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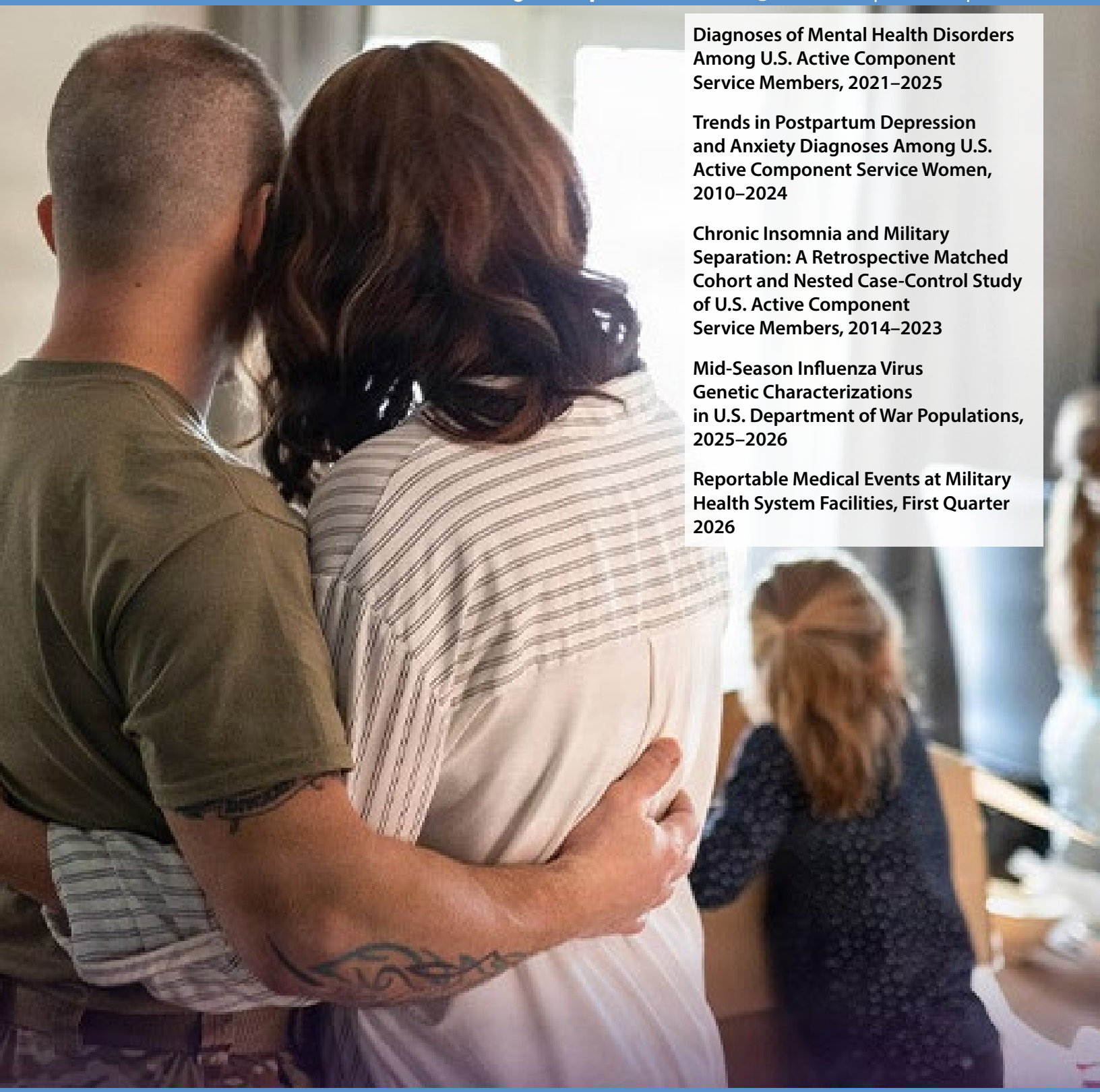

A Publication of the Armed Forces Health Surveillance Division

Medical Surveillance for Military Readiness

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Update

Diagnoses of Mental Health Disorders Among U.S. Active Component Service Members, 2021–2025

Safeguarding the mental well-being of military service members is a critical strategic imperative for force readiness. This report summarizes the incidence of mental health disorders among U.S. active component service members (ACSMs) from January 1, 2021 through December 31, 2025. During the surveillance period, 582,279 ACSMs received at least 1 mental health diagnosis, and 1,050,231 total incident diagnoses were made. Overall incidence rates peaked in 2023 before declining slightly, through 2025. Adjustment, anxiety, and depressive disorders comprise the clinical burden majority of mental health care, accounting for 66.5% of all incident diagnoses. Diagnostic comorbidity was notably high, with 48.4% of affected ACSMs receiving diagnoses in multiple mental health categories. Female ACSMs generally experienced higher rates for most mental health conditions, while male ACSMs had higher incidence rates for alcohol- and substance-related disorders. Vulnerabilities related to occupation are prominent: Health care personnel evinced highest rates for most disorders, while combat-related functions were most closely associated with substance-related conditions. These findings underscore the ongoing need to prioritize access to mental health services for ACSMs. The high volume of co-occurring diagnoses and distinct occupational risks require robust, multidisciplinary clinical resources to sustain a resilient and ready joint force.

What are the new findings?

From 2021 through 2025, over 1 million incident mental health diagnoses for U.S. active component service members occurred, with most of that health care burden a result of disorders related to adjustment, anxiety, and depression. Notably, those three disorder categories accounted for approximately two-thirds (66.5%) of all incident mental health diagnoses during the surveillance period.

What is the impact on readiness and force health protection?

The sustained high incidence of mental health disorders (10,990.6 per 100,000 person-years) in 2025 and high rates of diagnostic comorbidity among active component service members directly compromise operational readiness. Variations in diagnosis rates by sex, service branch, occupation, and length of service underscore the need for targeted, multidisciplinary interventions.

A modern, effective fighting force requires service members who are not only physically fit but also cognitively and psychologically resilient.[1] The complex nature of global security environments, coupled with the rigorous demands of continuous operations, necessitates a total force capable of adapting and performing under extreme pressure.[2] Safeguarding the mental well-being of service members is not merely a medical objective, but a critical strategic imperative essential for sustained mission success and national security.[3]

In 2025, mental health disorders were a primary factor of health care provision among U.S. active component service members (ACSMs), accounting for a significant portion of both ambulatory care and hospitalizations.[4] These disorders led to more hospital bed days than any other condition, contributing to more than half (51.0%) of all hospital bed days for this population.[4] Although injuries were the primary factor in ambulatory health care encounters, mental health disorders constituted the second-largest category of total medical visits, affecting nearly 275,000 service members and generating approximately 2.6 million clinical encounters.[4] Conditions such as adjustment disorders, major depressive disorders, and alcohol dependence require substantial health care resources, evidenced by the prolonged hospital stays associated with them, which frequently exceeded 10 days.[5]

To address this substantial clinical burden, the Department of War (DOW) has increasingly prioritized policies designed to destigmatize behavioral health care, protect patient privacy, and encourage early intervention. Central to this effort is implementation of the Brandon Act,[6] which empowers service members to independently request and receive expedited mental health evaluations through their chains of command. Department Instruction 6490.08 reinforces crucial privacy protections for service members by strictly limiting notifications to commands within critical safety or mission impact parameters, thereby mitigating fear of career repercussions.[7]

Understanding the epidemiology of these mental health conditions is vital to optimize medical resource allocation and develop targeted prevention strategies. This report presents a summary of the numbers, types, and incidence rates (IRs) of mental health disorder diagnoses among U.S. ACSMs during a 5-year surveillance period, from 2021 through 2025.

Methods

The surveillance population for this study included all individuals who served in the active components of the U.S. Army, Navy, Air Force, Marine Corps, Coast Guard, and Space Force at any time during the surveillance period, January 1, 2021 through December 31, 2025. Because only 2023 Space Force personnel data were available, Space Force members were combined with Air Force personnel for this analysis.

All data utilized to determine mental health diagnoses were derived from records routinely maintained in the Defense Medical Surveillance System (DMSS). DMSS records document both ambulatory health care encounters and hospitalizations of U.S. active component service members at permanent military and civilian (if reimbursed through the Military Health System, or MHS) hospitals and clinics. Diagnoses were also derived from records of medical encounters of deployed service members documented in the Theater Medical Data Store (TMDS) within DMSS.

Mental health disorder diagnoses were ascertained from records of medical encounters that included International Classification of Diseases, 9th and 10th revisions (ICD-9/ICD-10) mental health disorder-specific diagnosis codes (ICD-9: 290–319; ICD-10: F01–F99) **(Table 1)** in the first or second diagnostic position. Although the MHS transitioned to ICD-10 coding on October 1, 2015, ICD-9 codes were included in this analysis, as some TMDS encounters still contain ICD-9 diagnoses necessary to identify and exclude prevalent cases documented in records before October 1, 2015. Diagnoses of pervasive developmental disorder (ICD-9: 299.*; ICD-10: F84.*), specific delays in development (ICD-9: 315.*; ICD-10: F80.*–F82.*, F88–F89), mental retardation (ICD-9: 317.*–319.*; ICD-10: F70–F79), tobacco use disorder and nicotine dependence (ICD-9: 305.1; ICD-10: F17.*), and post-concussion syndrome (ICD-9: 310.2; ICD-10: F07.81) were excluded from analysis.

TABLE 1. Mental Health Disorder Classifications

Category	ICD-9 Codes	ICD-10 Codes
Acute stress disorder	308*	F43.0
Adjustment disorders	309, 309.0, 309.1, 309.2, 309.21, 309.22, 309.23, 309.24, 309.28, 309.29, 309.3, 309.4, 309.8, 309.82, 309.83, 309.89, 309.9	F43.2*, F43.8* F43.9, F93.0, F94.8, F94.9
Alcohol-related disorder	291.0, 291.81, 303.9, 303.90, 303.91, 303.92, 303.93, 303.00, 303.01, 303.02, 303.03, 305.00, 305.01, 305.02, 305.03	F101*, F102*
Substance-related disorder	304*, 305.2*–305.9*	F111*, F112*, F121*, F122*, F131*, F132*, F141*, F142*, F151*, F152*, F161*, F162*, F181*, F182*, F191*, F192*
Anxiety disorders	300.0*, 300.2*, 300.3	F40*, F41*, F42*
PTSD	309.81	F431*
Depressive disorder	296.2, 296.20, 296.21, 296.22, 296.23, 296.24, 296.25, 296.26, 296.3, 296.30, 296.31, 296.32, 296.33, 296.35, 296.36, 296.82, 296.34, 296.9, 296.90, 296.99, 300.4, 311	F32*, F33*, F34, F341, F348, F349, F348.1, F348.9, F39
Eating disorders	307.1, 307.50, 307.51, 307.59	F50.0*, F50.2*, F50.8*, F50.9
Factitious disorders	300.16, 300.19, 301.51	F681*
Bipolar disorder	296.0, 296.00, 296.01, 296.02, 296.03, 296.04, 296.05, 296.06, 296.1, 296.10, 296.11, 296.12, 296.13, 296.14, 296.15, 296.16, 296.4, 296.40, 296.41, 296.42, 296.43, 296.44, 296.45, 296.46, 296.5, 296.50, 296.51, 296.52, 296.53, 296.54, 296.55, 296.56, 296.6, 296.60, 296.61, 296.62, 296.63, 296.64, 296.65, 296.66, 296.7, 296.8, 296.80, 296.81, 296.89, 301.13	F30*, F31*, F340
Personality disorders	301, 301.0, 301.1, 301.10, 301.11, 301.12, 301.2, 301.20, 301.21, 301.22, 301.3, 301.4, 301.5, 301.50, 301.59, 301.6, 301.7, 301.8, 301.81, 301.82, 301.83, 301.84, 301.89, 301.9	F21, F60*
Schizophrenia	295*	F20*, F25*
Psychotic disorders (other psychoses)	293.81, 293.82, 297.0, 297.1, 297.2, 297.3, 297.8, 297.9, 298.0, 298.1, 298.2, 298.3, 298.4, 298.8, 298.9	F06.0, F06.2, F22, F23, F24, F28, F29
Other mental health diagnoses	Any other not-excluded code between 290–319	Any other not-excluded code between F01–F99
Exclusions	305.1, 310.2, 299*, 315*, 317*–319*	F17*, F0781, F70–F79, F80*, F81*, F82*, F84*, F88–F89

Abbreviations: ICD-9, International Classification of Diseases, 9th Revision; ICD-10, International Classification of Diseases, 10th Revision; PTSD, post-traumatic stress disorder.
*Asterisk (*) indicates that any subsequent digit, character included.

Each incident diagnosis of a mental health disorder was defined using the corresponding Armed Forces Health Surveillance Case Definition.[8] For most mental health disorders, a case was defined by either a hospitalization with an indicator diagnosis in the first or second diagnostic position; 2 outpatient or TMDS visits within 180 days documented with indicator diagnoses (from the same mental health disorder category) in the first or second diagnostic position; or a single outpatient visit in a psychiatric or mental health care specialty setting (defined by Medical Expense and Performance Reporting System [MEPRS] code beginning with 'BF') with an indicator diagnosis in the first or second diagnostic position.

The surveillance case definitions for schizophrenia, acute stress disorder, and eating disorders included some exceptions to the case parameters described. The case definition for schizophrenia required either a single hospitalization with a diagnosis of schizophrenia in the first or second diagnostic position or 4 outpatient or TMDS encounters with a diagnosis of schizophrenia in the first or second diagnostic position. Schizophrenia cases who remained in the military for more than 2 years after becoming incident cases were excluded, as those cases were assumed to have been misdiagnosed. The case definition for acute stress disorders required 1 encounter with an indicator diagnosis in any diagnostic position, due to its transient diagnosis. Eating disorder cases required 1 inpatient encounter with an indicator diagnosis in the first or second diagnostic position, or a single outpatient or TMDS encounter with an indicator diagnosis in the primary diagnostic position.

Service members diagnosed with 1 or more mental health disorders before the surveillance period (i.e., prevalent cases) were not considered at risk of incident diagnoses of the same conditions during the period. Service members diagnosed with more than 1 mental health disorder during the surveillance period were considered incident cases in each category in which they fulfilled the case-defining criteria. Service members could be considered incident cases only once in each mental health disorder-specific category.

Results

Numbers and incidence rates of mental health diagnoses

During the 5-year surveillance period, 582,279 ACSMs were diagnosed with at least 1 mental health disorder; of those individuals, 282,073 (48.4%) were diagnosed with mental health disorders in more than 1 diagnostic category **(Table 2)**. Overall, 1,050,231 incident diagnoses of mental health disorders were recorded in all diagnostic categories. Annual IRs of at least 1 mental health disorder increased from 10,254.3 per 100,000 person-years (p-yrs) in 2021 to 11,679.9 per 100,000 p-yrs in 2023, then decreased slightly to 11,539.6 in 2024 and 10,990.6 per 100,000 p-yrs in 2025 **(Table 2)**.

Over the entire surveillance period, 95% of all incident mental health diagnoses were attributed to adjustment disorders (n=286,375, 27.3%), anxiety disorders (n=225,557, 21.5%), depression disorders (n=186,257, 17.7%), 'other' mental health disorders (n=131,157, 12.5%), PTSD (n=101,969, 9.7%), and alcohol-related disorders (n=69,779, 6.6%) **(Table 2)**. A relatively small number of incident diagnoses for personality disorders (n=15,585, 1.5%), substance-related disorders (n=14,670, 1.4%), bipolar disorder (n=8,491, 0.8%), eating disorders (n=3,911, 0.4%), other psychoses (n=3,742, 0.4%), schizophrenia (n=1,464, 0.1%), acute stress disorders (n=1,181, 0.1%), and factitious disorders (n=93, 0.01%) contributed to the incident mental health disorder diagnoses of ACSMs.

Annual IRs for adjustment, personality, substance-related, bipolar, and eating disorders increased from 2021 to 2022, then subsequently decreased. Anxiety evinced a gradual and steady increase over the 4-year surveillance period before declining in 2025. Depression and PTSD began to decrease in 2024 **(Table 2)**.

Co-occurring mental health diagnoses

Individuals with mental health disorders are often co-diagnosed with other mental health disorders. For example, adjustment disorders were often co-diagnosed with other mental health disorders, ranging from co-diagnoses with 34.6% of substance-related disorder diagnoses to 57.7% of personality disorder diagnoses during the surveillance period. Depressive disorders were also often co-diagnosed with all other mental health disorders, ranging from co-diagnoses with 26.6% of substance-related disorder diagnoses to 58.8% of bipolar disorder diagnoses. Additionally, co-occurring anxiety disorders were highly prevalent among individuals with other primary diagnoses, affecting 50.5% of those with factitious disorders, 48.0% of those with bipolar disorders, 47.8% of those with depressive disorders, 44.4% of those with eating disorders, 42.8% of those with PTSD, 41.8% of those with personality disorders, and 37.5% of those with acute stress disorder **(Table 3)**.

Incidence rates of mental health diagnoses by sex

In general, most incident mental health disorder diagnoses were more prevalent among female service members, but alcohol- and substance-related disorders were more prevalent in male service members during the 5-year surveillance period. Schizophrenia was diagnosed at a higher rate in male service members in 2024 and 2025 **(Figures 1a–2b)**.

Among male service members, rates of diagnoses including adjustment disorders, alcohol-related disorders, substance-related disorders, bipolar disorders, personality disorders, other psychoses, and acute stress disorders decreased in 2023 and continued a downward trend thereafter, while anxiety disorders among male service members increased through 2024 and then decreased in 2025 **(Figures 1a, 1b)**.

Rates of mental health disorder diagnoses among female service members generally mirrored those of their male counterparts, with the notable exceptions of eating disorders (since 2023) and factitious disorders (since 2024); unlike the fluctuating rates among male service members, those 2 conditions showed a continuous downward trend among female service members. As of 2025, adjustment disorder evinced the highest IRs among women,

TABLE 2. Incident Diagnoses and Rates of Mental Health Disorders, Active Component, U.S. Armed Forces, 2021–2025

Characteristics	Total, 2021–2025		2021		2022		2023		2024		2025	
	No.	Rate[b]	No.	Rate[b]	No.	Rate[b]	No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
Category of mental health disorder[a]												
Adjustment disorders	286,375	5,122.0	61,149	5,203.0	62,208	5,514.0	56,059	5,118.0	52,976	4,904.0	53,983	4,855.0
Anxiety	225,557	3,814.0	37,654	3,008.0	45,348	3,768.0	48,681	4,190.0	48,312	4,254.0	45,562	3,922.0
Depression	186,257	3,091.0	34,451	2,728.0	39,118	3,209.0	39,441	3,332.0	37,659	3,235.0	35,588	2,974.0
Other mental health disorder	131,157	2,164.0	24,355	1,926.0	26,746	2,184.0	26,020	2,181.0	26,781	2,281.0	27,255	2,261.0
PTSD	101,969	1,611.0	17,311	1,312.0	20,835	1,630.0	22,386	1,798.0	21,622	1,764.0	19,815	1,573.0
Alcohol-related disorder	69,779	1,108.0	14,247	1,092.0	14,885	1,174.0	13,590	1,096.0	13,322	1,089.0	13,735	1,091.0
Personality disorders	15,585	239.0	3,296	244.0	3,586	273.0	3,193	249.0	2,838	224.0	2,672	205.0
Substance-related disorder	14,670	225.0	3,361	249.0	3,489	266.0	2,920	227.0	2,543	200.0	2,357	181.0
Bipolar disorder	8,491	130.0	1,833	135.0	1,960	149.0	1,806	140.0	1,565	123.0	1,327	102.0
Eating disorders	3,911	60.0	708	52.0	885	67.0	808	63.0	779	61.0	731	56.0
Other psychoses	3,742	57.0	844	62.0	820	62.0	765	59.0	674	53.0	639	49.0
Schizophrenia	1,464	22.0	310	23.0	309	23.0	300	23.0	282	22.0	263	20.0
Acute stress disorder	1,181	18.0	262	19.0	291	22.0	221	17.0	214	17.0	193	15.0
Factitious disorders	93	1.0	16	1.0	24	2.0	18	1.0	21	2.0	14	1.0
Total	1,050,231		199,797		220,504		216,208		209,588		204,134	
Individuals, *n*												
More than 1 type of diagnosis[c]	282,073	4,306.4	43,455	3,203.6	48,865	3,703.4	47,854	3,706.3	45,948	3,607.9	44,075	3,365.7
Any diagnosis[d]	582,279	8,889.6	139,094	10,254.3	152,608	11,566.0	150,807	11,679.9	146,961	11,539.6	143,924	10,990.6

Abbreviations: No., number; PTSD, post-traumatic stress disorder; *n*, number.
[a] An individual could be a case within a category only once per lifetime, i.e., censored person-time.
[b] Rate per 100,000 person-years.
[c] Rate per 100,000 person-years (individual continually at risk- uncensored person-time).
[d] Defined as a unique occurrence of any mental health diagnosis.

followed by anxiety disorders, depressive disorders, other mental health disorders, and PTSD. Throughout the 5-year surveillance period, eating disorders occurred 6–10 times more frequently in female service members than in men, and personality disorders were identified 3.1–3.6 times more frequently in women **(Figures 2a, 2b)**.

Incidence rates of mental health diagnoses by age

Rates of most mental health disorders varied by age, with adjustment disorders exhibiting the highest incidence among all age groups **(Figure 3)**. Service members younger than age 20 years had the highest IR of other psychoses, compared to all other age groups. Rates of alcohol- and substance-related disorders, along with personality disorders, bipolar disorders, eating disorders, and schizophrenia, were highest for service members ages 20-24 years, then declined with increasing age. As age increased, PTSD increased, while adjustment disorders, anxiety disorders, depressive disorders, and acute stress disorders and factitious disorders evidenced fluctuating trends. ACSMs ages 40-49-years had the highest IRs of adjustment disorders, anxiety disorders, and depressive disorders; and those older than age 50 years had the highest incidence of PTSD and factitious disorders. Rates of adjustment disorders, anxiety disorders, and depressive disorders began increasing among those older than age 30 years until age 49 years, then declining thereafter among those older than age 50 years.

Incidence rates of mental health diagnoses by service

The Army evidenced the highest IRs of mental health disorders, notably adjustment disorders, alcohol-related disorders, substance related disorders, PTSD, schizophrenia, other psychoses, eating disorders, and factitious disorders. The Navy accounted for the highest IRs of depressive, personality, and bipolar disorders, while the Coast Guard accounted for the highest IRs of anxiety and acute stress disorders **(Figure 4)**.

Incidence rates of mental health diagnoses by occupation

Rates of adjustment disorders, anxiety disorders, depressive disorders, PTSD,

TABLE 3. Co-Morbid Incident Mental Health Disorder Diagnoses[a], Active Component, U.S. Armed Forces, 2021–2025

Categories of Mental Health Disorders	Adjustment Disorders		Alcohol-related Disorder		Substance-related Disorder		Anxiety		PTSD		Depression		Bipolar Disorder	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Adjustment disorders	286,375	—	25,596	36.7	5,071	34.6	92,666	41.1	44,399	43.5	88,020	47.3	3,666	43.2
Alcohol-related disorder	25,596	8.9	69,779	—	7,010	47.8	18,169	8.1	9,702	9.5	21,381	11.5	1,486	17.5
Substance-related disorder	5,071	1.8	7,010	10.1	14,670	—	3,099	1.4	1,462	1.4	3,898	2.1	506	6.0
Anxiety	92,666	32.4	18,169	26.0	3,099	21.1	225,557	—	43,619	42.8	88,999	47.8	4,074	48.0
PTSD	44,399	15.5	9,702	13.9	1,462	10.0	43,619	19.3	101,969	—	40,879	22.0	2,611	30.8
Depression	88,020	30.7	21,381	30.6	3,898	26.6	88,999	39.5	40,879	40.1	186,257	—	4,989	58.8
Bipolar disorder	3,666	1.3	1,486	2.1	506	3.5	4,074	1.8	2,611	2.6	4,989	2.7	8,491	—
Personality disorders	8,994	3.1	2,991	4.3	725	4.9	6,520	2.9	3,803	3.7	8,276	4.4	1,283	15.1
Schizophrenia	579	0.2	241	0.4	136	0.9	505	0.2	256	0.3	746	0.4	290	3.4
Other psychoses	1,656	0.6	661	1.0	426	2.9	1,274	0.6	641	0.6	1,789	1.0	706	8.3
Acute stress disorder	501	0.2	101	0.1	22	0.2	443	0.2	302	0.3	388	0.2	39	0.5
Eating disorders	1,656	0.6	416	0.6	66	0.5	1,736	0.8	1,045	1.0	1,808	1.0	170	2.0
Factitious disorders	56	0.0	9	0.0	4	0.0	47	0.0	15	0.0	49	0.0	4	0.1
Other mental health disorder	46,258	16.2	19,827	28.4	5,644	38.5	39,719	17.6	19,325	19.0	34,865	18.7	2,058	24.2
Total	286,375		69,779		14,670		225,557		101,969		186,257		8,491	

	Personality Disorders		Schizophrenia		Other Psychoses		Acute Stress		Eating Disorders		Factitious Disorder		Other	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Adjustment disorders	8,994	57.7	579	39.6	1,656	44.3	501	42.4	1,656	42.3	56	60.2	46,258	35.3
Alcohol-related disorder	2,991	19.2	241	16.5	661	17.7	101	8.6	416	10.6	9	9.7	19,827	15.1
Substance-related disorder	725	4.7	136	9.3	426	11.4	22	1.9	66	1.7	4	4.3	5,644	4.3
Anxiety	6,520	41.8	505	34.5	1,274	34.1	443	37.5	1,736	44.4	47	50.5	39,719	30.3
PTSD	3,803	24.4	256	17.5	641	17.1	302	25.6	1,045	26.7	15	16.1	19,325	14.7
Depression	8,276	53.1	746	51.0	1,789	47.8	388	32.9	1,808	46.2	49	52.7	34,865	26.6
Bipolar disorder	1,283	8.2	290	19.8	706	18.9	39	3.3	170	4.4	4	4.3	2,058	1.6
Personality disorders	15,585	—	202	13.8	522	14.0	54	4.6	388	9.9	15	16.1	4,130	3.2
Schizophrenia	202	1.3	1,464	—	923	24.7	5	0.4	13	0.3	5	5.4	461	0.4
Other psychoses	522	3.4	923	63.1	3,742	—	17	1.4	25	0.6	16	17.2	1,179	0.9
Acute stress disorder	54	0.4	5	0.3	17	0.5	1,181	—	11	0.3	0	0.0	351	0.3
Eating disorders	388	2.5	13	0.9	25	0.7	11	0.9	3,911	—	3	3.2	1,269	1.0
Factitious disorders	15	0.1	5	0.3	16	0.4	0	0.0	3	0.1	93	—	35	0.0
Other mental health disorder	4,130	26.5	461	31.5	1,179	31.5	351	29.7	1,269	32.5	35	37.6	131,157	—
Total	15,585		1,464		3,742		1,181		3,911		93		131,157	

Abbreviation: PTSD, post-traumatic stress disorder; No., number.
[a] Mental health disorder diagnosis at any time during surveillance period.

personality disorders, bipolar disorders, eating disorders, and acute stress disorders were generally highest in health care occupations. Service members in combat-related roles exhibited the highest IRs of alcohol- and substance-related disorders and factitious disorders, while those in motor transport had the highest rates of other psychoses and schizophrenia. By contrast, pilots and air crew personnel showed the lowest IRs of mental health disorders **(Figure 5)**.

Incidence rates of mental health diagnoses by time in service

Rates of mental health disorder diagnoses differ by length of service, with highest IRs of other psychoses and acute stress disorder diagnoses occurring among ACSMs with less than 6 months of service. For those who served 12–36 months, the most common diagnoses were adjustment disorders, alcohol-related disorders, substance-related disorders, personality disorders, bipolar disorders, eating disorders, and schizophrenia. Among those who served 36 months or longer, anxiety disorders, depressive disorders, and PTSD were most common **(Figure 6)**.

FIGURE 1a. Annual Incidence Rates for the Five Most Frequent Mental Health Disorder Diagnoses, Active Component Service Men, U.S. Armed Forces 2021–2025

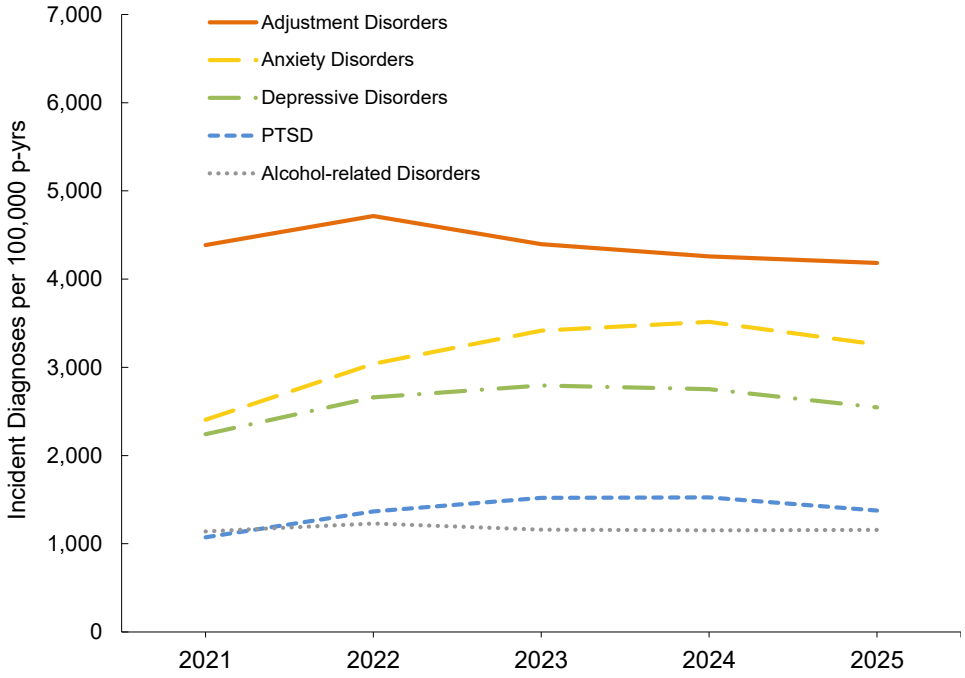
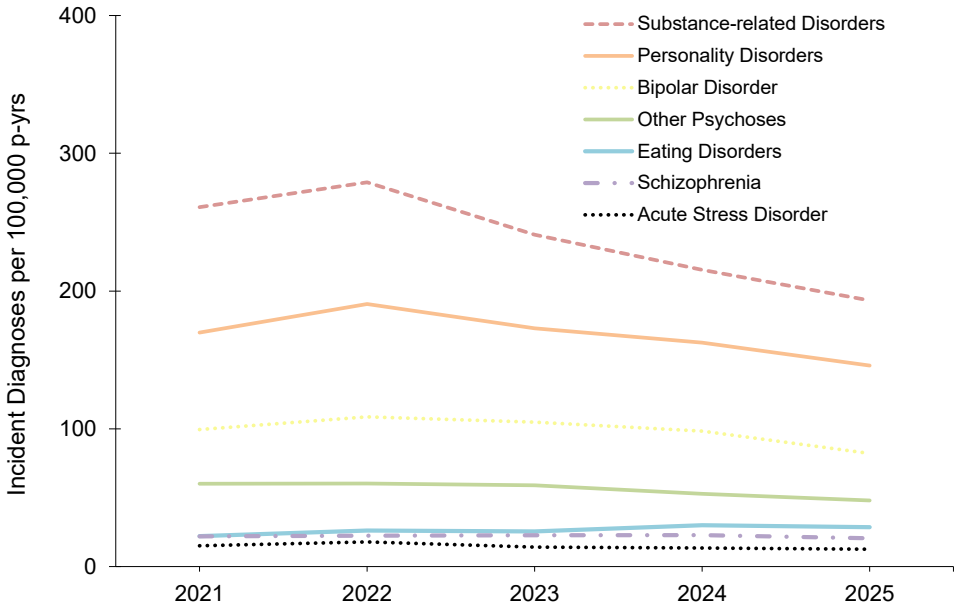


FIGURE 1b. Annual Incidence Rates[a] for the Next Most Frequent Mental Health Diagnoses, Active Component Service Men, U.S. Armed Forces 2021–2025



Abbreviations: PTSD, post-traumatic stress disorder; p-yrs, person-years.
[a] Due to small rate sizes, factitious disorders are not represented in this figure.

Discussion

The findings from this 5-year surveillance period underscore a substantial and evolving mental health burden among active component service members of the U.S. Armed Forces. While the overall incidence of mental health diagnoses peaked in 2023 before demonstrating a slight decline through 2025, the volume of health care provision (over 1 million incident diagnoses affecting more than 582,000 service members) highlights the persistent operational impact of behavioral health conditions. Adjustment, anxiety, and depressive disorders overwhelmingly drove this burden, accounting for nearly two-thirds (66.5%) of all incident diagnoses.

Consistent with historical trends, female service members generally experienced higher rates for most mental health conditions, disproportionately bearing the burden of eating and personality disorders. Furthermore, female diagnosis rates for adjustment and anxiety disorders were double those of their male counterparts. Conversely, male service members exhibited higher IRs for alcohol- and substance-related disorders, as well as schizophrenia in the later years of the surveillance period. Occupational analysis further highlights specific vulnerabilities: health care personnel experienced the highest rates of adjustment, anxiety, depressive, and post-traumatic stress disorders, potentially reflecting the compounding, chronic stress inherent to military medicine. In contrast, combat-related roles were most closely associated with alcohol and substance-related disorders, pointing to different environmental stressors and possibly different behavioral coping mechanisms among specialties.

The manifestation of mental health disorders shifted significantly across a service member's career lifecycle. Early-career personnel (younger than 20 years of age or with less than 6 months of service) were most vulnerable to acute stress and psychotic disorders, which may reflect the initial stressors of transitioning into the rigorous military environment. Mid-career members (ages 20–24 years or 12–36 months of service) saw peaks in substance-related, bipolar, and personality disorders. As time in service and age increased, the clinical presentation shifted

heavily toward cumulative or chronic conditions, with personnel older than age 40 years experiencing the highest rates of PTSD, anxiety, and depressive disorders.

Finally, the high rate of diagnostic comorbidity presents a substantial clinical challenge. Nearly half (48.4%) of the affected surveillance population received diagnoses in more than 1 mental health category, with adjustment and depressive disorders frequently co-occurring with conditions such as substance-related and bipolar disorders. This complicated clinical picture suggests that isolated, single-disorder treatment approaches may be insufficient for this population.

There are several limitations to interpreting the results in this report. First, this report was compiled based on standardized administrative records that may not be reliable indicators of the true burden of mental health disorders among military service members. Second, this report may underestimate the incidence of mental health disorders if service members did not seek appropriate care or received care not documented routinely as ICD-9/ICD-10-coded diagnoses (e.g., from counseling or advocacy support centers, chaplains), or if mental health disorders were not diagnosed or reported on standardized records of care (e.g., from private practitioners), or if diagnoses were miscoded or incorrectly transcribed on centrally transmitted records. Conversely, some conditions may have been erroneously diagnosed or miscoded (e.g., screening visits) as mental health disorders, which could contribute to an over-estimation of the true burden of disease. Lastly, these analyses summarize the experiences of individuals while serving in an active component of the U.S. military and do not include mental health disorders or problems that affected members of reserve components or veterans of recent military service who received care outside the MHS.

The DOW policy framework actively promotes help-seeking by protecting patient privacy during mental health and voluntary substance misuse treatments.[7] This confidentiality is reinforced by the Brandon Act's mandate for unquestioned, expedited command referrals.[6] Notably, the 2023 peak in overall incidence and high volume of anxiety and adjustment disorders coincides with the early implementation of these initiatives aimed at reducing stigma and removing barriers to care. As service members use these protected mechanisms, an initial rise in diagnosed incidence may represent an indicator of increased care provision rather than a confirmed expansion of disease burden.

Mental health is an integral component of military readiness and operational lethality. Consistent epidemiological surveillance is a proven mechanism for monitoring health care provision, clinical treatment, and timeliness of care.[9] Ultimately, the high rates of diagnostic comorbidity and occupational vulnerabilities documented in this report reveal the need for multidisciplinary clinical care capable of managing complex, concomitant behavioral health needs throughout the force.

FIGURE 2a. Annual Incidence Rates of Five Most Frequent Mental Health Disorder Diagnoses, Active Component Service Women, U.S. Armed Forces 2021–2025

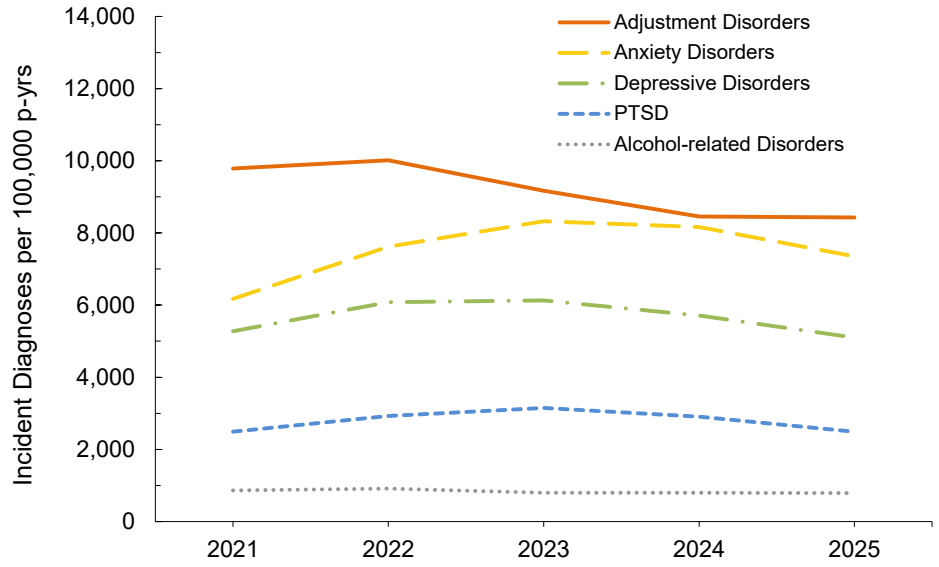
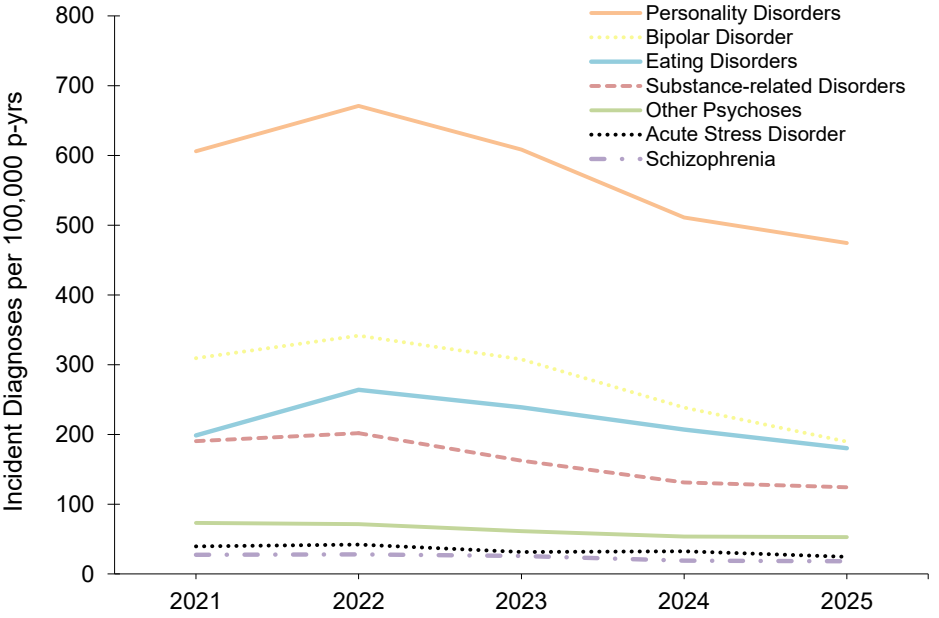
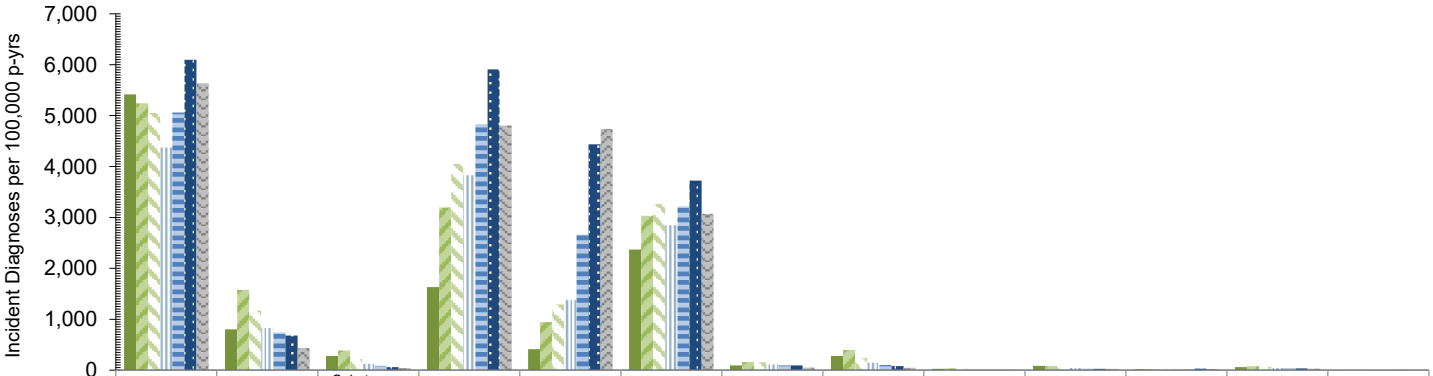


FIGURE 2b. Annual Incidence Rates[a] for Next Most Frequent Mental Health Diagnoses, Active Component Service Women, U.S. Armed Forces 2021–2025



Abbreviations: PTSD, post-traumatic stress disorder; p-yrs, person-years.
[a] Due to small rate sizes, factitious disorders are not represented in this figure.

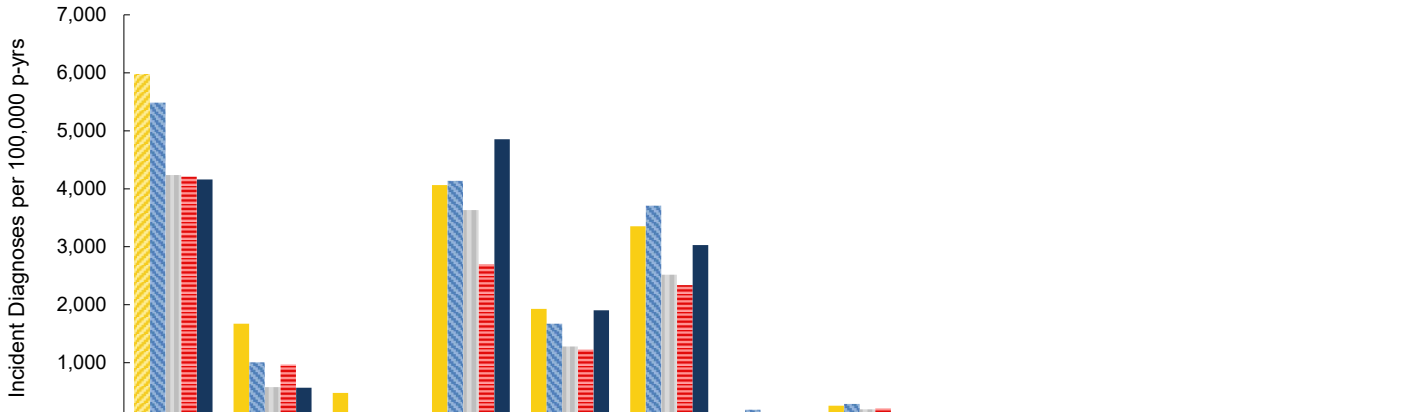
FIGURE 3. Incidence Rates of Mental Health Disorder Diagnoses by Category and Age Group, Active Component, U.S. Armed Forces, 2021–2025



	Adjustment Disorders	Alcohol-related Disorders	Substance-related Disorders	Anxiety Disorders	PTSD	Depressive Disorders	Bipolar Disorder	Personality Disorders	Schizophrenia	Other Psychoses	Acute Stress Disorder	Eating Disorders	Factitious Disorders
<20	5,418.8	802.9	279.2	1,630.2	411.3	2,368.7	94.2	278.8	26.9	84.3	17.3	57.4	1.6
20–24	5,240.5	1,575.7	387.8	3,193.5	944.3	3,031.4	161.3	395.9	34.1	80.5	15.9	81.8	1.8
25–29	5,051.7	1,171.1	220.3	4,049.0	1,293.5	3,262.3	150.0	236.0	26.0	57.7	15.2	66.0	1.6
30–34	4,373.3	824.6	120.9	3,828.3	1,376.0	2,848.7	112.7	145.8	13.9	43.5	15.2	41.4	1.4
35–39	5,060.7	736.7	85.1	4,829.5	2,662.9	3,216.1	93.0	102.3	8.7	30.1	22.9	41.6	0.7
40–49	6,097.8	677.9	59.1	5,907.7	4,434.0	3,722.6	92.1	78.8	6.5	25.1	30.7	34.5	0.3
50+	5,633.5	436.9	42.0	4,804.9	4,736.2	3,067.4	52.5	48.7	9.2	27.5	23.6	31.5	2.6

Abbreviations: PTSD, post-traumatic stress disorder; p-yrs, person-years.

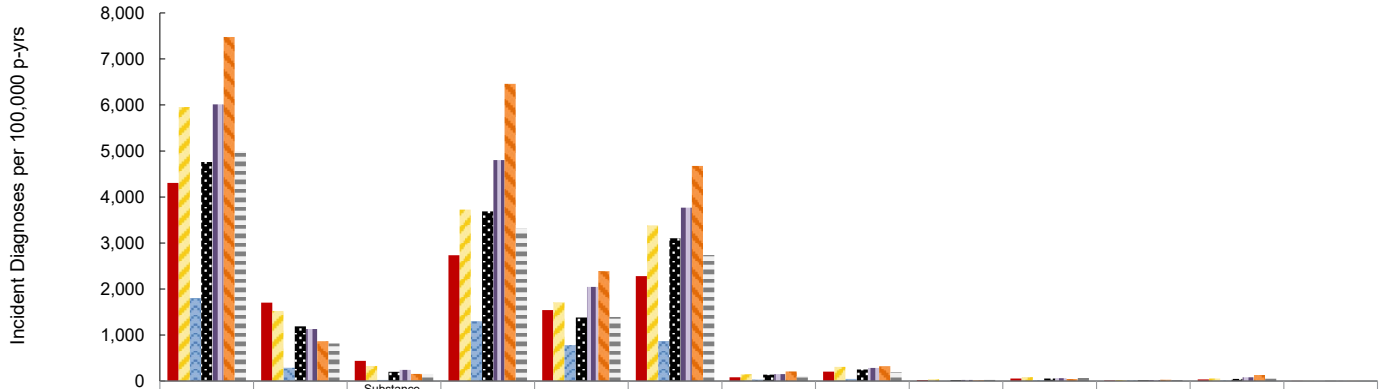
FIGURE 4. Incidence Rates of Mental Health Disorder Diagnoses by Category and Branch of Service, Active Component, U.S. Armed Forces, 2021–2025



	Adjustment Disorders	Alcohol-related Disorders	Substance-related Disorders	Anxiety Disorders	PTSD	Depressive Disorders	Bipolar Disorder	Personality Disorders	Schizophrenia	Other Psychoses	Acute Stress Disorder	Eating Disorders	Factitious Disorders
Army	5,969.7	1,672.3	478.1	4,062.6	1,929.4	3,352.2	118.3	257.5	25.9	68.3	17.3	70.1	2.7
Navy	5,486.1	1,006.8	123.4	4,135.2	1,671.6	3,708.6	188.7	290.9	22.3	59.4	23.6	58.5	0.9
Air Force	4,238.1	580.0	61.8	3,634.6	1,280.2	2,517.8	103.9	195.9	17.6	41.1	13.7	50.4	0.8
Marine Corps	4,209.7	968.6	97.4	2,696.4	1,226.0	2,338.5	94.7	210.8	23.5	59.4	14.4	57.7	0.7
Coast Guard	4,159.3	569.0	72.2	4,852.8	1,903.0	3,028.8	136.9	72.2	15.3	32.7	31.2	38.9	0.0

Abbreviations: PTSD, post-traumatic stress disorder; p-yrs, person-years.

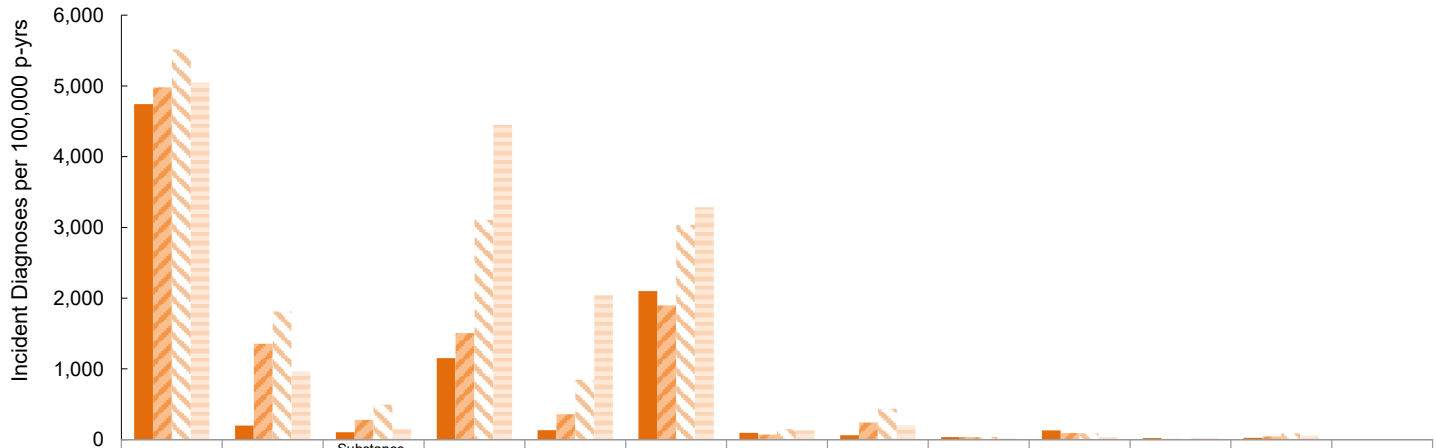
FIGURE 5. Incidence Rates of Mental Health Disorder Diagnoses by Category and Military Occupation, Active Component, U.S. Armed Forces, 2021–2025



	Adjustment Disorders	Alcohol-related Disorders	Substance-related Disorders	Anxiety Disorders	PTSD	Depressive Disorders	Bipolar Disorder	Personality Disorders	Schizophrenia	Other Psychoses	Acute Stress Disorders	Eating Disorders	Factitious Disorders
Combat-related[a]	4,306.6	1,705.3	439.6	2,733.0	1,543.1	2,282.5	83.7	204.9	19.5	54.9	11.6	36.2	2.0
Motor Transport	5,954.8	1,523.6	328.5	3,727.5	1,713.4	3,384.3	148.5	307.3	40.8	86.4	20.2	56.8	0.5
Pilot, Air Crew	1,803.7	289.2	25.1	1,298.5	781.8	871.5	30.4	47.2	4.4	15.9	12.3	12.8	0.0
Repair, Engineering	4,761.3	1,187.4	201.3	3,687.2	1,381.5	3,103.6	141.3	249.6	21.3	53.1	16.6	45.9	1.3
Communications, Intelligence	6,014.8	1,130.3	243.2	4,801.9	2,045.6	3,768.7	150.4	286.9	25.4	60.8	20.1	83.3	1.7
Health Care	7,478.6	867.0	156.2	6,460.0	2,387.6	4,675.7	207.6	322.5	16.3	44.6	28.3	130.3	1.0
Other	4,992.3	816.0	156.8	3,312.5	1,390.7	2,737.3	108.1	191.8	24.7	66.9	18.5	51.6	1.5

Abbreviations: PTSD, post-traumatic stress disorder; p-yrs, person-years.
[a] Infantry, artillery, combat engineering.

FIGURE 6. Incidence Rates of Mental Health Disorder Diagnoses by Category and Time in Service, Active Component, U.S. Armed Forces, 2021–2025



	Adjustment Disorders	Alcohol-related Disorders	Substance-related Disorders	Anxiety Disorders	PTSD	Depressive Disorders	Bipolar Disorder	Personality Disorders	Schizophrenia	Other Psychoses	Acute Stress Disorder	Eating Disorders	Factitious Disorders
< 6 months	4,741.6	197.8	105.1	1,152.7	132.6	2,100.6	97.2	61.8	37.1	129.8	23.3	24.7	0.3
6 ≤ 12 months	4,980.7	1,355.0	279.8	1,507.2	358.3	1,897.7	71.9	243.1	35.9	93.0	10.4	43.8	1.9
12 ≤ 36 months	5,517.1	1,810.3	496.7	3,106.6	847.9	3,034.9	146.5	435.6	39.1	89.5	16.2	88.0	3.0
>36 months	5,044.3	965.0	155.4	4,447.7	2,040.0	3,283.7	131.9	198.4	15.7	40.2	18.7	55.8	1.0

Abbreviations: PTSD, post-traumatic stress disorder; p-yrs, person-years.

Acknowledgment

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Disclaimers

The views expressed in this report reflect the results of research conducted by the authors and do not necessarily reflect official policy nor position of the Defense Health Agency, Department of War, or the U.S. Government.

The editors disclose use of an artificial intelligence (AI) language model during this report's preparation from Gemini Enterprise, a large language model from Google optimized specifically for Department of War mission support within an Impact Level 5 environment. This AI application was used to assist with initial discussion drafts, to refine prose for clarity. MSMR *editors directed all AI review and analysis, with careful editorial review and final edits. The editors assert full responsibility for the accuracy and integrity of the final content.*

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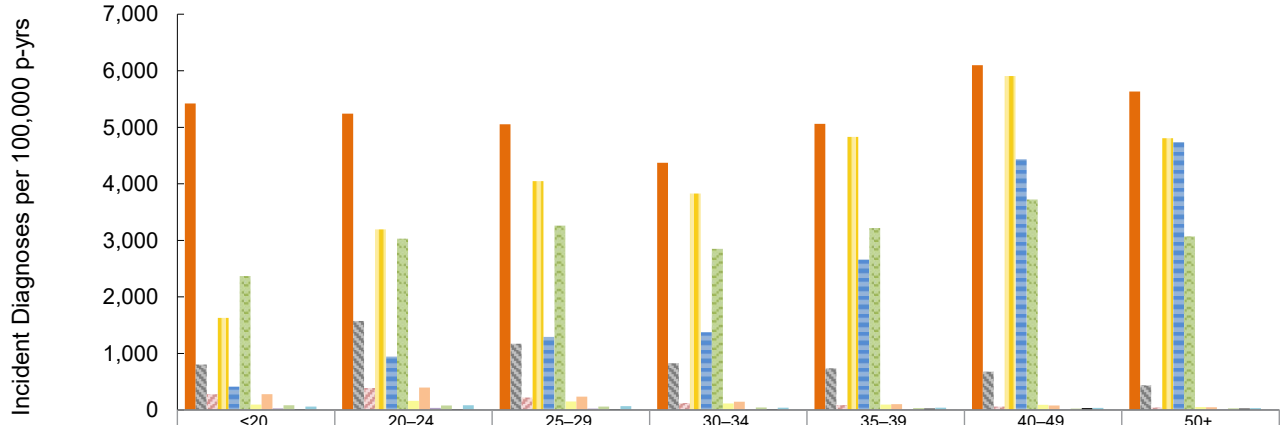
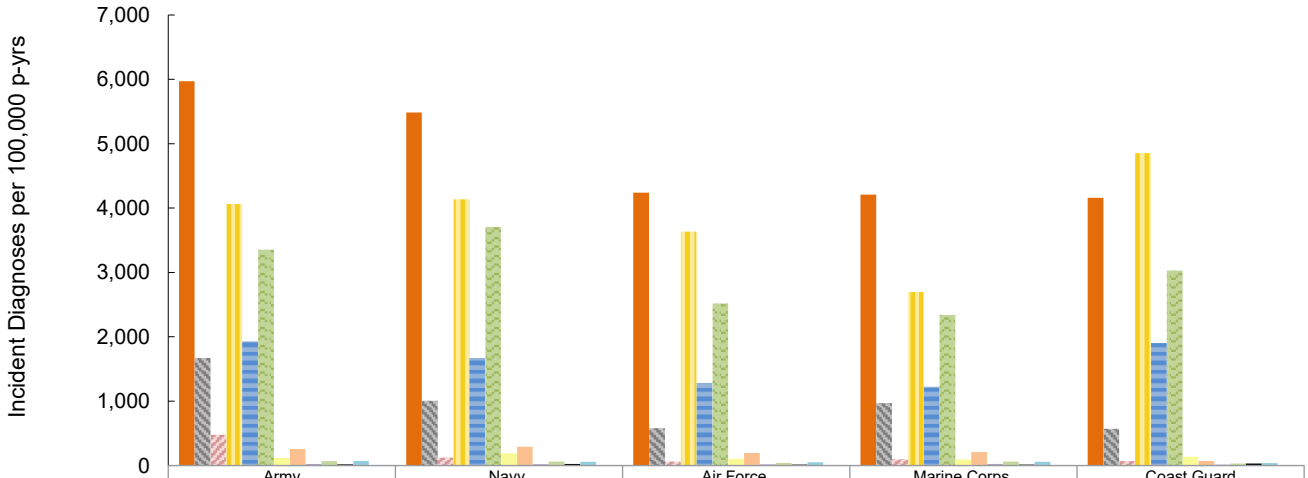
FIGURE 3 SUPPLEMENT. Incidence Rates of Mental Disorder Diagnoses by Age Group and Category, Active Component, U.S. Armed Forces, 2021–2025



	<20	20–24	25–29	30–34	35–39	40–49	50+
Adjustment Disorders	5,418.8	5,240.5	5,051.7	4,373.3	5,060.7	6,097.8	5,633.5
Alcohol-related Disorders	802.9	1,575.7	1,171.1	824.6	736.7	677.9	436.9
Substance-related Disorders	279.2	387.8	220.3	120.9	85.1	59.1	42.0
Anxiety Disorders	1,630.2	3,193.5	4,049.0	3,828.3	4,829.5	5,907.7	4,804.9
PTSD	411.3	944.3	1,293.5	1,376.0	2,662.9	4,434.0	4,736.2
Depressive Disorders	2,368.7	3,031.4	3,262.3	2,848.7	3,216.1	3,722.6	3,067.4
Bipolar Disorder	94.2	161.3	150.0	112.7	93.0	92.1	52.5
Personality Disorders	278.8	395.9	236.0	145.8	102.3	78.8	48.7
Schizophrenia	26.9	34.1	26.0	13.9	8.7	6.5	9.2
Other Psychoses	84.3	80.5	57.7	43.5	30.1	25.1	27.5
Acute Stress Disorder	17.3	15.9	15.2	15.2	22.9	30.7	23.6
Eating Disorders	57.4	81.8	66.0	41.4	41.6	34.5	31.5
Factitious Disorders	1.6	1.8	1.6	1.4	0.7	0.3	2.6

Abbreviations: PTSD, post-traumatic stress disorder; p-yrs, person-years.

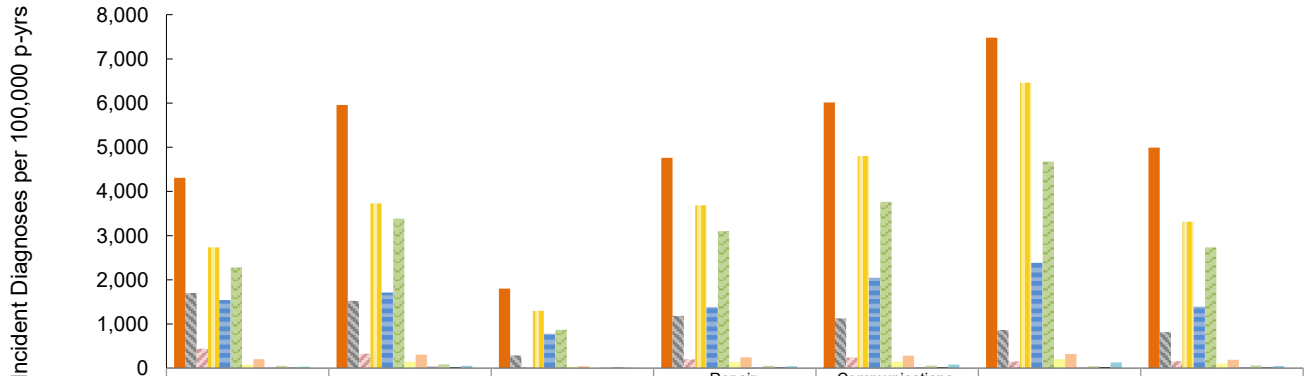
FIGURE 4 SUPPLEMENT. Incidence Rates of Mental Health Disorder Diagnoses by Branch of Service and Category, Active Component, U.S. Armed Forces, 2021–2025



	Army	Navy	Air Force	Marine Corps	Coast Guard
Adjustment Disorders	5,969.7	5,486.1	4,238.1	4,209.7	4,159.3
Alcohol-related Disorders	1,672.3	1,006.8	580.0	968.6	569.0
Substance-related Disorders	478.1	123.4	61.8	97.4	72.2
Anxiety Disorders	4,062.6	4,135.2	3,634.6	2,696.4	4,852.8
PTSD	1,929.4	1,671.6	1,280.2	1,226.0	1,903.0
Depressive Disorders	3,352.2	3,708.6	2,517.8	2,338.5	3,028.8
Bipolar Disorder	118.3	188.7	103.9	94.7	136.9
Personality Disorders	257.5	290.9	195.9	210.8	72.2
Schizophrenia	25.9	22.3	17.6	23.5	15.3
Other Psychoses	68.3	59.4	41.1	59.4	32.7
Acute Stress Disorder	17.3	23.6	13.7	14.4	31.2
Eating Disorders	70.1	58.5	50.4	57.7	38.9
Factitious Disorders	2.7	0.9	0.8	0.7	0.0

Abbreviations: PTSD, post-traumatic stress disorder; p-yrs, person-years.

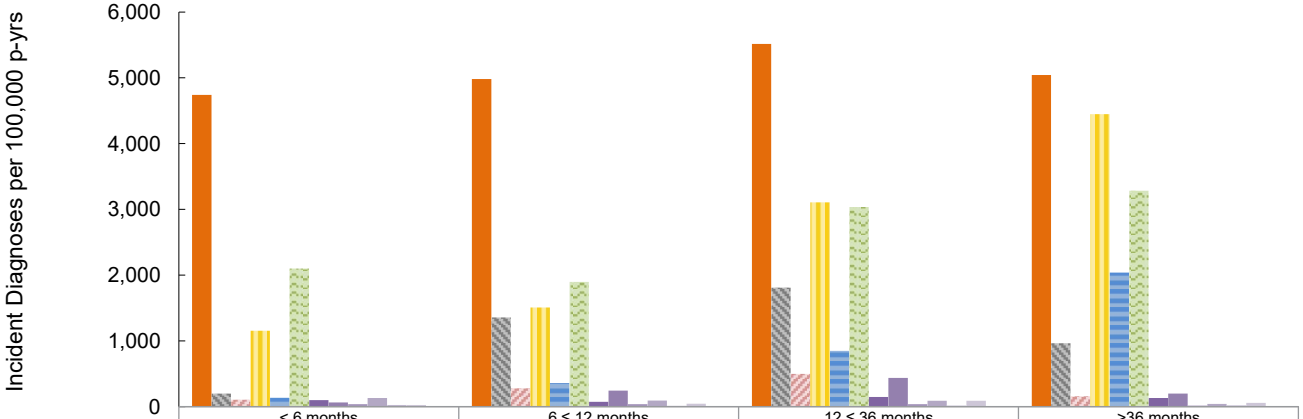
FIGURE 5 SUPPLEMENT. Incidence Rates of Mental Health Disorder Diagnoses by Military Occupation and Category, Active Component, U.S. Armed Forces, 2021–2025



	Combat-related[a]	Motor Transport	Pilot, Air Crew	Repair, Engineering	Communications, Intelligence	Health Care	Other
Adjustment disorders	4,306.6	5,954.8	1,803.7	4,761.3	6,014.8	7,478.6	4,992.3
Alcohol-related disorders	1,705.3	1,523.6	289.2	1,187.4	1,130.3	867.0	816.0
Substance-related disorders	439.6	328.5	25.1	201.3	243.2	156.2	156.8
Anxiety disorders	2,733.0	3,727.5	1,298.5	3,687.2	4,801.9	6,460.0	3,312.5
PTSD	1,543.1	1,713.4	781.8	1,381.5	2,045.6	2,387.6	1,390.7
Depressive disorders	2,282.5	3,384.3	871.5	3,103.6	3,768.7	4,675.7	2,737.3
Bipolar disorder	83.7	148.5	30.4	141.3	150.4	207.6	108.1
Personality disorders	204.9	307.3	47.2	249.6	286.9	322.5	191.8
Schizophrenia	19.5	40.8	4.4	21.3	25.4	16.3	24.7
Other psychoses	54.9	86.4	15.9	53.1	60.8	44.6	66.9
Acute stress disorders	11.6	20.2	12.3	16.6	20.1	28.3	18.5
Eating disorders	36.2	56.8	12.8	45.9	83.3	130.3	51.6
Factitious disorders	2.0	0.5	0.0	1.3	1.7	1.0	1.5

Abbreviations: PTSD, post-traumatic stress disorder; p-yrs, person-years.
[a] Infantry, artillery, combat engineering.

FIGURE 6 SUPPLEMENT. Incidence Rates of Mental Health Disorder Diagnoses by Time in Service and Category, Active Component, U.S. Armed Forces, 2021–2025



	< 6 months	6 ≤ 12 months	12 ≤ 36 months	>36 months
Adjustment Disorders	4,741.6	4,980.7	5,517.1	5,044.3
Alcohol-related Disorders	197.8	1,355.0	1,810.3	965.0
Substance-related Disorders	105.1	279.8	496.7	155.4
Anxiety Disorders	1,152.7	1,507.2	3,106.6	4,447.7
PTSD	132.6	358.3	847.9	2,040.0
Depressive Disorders	2,100.6	1,897.7	3,034.9	3,283.7
Bipolar Disorder	97.2	71.9	146.5	131.9
Personality Disorders	61.8	243.1	435.6	198.4
Schizophrenia	37.1	35.9	39.1	15.7
Other Psychoses	129.8	93.0	89.5	40.2
Acute Stress Disorder	23.3	10.4	16.2	18.7
Eating Disorders	24.7	43.8	88.0	55.8
Factitious Disorders	0.3	1.9	3.0	1.0

Abbreviations: PTSD, post-traumatic stress disorder; p-yrs, person-years.

Trends in Postpartum Depression and Anxiety Diagnoses Among U.S. Active Component Service Women, 2010–2024

Bradley S. McNeal, DO, MPH&TM; Shauna L. Stahlman, PhD, MPH; Saixia Ying, PhD; Symone M. Baker Miller, MD, MPH

This retrospective cohort study evaluated trends in postpartum depression (PPD) and postpartum anxiety (PPA) diagnoses among 138,588 active component service women with live births (2010-2024). Period prevalence of PPD/PPA remained relatively constant from 2010 to 2017 (2.4%) and began increasing in 2018, with a peak in 2022 (13.4%). Multivariable logistic regression (2021–2024) demonstrated a statistically significant decrease in adjusted odds of PPD/PPA diagnosis in 2023-2024 (adjusted odds ratio 0.89), following the pandemic peak. The most significant risk factors for PPD/PPA diagnosis were prior mental health history, service in the Navy, and cesarean delivery. The 15-year increase in diagnostic prevalence may reflect improved administrative documentation and reduced stigma associated with seeking care. Conversely, the post-2022 decline may reflect post-pandemic stabilization and mitigating effects of expanded parental leave. Current PPD/PPA prevalence remains higher than pre-pandemic proportions, however. Prior mental health diagnosis remains the critical predictor, identifying a key population requiring targeted support to enhance military readiness.

What are the new findings?

Period prevalence of PPD/PPA peaked in 2022 before declining in 2023 and 2024, while remaining higher than pre-pandemic levels. Service in the Navy, prior mood disorders, and cesarean delivery correlated with increased diagnostic odds, while Air Force and Space Force service, as well as officer status, were associated with reduced odds compared to Army and enlisted personnel.

What is the impact on readiness and force health protection?

Unrecognized postpartum depression and anxiety detrimentally affect return to duty and overall deployability. The identification of at-risk populations and implementing policies to mitigate the impacts of postpartum mood disorders are critical for sustaining the health, readiness, and retention of service women in the U.S. military.

Postpartum depression (PPD) and postpartum anxiety (PPA) present significant public health concerns and are the most prevalent complications following childbirth in the U.S. As many as 14% of childbearing individuals experience PPD, and another 6–8% experience PPA.[1] In addition to general risks for PPD/PPA experienced by their civilian counterparts, U.S. active component service women (ACSW) face unique stressors from military life, including family separation, frequent relocation, deployments, and combat exposures with pre-existing trauma.[2] Career and duty limitations, whether actual or perceived, may preclude ACSW from seeking mental health services and receiving care,[3] and duty requirements can inhibit appointment attendance.[4] Untreated mental health conditions may result in delays in returning to duty, difficulties in completing necessary tasks upon return to work, and ultimately, may result in subsequent duty limitations or service separations for ACSW.

Pregnancy, childbirth, and parenthood are times of great stress for ACSW, and hormonal shifts occurring from the antenatal to postpartum periods can briefly affect mood. "Baby blues," a common and normal phenomenon, occurs typically in the first 2-3 days after delivery. Feelings of sadness and lability of mood are not a *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision* (DSM-5-TR) diagnosis and are not pathological. Management involves non-clinical psychosocial support (e.g., reassurance, familial support, rest), and symptoms typically resolve no later than 2 weeks.[5,6]

Unlike 'baby blues', PPD is characterized by greater intensity and persistence, for more than 2 weeks, hindering ability to care for one's infant and self.[5,6] Symptoms of PPD include fatigue, irritability, frequent crying, difficulty with infant bonding, prolonged sadness, changes in sleep and appetite, feelings of guilt or worthlessness, and social withdrawal. In severe cases, individuals may experience thoughts of self-harm or suicide. Symptoms can appear within the first few weeks postpartum but may also develop during pregnancy or as long as 1 year after giving birth.[5,6] Postpartum anxiety may occur independently or concurrently with PPD, with symptoms including excessive worry, restlessness, panic attacks, and heart palpitations. Risk factors for PPD/PPA include personal or family history of mood disorder, hormonal fluctuations, sleep deprivation, lack of social support, relationship stress, and unplanned or complicated pregnancy.[5]

Systemic changes over the past 15 years could have affected PPD/PPA prevalence. In 2015, the U.S. Department of Defense extended postpartum deployment

deferments from 6 to 12 months. In 2016, maternity leave (in addition to 6 weeks medical convalescent leave) for the birth parent increased to 12 weeks[7]; this increase was from 6 weeks in the Army and Air Force; the Navy and Marine Corps had established an 18-week policy in July 2015. In 2018, TRICARE eliminated the primary care referral requirement for routine, outpatient mental health care, which significantly lowered institutional barriers to access.[8] Concurrently, in October 2018, a new International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) code, F53.0, was introduced to provide specificity for PPD. From March 2020 through March 2023, the COVID-19 pandemic affected mental health due to stress and isolation.[9] In 2023, parental leave for service members was further expanded, granting secondary caregivers 12 weeks of leave to provide additional support. Lastly, in 2023, the Brandon Act was enacted to reduce stigma and establish command-initiated approaches and access to mental health care, which potentially influenced care-seeking behaviors, although its direct impact on reducing stigma among service women remains difficult to isolate.[10]

This study aimed to evaluate the period prevalence of PPD/PPA diagnoses among U.S. ACSW from 2010 through 2024, in concurrence with the systemic changes to related policies during the period. As a secondary objective, this analysis examined potential demographic and clinical risk factors for PPD/PPA during the last 4 years of the surveillance period.

Methods

This retrospective cohort study utilized data from January 1, 2010 through December 31, 2024 from the Defense Medical Surveillance System (DMSS). The study population included all ACSW in the U.S. Army, Navy, Air Force, Space Force, and Marine Corps who had a live birth documented while in active service during the study period. To ensure independent observations and eliminate the compounding clinical effects of multi-parity within administrative data, the study cohort was restricted to an individual's first documented live birth event during the study period after accession into military service.

Analysis focused on this index inpatient or outpatient encounter with a live birth diagnosis in any diagnostic position (ICD-9-CM: V27.0, V27.2, V27.5, V27.9, V30*, V31*, V33*, V34*, V37*, V39*; ICD-10-CM: Z37.0, Z37.2, Z37.5*, Z37.9, Z38*). Subsequent births by the same individual during the 15-year surveillance period were excluded from the denominator: Each unique individual contributed exactly 1 delivery event and a single 365-day postpartum follow-up period to the analysis; this did not limit the dataset strictly to primiparous women if prior births occurred before the start of military service. This broad diagnostic approach was used to maximize baseline case capture in administrative medical records, and allowed capture of deliveries that may have occurred at home or in civilian health care facilities. Pregnancies resulting in stillbirth were excluded to avoid confounding postpartum trends with normal bereavement.

Based on the timings of policy changes, changes to the ICD-CM coding system, and the COVID-19 pandemic, for analysis the study period was divided into 5 distinct eras: 2010–2015 (baseline), 2016–2018 (ICD-10-CM, post-maternity leave expansion, 2018 TRICARE removal of outpatient mental health referral requirements), 2019–2020 (post-introduction of ICD-10-CM code F53.0, early pandemic), 2021–2022 (late pandemic), and 2023–2024 (post-parental leave expansion, pandemic, Brandon Act).

The primary outcome was a diagnosis of PPD or PPA. Cases were defined as at least 1 inpatient or outpatient medical encounter with a qualifying diagnosis code in any diagnostic position from 14 through 365 days after a live birth; the 2-week exclusion eliminated transient 'baby blues' from analysis.[5,6] The 1-year end date was implemented because prior studies indicate that 57.4% of new diagnoses are found at the 7-10 month follow-up, followed by subsequent decrease in diagnostic prevalence.[6] Qualifying diagnoses of PPD/PPA were identified using ICD-9-CM codes 648.42 (mental disorders of mother, delivered, with mention of postpartum complication) and 648.44 (mental disorders of mother, postpartum condition or complication), and ICD-10-CM codes F53.0 (postpartum depression), O90.6 (postpartum mood disturbance), and O99.345 (other mental disorders complicating the puerperium).

Two variations of the outcome were analyzed in a sensitivity analysis to calculate 2 different prevalence estimates, to assess the impact of coding variations on the unadjusted proportions of PPD/PPA. The first outcome variation was identical to the primary definition, except that ICD-9-CM code 648.40 ("mental disorders of the mother, unspecified as to episode of care or not applicable") was included. Tracking for code 648.40 was only used during the baseline period, from January 1, 2010 through September 30, 2015, as ICD-9-CM transition to ICD-10-CM occurred on October 1, 2015. This sensitivity analysis was included because, although non-specific to postpartum states, code 648.40 was used in previous studies, notably Herrick et al.[10] and provides an essential baseline for tracking historical trends.

The second outcome variation in the sensitivity analysis removed the 14-day exclusion period (observing days 0–365) and expanded diagnostic criteria to any anxiety or depressive disorder. This broader outcome definition was tested because providers may utilize non-specific psychiatric codes during the postpartum period, either due to clinical uncertainty or avoidance of administrative stigma.

Demographic variables considered in analysis included age at delivery, race and ethnicity, and marital status. Records with missing or unspecified race or ethnicity data were retained in the analysis and classified as 'unknown'. Military variables included rank, service branch, and deployment history prior to the index delivery date (which was restricted to earlier than 2022 due to DMSS data limitations).

Clinical covariates included mode of delivery (cesarean vs. vaginal) and prior diagnosis of adjustment disorder, anxiety disorder, or depressive disorder in any diagnostic position of an inpatient or outpatient encounter prior to the delivery date. The ICD-9-CM/ICD-10-CM codes used for depression, anxiety, and adjustment disorder are described in a prior *MSMR* report.[11]

Secondary analysis used multivariate logistic regression restricted to the contemporary 2021-2024 surveillance period to assess independent associations with PPD/PPA diagnosis. This temporal restriction was applied to prevent confounding from historical ICD-CM coding transitions and pandemic-related access distortions.

While this study is fundamentally descriptive, multivariable logistic regression yielding adjusted odds ratios (aORs) was employed to isolate independent risk factors by controlling for inherent demographic confounding (e.g., collinearity between military rank and age). This methodology remains statistically robust, as the estimates are interpreted as odds ratios rather than risk ratios, which would otherwise require a rare disease assumption. The model adjusted for maternal age, race and ethnicity, service branch, military rank, prior deployment history, mode of delivery, and prior mental health diagnosis. Analysis was performed using SAS Enterprise Guide version 8.4.

Results

The final study cohort comprised 138,588 first documented live births among ACSW from 2010 through 2024. Detailed baseline demographic, clinical, and military characteristics for the complete cohort are detailed in the "Overall" column rows of **Table 1**. The majority of delivery events occurred among individuals ages 20-29 years (76.9%), of non-Hispanic White race or ethnicity (43.6%), and in enlisted ranks (85.2%). The U.S. Army contributed the largest volume of delivery records (37.9%), followed by the Navy (27.6%), Air Force (26.3%), and Marine Corps (8.2%).

Utilizing the primary strict case parameters, a total of 9,522 unique PPD/PPA conditions were identified throughout the entire surveillance period. From 2010 to 2015, the period prevalence of PPD/PPA was 2.4% using the primary outcome definition, which increased to 5.2% when ICD-9-CM code 648.40 was included. The proportion of depressive or anxiety disorder diagnoses during the 2010-2015 period was 16.7%. The period prevalence of PPD/PPA, using the primary outcome definition, increased from 5.1% in 2016–2018 to 11.1% in 2019-2020. In 2021-2022, the upward trend continued, with period prevalence peaking at 13.4%, before falling to 12.4% in 2023-2024. The proportion of depressive or anxiety disorder diagnoses also increased from 17.6% in 2016–2018 to 21.8% in 2019-2020, 29.4% in 2021-2022, and continued to increase to 32.7% in 2023-2024 **(Table 1, Figure)**.

There was significant decrease in odds of PPD/PPA diagnosis from the 2021-2022 to 2023-2024 periods (aOR 0.89, p=0.0001) **(Table 2)**. Compared to soldiers in the Army, Navy sailors exhibited a statistically significant 15% increase in odds of postpartum mood diagnosis (aOR 1.15, p<0.001), while Air Force and Space Force members demonstrated a statistically significant 13% reduction in odds (aOR 0.87, p=0.002). Compared to junior enlisted members, junior and warrant officers (aOR 0.73, p<0.0001), as well as senior officers (aOR 0.60, p<0.0001) had reduced odds of diagnosis. Delivery by cesarean section was associated with increased odds of diagnosis (aOR 1.16, p<0.0001), as was prior depression (aOR 1.22, p<0.0001), anxiety (aOR 1.33, p<0.0001), and adjustment disorder (aOR 1.29, p<0.0001). History of deployment prior to the index childbirth was not a statistically significant independent predictor of diagnosis in the adjusted model (aOR 0.92, p=0.074).

Discussion

Over the 15-year period, diagnoses of PPD and PPA increased overall among ACSW, with substantial increases in diagnoses from 2018, and through most of the pandemic, peaking in 2022. Introduction of the ICD-10-CM code F53.0 in 2018 may have influenced PPD case identification and surveillance, thereby improving diagnosis and data capture. Before code F53.0, there were multiple non-specific diagnostic codes, which makes it challenging to compare recent trends with the years preceding 2019. Furthermore, the massive gap between this study's strict primary outcome criteria (2.4-13.4%) and the broader sensitivity criteria (16.7-32.7%) highlights the potentially wide variability in prevalence estimates of PPD, depending on which ICD-10-CM codes are selected. Strict definitions maximize specificity but inevitably undercount total distress due to provider coding omissions or hesitance to apply formal postpartum diagnoses. Conversely, the broader definition maximizes sensitivity to capture logistical demand but introduces misclassification bias by sweeping in chronic, pre-existing, or unrelated psychiatric conditions that coincidentally occur during the postpartum year. Using both definitions provides health analysts with the operational boundaries between true obstetric complications and overall behavioral health demand.

The peak in period prevalence of PPD/PPA in 2022 correlates with increased diagnoses of several mental health disorders from 2021 through 2023 reported in the December 2024 issue of *MSMR*.[11] Specifically, that report documented significant force-wide increases in the incidence of adjustment disorders, anxiety disorders, and depressive disorders from 2021 to 2023 within the U.S. active component, highlighting that crude incidence rates (IRs) for these specific mental health categories were consistently and substantially higher among service women compared to service men throughout the surveillance period.[11] The rise in PPD/PPA diagnoses in this study cohort is, therefore, not isolated but correlates with broader trends in mental health diagnoses. Period prevalence of PPD/PPA decreased significantly in the 2023-2024 period compared to 2021-2022, however, which differed from diagnoses of depressive and anxiety disorder that continued to increase in 2023-2024.

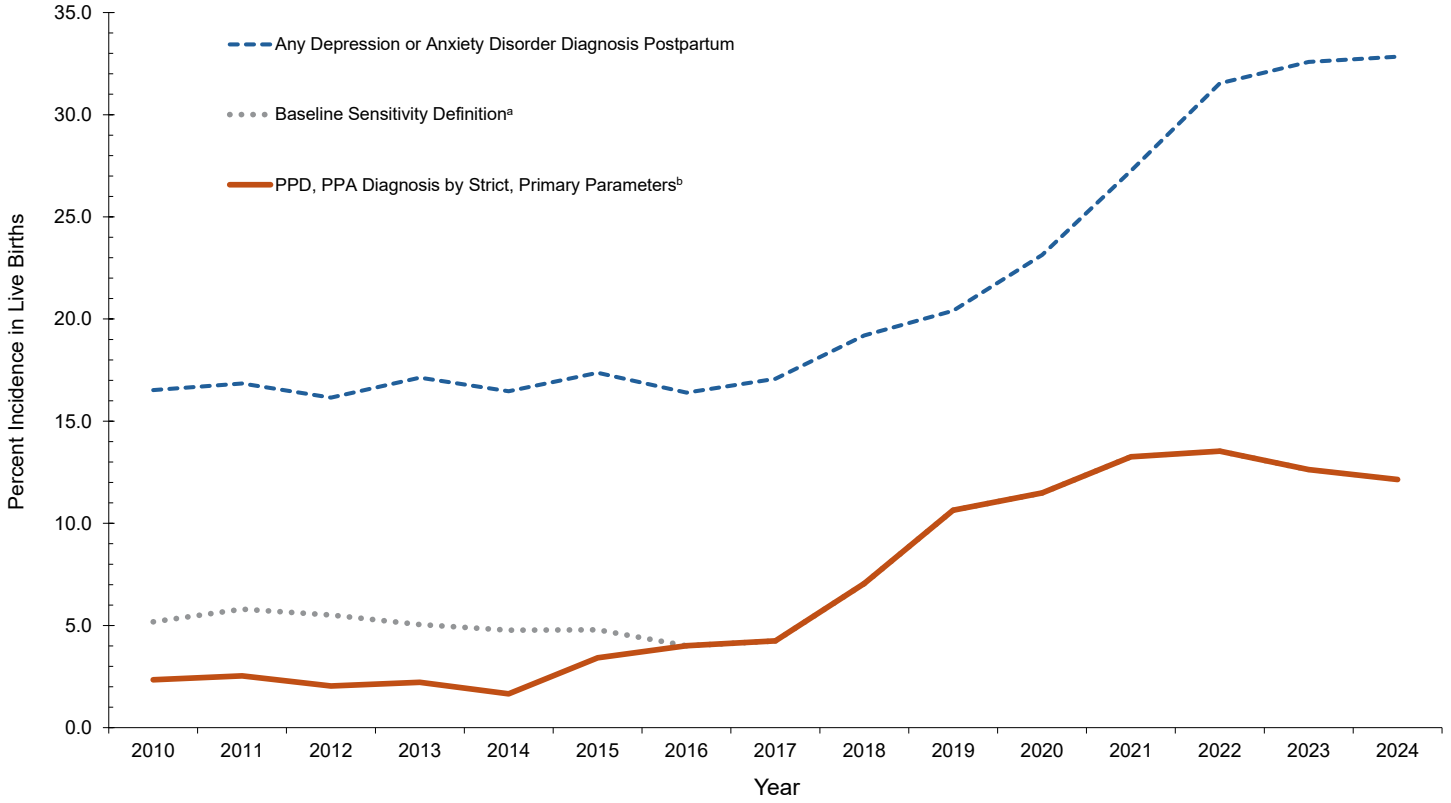
The primary strict postpartum depression period prevalence (2.4%) in this study is consistent with, although slightly lower than, the peak administrative IR of approximately 3.0% reported by Nicholson et al.[12] This variation is methodologically expected, as our model implemented a strict 14-day postpartum exclusion period to systematically eliminate transient, early behavioral health encounters. Conversely, the higher overall psychiatric care proportions reported by Moore et al. (12.5% within 1 year postpartum) and assessed globally

TABLE 1. Incidence of Postpartum Depression or Postpartum Anxiety Following Live Birth, Active Component Service Women, U.S. Armed Forces, 2010–2024

Characteristics	Total, 2010–2024		2010–2015		2016–2018		2019–2020		2021–2022		2023–2024	
	No.	%	No.	PP	No.	PP	No.	PP	No.	PP	No.	PP
Any depression or anxiety disorder diagnosis postpartum	138,588	100	9,416	16.7	4,704	17.6	4,202	21.8	5,604	29.4	5,639	32.7
PPD, PPA diagnoses by strict, primary parameters	9,522		1,331	2.4	1,370	5.1	2,135	11.1	2,551	13.4	2,135	12.4
ICD-9-CM 648.40 included[a]			2,922	5.2	—	—	—	—	—	—	—	—
Age, *y*												
<20	3,980	2.9	60	3.5	45	5.7	82	13.6	71	15.1	38	9.0
20–24	65,342	47.2	692	2.5	720	5.7	1,103	12.2	1,254	14.5	953	13.1
25–29	41,163	29.7	355	2.1	372	4.8	619	10.7	774	13.4	670	12.6
30–34	20,314	14.7	163	2.1	158	4.1	249	9.0	339	11.3	339	11.2
35+	7,789	5.6	61	2.2	75	4.7	82	7.7	113	9.7	135	11.2
Race and ethnicity												
White, non-Hispanic	60,367	43.6	666	2.6	630	5.5	928	11.6	1,027	13.1	822	11.8
Black, non-Hispanic	33,630	24.3	324	2.3	331	4.8	542	11.5	640	14.4	474	12.7
Hispanic	26,608	19.2	213	2.4	226	4.6	427	10.4	580	13.2	571	13.0
Other	15,407	11.1	110	1.7	156	5.2	198	9.9	248	12.3	240	12.6
Unknown	2,576	1.9	18	1.7	27	5.1	40	9.5	56	15.3	28	12.7
Branch of service												
Army	52,449	37.9	804	3.6	546	5.4	858	11.9	951	13.6	748	12.4
Navy	38,308	27.6	253	1.7	380	5.0	580	10.9	835	15.1	712	14.3
Air Force, Space Force	36,475	26.3	184	1.3	312	4.6	525	10.0	585	11.3	519	10.8
Marine Corps	11,356	8.2	90	1.9	132	5.9	172	11.2	180	13.2	156	10.8
Rank												
Junior enlisted (E1–E4)	80,682	58.2	956	2.8	895	5.7	1,356	12.2	1,564	14.9	1,128	12.8
Senior enlisted (E5–E9)	37,345	27.0	263	1.9	332	4.8	588	10.9	747	13.2	724	13.3
Warrant officer (W0)	384	0.3	2	1.2	5	7.1	3	7.1	7	13.7	5	9.6
Junior officer (O1–O3)	16,032	11.6	91	1.5	117	3.6	158	7.4	194	8.9	222	9.8
Senior officer (O4–O10)	4,145	3.0	19	1.3	21	2.6	30	4.9	39	6.4	56	8.6
Military occupation												
Combat-related	3, 727	2.7	26	2.4	29	4.4	60	9.9	92	12.9	71	10.4
Motor transport	5,331	3.9	37	1.7	59	5.6	83	11.0	102	13.6	80	12.3
Pilot, air crew	1,821	1.3	5	0.7	9	2.6	15	5.8	21	8.1	21	7.2
Repair, engineering	30,049	21.7	274	2.2	306	5.0	439	10.8	574	14.5	450	13.3
Communications, intelligence	45,760	33.0	491	2.6	452	5.3	711	11.2	807	13.2	704	12.7
Health care	25,531	18.4	251	2.4	261	5.4	413	11.6	436	12.4	397	12.7
Other	26,369	19.0	247	2.4	254	5.0	414	11.3	519	13.9	412	11.5
Marital status												
Single, never married	33,384	24.1	318	2.2	318	5.5	555	12.2	648	14.2	543	12.5
Married	97,933	70.7	929	2.4	991	5.0	1,432	10.5	1,749	13.1	1,449	12.3
Other	7,238	5.2	84	3.2	61	4.7	148	13.4	154	13.4	143	13.3
Unknown	33	0.0	—	—	—	—	—	—	—	—	—	—
Delivery type												
Vaginal	111,222	80.3	1,024	2.3	1,051	4.8	1,763	11.0	2,055	12.9	1,598	12.2
Cesarean section	27,366	19.8	307	2.6	319	6.4	372	11.5	496	15.9	537	12.8
Prior depressive disorder diagnosis												
Yes	20,511	14.8	402	5.0	306	9.0	469	18.4	574	18.7	574	17.0
No	118,077	85.2	929	1.9	1,064	4.6	1,666	10.0	1,977	12.4	1,561	11.3
Prior anxiety disorder diagnosis												
Yes	22,442	16.2	292	4.3	345	8.6	575	17.8	706	18.2	754	16.4
No	116,146	83.8	1,039	2.1	1,025	4.5	1,560	9.7	1,845	12.2	1,381	10.9
Prior adjustment disorder diagnosis												
Yes	32,425	23.4	479	4.2	456	7.6	751	15.9	900	17.5	823	16.0
No	106,163	76.6	852	1.9	914	4.4	1,384	9.5	1,651	11.9	1,312	10.9
Prior deployment (prior to 2022)												
Never deployed	94,829	68.4	826	2.6	998	5.4	1,667	11.6	2,203	13.8	1,807	12.6
Deployed, 1+	43,759	31.6	505	2.1	372	4.5	468	9.6	348	11.2	328	11.1

Abbreviations: No., number; PP, period prevalence; PPD, postpartum depression; PPA, postpartum anxiety; ICD-9-CM, International Classification of Diseases, 9th Revision, Clinical Modification; *y*, years.
[a] Includes ICD-9-CM code 648.40 strictly for the period January 1, 2010–September 30, 2015; following October 1, 2015 system-wide transition to ICD-10-CM, this historical variation corresponds identically with primary case definition due to retirement of 648.40 indicator.

FIGURE. Trends of Postpartum Depression and Postpartum Anxiety Proportions by Case Definition Variation, Active Component Service Women, U.S. Armed Forces, 2010–2024



Abbreviations: PPD, postpartum depression; PPA, postpartum anxiety; ICD-9-CM, International Classification of Diseases, 9th Revision, Clinical Modification; ICD-10-CM, International Classification of Diseases, 9th Revision, Clinical Modification.
[a] Includes legacy ICD-9-CM code 648.40 from January 1, 2010 through September 30, 2015, when code was retired; from October 1, 2015 afterwards, trend line converges with primary PPD/PPA diagnosis case definition line.
[b] Displays combined period prevalence using primary, strict case definition eliminating transient baby blues via 14-day exclusion period, restricted to specific ICD-9-CM/ICD-10-CM obstetric-complication billing codes.

in multi-year Military Health System profiles (e.g., Manzo et al.)[13,14] are explained by broader operational case parameters. While this study's primary models captured only encounters explicitly coded with specific obstetric or pregnancy-complication billing markers, the other study cohorts assessed a comprehensive array of general depressive, anxiety, and trauma-related disorders. In this study's secondary sensitivity analysis, which removed the exclusion period and included general psychiatric billing codes, the observed rate of 16.7% correlated with those broader, force-wide surveillance studies, demonstrating a precise boundary between localized obstetric pathology and overall medical demand among childbearing service women.

These longitudinal diagnostic trends are temporally coincident with major systemic and environmental changes, including the expansion of parental leave policies, initiatives to reduce mental health stigma, such as the Brandon Act, and widespread adoption of telehealth. Notably, this study's observations align with prior military cohorts: For example, Herrick et al. similarly observed a trend of decreasing diagnostic prevalence after revised 2016–2017 parental leave policies, followed by a sharp increase in 2018 and 2019.[10]

As a descriptive study, this analysis cannot determine causality nor isolate the direct impacts of those systemic changes. This study cannot definitively state whether the rising diagnostic trends reflect a true increase in the underlying population prevalence of these disorders or simply an increase in health care provision due to lowered structural barriers to care. For instance, while expanded parental leave is generally associated with improved maternal mental health, it simultaneously provides service women with the necessary time and flexibility to seek medical care, which could, theoretically, increase documented administrative diagnoses. The 2023-2024 decline in PPD/PPA period prevalence suggests that post-pandemic stabilization may have alleviated parental stress, although prevalence remains higher than pre-pandemic levels. This persistent elevation suggests historical under-estimation of pre-pandemic proportions, a new baseline with improved case capture via specific ICD-10-CM coding, a true increase in the proportion of diagnoses, or a combination of these factors. Future analytical studies examining these proportions in 2025 and beyond may provide more insight into this trend.

This analysis demonstrates that ACSW share several risk factors with their civilian counterparts, including increased odds of PPD/PPA diagnosis after a cesarean delivery or with a history of mood disorder.[15,16]

TABLE 2. Multivariable Logistic Regression Analysis of Demographic and Clinical Risk Factors Associated with Primary, Specific Postpartum Depression or Postpartum Anxiety Criteria, Active Component Service Women, U.S. Armed Forces, 2021–2024

Characteristics	Unadjusted				Adjusted [a]			
	Odds Ratio	95% LL	95% UL	*p*-value	Odds Ratio	95% LL	95% UL	*p*-value
Period of time								
2021–2022		Reference				Reference		
2023–2024	0.91	0.86	0.97	0.0040	0.89	0.83	0.94	0.0001
Age, *y*								
<20	0.87	0.70	1.06	0.1659	0.92	0.75	1.13	0.4093
20–24		Reference				Reference		
25–29	0.93	0.86	1.00	0.0388	0.97	0.90	1.05	0.4909
30–34	0.79	0.72	0.86	<0.0001	0.91	0.81	1.01	0.0741
35+	0.73	0.63	0.83	<0.0001	0.85	0.72	1.00	0.0565
Race and ethnicity								
White, non-Hispanic		Reference				Reference		
Black, non-Hispanic	1.10	1.02	1.20	0.0155	1.01	0.92	1.09	0.9045
Hispanic	1.06	0.98	1.15	0.1584	1.01	0.93	1.09	0.9080
Other	1.00	0.90	1.11	0.9496	0.99	0.89	1.10	0.7990
Unknown	1.17	0.92	1.48	0.1914	1.11	0.87	1.41	0.3901
Branch of service								
Army		Reference				Reference		
Navy	1.15	1.07	1.24	0.0002	1.15	1.07	1.25	0.0004
Air Force, Space Force	0.83	0.77	0.90	<0.0001	0.87	0.80	0.95	0.0020
Marine Corps	0.90	0.80	1.02	0.1058	0.89	0.78	1.01	0.0667
Rank								
Junior enlisted (E1–E4)		Reference				Reference		
Senior enlisted (E5–E9)	0.95	0.88	1.01	0.1022	0.91	0.84	0.99	0.0292
Junior officer (O1–O3, WO1–WO3)	0.64	0.58	0.72	<0.0001	0.73	0.64	0.83	<0.0001
Senior officer (O4–O10, W04–WO5)	0.50	0.41	0.62	<0.0001	0.60	0.47	0.77	<0.0001
Military occupation								
Combat-related		Reference				Reference		
Motor transport	1.13	0.90	1.41	0.2972	1.03	0.82	1.30	0.7998
Pilot, air crew	0.62	0.44	0.89	0.0087	0.94	0.65	1.34	0.7148
Repair, engineering	1.22	1.02	1.45	0.0280	1.13	0.94	1.35	0.1998
Communications, intelligence	1.13	0.95	1.34	0.1798	1.12	0.94	1.33	0.2250
Health care	1.08	0.90	1.29	0.3931	1.07	0.89	1.28	0.5031
Other	1.10	0.92	1.32	0.2768	1.14	0.95	1.37	0.1597
Marital status								
Single, never married		Reference				Reference		
Married	0.94	0.88	1.01	0.1165	1.03	0.96	1.11	0.4469
Other, unknown	0.99	0.87	1.14	0.8989	0.97	0.84	1.11	0.6449
Delivery type								
Vaginal		Reference				Reference		
Cesarean section	1.14	1.06	1.23	0.0005	1.16	1.08	1.25	0.0001
Prior depressive disorder diagnosis								
Yes	1.61	1.50	1.73	<0.0001	1.22	1.12	1.33	<0.0001
No		Reference				Reference		
Prior anxiety disorder diagnosis								
Yes	1.59	1.48	1.70	<0.0001	1.33	1.22	1.44	<0.0001
No		Reference				Reference		
Prior adjustment disorder diagnosis								
Yes	1.56	1.46	1.66	<0.0001	1.29	1.20	1.39	<0.0001
No		Reference				Reference		
Prior deployment (prior to 2022)								
Never deployed		Reference				Reference		
Deployed, 1+	0.82	0.75	0.89	<0.0001	0.92	0.83	1.01	0.0743

Abbreviations: LL, lower limit; UL, upper limit; *y*, years; PPD, postpartum depression; PPA, postpartum anxiety; ICD-9-CM, International Classification of Diseases, 9th Revision, Clinical Modification; ICD-10-CM, International Classification of Diseases, 10th Revision, Clinical Modification.

[a] Multivariable model adjusted for all listed covariates concurrently; complete covariate adjustment set includes maternal age, race or ethnicity, service branch, and military rank, pay grade. Outcome restricted exclusively to the primary, specific PPD/PPA case definition (ICD-9-CM: 648.42, 648.44; ICD-10-CM: F53.0, O90.6, O99.345). High prevalence, non-specific sensitivity outcome variations were excluded from multivariable modeling.

Notably, while unadjusted baseline profiles suggested lower diagnostic prevalence among previously deployed personnel, multivariable modeling demonstrates that prior deployment exerts no independent protective or hazardous association with postpartum outcomes, after accounting for underlying rank and age.

The statistically significant, divergent odds between branches of military service may reflect unique occupational structures, variations in localized care delivery systems, or socio-economic factors. A 15% relative increase in odds for Navy personnel represents a meaningful impact in absolute health care provision and total force medical readiness for a large population. Navy personnel may experience distinct, cluster-level stressors due to isolation at sea, high tempos and erratic schedules, and unique station cultures.

Rather than reflecting a clinical screening bias, these variations among service branches highlight the need for future targeted research into how unique naval operational environments, such as prolonged shipboard deployments, isolated maritime platforms, and localized medical resource constraints, can affect maternal mental health and subsequent provision of care. Decreased odds of diagnosis among officers compared to enlisted personnel may be due to greater age and life experience, along with lower stress and higher income. Additionally, there is documented relative aversion among senior leaders and officers to present for behavioral health diagnoses; prior military health research indicates that this population faces unique attitudinal barriers to care, including heightened concerns about professional reputation, career longevity, and an internalized sense of obligation to maintain continuous departmental performance.[17]

This study has several limitations, including its use of historical data and codes that complicates capture of diagnoses not definitively coded in the medical record. Crucially, lack of a dedicated, specific PPA diagnostic code in the ICD-CM system necessitates that providers utilize generic anxiety codes, which inhibits isolation of a reliable metric for concurrent, comorbid PPD / PPA in maternal surveillance data. Furthermore, this study could not account for variation in symptom severity or treatment modality. Because this study relied solely on administrative medical encounter data to identify live births, without independent validation through personnel registries, there is inherent risk of denominator misclassification. In addition, it was not possible to account for births that preceded military service. This study could not determine whether service members used parental leave immediately following convalescence or distributed it throughout the ensuing year. Furthermore, this observational design prevents establishment of causality between policy changes and period prevalence.

Moreover, these findings likely underestimate true PPD / PPA prevalence, as some service members may not seek care or utilize short-term, non-medical counseling services (i.e., chaplains, military family and life counseling) that do not generate medical diagnoses. Data were unavailable for deployments after 2022. Additionally, early separation from military service following childbirth inherently limits long-term medical accounting for those specific individuals within DMSS. Finally, unmeasured confounders, such as personal or operational stress, along with social support systems, may influence service member stress and could not be accounted for in this study.

Future research could disentangle the effects of concomitant initiatives by isolating confounding factors and events identified by this study, to better understand which interventions are most effective. Qualitative studies could assess the lived experiences of service members in the identified periods and effects of specific events, for better insights into how policy changes, family-focused initiatives, the pandemic, and efforts to reduce stigma have influenced the experiences of postpartum service members. Further studies are needed to evaluate whether policy decisions and MHS provision of care are adequately addressing the needs of service members, for maintaining a ready fighting force.

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Chronic Insomnia and Military Separation: A Retrospective Matched Cohort and Nested Case-Control Study of U.S. Active Component Service Members, 2014–2023

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This study characterized chronic insomnia disorder, utilizing data from the Defense Medical Surveillance System, to identify incident cases among U.S. active component service members from 2014 through 2023. A total of 126,733 service members met the case definition and were matched 1-to-1 with service members without chronic insomnia by sex, age, and time in service. Chronic insomnia was associated with increased probability of early separation from military service and frequently co-occurred with conditions that limit military readiness. Kaplan-Meier analysis showed diverging retention curves approximately 20 months following diagnosis, after which chronic insomnia cases had lower probability of continued active component service. A nested case-control analysis of 55,679 individuals with chronic insomnia found that early separation was associated with service branch, age, sex, race and ethnicity, marital status, rank, occupation, co-occurring diagnoses, and behavioral therapy or pharmacotherapy within 365 days of diagnosis. Behavioral therapy or pharmacotherapy within 365 days of diagnosis was more common among those who separated early. Continued attention to case surveillance, early identification, and timely evidence-based treatment may help mitigate the impacts of insomnia on service outcomes.

What are the new findings?

Service members with chronic insomnia face increased risk of early separation from service in the military. Early separation was more common among service members who had received behavioral therapy or pharmacotherapy within the first year after diagnosis. A high burden of co-occurring conditions was identified, including behavioral health disorders, traumatic brain injury, and chronic pain.

What is the impact on readiness and force health protection?

Chronic insomnia may serve as an early indicator of increased risk of separation from military service and is often concomitant with other conditions. Efforts to emphasize sleep health as a readiness factor, with a focus on improved preventive measures, in addition to early identification and timely use of evidence-based treatment, may help mitigate the impacts of insomnia on the health of the force.

Chronic insomnia disorder is characterized by difficulty falling asleep, difficulty staying asleep, or early morning awakening, causing significant distress or daytime impairment, occurring 3 times or more per week for at least 3 months and not explained by another condition or inadequate sleep opportunity.[1] Chronic insomnia is associated with reduced resilience, impaired functioning, and a range of negative occupational outcomes.[2-4] As many as one half of U.S. adults experience symptoms of insomnia, and the estimated prevalence of chronic insomnia disorder ranges 5–23%.[5-8] Military service members are at increased risk due to occupational factors such as operational stress, irregular work schedules, and deployments.[2,3]

A recent surveillance report identified over 148,000 active component service members (ACSMs) with incident chronic insomnia disorder from 2012 through 2021.[3] Observed rate differences suggested a disproportionate burden by branch of service, sex, age, and race and ethnicity, with higher rates among Army members, women, older service members, and non-Hispanic Black service members.[3]

Chronic insomnia may also affect military readiness because of its relationship with behavioral health disorders and neurological conditions, which are major contributors to disability evaluation and retention outcomes.[9,10] Sleep disorders frequently coexist with behavioral health disorders and neurological conditions; evidence suggests these relationships are often interrelated, with conditions mutually exacerbating each other.[3,5,6,8] Initial Physical Evaluation Board (PEB) evaluations serve as the proxy for retention medical standards, and data from fiscal year 2023 consistently emphasized high involvement of both behavioral health and neurological conditions.[9,10] Specifically, behavioral health conditions alone were involved in 35–47% of initial PEB evaluations among all service branches, while neurological conditions were involved in 20–26%.[9,10] Among those referred for disability evaluation,

over 40% of unfitting diagnoses involved mental health or neurological disorders.[10] While insomnia was not listed as a primary condition, it is frequently comorbid with other mental health diagnoses and cited as a potential contributing factor to overall impairment and unfit determinations.[3,10]

Effective, evidence-based treatments for chronic insomnia are available.[6,11] Cognitive behavioral therapy for insomnia (CBT-I) is the primary intervention recommended in both military and civilian clinical practice guidelines (CPGs).[5,6,11] Short-term pharmacotherapy may be used selectively, but is not recommended as a primary or long-term strategy.[6,11]

Although chronic insomnia is associated with impaired functioning and adverse occupational outcomes, less is known about its relationship with military-specific outcomes, including continued service and early separation. This report addresses 2 specific questions: 1) Do service members diagnosed with chronic insomnia have shorter lengths of active component service following diagnosis compared to matched peers without insomnia? and 2) Among those diagnosed with chronic insomnia, what demographic, medical, or treatment factors are associated with completing service versus separating early for medical or negative administrative reasons?

Methods

Data source and chronic insomnia case definition

The Defense Medical Surveillance System (DMSS) was utilized to identify insomnia diagnoses using International Classification of Diseases, 9th and 10th revisions (ICD-9/ICD-10), with an incident case defined as having at least 2 inpatient or outpatient medical encounters in any diagnostic position, separated by 90–390 days.[3,7] The first qualifying encounter was used as the date of diagnosis. The surveillance period was January 1, 2014 through December 31, 2023 and included all individuals serving in the active component of the U.S. Army, Navy, Air Force, Space Force, or Marine Corps. Exclusion criteria included National Guard, reserve, and Coast Guard personnel, and individuals with an insomnia diagnosis prior to the study period. This study was conducted as part of the Armed Forces Health Surveillance Division's routine public health surveillance mission.

Matched cohort analysis

To assess the association between chronic insomnia and separation from service, ACSMs with chronic insomnia, who were required to be in military service at the time of the case diagnosis, were matched 1-to-1 to an unexposed matched cohort of ACSMs without any insomnia diagnoses during their military careers. Additional matching criteria included sex, age (±365 days), and cumulative time in service (±365 days) as of the case's insomnia diagnosis. Branch of service was not included as a matching variable to avoid overly restrictive matching and potential loss of eligible matched pairs; sensitivity testing confirmed that matching by service branch did not significantly alter the survival curve. Members of the unexposed matched cohort were assigned the same index date as their corresponding chronic insomnia cases.

The primary outcome was separation from active component military service for any reason. The Kaplan–Meier survival method was used to estimate the probability of remaining in active service over time among chronic insomnia cases and the unexposed matched cohort. The log-rank test was used to evaluate whether there was a statistically significant difference between the survival curves. Demographic and occupational variables were assessed as of the index date.

Nested case-control analysis

A nested case-control analysis was conducted among ACSMs with chronic insomnia who separated from active component service during the study period. The objective was to evaluate whether treatment factors, common mental health and neurological comorbidities, or demographics were associated with completing a term of service versus separating early for medical or negative administrative reasons.

Eligible individuals were ACSMs who met the case definition for chronic insomnia during the surveillance period. Individuals had to remain in continuous active service for at least 1 year following diagnosis. This criterion ensured enough follow-up time to evaluate medical care and co-occurring diagnoses that occurred prior to separation. Separation records were reviewed to classify outcomes based on Interservice Separation Codes (ISCs), which are assigned at the time of discharge and documented on the official record of separation from military service, the Certificate of Release or Discharge from Active Duty, or DD214.

In the nested case-control analysis, cases were individuals with chronic insomnia who experienced "early separation," defined as separation due to medical disability or negative administrative reasons prior to completion of service obligation. The comparison group consisted of 'term-completion controls', defined as individuals with chronic insomnia who completed their obligated terms of service. The ISCs used to classify early separation and term completion are listed in **Table 1**.

Treatment exposure and co-occurring diagnoses

Treatment exposure was defined as receipt of CPG-concordant insomnia care within 365 days of diagnosis. Behavioral therapy (BT) was identified using outpatient medical encounters that included both an insomnia diagnosis and qualifying Current Procedural Terminology (CPT) codes for psychotherapy, as described by Hsu et al.[3] Because administrative data do not confirm the specific psychotherapy content delivered, BT exposure was categorized as: no therapy, brief therapy (defined as 1–3 sessions), and full CBT-I (defined as ≥4 sessions). Pharmacotherapy (PT) was defined by the presence of a prescription for CPG-recommended medications.[6] Timing of treatment initiation (within 90 days vs. later or no treatment) was also assessed.

Covariates included demographic and military characteristics, as well as co-occurring diagnoses for anxiety, depression, post-traumatic stress disorder (PTSD), bipolar disorder, substance use disorders,

adjustment disorder, traumatic brain injury (TBI), and chronic pain, captured from inpatient or outpatient records within ±365 days of the insomnia diagnosis. Mental health conditions were identified using ICD-9/ICD-10 code sets consistent with the methodology employed in the *MSMR* update on mental health disorders; TBI was identified using codes specified by the Armed Forces Health Surveillance Division surveillance case definition.[12,13] Chronic pain was identified using ICD-9 code 338.2 and ICD-10 codes G89.29 and G89.4.

Statistical analysis

Descriptive statistics were used to compare treatment patterns and comorbidities for types of separation. A multivariable logistic regression model was used to obtain adjusted odds ratios (aORs) for early separation. The final model included branch of service, sex, age, race and ethnicity, marital status, rank, occupation, alcohol or substance use disorder, TBI, chronic pain, anxiety, depressive disorder, adjustment disorder, PTSD, bipolar disorder, and receipt of any CPG-concordant therapy within 365 days.

Results

A total of 126,751 ACSMs met the surveillance case definition for chronic insomnia. A total of 18 chronic insomnia cases were excluded because no matched service member was identified within 1 year of cumulative time in service. Total cases by year, as well as baseline demographic and military characteristics, are shown in **Table 2**. The largest demographic groups were Army soldiers, men, non-Hispanic White individuals, senior enlisted service members, those never deployed, those with less than 5 years of service at diagnosis, and those in communications or intelligence and repair or engineering occupations.

Time-to-separation analysis

Matched survival analysis was conducted using 126,733 chronic insomnia cases and an equal number of matched service members in the matched unexposed

TABLE 1. Inter-Service Codes Associated with Early Separation and Term Completion, Active Component, U.S. Armed Forces

Code	Description
Early Separation	
1010	Condition existing prior to service
1011	Disability, severance pay
1012	Permanent disability retirement
1013	Temporary disability retirement
1014	Disability, no condition existing prior to service, no severance pay
1017	Failure to meet weight or body fat standards
1060	Character or behavior disorder
1062	Enuresis
1064	Alcoholism
1065	Discreditable incidents, civilian or military
1066	Shirking
1067	Drugs
1068	Financial Irresponsibility
1069	Lack of dependent support
1071	Civil court conviction
1072	Security
1073	Court-martial
1074	Fraudulent entry
1075	AWOL or desertion
1079	Juvenile offender
1080	Misconduct, reason unknown
1083	Pattern of minor disciplinary infractions
1084	Commission of a serious offense
1085	Failure to meet minimum qualifications for retention
1086	Unsatisfactory performance (former Expeditious Discharge Program)
1087	Entry level performance and conduct (former Trainee Discharge Program)
1088	Unsatisfactory performance of Ready Reserve obligation
1098	Breach of contract
1101	Dropped from strength, desertion
1102	Dropped from strength, imprisonment
2010	Condition existing prior to service
2011	Disability, severance pay
2012	Permanent disability retirement
2013	Temporary disability retirement
2017	Failure to meet weight or body fat standards
2060	Character or behavior disorder
2061	Motivational problems (apathy)
2063	Failure of course of instruction
2064	Alcoholism
2065	Discreditable incidents, civilian or military
2067	Drugs
2068	Financial Irresponsibility
2071	Civil court conviction
2072	Security
2073	Court martial
2074	Fraudulent entry
2078	Good of the service (discharge in lieu of court martial)
2083	Pattern of minor disciplinary infractions
2084	Commission of a serious offense
2085	Failure to meet minimum retention requirements
2102	Dropped from strength, imprisonment
Term Completion	
1001	Expiration of term of service
1050	Retirement, 20-30 years of service
1051	Retirement, 30+ years of service
1052	Retirement, other
2001	Expiration of term of service
2050	Retirement, 20-30 years of service
2051	Retirement, 30+ years of service
2052	Retirement, other
2053	Retirement, failure of selection for promotion

Abbreviation: AWOL, absent without leave.

cohort. Time to separation was tracked beginning at the index insomnia diagnosis for cases and the corresponding match date for matched service members without chronic insomnia.

The Kaplan-Meier survival curves **(Figure)** display descriptive estimates of the probability of retention over time. The curves differed significantly between chronic insomnia cases and the matched unexposed cohort ($p<0.01$). The curves cross between 19 and 20 months, after which service members with chronic insomnia had a lower estimated probability of continued active duty service. By 24 months after index diagnosis, 45.6% of chronic insomnia cases remained on active duty compared to 48.5% of the matched unexposed cohort. At 24, 48, and 100 months after the index date, retention rates were 45.6%, 26.5%, and 12.3%, respectively, among chronic insomnia cases, compared with 48.5%, 32.8%, and 19.1% in the matched unexposed cohort.

Demographic, medical and treatment factors association with separation

The nested case-control analysis included 55,679 service members with chronic insomnia who separated from active duty during the surveillance period. Of these, 29,282 experienced early separation and 26,397 were term-completion controls **(Table 3)**.

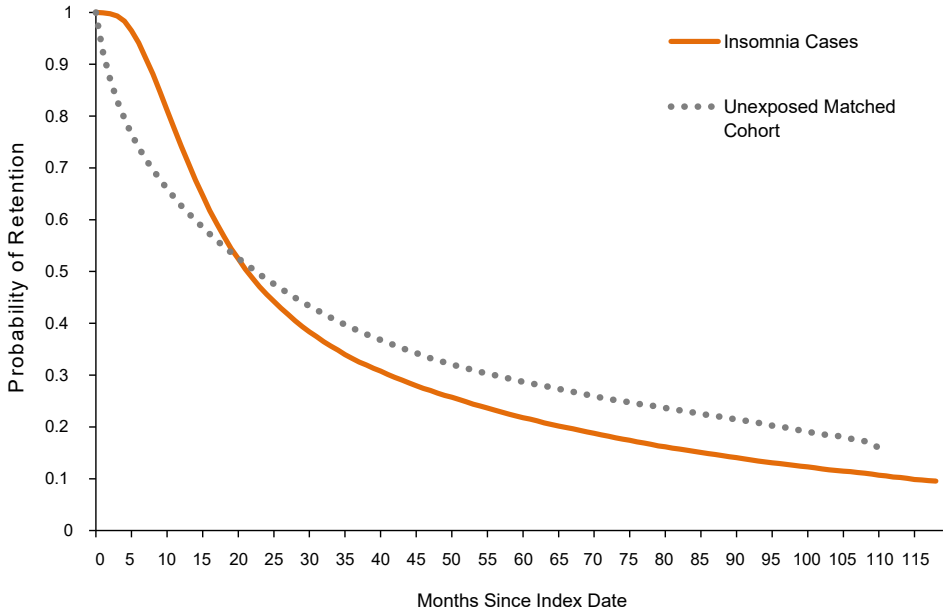
The Army constituted the largest share of the study population and had the highest proportion of early separations, evidencing differences in separation outcomes among the service branches. Separation outcomes by demographic subgroup showed variations in the proportions of early separation versus term completion in relation to sex, race and ethnicity, marital status, age, rank, occupation, deployment history, and time in service. Service members with 1 or more prior deployments had lower unadjusted odds of early separation than those who had never deployed. Service members with 18 or more years of service at diagnosis had a substantially higher proportion of term completion. Within occupational categories, motor transport had higher unadjusted odds of early separation compared

TABLE 2. Service Members Diagnosed with Chronic Insomnia and Matched Unexposed Cohort Used in Time-to-Separation Analysis, Active Component, U.S. Armed Forces, 2014–2023

Characteristics	Chronic Insomnia		Unexposed Matched Cohort		Chi-square *p*-value[a]
	No.	%	No.	%	
Total	126,733	100	126,733	100	
Year of matching, diagnosis					1.0000
2014	11,215	8.8	11,215	8.8	
2015	12,902	10.2	12,902	10.2	
2016	14,044	11.1	14,044	11.1	
2017	12,587	9.9	12,587	9.9	
2018	11,137	8.8	11,137	8.8	
2019	11,844	9.3	11,844	9.3	
2020	11,192	8.8	11,192	8.8	
2021	13,741	10.8	13,741	10.8	
2022	14,163	11.2	14,163	11.2	
2023	13,908	11.0	13,908	11.0	
Branch of service					<0.0001
Army	71,497	56.4	39,480	31.2	
Navy	20,675	16.3	35,580	28.1	
Air Force	23,011	18.2	33,121	26.1	
Marine Corps	11,550	9.1	18,552	14.6	
Sex					1.0000
Male	97,077	76.6	97,077	76.6	
Female	29,656	23.4	29,656	23.4	
Race and ethnicity					<0.0001
White, non-Hispanic	60,288	47.6	72,903	57.5	
Black, non-Hispanic	32,615	25.7	19,775	15.6	
Hispanic	20,015	15.8	18,956	15.0	
Other	11,505	9.1	12,919	10.2	
Unknown	2,310	1.8	2,180	1.7	
Marital status					<0.0001
Single	38,439	30.3	46,473	36.7	
Married	77,348	61.0	73,089	57.7	
Other	10,925	8.6	7,060	5.6	
Unknown	21	0.0	111	0.1	
Age, *y*					<0.0001
<20	3,778	3.0	6,355	5.0	
20–24	30,233	23.9	30,713	24.2	
25–29	27,714	21.9	26,612	21.0	
30–34	20,274	16.0	19,647	15.5	
35–39	23,083	18.2	21,772	17.2	
40+	21,651	17.1	21,634	17.1	
Rank					<0.0001
Junior enlisted (E1–E4)	46,172	36.4	46,064	36.3	
Senior enlisted (E5–E9)	65,188	51.4	56,567	44.6	
Junior officer (O1–O3)	5,914	4.7	10,209	8.1	
Senior officer (O4–O10)	6,368	5.0	11,763	9.3	
Warrant officer	3,091	2.4	2,130	1.7	
Military occupation					<0.0001
Infantry, artillery, armor, combat engineering	17,697	14.0	15,718	12.4	
Motor transport	4,375	3.5	3,431	2.7	
Pilot, air crew	1,560	1.2	5,514	4.4	
Repair, engineering	32,105	25.3	38,094	30.1	
Communications, intelligence	34,512	27.2	28,036	22.1	
Health care	15,360	12.1	11,411	9.0	
Other	21,124	16.7	24,529	19.4	
Deployment prior to matching					<0.0001
Never deployed	61,542	48.6	63,790	50.3	
1 deployment	23,792	18.8	23,610	18.6	
2+ deployments	41,399	32.7	39,333	31.0	
Time in service at matching, *y*					<0.0001
<5	46,949	37.0	49,962	39.4	
5–<10	26,852	21.2	25,262	19.9	
10–<18	24,893	19.6	24,753	19.5	
18+	28,039	22.1	26,756	21.1	

Abbreviations: No., number; *y*, years.
[a] Significant *p*-values (<0.0001) for matched variables are an artifact of displaying continuous ±365-day matches in categorical groups.

FIGURE. Probability of Retention of Service Members with Chronic Insomnia, Active Component, U.S. Armed Forces, 2014–2023



with the infantry, artillery, armor, combat engineering category, while pilot and air crew, repair and engineering, communications and intelligence, health care, and other occupations had lower unadjusted odds.

Table 3 also shows early separation and term completion outcomes by co-occurring diagnoses. The diagnoses were not mutually exclusive. As a descriptive summary of the co-occurring diagnosis burden, individuals were classified as having at least 1 listed co-occurring diagnosis if they had any of the selected diagnoses included in **Table 3** within ±365 days of a chronic insomnia diagnosis. Of the 55,679 individuals included in the nested case-control study, only 8,400 (15.1%) had no listed co-occurring diagnoses.

Table 4 lists insomnia treatments received by individuals within 365 days of initial diagnosis, highlighting differences between the early separation and term completion groups, including receipt of behavioral therapy (categorized as 'no therapy', 'brief therapy with 1–3 encounters', or 'full CBT-I with 4+ encounters') and receipt of any CPG-concordant pharmacotherapy. A greater proportion of early separation cases received behavioral therapy or CPG-concordant pharmacotherapy within 365 days of diagnosis.

Table 5 details the aORs for early separation. Compared with the Army, odds of early separation were significantly lower for Navy (aOR 0.37), Air Force (aOR 0.32), and Marine Corps (aOR 0.26) personnel. Female sex was associated with higher adjusted odds of early separation compared with male sex (aOR 1.26). Older age groups had lower adjusted odds of early separation compared with service members younger than age 20 years. Adjusted odds of early separation were higher among junior personnel than among senior enlisted personnel, senior officers, and warrant officers. Among the occupational categories, motor transport was associated with higher adjusted odds of early separation compared with the infantry, artillery, armor, combat engineering category (aOR 1.16), while communications and intelligence (aOR 0.89) and health care (aOR 0.89) had lower adjusted odds. Receipt of behavioral therapy or pharmacotherapy within 365 days of diagnosis was associated with higher adjusted odds of early separation (aOR 1.12). All listed co-occurring diagnoses were associated with increased odds of early separation.

Discussion

Service members diagnosed with chronic insomnia demonstrated a reduced probability of continued active component service after 20 months compared with the matched unexposed cohort, with this difference sustained through the remainder of the surveillance period. The survival curve is likely influenced by the case definition, which required 2 insomnia-related encounters 90–390 days apart. This introduced a survivorship period of 3–13 months, during which, unlike individuals in the matched unexposed cohort, cases had to remain in service to be included. As a result, retention initially appeared higher among cases, but once that period ended, the curves converged and then crossed, indicating an overall higher probability of separation among those with chronic insomnia.

The nested case-control analysis highlights several key patterns. Consistent with prior surveillance findings showing service-specific differences in chronic insomnia burden, Army members accounted for the largest number of chronic insomnia cases.[3] In this study, service members in the Navy, Air Force, and Marine Corps had lower adjusted odds of early separation compared with Army members. The reasons for these service-specific differences could not be determined from this analysis.

In the nested case-control analysis, early separation among ACSMs with chronic insomnia was associated with younger age, female sex, non-Hispanic Black race or ethnicity, current marriage, and motor transport occupation. Older age groups had lower adjusted odds of early separation compared with service members younger than 20 years, and senior enlisted personnel, senior officers, and warrant officers had lower adjusted odds compared with junior enlisted personnel. The associations with younger age and lower rank are expected within the context of this analysis, as these individuals are inherently less likely to reach retirement eligibility. Observed differences in chronic insomnia burden and associated separation risk by sex, race and ethnicity, and marital status are consistent, however, with findings

TABLE 3. Demographic and Medical Factors, Diagnoses of Chronic Insomnia, Early Separation Versus Term Completion Controls, Active Component, U.S. Armed Forces, 2014–2023

Characteristics	Early Separation Cases		Term-Completion Controls		Odds Ratio	95% CI LL	95% CI UL	*p*-value
	No.	%	No.	%				
Total	29,282	100	26,397	100				
Branch of service								
Army	20,678	70.6	12,202	46.2	Reference			
Navy	3,238	11.1	4,816	18.2	0.40	0.38	0.42	<0.0001
Air Force	3,225	11.0	6,106	23.1	0.31	0.30	0.33	<0.0001
Marine Corps	2,141	7.3	3,273	12.4	0.39	0.36	0.41	<0.0001
Sex								
Male	21,907	74.8	21,322	80.8	Reference			
Female	7,375	25.2	5,075	19.2	1.41	1.36	1.47	<0.0001
Race and ethnicity								
White, non-Hispanic	13,745	46.9	12,789	48.4	Reference			
Black, non-Hispanic	8,344	28.5	6,758	25.6	1.15	1.10	1.20	<0.0001
Hispanic	4,500	15.4	3,869	14.7	1.08	1.03	1.14	0.0017
Other	2,174	7.4	2,301	8.7	0.88	0.83	0.94	<0.0001
Unknown	519	1.8	680	2.6	0.71	0.63	0.80	<0.0001
Marital status								
Single	9,182	31.4	5,094	19.3	Reference			
Married	17,744	60.6	18,437	69.8	0.53	0.51	0.56	<0.0001
Other	2,352	8.0	2,863	10.8	0.46	0.43	0.49	<0.0001
Unknown	4	0.0	3	0.0	0.74	0.17	3.31	0.6931
Age, *y*								
<20	1,171	4.0	266	1.0	Reference			
20–24	8,104	27.7	3,283	12.4	0.56	0.49	0.64	<0.0001
25–29	7,376	25.2	2,887	10.9	0.58	0.51	0.67	<0.0001
30–34	5,606	19.1	2,533	9.6	0.50	0.44	0.58	<0.0001
35–39	4,018	13.7	7,871	29.8	0.12	0.10	0.13	<0.0001
40+	3,007	10.3	9,557	36.2	0.07	0.06	0.08	<0.0001
Rank								
Junior enlisted (E1–E4)	13,026	44.5	4,593	17.4	Reference			
Senior enlisted (E5–E9)	13,793	47.1	17,066	64.7	0.29	0.27	0.30	<0.0001
Junior officer (O1–O3)	1,359	4.6	922	3.5	0.52	0.48	0.57	<0.0001
Senior officer (O4–O10)	571	2.0	2,781	10.5	0.07	0.07	0.08	<0.0001
Warrant officer	533	1.8	1,035	3.9	0.18	0.16	0.20	<0.0001
Military occupation								
Infantry, artillery, armor, combat engineering	4,732	16.2	3,263	12.4	Reference			
Motor transport	1,296	4.4	740	2.8	1.21	1.09	1.34	0.0002
Pilot, air crew	211	0.7	459	1.7	0.32	0.27	0.38	<0.0001
Repair, engineering	6,989	23.9	6,660	25.2	0.72	0.68	0.77	<0.0001
Communications, intelligence	7,765	26.5	7,819	29.6	0.69	0.65	0.72	<0.0001
Health care	3,521	12.0	3,236	12.3	0.75	0.70	0.80	<0.0001
Other	4,768	16.3	4,220	16.0	0.78	0.73	0.83	<0.0001
Deployment prior to incident diagnosis								
Never deployed	13,878	47.4	6,332	24.0	Reference			
1 deployment	6,518	22.3	5,264	19.9	0.57	0.54	0.59	<0.0001
2+ deployments	8,886	30.3	14,801	56.1	0.27	0.26	0.29	<0.0001
Time in service at incident diagnosis, *y*								
<5	8,182	27.9	2,259	8.6	Reference			
5–<10	9,214	31.5	4,102	15.5	0.62	0.58	0.66	<0.0001
10–<18	7,117	24.3	1,711	6.5	1.15	1.07	1.23	0.0001
18+	4,769	16.3	18,325	69.4	0.07	0.07	0.08	<0.0001
Co-occurring diagnoses within ±365 days of incident diagnosis								
Alcohol, substance use disorder	5,648	19.3	2,252	8.5	2.56	2.43	2.70	<0.0001
Anxiety disorder	16,303	55.7	11,121	42.1	1.73	1.67	1.78	<0.0001
Depressive disorder	15,738	53.7	8,487	32.2	2.45	2.37	2.54	<0.0001
Adjustment disorder	19,364	66.1	11,982	45.4	2.35	2.27	2.43	<0.0001
PTSD	10,549	36.0	6,445	24.4	1.74	1.68	1.81	<0.0001
Bipolar disorder	993	3.4	200	0.8	4.60	3.95	5.36	<0.0001
TBI	5,874	20.1	3,009	11.4	1.95	1.86	2.05	<0.0001
Chronic pain	11,512	39.3	6,251	23.7	2.09	2.01	2.17	<0.0001
None	2,256	7.7	6,144	23.3				

Abbreviations: No., number; CI, confidence interval; LL, lower limit; UL, upper limit; *y*, years; PTSD, post-traumatic stress disorder; TBI, traumatic brain injury.

TABLE 4. Treatment Factors, Chronic Insomnia Diagnoses, Early Separation Versus Term Completion Controls, Active Component, U.S. Armed Forces, 2014–2023

Characteristics	Early Separation Cases		Term-Completion Controls		Odds Ratio	95% CI LL	95% CI UL	*p*-value
	No.	%	No.	%				
Total	29,282	100	26,397	100				
Behavioral therapy within 365 days on, after diagnosis								
Yes	18,041	61.6	12,169	46.1	1.88	1.81	1.94	<0.0001
No	11,241	38.4	14,228	53.9	Reference			
CPG-recommended pharmacotherapy within 365 days on, after diagnosis								
Yes	7,602	26.0	5,455	20.7	1.35	1.29	1.40	<0.0001
No	21,680	74.0	20,942	79.3	Reference			
Behavioral therapy or CPG-recommended pharmacotherapy within 365 days on, after diagnosis								
Yes	20,626	70.4	14,832	56.2	1.86	1.79	1.92	<0.0001
No	8,656	29.6	11,565	43.8	Reference			
Behavioral therapy sessions within 365 days on, after diagnosis, *n*								
1–3	9,749	33.3	7,136	27.0	1.73	1.66	1.80	<0.0001
4+	8,292	28.3	5,033	19.1	2.09	2.00	2.18	<0.0001
None	11,241	38.4	14,228	53.9	Reference			
Behavioral therapy within 90 days on, after diagnosis								
Yes	13,269	45.3	8,837	33.5	1.65	1.59	1.70	<0.0001
No	16,013	54.7	17,560	66.5	Reference			
CPG-recommended pharmacotherapy within 90 days on, after diagnosis								
Yes	3,874	13.2	3,100	11.7	1.15	1.09	1.21	<0.0001
No	25,408	86.8	23,297	88.3	Reference			
Behavioral therapy or CPG-recommended pharmacotherapy within 90 days on, after diagnosis								
Yes	15,258	52.1	10,831	41.0	1.56	1.51	1.62	<0.0001
No	14,024	47.9	15,566	59.0	Reference			
Behavioral therapy sessions within 90 days on, after diagnosis, *n*								
1–3	10,204	34.8	6,978	26.4	1.60	1.55	1.66	<0.0001
4+	3,065	10.5	1,859	7.0	1.81	1.70	1.92	<0.0001
None	16,013	54.7	17,560	66.5	Reference			

Abbreviations: No., number; CI, confidence interval; LL, lower limit; UL, upper limit; CPG, clinical practice guideline; *n*, number.

from longitudinal military cohorts, such as the Millennium Cohort Study, and military surveillance reports.[2,4] These differences may reflect underlying social or structural factors, including unequal access to support resources, potential bias in administrative separation processes, or differences in exposure to occupational stressors.[3,6,7] Prior studies have identified differences by sex and race/ethnicity in chronic insomnia burden among service members and sociodemographic variation in insomnia-related care among veterans, supporting the need for further study of potential disparities in military populations.[3,7] These findings emphasize the need for further investigation into potential disparities in separation outcomes among demographic subgroups.

It is difficult to isolate a direct relationship between chronic insomnia and separation from service, in part, due to the high prevalence of co-occurring conditions. In this study, nearly 85% of individuals with chronic insomnia had at least 1 co-occurring diagnosis selected for analysis: anxiety, depression, PTSD, bipolar disorder, substance use disorders, adjustment disorder, TBI, or chronic pain. The relationships between chronic insomnia and those co-occurring diagnoses are often interrelated, with insomnia potentially both a cause and a consequence.[5,6] Furthermore, these highly comorbid conditions, or the treatments used for their management (e.g., antipsychotics, benzodiazepines, hypnotics, intensive therapy), may render a service member non-deployable or unfit for duty, thereby mandating a Medical Evaluation Board (MEB) and subsequent PEB determination.[6,9,10] This required medical review directly factors into the odds ratios for early separation, as the PEB outcome serves as a proxy for service retention medical standards.[9,10] As such, insomnia may serve as a marker of underlying risk rather than a primary driver of separation. Future research should aim to link clinical diagnoses, including symptom severity, to documented reasons for separation.

TABLE 5. Adjusted Odds Ratios for Early Separation, Chronic Insomnia Diagnoses, Active Component, U.S. Armed Forces, 2014–2023

Characteristics	Adjusted Odds Ratio	95% CI LL	95% CI UL
Sex			
Male	Reference		
Female	1.26	1.19	1.32
Branch of service			
Army	Reference		
Navy	0.37	0.35	0.40
Air Force	0.32	0.30	0.34
Marine Corps	0.26	0.24	0.28
Age, *y*			
<20	Reference		
20–24	0.53	0.46	0.61
25–29	0.59	0.50	0.69
30–34	0.51	0.43	0.60
35–39	0.10	0.09	0.12
40+	0.07	0.05	0.08
Race and ethnicity			
White, non-Hispanic	Reference		
Black, non-Hispanic	1.08	1.03	1.14
Hispanic	1.01	0.95	1.07
Other	0.94	0.87	1.02
Unknown	1.12	0.97	1.28
Rank			
Junior enlisted (E1–E4)	Reference		
Senior enlisted (E5–E9)	0.59	0.55	0.63
Junior officer (O1–O3)	1.05	0.93	1.17
Senior officer (O4–O10)	0.37	0.33	0.42
Warrant officer	0.48	0.41	0.55
Military occupation			
Infantry, artillery, armor, combat engineering	Reference		
Motor transport	1.16	1.02	1.30
Pilot, air crew	1.03	0.84	1.28
Repair, engineering	1.02	0.95	1.09
Communications, intelligence	0.89	0.83	0.96
Health care	0.89	0.82	0.97
Other	1.08	1.00	1.17
Marital status			
Single	Reference		
Married	1.23	1.16	1.31
Other	1.06	0.97	1.15
Unknown	0.98	0.18	5.31
Co-occurring diagnoses within ±365 days of chronic insomnia diagnosis			
No listed diagnosis	Reference		
Alcohol, substance use disorder	1.45	1.36	1.54
Anxiety disorder	1.17	1.12	1.22
Depressive disorder	1.67	1.59	1.74
Adjustment disorder	1.30	1.25	1.36
PTSD	1.66	1.58	1.75
Bipolar disorder	2.52	2.12	3.00
TBI	1.67	1.58	1.77
Chronic pain	2.06	1.97	2.16
Behavioral therapy or CPG-concordant pharmacotherapy within 365 days of chronic insomnia diagnosis			
No	Reference		
Yes	1.12	1.07	1.17

Abbreviations: CI, confidence interval; LL, lower limit; UL, upper limit; *y*, years; PTSD, post-traumatic stress disorder; TBI, traumatic brain injury.

Lastly, receipt of behavioral therapy or CPG-concordant pharmacotherapy within 365 days of chronic insomnia diagnosis was associated with higher adjusted odds of early separation (aOR 1.12). This should not be interpreted as evidence that treatment increased separation risk. Rather, treatment may have served as a proxy for greater symptom severity, persistence, functional impairment, or clinical recognition. Administrative data could not capture treatment fidelity, completion, symptom response, or duty-related functional outcomes. Prior research among active duty personnel suggests that CBT-I can improve insomnia symptoms, although clinically meaningful improvement may occur in only a subset of treated service members.[14] Future studies should evaluate whether timely, complete, and high-fidelity insomnia treatment improves functional outcomes and reduces early separation risk.

This study has several important limitations. It lacked clinical information on insomnia severity, symptom burden, functional impairment, and treatment response, which limits interpretation of clinical impact and its association with early separation. Specific medical conditions responsible for separation were also not available, meaning that some separations may have been driven by conditions unrelated to insomnia. Additionally, this analysis did not distinguish between medical and negative administrative separations, which likely involve different contributing factors. The case definition required 2 insomnia diagnoses 90–390 days apart, potentially excluding milder or short-term cases and skewing the sample toward more severe, persistent, or treatment-resistant insomnia. The reliance on administrative data from DMSS may not adequately capture self-managed cases and may reflect potential variability in clinical coding practices. Behavioral therapy exposure was also identified using diagnosis and CPT codes, which did not confirm whether CBT-I-specific components were delivered, whether treatment was completed, or whether symptoms improved. Similarly, ISCs are applied administratively and may not fully capture the complexity of discharge circumstances; their use may vary among service branches or over time, introducing potential bias

into comparisons between early separation and term completion.

Despite these limitations, the findings offer important insights into the relationship between chronic insomnia and service outcomes. Chronic insomnia was associated with an increased probability of early separation and frequently co-occurred with behavioral health and neurological conditions. Although it may not be the primary cause of separation, insomnia may serve as a marker of broader risk, particularly when present with other comorbidities. Efforts to improve early identification, intervention, and adherence to clinical practice guidelines may help mitigate the impacts of insomnia on force health. Future studies and surveillance efforts would benefit from incorporating broader case definitions, assessing clinical severity, evaluating the impact of evidence-based insomnia therapies on separation outcomes, and prospectively linking clinical diagnoses to specific reasons for separation from military service. Enhanced surveillance and greater policy attention to sleep health may support force readiness and long-term retention.

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Mid-Season Influenza Virus Genetic Characterizations in U.S. Department of War Populations, 2025–2026

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Continuous monitoring of influenza antigenic drift is vital for vaccine strain selection. This study utilized global Department of War (DOW) surveillance data to evaluate circulating influenza strains and inform the 2026-2027 Northern Hemisphere influenza vaccine recommendations by the World Health Organization. From September 2025 through February 2026, the Department of Defense Global Respiratory Pathogen Surveillance Program collected and analyzed respiratory specimens from over 100 sentinel sites globally. Influenza-positive samples underwent next-generation sequencing, phylogenetic analysis, and antigenic characterization. Analysis of 1,300 sequences revealed A(H3N2) as the predominant (80.1%) subtype, followed by A(H1N1)pdm09 (10.6%) and B/Victoria (9.3%), with variations between combatant commands. Significant antigenic drift led to the dominance of subclades K, D.3.1/D.3.1.1, and C.3.1, respectively. Testing indicated that the 2025-2026 vaccine components offered reduced protection against these emerging strains. Antigenic cartography confirms that the 2026-2027 vaccine strains provide significantly improved protection against circulating viruses. Antiviral resistance markers for neuraminidase inhibitors such as oseltamivir remain rare, with only 2 identified in A(H1N1)pdm09. These data are critical for maintaining force health protection and assessing vaccine performance within highly mobile DOW populations.

What are the new findings?

Analysis of 2025-2026 influenza season data revealed the predominance of subclades A(H1N1)pdm09 D.3.1/D.3.1.1, A(H3N2) K, and B/Victoria C.3.1. Antigenic cartography employing recent candidate vaccine viruses from the U.S. Centers for Disease Control and Prevention confirmed that the World Health Organization's strain recommendations for the 2026-2027 Northern Hemisphere influenza vaccine provide the best protection against these circulating strains.

What is the impact on readiness and force health protection?

Influenza illnesses directly reduce military force readiness. Annual vaccination remains a proven mechanism for reducing cases and mitigating their severity. These data from the Department of War, presented at the 2026 U.S. Food and Drug Administration Vaccines and Related Biological Products Advisory Committee meeting, in conjunction with U.S. Centers for Disease Control and Prevention findings, informed the selection of the most appropriate virus strains for the 2026-2027 influenza vaccine, to optimize protection for U.S. service members.

Annual evaluation and updates, as necessary, of seasonal influenza vaccine strains remain important to counter constant antigenic drift.[1] The U.S. Department of War (DOW), with a historically highly vaccinated, global population, produces critical surveillance data that help inform annual influenza strain selections.[2] Data collected from the Department of Defense Global Respiratory Pathogen Surveillance Program (DoDGRPSP)[3] and Global Emerging Infections Surveillance (GEIS)-funded global partner laboratories provide a robust surveillance picture for monitoring influenza activity and antigenic drift throughout the year.[4]

On February 27, 2026, the World Health Organization (WHO) recommended updates for the 2026-2027 Northern Hemisphere influenza vaccine: transitioning the A(H1N1)pdm09 component to a subclade D.3.1 A/Missouri/11/2025-like virus for all vaccine platforms (egg, cell, recombinant), changing the A(H3N2) component to a subclade K A/Darwin/1454/2025-like virus (egg) and A/Darwin/1415/2025-like virus (cell/recombinant), and the B/Victoria component to a subclade C.3.1 B/Tokyo/EIS13-175/2025-like virus (egg) or B/Pennsylvania/14/2025-like virus (cell/recombinant).[5] This report utilizes DOW genetic, antigenic, and epidemiological data, presented to the U.S. Food and Drug Administration (FDA)'s Vaccines and Related Biological Products Advisory Committee (VRBPAC) on March 12, 202'6, to contextualize the new WHO recommendations.[6]

Methods

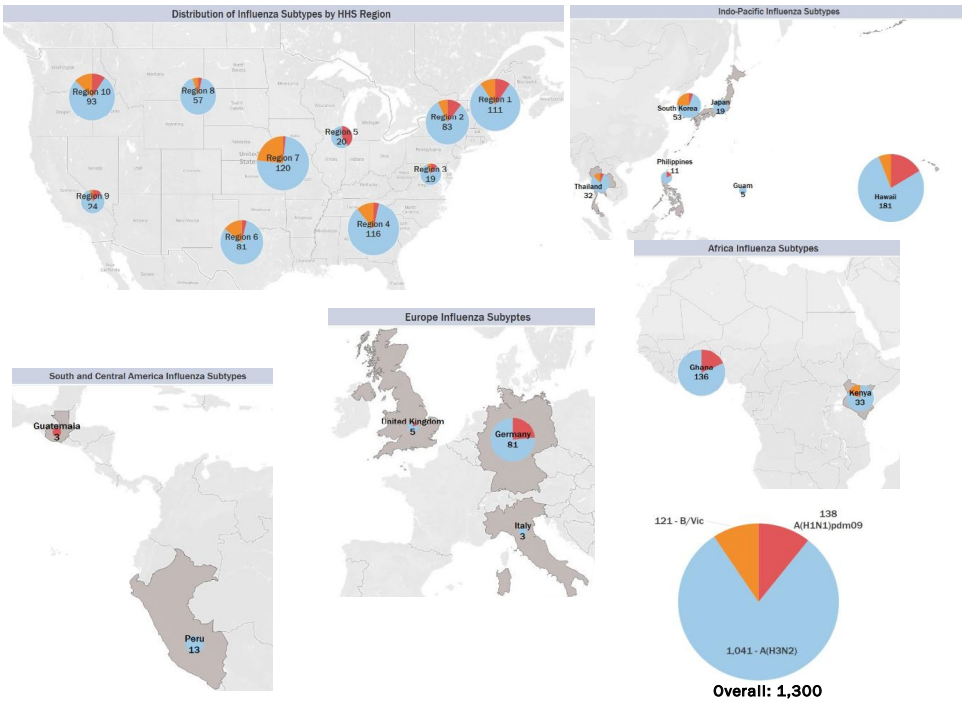
Influenza data from the DOW were accumulated from analyses of respiratory specimens collected as part of DoDGRPSP systematic sampling from more than 100 sentinel sites, along with sequence data contributed from GEIS-funded partner

laboratories around the world, from September 1, 2025 through February 17, 2026. Specimens collected through DoDGRPSP efforts were first tested using a commercial real-time polymerase chain reaction (PCR) multiplex pathogen panel to determine influenza positivity and type or subtype. Regional differences in subtype proportions were assessed using Pearson's chi-squared test in R Statistical Software (version 4.2.3). Test-positive influenza specimens were subsequently sequenced using Illumina next-generation sequencing technology and analyzed using Nextstrain to determine clade and subclade. Other analytical tools were used to construct phylogenetic trees and screen amino acid substitutions consistent with changes to hemagglutinin (HA) glycosylation motifs and neuraminidase (NA) markers of resistance to NA-inhibiting antiviral drugs such as oseltamivir. Frequently occurring substitutions that were in addition to substitutions consistent with subclade designations **(Table 1)** were also noted. A subset of positive influenza specimens that were genetically characterized were also sent to partners at the Naval Medical Research Command (NMRC) for antigenic characterization using the High-content Imaging-based micro-Neutralization Test (HINT) and antigenic cartography mapping.[7-8] Specimens sent for HINT testing were selected based on distribution across collection dates and location as well as clade and subclade diversity.

Results

DOW data comprised 1,300 influenza sequences in total, including data for 138 A(H1N1)pdm09 (10.6%), 1,041 A(H3N2) (80.1%), and 121 B / Victoria (9.3%). Although A(H3N2) was the predominant subtype circulating throughout the sentinel site network, some regional differences were observed **(Figure 1)**. A higher proportion of A(H1N1)pdm09 was observed in U.S. European Command (EUCOM), West Africa, Hawai'i, and U.S. Department of Health and Human Services (HHS) regions 3, 5, and 9 than in other geographic locations, while a higher proportion of B / Victoria was observed in South Korea, East Africa, and HHS regions 4, 6, 7, and 10 than in other geographic locations. Examining DOW subtype by combatant command (CCMD), statistically significant differences included higher than expected A(H1N1)pdm09 in EUCOM and B / Victoria in U.S. Northern Command (NORTHCOM), and lower than expected A(H1N1) pdm09 in NORTHCOM, B / Victoria in U.S. Africa Command (AFRICOM), and B/ Victoria in EUCOM. These dynamics are consistent with CDC and WHO data that showed regional variation of subtype diversity across continents.[5]

FIGURE 1. Geographic Distribution of Influenza Phylogenetic Analysis Sequence Data



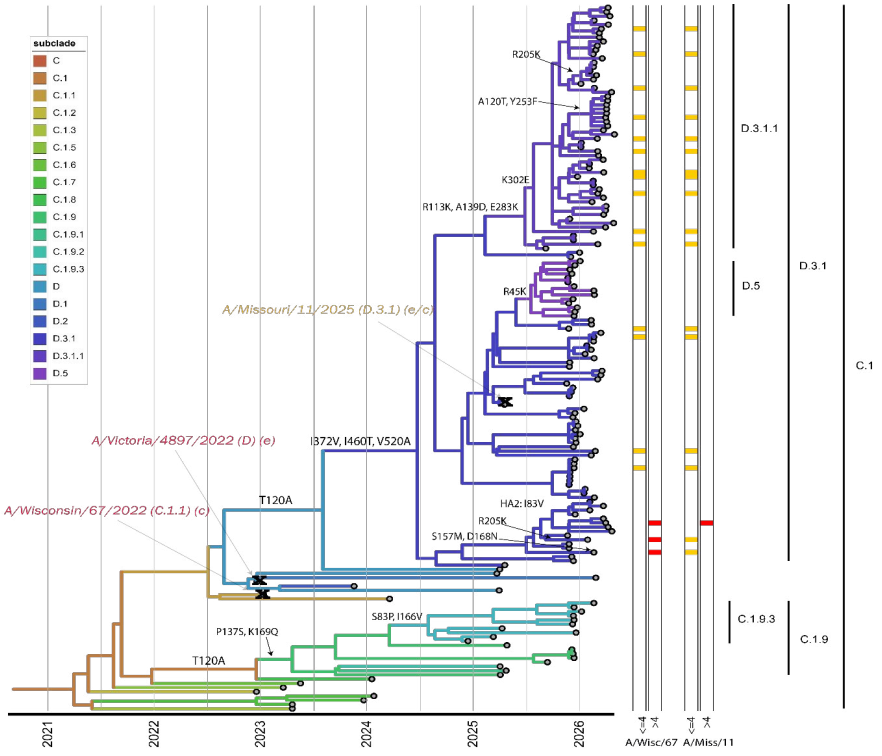
Phylogenetic analysis of the DOW A(H1N1)pdm09 HA data revealed an approximately even split between circulating subclades D.3.1 and D.3.1.1, at 52.2% and 40.6% of sequences, respectively, while the 2024-2025 predominant subclades C.1.9 and C.1.9.3 continued to co-circulate at 2.2% and 5.1%, respectively **(Table 1, Supplementary Figure 1a)**. The Northern Hemisphere 2026-2027 WHO influenza vaccine strain recommendation for both egg and cell/recombinant formulations, A/ Missouri/11/2025-like viruses, sat firmly in the middle of the branching for D.3.1 **(Figure 2a)**. Incorporating HINT-based antigenic characterization performed at NMRC and utilizing post-infection ferret antisera raised against vaccine candidate strains, 2 subclade D.3.1 viruses out of 23 (8.7%) DOW A(H1N1)pdm09 viruses tested showed low reaction, as defined as a greater than 4-fold decrease in titer relative to the homologous titer for A/Wisconsin/ 67/2022-like virus (Northern Hemisphere 2025-2026 strain component). These 2 viruses had HA1 amino acid substitutions of either R205K or S157M and D168N. One (4.3%) additional subclade D.3.1 virus with the HA1 substitution I510V showed a greater than 4-fold decrease in titer relative to homologous titers for both A/Wisconsin/ 67/2022-like and A/Missouri/11/2025-like virus post-infection ferret antisera (red bars to right, **Figure 2a**). High reacting strains, as defined as a less than 4-fold decrease in titer relative to the homologous titer, are represented as yellow bars to the right of the phylogenetic trees. Antigenic cartography confirmed that the updated Northern Hemisphere vaccine strain recommendation, A/Missouri/11/2025-like virus, shifts protection toward the predominantly circulating D.3.1 and D.3.1.1 strains compared to the 2025-2026 vaccine component **(Figure 3a, Supplementary Table 1a)**.

TABLE 1. Distribution of Influenza Subclade Diversity, by Influenza A Subtype and B/Victoria Lineage Virus, U.S. Department of War, 2025–2026

Subtype, Lineage	Clade	Subclade	No.	% of Total Subtype	Defining Substitutions[a]
A(H1N1)pdm09	5a.2a	C.1.9	3	2.2	K169Q
		C.1.9.3	7	5.1	S83P, K169Q
	5a.2a.1	D.3.1[b]	72	52.2	I372V, I460T, V520A
		D.3.1.1	56	40.6	R113K, A139D, E283K, K302E
A(H3N2)	2a.3a.1	J.2[c]	14	1.3	K276E
		J.2.2	6	4.3	T65K, S124N
		J.2.3	7	0.7	S378N
		J.2.4	39	3.7	T135K
		K[d]	975	93.7	K2N, Q173R
B/Victoria	V1A.3a.2	C.3	16	13.2	A154E, S208P, S255P
		C.3.1[e]	87	71.9	D197N
		C.5.1	2	1.7	E128K, E183K
		C.5.6	11	9.1	D128E
		C.5.6.1	4	3.3	T37I, P241Q
		C.5.7	1	0.8	E128G, E183K

Abbreviation: No., number.
[a] All substitutions reference changes in hemagglutinin subunit 1 (HA1).
[b] Subclade of selected 2026-2027 Northern Hemisphere A(H1N1)pdm09 strain A/Missouri/11/2025 (egg, cell).
[c] Subclade of previous 2025-2026 Northern Hemisphere A(H3N2) strains A/Croatia/10136RV/2023 (egg) and A/District of Columbia/27/2023 (cell).
[d] Subclade of selected 2026-2027 Northern Hemisphere A(H3N2) strains A/Darwin/1454/2025 (egg) and A/Darwin/1415/2025 (cell).
[e] Subclade of selected 2026-2027 Northern Hemisphere B/Victoria strains B/Tokyo/EIS13-175/2025 (egg) and B/Pennsylvania/14/2025 (cell).

FIGURE 2a. Influenza A(H1N1)pdm09 Hemagglutinin Coding Sequence Phylogenetic Tree, U.S. Department of War, 2025–2026

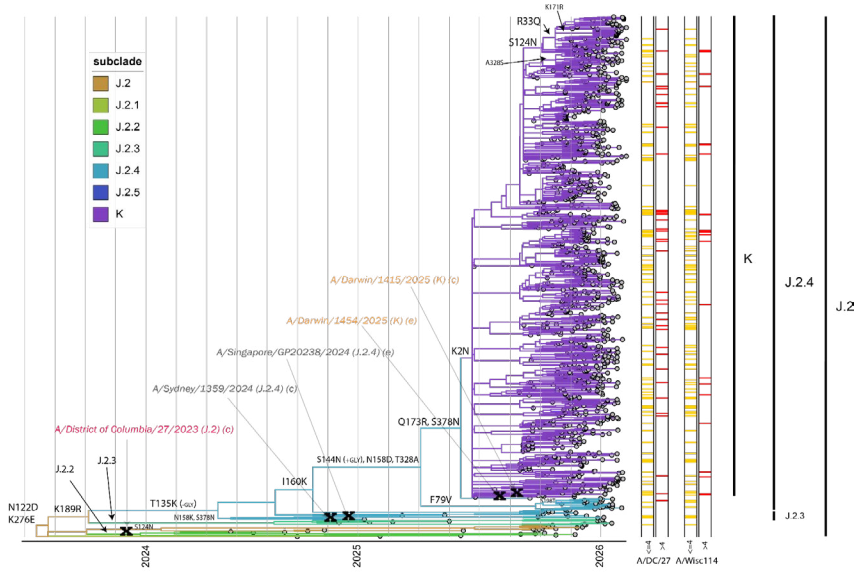


This A(H1N1)pdm09 phylogenetic tree visually confirms the emergence and shared dominance of subclades D.3.1 and D.3.1.1 from the C.1 lineage, mid-to-late 2025.
Legend: 2025-2026 vaccine strains in red, 2026-2027 strain selection in orange; subclades indicated by color legend or far right solid vertical bars. Bars immediately to right of tree indicate high reactors (orange bars, <4-fold) or low reactors (red bars, >4-fold) to 2025-2026 strain A/Wisconsin/67/2022 and 2026-2027 strain selection A/Missouri/11/2025, determined by HINT assay.
Abbreviations: (e), egg-based; (c), cell- or recombinant-based; HINT, high-content imaging-based micro-neutralization test.

No changes to glycosylation sites, which can alter immune response, were observed for the A(H1N1)pdm09 viruses characterized. One virus contained the NA substitution H275Y in the consensus sequence, while another contained I223V and S247N, both of which may confer NA inhibitor antiviral resistance.[9]

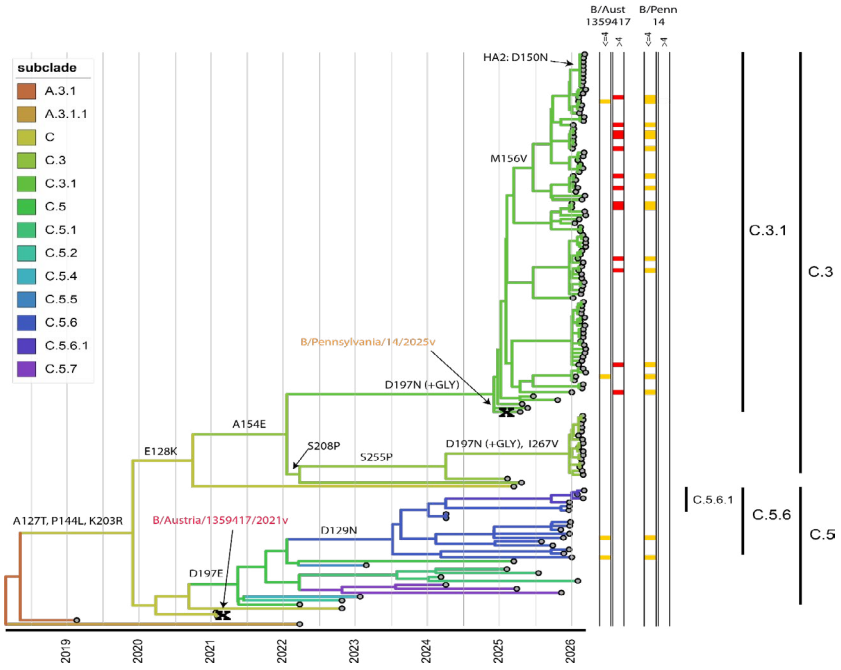
Phylogenetic analysis of the DOW A(H3N2) HA data showed that subclade K predominated, overwhelmingly, contributing 93.7% of the circulating viruses sequenced, while subclades J.2, J.2.2,

FIGURE 2b. Influenza A(H3N2) Hemagglutinin Coding Sequence Phylogenetic Tree, U.S. Department of War, 2025–2026



This A(H3N2) phylogenetic tree visually confirms the rapid emergence and dominance of subclade K from the J.2.4 lineage, mid-to-late 2025.
Legend: Cell- or recombinant-based 2025-2026 vaccine strain in red, 2026-2027 strain selections in orange; subclades indicated by color legend or far right solid vertical bars. Bars immediately to right of tree indicate high reactors (orange bars, <4-fold) or low reactors (red bars, >4-fold) to 2025-2026 strain A/District of Columbia/27/2023 and 2026-2027 strain selection A/Darwin/1415/2025-like virus, A/Wisconsin/114/2025, determined by HINT assay.
Abbreviation: HINT, high-content imaging-based micro-neutralization test.

FIGURE 2c. Influenza B/Victoria Hemagglutinin Coding Sequence Phylogenetic Tree, U.S. Department of War, 2025–2026

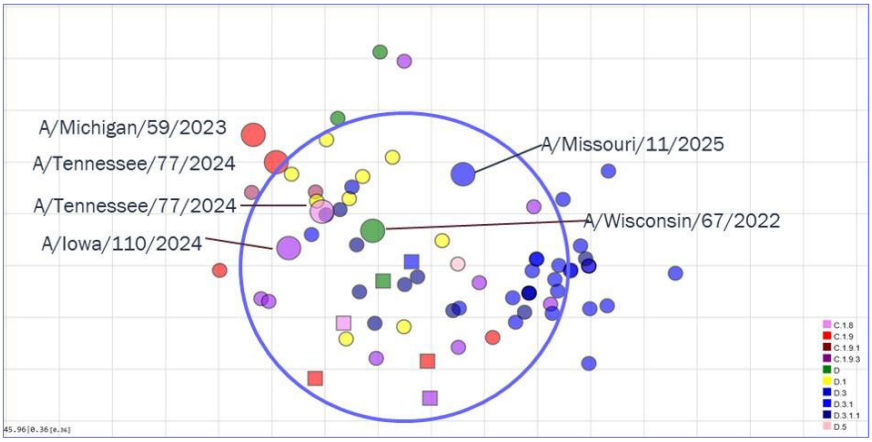


This B/Victoria phylogenetic tree visually confirms the emergence of subclade C.3.1 from C.3 in early 2025 and subsequent dominance by early 2026, with continuing circulation of the other lineages C.3 and C.5 sub-lineages.
Legend: Egg and cell/recombinant 2025-2026 vaccine strain in red, 2026-2027 cell- or recombinant-based strain selection in orange; subclades indicated by color legend or far right solid vertical bars. Bars immediately to right of tree indicate high reactors (orange bars, <4-fold) or low reactors (red bars, >4-fold) to 2025-2026 strain B/Austria/1359417/2021 and 2026-2027 strain selection B/Pennsylvania/14/2025, determined by HINT assay.
Abbreviation: HINT, high-content imaging-based micro-neutralization test.

J.2.3, and J.2.4 co-circulated at very low levels **(Table 1, Supplementary Figure 1b)**. HINT data using post-infection ferret antisera raised against A/District of Columbia/27/2023-like virus (Northern Hemisphere 2025-26 cell-component) showed 36 out of 144 (25.0%) representative viruses with a greater than 4-fold decrease from the homologous titer, whereas only 20 (13.9%) viruses showed a greater than 4-fold decrease in titer to A/Wisconsin/114/2025, an A/Darwin/1415/2025-like virus (red bars, **Figure 2b**). Antigenic cartography confirmed that the Northern Hemisphere 2026-2027 recommendations shift protection towards the predominantly circulating subclade K strains as compared to the Northern Hemisphere 2025-2026 vaccine components **(Figure 3b, Supplementary Table 1b)**. All subclade J.2.4 and K sequences shared the loss of a glycosylation site due to the HA1 amino acid substitution at T135K, while all the subclade K and many of the J.2.4 sequences shared the gain of a glycosylation site due to the HA1 amino acid substitution S144N **(Figure 2b)**. No consensus NA sequences showed markers for antiviral resistance.

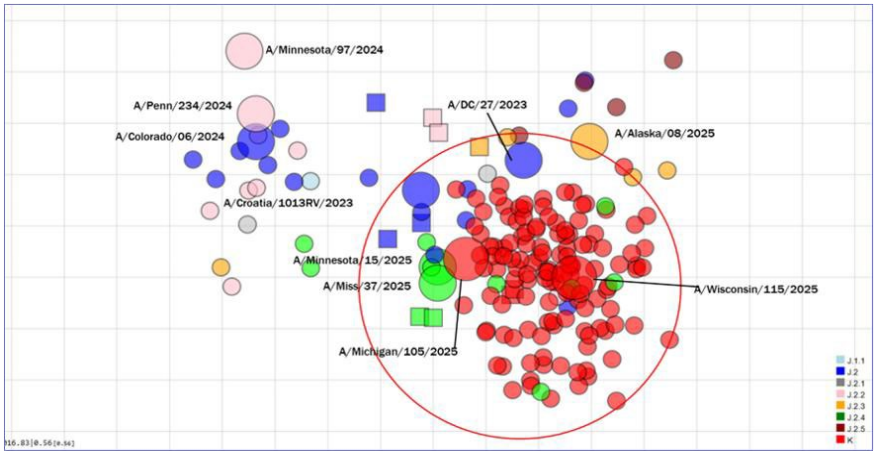
Phylogenetic analysis of DOW B/Victoria data showed that 71.9% of the HA sequences belonged to the predominantly circulating subclade C.3.1, while moderate amounts of subclades C.3 and C.5.6 co-circulated at 13.2% and 9.1%, respectively, and subclades C.5.1, C.5.6.1, and C.5.7 co-circulated at lower levels **(Table 1, Supplementary Figure 1c)**. The Northern Hemisphere 2026-2027 WHO vaccine strain recommendation is B/Tokyo/EIS13-175/2025-like (egg) and B/Pennsylvania/14/2025-like (cell/recombinant) viruses from subclade C.3.1. HINT data using post-infection ferret antisera raised against the Northern Hemisphere 2025-2026 component, B/Austria/1359417/2021-like virus, showed 13 out of 18 (72.2%) representative viruses with greater than a 4-fold decrease from the homologous titer (red bars), but no low reactors to B/Pennsylvania/14/2025 were observed **(Figure 2c)**. Antigenic cartography data indicate distinct clustering of C.3.1 viruses away from the previous B/Austria/1359417/2021-like vaccine strain, justifying the recommended update **(Figure 3c, Supplementary Table 1c)**. All subclade C.3.1

FIGURE 3a. Influenza A(H1N1)pdm09 Antigenic Cartography Map



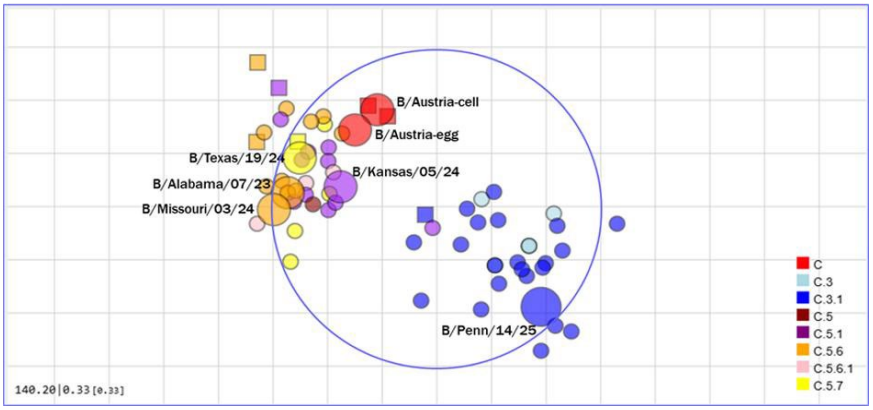
Legend: Neutralizing titers from HINT mapped with each square in grid representing 2-fold difference in titer; large blue circle represents 8-fold difference from homologous titer for 2026-2027 Northern Hemisphere vaccine strain recommendation, A/Missouri/11/2025. Clades indicated by color; large circles indicate reference strains, small circles indicate circulating strains, colored squares indicate reference antisera.
Abbreviation: HINT, high-content imaging-based micro-neutralization test.

FIGURE 3b. Influenza A(H3N2) Antigenic Cartography Map



Legend: Neutralizing titers from HINT mapped with each square in grid representing 2-fold difference in titer; large red circle represents 8-fold difference from homologous titer for 2026-2027 Northern Hemisphere cell-based vaccine strain recommendation, A/Wisconsin/115/2025, an A/Darwin/1415/2025-like virus. Clades indicated by color; large circles indicate reference strains; small circles indicate circulating strains; colored squares indicate reference antisera.
Abbreviation: HINT, high-content imaging-based micro-neutralization test.

FIGURE 3c. Influenza B/Victoria Antigenic Cartography Map



Legend: Neutralizing titers from HINT mapped with each square in grid representing 2-fold difference in titer; large blue circle represents 8-fold difference from homologous titer for 2026-2027 Northern Hemisphere vaccine cell-based strain recommendation, B/Pennsylvania/14/2025. Clades indicated by color; large circles indicate reference strains; small circles indicate circulating strains; colored squares indicate reference antisera.
Abbreviation: HINT, high-content imaging-based micro-neutralization test.

sequences and most C.3 sequences shared the HA1 amino acid substitution D197N, which caused the addition of a glycosylation site **(Figure 2c)**. Again, no consensus NA sequences showed markers for antiviral resistance.

Discussion

Analysis of the DOW influenza sequence data collected by GEIS partner laboratories and presented at the 2026 VRBPAC meeting, in combination with antigenic characterization data, support the WHO recommendations for updating the A(H1N1)pdm09, A(H3N2), and B/Victoria strain components for the Northern Hemisphere 2026-2027 season. In conjunction with mid-season vaccine data, these analyses complement national CDC data and remain essential for assessing vaccine performance in the highly mobile, global DOW populations.

Antigenic drift was observed throughout the 2025-2026 season for influenza A(H1N1)pdm09, A(H3N2), and B/Victoria, leading to majority strain circulation in the subclades D.3.1.1, K, and C.3.1, respectively. The 2025-2026 Northern Hemisphere influenza vaccine strains show evidence of reduced protection against those strains, whereas the WHO strain recommendations for the 2026-2027 vaccine demonstrate improved protection against tested representatives from those subclades. A(H3N2) was the most prominent circulating subtype in global CCMDs, but A(H1N1)pdm09 and B/Victoria displayed more circulating subclade diversity than A(H3N2).

While annual influenza vaccination remains a proven method of protection against influenza disease burden, antiviral treatment such as the NA inhibitor oseltamivir is an effective method to mitigate influenza case severity. Two A(H1N1)-pdm09 consensus sequences analyzed in this study displayed molecular markers in the NA gene that may confer drug resistance. Continued monitoring of substitutions that confer resistance, along with substitutions that result in loss or gain of glycosylation motifs that may affect virus

receptor binding and virulence, are important to interpret in addition to estimates of influenza burden in the DOW.[10]

Limitations of this study include uneven sentinel site participation and lack of sampling sites in some global regions, resulting in incomplete representation of global influenza circulation. Additionally, detection of antiviral resistance markers relying solely on consensus sequencing data is not definitive; subsequent studies will include investigation of minor variants as well as phenotypic assays for confirmation.

Acknowledgments

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Disclaimer

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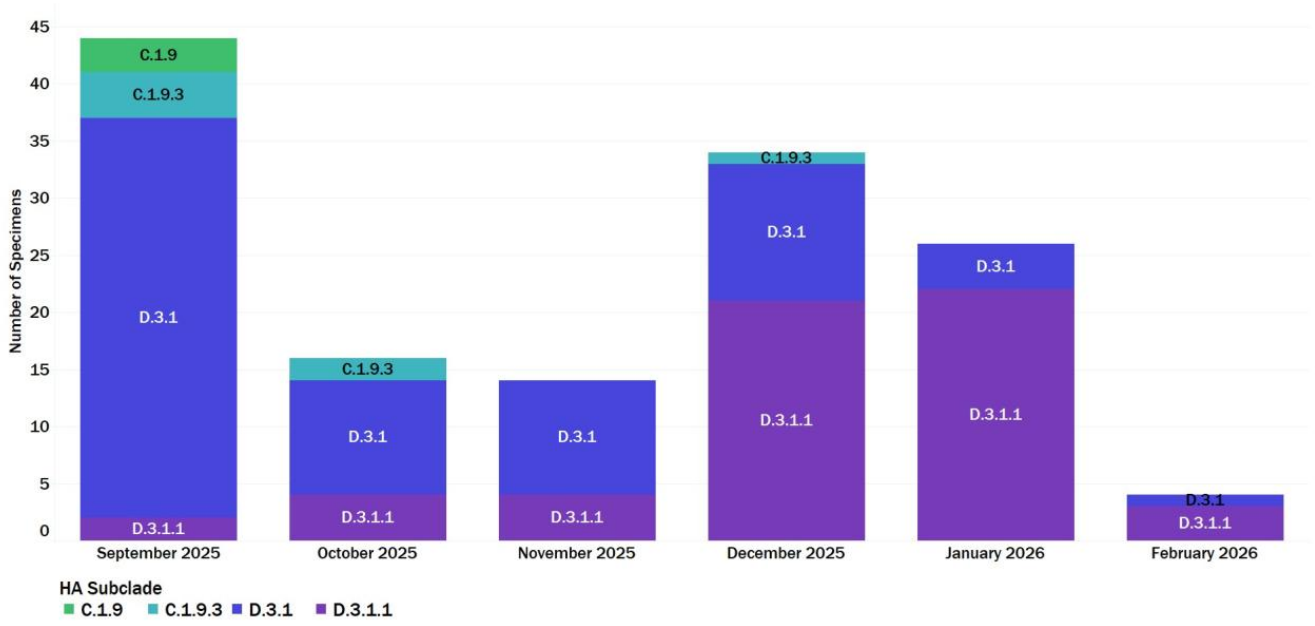
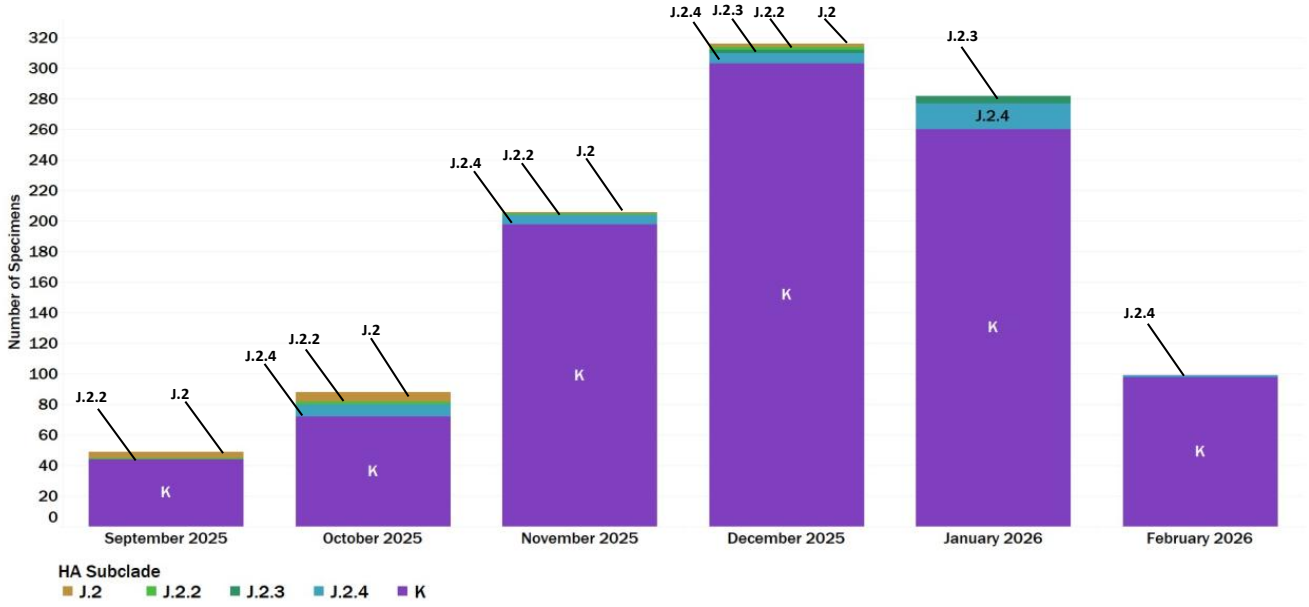
SUPPLEMENTARY FIGURE 1a. Influenza A(H1N1)pdm09 Specimen Numbers and Subclade Proportions, September 2025–February 2026



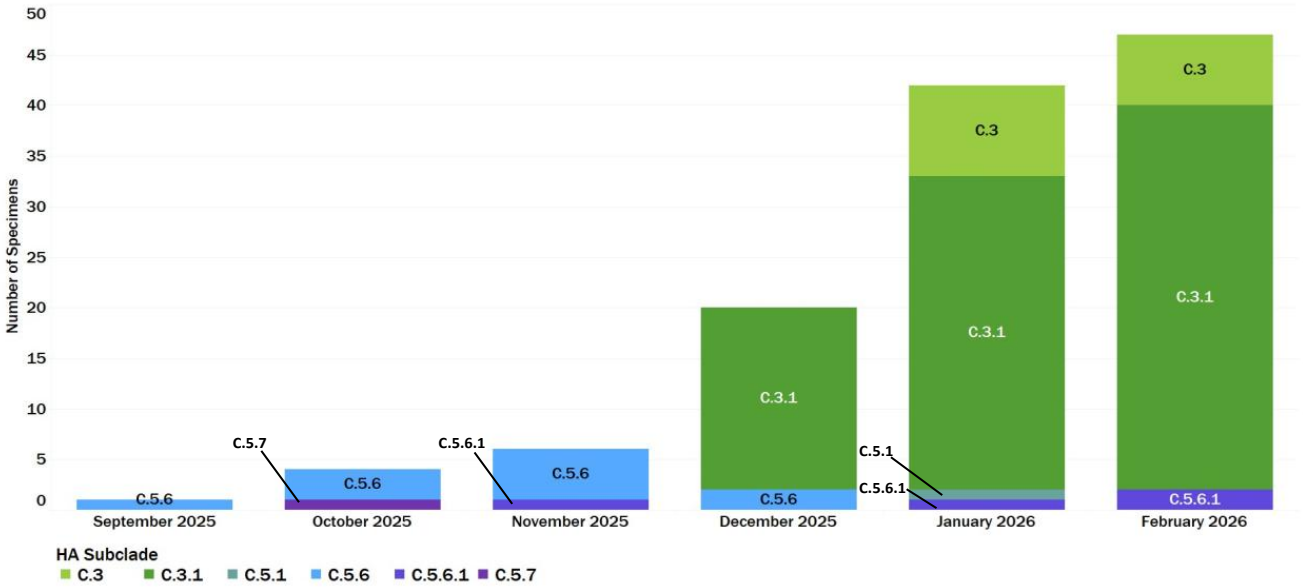
Abbreviation: HA, hemagglutinin.

SUPPLEMENTARY FIGURE 1b. Influenza A(H3N2) Specimen Numbers and Subclade Proportions, September 2025–February 2026



Abbreviation: HA, hemagglutinin.

SUPPLEMENTARY FIGURE 1c. Influenza B/Victoria Specimen Numbers and Subclade Proportions, September 2025–February 2026



Abbreviation: HA, hemagglutinin.

SUPPLEMENTARY TABLE 1a. Influenza A(H1N1)pdm09 HINT Assay Antigenic Characterization Titer Table

Viruses Tested		Reference Antisera						
		A/WI/67/22 c[a]	A/Vic/4897/22 e[a]	A/CT/17/23	A/MI/59/23	A/IA/110/24	A/MO/11/25 c[b]	A/MO/11/25 e[b]
	Clade	C.1.1	D	C.1.8	C.1.9	C.1.9.3	D.3.1	D.3.1
Reference virus								
A/Wisconsin/67/2022 c[a]	C.1.1	**2,560**[c]	1,280	1,280	1,280	640	1,280	640
A/Victoria/4897/2022 e[a]	D	640	**320**[c]	320	320	80	320	160
A/Connecticut/17/2023	C.1.8	2,560	640	**1,280**[c]	640	320	320	320
A/Michigan/59/2023	C.1.9	320	160	320	**640**[c]	160	320	320
A/Iowa/110/2024	C.1.9.3	640	320	1,280	1,280	**640**[c]	640	640
A/Missouri/11/2025 c[b]	D.3.1	640	640	640	320	320	**640**[c]	1,280
A/Missouri/11/2025 e[b]	D.3.1	10,240	2,560	5,120	5,120	1,280	640	**640**[c]
Test virus								
H125062	C.1.9	640	160	640	1,280	160	160	80
H125069	C.1.9	1,280	640	1,280	1,280	1,280	320	1,280
H125065	C.1.9.1	320	320	640	640	160	320	160
H125066	C.1.9.1	640	320	1,280	640	320	640	640
H125073	C.1.9.3	1,280	320	640	2,560	1,280	640	640
H125092	C.1.9.3	640	320	320	640	640	320	640
H125107	C.1.9.3	1,280	2,560	1,280	1,280	640	640	640
H125063	D	640	320	320	320	80	320	320
H125074	D	320	160	80	160	40	320	160
H125081	D.1	1,280	1,280	640	1,280	160	1,280	320
H125064	D.3.1	1,280	640	640	320	160	640	320
H125100	D.3.1	640	1,280	320	320	640	640	640
H125103	D.3.1	320	1,280	160	160	320	320	640
H125106	D.3.1	640	2,560	320	640	1,280	1,280	2,560
H126002	D.3.1	640	1,280	320	320	640	640	1,280
H126003	D.3.1.1	640	1,280	640	320	1,280	640	1,280
H126019	D.3.1.1	2,560	2,560	1,280	2,560	1,280	2,560	2,560
H126021	D.3.1.1	1,280	1,280	1,280	1,280	320	1,280	1,280
H125070	D.5	1,280	320	1,280	1,280	640	1,280	1,280
H125095	D.5	320	320	160	160	320	320	1,280

Abbreviations: HINT, high-content imaging-based micro-neutralization test; WI, Wisconsin; Vic, Victoria; CT, Connecticut; MI, Michigan; IA, Iowa; MO, Missouri.
[a] Titers against 2025-2026 vaccine strain selections.
[b] Titers against 2026-2027 vaccine strain recommendations.
[c] Homologous titers.

SUPPLEMENTARY TABLE 1b. Influenza A(H3N2) HINT Assay Antigenic Characterization Titer Table

Viruses Tested		Reference Antisera							
		A/Cro/10136RV/23 e[a]	A/DC/27/23 c[a]	A/CO/06/24	A/PA/234/24	A/AK/08/25	A/MN/15/25	A/MI/105/25 e[b]	A/WI/114/25 c[b]
	Clade	J.2	J.2	J.2.1	J.2.2	J.2.3	J.2.4	K	K
Reference virus									
A/DC/27/2023 c[a]	J.2	**10,240**[c]	5,120	2,560	5,120	2,560	5,120	5,120	5,120
A/Croatia/10136RV/2023 e[a]	J.2	5,120	**1,280**[c]	640	1,280	640	1,280	2,560	2,560
A/Colorado/06/2024	J.2.1	2,560	640	**640**[c]	320	320	640	320	320
A/Pennsylvania/234/2024	J.2.2	1,280	320	640	**320**[c]	320	320	320	640
A/Alaska/08/2025	J.2.3	1,280	320	320	320	**1,280**[c]	1,280	1,280	1,280
A/Minnesota/15/2025	J.2.4	5,120	2,560	640	640	320	**5,120**[c]	10,240	10,240
A/Michigan/105/2025[b]	K	10,240	2,560	160	1,280	1,280	10,240	**20,480**[c]	20,480
A/Wisconsin/114/2025[b]	K	1,280	320	80	320	640	2,560	10,240	**10,240**[c]
Test virus									
H325085	J.1.1	2,560	640	320	1280	640	1,280	1,280	2,560
H325064	J.2	5,120	1,280	640	1,280	1,280	2,560	2,560	2,560
H325075	J.2	2,560	640	80	160	640	5,120	5,120	5,120
H325103	J.2	2,560	1,280	640	640	640	1,280	640	1,280
H325107	J.2	1,280	640	640	640	320	640	640	640
H325071	J.2.1	1,280	640	640	320	80	1,280	640	1,280
H325072	J.2.1	5,120	640	640	2,560	2,560	2,560	2,560	5,120
H325066	J.2.2	1,280	320	640	640	160	640	640	640
H325086	J.2.2	1,280	640	160	160	80	640	640	1,280
H325089	J.2.2	1,280	320	160	160	160	320	320	1,280
H325104	J.2.2	2,560	640	640	640	640	640	640	1,280
H325084	J.2.3	640	160	80	80	1,280	1,280	320	640
H325088	J.2.3	1,280	320	80	160	1,280	1,280	1,280	1,280
H326082	J.2.3	2,560	640	320	1,280	2,560	2,560	1,280	5,120
H326071	J.2.4	640	160	80	640	1,280	2,560	5,120	2,560
H326088	J.2.4	2,560	1,280	80	320	640	2,560	2,560	2,560
H326128	J.2.4	1,280	320	80	160	320	1,280	5,120	2,560
H326131	J.2.4	640	320	20	40	320	5,120	5,120	5,120
H325077	J.2.5	320	160	80	80	640	160	320	640
H325079	J.2.5	2,560	160	160	320	2,560	640	640	640
H325083	J.2.5	1,280	160	160	160	2,560	1,280	640	640
H325106	J.2.5	2,560	1,280	640	1,280	2,560	1,280	1,280	2,560
H325094	K	1,280	320	320	640	2,560	2,560	5,120	10,240
H325095	K	320	320	160	640	640	2,560	5,120	5,120
H326006	K	1,280	640	80	640	640	5,120	10,240	10,240
H326117	K	640	640	80	160	320	640	1,280	10,240
H326118	K	640	320	80	160	640	1,280	5,120	2,560
H326130	K	1,280	640	160	640	1,280	2,560	10,240	5,120

Abbreviations: HINT, high-content imaging-based micro-neutralization test; Cro, Croatia; DC, District of Columbia; CO, Colorado; PA, Pennsylvania; AK, Alaska; MN, Minnesota; MI, Michigan; WI, Wisconsin.
[a] Titers against 2025-2026 vaccine strain selections.
[b] Titers against 2026-2027 vaccine strain recommendations.
[c] Homologous titers.

SUPPLEMENTARY TABLE 1c. Influenza B/Victoria HINT Assay Antigenic Characterization Titer Table

Viruses Tested	Clade	Reference Antisera					
		B/Aus/1359417/21 c[a]	B/Aus/1359417/21 e[a]	B/PA/14/25[b]	B/KS/05/24	B/MO/03/24	B/TX/19/24
		C	C	C.3.1	C.5.1	C.5.6	C.5.7
Reference virus							
B/Austria/1359417/2021 c[a]	C	**2,560**[c]	1,280	640	2,560	2,560	2,560
B/Austria/1359417/2021 e[a]	C	1280	**1,280**[c]	1,280	5,120	5,120	2,560
B/Pennsylvania/14/2025[b]	C.3.1	80	40	**640**[c]	160	80	320
B/Kansas/05/2024	C.5.1	640	320	1,280	**5,120**[c]	2,560	2,560
B/Missouri/03/2024	C.5.6	320	320	320	1,280	**5,120**[c]	5,120
B/Texas/19/2024	C.5.7	640	320	640	5,120	5,120	**10,240**[c]
Test virus							
B25011	C.3	320	80	1280	160	320	640
B25013	C.3	320	80	640	160	160	320
B25016	C.3	320	320	1,280	320	640	640
B25017	C.3	320	80	1,280	160	160	320
B25027	C.3.1	160	80	1,280	160	160	320
B25036	C.3.1	160	160	1,280	160	160	640
B25048	C.3.1	320	80	640	80	160	320
B26008	C.3.1	640	160	1,280	640	320	640
B26010	C.3.1	640	80	2,560	640	640	640
B25045	C.5	640	320	640	2,560	5,120	2,560
B25046	C.5.1	320	320	1,280	5,120	5,120	5,120
B25047	C.5.1	320	320	640	2,560	5,120	5,120
B25020	C.5.1	640	640	1,280	5,120	5,120	5,120
B25037	C.5.1	640	160	2,560	640	640	2,560
B25010	C.5.6	640	320	320	2,560	5,120	5,120
B25014	C.5.6	640	320	320	2,560	5,120	5,120
B26003	C.5.6	640	320	320	2,560	2,560	5,120
B25033	C.5.6	1,280	640	640	5,120	5,120	5,120
B25023	C.5.6.1	640	320	640	5,120	5,120	5,120
B25042	C.5.6.1	640	640	1,280	2,560	5,120	5,120
B25009	C.5.7	320	160	640	1,280	5,120	5,120
B25030	C.5.7	320	160	320	1,280	2,560	2,560
B25008	C.5.7	640	320	1,280	2,560	5,120	5,120

Abbreviations: HINT, high-content imaging-based micro-neutralization test; Aus, Australia; PA, Pennsylvania; KS, Kansas; MO, Missouri; TX, Texas.
[a] Titers against 2025-2026 vaccine strain selections.
[b] Titers against 2026-2027 vaccine strain recommendations.
[c] Homologous titers.

Reportable Medical Events at Military Health System Facilities, First Quarter, 2026

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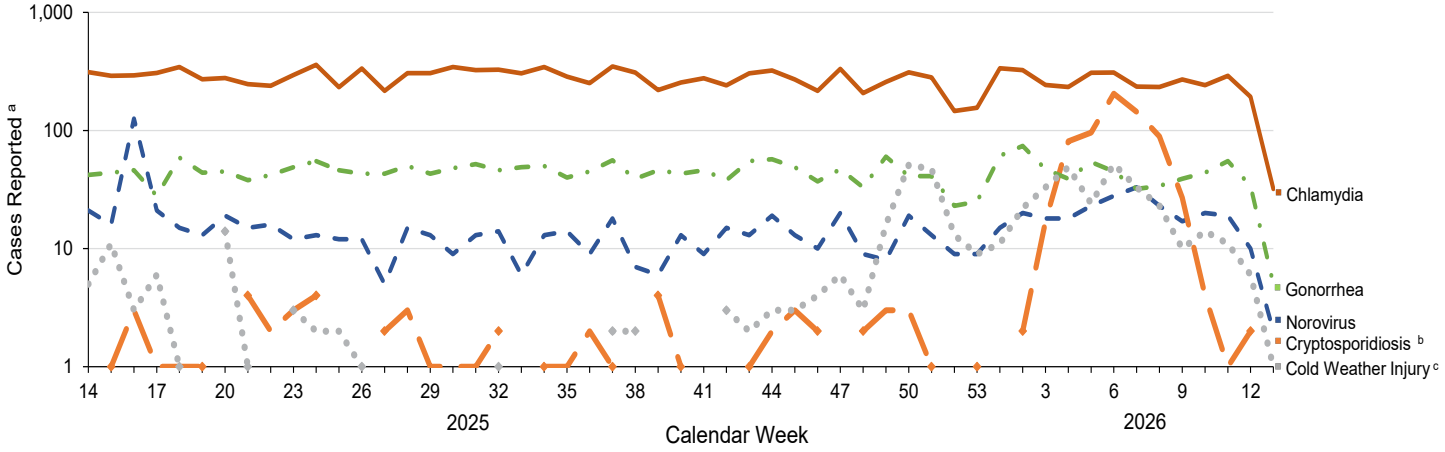
FIGURE 1. Leading Five Reportable Medical Events by Calendar Week, Active Component, U.S. Armed Forces, March 30, 2025–March 31, 2026



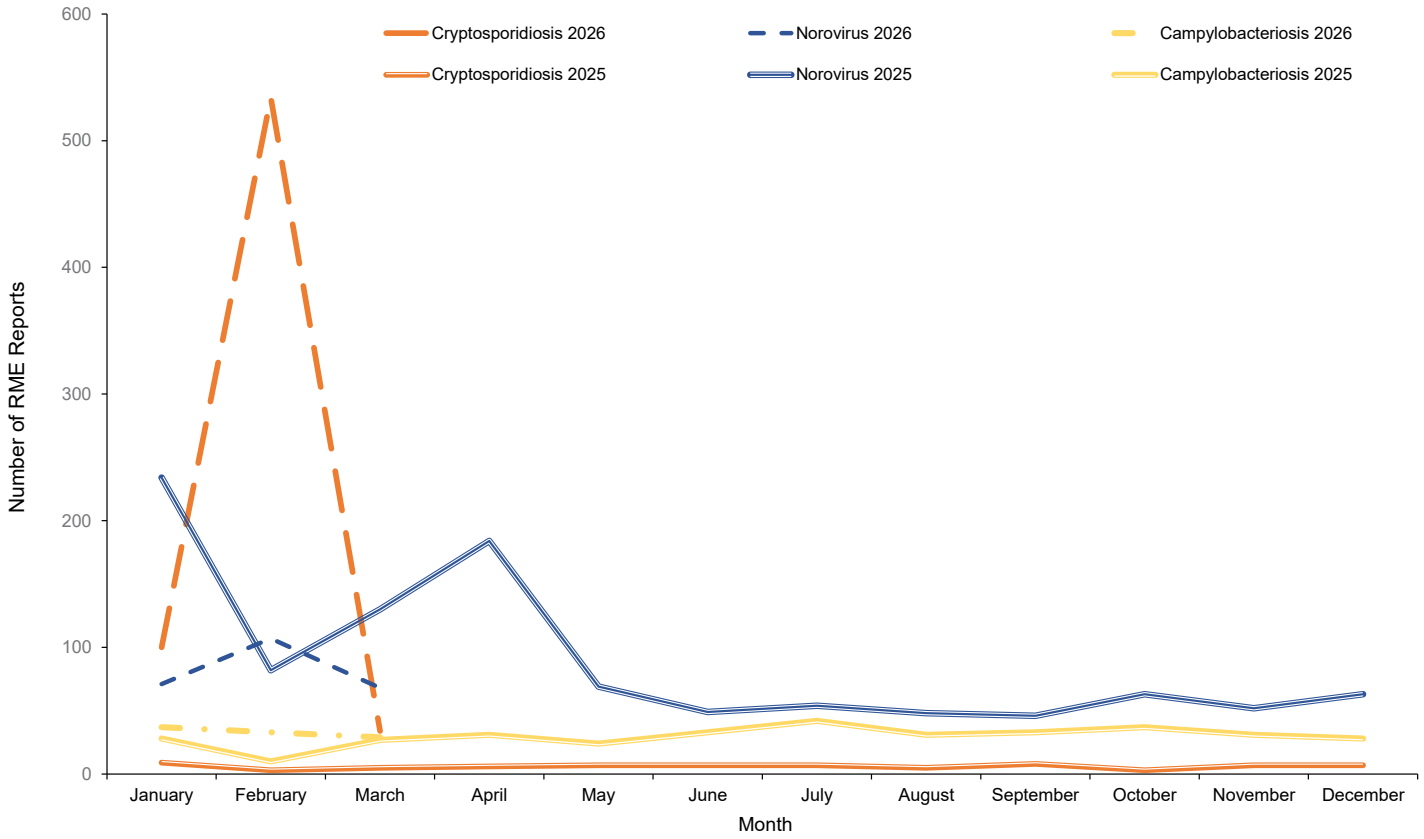
[a] Cases shown on a logarithmic scale.
[b] There were 0 reported cryptosporidiosis cases during weeks 14, 20, 25–26, 33, 38, 41–42, 47, and 52 of 2025, and weeks 1 and 13 of 2026.
[c] There were 0 reported cold weather injury cases during weeks 19, 22, 27–31, 33–36, and 39–41 of 2025.

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 a team of validators from Defense Centers for Public Health (DCPH). The DRSi collects reports on over 70 different RMEs, including infectious and non-infectious conditions, outbreak reports, sexually transmitted infection (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 graphs and table 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 5 most frequently reported RMEs for the prior year, or preceding 52 weeks. Each quarter, the graph is updated and presented with the quarter's (Q1, 2026) 5 most frequently reported RMEs, which may differ from those of previous quarters.

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

FIGURE 2. Selected Reportable Medical Events by Month, Active Component, U.S. Armed Forces, First Quarter, 2026



Abbreviation: RME, reportable medical event.

DRSi requires the reporting of numerous gastrointestinal (GI) illnesses.[1] In Q1 2026, the most frequently reported GI illnesses among U.S. active component service members were cryptosporidiosis, norovirus, and campylobacteriosis. An outbreak of cryptosporidiosis occurred in the Republic of Korea (ROK), with most cases reported in January and February 2026, which contributed to a much larger number of reports of cryptosporidiosis in Q1 2026 compared to the entire calendar year of 2025. The number of reports for norovirus in DRSi were lower in January and March 2026 than in their respective months in 2025, while the number of norovirus reports in February 2026 was slightly higher than February 2025. Additionally, campylobacteriosis reports in DRSi during the months of Q1 2026 remained similar to the number of reports seen in the months of Q1 2025.

DCPH-A developed the Communicable Disease Toolkit to provide guidance for reporting RME cases and outbreaks to DRSi.[2] Tools such as investigation worksheets and case definition flowcharts are available in the Communicable Disease Toolkit for all RMEs, including reportable GI illnesses.

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2. Defense Health Agency–Public Health. Communicable Disease Toolkit. health.mil. U.S. Dept. of War. Updated Apr. 14, 2025. Accessed Jul. 28, 2026. https://ph.health.mil/topics/healthsurv/de/Pages/cdt.aspx

TABLE. Reportable Medical Events, Military Health System Facilities, First Quarter, 2026[a]

Reportable Medical Event[b]	Active Component[c]					MHS Beneficiaries[d]
	Q1 2026[e]	YTD 2026[e]	Q1 2025[e]	YTD 2025[e]	Total 2025	Q1 2026
	No.	No.	No.	No.	No.	No.
Amebiasis	5	5	7	7	15	0
Arboviral diseases, neuroinvasive, non-neuroinvasive	0	0	0	0	4	0
Babesiosis	0	0	0	0	1	0
Botulism	0	0	0	0	0	1
COVID-19-associated hospitalization, death	2	2	15	15	33	23
Campylobacteriosis	99	99	65	65	355	50
Chlamydia trachomatis infection	3,252	3,252	3,636	3,636	14,877	358
Coccidioidomycosis	4	4	5	5	24	2
Cold weather injury[f]	289	289	231	231	444	N/A
Cryptosporidiosis[g]	668	668	17	17	74	6
Cyclosporiasis	0	0	1	1	22	0
Dengue virus infection	2	2	3	3	9	1
E. coli, Shiga toxin-producing	7	7	6	6	58	11
Ehrlichiosis, anaplasmosis	0	0	0	0	1	0
Giardiasis	16	16	22	22	103	12
Gonorrhea	563	563	554	554	2,339	48
H. influenzae, invasive	0	0	1	1	2	1
Heat illness[f]	58	58	36	36	1,413	N/A
Hepatitis A	0	0	0	0	2	0
Hepatitis B, acute, chronic	11	11	19	19	83	18
Hepatitis C, acute, chronic	3	3	7	7	28	7
Influenza-associated hospitalization[h]	23	23	39	39	68	73
Lead poisoning, pediatric[i]	N/A	N/A	N/A	N/A	N/A	13
Legionellosis	0	0	0	0	2	2
Leishmaniasis	1	1	0	0	1	0
Listeriosis	0	0	1	1	1	0
Lyme disease	8	8	6	6	74	3
Malaria	8	8	1	1	29	2
Measles	0	0	0	0	0	1
Meningococcal disease	0	0	0	0	2	0
Mpox	1	1	2	2	11	0
Mumps	0	0	1	1	1	1
Norovirus infection	246	246	446	446	1,074	241
Pertussis	6	6	14	14	42	9
Q fever	0	0	0	0	2	0
Rabies post-exposure prophylaxis (PEP)	112	112	128	128	647	104
Salmonellosis	18	18	20	20	164	22
Shigellosis	9	9	6	6	25	1
Spotted fever rickettsiosis	2	2	3	3	33	1
Syphilis	106	106	112	112	465	24
Toxic shock syndrome	0	0	0	0	1	0
Trypanosomiasis	1	1	1	1	2	0
Tuberculosis	2	2	1	1	8	1
Tularemia	0	0	0	0	2	0
Typhus fever	0	0	1	1	10	0
Varicella	3	3	2	2	15	13
Zika virus infection	1	1	0	0	0	0
Total case counts	5,526	5,526	5,409	5,409	22,566	1,049

Abbreviations: MHS, Military Health System; Q1, first quarter; YTD, year-to-date; No., number; COVID-19, coronavirus disease 2019; N/A, not applicable; *E., Escherichia*; *H., Haemophilus*; PEP, post-exposure prophylaxis; RME, reportable medical event; DRSi, Disease Reporting System internet.

[a] RMEs submitted to DRSi as of Jul. 20, 2026, classified by date of diagnosis or, where unavailable, date of onset. Q1 comparisons displayed for the period Jan. 1, 2026–Mar. 31, 2026 (current year) and Jan. 1, 2025–Mar. 31, 2025 (previous year). YTD comparisons are displayed for period Jan. 1, 2026–Mar. 31, 2026 (current year) and Jan. 1, 2026–Mar. 31, 2026. Total 2025 count includes period Jan. 1, 2025–Dec. 31, 2025. All displayed counts from MHS facilities.

[b] RME categories with 0 reported cases among active component service members and MHS beneficiaries for periods covered are not included.

[c] Branches of service included in this report are the Army, Navy, Air Force, Marine Corps, Coast Guard, and Space Force, including personnel classified as active duty, cadet, midshipman, or recruit in DRSi.

[d] Beneficiaries include individuals classified as retired and family members, i.e. spouse, child, other, unknown; National Guard, reservists, civilians, contractors, and foreign nationals excluded from these counts.

[e] Q1 and YTD counts are same for first quarterly report of each year; otherwise, quarter and YTD counts will vary.

[f] Only reportable for service members.

[g] Large number of cryptosporidiosis cases reported in 2026 due to large outbreak in Jan.-Feb. 2026 in Republic of Korea.

[h] Influenza-associated hospitalization reportable only for individuals younger than age 65 years.

[i] Pediatric lead poisoning reportable only for children ages 6 years or younger.

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