



Applications of the Taxonomy of Injuries

Injury Definition and Standardized Medical Encounter Reporting

Dr. Anna Schuh-Renner

V.D. Hauschild, A.K. McCabe, B.H. Jones, M. Canham-Chervak

September 14, 2023

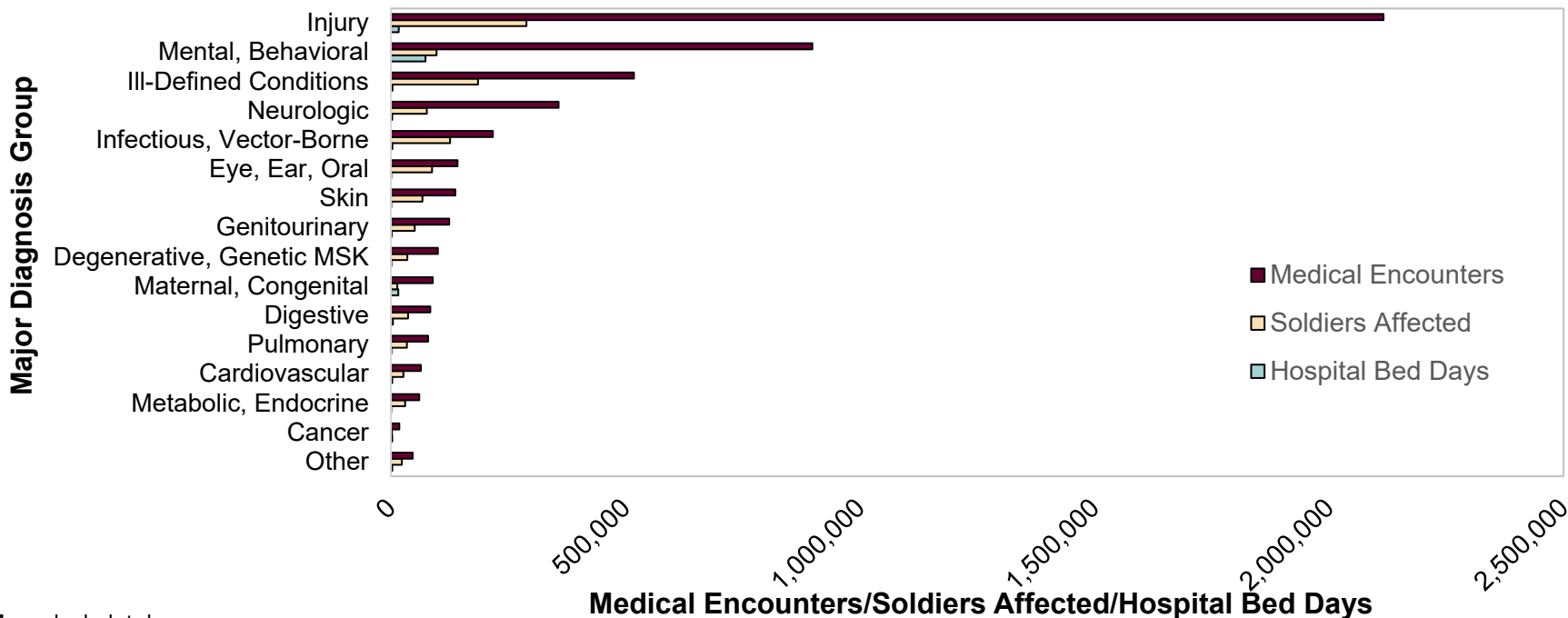
Disclaimer

The views expressed in this presentation are those of the author(s) and do not necessarily reflect the official policy of the Department of Defense, Defense Health Agency or the U.S. Government.

The mention of any non-federal entity and/or its products is not to be construed or interpreted, in any manner, as federal endorsement of that non-federal entity or its products.



Background: 2021 U.S. Army Burden of Illness and Injury



MSK: Musculoskeletal

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 Taxonomy of Injuries.

Improving Health and Building Readiness. Anytime, Anywhere — Always



Background, ICD-10-CM Transition

1 October 2015: U.S. implements 10th revision of International Classification of Diseases, Clinical Modification (ICD-10-CM, from the prior ICD-9-CM)

There was a 1,554% increase in acute injury diagnosis (dx) codes:

- >43,000 ICD-10-CM codes (S&T), vs. 2,600 ICD-9-CM (800-900)
- Increase is even greater with other injury types (e.g., overuse)

Mapping prior ICD-9-CM codes to ICD-10-CM presented significant challenges



Background: Taxonomy of Injuries

- The ICD-10-CM transition necessitated the development of a comprehensive injury definition and a systematic categorization of injury types.

Military Injury Definition, 2017

Damage of or interruption to the normal functioning of body tissues that results when an energy transfer exposure exceeds the threshold of tissue tolerance, either suddenly or gradually.

Mechanical Energy

MSK or Non-MSK

Acute traumatic or

Cumulative micro-traumatic

Non-Mechanical Energy

Environmental (heat, cold)

Poisons (drugs, chemicals, toxins)

Electrical, burns, radiation

Other/Unspecified Energy

Medical accidents/complications

Foreign bodies

Abuse, violence

- Includes codes from 13 ICD-10-CM chapters, predominantly M, S, and T.
- Infections, genetic disorders, and degenerative conditions are excluded.



Application: U.S. Army Annual Injury Surveillance Report

- Allows for comprehensive characterization of injuries across populations.
- Subcategories can be focused on, in context of the broad analysis.

ALL 2021 ACTIVE DUTY ARMY INCIDENT INJURIES, N = 653,051

**Mechanical Energy
Injuries
(96%)**

**Non-Mechanical
Energy Injuries
(2%)**

**Other/
Unspecified
Injuries
(2%)**

**Acute Trauma
(20%)**

*94% of acute dx codes
are from ICD-10-CM
Chapters S&T*

**Cumulative Microtrauma
(76%)**

*81% of cumulative dx codes
are from ICD-10-CM
Chapter M*

**Environmental
(1%)**

**Poisons
(1%)**

**Non-
Environmental
(<1%)**

**MSK
(11%)**

**Non-MSK
(9%)**

**MSK
(70%)**

**Non-MSK
(6%)**



Application: U.S. Army Annual Injury Surveillance Report

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	26	231	2,714	153,996	176	3	3,974	80,295	7,123	203,217	126	11,751	463,632	73.9
Other Tissue Damage	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	16,7915	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

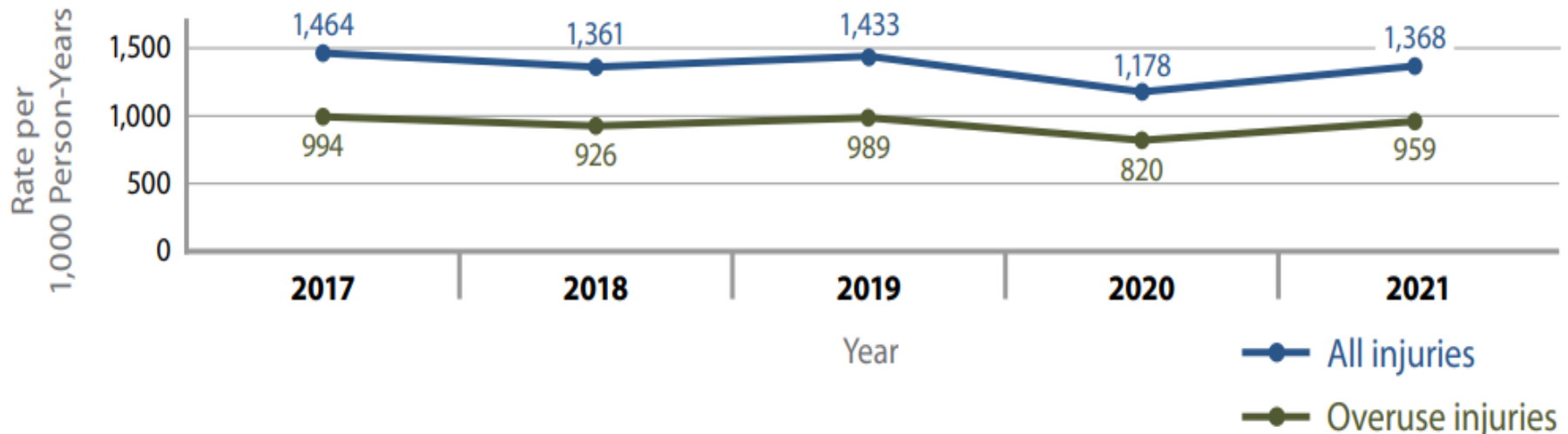


Improving Health and Building Readiness. Anytime, Anywhere — Always



Application: U.S. Army *Health of the Force Report*

- Rates of Active Duty incident injuries, aggregating Taxonomy ICD-10-CM dx codes



Data source: Military Health System Data Repository (MDR)

Injuries defined using the Taxonomy of Injuries; Overuse Injuries were those categorized as cumulative micro-traumatic musculoskeletal



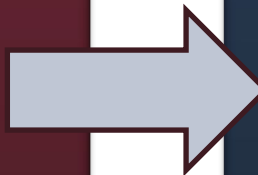
Improving Health and Building Readiness. Anytime, Anywhere — Always



Methodology Update: Gap-in-care Incidence Rule

Original Incidence Rule

- Same ICD-10-CM code within 60 days
- Unintentionally counted some injuries multiple times, due to more codes for the same injury
- Injury rates appeared to increase >30%



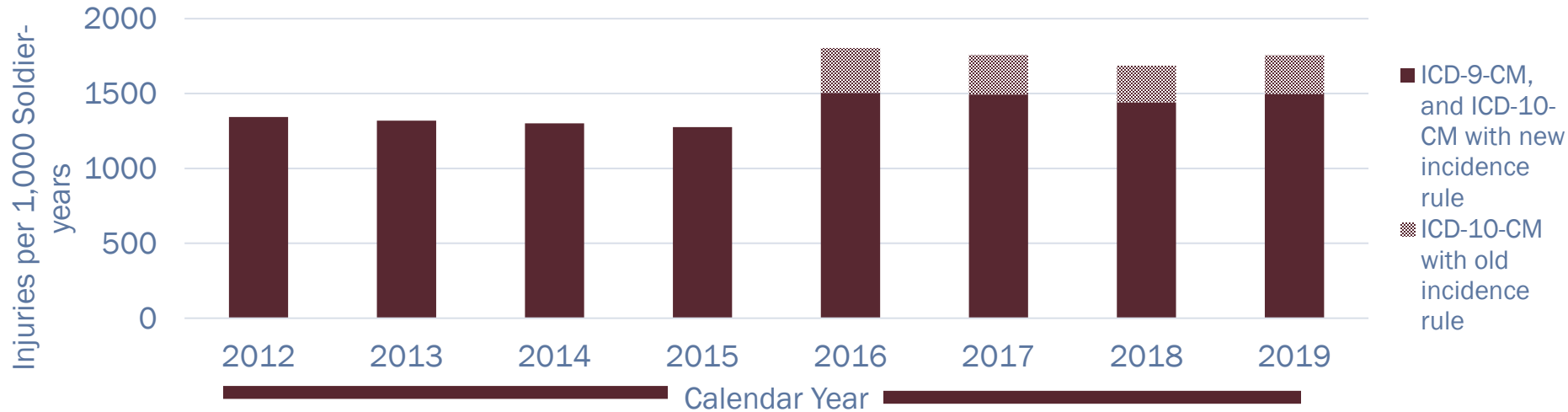
Revised Incidence Rule

- Same injury type and injured body region within 60 days
- Fewer unique injuries identified; allows for more variation in provider coding for the same injury
- Injury rates only increased 13%



Methodology Update: Gap-in-care Incidence Rule

Incident Injury Rates, U.S. Army, 2012–2019



ICD-9-CM

Average rate: 1,310 injuries per 1,000

ICD-10-CM

Average rate: 1,484 injuries per 1,000

Significantly higher ($p < 0.001$)

With a modified injury incidence rule applied, the average injury rate only increased 13%, likely attributable to additional injury types captured using the Taxonomy definition.



Improving Health and Building Readiness. Anytime, Anywhere — Always



Growth of the Taxonomy of Injuries

- Defense Safety Oversight Council Military Injuries Working Group reviewed/approved for use in medical injury analyses for all Services.
- Taxonomy musculoskeletal injury definition published in DoDI 1308.03 *DoD Physical Fitness and Body Fat Programs*, which requires annual U.S. military report of MSK injuries by Service using the Taxonomy of Injuries.
- Taxonomy of Injuries resources have been shared with over 20 organizations from three countries.
- Recognition by the U.S. Centers for Disease Control and Prevention National Center for Health Statistics, Hedegaard et al. 2020:

“It is important to recognize that other categorization schemas have been developed. One such schema is the Taxonomy of Injuries for Public Health Monitoring and Reporting developed by the Army Public Health Center (17). Users should recognize that other categorization schemas exist and consider whether those schemas might better meet their needs or better reflect the clinical setting in which their data were collected.”



Taxonomy of Injuries: Resources Available

- ICD-10-CM code list, SAS[®] code, analysis templates, published technical report, and articles are all available upon request
 - Group mailbox: dha.apg.Pub-Health-A.mbx.injuryprevention@health.mil
- All resources are available here (U.S. Government only):
<https://www.milsuite.mil/book/groups/aphc-injury-taxonomy>
- Files are updated each Fiscal Year in accordance with the World Health Organization (WHO) ICD-10 code updates



Summary

The transition to ICD-10-CM added complexity to injury surveillance.

The Taxonomy of Injuries provides a comprehensive methodology for standardized military medical injury reporting and allows for injury subcategories of focus.

Most injuries in the U.S. Army population are cumulative micro-traumatic musculoskeletal injuries.

The Taxonomy of Injuries is widely recognized and is applied to many surveillance efforts in the Department of Defense.

The Taxonomy, including related surveillance methodology like the incidence rule, is routinely updated and publicly available.



Key References

- U.S. Army Public Health Center. 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/AD1150155>
- U.S. Army Public Health Center. 2022. FY2023 UPDATE: Public Health Information Paper No. 12-01-0717, *A Taxonomy of Injuries for Public Health Monitoring and Reporting*. <https://apps.dtic.mil/sti/pdfs/AD1177880.pdf>
- 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, 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 Center. 2023. *Annual Injury Surveillance Report 2021 Summary*. <https://apps.dtic.mil/sti/trecms/pdf/AD1193240.pdf>, <https://phc.amedd.army.mil/news/Pages/PublicationDetails.aspx?type=Active%20Duty%20Army%20Injury%20Surveillance%20Summary>
- Defense Centers for Public Health - Aberdeen. 2023. *2022 Health of the Force Report*. phc.amedd.army.mil/PeriodicalLibrary/2022-hof-report-web.pdf, <https://phc.amedd.army.mil/topics/campaigns/hof/Pages/Online-Data.aspx>
- Hedegaard H, Johnson RL, Garnett MF, and Thomas KE. 2020. *The 2020 International Classification of Diseases, 10th Revision, Clinical Modification Injury Diagnosis Framework for Categorizing Injuries by Body Region and Nature of Injury*. <https://stacks.cdc.gov/view/cdc/100035>
- WHO. 2004. *ICD-10: International Statistical Classification of Diseases and Related Health Problems: Tenth Revision*. 2nd ed. Geneva, Switzerland: WHO. <https://apps.who.int/iris/handle/10665/42980>
- Department of Defense. 2002. *DoD Military Injury Metrics Working Group White Paper*. Arlington, Virginia: Department of Defense. <https://www.denix.osd.mil/ergoworkinggroup/metrics/unassigned/dod-military-injury-metrics-workinggroup-white-paper/MilitaryInjuryMetricsWhitepaperNov02rev.pdf>



Questions?

