

TIP No. 12-120-0322

Annual Injury Surveillance Report 2020 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 APHC 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) 2020, analyzed and presented by the U.S. Army Public Health Center (APHC) 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, nonenvironment, 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). Injury rates were lower during 2020 than in previous reporting years, due to a combination of a revised injury incidence rule and lower healthcare utilization during the COVID-19 pandemic.

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 APHC 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>

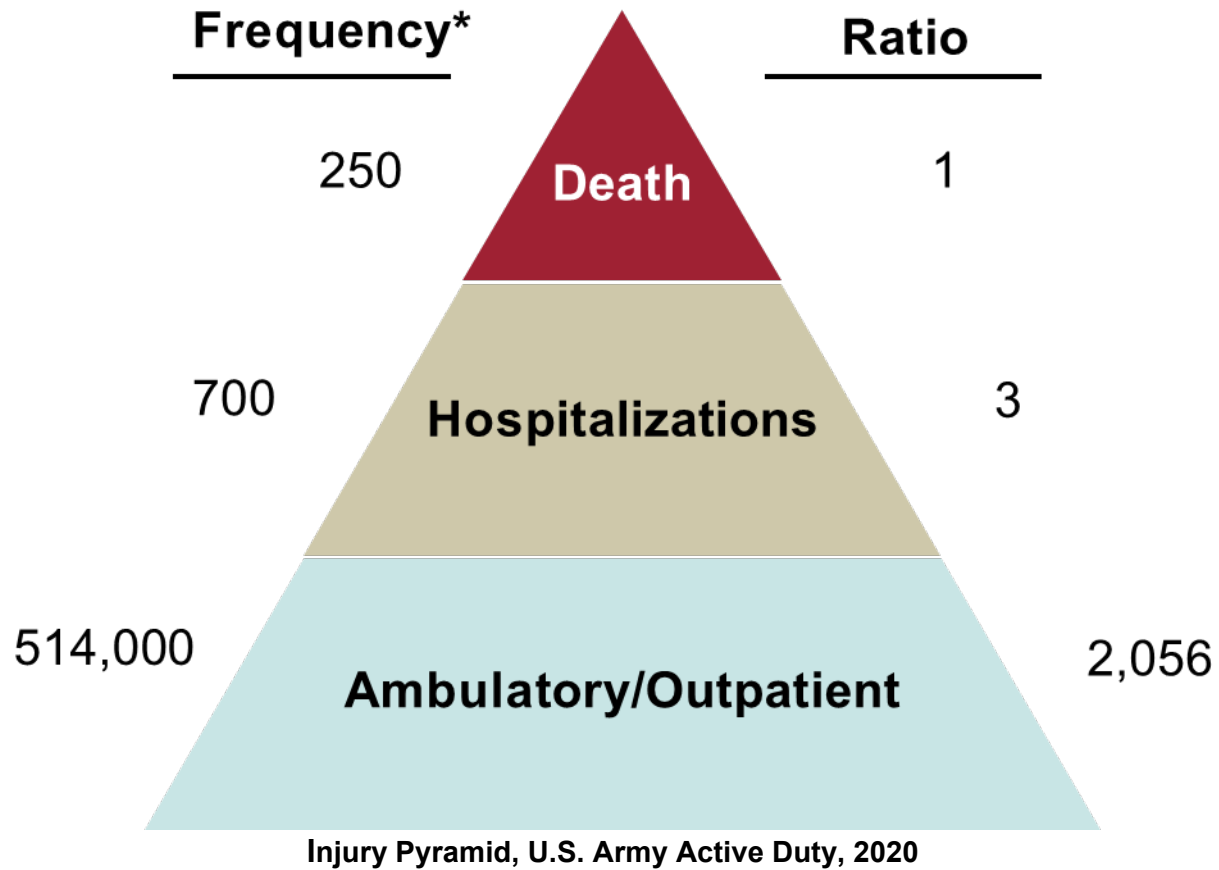
The APHC IPB also provides installation-level injury summaries for both Active Duty and Civilian populations, upon request, for those interested in detailed installation-specific data. Installation injury rates, one element of these summaries, can be accessed at: <https://www.sms.army.mil/>, and navigating 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 > Epidemiology and Disease Surveillance Portfolio > Active Duty Injuries by Installation, MEDCOM Region, and MACOM (Quarterly).

Furthermore, injury data, specific to basic trainee populations, are available upon request, and at: <https://carepoint.health.mil/sites/APH/PHPMO/Pages/AD-Training-Related-Injuries.aspx>

For additional information, please visit the Injury Prevention Branch Website at: <https://phc.amedd.army.mil/topics/discond/ptsaip/Pages/default.aspx>, and contact us by email at: usarmy.apg.medcom-aphc.mbx.injuryprevention@mail.mil

DISTRIBUTION OF INJURIES

The injury pyramid depicts injuries by level of severity, from deaths to injuries treated in an outpatient setting. In 2020, for every one injury-related death, there were over 2,000 outpatient encounters. Injuries treated on an outpatient basis represent a significant obstacle to Soldier medical readiness.



Notes:

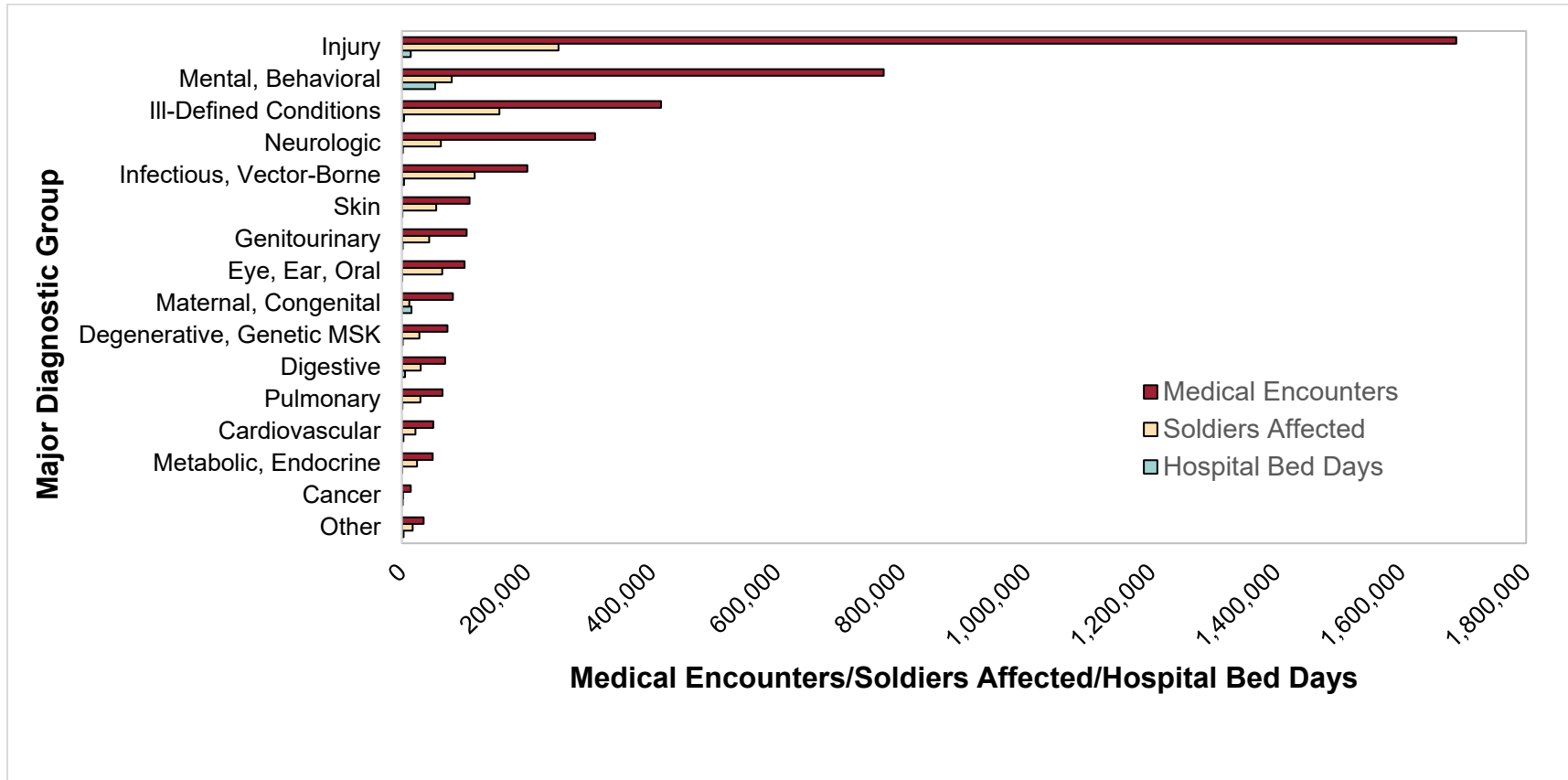
*Frequencies are rounded and represent incident injury visits

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 APHC Injury Prevention

MAGNITUDE OF THE PROBLEM

During 2020, injuries accounted for over 1.5 million medical encounters (41% of all encounters) among Active Duty Army Soldiers, about 2.2 times as many encounters as the second leading cause, mental disorders (19%). Injuries also affected the greatest number of Soldiers, over 250,000, compared to all other medical conditions.



Relative Burden of Injuries and Diseases, U.S. Army Active Duty, 2020

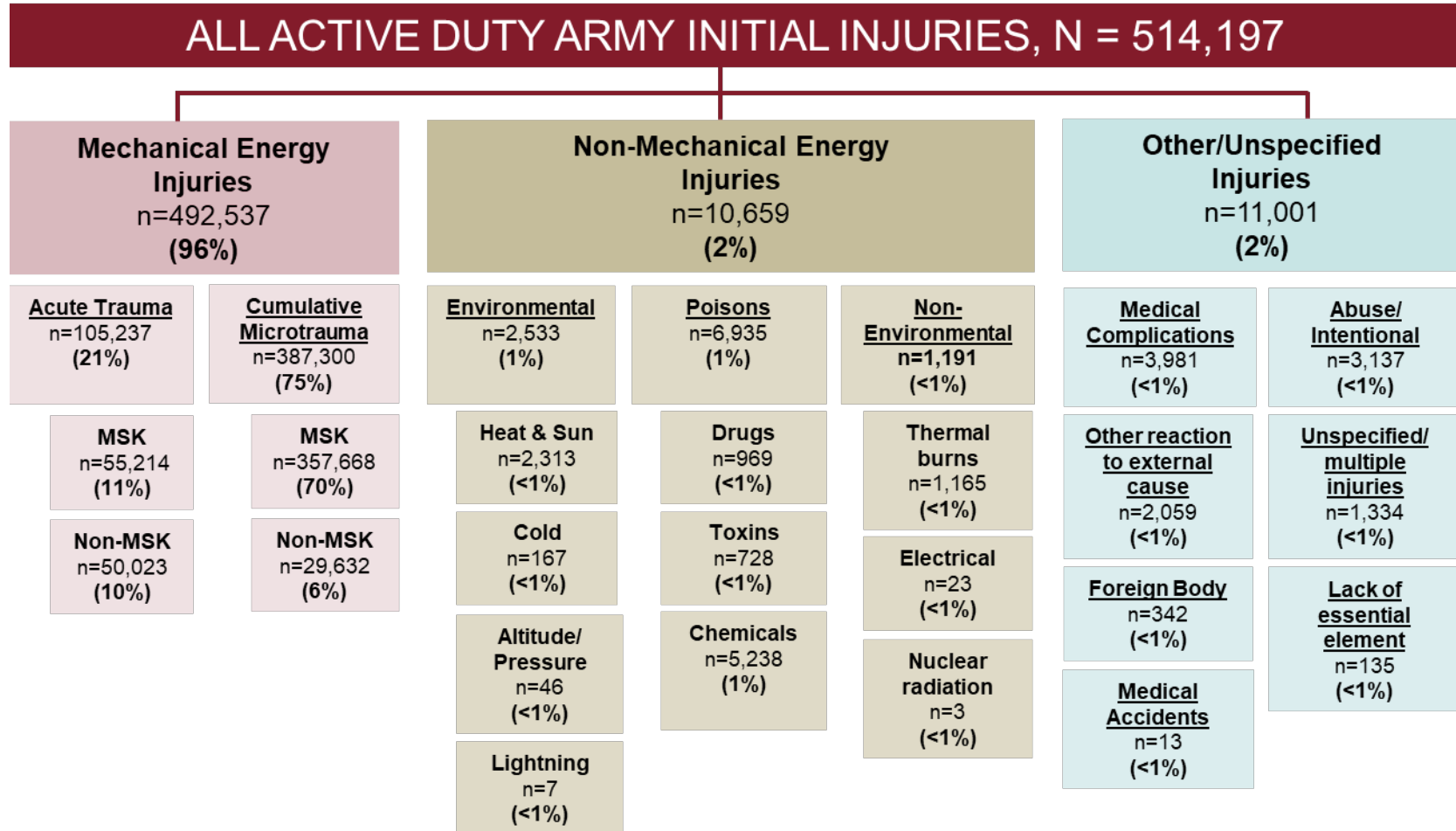
Notes:

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 APHC Injury Prevention

The vast majority (96%) of new (incident) injury diagnoses were attributable to mechanical energy sources and 75% to cumulative micro-traumatic injuries.



Taxonomy Distribution of Injuries, U.S. Army Active Duty, 2020

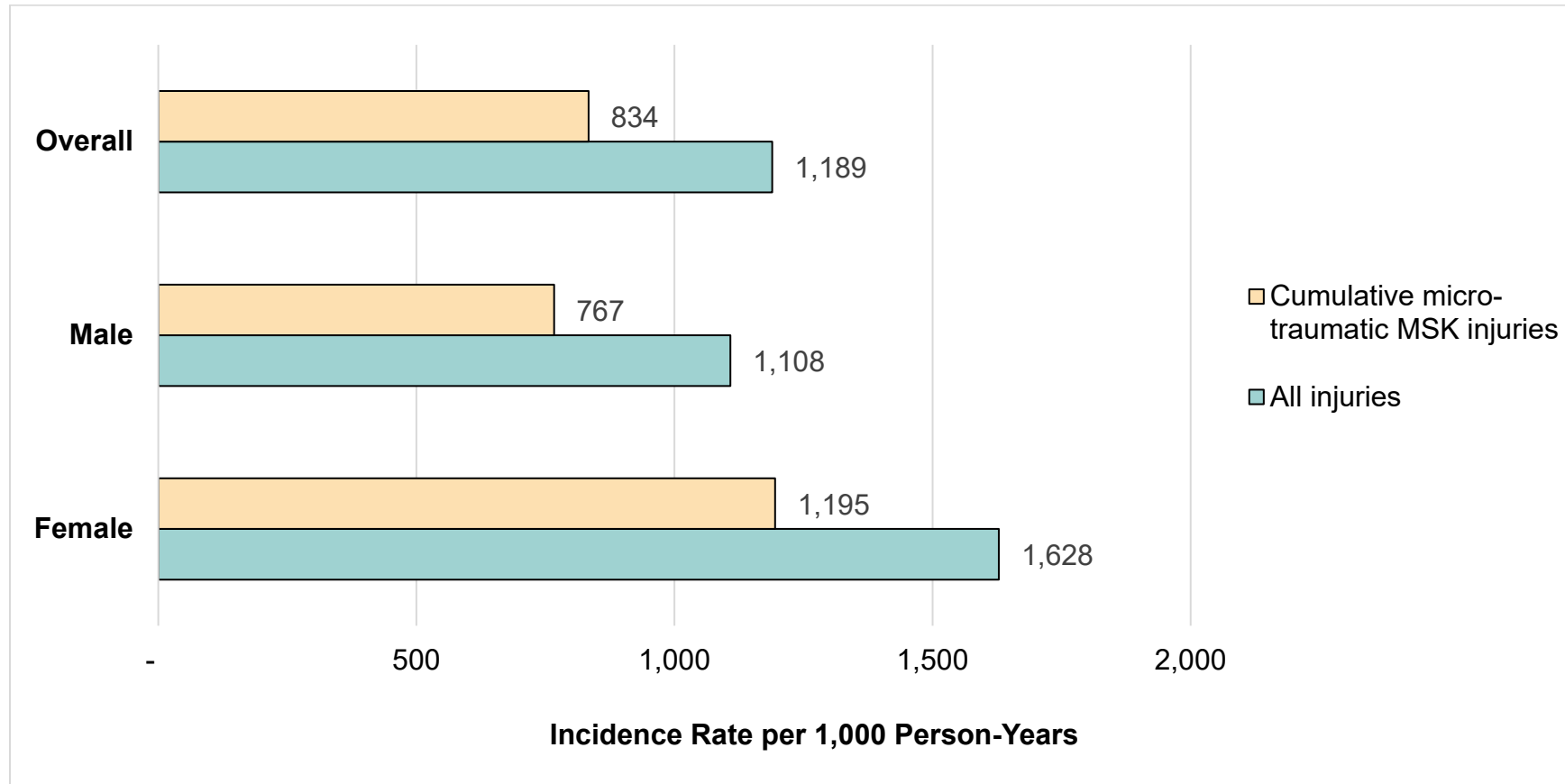
Notes:

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

Prepared by APHC Injury Prevention

INJURY RATE

The rate of incident injuries among Army Soldiers during 2020 was 1,189 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.



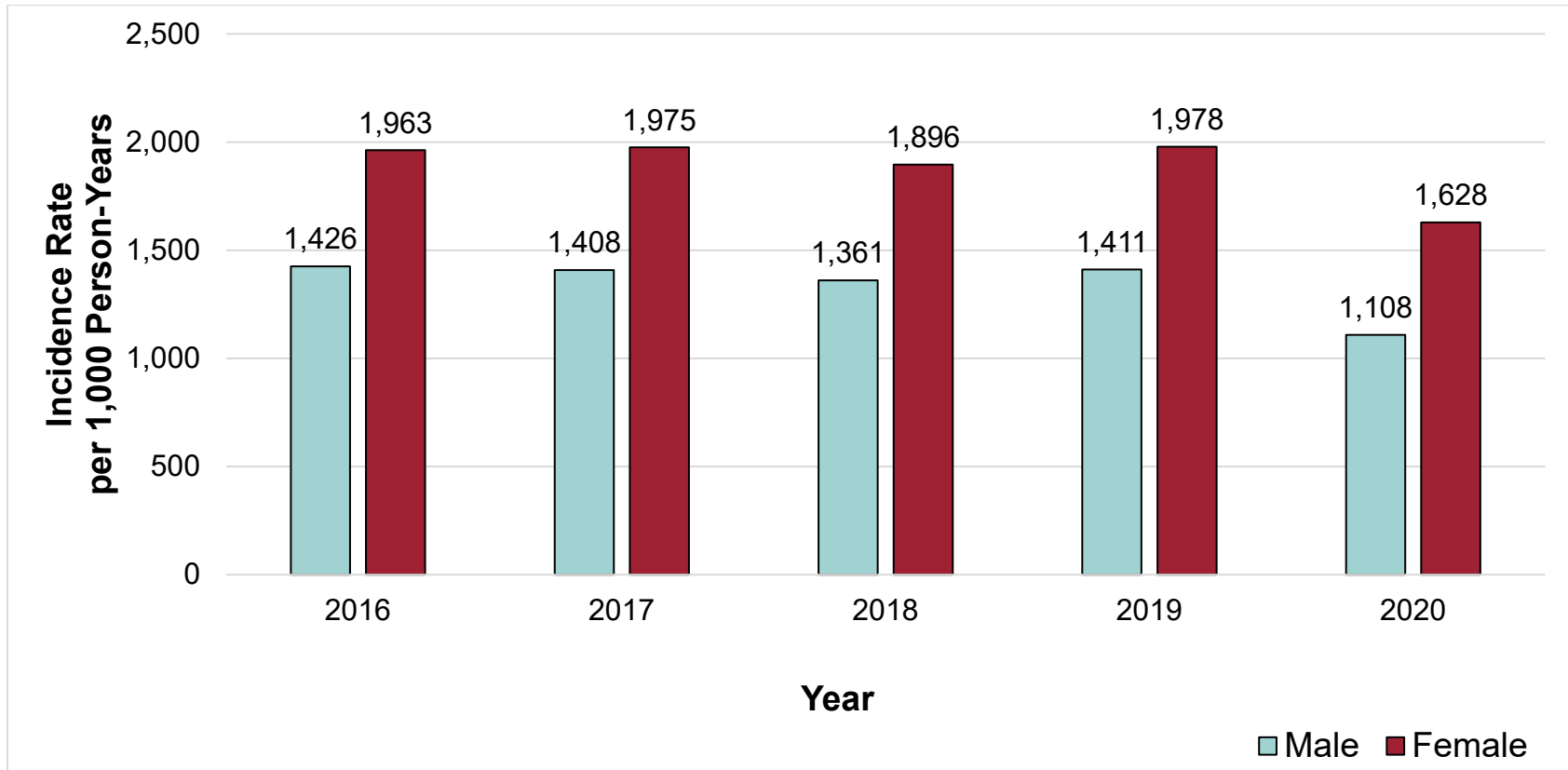
All Injury and Cumulative Micro-traumatic Musculoskeletal Incident Injury Visit Rates by Sex, U.S. Army Active Duty, 2020

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 APHC Injury Prevention

The rates of incident injuries among female Army Soldiers were consistently and significantly higher than male Soldiers from 2016 to 2020 ($p < 0.001$). Rates for both sexes were significantly lower in 2020, compared to previous years ($p < 0.01$).



**All Injury Incident Injury Visit Rates by Sex,
U.S. Army Active Duty, 2016–2020**

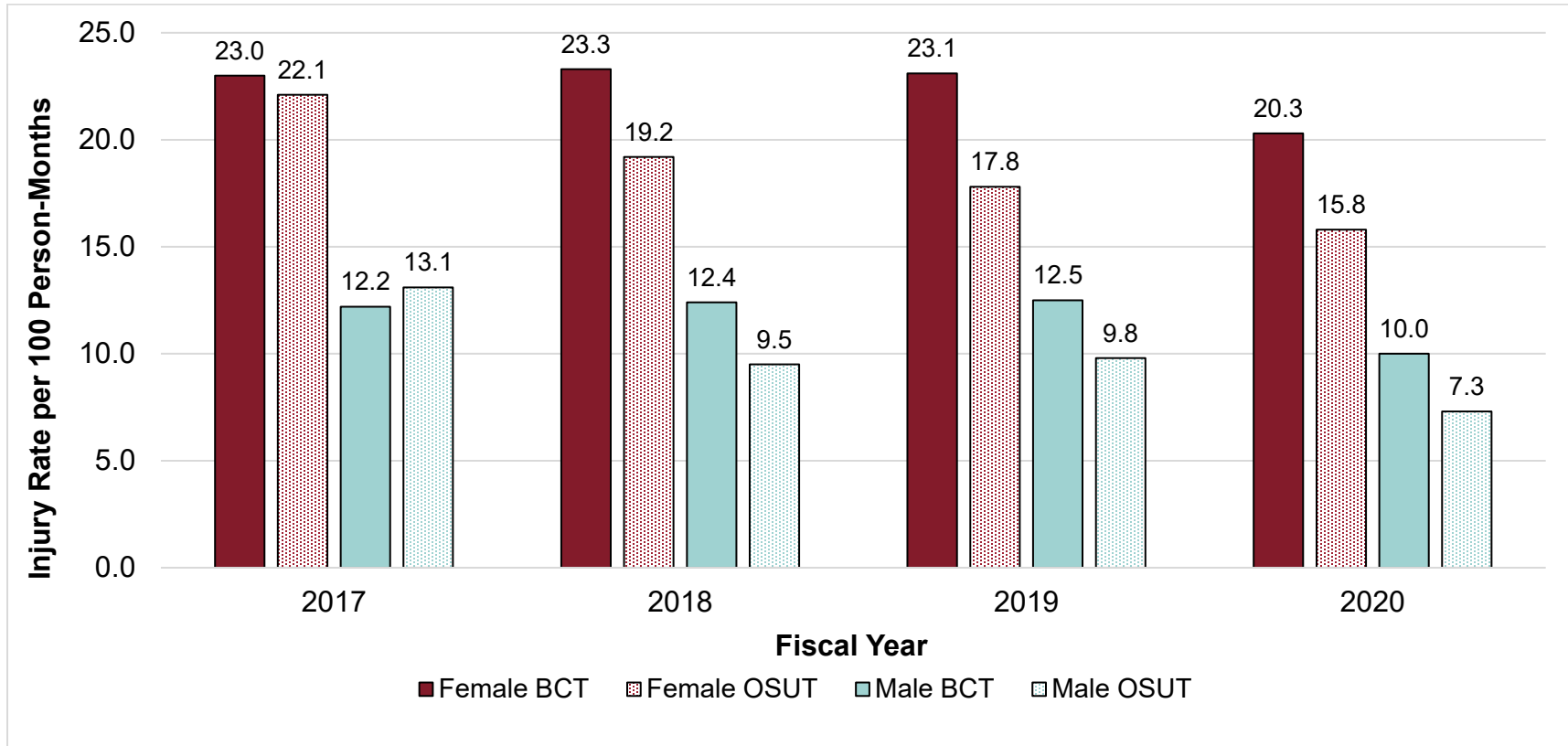
Notes:

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 APHC Injury Prevention

Incident injury rates among female trainees in Basic Combat Training (BCT) and One Station Unit Training (OSUT) were higher than male trainees from 2017–2020. In most years (2018–2020), injury rates during BCT were higher than rates during OSUT for both males and females. Following overall injury rate trends, injury rates among male and female trainees, during both BCT and OSUT, were lower in 2020 when compared to previous years.



Overall Incident Injury Visit Rates, U.S. Army Active Duty vs. Trainee, 2017–2020

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. 2021. Public Health Report No. S.0079146-21 Injury Surveillance and Longitudinal Studies for Gender Integration in the Army: Sixth Annual Assessment, 2021.

Prepared by APHC 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 injury encounters among Active Duty Soldiers were due to cumulative micro-trauma (overuse). With regard to body region, most injuries were to the lower extremities (42%), followed by the spine and back (27%) and upper extremities (21%).

Incident Mechanical Injuries by Body Region and Acute/Overuse*, U.S. Army Active Duty, 2020

Body Region	Acute Traumatic	Cumulative Micro-traumatic (Overuse)	All
Lower Extremity	38,644 (7.5)	170,261 (33.1)	208,905 (42.4)
Spine & Back	7,860 (1.5)	125,798 (24.5)	133,658 (27.1)
Upper Extremity	32,944 (6.4)	68,864 (13.4)	101,808 (20.7)
Head, Face, & Neck	19,048 (3.7)	12,158 (2.4)	31,206 (6.3)
Torso	6,166 (1.2)	651 (0.1)	6,817 (1.4)
Other	575 (0.1)	9,568 (1.9)	10,143 (2.1)
Total (%)	105,237 (21.4)	387,300 (78.6)	492,537 (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 APHC Injury Prevention

Musculoskeletal tissue damage like joint pain, tendinitis, and bursitis accounted for nearly three-quarters (73%) of incident mechanical injury encounters during 2020.

Incident Mechanical Injury Diagnoses by Body Region, U.S. Army Active Duty, 2020

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	36	126	2055	114759	133	4	3202	62899	5364	163232	128	9463	361,401	73.0
Tissue Damage, Other	6930	12008	1414	0	1668	0	3856	0	2943	0	387	1	29,207	5.9
Sprain/Joint Damage	9	0	1102	0	385	0	3660	419	13637	1643	36	28	20,919	4.2
Nerve	22	0	17	11023	4	376	2781	2932	744	672	0	0	18,571	3.8
Contusion/Superficial	3711	24	0	0	1463	14	4078	53	4786	2529	0	0	16,658	3.4
Strain/Tear	1428	0	2709	0	1358	0	3014	2554	4507	5	24	6	15,605	3.2
Fracture	778	0	433	16	414	257	4224	7	3886	2180	0	70	12,265	2.5
Open Wound	2849	0	0	0	292	0	6161	0	2092	0	0	0	11,394	2.3
Internal Organ and Blood Vessel	3236	0	101	0	407	0	54	0	15	0	0	0	3,813	0.8
Dislocation	40	0	29	0	27	0	1318	0	458	0	0	0	1,872	0.4
Crush	8	0	0	0	14	0	499	0	188	0	0	0	709	0.1
Amputation	1	0	0	0	1	0	97	0	24	0	0	0	123	0.0
Total	19,048	12,158	7,860	125,798	6,166	651	32,944	68,864	38,644	170,261	575	9,568	492,537	100.0
Percent Total (%)	3.9	2.5	1.5	25.5	1.3	0.1	6.7	14.0	7.8	34.6	0.1	1.9		100

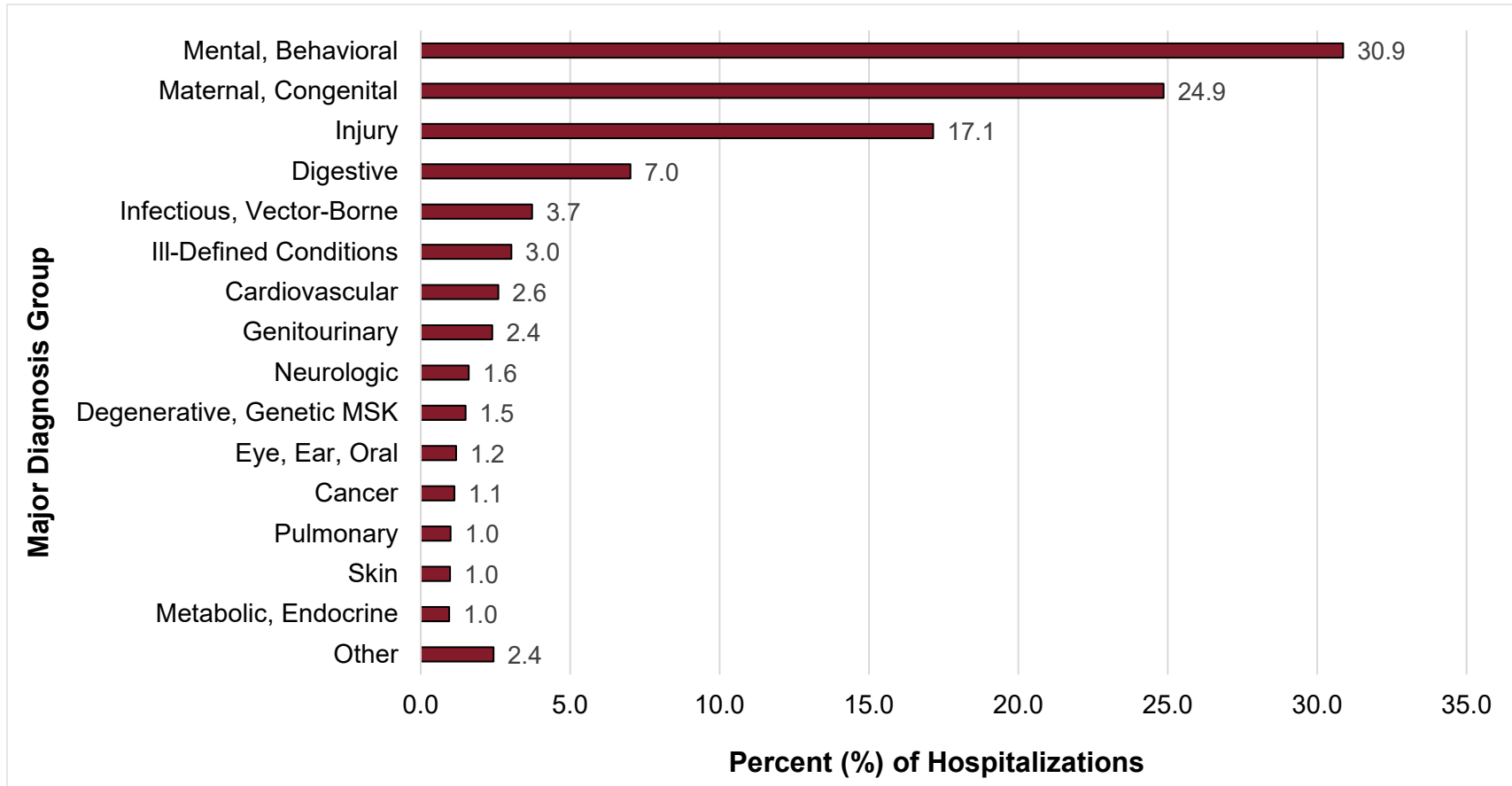
Notes:

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

Prepared by APHC Injury Prevention

HOSPITALIZATIONS

Injuries were the third leading cause of hospitalizations during 2020, accounting for 17% of all hospitalizations among Active Duty Army Soldiers. See Appendix A for data on causes of injury hospitalizations.



Major Diagnosis Groups Resulting in Hospitalizations, U.S. Army Active Duty, 2020

Notes:

Total number of hospitalizations = 17,119

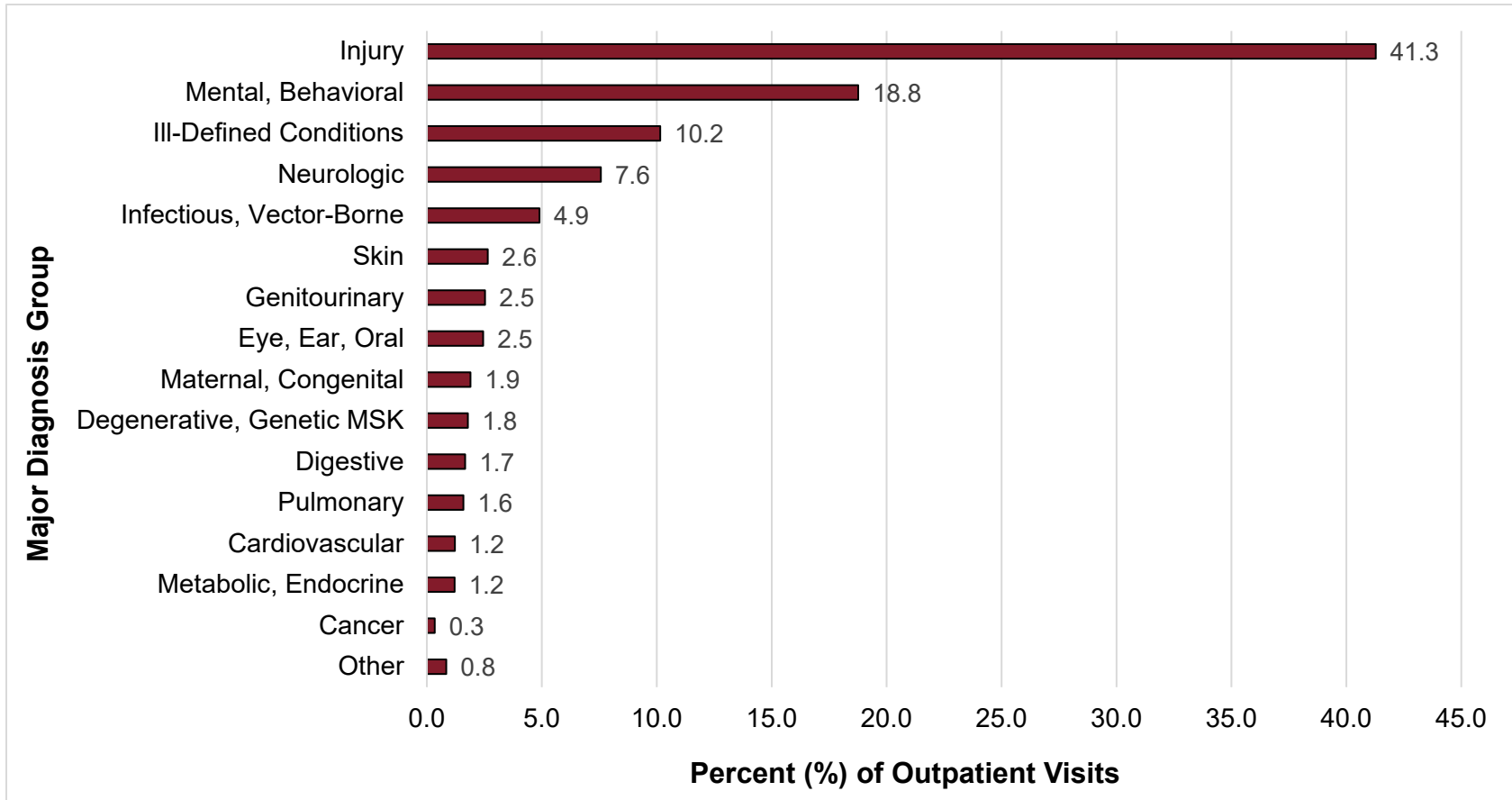
Diagnosis group “Other” includes adverse effects of drugs, blood disorders, and other neoplasms (not cancer).

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

Prepared by APHC Injury Prevention

OUTPATIENT ENCOUNTERS

Injuries were the leading cause of outpatient encounters during 2020, accounting for 41% of all outpatient visits among Active Duty Army Soldiers.



Major Diagnosis Groups Resulting in Outpatient Visits U.S. Army Active Duty, 2020

Notes:

Total number of outpatient visits = 4,117,157

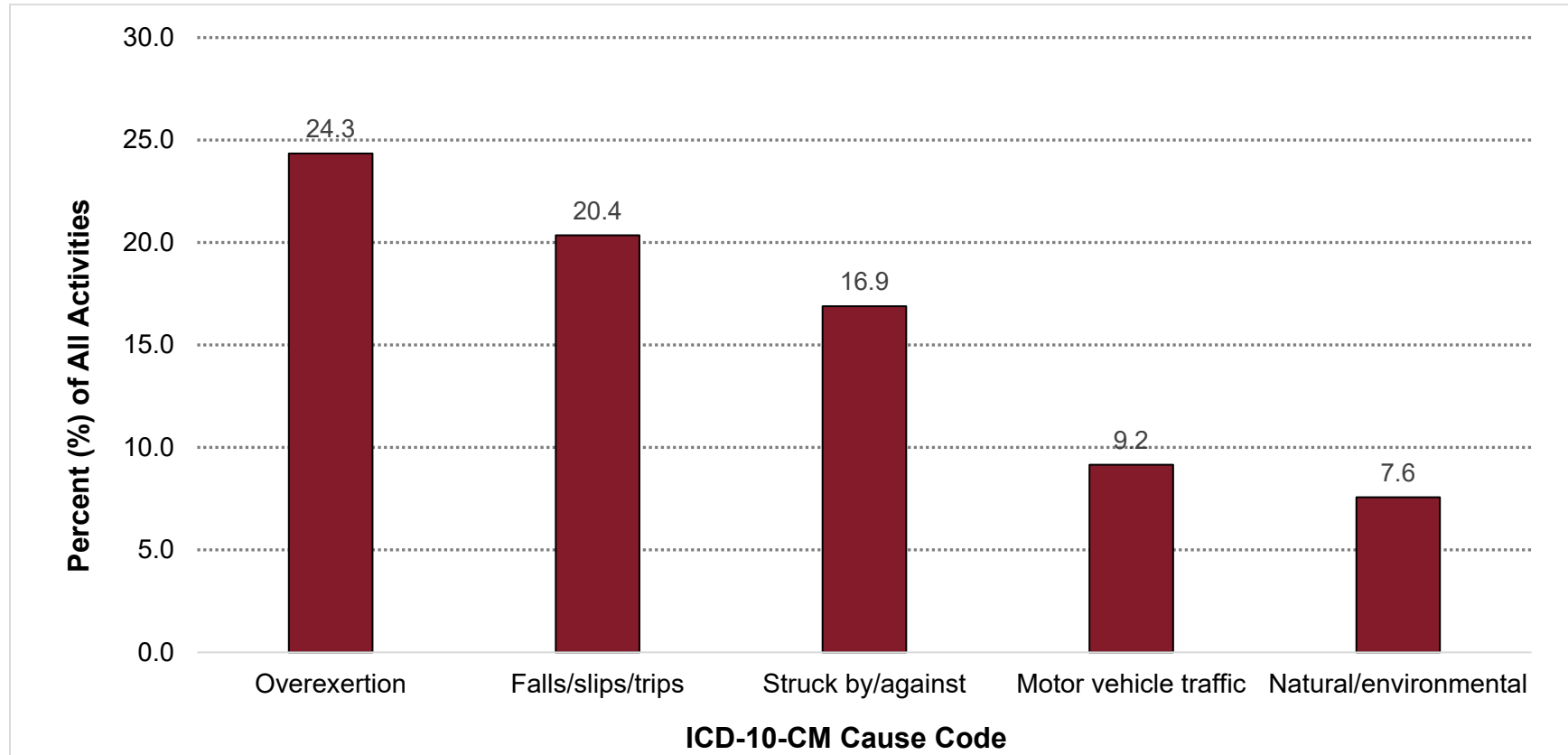
Diagnosis group “Other” includes adverse effects of drugs, blood disorders, and other neoplasms (not cancer).

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

Prepared by APHC Injury Prevention

MECHANISMS ASSOCIATED WITH INJURIES

Among outpatient injury encounters with a cause code in 2020, leading mechanisms of injuries were overexertion (24%) and falls (20%).



Leading Causes of Unintentional Injury, Outpatient Visits, U.S. Army Active Duty, 2020

Notes:

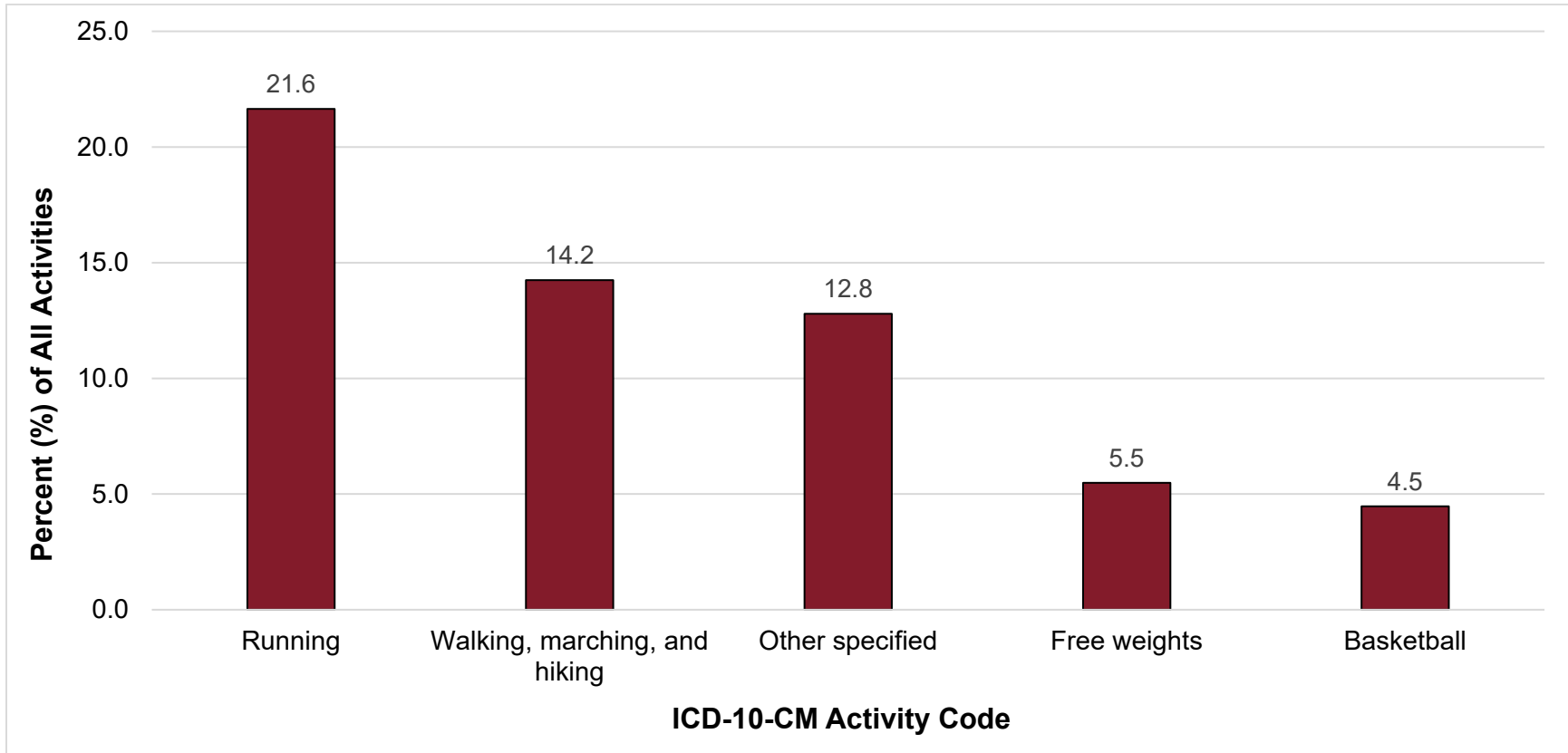
Total number of cause-coded unintentional outpatient visits = 49,700 (10%); may not be representative of the distribution of causes for all injuries. Based on ICD-10-CM cause codes meeting the National Center for Health Statistics definition for unintentional injuries (excludes intentional self-harm, 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 APHC Injury Prevention

ACTIVITIES ASSOCIATED WITH INJURIES

In 2020, the leading activity associated with unintentional injuries among Active Duty Army Soldiers was running (22%), followed by walking, marching, and hiking (14%).



Leading Activities Associated with Unintentional Injury Outpatient Visits, 2020

Notes:

Total number of unintentional outpatient encounters with activity codes = 24,545 (5%); may not be representative of the distribution of activities for all injuries.

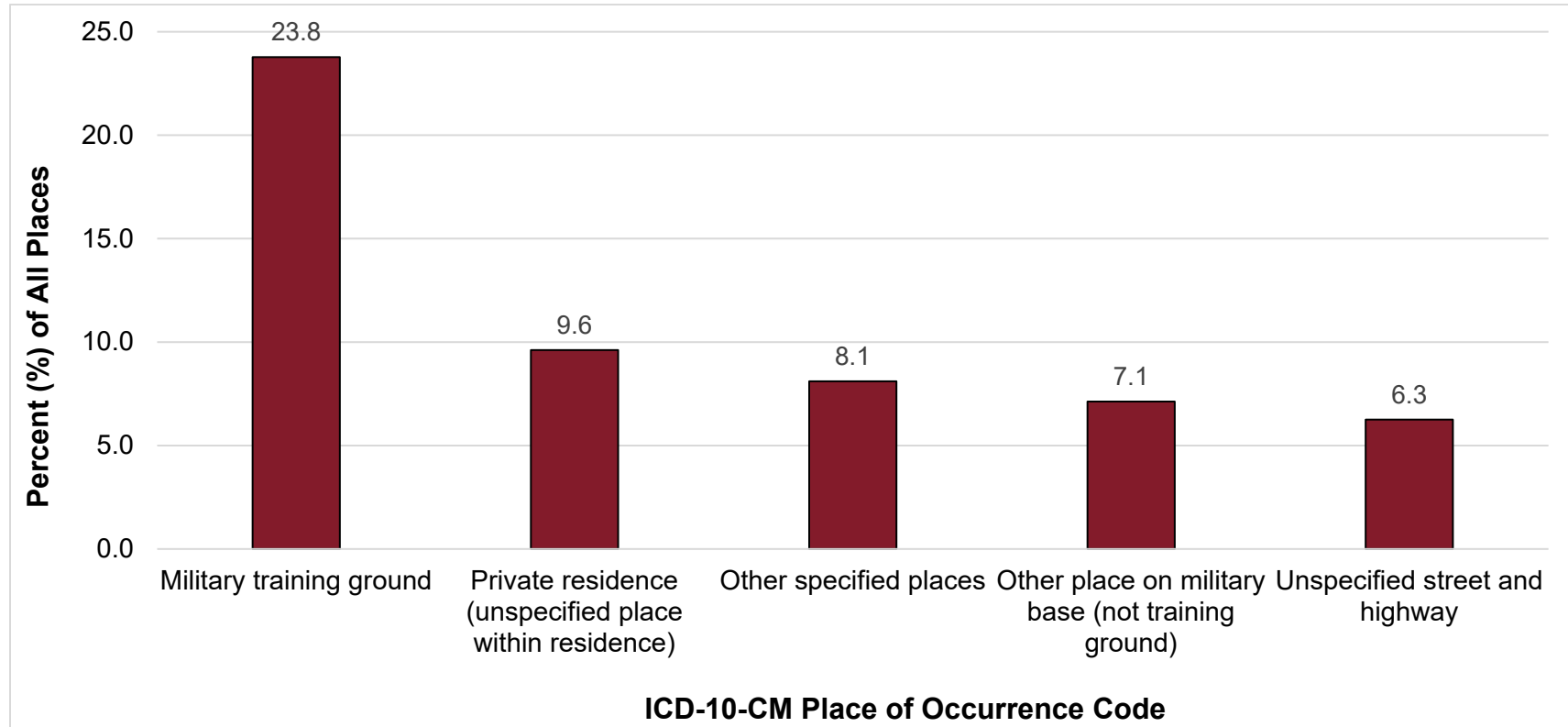
Based on ICD-10-CM cause codes meeting the National Center for Health Statistics definition for unintentional injuries (excludes intentional self-harm, abuse, and violence).

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

Prepared by APHC Injury Prevention

PLACES OF OCCURRENCE ASSOCIATED WITH INJURIES

The leading place of occurrence associated with unintentional injuries among Active Duty Army Soldiers in 2020 was a military training ground (24%).



Leading Places Associated with Unintentional Injury Outpatient Visits, 2020

Notes:

Total number of unintentional outpatient encounters with place of occurrence codes = 13,965 (3%); may not be representative of the distribution of places for all 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 APHC Injury Prevention

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.
- 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 were 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.

BIBLIOGRAPHY OF KEY MILITARY INJURY SURVEILLANCE REFERENCES

Military Injury Surveillance Background

- Canham-Chervak M, RA Steelman, A Schuh, and BH Jones. 2016. Importance of External Cause Coding for Military Injury Surveillance: Lessons from Assessment of Overexertion Injuries among U.S. Army Soldiers in 2014. *MSMR* 23(11):10–15.
<https://europepmc.org/abstract/med/27880039>
- Hauret KG, BH Jones, SH Bullock, M Canham-Chervak, and S Canada. 2010. Musculoskeletal Injuries: Description of an Under-Recognized Injury Problem among Military Personnel. *Am J Prev Med* 38(S1):S61–S70.
<https://phc.amedd.army.mil/PHC%20Resource%20Library/Musculoskeletal%20Injuries%20Description%20of%20an%20Under-Recognized%20Injury%20Problem%20among%20Military%20Personnel.pdf>
- Jones BH, M Canham-Chervak, S Canada, TA Mitchener, and S Moore. 2010. Medical Surveillance of Injuries in the U.S. Military: Descriptive Epidemiology and Recommendations for Improvement. *Am J Prev Med* 38(S1):S42–S60.
<https://phc.amedd.army.mil/PHC%20Resource%20Library/Medical%20Surveillance%20of%20Injuries%20in%20the%20U.S.%20Military%20Descriptive%20Epidemiology%20and%20Recommendations%20for%20Improvement.pdf>

TIP No. 12-120-0322

Jones BH, PJ Amoroso, ML Canham, JB Schmitt, and B Weyandt. 1999. Atlas of Injuries in the U.S. Armed Forces: Conclusions and Recommendations of the DoD Injury Surveillance and Prevention Work Group. *Mil Med* 164(S8):548–573.

https://academic.oup.com/milmed/article/164/suppl_8/548/4832959?searchresult=1

Schuh A, M Canham-Chervak, and BH Jones. 2017. Statistical process control charts for monitoring military injuries. *Inj Prev* 23(6):416–422.

<https://injuryprevention.bmj.com/content/23/6/416>

Schuh-Renner A, MC Inscore, VD Hauschild, BH Jones, and M Canham-Chervak. 2021. The Impacts of ICD-10-CM on U.S. Army Injury Surveillance. *AJPM* 61(1):e47–e52.

[https://www.ajpmonline.org/article/S0749-3797\(21\)00183-5/fulltext](https://www.ajpmonline.org/article/S0749-3797(21)00183-5/fulltext)

U.S. Army Public Health Command (Provisional). 2009. Injury Epidemiology Report No. 12-HF-0APLa-09. U.S. Army Annual Injury Epidemiology Report 2008

<https://apps.dtic.mil/docs/citations/ADA523368>

Military Injury Definition

APHC. 2017. Public Health Information Paper No. 12-01-0717, *A Taxonomy of Injuries for Public Health Monitoring and Reporting*.

<https://apps.dtic.mil/sti/citations/AD1039481>

Hauschild VD, A Schuh-Renner, T Lee, MD Richardson, K Hauret, and BH Jones. 2019. Using Causal Energy Categories to Report the Distribution of Injuries in an Active Population: An Approach Used by the U.S. Army. *J Sci Med Sport* 22(9):997–1003.

<http://jsams.org/retrieve/pii/S1440244019300994>

Schuh-Renner A, M Canham-Chervak, TL Grier, VD Hauschild, and BH Jones. 2019. Expanding the Injury Definition: Evidence for the Need to Include Musculoskeletal Conditions. *Public Health* 169:69–75.

<https://www.sciencedirect.com/science/article/abs/pii/S0033350619300022?via%3Dihub>

Military Injury Prevention Overview

Canham-Chervak M, TI Hooper, FH Brennan, SC Craig, DC Girasek, RA Schaefer, G Barbour, KS Yew, and BH Jones. 2010. A Systematic Process to Prioritize Prevention Activities: Sustaining Progress toward the Reduction of Military Injuries. *Am J Prev Med* 38(1S):S11–S18.

<https://phc.amedd.army.mil/PHC%20Resource%20Library/Systematic%20Process%20to%20Prioritize%20Prevention%20Activities%20Sustaining%20Progress%20toward%20the%20Reduction%20of%20Military%20Injuries.pdf>

Jones BH, VD Hauschild, and M Canham-Chervak. 2018. Musculoskeletal Training Injury Prevention in the U.S. Army: Evolution of the Science and the Public Health Approach. *J Sci Med Sport* 21(11):1139–1146.

<https://www.sciencedirect.com/science/article/pii/S144024401830063X>

TIP No. 12-120-0322

Jones BH and VD Hauschild. 2015. Physical Training, Fitness, and Injuries: Lessons Learned from Military Studies. *J Strength Cond* 29(S1):S57–S64.

https://journals.lww.com/nsca-jscr/Abstract/2015/11001/Physical_Training,_Fitness,_and_Injuries_Lessons.10.aspx

Marshall SW, M Canham-Chervak, EO Dada, and BH Jones. 2014. Burden of Musculoskeletal Diseases in the United States: *Military Injuries*.

<https://www.boneandjointburden.org/2013-report/military-injuries/vi5>

Molloy JM, TL Pendergrass, IE Lee, MC Chervak, KG Hauret, and DI Rhon. 2020. Musculoskeletal Injuries and United States Army Readiness Part I: Overview of Injuries and their Strategic Impact. *Mil Med*, 185(9-10):e1461–1471.

<https://academic.oup.com/milmed/advance-article/doi/10.1093/milmed/usaa027/5805225>

Molloy JM, TL Pendergrass, IE Lee, KG Hauret, MC Chervak, and DI Rhon. 2020. Musculoskeletal Injuries and United States Army Readiness. Part II: Management Challenges and Risk Mitigation Initiatives. *Mil Med* 185(9–10):e1472–1480.

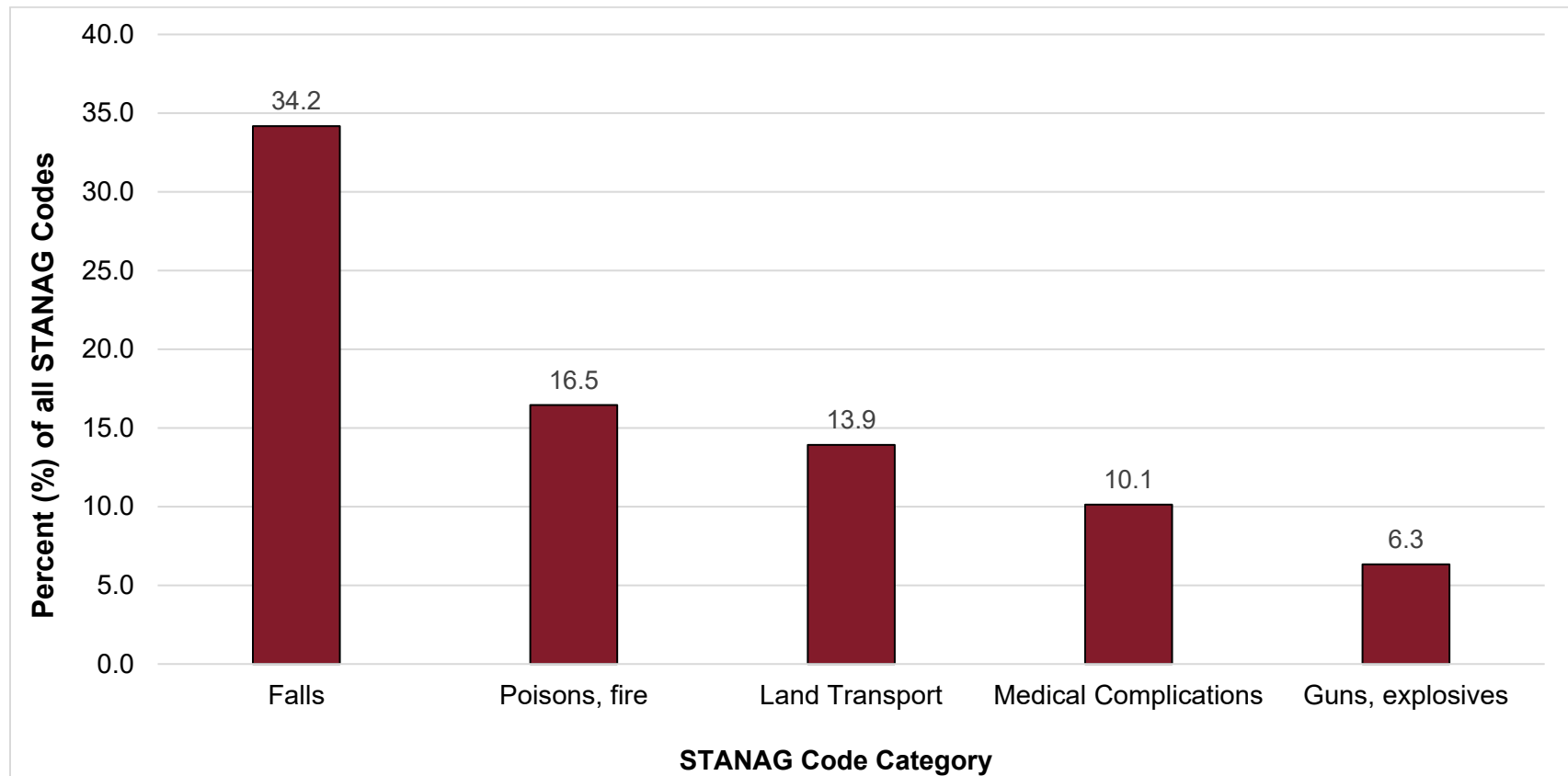
<https://academic.oup.com/milmed/advance-article/doi/10.1093/milmed/usaa028/5762817>

Prepared by: Injury Prevention Branch, usarmy.apg.medcom-aphc.mbx.injuryprevention@mail.mil, 410-417-2886, DSN 583-2886

Dated: January 2022

APPENDIX A CAUSES OF INJURY HOSPITALIZATIONS

In 2020, a total of 79 hospitalizations for injuries received Standardized Agreement Codes (STANAG) cause codes. The leading causes were falls (35%).



Leading STANAG Cause Codes for Injury Hospitalizations, U.S. Army Active Duty, 2020

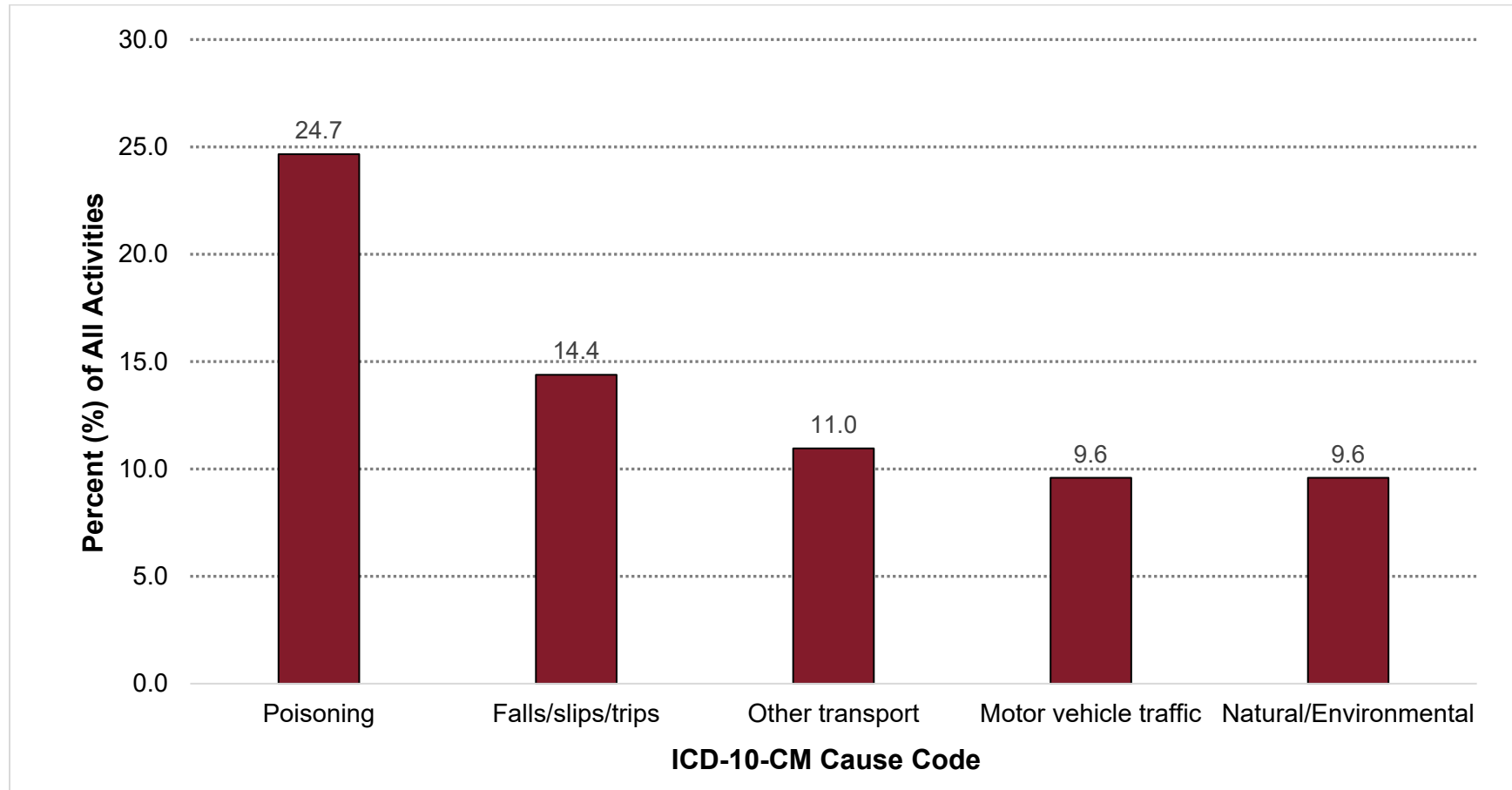
Notes:

Total number of STANAG-coded injury hospitalizations = 79 (11%); may not be representative of the distribution of causes for all 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 APHC Injury Prevention

Among those injury hospitalizations that were given an ICD-10-CM medical diagnosis cause code in 2020 (21%), leading causes were poisoning (25%) and falls (14%).



Leading External Causes of Unintentional Hospitalizations, U.S. Army Active Duty, 2020

Notes:

Total number of cause-coded unintentional injury hospitalizations = 146 (21%); may not be representative of the distribution of causes for all 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 APHC Injury Prevention