U.S. Army Public Health Center

Public Health Report

Surveillance of Substance Abuse and Dependence:
U.S. Army Soldiers, January 2016–December 2019

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General Medicine 500-A, Public Health Data

October 2021

APHC

ACKNOWLEDGMENTS

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SURVEILLANCE OF SUBSTANCE ABUSE AND DEPENDENCE:
U.S. ARMY SOLDIERS
JANUARY 2016–DECEMBER 2019

1   SUMMARY

1.1   Purpose

The Division of Behavioral and Social Health Outcomes Practice (BSHOP) estimated the prevalence and incidence of substance abuse and dependence among U.S Active Component (AC) Army Soldiers during 2016–2019. The goal of this surveillance effort was to report on the epidemiology of substance abuse and dependence in AC Soldiers using various military administrative data sources. The objectives included reporting the number of Soldiers in each of three categories: 1) those who had a medical encounter for substance abuse or dependence, 2) those who were prescribed opioids, and 3) those who reported symptoms of alcohol use disorder (AUD). Findings from this report will inform Army leadership about the prevalence of substance abuse and dependence among Soldiers and statistically significant trends over the 4-year period. Moreover, these data provide an opportunity to report the true burden of substance abuse and dependence and provide insights into opioid-prescribing patterns within the Army.

1.2   Methodology

This retrospective surveillance analysis used multiple military administrative databases to comprehensively report on substance abuse and dependence. Medical encounters with substance-related codes from the International Classification of Diseases, 10th edition (ICD-10 codes) in the first diagnosis position were extracted from data in the Military Health System Data Repository and categorized by substance type: alcohol, opioid, cannabis, hallucinogen, cocaine, inhalant, psychoactive, sedative, and stimulant. The National Drug Code classification system—which assigns a unique identifier to each drug—was used to identify prescriptions for opioids in data from the Pharmacy Data Transaction Service. Opioid prescriptions were categorized as high-dose or low-dose based on the amount of morphine in milligrams equivalent (MME) of the opioid dose prescribed. The Alcohol Use Disorder Identification Test-Concise (AUDIT-C)—a self-report screening tool on the Periodic Health Assessment (PHA)—was used to identify the proportion of Soldiers who screened positive for potential AUD or hazardous drinking behaviors. Crude and stratified annual rates were calculated for substance abuse and dependence encounters and high-dose opioid prescriptions. Simple and multiple logistic regression analyses identified behavioral and social health factors significantly associated with AUD.

1.3. Results

1.3.1 Medical Encounters for Substance Abuse and Dependence

From 2016 to 2019, 38,162 AC Soldiers accounted for 672,236 medical encounters for substance abuse or dependence; 85% (n=32,262) had their first encounter for substance abuse and dependence over the 4-year period. Annual rates of encounters for substance abuse and

dependence showed a declining trend, but this was not statistically significant. However, rates of encounters for opioid abuse and dependence decreased significantly over the 4-year period. Initial encounters were generally for dependence, particularly where the encounter was for opioids, with 67% for dependence and 33% for abuse. The highest rates of encounters for substance abuse and dependence were among Soldiers who were male, junior enlisted (E1–E4), young (17–24 years old), or American Indian/Alaska Native. Alcohol, cannabis, and opioids were the substances most frequently documented.

1.3.2 Opioid Prescriptions

From 2016 to 2019, 319,813 Soldiers were prescribed opioids, and 8% of these individuals (n=24,928) had a high-dose prescription. The highest proportions of Soldiers with at least one prescription of opioid or high-dose opioid prescription were among those with any of these characteristics: male, White, married, junior enlisted, or having a high school-education. However, Soldiers with high-dose prescriptions were generally age 25 or older, whereas those prescribed at least one opioid were mostly under age 25. The rates of high-dose opioid prescriptions decreased statistically over the 4-year period. Male and female Soldiers had similar rates of high-dose prescriptions over the observed time frame. Senior enlisted (E7–E9), 35–65-year-old, and American Indian/Alaska Native Soldiers had the highest rates of high-dose opioid prescriptions.

1.3.3 AUD

In 2016, 7% (n=43,217) of Soldiers who completed the AUDIT-C screened positive for hazardous drinking. Soldiers who reported symptoms of depression (OR=2.92, 95% CI: 2.78–3.06) and thoughts of violence (OR=2.83, 95% CI: 2.56–3.13) or suicide (OR=1.62, 95% CI: 1.45–1.80) had significantly higher odds of screening positive on the AUDIT-C compared to Soldiers who did not report such symptoms or thoughts.

1.4   Conclusion and Recommendations

Over the 4-year period, approximately 38,000 Soldiers accounted for 600,000 substance-related medical encounters, the majority of which were for alcohol abuse and dependence. This illustrates the chronic nature of substance abuse, requiring multiple contacts with the Behavioral Health System of Care. Although rates of high-dose opioid prescriptions are decreasing and may indicate improvements in prescribing patterns, the proportion of Soldiers prescribed high-dose opioids is still higher than corresponding estimates for the general population.

These findings illustrate the need to develop, refine, and implement public health interventions to target populations most at risk based on demographic and military characteristics such as young and American Indian Soldiers, and among Soldiers screened as potentially violent or suicidal. Findings also highlight the need to evaluate programs targeted at improving the continuum care for treatment of substance use disorders such as the Army Substance Use Disorder Clinical Care (SUDCC) intensive outpatient care and residential rehabilitation facilities. (Evaluation of the SUDCC is currently underway within BSHOP.) Additionally, future public health studies may incorporate hospitalizations, examine comorbidity—not only other behavioral

and social health conditions but injury as well—and assess potential impacts of the Coronavirus Disease 2019 pandemic.

2 REFERENCES

Appendix A lists references used within this report.

3 AUTHORITY

The authority for this report is Army Regulation 40–5 (*Preventive Medicine*, 25 May 2007).

4 BACKGROUND

From 2001 to 2012, an estimated 10–15% of the U.S. population was diagnosed with a substance use disorder (SUD)[1,2] with the highest proportion occurring among adults between ages 18–44.[1] SUDs often co-occur with mental health conditions[1,3] and sexually transmitted infections,[4,5] resulting in high healthcare utilization and economic costs. The work environment is often linked to substance use; people in occupations characterized by high physical job demands and hazardous working conditions are at increased risk for being diagnosed with a SUD.[6]

Due to the composition of the Army—over 75% of Soldiers are 18–40 years old[7]—and high levels of occupational stress indicated by frequent physical training-related injuries[8] and trauma exposure particularly during deployment,[9] the Soldier population may be at increased risk for SUDs. Soldiers who return from deployment are often prescribed multiple opioid medications (e.g., oxycodone and morphine) and psychoactive medications (i.e., antipsychotics, mood stabilizers, anti-depressants, anti-obsessive agents, anti-anxiety agents, and stimulants) to treat a variety of health conditions.[10,11] Individuals who are regularly prescribed opioid and psychoactive medications are of particular interest due to substantial evidence that this practice is a precursor to misuse, abuse and overdose.[11,12,13] Consequently, routine surveillance for SUD within the military is needed.

Current surveillance efforts consist of an anonymous survey containing questions on alcohol and drug use that has been distributed to a randomly selected representative sample of Service Members from the Army, Navy, Marine Corps, Coast Guard, and Air Force every three years since 1980. According to recent statistics from this Department of Defense Health Related Behavior Survey, the use of illicit drugs—including marijuana, cocaine, or prescription misuse—is on the rise, with estimates ranging from 3.4% in 2002 to 12% in 2008.[14] However, these estimates are often presented in aggregate form. The three-year interval between data collection could potentially miss a critical period and requires more frequent observations. To our knowledge, few, if any studies provide estimates of the incidence or prevalence of substance abuse and dependence, including prescription misuse, in the Army population.

5   METHODS

5.1   Design Overview and Population

This analysis provides a comprehensive examination of substance abuse and dependence and of opioid prescribing patterns in the U.S Army population during 2016–2019. Multiple administrative data sources were used to identify Soldiers who 1) had at least one medical encounter for substance abuse or dependence, 2) had a prescription for opioid medication, or 3) who were at high risk for hazardous drinking behavior or AUD. The source population was restricted to AC Soldiers who made contact with the Military Health System (MHS) by receiving care or medication prescriptions at a Military Treatment Facility (MTF) or civilian health institution through TRICARE®, or AC Soldiers who completed the AUDIT-C on the PHA. Soldiers without a personnel record or missing information on all demographic and military characteristics (race-ethnicity, date of birth, marital status, and educational level) were excluded (n=3,834). Soldiers with missing information on the PHA were excluded during the analysis (n=43,739). The following sections provide details pertaining to the data sources and the metrics.

5.2   Data Sources

5.2.1 Military Health System Data Repository (MDR)

Inpatient and outpatient medical encounters by AC Soldiers are collected from various health administrative databases and compiled in the MDR. MDR[15] compiles all medical services rendered or contacts made with the health system over a Service Member's military career from the following sources: Standard Inpatient Data Record (SIDR), Comprehensive Ambulatory/Professional Encounter Record (CAPER), TRICARE Encounter Data-Institutional (TED-I), Non-Institutional (TED-NI), and Pharmacy Data Transaction Service (PDTS). SIDR and CAPER contain medical services received at MTFs and created from clinical data entered into the Composite Health Care System and/or Armed Forces Health Longitudinal Technology Application. TED-I and TED-NI include inpatient and outpatient encounters that occurred at civilian health institutions and were paid for through the TRICARE purchased care program. The PDTS contains all prescriptions filled at MTFs or under TRICARE and was used as the source for opioid prescriptions.

5.2.2 PHA

The PHA[16] is a health screening tool Soldiers complete annually, which is used to determine medical and combat readiness by collecting information on a variety of health conditions and adverse exposures, including sexually transmitted infections, chronic diseases, behavioral health, violence, and occupational-related hazards. The PHA is completed electronically using the Medical Health Assessment application via the Medical Protection System. Once completed, a health care provider reviews the form, provides recommendations on follow-up care, and determines if a Soldier is deployable. The PHA provided information used to determine the

proportion of AC Soldiers who screened positive for AUD or hazardous drinking behaviors in 2016.

5.2.3 Defense Manpower Data Center

The Defense Manpower Data Center (DMDC)[17] is a data repository that receives and maintains demographic, military, and deployment information on all military personnel, thus creating an archive of information about a Soldier's military career. Population totals (or rate denominators), demographic and military characteristics were obtained from DMDC.

5.3   Metrics

5.3.1 Medical Encounters for Substance Abuse and Dependence

Medical encounters in MDR with substance abuse and dependence codes from the International Classification of Diseases, 9th (ICD-9 codes) and 10th (ICD-10 codes) editions in the first diagnosis position were extracted and categorized by substance type: alcohol, opioid, cannabis, hallucinogen, cocaine, inhalant, psychoactive, sedative, and stimulant. Medical records from 2016 to 2019 were compared to records from 2015 to 2000 to identify incident cases, i.e., Soldiers whose first medical encounter for substance abuse and dependence occurred after 2015. See Appendix B, Table B1, for a list of ICD-9 and ICD-10 codes by substance type.

5.3.2 Opioid Prescriptions

The National Drug Code (NDC) classification system[18]—which assigns a unique identifier to each prescription drug—and a list of NDCs for opioid from the Centers for Disease Control and Prevention (CDC)[19] were used to identify opioid prescriptions. The number of days of supply, number of units or pills, and strength per unit or pill were collected from the prescription in PDTS. The MME conversion factor—provided by the CDC—is used to standardize the amount of opioid dispensed for each prescription or determine the potency of each opioid medication prescribed. This was used to calculate MME/day (MME*Strength per unit*(number of units/days of supply)) and to stratify the dosage as high (i.e., ≥90 MME/day) or low dose.

5.3.3 AUD

The AUDIT-C[20] is a self-report screening tool on the PHA that evaluates hazardous drinking behavior and potential AUD using three questions about the frequency of alcohol consumption. Responses are on a 5-point scale (0–4) with scores ranging from 0 to 12. Based on the PHA provider guidelines, men with scores over 4 and women with scores over 3 were considered positive for hazardous drinking behavior or AUD.

5.3.4 Post Traumatic Stress Disorder (PTSD) and Depression Symptoms

Depression and PTSD are associated with AUD within the military population.[21,22] The Primary Care-*Post Traumatic Stress Disorder* (PC-PTSD)[23] is a self-report screening tool on the PHA

that measures the effect of trauma on daily life over the last 30 days. There are four 'yes' or 'no' questions. A response of 'yes' on two or more questions indicates a positive result and prompts the completion of a second instrument, the PTSD Checklist–Civilian.[24] This 17-item tool measures how bothersome symptoms of PTSD (e.g., disturbing dreams, avoidance, and trouble sleeping) have been over the last month using a 5-point Likert scale (i.e., 1=not at all, 5=extremely) with scores ranging from 17 to 85. Soldiers with a score over 39 were categorized as displaying moderate to severe PTSD symptoms.[25]

The Patient Health Questionnaire (PHQ)-2[26] is a two-question self-report screening tool on the PHA that assesses the frequency of *depression symptoms* (e.g., hopelessness, poor appetite, and trouble concentrating) over the last two weeks using a 4-point Likert scale (i.e., 0=not at all, 3=nearly every day). A response of "more than half the days" or "nearly every day" on at least one question prompts the completion of the 8-item version: the PHQ-8. Soldiers with a score over 14 (score range: 0–24)[27] were considered positive for moderate to severe depression symptoms.

5.3.5 Social Indicators

Social indicators, such as the potential for violent behavior, suicidal risk, and experiencing major life stressors have been identified as risk factors of alcohol misuse within the military and general populations.[21,28] These factors were measured using several questions on the PHA. The following question captures a Soldier's potential to exhibit violent behavior: *"Over the past month have you had thoughts or concerns that you might hurt or lose control with someone?"* The question *"Over the past month, have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way?"* identifies Soldiers who have had *suicidal thoughts*. Soldiers who responded to the following question were categorized as having experienced a significant life stressor: *"Over the past month, what major life stressors have you experienced that are a cause of significant concern or make it difficult for you to do your work, take care of things at home, or get along with other people (for example, serious conflicts with others, relationship problems, or a legal, disciplinary, or financial problem)?"*

5.3.6 Personal Characteristics

Demographic and military characteristics obtained from DMDC include sex (male, female), age (17–24, 25–34, 35–64), rank (junior enlisted (E1–E4), non-commissioned officers (E5–E6), senior enlisted (E7–E9), officers (O1–O8), and warrant officers (W1–W5)), educational level (high school graduate, some undergraduate, undergraduate degree, graduate degree or higher), race-ethnicity (non-Hispanic Black, non-Hispanic White, Hispanic, non-Hispanic Asian/Pacific Islander, non-Hispanic American Indian/Alaska Native), and marital status (married, single, divorced, other).

5.4   Analysis

The population of Soldiers who 1) had at least one medical encounter for substance abuse or dependence, 2) had been prescribed at least one opioid medication or high-dose opioid

medication, or 3) reported symptoms of AUD were described by behavioral and social health factors using univariate statistics (e.g., percent and frequency).

Objective 1: The distribution of medical encounters for abuse and dependence were reported for the five most frequently documented substances for incident and prevalent cases. Crude annual rates of substance-related medical encounters were calculated by dividing the number of substance-related medical encounters by total population and reported per 100,000 Soldiers, overall and stratified by substance type, sex, rank, age and race-ethnicity. See Appendix B, Table B2, for overall and stratum-specific rates of medical encounters for substance abuse and dependence. Linear regression was used to test for statistically significant trends over the specified time period.

Objective 2: Annual crude and stratified (i.e. by sex, rank, age and race-ethnicity) rates of high-dose opioid medication prescribing patterns were calculated by dividing the number of unique high-dose prescriptions by total populations and reported per 100,000 Soldiers. Overall and stratum-specific rates of high-dose opioid prescriptions are provided in Appendix B, Table B3. Linear regression was used to test for overall and strata-specific trends over the specified time period.

Objective 3: Chi-square analysis was used to assess significant relationships between symptoms of AUD and demographic and military characteristics, social indicators, and depression and PTSD symptoms. Based on this assessment and the literature, the most parsimonious model was constructed to determine which characteristics were significantly associated with screening positive for AUD on the AUDIT-C using multivariable logistic regression. Akaike Information Criterion was used to compare goodness of fit between models. Crude and adjusted odds ratios, along with 95% confidence intervals, were calculated and reported.

6   RESULTS

6.1   Medical Encounters for Substance Abuse and Dependence

From 2016 to 2019, a total of 672,236 medical encounters for abuse or dependence were documented among 38,162 U.S. Army Active Duty Soldiers. The majority of this population consisted of Soldiers who were male (90%), under age 25 (56%), White (52%), single (53%), junior enlisted (68%), and high school graduates (82%) (Table 1). Nearly all (84%) were incident cases. Seventy percent (n=473,128) of the total number of encounters and 41% (n=13,198) of first encounters were for dependence. The majority of encounters were for dependence; the substances most frequently treated were alcohol (72%), cocaine (68%), stimulants (64%) and opioids (90%) (Figure 1). Encounters for cannabis were evenly distributed between abuse (52%) and dependence (48%). Among incident cases, there were higher proportions of encounters for abuse among four of the five most frequently treated substances; only opioids had a significantly higher proportion of encounters for dependence (67%) (Figure 2).

The highest rate of medical encounters for substance abuse and dependence over the 4-year period occurred during 2017 (41,351 encounters per 100,000 Soldiers) (Figure 3). From 2016–2019, the substances with the highest rates of medical encounters were alcohol (28,450 to 35,586 encounters per 100,000 Soldiers) and cannabis (2,164 to 2,949 encounters per 100,000 Soldiers) (Figure 4). There was a statistically significant decline in the rates of opioid medical encounters during 2016–2019 (β= -276.92, p=0.01). Across all years, male Soldiers had higher rates of encounters (34,549 to 43,669 encounters per 100,000 Soldiers) compared to female Soldiers (Figure 5). Junior enlisted Soldiers (47,954 to 58,309 encounters per 100,000 Solders) and Soldiers in the 17–24-year-old age range (42,769 to 53,051 encounters per 100,000 Soldiers) had the highest rates of medical encounters (Figures 6 and 7, respectively). American Indian/Alaska Native Soldiers had the highest rates of medical encounters (81,877 to 111,415 encounters per 100,000 Soldiers) compared to Soldiers in other race-ethnicity categories (Figure 8).

**Table 1. Demographic and military characteristics[a]
of U.S. Army Active Soldiers with encounters for substance
abuse and dependence[b] during CY 2016–2019 (n=38,162)[c] n(%)**

	2016–2019 n(%)
Sex	
Male	34,477 (90)
Female	3,685 (10)
Age (yr)	
17–24	21,413 (56)
25–34	12,315 (32)
35–64	4,434 (12)
Race-Ethnicity	
Non-Hispanic White	19,829 (52)
Non-Hispanic Black	10,421 (27)
Hispanic	5,665 (15)
Non-Hispanic Asian/Pacific Islander	1,418 (4)
Non-Hispanic American Indian/Alaska Native	634 (2)
Marital Status	
Single	20,376 (53)
Married	15,996 (42)
Divorced	1,716 (5)
Other[d]	70 (0.2)
Rank	
E1–E4	26,051 (68)
E5–E6	8,333 (22)

	2016–2019 n(%)
E7–E9	2,225 (6)
O1–O8	1,273 (3)
W1–W5	280 (1)
Education	
Graduate Degree or Higher	553 (2)
Undergraduate Degree	3,267 (9)
Some Undergraduate	2,600 (7)
High School Graduate	31,419 (82)
Case Type	
Incident[e]	32,262 (85)
Prevalent[f]	5,900 (15)

Legend:
CY = Calendar Year
E = Enlisted
O = Officer
W = Warrant Officer
Notes:
[a]Data obtained from Defense Manpower Data Center (DMDC).
[b]Data obtained from the Military Health System Data Repository (MDR).
[c]Included Soldiers missing information for race-ethnicity (n=195), marital status (n=4), and educational level (n=323).
[d]Included widowed and legally separated.
[e]Included Soldiers whose first encounter for substance abuse and dependence occurred after 2015.
[f]Included Soldiers whose first encounter for substance abuse and dependence occurred before 2016.
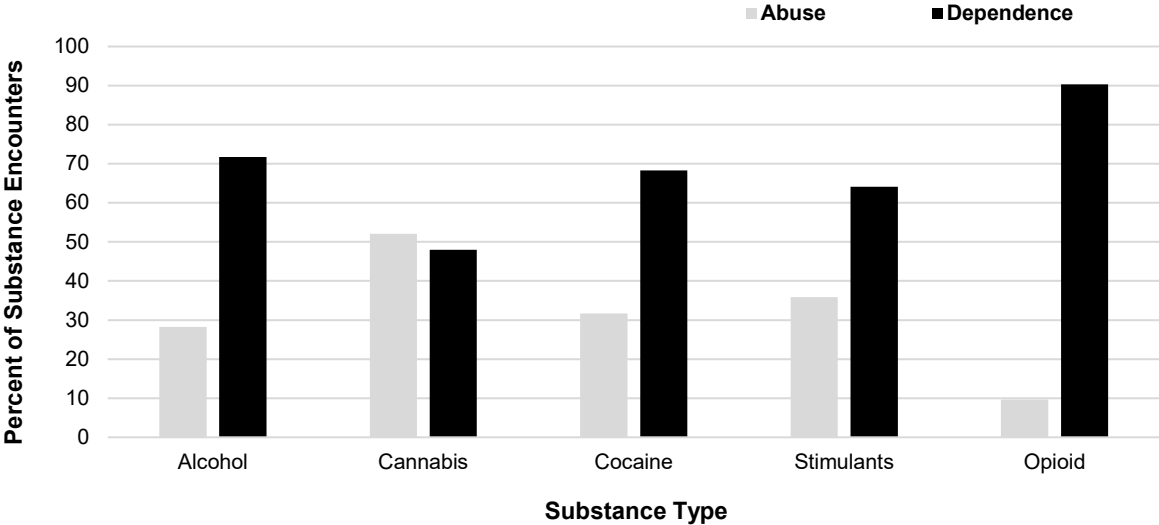
Figure 1. Distribution of medical encounters between abuse and dependence for the five most frequently treated substances, U.S. Army Active Component Soldiers, 2016–2019. (n=662,788)
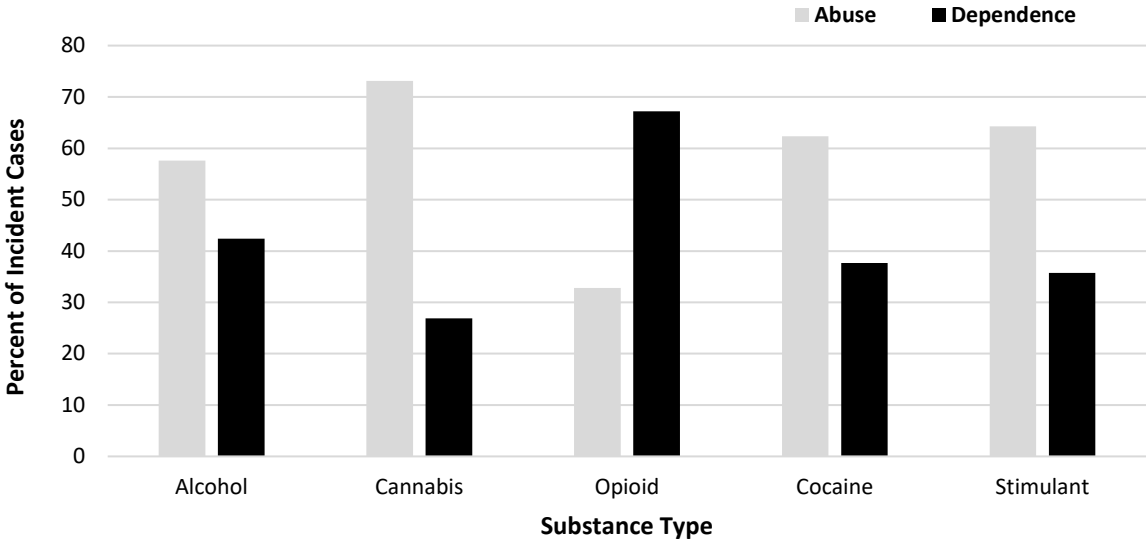
Figure 2. Distribution of first encounters for abuse and dependence among the five most frequently treated substances, U.S. Army Active Component Soldiers, 2016–2019. (n=32,262)
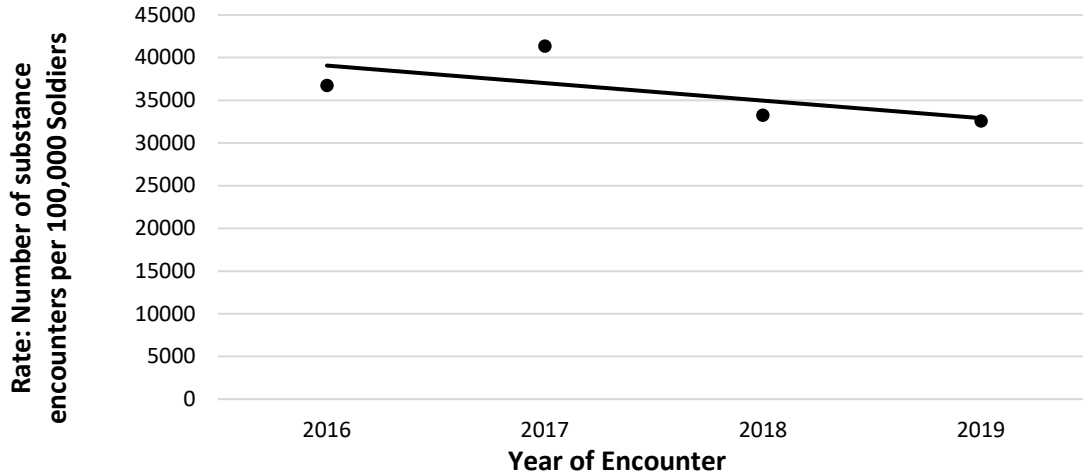
Figure 3. Unadjusted annual rates of medical encounters for substance abuse and dependence among U.S. Army Active Component Soldiers, 2016–2019. (n=672,236)
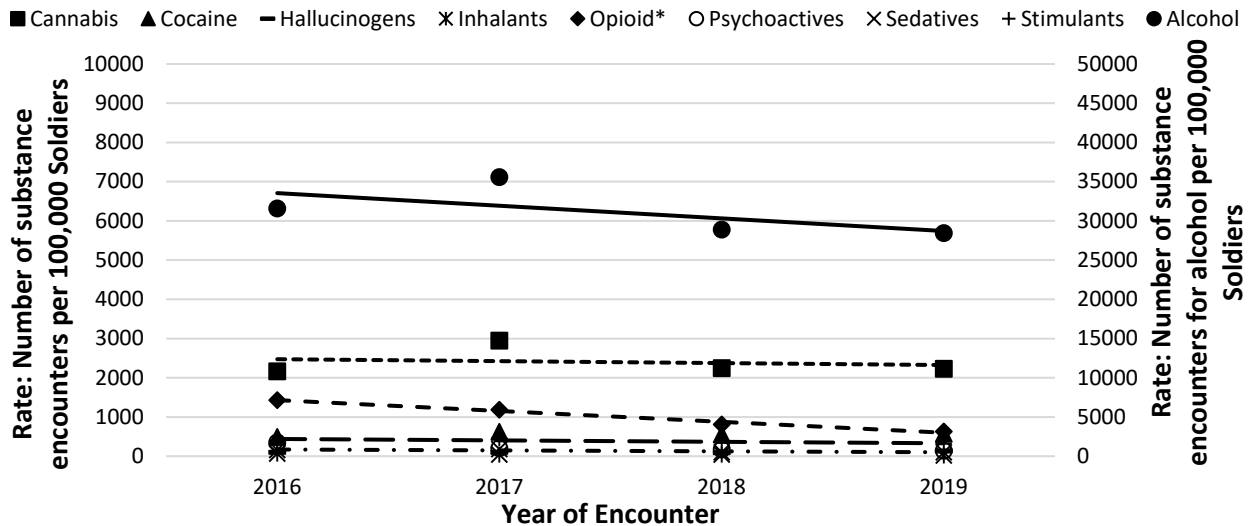
Figure 4. Unadjusted annual rates of medical encounters for substance abuse and dependence by substance type among U.S. Army Active Component Soldiers, 2016–2019. (n=672,236)

Note: *Statistically significant declining trend was observed (β= -276.92, p = 0.01)
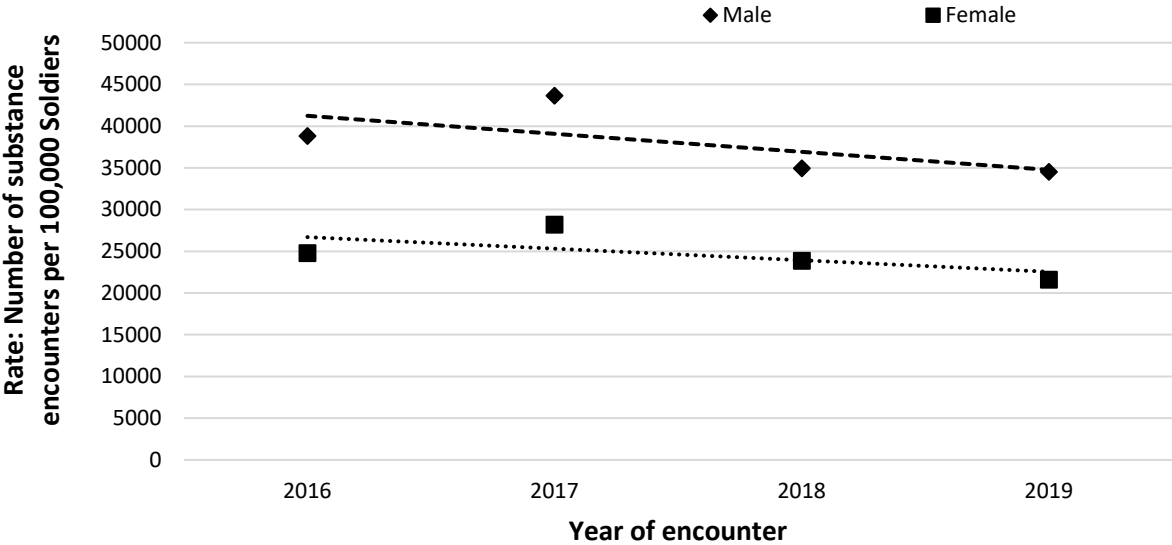
Figure 5. Stratified annual rates of medical encounters for substance abuse and dependence by sex among U.S. Army Active Component Soldiers, 2016–2019. (n=672,236)
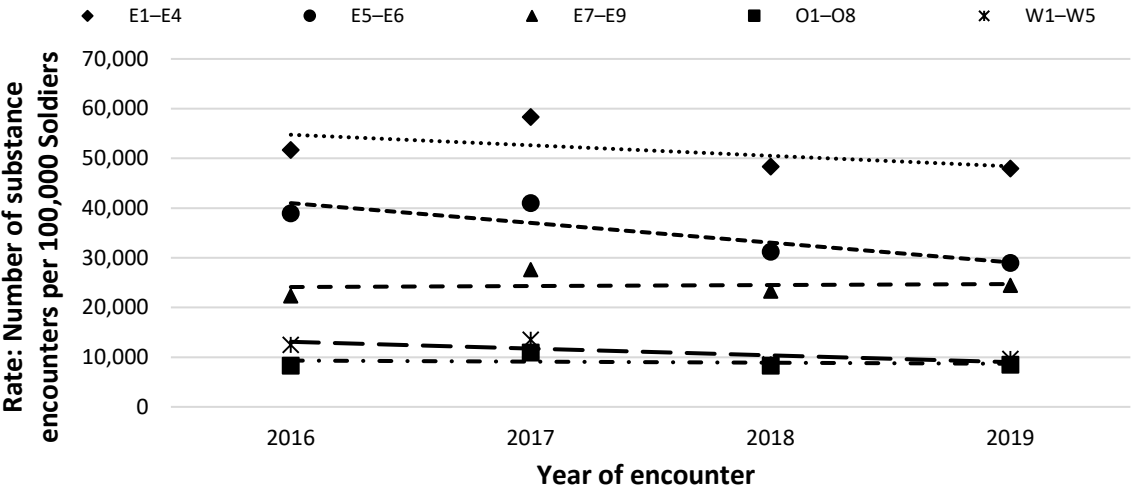
Figure 6. Stratified annual rates of medical encounters for substance abuse and dependence by rank among U.S. Army Active Component Soldiers, 2016–2019. (n=672,236)
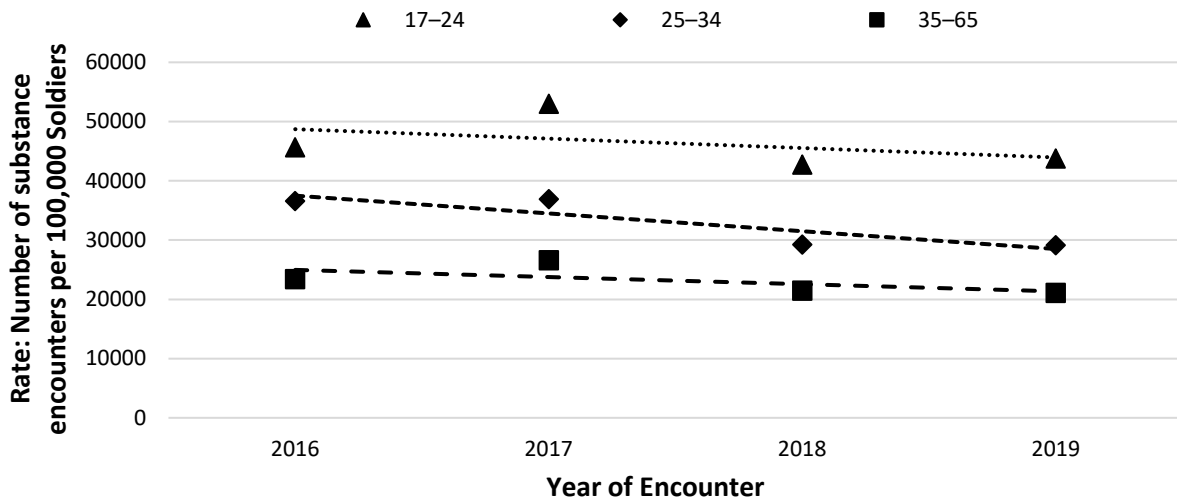
Figure 7. Stratified annual rates of medical encounters for substance abuse and dependence by age among U.S. Army Active Component Soldiers, 2016–2019. (n=672,236)
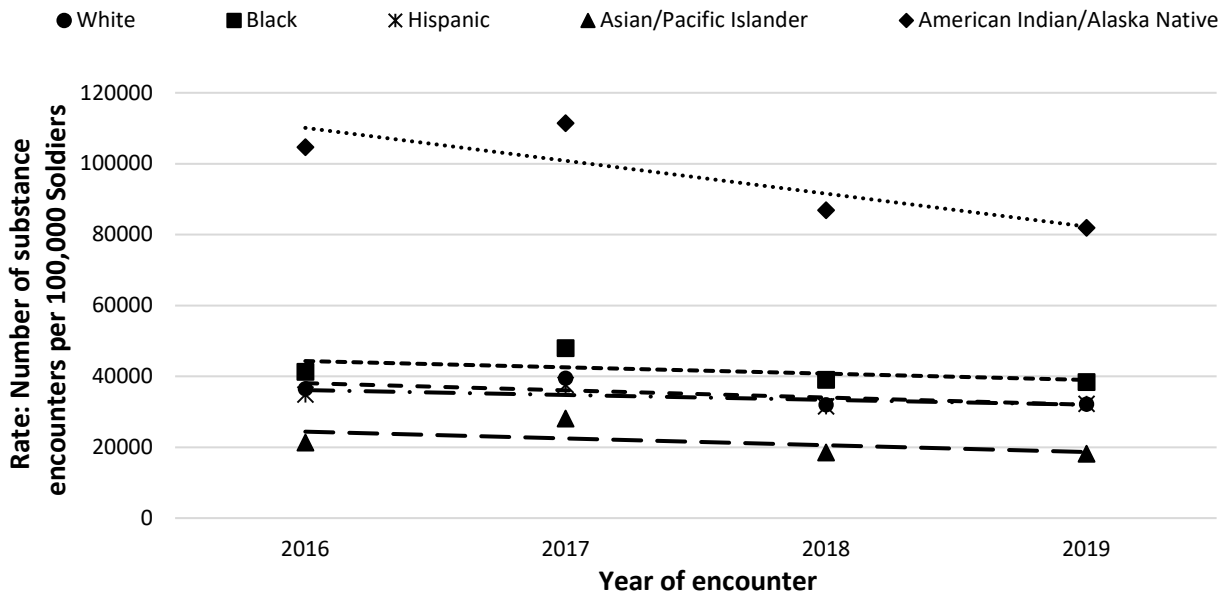
Figure 8. Stratified annual rates of medical encounters for substance abuse and dependence by race-ethnicity, U.S. Army Active Component Soldiers, 2016–2019. (n=672,236)

6.2   Opioid Prescriptions

There were 1,009,817 opioid prescriptions among 319,813 U.S. Army Active Duty Soldiers from 2016 to 2019. Of those with at least one opioid prescription over the 4-year period, 8% (n=24,928) had at least one high-dose opioid prescription (Table 2). Some characteristics were similar for both Soldiers with at least one opioid prescription and those with high-dose prescriptions: most were male (83% and 84%, respectively), non-Hispanic White (66% and 68%, respectively), married (54% and 65%, respectively), and high school graduates (64% and 56%, respectively). However, there were significant differences by age and rank. Soldiers with any opioid prescription were generally under age 24 (42%) and junior enlisted (51%), whereas Soldiers with a high-dose opioid prescription were older or over age 24 (72%) and split between junior enlisted (35%) and non-commissioned officers (28%). The majority of prescriptions for any opioids and high-dose opioids were filled at MTFs (88% and 79%, respectively) and were primarily for oxycodone (53% and 87%, respectively), followed by hydrocodone (28% and 8%, respectively) (not tabled).

The rate of high-dose opioid prescriptions declined significantly (β=-775, $p < 0.01$) across the 4-year period (Figure 9). The annual rates of high-dose prescriptions were equally high among male (995 to 2,841 high-dose prescriptions per 100,000 Soldiers) and female (1,107 to 2,768 high-dose prescriptions per 100,000 Soldiers) Soldiers (Figure 10). Senior enlisted Soldiers had the highest rates of high-dose opioid prescriptions (2,027 to 5,170 high-dose prescriptions per 100,000 Soldiers), while junior enlisted Soldiers had the lowest rates (728 to 2,192 high-dose prescriptions per 100,000 Soldiers) (Figure 11). However, in 2019, rates were lowest and similar across all rank categories. White Soldiers (1,056 to 3,120 high-dose prescriptions per 100,000 Soldiers) and non-Hispanic American Indian/Alaska Native Soldiers (1,774 to 4,200 high-dose prescriptions per 100,000 Soldiers) had similarly high rates of high-dose opioid prescriptions across the 4-year period, while Hispanic Soldiers (928 to 2,464 high-dose prescriptions per 100,000 Soldiers) had the lowest rates (Figure 12). Soldiers between the 35–65-year-old age range had the highest rates of high-dose opioid prescriptions (1,734 to 4,445 high-dose opioid prescriptions per 100,000 Soldiers) (Figure 13).

Table 2. Demographic and military characteristics[a] of U.S. Army Active Component Soldiers prescribed opioid medication during CY 2016–2019 n(%)

	Soldiers Prescribed Opioids[b] 2016–2019	
	All (n=319,813)	**High-Dose[c] (n=24,928)**
Sex		
Male	265,117 (83)	21,028 (84)
Female	54,696 (17)	3,900 (16)
Age (yr)		
17–24	132,798 (42)	6,832 (27)
25–34	111,026 (35)	9,292 (37)
35–64	75,989 (24)	8,804 (35)

	Soldiers Prescribed Opioids[b] 2016–2019	
	All (n=319,813)	**High-Dose[c] (n=24,928)**
Race-Ethnicity[d]		
Non-Hispanic White	170,587 (54)	14,492 (59)
Non-Hispanic Black	4,486 (24)	5,296 (22)
Hispanic	49,427 (16)	3,424 (14)
Non-Hispanic Asian/Pacific Islander	19,037 (6)	1,109 (5)
Non-Hispanic American Indian/Alaska Native	2,978 (1)	278 (1)
Marital Status[e]		
Single	131,246 (41)	6,845 (27)
Married	171,694 (54)	16,325 (66)
Divorced	16,380 (5)	1,699 (7)
Other[f]	467 (0.2)	56 (0.2)
Rank		
E1–E4	163,070 (51)	9,077 (36)
E5–E6	74,011 (23)	7,017 (28)
E7–E9	34,324 (11)	4,290 (17)
O1–O8	40,349 (13)	3,651 (15)
W1–W5	8,059 (3)	893 (4)
Education[f]		
Graduate Degree or Higher	22,529 (7)	2,240 (9)
Undergraduate Degree	60,687 (19)	5,501 (22)
Some Undergraduate	29,923 (9)	2,989 (12)
High School Graduate	204,513 (64)	13,953 (56)

Legend:
CY = Calendar Year
E = Enlisted
O = Officer
W = Warrant Officer
Notes:
[a]Data obtained from Defense Manpower Data Center (DMDC).
[b]Data obtained from Pharmacy Data Transaction System.
[c]Dosage ≥90 morphine milligram equivalent (MME).
[d]Race-ethnicity information was missing for 329 Soldiers.
[e]Marital status was missing for 3 Soldiers.
[f]Included widowed and legally separated.
[g]Educational level was missing for 208 Soldiers.
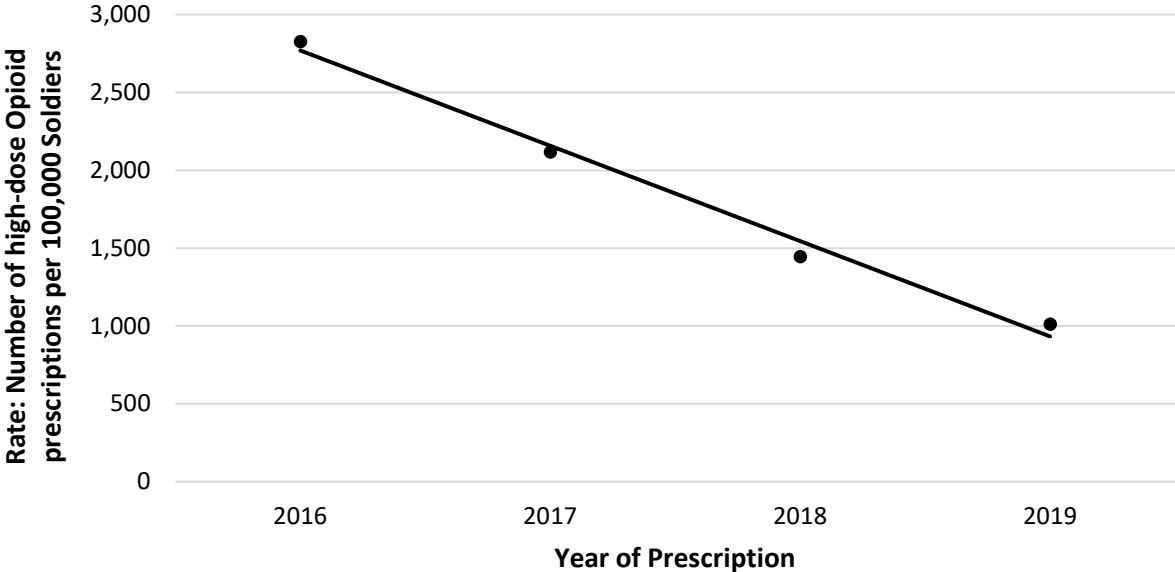
Figure 9. Unadjusted annual rates of high-dose opioid prescriptions among U.S. Army Component Soldiers, 2016–2019. (n=34,602)
Note: *Statistically significant declining trend was observed (β= -775, p < 0.01)
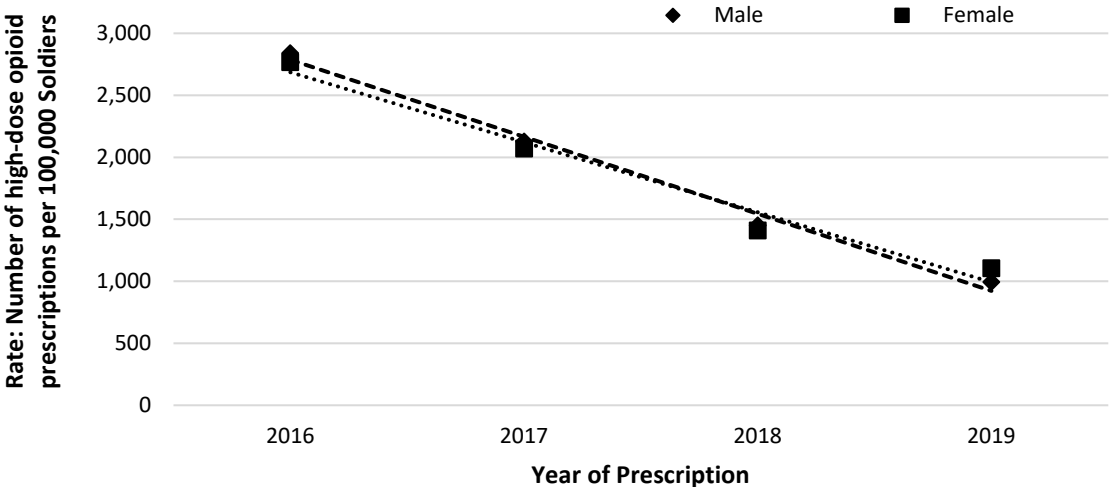
Figure 10. Stratified annual rates of high-dose opioid prescriptions by sex among U.S. Army Active Component Soldiers, 2016–2019. (n=34,602)
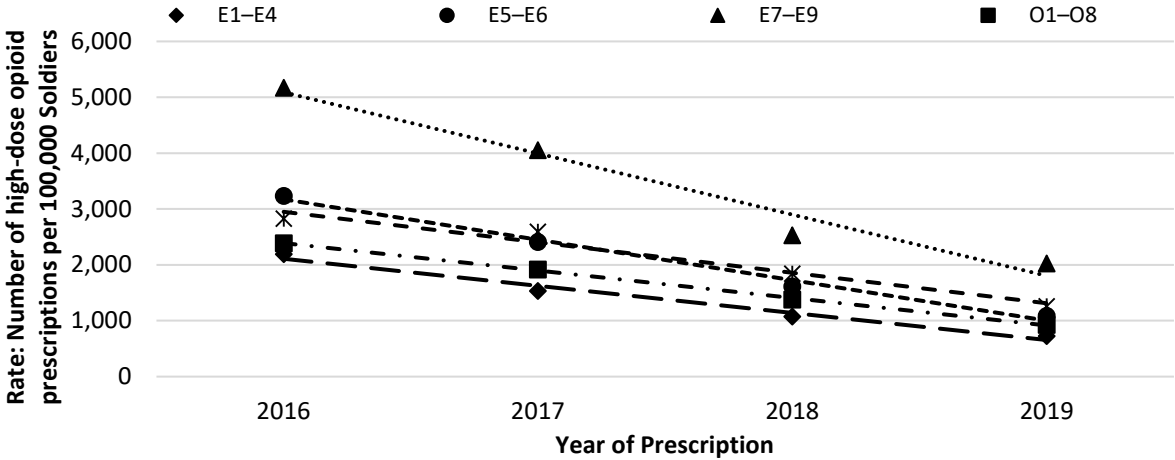
Figure 11. Stratified annual rates of high-dose opioid prescriptions by rank among U.S. Army Active Component Soldiers, 2016–2019. (n=34,602)
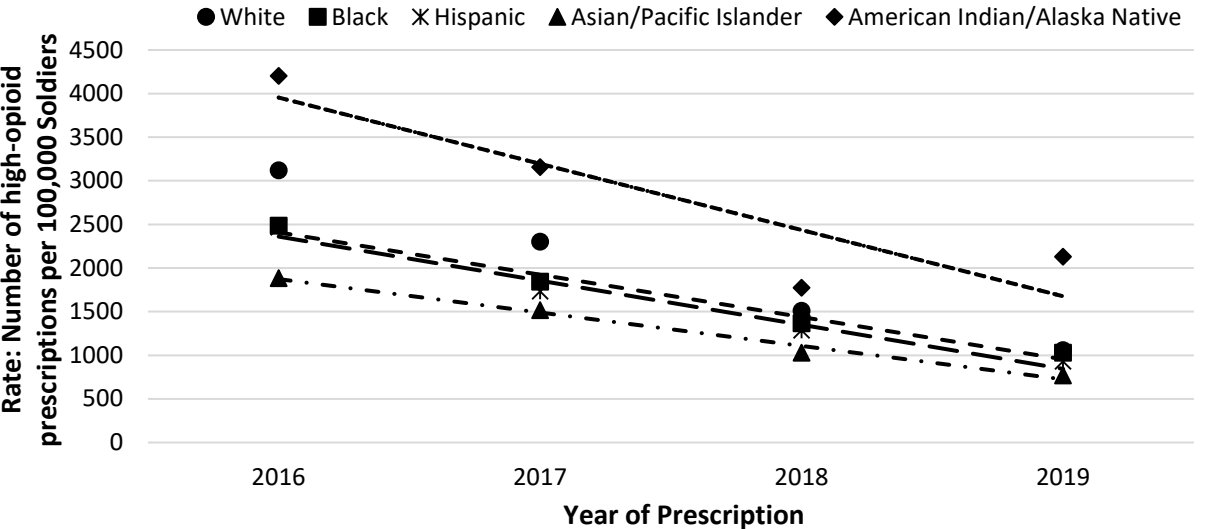
Figure 12. Stratified annual rates of high-dose opioid prescriptions by race-ethnicity among U.S. Army Active Component Soldiers, 2016–2019. (n=34,160)
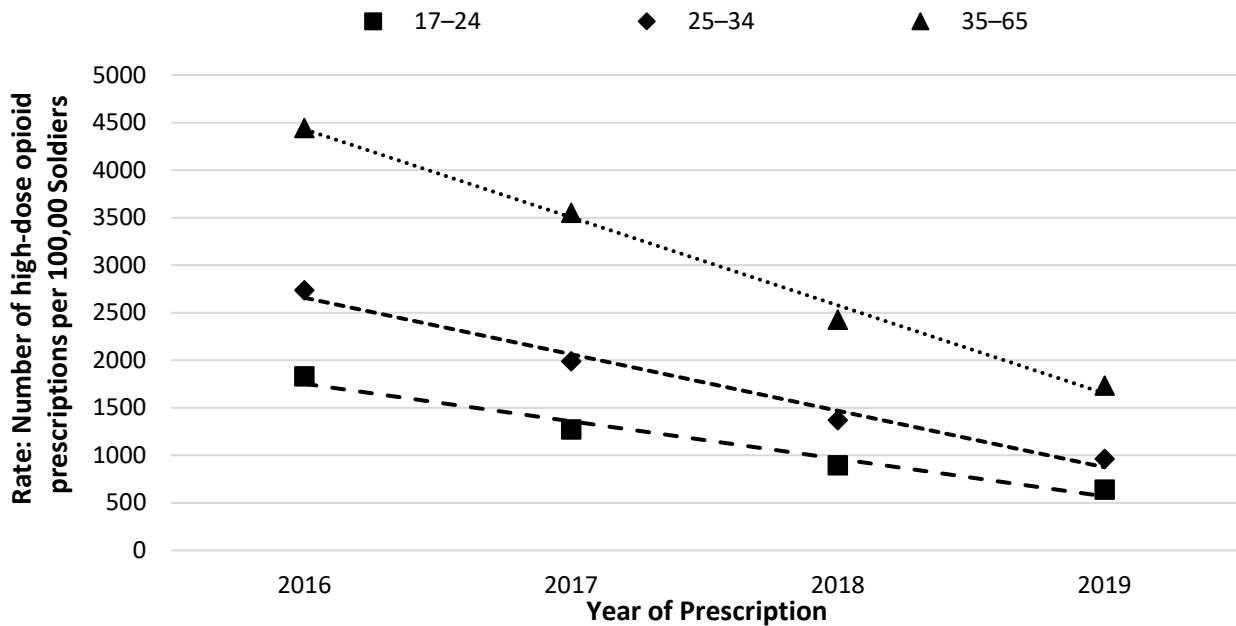
Figure 13. Stratified annual rates of high-dose opioid prescriptions by age group among U.S. Army Active Duty Soldiers, 2016–2019. (n=34,602)

6.3   AUD

Due to historically high rates of alcohol use among the military population[29], a deeper dive into the population of Soldiers who screened positive on the AUDIT-C was conducted to identify significant factors associated with screening positive for hazardous drinking behavior and potential AUD. Of the Soldiers who completed a PHA and the AUDIT-C in 2016, 7% (n=40,502) screened positive for hazardous drinking behavior and potential AUD. Soldiers who reported having thoughts of violence (aOR = 2.83, 95% CI: 2.56–3.13) or suicide (aOR = 1.62, 95% CI: 1.45–1.80) had higher odds of screening positive compared to Soldiers who did not report having thoughts of violence or suicide, respectively. Soldiers who screened positive for displaying symptoms of depression (aOR = 2.92, 95% CI: 2.78–3.06) had significantly higher odds of screening positive for AUD compared to Soldiers who did not screen positive for depression symptoms.

Table 3. The association between social indicators and screening positive for alcohol use disorder among U.S. Army Soldiers who completed the PHA, 2016. (n= 599,027)

	Alcohol Use Disorder[a]		
	(n = 43,217) n (%)	cOR (95% CI)	aOR (95% CI)[b]
Major Life Stressors[c]			
Yes	7,318 (13)	2.29 (2.23–2.35)	–
No	35,771 (6)	Ref	–
Thoughts of Violence[d]			
Yes	659 (25)	4.62 (4.23–5.05)	2.83 (2.56–3.13)
No	42,428 (7)	Ref	Ref
Posttraumatic Stress Disorder[e]			
Yes	4,725 (17)	3.03 (2.94–3.14)	–
No	38,067 (6)	Ref	–
Depression[f]			
Yes	2,546 (18)	3.14 (3.00–3.28)	2.92 (2.78–3.06)
No	38,351 (6)	Ref	Ref
Thoughts of Suicide[g]			
Yes	569 (21)	3.75 (3.42–4.12)	1.62 (1.45–1.80)
No	42,518 (7)	Ref	Ref

Legend:
cOR = crude odds ratio,
aOR = adjusted odds ratio,
CI = confidence interval
Notes:
[a]Men with scores over 5 and women with scores over 4 on the AUDIT-C were considered positive for hazardous drinking behavior; scores ranged from 0–12.
[b]Adjusted logistic model controlled for sex, age, race-ethnicity, thoughts of violence, symptoms of depression, and thoughts of suicide.
[c]Soldiers who reported major life stressors were identified using the following question: "Over the past month, what major life stressors have you experienced that are a cause of significant concern or make it difficult for you to do your work, take care of things at home, or get along with other people (for example, serious conflicts with others, relationship problems, or a legal, disciplinary, or financial problem)?"
[d]A Soldier's potential to exhibit violent behavior was captured using the following question: "Over the past month have you had thoughts or concerns that you might hurt or lose control with someone?"
[e]Soldiers with a score over 39 on the PC-PTSD were categorized as displaying moderate to severe PTSD symptoms; scores ranged from 17–85.
[f]Soldiers with a score over 14 (score range: 0–24) on the PHQ-8 were considered positive for displaying moderate to severe depression symptoms.
[g]The question "Over the past month, have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way?" was used to identify Soldiers who have had suicidal thoughts.

7   DISCUSSION AND RECOMMENDATIONS

From 2016 through 2019, 38,162 U.S. Army Active Duty Soldiers were seen by a Behavioral Health (BH) medical provider for substance abuse or dependence, with the highest rate occurring in 2017. Although no significant trend in substance abuse encounters was observed over the 4-year period, rates of medical encounters for opioid abuse or dependence decreased significantly during the study period. This decline is consistent with a decline in opioid misuse observed in the general population over the same time period.[30]

The rates of high-dose opioid prescriptions showed a statistically significant decreasing trend over the 4-year period. This decrease may be attributed to the 2016 implementation of the Department of Defense Opioid Prescriber Safety Training Program,[31] a training for medical providers for effectively prescribing pain medications and the potential misuse of controlled substances. This training program stems from a presidential directive released in October 2015 mandating that all health care providers who prescribe controlled substances receive regular training on opioid prescribing and the treatment of opioid use disorders. Nonetheless, the proportion of Soldiers with high-dose prescriptions (8%, n=24,928) is higher than the 3.6% reported for the civilian population.[32]

The most commonly documented substance for abuse or dependence was alcohol. Alcohol misuse and abuse is a long-standing and well-documented problem within the U.S. military[33]. When controlling for other known risk factors, military service itself contributes to increases in problematic drinking behavior.[34] Rates of heavy drinking were significantly higher among young military personnel compared with civilians of a similar age.[35] Various forms of military-related trauma, including exposure to killing within combat settings and military sexual trauma, elevates the risk for alcohol abuse and dependence among service members. Social indicators found to be significantly associated with higher odds of AUD in this study were screening positive for symptoms of depression and reporting thoughts of violence and suicide. The finding that thoughts of suicide were significantly associated with screening positive for AUD is consistent with a prior study identifying suicide and other deaths as consequences of untreated SUDs.[36] These findings also highlight the likelihood of high levels of comorbidity between SUDs and other BH conditions. It might be worth assessing, particularly during the Coronavirus Disease–2019 pandemic, the impacts of comorbidity between substance use disorders and other BH conditions to include injury-related outcomes due to the compounding effects.

Findings from this study indicate that substance dependence made up the majority of all encounters for substance abuse and dependence over the 4-year period. This is not surprising since treatment programs for substance use disorders are often long-term and require multiple contacts with the behavioral healthcare system. Due to the multiple contacts, cost is highlighted as a factor to consider when determining the extent of the burden substance use disorder places on the MHS. Furthermore, the effectiveness of intensive outpatient and residential rehabilitation has yet to be evaluated within the military.

Encounters for abuse were the most frequent among incident cases, with the notable exception of opioids, which had a significantly higher proportion of encounters for dependence compared

to the other four most frequently, documented substances. There are social norms, both cultural and systemic, that are unique to the military and serve to prevent Soldiers from seeking and receiving treatment for substance abuse and dependence. Active-duty Military personnel returning from combat zones consistently cite stigma as the most common reason for not seeking treatment for combat-related mental health and substance use disorders.[37] Army policies and practices consider a Soldier's problematic substance use as a violation of the Soldier code of conduct, and substance use thus often has adverse career implications.[33] The SUDCC[38] program was formed in 2016 when the Army Substance Abuse Program was integrated within the U.S. Army Medical Command Behavioral Health System of Care, creating a pathway for Soldiers to self-refer or voluntarily seek substance abuse treatment without career-related repercussions. Embedded Behavioral Health (EBH) teams[39]—multidisciplinary teams of BH care professionals stationed in close proximity to Army units—have been deemed the preferred mechanism to deliver quality BH care to Soldiers in operational units, providing a single point of entry into the behavioral healthcare system. The EBH and SUDCC programs were implemented to reduce barriers to care relating to access, perceived stigma, and disciplinary consequences associated with seeking treatment as well as improve the continuum of care for substance use and comorbid BH conditions. Current efforts are underway to assess the effectiveness of SUDCC in reducing the impact of SUDs on Soldier readiness.

Finally, this report identified several groups of Soldiers at high risk for SUDs. Male Soldiers had higher rates of medical encounters for substance abuse and dependence compared to female Soldiers but both had similarly high rates of high-dose opioid prescriptions. Native American Soldiers had the highest rates of substance encounters and high-dose opioid prescriptions. These findings are consistent with findings from the U.S. general population.[1,40] Adverse childhood experiences (ACE) have been linked to outcomes such as substance abuse and dependence in adulthood. Native Americans experience various forms of ACEs to include poverty, witnessing and experiencing violence and abuse, and neglect at higher rates than other racial ethnic groups.[41] Young (17–24 years) and junior enlisted (E1–E4) Soldiers had the highest rates of encounters for substance abuse and dependence. This is consistent with previous work in which 51% of college students reported binge drinking within the last 30 days.[42] In contrast, senior enlisted (E7–E9) and older Soldiers had the highest rates of high-dose opioid prescriptions. Years of military service is highly correlated with reporting severe injuries, increasing the likelihood of being prescribed high-dose pain medication to treat chronic pain.[43]

These findings suggest the need to continue substance abuse screening and treatment efforts, and the need for novel preventive solutions targeted toward high-risk populations, particularly for alcohol abuse and dependence. Current efforts include the "Own your Limits" educational campaign developed by the Department of Defense which provides information on learning how to drink responsibly, short- and long-term effects of alcohol misuse, screening tools to assess drinking habits and a list of support resources.[44] An example of a primary prevention effort includes an educational program/intervention administered to Soldiers during initial military training targeting young and early-career Soldiers. The curriculum might focus on encouraging the use of positive coping skills, the importance of social support, and providing information about available BH resources.

7.1 Limitations

Medical encounters do not capture the true prevalence or incidence of substance abuse and dependence because these only represent Soldiers who made contact with the health care system. Nonetheless, these statistics provide valuable information that can assist in improving healthcare delivery of SUD treatment for those who need care. Estimates of AUD obtained using the AUDIT-C on the PHA may be underestimated. Soldiers may be reluctant to answer the questions on the AUDIT-C honestly because the PHA is not anonymous. However, this health assessment provides a unique opportunity to refer Soldiers who screen positive to receive the proper healthcare services.

7.2 Conclusion

Over the 4-year period, approximately 38,000 Soldiers accounted for 600,000 substance-related medical encounters, the majority for alcohol abuse and dependence. This illustrates the chronic nature of this condition, requiring multiple contacts with the Behavioral Health System of Care. Although rates of high-dose opioid prescriptions are decreasing and mark improvements in prescribing patterns, the proportion of Soldiers prescribed high-dose opioids is still higher than estimates for the general population.

These findings illustrate the need to develop, refine and implement public health interventions to target populations most at highest risk based on demographic and military characteristics such as young and American Indian Soldiers, and among Soldiers screened as potentially violent or suicidal. Findings also highlight the need to evaluate programs targeted at improving the continuum care for treatment of SUDs such as the Army SUDCC intensive outpatient care and residential rehabilitation facilities. (Evaluation of the SUDCC is currently underway within BSHOP.) Additionally, future public health studies may incorporate hospitalizations, examine comorbidity—not only other behavioral and social health conditions but injury as well—and assess potential impacts of the Coronavirus Disease 2019 pandemic.

Public Health Report No. S.0079048.3-16, Surveillance of Substance Abuse and Dependence, January 2016–December 2019

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Appendix A

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Appendix B

Supplemental Tables and Figures

Table B-1. International Classification of Diseases, 9th (ICD-9) and 10th (ICD-10) editions codes used to extract medical encounters for substance abuse and dependence by substance type

Substance Type	ICD-9	ICD-9 Description	ICD-10	ICD-10 Description
Alcohol	305.00–305.03	Alcohol Abuse	F10.10–F10.19	Alcohol Abuse
	303.90–303.93	Alcohol Dependence	F10.20–F10.29	Alcohol Dependence
			F10.92–F10.99	Alcohol Use
Opioids	304.00–304.03	Opioid Type Dependence	F11.20–F11.29	Opioid Dependence
	305.50–305.53	Nondependent Opioid Abuse	F11.10–F11.19	Opioid Abuse
			F11.90–F11.99	Opioid Use
Cannabis	304.30–304.32	Cannabis Dependence	F12.20–F12.29	Cannabis Dependence
	305.20–305.23	Nondependent Cannabis Abuse	F12.10–F12.19	Cannabis Abuse
			F12.90–F12.99	Cannabis Use
Sedatives, hypnotics, anxiolytics	304.10–304.13	Sedative, Hypnotic or Anxiolytic Dependence	F13.20–F13.29	Sedative, Hypnotic or Anxiolytic Dependence
	305.40–305.43	Nondependent Sedative, Hypnotic, or Anxiolytic Abuse	F13.10–F13.19	Sedative, Hypnotic or Anxiolytic Abuse
			F13.90–F13.99	Sedative, Hypnotic or Anxiolytic Use
Cocaine	304.20–304.23	Cocaine Dependence	F14.20–F14.29	Cocaine Dependence
	305.60–305.63	Nondependent Cocaine Abuse	F14.10–F14.19	Cocaine Abuse
			F14.90–F14.99	Cocaine Use
Hallucinogens	304.50–304.53	Hallucinogen Dependence	F16.20–F16.29	Hallucinogen Dependence

Substance Type	ICD-9	ICD-9 Description	ICD-10	ICD-10 Description
	305.30–305.33	Nondependent Hallucinogen Abuse Unspecified Use	F16.10–F16.19	Hallucinogen Abuse
			F16.90–F16.99	Hallucinogen Use
Inhalants	305.90–305.93	Nondependent Other Mixed or Unspecified Drug Abuse	F18.10–F18.19	Inhalant Abuse
			F18.20–F18.29	Inhalant Dependence
			F18.90–F18.99	Inhalant Use
Other Psychoactive Substances	304.60–304.63; 292.0; 292.9	Other Specified Drug Dependence	F19.10–F19.19	Other Psychoactive Substance Abuse
			F19.20–F19.29	Other Psychoactive Substance Dependence
			F19.90–F19.99	Other Psychoactive Substance Use
Other Stimulants	305.70–305.73; 292.2	Nondependent Amphetamine or Related Acting Sympathomimetic Abuse	F15.10–F15.19	Other Stimulant Abuse
			F15.20–F15.29	Other Stimulant Dependence
			F15.90–F15.99	Other Stimulant Use

Table B-2. Crude and stratum-specific rates[a,b] of medical encounters for substance abuse and dependence among U.S. Army Active Component Soldiers, 2016–2019 (n=672,236)

	Medical Encounters for Substance Abuse and Dependence							
	2016		**2017**		**2018**		**2019**	
	n[d]	Rate[c]	n[d]	Rate[c]	n[d]	Rate[c]	n[d]	Rate[c]
Overall	172,805	36,745	191,852	41,351	154,754	33,262	152,825	32,600
SEX								
Female	17,088	24,791	19,301	28,203	16,580	23,876	15,272	21,618
Male	155,717	38,836	172,551	43,669	138,174	34,942	137,553	34,549
RANK								
E1–E4	106,115	51,692	119,246	58,309	98,116	48,334	96,614	47,954
E5–E6	47,146	38,940	48,759	41,015	37,345	31,202	35,856	28,964
E7–E9	11,179	22,325	13,446	27,612	11,633	23,273	12,299	24,435
O1–O10	6,524	8,285	8,448	10,966	6,435	8,266	6,679	8,467
W1–W5	1,841	12,512	1,953	13,517	1,225	8,528	1,377	9,629
AGE								
17–24	79,021	45,680	95,885	53,051	79,297	42,769	77,319	43,810
25–34	66,659	36,608	66,411	36,931	52,347	29,288	52,746	29,155
35–59	27,125	23,422	29,556	26,606	23,110	21,505	22,760	21,097
RACE-ETHNICITY								
White	97,544	36,444	104,736	39,510	84,522	31,989	83,275	32,190
Black	41,822	41,295	48,113	47,939	38,364	39,035	37,232	38,340
Hispanic	23,057	34,840	26,318	37,585	22,998	31,513	23,700	32,280
Asian/Pacific Islander	5,809	21,357	7,845	28,054	5,220	18,506	5,152	18,154
American Indian	3,487	104,620	3,670	111,415	2,887	86,827	2,652	81,877
SUBSTANCE TYPE								
Alcohol	148,528	31,583	165,104	35,586	134,390	28,885	133,369	28,450
Cannabis	10,179	2,164	13,683	2,949	10,469	2,250	10,465	2,232
Opioid	6,725	1430	5,513	1,188	3,725	806	2,973	634
Cocaine	2,306	490	2,885	622	2,581	555	2,677	571
Stimulant	1,886	401	2,170	468	1,644	353	1,489	318
Psychoactive	1,676	356	957	206	798	172	655	140
Sedatives	728	155	851	183	475	102	487	104
Hallucinogen	459	98	480	103	441	95	606	129

Public Health Report No. S.0079048.3-16, Surveillance of Substance Abuse and Dependence, January 2016–December 2019

| | Medical Encounters for Substance Abuse and Dependence | | | | | | | |
| | 2016 | | 2017 | | 2018 | | 2019 | |
	n[d]	Rate[c]	n[d]	Rate[c]	n[d]	Rate[c]	n[d]	Rate[c]
Inhalants	318	68	209	45	204	44	104	22

Legend:
E=Enlisted
O=Officer
W=Warrant
Notes:
[a]Included U.S. Army Active Soldiers with identifiable demographic factors.
[b]Population counts were provided by Defense Manpower Data Center.
[c]Rates are interpreted as the number of encounters per 100,000 Active Duty Soldiers.
[d]Counts of medical encounters for substance abuse and dependence were obtained from the Military Health System Data Repository (MDR).

Table B-3. Crude and stratum-specific rates[a,b] of high-dose opioid prescriptions among U.S. Army Active Component Soldiers, 2016–2019 (n=34,602)

	High-Dose Opioid Prescriptions							
	2016		2017		2018		2019	
	n[d]	Rate[c]	n[d]	Rate[c]	n[d]	Rate[c]	n[d]	Rate[c]
Overall	13,301	3,602	9,830	2,753	6,726	1,895	4,745	1,304
SEX								
Female	1,908	2,768	1,418	2,072	979	1,410	782	1,107
Male	11,393	2,841	8,412	2,129	5,747	1,453	3,963	995
RANK								
E1–E4	4,500	2,192	3,136	1,533	2,184	1,076	1,467	728
E5–E6	3,917	3,235	2,867	2,412	1,935	1,617	1,346	1,087
E7–E9	2,589	5,170	1,975	4,056	1,267	2,535	1,020	2,027
O1–O10	1,879	2,386	1,477	1,917	1,075	1,381	732	928
W1–W10	416	2,827	375	2,595	265	1,845	180	1,259
AGE								
17–24	3,168	1,831	2,301	1,273	1,663	897	1,132	641
25–34	4,985	2,737	3,581	1,991	2,453	1,372	1,742	963
35–59	5,148	4,445	3,948	3,554	2,610	2,428	1,871	1,734
RACE-ETHNICITY								
White	8,352	3,120	6,101	2,301	3,984	1,508	2,734	1,056
Black	2,518	2,486	1,850	1,843	1,343	1,366	999	1,029
Hispanic	1,631	2,464	1,212	1,731	939	1,286	681	928
Asian/Pacific Islander	512	1,882	424	1,516	290	1,028	218	768
American Indian/Alaskan Native	140	4,200	104	3,157	59	1,774	69	2,130

Legend: E=Enlisted; O=Officer; W=Warrant; CI=Confidence Intervals
Notes:
[a]Included U.S. Army Active Soldiers with identifiable demographic factors.
[b]Population counts were provided by Defense Manpower Data Center.
[c]Rates are interpreted as the number of encounters per 100,000 Active Soldiers.
[d]Counts of high-dose opioid prescription were obtained from Pharmacy Data Transaction Service.

Glossary

ABHIDE
Army Behavioral Health Integrated Data Environment

AC
Active Component

APHC
U.S. Army Public Health Center

AUD
Alcohol Use Disorder

AUDIT-C
Alcohol Use Disorder Identification Test-Concise

BH
behavioral health

BSHOP
Behavioral and Social Health Outcomes Practice

CDC
Centers for Disease Control and Prevention

CY
Calendar Year

DCIPS
Defense Casualty Information Processing System

DMDC
Defense Manpower Data Center

DOD
Department of Defense

E1–E9
Enlisted rank

EBH
Embedded Behavioral Health

ICD-9
International Classification of Diseases, Ninth Revision, Clinical Modification

ICD-10
International Classification of Diseases, 10th Revision, Clinical Modification

MDR
Military Health System Data Repository

MHS
Military Healthcare System

MME
milligrams equivalent

MTF
Military Treatment Facilities

NDC
National Drug Code

O1–O9
Officer rank

PC-PTSD
Primary Care-Post Traumatic Stress Disorder

PDTS
Pharmacy Data Transaction Service

PHA
Periodic Health Assessment

PHQ
Patient Health Questionnaire

PTSD
Post-traumatic Stress Disorder

RC
Reserve Component

SUD
Substance Use Disorder

SUDCC
Army Substance Use Disorder Clinical Care

TED-I
TRICARE Encounter Data-Institutional

TED-NI
TRICARE Encounter Data-Non-Institutional

W1–W5
Warrant Officer rank