the Marine Corps **(Figure 1)**. The active component service-specific incidence rates decreased the most from 2021-2022 to 2022-2023 among Marine Corps members, by 22.0%, followed by the Army, with a 15.8% decrease, while the Navy reported a 13.6% decrease, and the Air Force rate decreased 2.5%. Incidence rates of cold injuries for the last 2 cold seasons were similar for the Coast Guard (5.1 per 100,000 p-yrs in 2022-2023, 5.0 in 2021-2022). Crude overall incidence rates of cold injuries were also similar for reserve component service members (5.7 per 100,000 p-yrs in 2022-2023 and 5.8 per 100,000 p-yrs in 2021-2022) for the past 2 seasons **(Figure 2)**.

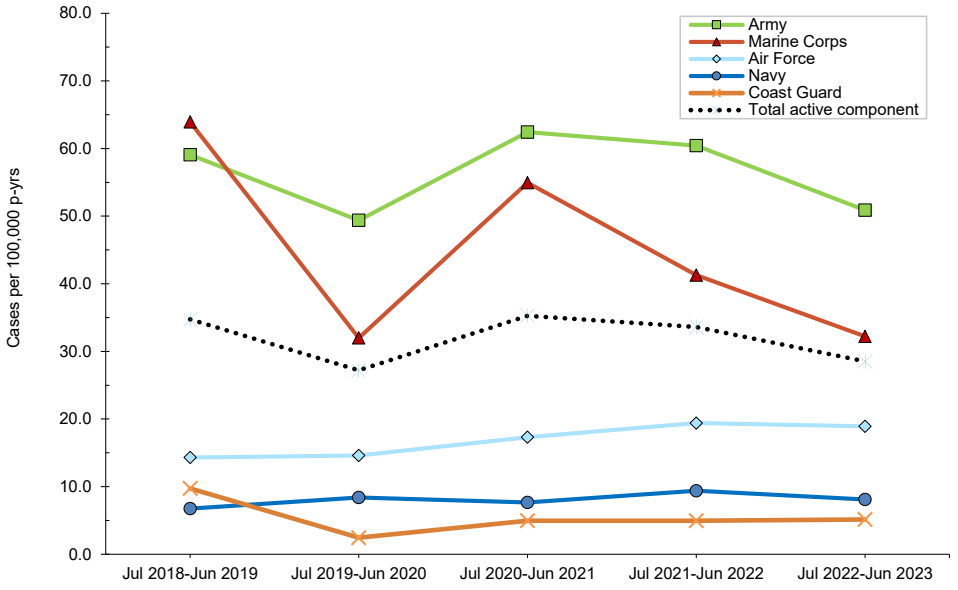
During the 5-year surveillance period, overall rates of cold injuries were generally higher among males in all services except the Coast Guard **(Tables 3a–3e)**. The overall rates among male service members of the Navy, Air Force, and Marine Corps were 1.6 to 1.8 times higher than those of their female counterparts.

For all services, overall rates of cold injuries were higher among non-Hispanic Black service members than those of the other races and ethnicities **(Tables 3a–3e)**. Rates of frostbite among non-Hispanic Black members of the Army were more than 3 times higher than those of other races and ethnicities, with the biggest differences observed in the Marine Corps—where it was more than 4 times higher.

Rates of cold injuries in all services were highest among the youngest service members and tended to decrease with increasing age **(Tables 3a–3e)**.

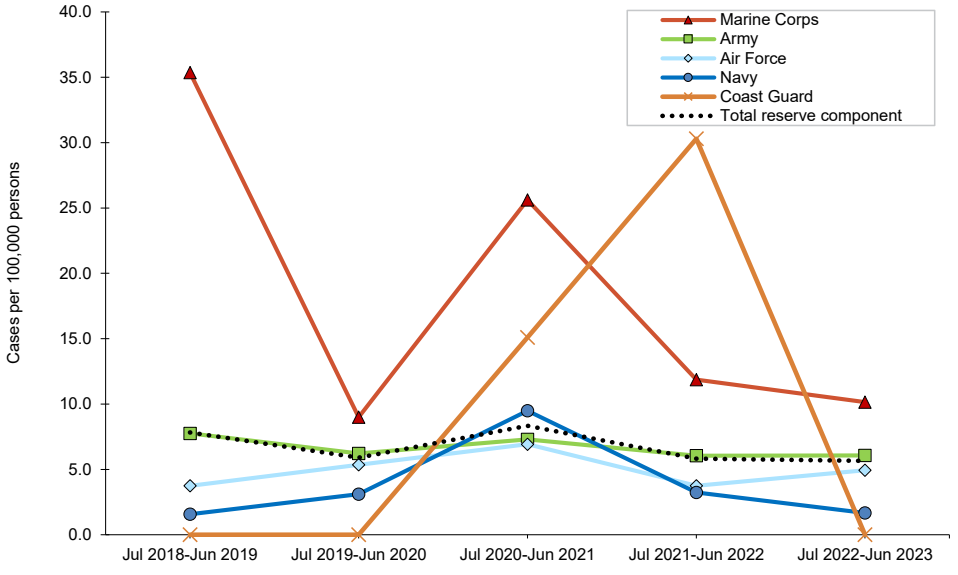
Enlisted members of all 5 services experienced higher rates of injury than officers. Rates of all cold injuries in the Army, Air Force, and Marine Corps combined were highest among service members in combat-specific (infantry/artillery/combat or engineering/armor) occupations **(Tables 3a, 3c–3d)**. Among the active component of the Navy, rates of cold injuries during the 5-year surveillance period were highest for service members in motor transport occupations **(Table 3b)**.

FIGURE 1. Annual Incidence Rates of Service Members Affected by Any Cold Injury (1 per person per year), by Service, Active Component, U.S. Armed Forces, July 2018–June 2023



Abbreviation: P-yrs, person-years.

FIGURE 2. Annual Incidence Rates of Service Members Affected by Any Cold Injury (1 per person per year), by Service, Reserve Component, U.S. Armed Forces, July 2018–June 2023



Abbreviation: P-yrs, person-years.

Among the cold injury cases reported within the active component during the 5-year period (n=2,137), 89 (4.2% of the total) occurred during basic training. The Army (n=36) and Marine Corps (n=51) accounted for 97.8% of all basic trainees

affected by cold injuries **(data not shown)**. Throughout the course of the 5-year surveillance period, a total of 46 service members were hospitalized, a figure which represents 2.2% of total cold weather injuries for the period: Army (n=32) and Marine Corps (n=9) members accounted for most (89.1%) of all hospitalized cases **(data not shown)**.

Cold injuries during deployments

During the 5-year surveillance period a total of 66 cold injuries were diagnosed among service members deployed outside the U.S. **(data not shown)**, of which 35 (53.0%) were frostbite, 20 (30.3%) were immersion injuries, and 11 (16.7%) were hypothermia. Approximately one-third (n=23) of all 66 deployment-associated cold injuries were diagnosed during the 2018-2019 cold season. The number of cases in subsequent cold seasons were consistent, with 10 to 12 cold injuries recorded each season **(data not shown)**. Frostbite injuries accounted for half (n=5; 50.0%) of cold weather injuries identified in service members deployed outside of the U.S during the 2022-2023 cold season.

TABLE 3a. Annual Incidence of Frostbite, Immersion Foot, and Hypothermia Among All Cold Injuries (1 type per person per year), Active Component, U.S. Army, July 2018–June 2023

	Frostbite		Immersion foot		Hypothermia		All cold injuries	
	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]
Total	753	32.1	424	18.1	195	8.3	1,372	58.6
Sex								
Male	644	32.5	371	18.7	176	8.9	1,191	60.1
Female	109	30.3	53	14.7	19	5.3	181	50.2
Race and ethnicity								
White, non-Hispanic	260	20.8	192	15.3	93	7.4	545	43.5
Black, non-Hispanic	348	73.4	158	33.3	61	12.9	567	119.5
Other	145	23.6	74	12.0	41	6.7	260	42.2
Age								
<20	72	45.8	57	36.3	20	12.7	149	94.8
20-24	312	43.2	212	29.4	106	14.7	630	87.3
25-29	155	27.9	83	14.9	49	8.8	287	51.7
30-34	104	28.1	38	10.3	12	3.2	154	41.7
35-39	60	21.3	20	7.1	4	1.4	84	29.9
40-44	26	16.9	8	5.2	3	2.0	37	24.1
45+	24	23.1	6	5.8	1	1.0	31	29.8
Rank								
Enlisted	663	35.3	391	20.8	178	9.5	1,232	65.6
Officer	90	19.3	33	7.1	17	3.7	140	30.1
Occupation								
Infantry/artillery/armor/combat engineering	287	49.0	191	32.6	100	17.1	578	98.7
Motor transport	23	31.6	13	17.8	4	5.5	40	54.9
Repair/engineering	124	26.2	75	15.8	31	6.5	230	48.5
Communications/intelligence	171	29.6	87	15.1	30	5.2	288	49.9
Health care	51	22.1	18	7.8	9	3.9	78	33.7
Other	97	24.1	40	10.0	21	5.2	158	39.3
Cold year (July-June)								
2018-2019	143	30.7	106	22.8	41	8.8	290	62.3
2019-2020	115	24.3	94	19.8	47	9.9	256	54.0
2020-2021	181	37.9	81	17.0	38	8.0	300	62.8
2021-2022	189	40.1	67	14.2	38	8.1	294	62.3
2022-2023	125	27.5	76	16.7	31	6.8	232	51.1

Abbreviation: No., number.

[a]Rate per 100,000 person-years.

Cold injuries by location

During the 5-year period, 20 military locations reported at least 25 incident cold injuries (1 per person per year) among ACSM **(Figure 3)**. Locations with the highest 5-year counts of incident injuries were Fort Wainwright (n=236), Joint Base Elmendorf-Richardson (n=167), Fort Carson (n=96), Camp Lejeune (n=93), Fort Moore (formerly Benning) (n=79), Fort Drum (n=71), and Fort Campbell (n=71) **(data not shown)**. During the 2022-2023 cold season, incidence rates of cold injuries were higher than the 2021-2022 incidence rates at 6 of the 20 locations **(data not shown)**. The most notable increase was at the Army's Fort Carson, where 22 cases (98.2 per 100,000 p-yrs) were identified in 2022-2023, compared to 11 (42.1 per 100,000 p-yrs) the prior year **(data not shown)**. U.S. Army Garrison Bavaria's case count increased the most, from 1 in 2021-2022 to 40 in 2022-2023. **Figure 3** charts the 2022-2023 seasonal numbers of cold injuries and median case numbers for the prior 4 seasons for the 20 locations with at least 25 cases. At 16 installations, case numbers in 2022-2023 were less than the median counts for the previous 4 years.

TABLE 3b. Annual Incidence of Frostbite, Immersion Foot, and Hypothermia Among All Cold Injuries (1 type per person per year), Active Component, U.S. Navy, July 2018–June 2023

	Frostbite		Immersion foot		Hypothermia		All cold injuries	
	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]
Total	59	3.5	25	1.5	51	3.0	135	8.1
Sex								
Male	51	3.8	23	1.7	44	3.3	118	8.9
Female	8	2.4	2	0.6	7	2.1	17	5.0
Race and ethnicity								
White, non-Hispanic	27	3.2	9	1.1	28	3.4	64	7.7
Black, non-Hispanic	17	6.5	8	3.1	8	3.1	33	12.6
Other	15	2.6	8	1.4	15	2.6	38	6.6
Age								
<20	3	3.1	3	3.1	7	7.2	13	13.3
20-24	18	3.6	9	1.8	21	4.2	48	9.7
25-29	25	6.1	3	0.7	18	4.4	46	11.3
30-34	6	2.1	2	0.7	3	1.0	11	3.8
35-39	2	1.0	3	1.4	2	1.0	7	3.3
40-44	1	0.9	4	3.7	0	0.0	5	4.6
45+	4	6.1	1	1.5	0	0.0	5	7.6
Rank								
Enlisted	47	3.4	22	1.6	47	3.4	116	8.3
Officer	12	4.3	3	1.1	4	1.4	19	6.8
Occupation								
Infantry/artillery/armor/combat engineering	3	2.9	0	0.0	3	2.9	6	5.8
Motor transport	2	3.0	0	0.0	17	25.3	19	28.3
Repair/engineering	15	2.0	8	1.1	13	1.8	36	4.9
Communications/intelligence	8	3.0	7	2.6	4	1.5	19	7.1
Health care	16	9.0	0	0.0	3	1.7	19	10.7
Other	15	4.7	10	3.1	11	3.4	36	11.2
Cold year (July-June)								
2018-2019	16	4.9	1	0.3	5	1.5	22	6.7
2019-2020	14	4.2	6	1.8	8	2.4	28	8.4
2020-2021	10	2.9	3	0.9	13	3.8	26	7.6
2021-2022	11	3.2	8	2.3	13	3.8	32	9.4
2022-2023	8	2.4	7	2.1	12	3.6	27	8.1

Abbreviation: No., number.

[a]Rate per 100,000 person-years.

Discussion

The overall rate of cold weather injuries among ACSM in 2022-2023 decreased by 15.2% from the previous cold injury season. This decrease was most pronounced within the Marine Corps, with a 22.0% lower incidence rate from 2021-2022. As in prior years, cold injury rates were much higher among members of the Army and Marine Corps. In 2022-2023, frostbite was the most common type of cold injury among ACSM in all 5 services.

Compared to their respective counterparts, overall rates of cold injuries were higher among male service members, non-Hispanic Black service members, the youngest (less than 20 years old), and enlisted service members. Rates of frostbite were markedly higher among non-Hispanic Blacks compared to non-Hispanic Whites and those in the other/unknown race and ethnicity group. These differences have been noted in prior *MSMR* updates, and results of several studies suggest that other factors (e.g., physiological differences,

TABLE 3c. Annual Incidence of Frostbite, Immersion Foot, and Hypothermia Among All Cold Injuries (1 type per person per year), Active Component, U.S. Air Force, July 2018–June 2023

	Frostbite		Immersion foot		Hypothermia		All cold injuries	
	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]
Total	227	14.0	16	1.0	35	2.2	278	17.1
Sex								
Male	198	15.5	13	1.0	28	2.2	239	18.7
Female	29	8.5	3	0.9	7	2.1	39	11.4
Race and ethnicity								
White, non-Hispanic	123	12.9	7	0.7	21	2.2	151	15.8
Black, non-Hispanic	55	24.8	4	1.8	6	2.7	65	29.3
Other	49	11.1	5	1.1	8	1.8	62	14.0
Age								
<20	18	24.2	2	2.7	4	5.4	24	32.2
20-24	119	25.8	10	2.2	12	2.6	141	30.6
25-29	39	9.7	2	0.5	10	2.5	51	12.7
30-34	24	7.9	0	0.0	6	2.0	30	9.9
35-39	17	7.3	2	0.9	1	0.4	20	8.6
40-44	3	2.9	0	0.0	1	1.0	4	3.9
45+	7	15.2	0	0.0	1	2.2	8	17.4
Rank								
Enlisted	206	15.8	15	1.1	29	2.2	250	19.1
Officer	21	6.7	1	0.3	6	1.9	28	8.9
Occupation								
Infantry/artillery/armor/combat engineering	10	81.5	0	0.0	0	0.0	10	81.5
Motor transport	0	0.0	0	0.0	0	0.0	0	0.0
Repair/engineering	90	17.9	6	1.2	8	1.6	104	20.6
Communications/intelligence	35	10.2	1	0.3	5	1.5	41	11.9
Health care	9	6.0	1	0.7	2	1.3	12	8.0
Other	83	13.9	8	1.3	20	3.3	111	18.5
Cold year (July-June)								
2018-2019	40	12.4	2	0.6	5	1.6	47	14.6
2019-2020	39	11.9	2	0.6	8	2.4	49	14.9
2020-2021	47	14.3	1	0.3	9	2.7	57	17.3
2021-2022	53	16.3	5	1.5	6	1.8	64	19.7
2022-2023	48	15.1	6	1.9	7	2.2	61	19.2

Abbreviation: No., number.

[a]Rate per 100,000 person-years.

previous cold weather experience) are possible explanations for increased susceptibility.[9,15,26–28]

It should be noted that this analysis of cold injuries was unable to distinguish between injuries sustained during official military duties (training or operations) and those associated with unrelated or personal activities. RMEs for non-freezing peripheral injuries were excluded if "chilblains" was listed in case comments; some RMEs for chilblains were potentially misclassified, however, as immersion injury if chilblains were not listed in the case comments.

To prepare for all circumstances posing a threat for cold weather injury, service members should be aware of and able to identify signs of cold injury, as well as environmental, individual and situational risk factors, and protective measures for themselves and fellow service members, whether during training, operations, combat, or recreation in wet or freezing conditions.

This article has been revised due to an error in the original published version.

TABLE 3d. Annual Incidence of Frostbite, Immersion Hand and Foot, and Hypothermia Among All Cold Injuries (1 type per person per year), Active Component, U.S. Marines, July 2018–June 2023

	Frostbite		Immersion foot		Hypothermia		All cold injuries	
	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]
Total	190	21.2	124	13.8	95	10.6	409	45.6
Sex								
Male	183	22.4	117	14.3	85	10.4	385	47.2
Female	7	8.6	7	8.6	10	12.3	24	29.6
Race and ethnicity								
White, non-Hispanic	89	17.2	75	14.5	44	8.5	208	40.3
Black, non-Hispanic	62	70.0	8	9.0	20	22.6	90	101.6
Other	39	13.3	41	14.0	31	10.6	111	38.0
Age								
<20	21	17.4	57	47.2	28	23.2	106	87.8
20-24	117	27.2	52	12.1	52	12.1	221	51.4
25-29	31	19.7	11	7.0	11	7.0	53	33.6
30-34	15	18.2	4	4.8	3	3.6	22	26.6
35-39	6	9.6	0	0.0	0	0.0	6	9.6
40-44	0	0.0	0	0.0	1	3.6	1	3.6
45+	0	0.0	0	0.0	0	0.0	0	0.0
Rank								
Enlisted	165	20.9	113	14.3	88	11.2	366	46.4
Officer	25	23.1	11	10.2	7	6.5	43	39.7
Occupation								
Infantry/artillery/armor/combat engineering	114	58.7	16	8.2	38	19.6	168	86.6
Motor transport	3	6.9	1	2.3	2	4.6	6	13.8
Repair/engineering	14	6.5	13	6.0	4	1.8	31	14.3
Communications/intelligence	31	14.5	11	5.1	8	3.7	50	23.4
Health care	0	0.0	0	0.0	0	0.0	0	0.0
Other	28	12.3	83	36.4	43	18.8	154	67.5
Cold year (July-June)								
2018-2019	54	29.3	36	19.5	30	16.3	120	65.0
2019-2020	26	14.1	15	8.1	18	9.8	59	32.0
2020-2021	57	31.6	24	13.3	18	10.0	99	55.0
2021-2022	33	18.7	24	13.6	18	10.2	75	42.4
2022-2023	20	11.7	25	14.6	11	6.4	56	32.8

Abbreviation: No., number.

[a]Rate per 100,000 person-years.

TABLE 3e. Annual Incidence of Frostbite, Immersion Foot, and Hypothermia Among All Cold Injuries (1 type per person per year), Active Component, U.S. Coast Guard, July 2018–June 2023

	Frostbite		Immersion foot		Hypothermia		All cold injuries	
	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]
Total	8	4.0	0	0.0	3	1.5	11	5.5
Sex	.	.	.	.	.	.	.	.
Male	7	4.1	0	0.0	2	1.2	9	5.3
Female	1	3.2	0	0.0	1	3.2	2	6.5
Race and ethnicity	.	.	.	.	.	.	.	.
White, non-Hispanic	7	5.4	0	0.0	2	1.6	9	7.0
Black, non-Hispanic	0	0.0	0	0.0	1	9.8	1	9.8
Other	1	1.6	0	0.0	0	0.0	1	1.6
Age	.	.	.	.	.	.	.	.
<20	0	0.0	0	0.0	0	0.0	0	0.0
20-24	1	2.4	0	0.0	1	2.4	2	4.8
25-29	3	7.3	0	0.0	2	4.9	5	12.2
30-34	2	5.0	0	0.0	0	0.0	2	5.0
35-39	1	2.6	0	0.0	0	0.0	1	2.6
40-44	1	4.5	0	0.0	0	0.0	1	4.5
45+	0	0.0	0	0.0	0	0.0	0	0.0
Rank	.	.	.	.	.	.	.	.
Enlisted	8	5.1	0	0.0	3	1.9	11	7.0
Officer	0	0.0	0	0.0	0	0.0	0	0.0
Occupation	.	.	.	.	.	.	.	.
Infantry/artillery/armor/combat engineering	0	0.0	0	0.0	0	0.0	0	0.0
Motor transport	2	7.7	0	0.0	0	0.0	2	7.7
Repair/engineering	4	6.3	0	0.0	1	1.6	5	7.9
Communications/intelligence	1	3.4	0	0.0	2	6.9	3	10.3
Health care	0	0.0	0	0.0	0	0.0	0	0.0
Other	1	1.3	0	0.0	0	0.0	1	1.3
Cold year (July-June)	.	.	.	.	.	.	.	.
2018-2019	4	9.7	0	0.0	0	0.0	4	9.7
2019-2020	1	2.5	0	0.0	0	0.0	1	2.5
2020-2021	1	2.5	0	0.0	1	2.5	2	5.0
2021-2022	1	2.5	0	0.0	1	2.5	2	5.0
2022-2023	1	2.6	0	0.0	1	2.6	2	5.1

Abbreviation: No., number.

[a]Rate per 100,000 person-years.

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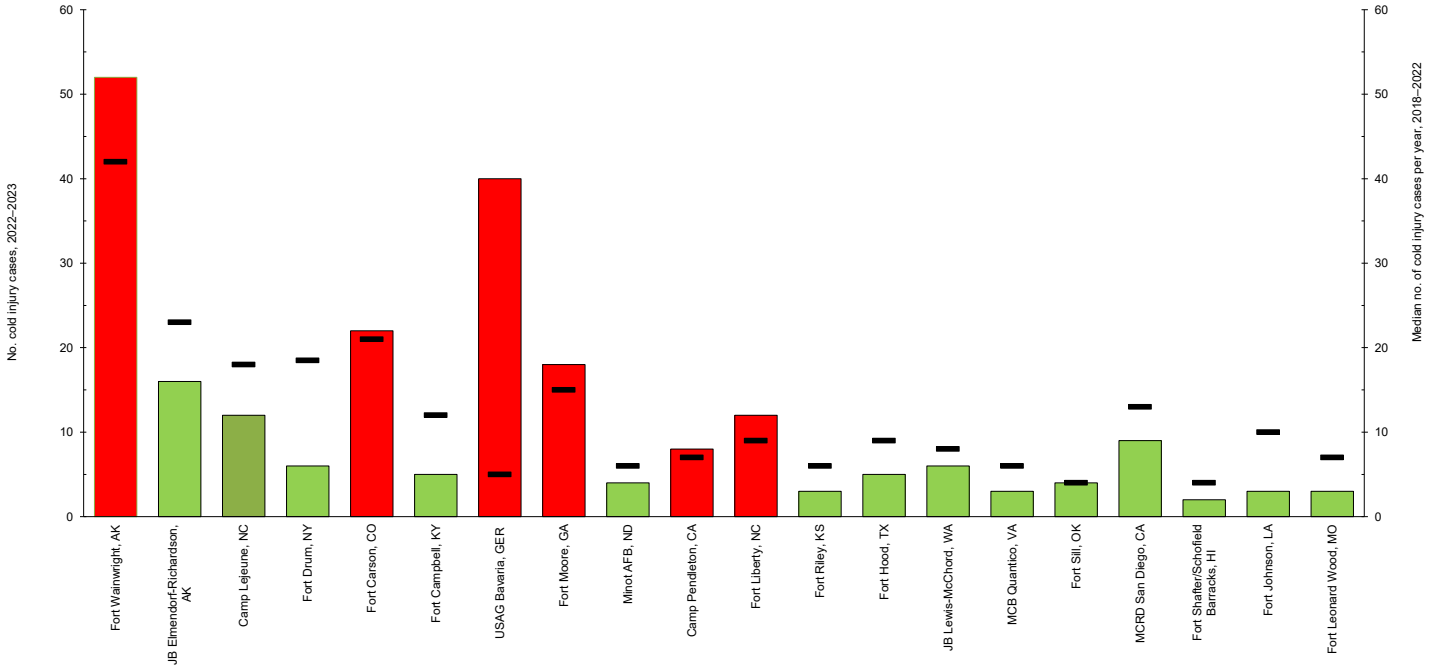
FIGURE 3. Annual Frequency (cold season 2022–2023) and Median Numbers (cold seasons 2018–2022) of Cold Injuries at Locations with at Least 25 Cold Injuries During the Surveillance Period, Active Component, U.S. Armed Forces, July 2018–June 2023



No., number; JB, Joint Base; USAG, U.S. Army Garrison; GER, Germany; AFB, Air Force Base; MCB, Marine Corps Base; MCRD, Marine Corps Recruit Depot.

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Clinically Diagnosed Sunburn Among Active Component Service Members, U.S. Armed Forces, 2014–2022

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Sunburn affects U.S. military mission readiness, from clothing and gear discomfort, to infection and dehydration risk due to skin barrier breakdown and fluid loss.[1] Depending on a service member's military occupation, ultraviolet radiation (UVR) exposure will vary, as seen with higher incidences of sunburn in recruits, aircraft and aircraft-related occupations, and infantry.[1] Clinically, sunburn is classified and managed within 2 main categories: mild-moderate and severe.[2] Electronic health record (EHR) sunburn documentation is determined by International Classification of Diseases, 10th Revision (ICD-10) diagnosis codes that classify sunburn as sunburn of first degree, second degree, third degree, or unspecified. Sunburn of first degree (superficial burn) only affects the outer layer of the skin (epidermis), manifesting in mild to moderate erythema without blistering. Sunburn of second degree (partial thickness burn) affects both the epidermis and part of the dermis, resulting in erythema with blistering, with or without edema. Sunburn of third degree (full thickness burn) affects the epidermis and dermis, and occasionally the underlying bones, muscles, and tendons.

A significant cause of skin cancer is excessive UVR exposure, often in the form of repeated sunburn.[3] Among U.S. military service members, non-melanoma skin cancers (NMSC) are the most frequently diagnosed cancer.[4,5] Additionally, a recent Department of Defense (DOD) report found that U.S. military aircrew had an 87% higher rate of melanoma, and aviation support personnel (ground crew) had a 9% higher rate of melanoma, compared to the general U.S. population.[6]

A 2014 *MSMR* report documented 19,172 incident cases of clinically-diagnosed sunburn among active component service members of the U.S. military from January 2002 to December 2013.[1] Incidence rates were higher among women, non-Hispanic White service members, and those in younger age groups. Additionally, incidence was also higher for those in the Marine Corps and Army, as well as enlisted members, and recruits.[1] This report describes recent frequencies and rates of clinically-diagnosed sunburn among active component service members (ACSM).

Methods

This retrospective cohort study covered a surveillance period from January 1, 2014 to September 30, 2022 and included all ACSM of the U.S. Army, Air Force, Navy, and Marine Corps. Data were derived from the Defense Medical Surveillance System (DMSS), which is maintained by the Armed Forces Health Surveillance Division (AFHSD). DMSS documents ambulatory care encounters and hospitalizations in fixed military and civilian (if reimbursed through the Military Health System) treatment facilities worldwide.

Outcome of sunburn was identified through inpatient and outpatient medical encounters containing an ICD-9 code of 692.71 (sunburn of first degree), 692.76 (sunburn of second degree), 692.77 (sunburn of third degree), or an ICD-10 code of L55.0 (sunburn of first degree), L55.1 (sunburn of second degree), L55.2 (sunburn of third degree), or L55.9 (sunburn, unspecified), in the first or second diagnostic position. The transition between ICD-9 and ICD-10 codes, in 2015, occurred during the study's surveillance period.

An individual was classified as a new case of sunburn if at least 30 days passed since the documentation of a previous sunburn-associated medical encounter. Incidence of sunburn was calculated per 100,000 person-years (p-yrs). Negative binomial regression calculated incidence rate ratios for occupation categories, adjusting for sex, age, and race and ethnicity.

Results

Table 1 provides the total incident case counts and crude incidence rates of clinically-diagnosed sunburn among ACSM during the 9-year surveillance period. Over half of the cases were first degree sunburn (n=6,244; 54.5%), and almost all cases were diagnosed in the ambulatory setting (n=12,029; 99.95%). During the 9-year surveillance period, most, 97.1% (n=11,687), reported cases had only 1 diagnosed sunburn.

The incidence rate of sunburn diagnosis was higher among women compared to men. Non-Hispanic White service members had the highest rate compared to other races and ethnicities. The 3 youngest age groups, under 20 years, 20-24, and 25-29 years of age, had the highest incidence rates of sunburn diagnosis, with rates decreasing with increasing age until 45 years of age. The Marine Corps and Army had the highest rates among the services. Recruits had a significantly higher sunburn incidence compared to non-recruit enlisted service members and officers.

The annual total sunburn incidence rates, which varied annually, increased overall 6.4% from 2014 (100.3 per 100,000) through 2022 (106.8 per 100,000). Of the 12,035 cases of sunburn, 5,542 occurred in June (46.0%), more than in any other month **(data not shown)**. Ten military installations/regions accounted for 36% of all sunburns during the surveillance period. The highest overall counts were in Okinawa, Japan

(n=513) and San Diego, CA (n=510), followed closely by Fort Moore (formerly Benning), GA (n=468), and Fort Leonard Wood, MO (n=454) **(data not shown).**

Table 2 provides the crude and adjusted rate ratios for the association between occupational category and sunburn. The pilot/air crew category had the lowest crude and adjusted incidence rate of sunburn diagnosis.

Discussion

Compared to the prior *MSMR* report, the incidence of clinically-diagnosed sunburn among ACSM decreased 15.9% from 2002-2013 to 2014-2022 (from 124.8 cases per 100,000 p-yrs to 105.0 cases per 100,000 p-yrs).[1] In both studies, women demonstrated a higher rate of sunburn diagnosis. Epidemiological data of the general U.S. population suggest that women are less likely to report frequent sunburn and are more likely to implement sunburn prevention measures.[7,8,9] According to National Cancer Institute statistics, however, reported sunburn for women differs from men by age, with younger women (aged 18-24) accounting for a higher proportion of sunburns than men in the same age group.[10] The majority of ACSM are under 25 years of age, which could partially explain the higher incidence of sunburn among women described in this study.

Similar to the 2014 *MSMR* report, non-Hispanic White service members and younger age groups had higher diagnosed sunburn rates, which is consistent with the general U.S. population.[7] The current study found that pilot/air crew had the lowest rate of sunburn diagnosis, both before and after adjustment for potential confounders, which suggests that other factors such as differences in health care utilization or sunburn prevention measures may influence lower incidence of sunburn diagnoses.

One limitation of this study is outcome misclassification bias for sunburn diagnosis based upon health care utilization. This report likely underestimates the true rate of sunburn, as only individuals with more serious burns are likely to present for medical care. Additionally,

TABLE 1. Incident Counts and Rates of Sunburn by Severity, Demographic and Military Characteristics, Active Component, U.S. Armed Forces, 2014-2022[a]

	No.	Rate[b]
Total	12,035	105.0
Type of sunburn		
First degree (ICD-9: 692.71; ICD-10: L55.0)	6,244	54.5
Second degree (ICD-9: 692.76, ICD-10: L55.1)	3,264	28.5
Third degree (ICD-9: 692.77; ICD-10: L55.2)	27	0.2
Unspecified (ICD-10: L55.9, L55)	2,500	21.8
Sex		
Male	9,608	100.2
Female	2,427	129.4
Race and ethnicity		
Non-Hispanic White	10,212	157.8
Non-Hispanic Black	259	14.0
Hispanic	866	47.6
Other	553	49.9
Unknown/missing	145	69.6
Age group, years		
<20	4,236	277.5
20–24	4,165	141.4
25–29	2,071	77.5
30–34	812	44.2
35–39	451	33.8
40–44	172	24.1
45+	128	29.8
Service		
Army	5,144	123.2
Navy	2,061	71.7
Air Force	2,558	91.3
Marine Corps	2,272	141.4
Rank		
Recruit	1387	575.8
Enlisted (non-recruit)	9,949	108.3
Officer	699	34.4
Military occupation		
Combat-specific[c]	1,511	94.9
Armor/motor transport	449	132.9
Pilot/air crew	126	30.1
Repair/engineer	3,292	97.0
Communications/intelligence	2,527	102.4
Health care	1,000	99.6
Other/unknown	3,130	139.2

Abbreviation: No., number.

[a] Through Sept. 30, 2022.

[b] Incidence rate per 100,000 person-years.

[c] Infantry/artillery/combat engineering/armor.

TABLE 2. Crude and Adjusted Incidence Rate Ratios for Sunburn by Military Occupation Category

Military occupation	No.	Crude rate	cIRR	Adjusted rate	aIRR (95% CI)
Health care	1,000	99.6	1.0 (0.1 - 16.8)	46.1	1.5 (1.2 - 1.8)
Communications/intelligence	2,527	102.4	1.1 (0.1 - 17.3)	41.3	1.3 (1.1 - 1.6)
Repair/engineer	3,292	97.0	1.0 (0.1 - 16.4)	34.0	1.1 (0.9 - 1.3)
Pilot/air crew	126	30.1	0.3 (0.0 - 5.1)	14.9	0.5 (0.4 - 0.6)
Armor/motor transport	449	132.9	1.4 (0.1 - 22.4)	48.5	1.5 (1.3 - 1.9)
Combat-specific[a]	1,511	94.9	--	31.5	--
Other/unknown (reference)	3,130	139.2	1.5 (0.1 - 23.5)	40.8	1.3 (1.1 - 1.5)

Abbreviations: No., number; cIRR, crude incidence rate ratio; aIRR, adjusted incidence rate ratio; CI, confidence interval.

[a] Infantry/artillery/combat engineering/armor.

the introduction of the ICD-10 code of "unspecified" may limit ascertainment of burn severity, potentially affecting accurate surveillance. A second limitation of this study is that the data could not differentiate sunburn during work hours versus non-work hours, challenging associations of occupation with sunburn risk.

Sunburn affects military readiness by removing service members from duty while their burns heal, affecting both garrison and combat missions. As a risk factor for future skin cancer, sunburn is a longitudinal concern for both the public health sector and the military due to the health care costs and time involved in management of melanoma and NMSC.[11,12] Emphasis on prevention should continue.

Sunburn is likely multifactorial, from limited access to sunscreen, to its lack of use, variable encouragement of use by peers or leadership, operational time constraints, and low prioritization or understanding of the long-term effects of sun damage.[12,13] Mitigation strategies can include predeployment or seasonal health promotion focused on increasing use of available sun-protective measures, including sunscreen, sunglasses, headgear, shade structures, and modified outdoor training times to early morning or later day/early evening.

Survey analysis of military-specific populations could help quantify incidence of sunburn that is more specific than clinical diagnoses, and could quantify occurrence of unreported sunburn. Survey research could evaluate behavioral practices, such as use of preventive measures, location and timing (on- or off-duty) of sunburn, and inquiry about unreported burns, which may better inform sunburn-reduction strategies.

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Disclaimer

The opinions and assertions expressed herein are those of the authors and do not reflect the official policy nor position of the Uniformed Services University of the Health Sciences or the Department of Defense.

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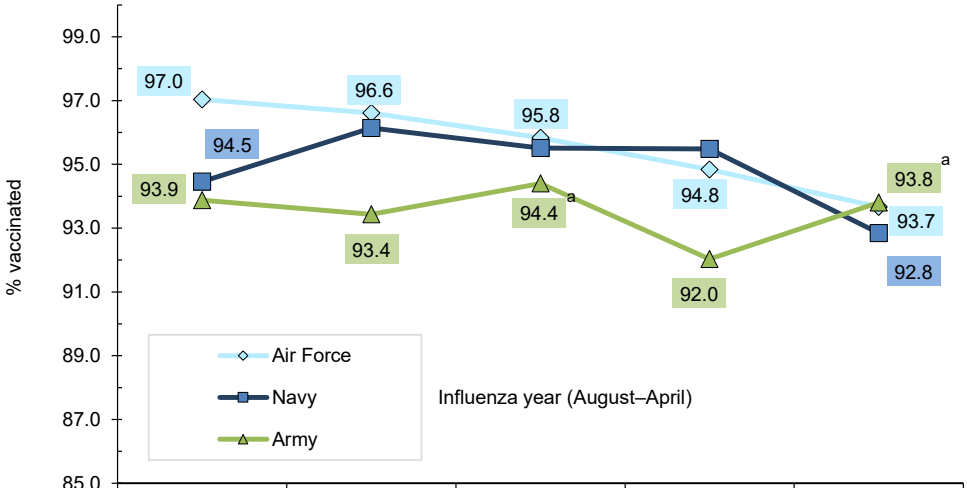
Influenza Immunization Among U.S. Armed Forces Health Care Workers, August 2018–April 2023

FIGURE. Percentage of Health Care Specialists and Officers with Records of Influenza Vaccination, by Influenza Year (August 1–April 30) and Service, Active Component, U.S. Armed Forces, August 2018–April 2023



	2018–2019	2019–2020	2020–2021	2021–2022	2022–2023
Air Force	97.0	96.6	95.8	94.8	93.7
Navy	94.5	96.1	95.5	95.5	92.8
Army	93.9	93.4	94.4 [a]	92.0	93.8 [a]

[a]Accurate immunization data for the Army 2020-2021 and 2022-2023 influenza seasons were not available via the Defense Medical Surveillance System (DMSS), which documented an under-estimation of influenza immunization rate for the Army, at 88.6% and 86.9%. Based on data from the Medical Protection System (MEDPROS), the overall influenza immunization rate among active component Army members was 94.4% for the 2020-2021 season and 93.8% for the 2022-2023 season.

The U.S. Advisory Committee on Immunization Practices recommends vaccination for all health care personnel against influenza to protect both themselves and their patients.[1] The Joint Commission's standard for infection control emphasizes that individuals infected with influenza virus are contagious to others before any signs or symptoms appear. The Joint Commission mandates 90% influenza vaccination for health care personnel, and health care organizations provide influenza vaccination programs for their practitioners and staff. Within the Department of Defense, seasonal influenza immunization is mandatory for all uniformed and health care personnel who provide direct patient care, and is recommended for all others (excluding those medically exempt).[2–5]

This Surveillance Snapshot covers a 5-year surveillance period (August 2018–April 2023) and presents the documented percentage of compliance for the influenza immunization requirement among active component health care personnel of the Army, Navy, and Air Force. In general, these health care personnel include health care specialists (DOD occupation code=13) and health care officers (DOD ocupation code=26), but exclude veterinary medicine, environmental health, biomedical equipment maintenance and repair, and health services administration and logistics personnel. In the 2022-2023 influenza season, compliance rates ranged from 92.8% among Navy health care personnel to 93.8%[b] among Army health care personnel **(Figure).**

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Commentary

The Role of Vaccines in Combatting the Potential "Tripledemic" of Influenza, COVID-19 and RSV

John K. Iskander, MD, MPH; Katie M. Martinez, PharmD; Nicole Hsu, MD, MPH

Common respiratory viruses are associated with substantial morbidity within the Military Health System (MHS). In 2022 more than 250,000 medical encounters were recorded within the MHS for respiratory illness among active component service members, with an additional 160,000 encounters for COVID-19.[1] Among non-service member beneficiaries, there were approximately 2 million encounters for respiratory infections in 2022, with just over one quarter of these among the pediatric 0-17 years age group.[2] During the most recent winter season in the Northern Hemisphere, the co-circulation at relatively high levels of influenza, SARS-CoV-2, and RSV was termed the "tripledemic."[3]

Persons at high risk, especially those over 65 years of age, can be hospitalized or die from complications of infection with influenza, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), respiratory syncytial virus (RSV), or from other frequently encountered pathogens. Mortality from respiratory viral illness also occurs among infants, children, and adolescents.[4,5]

With children returned to school, another respiratory infection season approaches. This year, however, health care providers have new tools to prevent these infections in their patients, in the form of newly licensed or updated vaccines and immunotherapeutics against RSV and SARS-CoV-2. Revised recommendations for annual influenza vaccines will potentially also allow more people to easily receive these products.[6]

Yearly influenza vaccination is recommended for almost all persons aged 6 months or older (including pregnant persons)[6] and is a requirement for both military personnel and all health care personnel working in military medical facilities.[7] Data from the 2019-2020 influenza season show that influenza vaccination of U.S. Department of Defense (DOD) beneficiaries reduced influenza disease by 40-60%, and by 12-31% among military members; for methodological reasons, military vaccine effectiveness may be underestimated.[8]

The U.S. Centers for Disease Control and Prevention (CDC) states that the preferred time for vaccination for most persons who need only 1 dose of influenza vaccine is September or October. Vaccination should continue throughout the season, however, for as long as influenza viruses are circulating and vaccination is available. For children aged 6 months through 8 years, as well as pregnant persons in their third trimester, specific recommendations for timing of vaccination should be consulted.[6]

A notable change this year, which expands the population eligible for more ready vaccination, is the recommendation that all persons with egg allergy who are aged 6 months or older can receive influenza vaccine without special precautions. Regardless of the severity of prior egg reaction, egg allergy requires no additional safety measures for influenza vaccination. Observational data from numerous sources have documented the extreme rarity of anaphylactic-type allergic reactions to influenza vaccine in persons with egg allergy.[6] Consistent with best practice recommendations, all vaccines including influenza should be administered in settings where rapid recognition and treatment of acute hypersensitivity reactions can occur.[9]

Vaccines against SARS-CoV-2, the virus which causes COVID-19 disease and its sequelae, are in a transitional period. Bivalent formulations (which should no longer be used) have been replaced by monovalent formulations based on the recent XBB.1.5 variant of the Omicron virus lineage.[10] Both protein and mRNA-based vaccines are available this fall.

The Food and Drug Administration (FDA) has approved monovalent vaccines for use as a single dose in all persons 5 years of age and older, provided that 2 months have elapsed following any prior COVID-19 vaccination. Infants and children 6 months through 4 years of age may receive 1, 2, or 3 doses of a monovalent vaccine, depending on COVID-19 vaccination history and which vaccine is used.[10] The CDC is recommending the newly available monovalent COVID-19 vaccines for everyone 6 months and older.

In explaining its recommendations, the CDC noted that while older and immunocompromised individuals are at highest risk for hospitalization and death due to COVID-19, serious outcomes continue among healthy children and adults.[11,12] Data indicate that, among those eligible for vaccination, individuals over age 75 and between 65-74 years of age have the highest hospitalization rates; continued vaccination of working-age adults (ages 18-49, the group that constitutes most military personnel) could prevent as many as 414 added hospitalizations over 6 months per 1 million doses administered.[11]

While it is well-documented that breakthrough infections can occur with COVID-19 vaccines, a recent evidence synthesis found that vaccination against Omicron variants was nearly 90% effective at preventing hospitalization due to COVID-19 within 6 weeks, with 71% effectiveness up to 16 weeks after vaccination.[13] The CDC has estimated that for every 1 million COVID-19 doses administered to adolescents over a period of 6 months, up to 95 hospitalizations, 19 ICU admissions, and 1 death can be prevented.[11] These estimates, complemented by a comprehensive

benefit and risk assessment of COVID-19 vaccination provided by the CDC, constitute reliable evidence supporting the CDC Advisory Committee on Immunization Practices (ACIP) recommendation.[14]

RSV, long known as a widespread and potentially serious pediatric pathogen, is also a known cause of serious illness in older adults.[15] The 2 new RSV vaccines, with recent FDA approval and CDC recommendation,[16] are a new addition to the armamentarium against respiratory viruses and their complications. Both vaccines use inactivated RSV proteins to stimulate active immune response.

In clinical trials, both vaccines showed high efficacy in preventing symptomatic lower respiratory infection with RSV. Two-season interim analyses showed 81.0% efficacy of the Pfizer vaccine against medically-attended lower respiratory tract disease, and 77.5% efficacy of the GSK vaccine against the same outcome.[16] The CDC ACIP recommends a single dose of either vaccine in persons aged 60 and over, using what it terms "shared clinical decision-making."[16] This phrase generally describes health care provider discussion of vaccination options with their patients, taking into account their preferences, as well as medical fragility, advanced age, and other clinical characteristics that may increase risk of severe outcomes from RSV.[17] One of the newly-licensed RSV vaccines was also approved by the FDA for vaccination of pregnant persons for prevention of RSV infection in their infants, and the CDC has recently provided usage recommendations.[18]

Nirsevimab, a long-acting monoclonal antibody (mAb) designed to prevent severe RSV lower respiratory tract disease in infants and children under 20 months of age, was recently licensed by the FDA. ACIP recommends nirsevimab for all infants under 8 months of age either born during or entering their first RSV season, in addition to infants and children aged 8 to 19 months at increased risk of severe RSV disease who are entering their second RSV season.[19] Children at high risk include those with chronic lung disease requiring specific types of medical support, with severe immune compromise, or cystic fibrosis-meeting clinical criteria, in addition to children of American Indian or Alaskan Native heritage.

An inherent limitation of nirsevimab is that as an antibody product rather than a true vaccine: It provides only passive immunity and does not result in longer-term immunologic memory. It is also not a treatment for RSV disease. Compared to palivizumab, a mAb previously approved by the FDA for RSV prevention in children up to 2 years of age,[20] nirsevimab has advantages of single dose administration, rather than requiring a 5-dose series, and is recommended for all infants entering RSV season instead of only certain high-risk pediatric patients. Maternal vaccination with the licensed and recommended RSV vaccine is an additional option for protection of all infants.[18]

While use of influenza, COVID-19, and RSV vaccine products are primary prevention measures against the "tripledemic," the strategy has limitations. Only the influenza vaccine is currently required for military personnel. Only persons aged 60 years and older and children under 2 years of age can receive active and passive immunization against RSV, respectively. While preliminary laboratory evidence suggests that updated COVID-19 vaccines will offer cross-protection against recently-circulating SARS-CoV-2 Omicron virus variants such as BA.2.86,[21] it is unknown how clinically effective the newly updated formulations will be.

While shared vaccine decision-making for RSV protection is a patient-centered approach, it is also more time-consuming and may result in lower overall vaccine uptake. For example, the shared decision-making model precludes standing orders for RSV vaccination of eligible adults within the MHS.

Because none of this group of vaccines is expected to produce sterilizing immunity (i.e., absolute protection against infection), additional voluntary personal protection methods for preventing respiratory virus transmission are warranted. Recent DOD Force Health Protection Guidance includes recommendations for frequent use of hand hygiene and covering the mouth and nose when coughing or sneezing.[22] Health care providers should refrain from direct patient care while ill with respiratory symptoms, and may wish to consider wearing a securely-fitting mask for the duration of the winter respiratory virus season. Enhancing ventilation in indoor settings, where feasible, may also limit respiratory virus spread. Treatment facilities can monitor local respiratory virus circulation conditions that could affect testing and mitigation strategies by consulting DOD resources from Armed Forces Health Surveillance Division, Global Emerging Infections Surveillance, and CDC sites including Fluview and the Covid Data Tracker.

Evidence-based methods for enhancing immunization (including standing orders where applicable and offers of vaccination at all visits) should be implemented. Patients should be screened for eligibility for all 3 vaccines during fall and winter season visits **(Table)**. Consistent with CDC best practices, co-administration of recommended vaccines at the same visit is recommended.[9] Individuals who received the Southern Hemisphere influenza vaccine earlier this year should receive the Northern Hemisphere formulation this fall, as long as it has been 30 days since their most recent dose of influenza vaccine.

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Acknowledgements
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TABLE. Immunizations for Protection Against Selected Respiratory Viruses, 2023–2024

Target Disease	Required for Military Personnel	Recommended Age Group	Available Vaccine Products Within MHS	Timing of Vaccination
Influenza	Yes	≥ 6 months	Fluzone Quadrivalent and High-Dose Quadrivalent (Sanofi Pasteur),[a] Afluria Quadrivalent, Flucelvax Quadrivalent, Fluad Quadrivalent (Seqirus),[a] Fluarix Quadrivalent and Flulaval Quadrivalent (GSK)[a]	September–October preferred
COVID-19	No	≥ 6 months	Comirnaty (Pfizer),[a] Spikevax (Moderna),[a] Novavax[a] Monovalent	≥2 months after most recent dose of COVID-19 vaccine
RSV, adult[b]	No	≥ 60 years	Abrysvo preF (Pfizer),[a] Arexvy preF (GSK)[a]	When vaccine is available locally
RSV, pediatric[c]	N/A	Pregnant persons	Abrysvo (Pfizer)[a,c]	32-36 weeks prenatally
RSV, pediatric[c]	N/A	0-8 months 8-19 months[d]	Beyfortus mAb (Sanofi, Astra-Zeneca)[a,c]	Before start of RSV season[e]

Note: Per ACIP General Best Practice guidelines, all vaccines can be given with other vaccines.
Abbreviations: MHS, Military Health System; RSV, Respiratory Syncytial Virus; preF: Recombinant-stabilized prefusion F protein; mAb, Monoclonal antibody; ACIP, Advisory Committee on Immunization Practices.
[a] Product and company names are provided for identification only and do not imply endorsement.
[b] Recommended with shared clinical decision-making.
[c] Using shared clinical decision-making, either prenatal Abrysvo or Beyfortus is recommended for prevention among infants 0-8 months of age entering their first RSV season.
[d] Second dose only or specific high-risk infants entering their second RSV season.
[e] In most of the continental U.S., from October through end of March.

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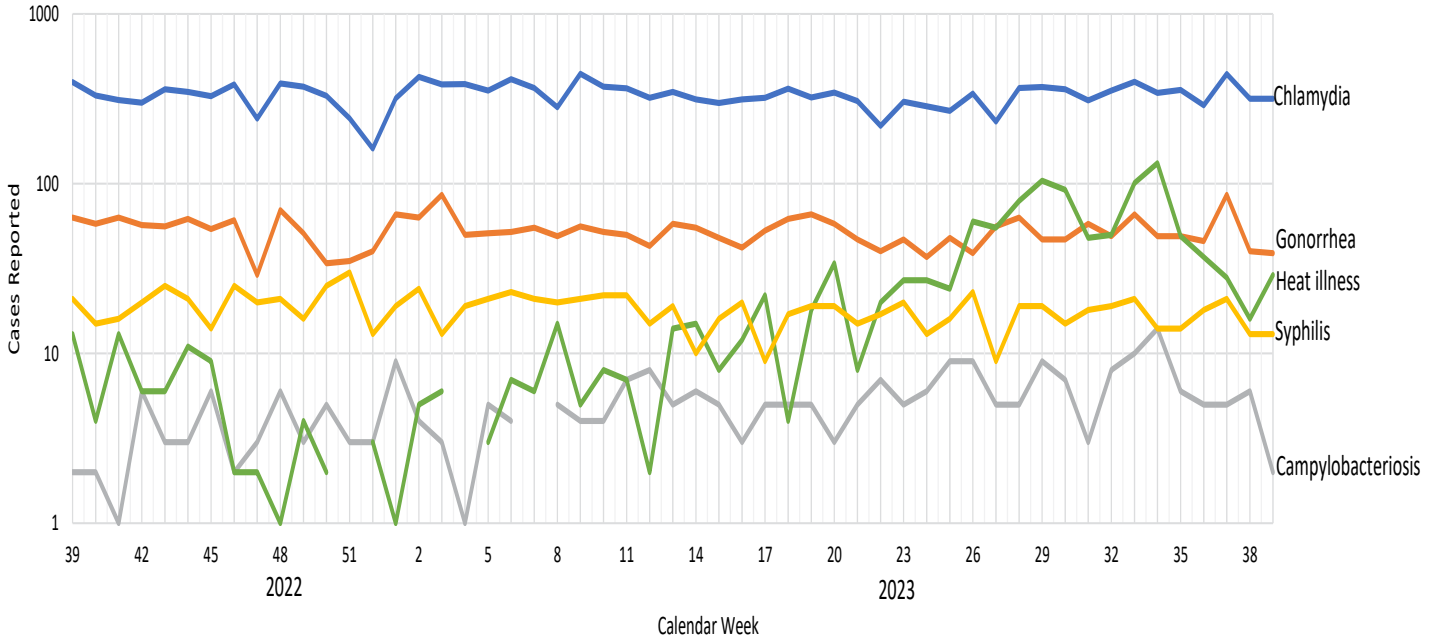
Reportable Medical Events at Military Health System Facilities Through Week 39, Ending September 30, 2023

Matthew W. R. Allman, MPH; Anthony R. Marquez, MPH; Katherine S. Kotas, MPH

TOP 5 REPORTABLE MEDICAL EVENTS BY CALENDAR WEEK, ACTIVE COMPONENT (OCTOBER 1, 2022 - SEPTEMBER 30, 2023)



Note: There were 0 heat illness cases in week 51 of 2022 and week 4 of 2023. 0 cases of campylobacteriosis were reported in week 7 of 2023.
Abbreviation: No., number.
[a]Cases are shown on a log scale.

Reportable Medical Events (RMEs) are documented in the Disease Reporting System internet (DRSi) by health care providers and public health officials throughout the Military Health System (MHS) for monitoring, controlling, and preventing the occurrence and spread of diseases of public health interest or readiness importance. These reports are reviewed by each service's public health surveillance hub. The DRSi collects reports on over 70 different RMEs, including infectious and non-infectious conditions, outbreak reports, STI risk surveys, and tuberculosis contact investigation reports. A complete list of RMEs is available in the *2022 Armed Forces Reportable Medical Events Guidelines and Case Definitions*.[1] Data reported in these tables are considered provisional and do not represent conclusive evidence until case reports are fully validated.

Total active component cases reported per week are displayed for the top 5 RMEs for the previous year. Each month, the graph is updated with the 5 leading RMEs, and is presented with the current month's (September 2023) 5 leading RMEs, which may differ from previous months. COVID-19 is excluded from these graphs due to changes in reporting and case definition updates in 2023.

For questions about this report, please contact the Disease Epidemiology Branch at the Defense Centers for Public Health–Aberdeen. Email: dha.apg.pub-health-a.mbx.disease-epidemiologyprogram13@health.mil.

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TABLE. Reportable Medical Events, Military Health System Facilities, Week Ending September 30, 2023 (Week 39)[a]

Reportable Medical Event[b]	Active component[c]					MHS beneficiaries[d]
	August	September	YTD 2023	YTD 2022	Total, 2022	September
	no.	no.	no.	no.	no.	no.
Amebiasis	1	0	12	7	13	0
Arboviral diseases, neuroinvasive and non-neuroinvasive	2	0	2	1	1	1
Brucellosis	0	0	0	2	2	0
COVID-19-associated hospitalization and death[e]	1	8	82	0	7	69
Campylobacteriosis	41	18	217	183	230	13
Chikungunya virus disease	1	0	1	1	1	0
Chlamydia trachomatis	1,650	1,417	13,231	15,320	19,432	182
Cholera	0	0	4	1	2	0
Coccidioidomycosis	3	1	19	11	15	2
Cold weather injuries[f]	3	1	102	113	151	0
Cryptosporidiosis	5	6	59	35	46	7
Cyclosporiasis	0	0	15	9	10	1
Dengue virus infection	2	2	6	1	1	1
E. coli, Shiga toxin-producing	7	13	60	59	67	4
Ehrlichiosis/anaplasmosis	1	0	29	3	3	0
Giardiasis	7	7	59	55	71	5
Gonorrhea	252	222	2,068	2,634	3,305	23
Haemophilus influenzae, invasive	0	0	1	1	1	1
Hantavirus disease	0	0	1	0	1	0
Heat illness[f]	364	113	1,178	1,149	1,213	1
Hepatitis A	0	1	7	11	16	1
Hepatitis B	10	14	116	94	119	11
Hepatitis C	5	3	41	47	57	8
Influenza-associated hospitalization[g]	1	1	7	118	148	1
Lead poisoning, pediatric[h]	0	0	0	0	0	5
Legionellosis	0	0	3	2	4	2
Leishmaniasis	0	0	1	1	1	0
Leprosy	2	0	2	1	1	0
Leptospirosis	1	0	3	1	1	0
Lyme disease	5	6	56	54	65	8
Malaria	2	4	19	22	26	0
Meningococcal disease	0	0	2	1	2	0
Mpox	0	0	0	87	93	0
Norovirus	17	14	346	182	221	26
Pertussis	0	0	4	8	10	1
Post-Exposure prophylaxis against rabies	46	47	446	399	514	26
Q fever	0	0	2	3	3	0
Rubella	0	0	2	2	3	0
Salmonellosis	12	17	81	104	122	20
Schistosomiasis	0	0	0	1	1	0
Severe acute respiratory syndrome (SARS)	0	0	0	1	1	0
Shigellosis	10	8	56	26	33	1
Spotted fever rickettsiosis	4	1	30	56	70	0
Syphilis (all)	78	70	686	787	1,048	11
Toxic shock syndrome	0	0	1	0	0	0
Trypanosomiasis	0	0	1	1	1	0
Tuberculosis	2	1	7	7	11	0
Tularemia	0	0	1	0	0	0
Typhoid fever	0	1	2	0	0	0
Typhus fever	0	0	2	1	1	0
Varicella	0	1	9	12	16	5
Total case counts	2,535	1,997	19,079	21,614	27,160	436

Abbreviations: RME, reportable medical event; MHS, Military Health System; YTD, year to date; no., number.

[a] RMEs reported through the DRSi as of October 31, 2023 are included in this report. RMEs were classified by date of diagnosis, or where unavailable, date of onset. Monthly comparisons are displayed for the periods August 1, 2023-August 31, 2023 and September 1, 2023-September 30, 2023. Year-to-date comparison is displayed for the period January 1, 2023-September 30, 2023 for MHS facilities. Previous year counts are provided as the following: previous year YTD—January 1, 2022-September 30, 2022; total 2022—January 1, 2022-December 31, 2022.

[b] RME categories with 0 reported cases among active component service members and MHS beneficiaries for the time periods covered were not included in this report.

[c] Services included in this report include Army, Navy, Air Force, Marine Corps, Coast Guard, and Space Force, including personnel classified as FMP 20 with duty status of AD, Recruit, or Cadet in DRSi.

[d] Beneficiaries included the following: individuals classified as FMP 20 with duty status of Retired and individuals with all other FMPs except 98 and 99. Civilians, contractors, and foreign nationals were excluded from these counts.

[e] Only cases reported after May 4, 2023 case definition update; includes only cases resulting in hospitalization or death; does not include cases of hospitalization/death reported under previous COVID-19 case definition.

[f] Only reportable for active component service members.

[g] Influenza-associated hospitalization is reportable only for individuals aged 65 years or younger.

[h] Pediatric lead poisoning is reportable only for children aged 6 years or younger.

Medical Surveillance Monthly Report (MSMR), in continuous publication since 1995, is produced by the Armed Forces Health Surveillance Division (AFHSD) of the Defense Health Agency (DHA) Public Health Directorate. AFHSD is a designated public health authority within the Defense Health Agency. The *MSMR* provides evidence-based estimates of the incidence, distribution, impact, and trends of illness and injuries among U.S. military members and associated populations. Most reports in the *MSMR* are based on summaries of medical administrative data that are routinely provided to the AFHSD and integrated into the Defense Medical Surveillance System for health surveillance purposes.

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11800 Tech Road, Suite 220
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