The Impacts of ICD-10-CM on U.S. Army Injury Surveillance

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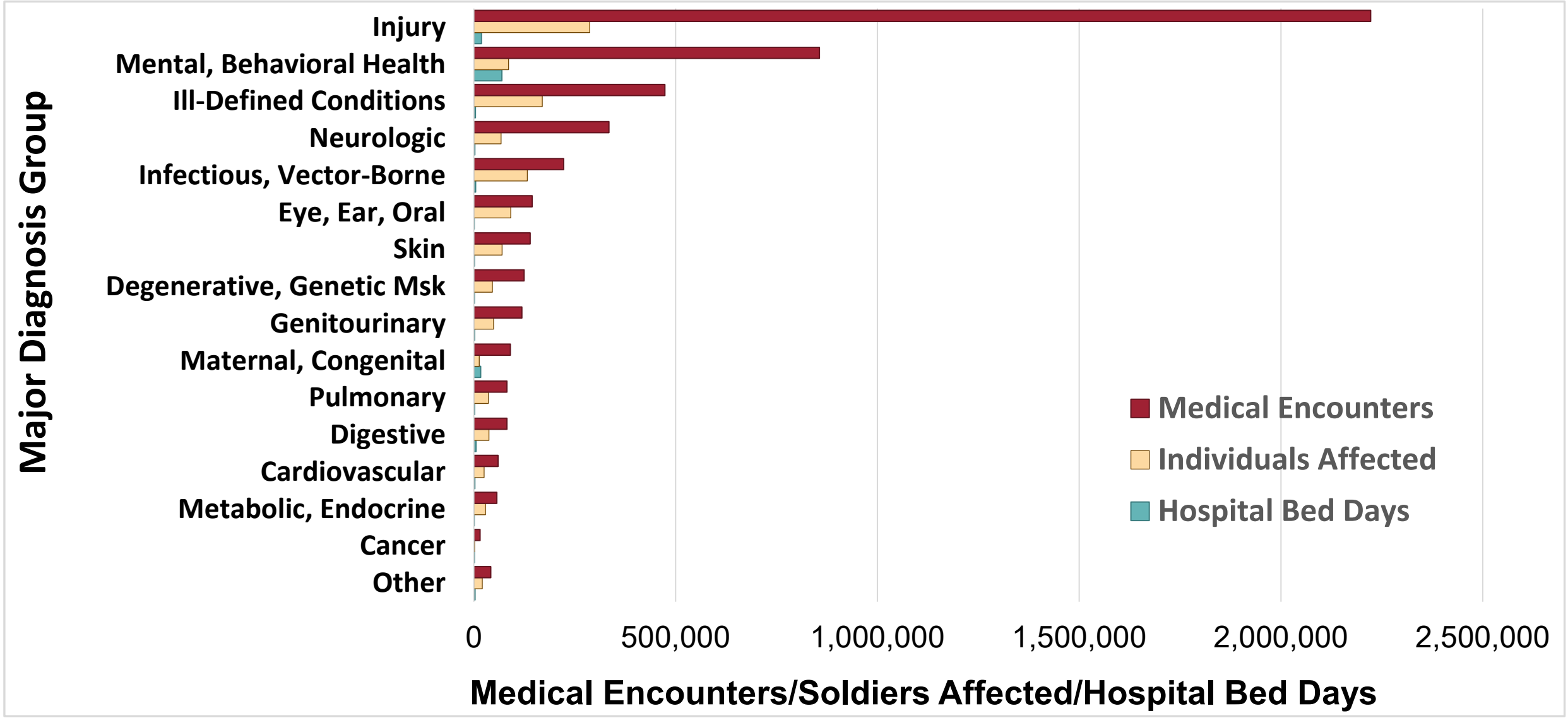
Background: 2019 Burden of Illness and Injury

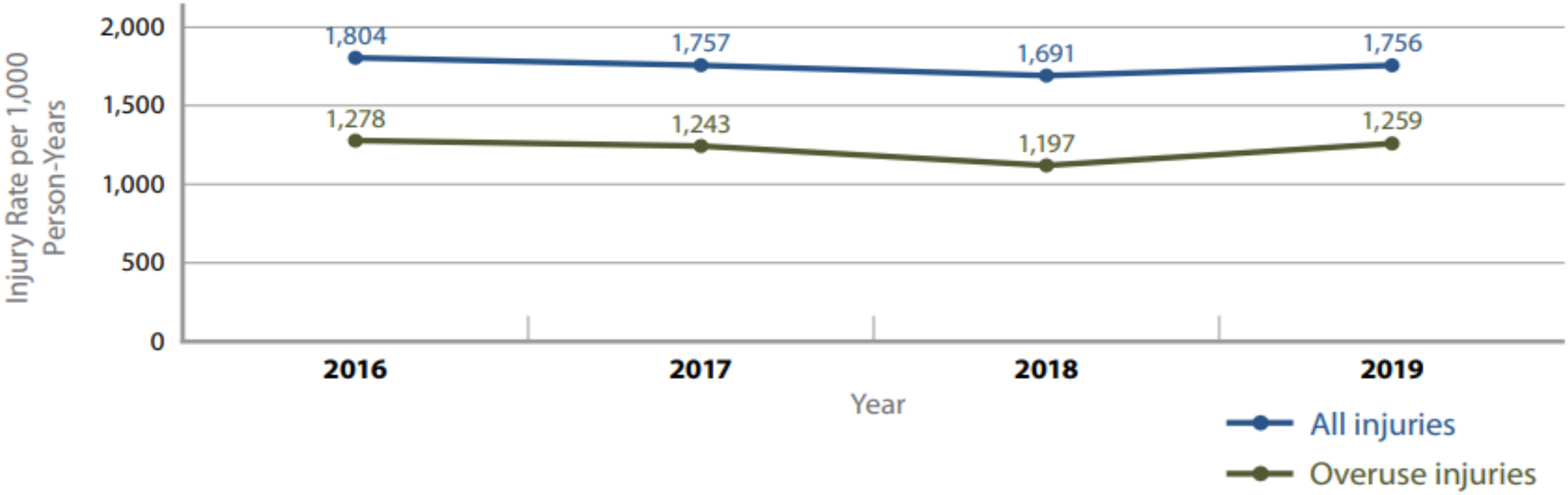


Background: Injury Rate Trends, 2016-2019

Incident injury rates over time are reported in annual surveillance reports, including the Health of the Force Report.

Incidence of Injury per 1,000 Person-Years, AC Soldiers, 2016–2019

The incidence of all new injuries and new "overuse" injuries in 2019 was similar to incidence rates in recent years.



Background: ICD-10-CM Transition

ICD-10-CM was effective 1 October 2015 for all U.S. medical providers, including military.

New structure for diagnosis codes:

- Code distinctions for laterality (right, left)
- Code distinctions for episode of care (initial, follow-up, sequelae)
- Overall more specific descriptions for many codes (e.g., fracture types)

1,554% increase in acute injury diagnosis codes:

- 2,600 ICD-9-CM codes (800-900), >43,000 ICD-10-CM codes (S and T chapters)
- Even greater increase when other injuries are considered (e.g., cumulative microtraumatic overuse injuries)

Mapping of ICD-9-CM codes to ICD-10-CM was not possible.

Background: APHC Injury Taxonomy

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

Army Injury Definition (APHC, 2017)

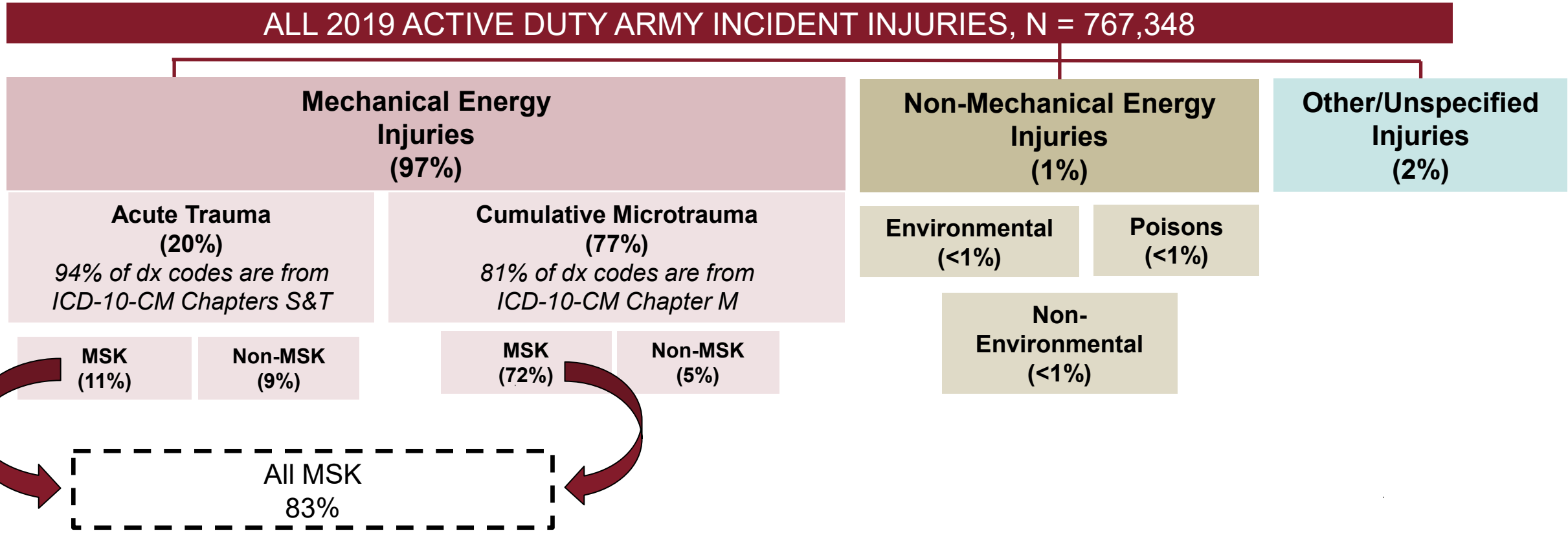
Tissue damage resulting from a transfer of energy to the body from an external source.

Mechanical Energy	Non-Mechanical Energy	Other/Unspecified Energy
MSK or non-MSK	Environmental (heat, cold)	Medical accidents
Acute traumatic or	Poisons, chemicals, toxins	Foreign bodies
Cumulative micro-traumatic	Electrical, burns, radiation	Abuse, violence

- Infections, genetic disorders, and degenerative conditions are excluded.
- This definition was applied to all ICD-10-CM diagnosis codes, each injury code categorized by energy type, injury type, and body region:
  - Includes codes from 13 ICD-10-CM chapters, predominantly M, S, and T.
  - Updated annually with new WHO/CDC codes.

Background: Taxonomy of Injuries

- Allows for comprehensive characterization of all possible injuries in a population.
- Subcategories can be focused on, in context of the broad analysis.



- In 2019, 83% of injuries were to the MSK system, and 72% were cumulative micro-traumatic injuries to the MSK system.

Objective and Methods

Objective

- Quantify differences in U.S. Army injury trends before and after the implementation of ICD-10-CM.

Methods

- Use best methodology and injury definitions available at the time of surveillance under each system.

ICD-9-CM

Annual surveillance reports 2012-2015

DoD Military Injury Working Group list of diagnosis codes (2002)

60-day incidence rule, based on full code

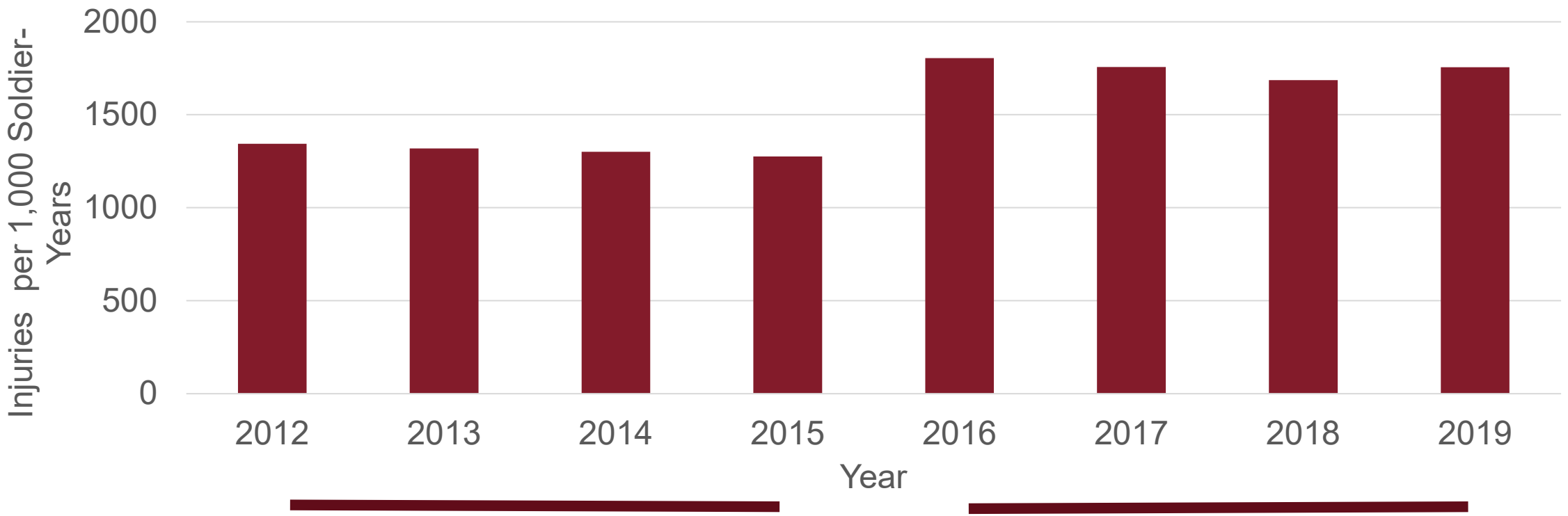
ICD-10-CM

Annual surveillance data 2016-2019

Diagnosis codes meeting APHC Taxonomy injury definition (2017)

60-day incidence rule, based on full code

Rates of Incident Injuries per 1,000 Soldier-years
U.S. Army Active Component Soldiers, 2012–2019

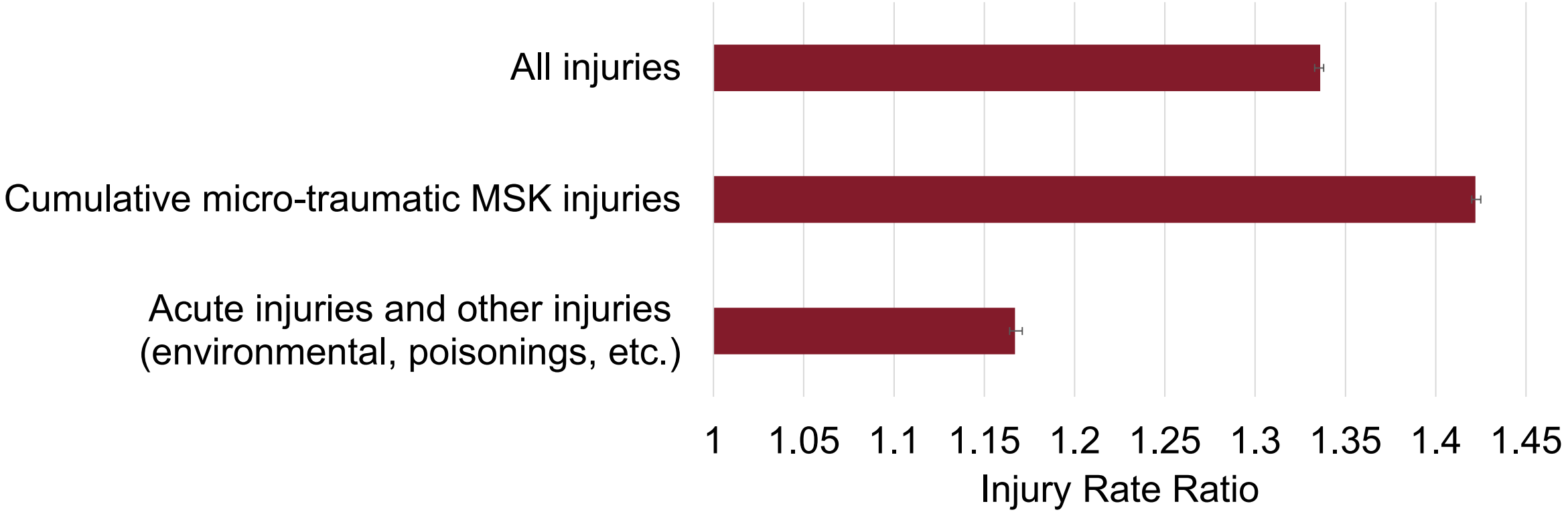


ICD-9-CM
Average rate: 1,310 injuries per 1,000

ICD-10-CM
Average rate: 1,756 injuries per 1,000
Significantly higher ($p<0.001$)

The average injury rate appears to have increased 34% under ICD-10-CM (2016-2019) compared to ICD-9-CM (2012-2015)

Injury Rate Ratios, 2016-2019 (ICD-10-CM) Compared to 2012-2015 (ICD-9-CM)



<u>Cumulative micro-traumatic MSK injury rates increased more than other injury types.</u>

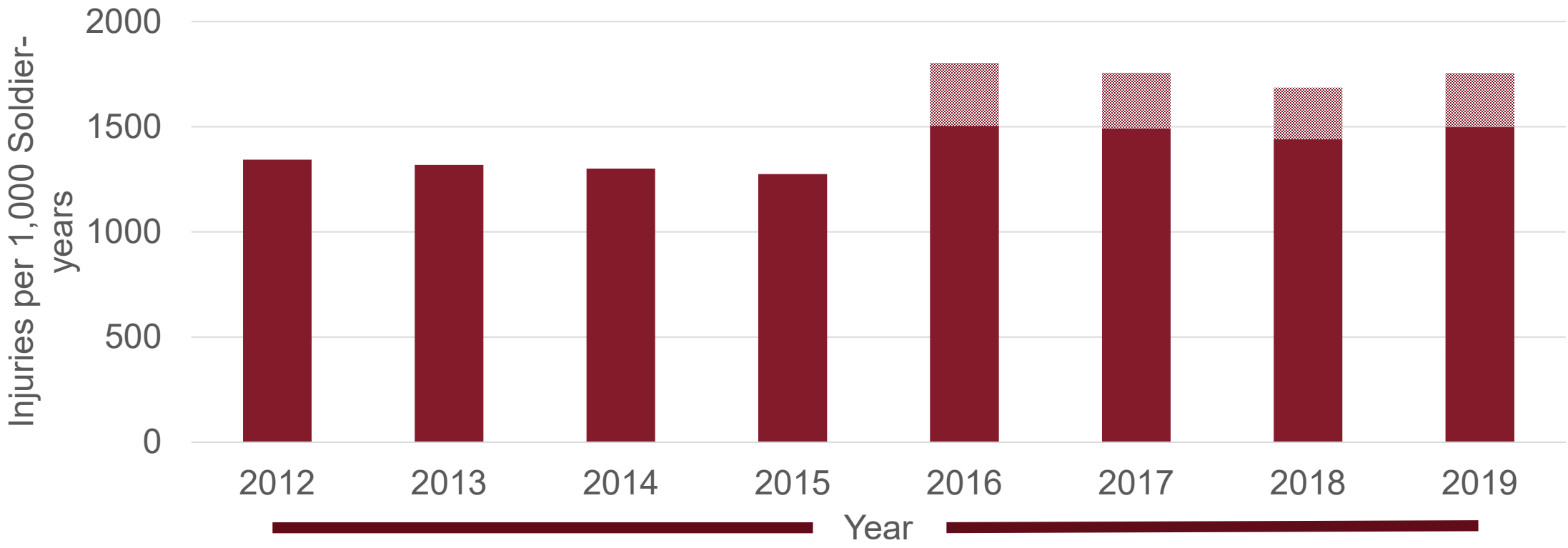
(RR=1.42, 95% CI 1.42-1.43 vs RR=1.17, 95% CI 1.16-1.17)

Revised Methodology: Injury Incidence Rule

- Due to the increased number of available ICD-10 codes compared to ICD-9, detailed data exploration revealed that providers were sometimes assigning multiple ICD-10 diagnosis codes to the same injury:
  - Counted (over-counted) as multiple injuries.
  - ICD-9-CM and initial ICD-10-CM "gap in care" incidence rules counted any encounter with the exact same injury diagnosis code within 60 days as a follow-up encounter to a previous injury.

- New "gap in care" incidence rule is less specific:
  - Counts injuries with the same **injury type** (e.g., fracture, sprain) and **body region** (e.g., leg, back, shoulder) within 60 days as a follow-up injury.
  - Fewer unique injuries identified.
  - Allows for more variation in provider coding for the same injury.

Updated: Rates of Incident Injuries per 1,000 Soldier-years U.S. Army Active Component Soldiers, 2012–2019

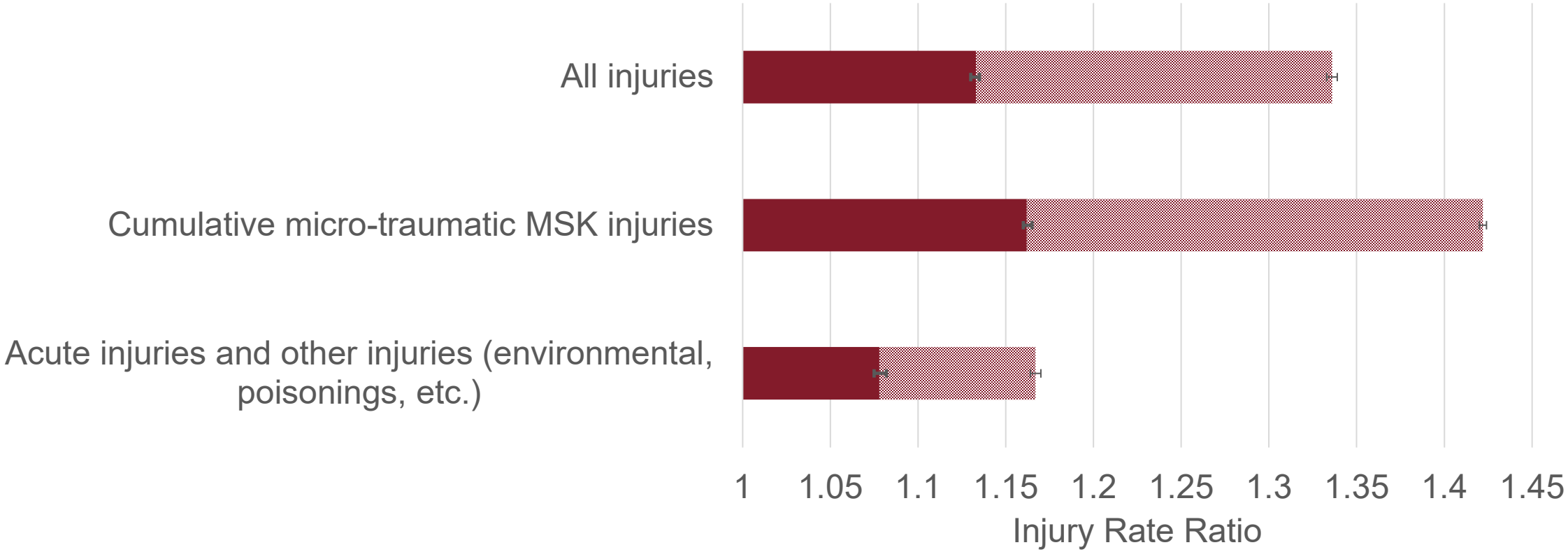


ICD-9-CM
Average rate: 1,310 injuries per 1,000

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 increased 13% under ICD-10-CM (2016-2019) compared to ICD-9-CM (2012-2015).

Updated: Injury Rate Ratios, 2016-2019 (ICD-10-CM) Compared to 2012-2015 (ICD-9-CM)



With an enhanced injury incidence rule applied, cumulative micro-traumatic MSK injury rates still increased more than other injury types.

(RR=1.16, 95% CI 1.16-1.16 vs RR=1.07, 95% CI 1.06-1.07)

Summary

- The transition to ICD-10-CM added complexity to diagnosis coding.
- Enhanced specificity of codes facilitated more comprehensive and reliable standardized military injury reporting (APHC Injury Taxonomy). Useful for other populations.
- Most injuries in the physically active Army population are cumulative micro-traumatic musculoskeletal injuries.
- Injury rates increased 34% with ICD-10-CM and introduction of the Taxonomy:
  - 42% increase for cumulative MSK injuries, 17% for acute and other injuries.
- With enhanced incidence rule, the ICD-10-CM increase was 13%:
  - 16% increase for cumulative MSK injuries, 7% for acute and other injuries.

Key References

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Questions?

Back-up Slides

Code Additions Under ICD-10-CM

Table 1. Codes Added to the Military Injury Definition After ICD-10-CM Implementation

External energy transfer type	ICD-9 codes for Army injury surveillance, *n*	ICD-10 codes for Army injury surveillance, *n*	Increase in the number of codes	Examples of ICD-10 diagnoses added, by chapter
Mechanical—ACT[a]	1,989	8,935	6,946	Chapter G: acute pain due to trauma Chapter M: mallet finger, cauliflower ear Chapter S: face and jaw fractures, physeal fractures
Mechanical—CMT[b]	193	714	521	Chapter G: tarsal tunnel, brachial plexus disorders Chapter M: bursopathies, chondromalacia, disc disorders
Nonmechanical	391	2,302	1,911	Chapter E: hyponatremia Chapter L: miliaria Chapter J: lung tissue damage from toxins Chapter T: poisonings, toxic effects
Other	64	932	868	Chapter T: abuse, medical complications, drowning
Total	2,637	12,883	10,246	

Note: Nonmechanical injuries include environmental injuries (e.g., heat or cold injuries), burns, and poisonings; other injuries include medical complications, foreign bodies, abuse, and loss of essential elements (e.g., drowning or asphyxiation).
[a]ACT injuried are injuries due to mechanical energy transfers.
[b]CMT injuries are overuse injuries due to mechanical energy transfers.
ACT, acute traumatic; CMT, cumulative microtraumatic; ICD-9, International Classification of Diseases, Ninth Revision.

Revised Incidence Rule Example: Different ICD-10-CM Code, Same Categories

Name	Encounter Date	ICD-10-CM primary diagnosis	Taxonomy Injury Type category	Taxonomy Body Region category	Original case definition identification	Revised case definition identification
Soldier X	19-Nov-18	M2391 Unspecified internal derangement of right knee	SPRAIN/ JOINT DAMAGE	KNEE	Incident injury visit	Incident injury visit
Soldier X	6-Dec-18	S83271A Complex tear of lateral meniscus, current injury, right knee, initial encounter	SPRAIN/ JOINT DAMAGE	KNEE	Incident injury visit	Follow-up injury visit
Resulting incident injury count					**2**	**1**

- Previously counted as two injuries, new incidence rule will recognize as only one injury.