

TIP No. 12-123-0123

Annual Injury Surveillance Report 2021 Summary

INTRODUCTION

According to the Centers for Disease Control and Prevention (CDC) (www.cdc.gov), monitoring of public health outcomes is one of the ten essential public health services. Monitoring of Army injuries is part of the Defense Centers for Public Health–Aberdeen (DCPH-A) mission and provides a foundation to recognize trends, define the magnitude and distribution of injuries, identify emerging issues, and guide Army injury prevention priorities. This document provides a summary of injury medical encounter surveillance data for active-duty Soldiers from Calendar Year (CY) 2021, analyzed and presented by the DCPH-A Injury Prevention Branch (IPB).

Injuries summarized in this report are based on medical encounters diagnosed using codes from the International Classification of Diseases, Clinical Modification, 10th Revision (ICD-10-CM). Diagnosis codes for injuries were identified as those describing any damage or interruption of body tissue function caused by an energy transfer that exceeds tissue tolerance suddenly (acute trauma) or gradually (cumulative micro-trauma). Energy transfers resulting in injuries are categorized as mechanical, environmental, electrical, nonenvironmental, or other. The definition of injury used in this report has been described in the APHC *Taxonomy of Injuries for Public Health Monitoring and Reporting* (see bibliography).

This report includes the following data types from the Military Health System Data Repository (MDR): outpatient Military Health System encounters (Comprehensive Ambulatory Professional Encounter Record, (CAPER)), outpatient purchased care (TRICARE Encounter Data – Not Institutional, (TED-NI)), inpatient Medical Health System encounters (Standard Inpatient Data Record, (SIDR)) and inpatient purchased care (TRICARE Encounter Data – Institutional, (TED-I)). The surveillance data presented in this document, along with past Army injury surveillance summaries, are available in a slide-set format on the DCPH-A Periodic Publications page:

<https://phc.amedd.army.mil/news/Pages/PublicationDetails.aspx?type=Active%20Duty%20Army%20Injury%20Surveillance%20Summary>

Similar population-level data are presented for injuries, other health outcomes, and key health indicators in the annual U.S. Army Health of the Force Report. Current and past reports can be accessed at: <https://phc.amedd.army.mil/topics/campaigns/hof/Pages/default.aspx>

Health of the Force data are also presented in a dashboard format at:

<https://carepoint.health.mil/sites/HOF>

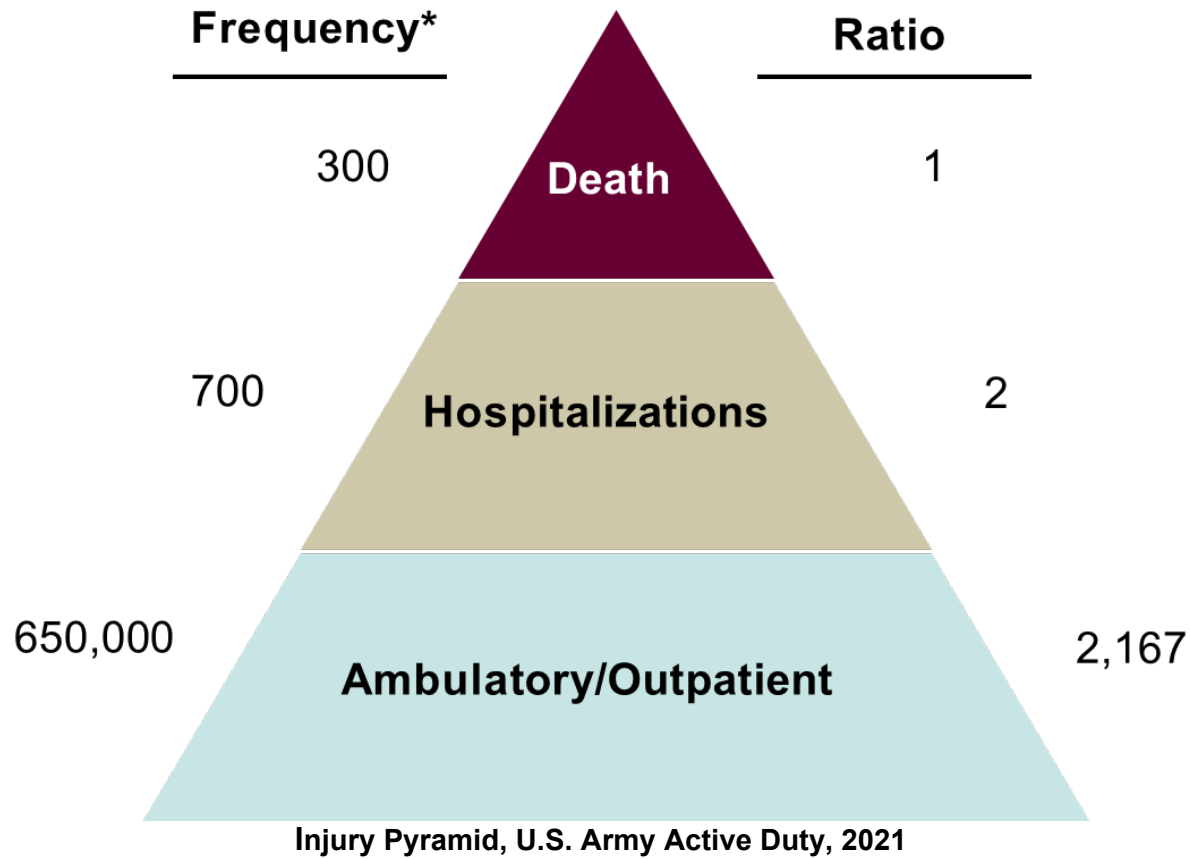
The DCPH-A IPB also provides installation-level injury summaries for both active duty and Civilian populations, upon request, for those interested in detailed installation-specific data. Installation injury rates, one element of these summaries, can be accessed at: <https://www.sms.army.mil/>, by navigating the menus to Dashboards (from the top left drop down) > Army Enterprise (from the left menu pane) > OTSG/MEDCOM > OTSG/MEDCOM HQ > DCS, Public Health > Clinical Public Health and Epidemiology > Active Duty Injuries by Installation, MEDCOM Region, and MACOM (Quarterly).

For additional information, please visit the IPB Website at:

<https://phc.amedd.army.mil/topics/discond/ptsaip/Pages/default.aspx>, and contact us by email at: usarmy.apg.medcom-hq.mbx.injuryprevention@health.mil

DISTRIBUTION OF INJURIES

The injury pyramid depicts injuries by level of severity, from deaths to injuries treated in an outpatient setting. In 2021, for every individual injury-related death, there were over 2,100 outpatient encounters. Injuries treated on an outpatient basis represent a significant obstacle to Soldier medical readiness.



Notes:

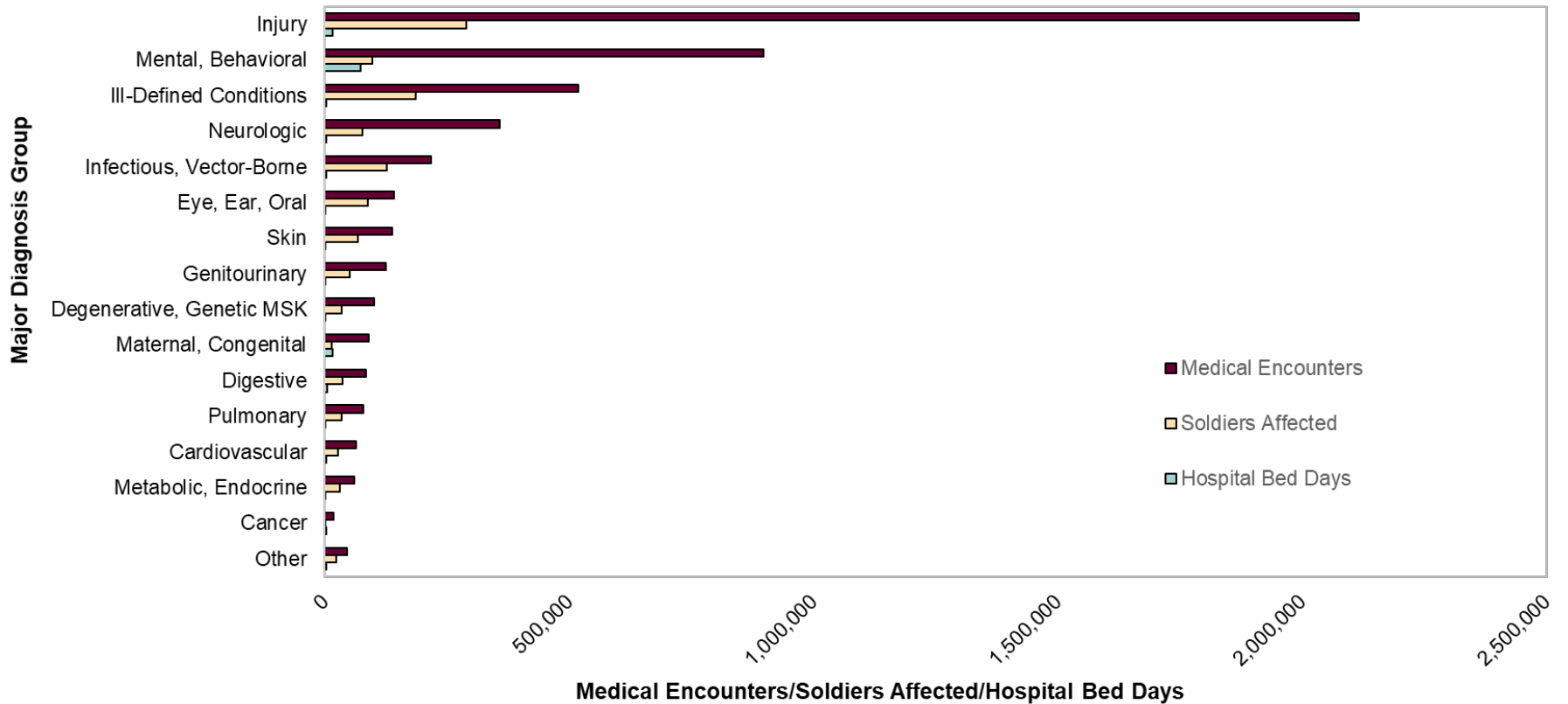
*Frequencies are rounded and represent incident injury visits.

Data source: Military Health System Data Repository (MDR) and Armed Forces Medical Examiner System (AFMES); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries.

Prepared by DCPH-A Injury Prevention.

MAGNITUDE OF THE PROBLEM

During 2021, injuries accounted for over 2 million medical encounters (42% of all encounters) among active-duty Soldiers, about 2.4 times as many encounters as the second leading cause, mental and behavioral health conditions (18%). Injuries also affected the greatest number of Soldiers, over 289,000, compared to all other medical conditions.



Relative Burden of Injuries and Diseases, U.S. Army Active Duty, 2021

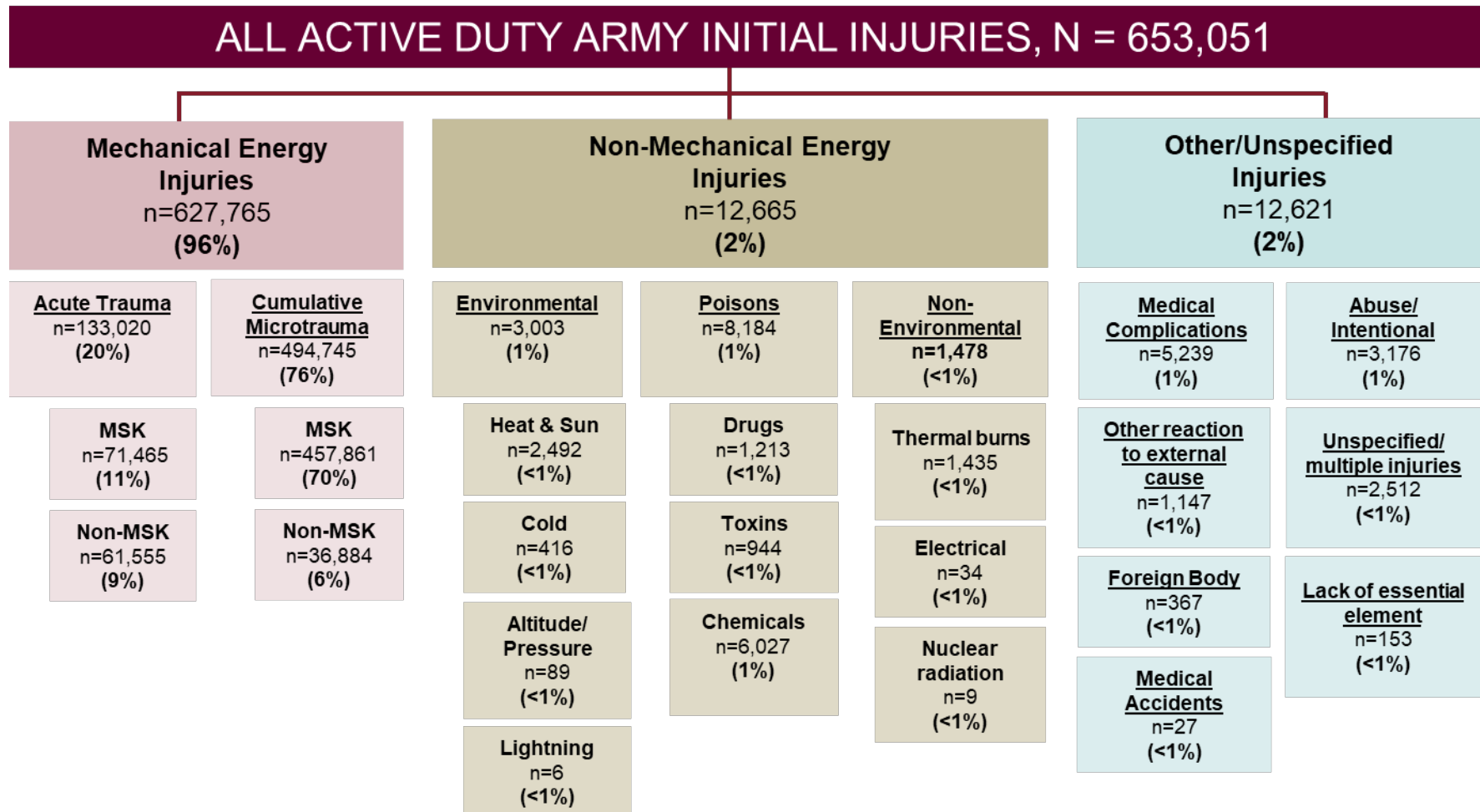
Notes:

Diagnosis group “Other” includes adverse effects of drugs, blood disorders, and other neoplasms (not cancer).

Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries.

Prepared by DCPH-A Injury Prevention.

The vast majority (n=627,765, 96%) of new (incident) injury diagnoses were attributable to mechanical energy sources and 76% (n=494,745) were cumulative micro-traumatic injuries.



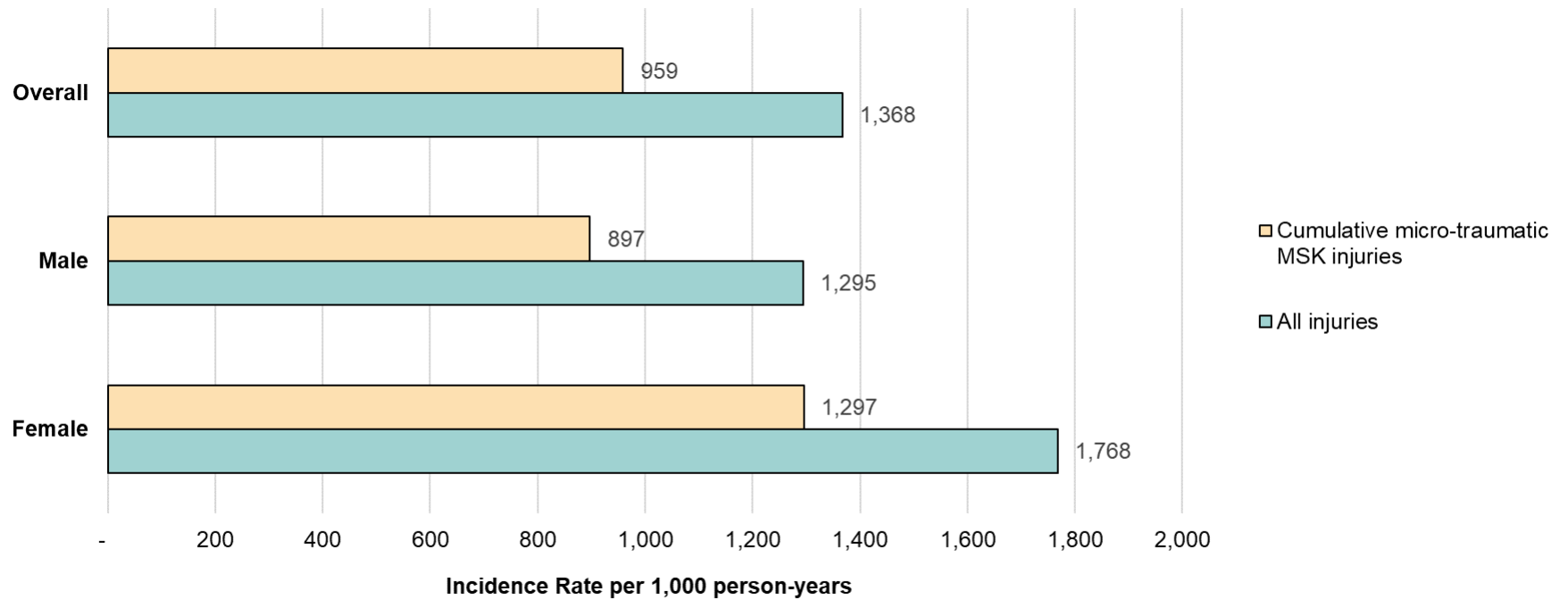
Taxonomy Distribution of Injuries, U.S. Army Active Duty, 2021

Notes:

Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries. Prepared by DCPH-A Injury Prevention.

INJURY RATE

The rate of incident injuries among Army Soldiers during 2021 was 1,368 injuries per 1,000 person-years. Rates for all injuries and cumulative micro-traumatic musculoskeletal (MSK) injuries were both significantly higher among women ($p < 0.001$). Across groups, 70% of all injuries were cumulative micro-traumatic MSK injuries.

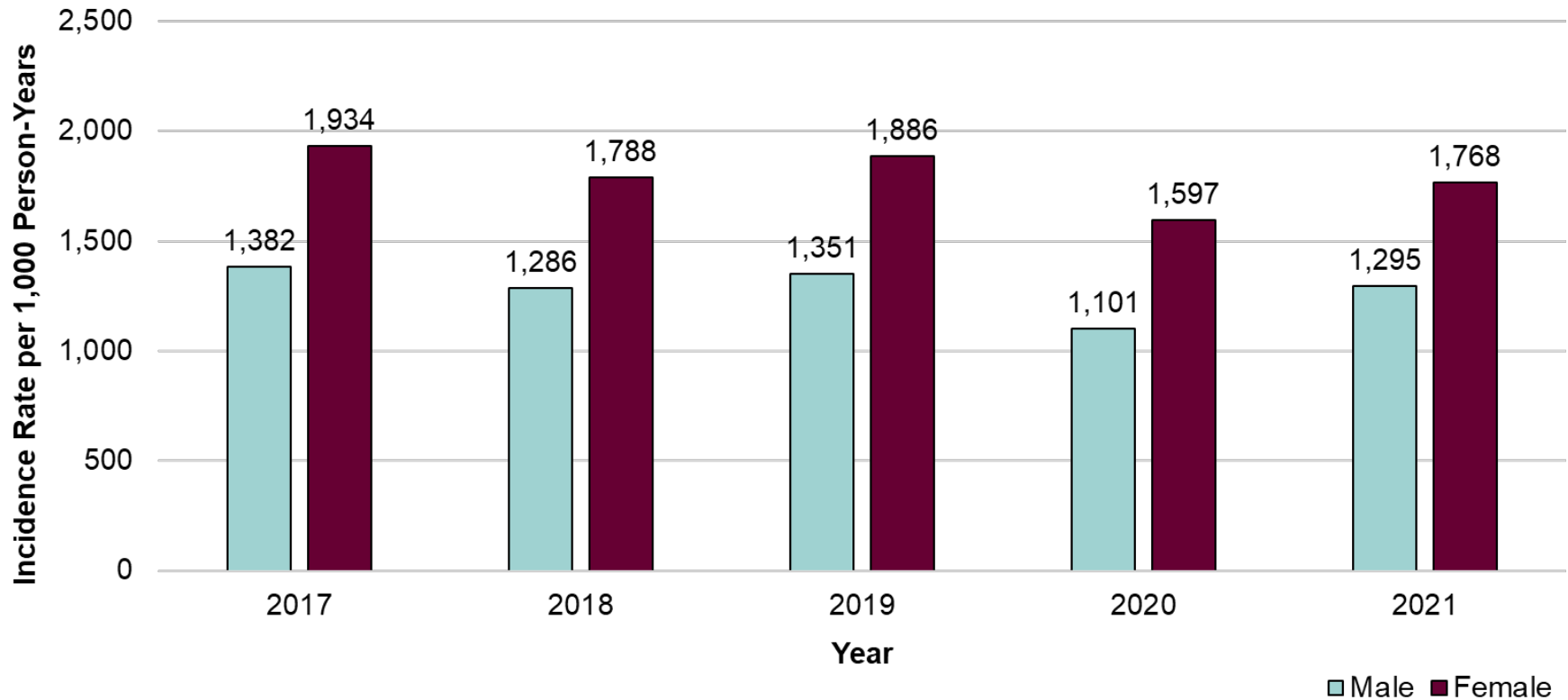


All Injury and Cumulative Micro-traumatic Musculoskeletal Incident Injury Visit Rates by Sex, U.S. Army Active Duty, 2021

Notes:

Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries. Prepared by DCPH-A Injury Prevention.

The rates of incident injuries among female Army Soldiers were consistently and significantly higher than male Soldiers from 2017 to 2021 ($p < 0.001$). For both females and males, incident injury rates in 2021 were significantly lower than rates in 2017–2019 ($p < 0.001$).



**All Injury Incident Injury Visit Rates by Sex,
U.S. Army Active Duty, 2017–2021**

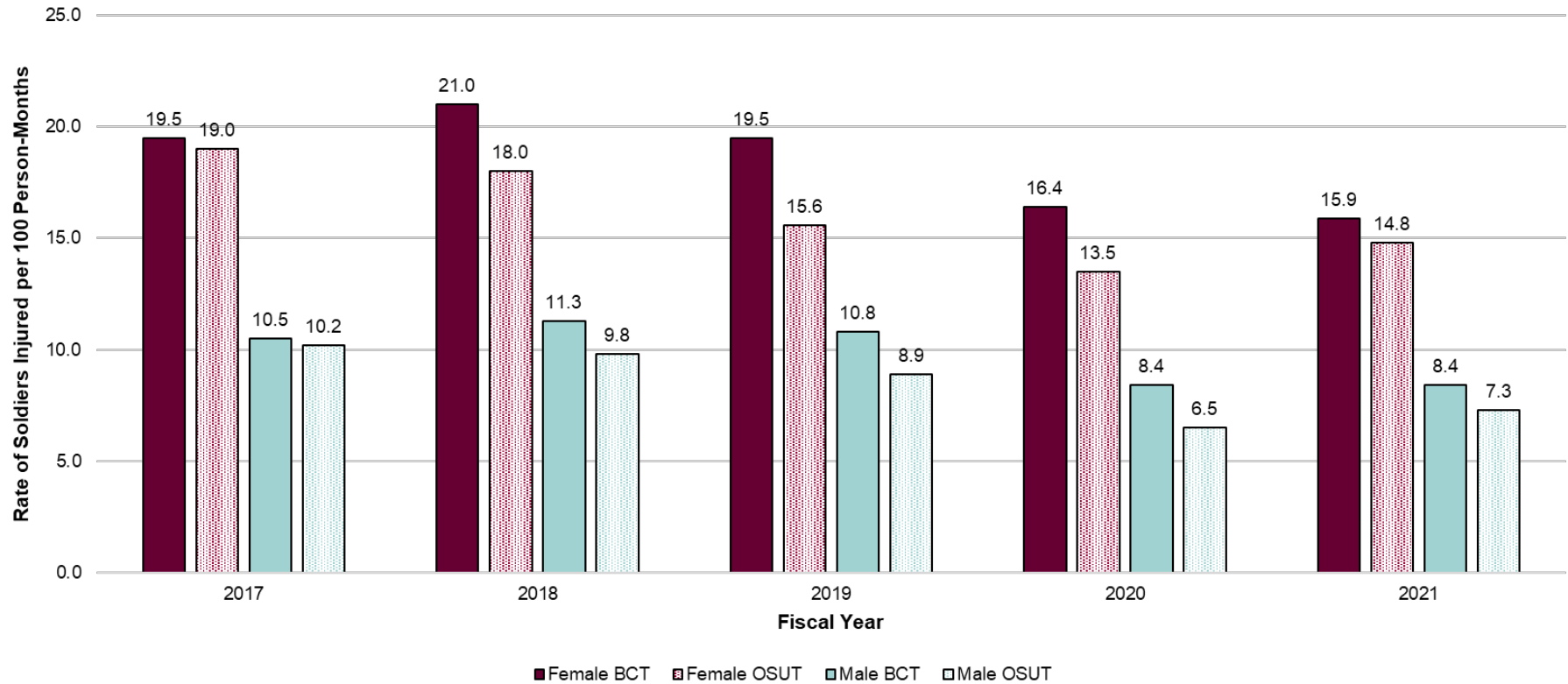
Notes:

Active-duty injury adjusted to remove deployed injury and deployed person-time.

Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries.

Prepared by DCPH-A Injury Prevention.

For all years 2017–2021, incident injury rates among female trainees in Basic Combat Training (BCT) and One Station Unit Training (OSUT) were significantly higher than male trainees ($p < 0.05$). Injury rates during BCT were significantly higher than rates during OSUT for both males and females ($p < 0.05$) for all years, except for females in 2017. Most trainee injury rates were significantly lower in 2021 when compared to 2017–2019 ($p < 0.05$), except 2021 rates for OSUT females were only significantly lower than 2017–2018.



Rates of Injured Soldiers, U.S. Army Active Duty vs. Trainee, 2017–2021

Notes:

Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries. Data reproduced from: APHC. 2022. Injury Surveillance and Longitudinal Studies for Gender Integration in the Army: Seventh Annual Assessment, 2022. Prepared by DCPH-A Injury Prevention.

INJURY DISTRIBUTION

Injuries resulting from mechanical energy are categorized as those that exceed tissue tolerance suddenly (acute trauma) or gradually over time (cumulative micro-trauma). Over three-quarters (79%) of incident mechanical injury encounters among active-duty Soldiers were due to cumulative micro-trauma (overuse). Regarding body region, most mechanical injuries were to the lower extremities (42%), followed by the spine and back (28%) and upper extremities (20%).

Incident Mechanical Injuries by Body Region and Acute/Overuse*, U.S. Army Active Duty, 2021

Body Region	Acute Traumatic n,%	Cumulative Micro-traumatic (Overuse) n,%	All n,%
Lower Extremity	49,111 (7.7)	211,081 (33.2)	260,192 (41.5)
Spine & Back	9,703 (1.5)	167,915 (26.4)	177,618 (28.3)
Upper Extremity	40,133 (6.3)	87,372 (13.8)	127,505 (20.3)
Head, Face, & Neck	24,523 (3.9)	15,768 (2.5)	40,291 (6.4)
Torso	8,011 (1.3)	668 (0.1)	8,679 (1.4)
Other	653 (0.1)	11,941 (1.9)	12,594 (2.0)
Total	132,134 (21.1)	494,745 (78.9)	626,879 (100)

Notes:

*In order of most frequently injured body region

Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries.

Prepared by DCPH-A Injury Prevention.

Musculoskeletal tissue damage like joint pain, tendinitis, and bursitis accounted for nearly three-quarters (74%) of incident mechanical injury encounters during 2021.

Incident Mechanical Injury Diagnoses by Body Region, U.S. Army Active Duty, 2021

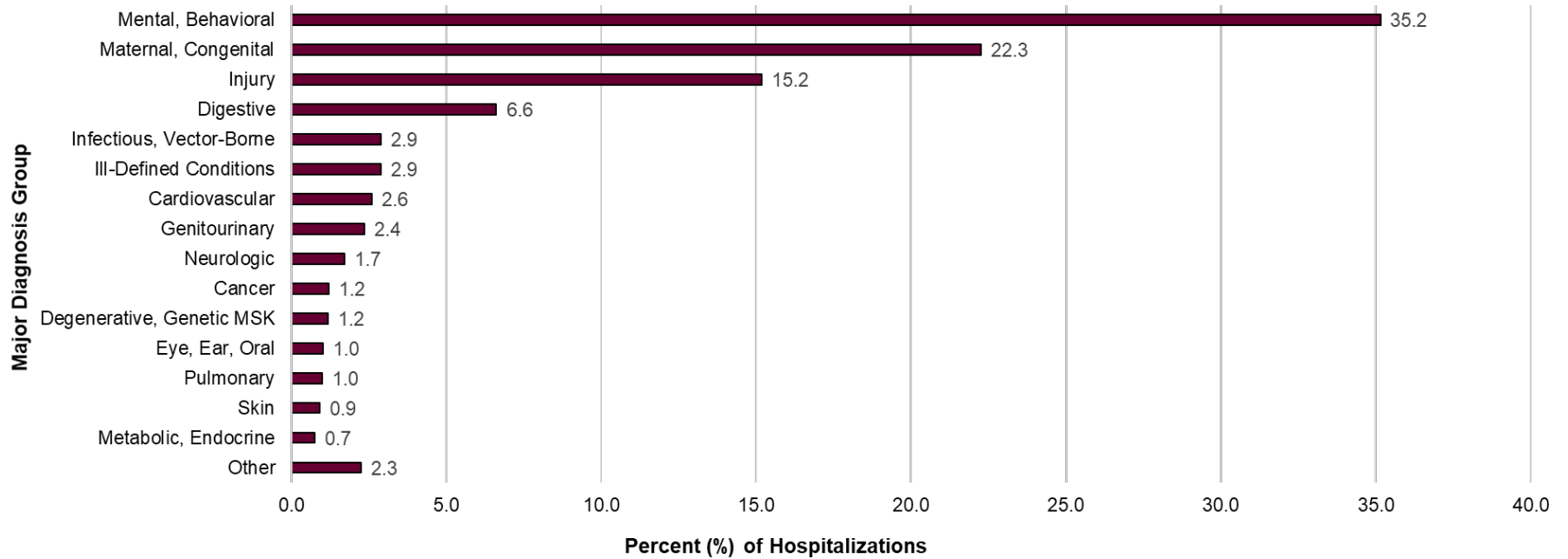
Diagnosis	Head, Face, and Neck		Spine and Back		Torso		Upper Extremity		Lower Extremity		Other		Total	Percent Total (%)
	Acute (ACT)	Cumulative (CMT)	ACT	CMT	ACT	CMT	ACT	CMT	ACT	CMT	ACT	CMT		
MSK Tissue Damage, Other	26	231	2,714	153,996	176	3	3,974	80,295	7,123	203,217	126	11,751	463,632	73.9
Tissue Damage, Other	8,843	15,518	1,405	0	2,109	0	4,524	0	3,648	0	465	0	36,512	5.8
Sprain/Joint Damage	14	0	1,253	0	483	0	4,893	453	17,466	2,247	34	57	26,900	4.3
Nerve	40	0	24	13,887	8	474	3,473	3,647	960	716	0	0	23,229	3.7
Strain/Tear	1,840	0	3,553	0	1,817	0	3,852	2,878	6,313	5	28	22	20,308	3.2
Contusion/Superficial	4,421	19	0	0	1,853	13	5,090	92	5,823	2,518	0	0	19,829	3.2
Fracture	1,102	0	541	32	606	178	5,427	7	4,904	2,378	0	111	15,286	2.4
Open Wound	3,373	0	0	0	360	0	7,185	0	2,321	0	0	0	13,239	2.1
Internal Organ and Blood Vessel	4,822	0	184	0	540	0	52	0	25	0	0	0	5,623	0.9
Dislocation	42	0	29	0	59	0	1,663	0	528	0	0	0	2,321	0.4
Crush	7	0	0	0	8	0	540	0	194	0	0	0	749	0.1
Amputation	2	0	0	0	1	0	109	0	25	0	0	0	137	0.0
Total	24,532	15,768	9,703	167,915	8,020	668	40,782	87,372	49,330	211,081	653	11,941	627,765	100.0
Percent Total (%)	3.9	2.5	1.5	26.7	1.3	0.1	6.5	13.9	7.9	33.6	0.1	1.9		100.0

Notes:

Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries. Prepared by DCPH-A Injury Prevention.

HOSPITALIZATIONS

Injuries were the third leading cause of hospitalizations during 2021, accounting for 15% of all hospitalizations among active-duty Soldiers. See Appendix A for data on causes of injury hospitalizations.



Major Diagnosis Groups Resulting in Hospitalizations, U.S. Army Active Duty, 2021

Notes:

Total number of hospitalizations = 19,204

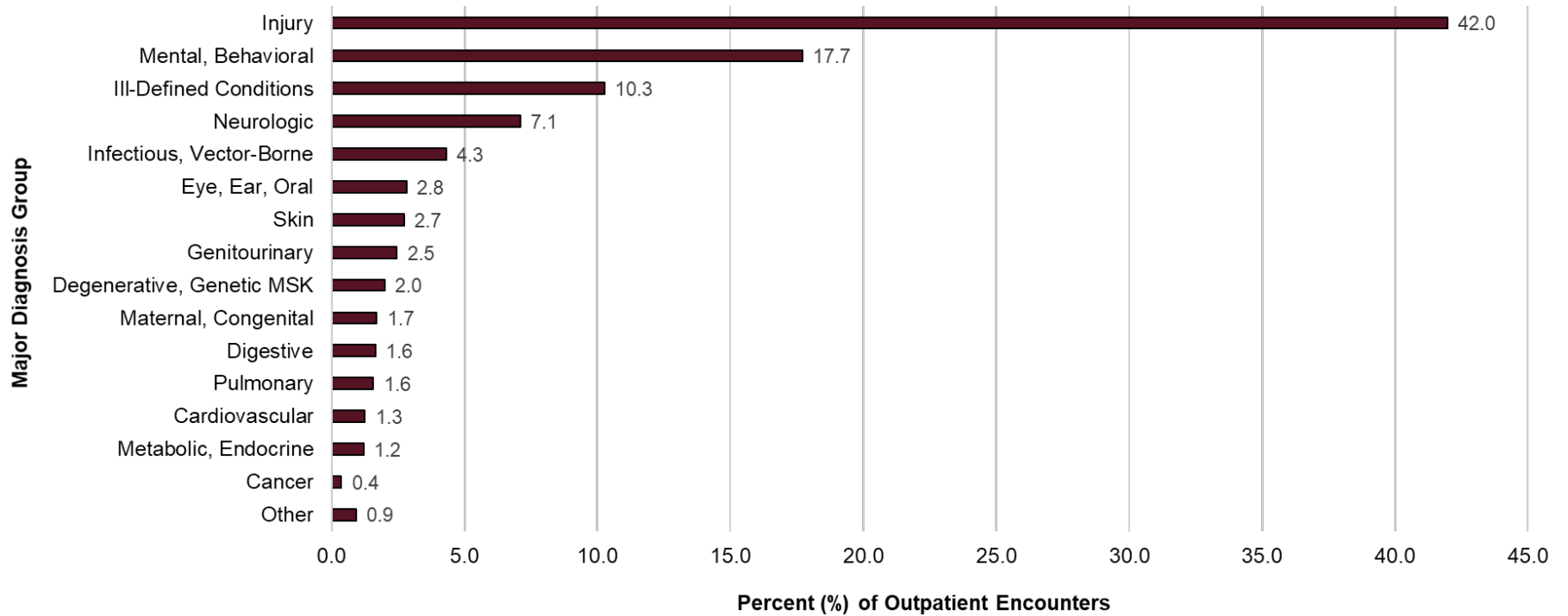
Diagnosis group “Other” includes adverse effects of drugs, blood disorders, and other neoplasms (not cancer).

Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries.

Prepared by DCPH-A Injury Prevention.

OUTPATIENT ENCOUNTERS

Injuries were the leading cause of outpatient encounters during 2021, accounting for 42% of all outpatient visits among active-duty Soldiers.



Major Diagnosis Groups Resulting in Outpatient Visits U.S. Army Active Duty, 2021

Notes:

Total number of outpatient visits = 5,034,156

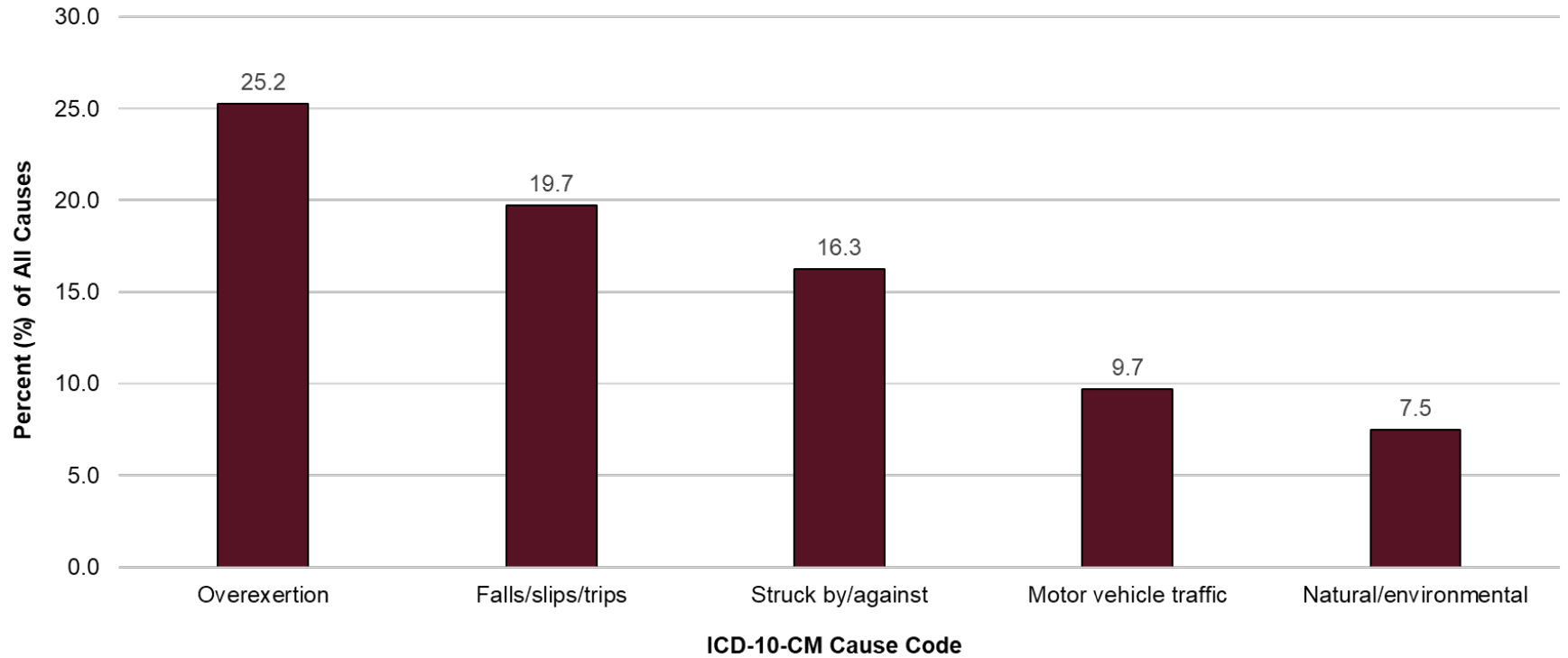
Diagnosis group “Other” includes adverse effects of drugs, blood disorders, and other neoplasms (not cancer).

Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries.

Prepared by DCPH-A Injury Prevention.

MECHANISMS ASSOCIATED WITH INJURIES

Among outpatient injury encounters with a cause code in 2021, leading mechanisms of injuries were overexertion (25%) and falls (20%).



Leading Causes of Unintentional Injury, Outpatient Visits, U.S. Army Active Duty, 2021

Notes:

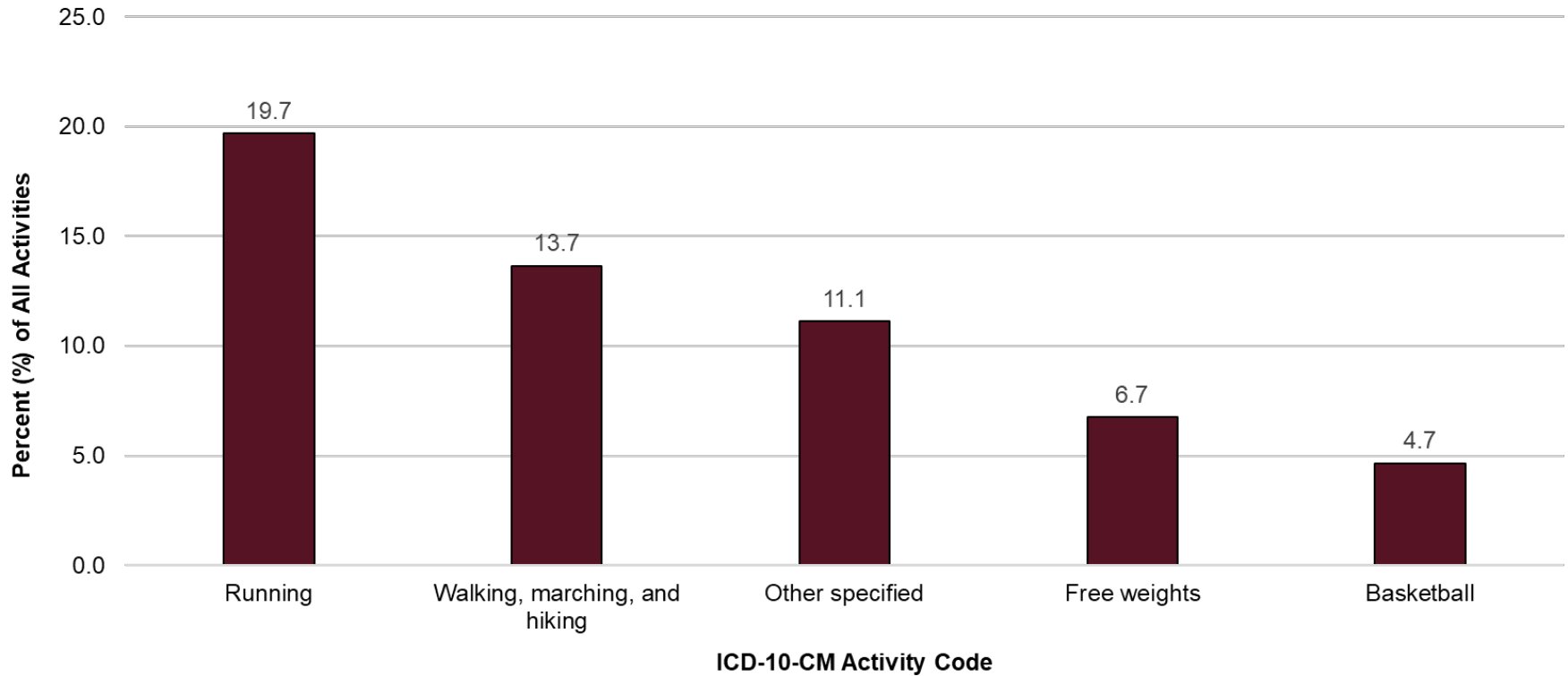
Total number of cause-coded unintentional outpatient visits = 55,208 (9%); may not be representative of the distribution of causes for all incident injuries. Based on ICD-10-CM cause codes meeting the National Center for Health Statistics definition for unintentional injuries (excludes intentional self-harm, abuse, and violence).

Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries.

Prepared by DCPH-A Injury Prevention.

ACTIVITIES ASSOCIATED WITH INJURIES

In 2021, the leading activity associated with unintentional injuries among active-duty Soldiers was running (20%), followed by walking, marching, and hiking (14%).



Leading Activities Associated with Unintentional Injury Outpatient Visits, 2021

Notes:

Total number of unintentional outpatient encounters with activity codes = 26,513 (4%); may not be representative of the distribution of activities for all incident injuries.

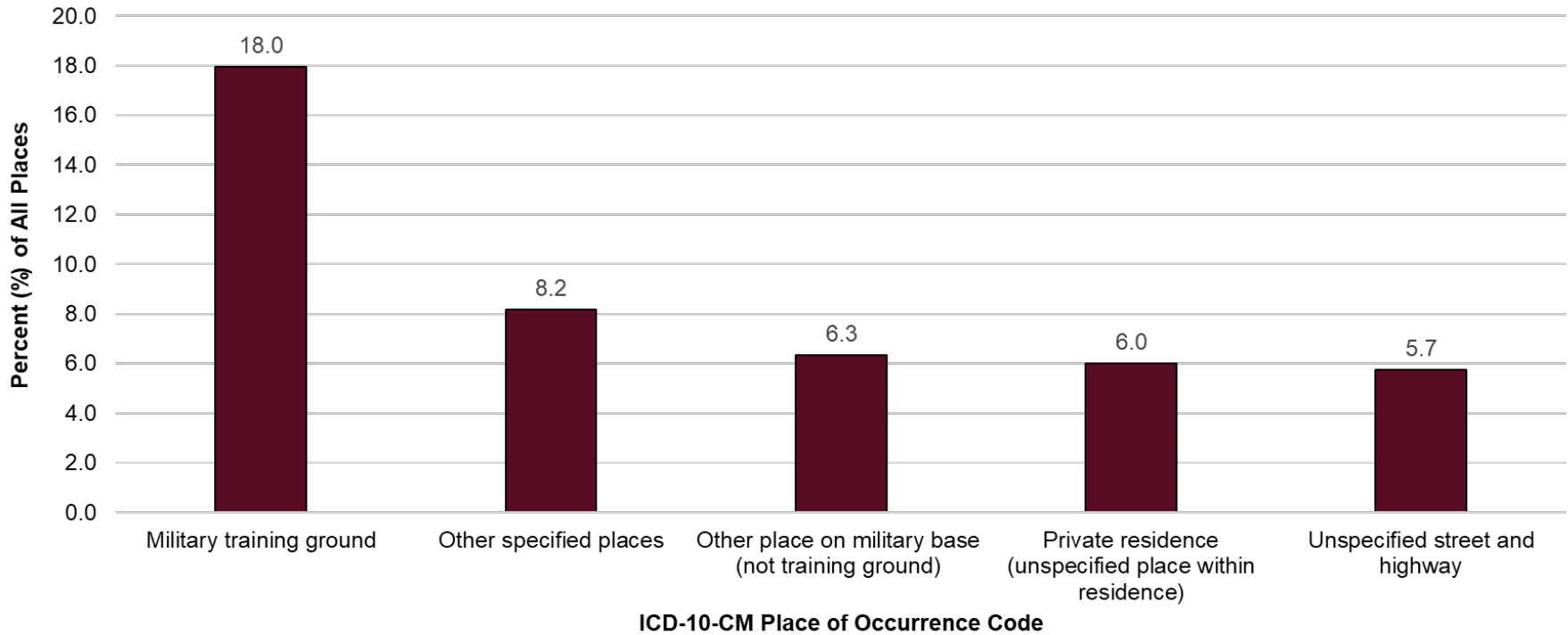
Based on ICD-10-CM cause codes meeting the National Center for Health Statistics definition for unintentional injuries (excludes intentional self-harm, abuse, and violence).

Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries.

Prepared by DCPH-A Injury Prevention.

PLACES OF OCCURRENCE ASSOCIATED WITH INJURIES

The leading place of occurrence associated with unintentional injuries among active-duty Soldiers in 2021 was a military training ground (18%).



Leading Places Associated with Unintentional Injury Outpatient Visits, 2021

Notes:

Total number of unintentional outpatient encounters with place of occurrence codes = 17,852 (3%); may not be representative of the distribution of places for all incident injuries.

Based on ICD-10-CM cause codes meeting the National Center for Health Statistics definition for unintentional injuries (excludes intentional self-harm, abuse, and violence).

Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries.

Prepared by DCPH-A Injury Prevention.

TIP No. 12-123-0123

SUMMARY

- Medical encounter data provide evidence of the magnitude and distribution of health conditions for which active-duty Soldiers seek medical care. These conditions represent barriers to medical readiness.
- Injuries are the biggest health problem for U.S. Army active-duty Soldiers, compared to any other category of medical conditions.
- Injury rates are higher among women compared to men.
- Cumulative micro-traumatic MSK (overuse) injuries account for a greater proportion of all active-duty Army injuries than acute traumatic injuries.
- The most common injury types are MSK tissue damage such as joint pain, tendinitis, and bursitis. The most frequently injured body regions are the lower extremities, spine and back, and upper extremities.
- Among those injuries receiving additional provider coding of injury details, activities most frequently associated with injuries are running and walking/marching/hiking and leading causes of outpatient injuries are overexertion and falls. Greater detail on causes of injury, information necessary for prevention planning, can be gained from surveys and electronic medical profile data.

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TIP No. 12-123-0123

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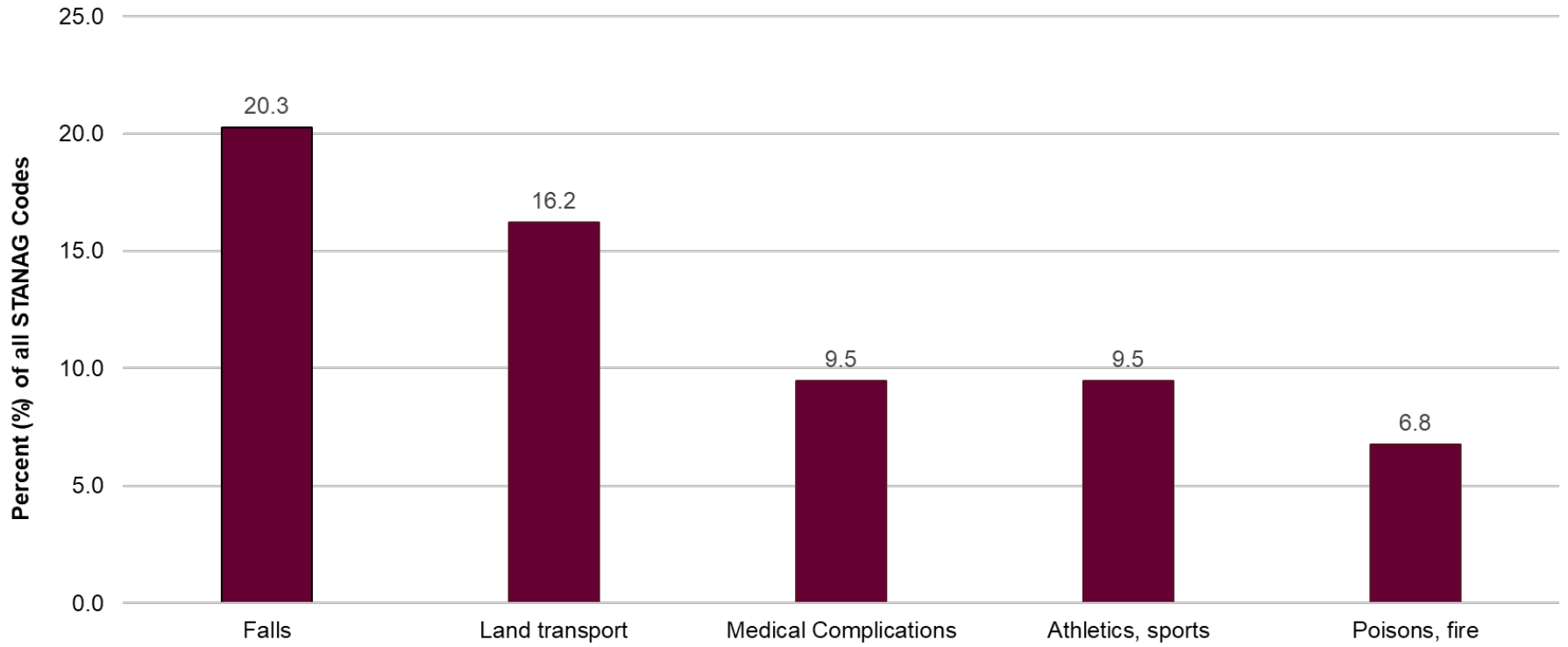
Prepared by: Injury Prevention Branch,

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Dated: January 2023

APPENDIX A CAUSES OF INJURY HOSPITALIZATIONS

In 2021, a total of 74 hospitalizations for injuries received Standardized Agreement Codes (STANAG) cause codes. The leading causes were falls (20%).

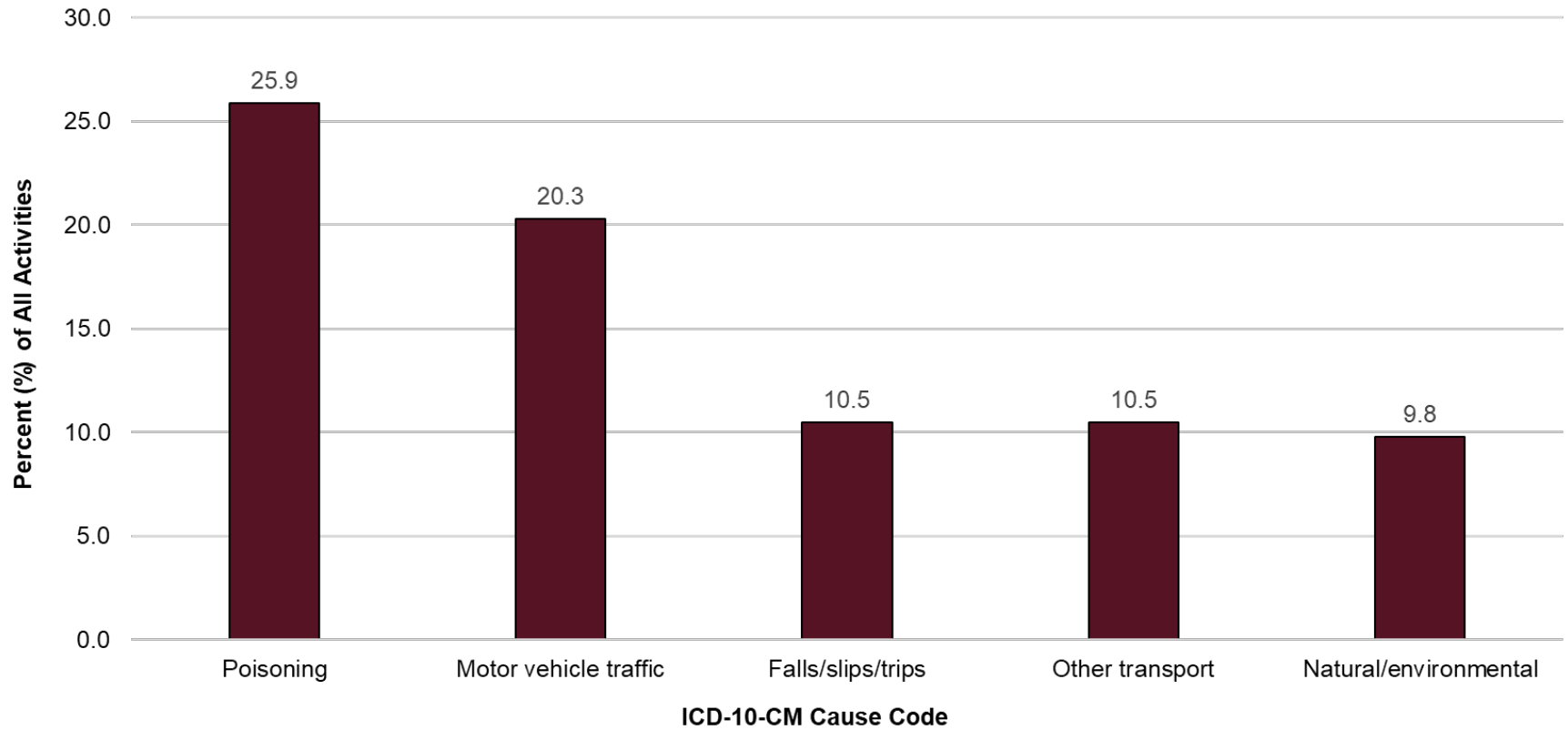


Leading STANAG Cause Codes for Injury Hospitalizations, U.S. Army Active Duty, 2021

Notes:
Total number of STANAG-coded injury hospitalizations = 74 (11%); may not be representative of the distribution of causes for all incident injuries.
Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries.
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Among those injury hospitalizations that were given an ICD-10-CM medical diagnosis cause code in 2021 (20%), leading causes were poisoning (26%) and motor vehicle traffic (20%).



Leading External Causes of Unintentional Hospitalizations, U.S. Army Active Duty, 2021

Notes:

Total number of cause-coded unintentional injury hospitalizations = 143 (20%); may not be representative of the distribution of causes for all incident injuries.

Data source: Military Health System Data Repository (MDR); injuries defined using the U.S. Army Public Health Center (APHC) Taxonomy of Injuries. Prepared by DCPH-A Injury Prevention.